



IBM Systems Reference Library

**IBM 9020 System Installation Manual—
Physical Planning**

This manual contains physical information for installing the IBM 9020 System, including floor planning, electrical, environmental, and construction requirements. It lists the physical characteristics of each unit and their effect on installation requirements. Detailed cable and location charts are included, together with illustrations and dimensions of cable connectors used in the system. The material presented is subject to engineering changes. Therefore, it is advisable to consult with IBM Physical Planning to be sure that no changes affecting installation of the system have occurred.

Sixth Edition (June, 1971)

This a major revision of, and obsoletes, ZC22-6878-4. Information is added about the Direct Access Storage Facility (DASF). In addition, this revision corrects minor errors and incorporates latest engineering changes. Changes to the text and small changes to illustrations are indicated by a vertical line to the left of the change. Changed or added illustrations or plan views are denoted by the symbol ● to the right of the caption.

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PREINSTALLATION PLANNING

The successful installation of an IBM 9020 System requires long-range planning and continuous supervision to see that the plans are followed. IBM Installation Planning representatives are available for consultation and planning physical requirements of the installation. The operation should follow a planned schedule so that the computer area will be ready to receive the system when it is delivered. Following is a typical recommended planning schedule:

Twelve months before system delivery:

1. Determine the configuration components required and review the order.
2. Review this physical planning installation manual and schedule an installation planning meeting through the FAA Project Office.
3. Make preliminary layout of the proposed equipment configuration, allowing for any planned future expansion.

Note: Uniform layouts for similar configurations are recommended. Some of the advantages are uniform cable lengths and one-time engineering of equipment locations, cable routing, and sequencing. An advantage will also be evident to the FAA when moving programmers, operators, or maintenance personnel between field locations.

Six months or more before system delivery (allowing sufficient time for review and procurement), air conditioning, power, and machine room design should be completed.

Four months before machine delivery, the final layout should be made and approved by FAA and IBM so that cables can be ordered.

THIS IS A CRITICAL POINT IN THE SCHEDULE. After these cables are ordered, no change should be made in the layout that will affect cable lengths.

One month before system delivery, a survey should be made of unloading and handling conditions at the site to determine specific requirements for moving the components from the delivery platform to the machine room. Also, a final check should be made of power distribution, air conditioning, and location of cable access holes.

Two weeks before system delivery:

1. Delivery of cables to the site and installation will be the responsibility of IBM. Installation of cables between 9020 System and external I/O devices will be the responsibility of the FAA.
2. Maintenance Room furniture, tools, and test equipment will be delivered and the Maintenance Room prepared for use.

One week before machine delivery, all air conditioning equipment should be installed, tested and ready for operation. Electrical facilities, lighting, floor ramps, paintings, plastering, etc. should also be completed at this time.

Every effort should be made to balance the air conditioning system as soon as possible after the 9020 System has been delivered.

BUILDING REQUIREMENTS

When locating the IBM 9020 System, consideration should be given to the following items:

1. Availability and location of proper and adequate power.
2. Space to house air conditioning equipment.
3. Ceiling height, outside wall area, and glass area.
4. Work flow to other areas.
5. Operational considerations in connection with other ATC functions.
6. Floor loading capacity.

The floor area required for this system will be determined by the configuration and allowances for future expansion. Space should be provided in the area of the IOCE's for storage of FLT documentation which will be constantly referenced during maintenance. Space may also be needed for FSPC Modules, CUE Adapters, teletype equipment, storage cabinets, card files, work tables and desks, and printer form stands as well as other punched card equipment.

Such items as permanent master document files, card files, and magnetic tape and disk files require different types of storage areas and should be carefully planned to minimize both the amount of space necessary and the travel time between areas.

A substantial amount of test equipment will be assigned to the installation to maintain the system. Equipment such as tape drives and 1052's may be moved into the Maintenance Room, depending upon the type of work to be done. These areas should be on the same floor level. The Maintenance Room should contain a minimum of 400 square feet of space, be at least 12 feet wide, and be air conditioned to the same specifications as the machine room. Air conditioning should be sized to include the heat load of at least one oscilloscope and magnetic tape unit.

EQUIPMENT LAYOUT

Included in this manual are plan drawings which show the clearances required to allow working room for the field engineer and his equipment. They also show the swinging radii of the component gates and machine covers, caster and cable hole locations. All dimensions are with covers installed. In some cases, clearances may be overlapped as long as the larger clearance is maintained. The gate swing of an auxiliary unit must not interfere with the gate swing of its corresponding control unit.

The units must be located so that the length of connecting cables will not exceed maximum limits.

In the interest of best electrical design, all cable lengths should be kept as short as possible. In the "Cabling" section, the cabling connections between units are illustrated, and the length limitations for the system are given. The limits given are center-to-center lengths between cabling access holes at the floor line; allowances will be necessary for false floor height and cases of indirect cable routing.

The final layout must be reviewed to ensure that cable limitations have not been violated and that proper clearances have been maintained. After the cables have been ordered, any layout changes that affect cable length will require an engineering change and may result in delays. Procurement and installation arrangements for external cables should be made with sufficient lead time to permit the cables to be installed prior to delivery of the computer system.

In laying out a system, the following points should be taken into consideration:

1. There should be visual access between a control unit and at least one of its associated I/O devices.
2. The System Console or Configuration Console is the central unit of operation; this should be considered when planning the layout.
3. The 2540 Card Read Punch and 1403 Printer Model 2 should be convenient to the console operator.
4. The fronts of the magnetic tape units should be visible from the console.
5. The control panels of the 7201 Computing Elements should be visible from the console.
6. Adequate working area is required around the console and magnetic tape units.

IBM will provide a scaled layout of equipment which will be installed in the Maintenance Room to be used as a guide in locating such items as receptacles and lights. The room should contain both 115-volt and 208-volt outlets adequate to repair any unit that can be serviced in the Maintenance Room. Following is a list of typical furniture and fixtures to be located in the Maintenance Room and their dimensions in inches.

<u>Item</u>	<u>Length</u>	<u>Width</u>	<u>Height</u>
Desk	45	34	29
Work bench	72	30	35
Shelf cabinet	36	18	72
Parts cabinet	42	24	87
File cabinet	18	28	60
Bookcase	33	15	42
Study table	60	30	29
Book cart	40	13	31
Card file	17	24	9

A typical Maintenance Room Layout is shown in Figure 1.

FLOOR CONSTRUCTION

The weight of each unit is listed on its specification page. The structure should be reviewed to determine whether the floor is capable of supporting the system weight load as oriented on your layout.

Factors to be considered in determining floor loading are:

1. If more than three machines are placed side by side, no allowance can be taken for side clearance at the ends of the machines.

2. Regardless of the actual service clearances required, clearances used in floor loading computations cannot be more than 30 inches in any one direction from the machine.

3. Twenty pounds for each square foot of service area used in calculation must be applied as live-load in floor loading computations.

4. If a false or raised floor is used, 10 pounds for each square foot of total area used in calculation must be applied as false floor load in the floor loading computation.

5. Building floors are normally rated either at 50 pounds per square foot with an additional allowance for partitions or at 75 pounds per square foot including partition allowance.

A raised floor will accomplish the following major objectives:

1. Allow future layout change with minimum reconstruction cost.

2. Protect the interconnecting cables and power receptacles.

3. Provide personnel safety.

4. Permit the space between the two floors to be used to supply air to the equipment and/or area.

A raised floor can be constructed of steel, aluminum, or fire-resistant wood. The two general floor types are shown in Figures 2 and 3.

IBM recommends:

1. There be no metal exposed to the walking surface where a raised floor using metal is used. Such exposure is considered an electrical safety hazard. It can also cause static discharge problems.

2. The raised floor height should be at least 12 inches.

3. The vertical clearance between the under side of the raised floor structure and any obstruction such as water piping, conduits, air-conditioning ducts, and additional floor supports must not be less than 4-1/2 inches to properly accommodate the routing of IBM cables and connectors.

4. When a raised floor panel is cut for cable entry, air register, etc., additional panel support may be required to restore the structural integrity of the panel.

5. Protective covering should be used to prevent damage to floor tiles, carpets, and panels while equipment is being moved into or relocated within the installation.

Floor covering material can contribute to the buildup of high static electrical charges as a result of the motion of people, carts, furniture, etc. in contact with the floor material. Abrupt discharge of these static charges to metallic surfaces or other people cause discomfort to personnel and may cause malfunction of electronic equipment.

This static buildup and discharge can be minimized by:

1. Providing a conductive path to ground from metallic raised floor structure including the metal panels.

2. The maximum resistance for floor tile or other floor surface material should be 2×10^{10} ohms, measured between floor surface and building (or applicable ground reference). The procedure outlined in NFPA No. 56, Chapter 25, Section 2522, should be used. Floor material with a lower resistance will further decrease static buildup and discharge. The minimum resistance should not be less than 5×10^5 ohms. (Note: Special attention must be given to floor panels constructed with metal facings and nonconductive core to ensure that the resistance requirements are met.)

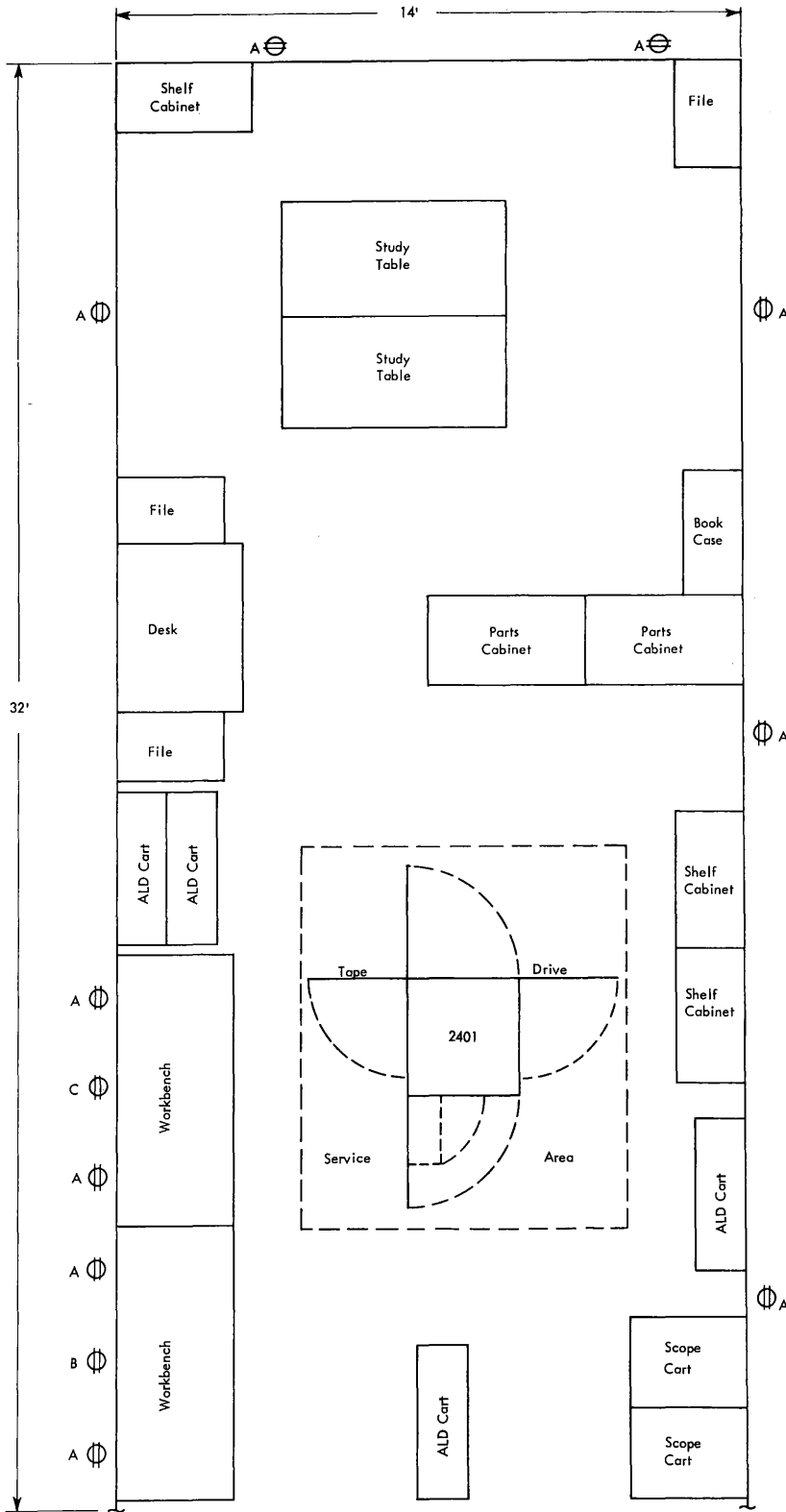
3. Maintain the room humidity within control limits of "Design Criteria" as defined under "Temperature and Humidity Design Criteria."

If carpet floor coverings are used, they should be of the variety marketed by carpet manufacturers as "anti-static." Two types are generally available: those with the anti-static properties manufactured into the material and those treated later with anti-static agents. Materials, depending on additives, may have short effective anti-static life without frequent retreatment of the carpet. Maintenance of all anti-static floor coverings (carpet, tile, etc.) should be in agreement with the individual supplier's recommendations.

ACOUSTICAL TREATMENT

Acoustical treatment is recommended for a more comfortable operation of the system. The following is presented as general information.

The principal noise sources in the system are the mechanical units such as card punch machines,



- A: 115V Duplex Convenience Outlet
- B: 208V 1Ø Outlet (P & S 5661 or equivalent)
- C: 208V 3Ø Outlet (P & S 7250 or equivalent)

Figure 1. Typical Maintenance Room

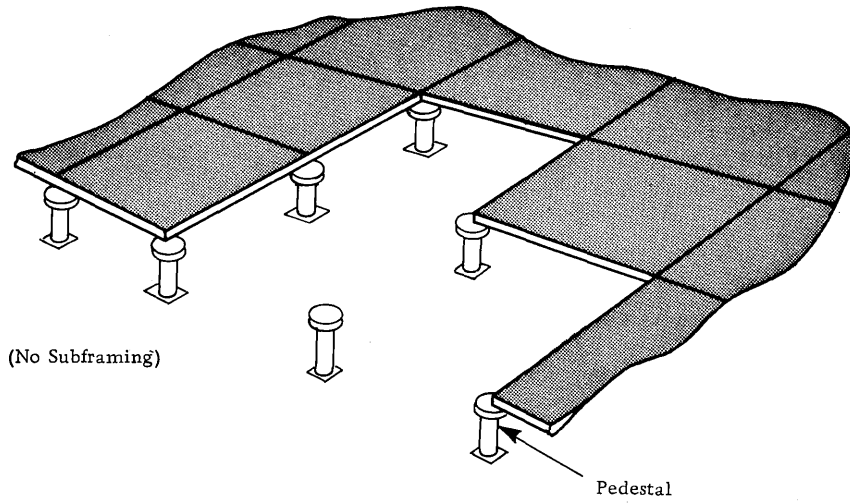


Figure 2. Pedestal-Supported Type Floor

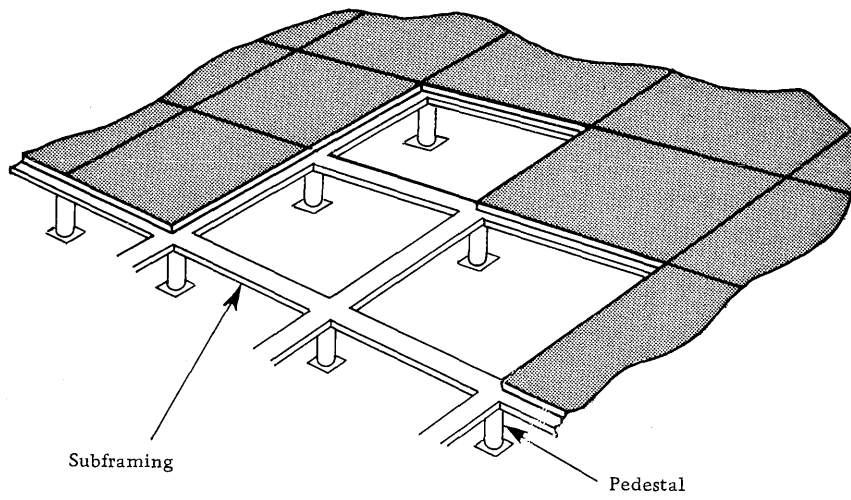


Figure 3. Stringer-Supported Type Floor

printers, reader, blowers, etc. The floor construction should be of a nature that will retard vibration to other areas. The walls should be constructed to prevent the transmission of noise to the adjacent area. It is important that these walls be constructed from the floor to the base ceiling and properly sealed. The doors must also have a good seal. The use of absorptive materials will reduce the average sound pressure level throughout an installation. The greatest sound reduction will be obtained by properly treating the ceiling. Best results can be expected from a dropped porous ceiling. If overhead duct work exists, it may be possible that noise generated in the computer room will be transmitted to other rooms unless proper precautions are taken. For large rooms, the floor is the second most effective area on which to apply absorptive materials. Wall surfaces should be made soft to prevent reverberations.

LIGHTING

A minimum average illumination of 40 foot-candles measured 30 inches above the floor should be maintained in the computer room area.

Direct sunlight should be avoided, since lower levels of illumination are needed to observe the various console and signal lamps. The lights for general illumination should be sectionally controlled by switches so that a portion of the lighting can be turned off as desired. Lights should not be powered from the computer power panel. See "Power Requirements" for details.

VIBRATION

It may be necessary to install the 9020 System in an area that is subject to minor vibrations. The intensity of vibrations in an office environment will not affect the reliable operation of the 9020 System.

STORAGE OF TAPE AND DISK PACKS

Storage facilities for frequent or infrequent usage of magnetic tape should be maintained within the following limits:

- IBM Heavy-duty Magnetic Tape
 - Relative Humidity: 20% to 80%
 - Temperature: 40° to 90°F
- Mylar* Tape-Long-term Storage
 - Relative Humidity: 20% to 80%
 - Temperature: 50° to 90°F

Tape exposed to atmospheric conditions outside the preceding limits will require reconditioning

*Trademark of E. I. du Pont de Nemours & Co. (Inc.)

before it is used. This is accomplished by permitting the tape to remain in the correct operating environment for a length of time equal to the storage time (up to maximum reconditioning period of 24 hours).

The tape should be stored in a dustproof container in a vertical position and should never come in contact with magnetic material at any time. Magnetic fields of greater than 50-oersted intensity can cause loss of information or introduction of noise.

When shipping magnetic tape, each reel should be sealed in a plastic bag and packed individually in stiff cardboard shipping boxes. These may be obtained from IBM.

The disk pack is a precision instrument. Storage facilities should be maintained within the following limits:

- Disk Pack
 - Short-term Storage:
 - Temperature: 60° to 90°F
 - Relative Humidity: 10% to 80%
 - Long-term Storage:
 - Temperature 40° to 150°F

Disk packs must be conditioned to the machine operating environment before use. This is accomplished by permitting the device to remain in the correct operating environment for a length of time equal to the time out of the operating environment (up to a maximum conditioning period of 2 hours).

These devices are equipped with dustproof covers which should be left in place, except when installed in the file. Storage should be in fire-resistant cabinets away from magnetic fields. Magnetic fields of greater than 50 oersteds can cause loss of information or introduction of noise.

FURNITURE

Furniture can provide a potential source of high static charge. Precautions should be taken to ensure that seat covers, etc., are made of materials resistant to static buildup. Many plastics will permit the buildup of high static charges. Cloth covered chairs are normally less susceptible to generating static charges. Rubber or other insulating type of feet for equipment should be avoided. If casters, ball bearings, etc., are used, they should be lubricated with a graphite or other conductive grease. Rubber tread casters, wheels, etc., should contain conductive material.

The resistance of furniture hardware which touches the floor (such as casters, feet, etc.) should be below 10^9 ohms from metal in the furniture frame to a metal test surface on which the unloaded furniture sample is place.

The components of the machines are internally cooled by air circulated by blowers in most units. The air intake varies slightly from one unit to another, but generally, is through the bottom and also through louvers along the bottom edge. One-inch dust filters are included at each air input. Warm air exhausts from the top of each unit.

To determine the air conditioning capacity necessary for an installation, the following factors must be considered.

Machine heat dissipation, personnel, latent load, fresh air introduction, infiltration of heat through outer walls, ceiling, floors, door openings, partitions, glass wall area, and possible reheat.

A separate air conditioning system is recommended for a data processing installation. Because of the amount of heat dissipated while this machine is in operation, it is necessary for the air conditioning system to maintain a cooling cycle year-round.

Machine heat dissipation loads are given on the specification page for each unit.

The air conditioning units should not be powered from the computer room power service panel. The riser for the air conditioning system and for the computer room power panel should not be in the same conduit.

TEMPERATURE AND HUMIDITY DESIGN CRITERIA

All components of a 9020 System have been designed for optimum operation at 75°F and 50% relative humidity at altitudes up to 7,000 feet. This design point provides for the largest buffer in terms of system available time. If the air conditioning system fails or malfunctions, the computer will be able to operate until it reaches its specified limits. This increases the possibility of effecting air conditioning repairs prior to computer shutdown. The design point has also been proven to be a generally acceptable personnel comfort level.

In certain geographical areas, a design point of 50% relative humidity is not practical and a value of 45% should be used.

Deviation from the recommended design point, in either direction, if maintained for long periods, will expose the system to malfunction from external conditions. High relative humidity levels may cause improper feeding of cards and paper, as well as operator discomfort and condensation on windows and walls when outside temperatures fall below room dew point. Low relative humidity levels alone will not cause static

discharge. However, in combination with certain types of floor construction, floor coverings, furniture, etc., static charges which are generated by moving people, carts, furniture, paper, etc., will be more readily stored on one or more of the objects. These charges may be high enough when discharged by contact with another person or object to be quite objectionable to operating personnel and can cause intermittent interference with operation of computers or other electronic equipment. Since deviations of 24 hours or longer will permit the floors, desks, furniture, cards, tape, and paper to reach steady-state condition, it is recommended that the air conditioning system be automatically controlled and provided with a high/low alarm or a continuously recording device with the appropriate limits marked. In most areas, it will be necessary to add moisture to the room air to meet the design criteria.

Under normal operation, the design conditions can be controlled within limits of $\pm 2^\circ\text{F}$ and $\pm 5\%$ relative humidity with standard air conditioning controls.

MACHINE OPERATING LIMITS

Some individual units may require special consideration and have more or less restrictive requirements. See unit specification pages for individual requirements.

	<u>Machine Operating</u>	<u>Machine Nonoperating</u>	<u>Design Criteria</u>
Temperature	60° to 90°F	50° to 110°F	75°F
Relative Humidity	20 to 80%	8 to 80%	50%
Max Wet Bulb	78° F	80°F	---

THE AIR ENTERING THE MACHINE MUST BE AT THE CONDITIONS FOR MACHINE OPERATION BEFORE MACHINE POWER IS TURNED ON.

Under no condition of operation may the machine input air and room air exceed 90°F. This is a maximum operating temperature limit and should not be considered a design condition.

When conditioned air is supplied to the base of any unit by a duct or underfloor air supply, the relative humidity of the air entering a machine unit should not be greater than 80%. This specification is an absolute maximum. Air temperature in this duct or underfloor air supply should be kept above room dew point temperature to prevent condensation within or on the machines.

When it is necessary to add moisture to the system for control of low relative humidity, one of the following methods should be used:

1. Steam grid or jets.
2. Steam cup.
3. Water atomizers.

Note: In localities where the outside temperature drops below freezing, condensation will form on single glazed window panes. Also, if outside temperatures are considerably below freezing, the outside walls of the building should be waterproofed or vapor sealed on the inside, or in time, structural damage will occur in outside walls.

AIR FILTRATION

A high efficiency filter rated according to the following specifications should be installed to filter all air supplied to the computer room.

Mechanical and electrostatic air cleaners operate on two entirely different principles. Therefore, it is necessary to specify a different efficiency rating for each type.

Mechanical Air Filter: This type must be rated at a minimum of 20% efficient by the Bureau of Standards discoloration test using atmospheric dust.

This rating applies to a clean filter and must be maintained throughout the life of the filter.

Electrostatic Plate Type Filter: This type must be rated at a minimum of 85-90% efficient by the Bureau of Standard discoloration test using atmospheric dust. Electrostatic air cleaners are designed to operate at 85-90% efficient at a given face velocity. As you increase the face velocity through an electrostatic filter, its efficiency decreases. Therefore, an electrostatic filter operated at increased face velocities or below 85% efficiency would allow a greater number of particles charged by the ionizing wires to pass through the plate section and enter the room. This would increase what is known as space charge. As the space charge increases, a greater voltage differential occurs between the positive charged particles and the negative surfaces in the room. This causes dust to accumulate rapidly on all surfaces, defeating the purpose of a high efficiency filter.

Special air filtration is necessary only where installations are exposed to corrosive gases, salt air or unusual dirt or dust conditions.

AIR DISTRIBUTION AND TYPES OF SYSTEMS

Even though the heat loads of the computer system are considerably reduced from previous systems, the heat load is concentrated in a relatively small area. For this reason careful attention should be given to the method of air distribution to eliminate areas of excessive air motion.

Several different types of air conditioning systems can be designed to satisfy the temperature and humidity requirements. The following are the most common types of systems in use with a brief description of each. In no case should these descriptions be considered complete, and the use of an experienced air conditioning design engineer is strongly recommended. All local building codes should be checked including the electrical code, as some localities will not permit the use of the raised floor as an air conditioning plenum as described in the following.

SINGLE DUCT -- OVERHEAD SYSTEM

In this system the entire heat load of the room including the heat generated by the computer system, is absorbed by the air supplied to the computer room. The air is generally supplied from either an overhead duct and diffuser system or by means of a ceiling plenum.

The return air to the air conditioning unit is taken from either ceiling return registers located above the heat producing units, or a fixed pattern of returns both in the ceiling or on the walls around the periphery of the room.

The temperature control system would consist of temperature and humidity controls placed in a representative location within the machine room. A temperature and humidity recorder (discussed in detail later) would be mounted adjacent to the controls to monitor the room conditions.

TWO DUCT -- TWO AIR-CONDITIONING-UNIT SYSTEM

One air handling unit with separate controls supplies conditioned and filtered air to the air inlets on the machines. This air may be supplied to the machines through ducts laid beneath the raised floor or fed to a floor plenum chamber with holes through the floor located under the machines. Each machine is supplied with a quantity of air equal to its internal fan capacity. This air absorbs the heat generated by the machine and is discharged

from the top of the units into the room. Relative humidity of the air supplied to the units should be maintained below 80% and temperatures should be controlled to prevent condensation on or within the units.

To insure a controlled relative humidity, it will be necessary to provide for a reheat system to operate in conjunction with the cooling unit. This unit is basically a sensible cooling operation.

The second air handling unit supplies air directly to the room through a separate duct system and should be large enough to absorb the remaining heat load in the computer area. It should be capable of maintaining room temperature and relative humidity as specified in this manual and give complete year-round air conditioning, ventilation and heating.

This system should use predominantly recirculated air with a set minimum for introduction of fresh air for personnel. This minimum fresh air introduction will enable the machine area to be pressurized so that air leakage is always outward. This will help prevent dust entry from adjacent areas.

TWO DUCT -- SINGLE AIR-CONDITIONING-UNIT SYSTEM

This system is similar to the preceding system except in one respect: this system uses only one air handling unit to supply both air circuits. The air is filtered and the temperature and humidity regulated before it is delivered to the room and the individual units through separate ducts.

A split coil with reheat and/or face and bypass dampers can be used to regulate the air to be supplied directly to the individual unit. Relative humidity of this air should be maintained below 80% and temperature should be controlled to prevent condensation on or with the units.

The temperature control system for the air being supplied to the overhead system would be the same as for the single duct system. In addition, a control system would have to be installed in the discharge duct to regulate the air supply to the underfloor system. The controls would operate either the separate cooling and reheat coils or the face and bypass dampers to maintain the required conditions. A remote reading temperature and humidity recorder should be installed with the sensing elements in the discharge air to the underfloor system to monitor the air entering the machine units.

UNDERFLOOR SYSTEM

In this system the space between the regular building floor and the raised floor is used as a supply plenum. All air is discharged into the room through floor registers around the perimeter of the area. The air is returned to the air conditioning unit by means of ceiling registers located directly above the machine units.

A higher return temperature can be used in this system without affecting the design conditions of the over-all room. The design of this system takes into consideration a heat transfer factor through the metal floor. This affords a certain amount of reheat to control R. H. of air before it enters the room.

The temperature control system would consist of the same controls as described for the single duct system. In addition, the system must have controls of air temperature in the underfloor supply system to prevent an uncomfortably cold floor. Air entering the machine through the cable holes must be within stated machine specifications.

The air conditioning load should not be supplied from the same transformer that supplies the computer system.

TEMPERATURE AND HUMIDITY RECORDING INSTRUMENTS

It is recommended that all customers install temperature and humidity recording instruments. Recording instruments are necessary to provide a continuous record of temperature and humidity conditions in the computer area. Also, if the air conditioning requirements are not met, a record is available to indicate the extent and duration of the undesirable condition and indicate whether a drying-

out period is required. This may, in some cases, save computer shut-down time.

The record of temperature and humidity can be used:

1. To assure the customer that his air conditioning installation is continuously performing its job properly. Installation errors and loss of efficiency due to malfunction of some part of the air conditioning system can be quickly detected.
2. To determine if a mandatory drying-out period is necessary when humidity limitations are exceeded. The drying-out may be necessary if the excess humidity occurs either during periods of actual machine operation or during periods when the machine is shut down and unattended. The extent and duration of the excess humidity is used to determine the duration of the drying-out period.
3. To determine if the environment in the area meets the requirements for the machine.

A visual or audible signal device should be incorporated into the instrument. Its purpose is to provide a visual or audible indication that the temperature or humidity conditions in the computer area are nearing the maximum limitations stated in this manual. Action can then be taken by the customer's personnel to correct this situation.

Direct-reading instruments with a 7-day electric-drive chart should be used for all installations to monitor the ambient room conditions. The recorder should be located at a representative location within the room and adjacent to the control devices.

For use in monitoring the underfloor air conditions, a remote indicating instrument is recommended. This should also have a 7-day electric-drive chart and can be the wet and dry bulb or electronic type if direct reading is not available. The recording instrument can be located on the wall in the room or in the mechanical equipment room or any other location convenient to the building engineer.

SAFETY AND FIRE PRECAUTIONS

Safety is a vital factor in planning for a large computer installation. This consideration is reflected in the choice of a computer location, building materials used, fire prevention equipment, air conditioning and electrical systems, and personnel training.

Locating a Computer Area

1. The computer area should be in a noncombustible or fire resistive building or room.
2. The computer room should not be located above, below, or adjacent to areas where inflammable or explosive materials or gases are stored, manufactured, or processed. If the customer must locate near such an area, he should take precautions to safeguard the area.

Structural Safety

1. Walls enclosing a computer area should be of noncombustible materials wherever possible. These walls should extend from floor to ceiling. If walls are made of combustible material they should be protected as prescribed by code.
2. If a computer area has one or more outside walls adjacent to a building that is susceptible to fire:
 - a. Installation of shatterproof windows in the computer room would improve the safety of personnel and equipment from flying debris and water damage.
 - b. Sprinklers could be installed externally over the windows to protect them with a blanket of water in case of fire in the adjacent area.
 - c. Seal up the windows with masonry.
3. Where a false (or hung) ceiling is to be added it should be of noncombustible or fire-resistant material. All ducts and insulating materials should be noncombustible and nondusting. If combustible materials are used in the space between the regular ceiling and the false ceiling, proper protection should be provided.
4. A raised floor, installed over the regular floor, should be constructed of noncombustible or fire-retardant materials. If the structural floor is of combustible material, it should be properly protected from the ceiling below, preferably by water sprinklers. (Note: Before the computer is installed, the space between the raised and the structural floors

should be cleared of debris. Also, this space should be periodically checked after installation, to keep it free of accumulated dust and possible debris.)

5. The roof or floor above the computer and tape storage areas should be a watertight slab. If practical, the walls of the room should be sealed to the slab in such a manner as to prevent water entering from above.

Type of Fire Prevention Equipment in a Computer Area

1. An "early warning" detection system should be installed to protect the computer and tape storage areas. This detection system should actuate an audible alarm.
2. Portable carbon dioxide fire extinguishers of suitable size--15 pounds and number should be provided in the machine room. Carbon dioxide is the recommended nonwetting agent for electrical equipment (Class C Hazard). Extinguishers should be readily accessible to individuals in the area and extinguisher locations should be visibly marked overhead. Local codes govern the frequency of inspecting the cylinders.
3. Where portable carbon dioxide cylinders are used as the primary extinguishing agent, it is advisable to locate a standpipe or hose unit within effective range of the computer area as a secondary extinguishing agent for a Class A Hazard.
4. In some cases, local building codes and ordinances, or insurance regulations, require automatic water sprinklers. Pre-action sprinkler systems should be considered if they conform to such codes and ordinances. High temperatures actuate heat-sensitive devices, which open a control valve. This valve, located outside the room, admits water into the sprinkler piping before the sprinkler heads operate. This type of system minimizes the possibility of accidental discharge of water because of failure or mechanical breakage of the automatic sprinkler heads.

Data Storage

1. Any data stored in the computer room -- whether in the form of magnetic tape, disk packs, paper tape, cards, or paper forms -- should be in enclosed metal cabinets or fire-resistant containers.

2. For security purposes or for maintaining duplicates of master records, a separate storage room should be used. This room should be of fire-resistant material and contain the same type of fire prevention equipment as described in "Type of Fire Prevention Equipment in a Computer Area."

Supporting Facilities

Air Conditioning Systems

1. In most installations, the computer area is controlled by a completely separate air conditioning system. In these cases, an emergency power-off switch should be placed in a convenient location, preferably near the operating console or next to the main exit door. Fusible-link dampers should be located at fire walls and at places as prescribed by local code.

2. Where the regular building air conditioning system is used, with supplemental units in the computer area, the supplemental units would then be handled as stated above. The regular building air conditioning system should have an alarm in the regular building maintenance area to alert the maintenance personnel of an emergency. Air ducts serving other areas but passing through the computer room should contain fusible-link dampers at each wall of the computer room.

3. The air filters used as part of the air conditioning system should contain noncombustible material.

Electric Systems

1. The main line breaker for the computer equipment should be pushbutton operated. This pushbutton control should be in a convenient location, preferably near the operating console and next to the main exit door. A light should be installed to indicate when power is on.

2. Some local codes require a special battery operated lighting unit that will automatically illuminate an area in case of power or lighting circuit failure. These units are wired to and controlled by the lighting circuit. Even when not required by code it is recommended that such lights be installed.

3. Protection against lightning surges can be obtained by installing lightning arresters on the

secondary power source, especially when:

- a. The utility company installs lightning protectors on the primary power source.
- b. Primary power is supplied by an overhead power service.

4. If power receptacles are located under the false floor which could be susceptible to excessive water, waterproof connectors should be used. Proper drainage will guard against flooding or trapping water under the false floor in the computer room. This is important in certain new buildings where the regular floor is depressed and the raised surface is on the level of the adjacent areas.

Preplanning to Continue Operation in an Emergency

1. The continuous operation of a customer's computer is dependent on information stored on cards, tape, etc. Duplicate or master records should be maintained from which the necessary information can be taken to resume operation.

2. A reliable stand-by power source should be installed to allow continued Air Traffic Control in cases of commercial power failure.

General Precautions and Personnel Training

1. The computer room, air conditioning equipment room, and data storage room should be monitored.

2. Steampipes and waterpipes running above the false ceiling should be inspected to guard against possible damage due to accidental breakage, leakage, or condensation.

3. Emergency exit doors should be located in the computer area. The number of doors depends on the size and location of the area.

4. Personnel should be trained in emergency measures such as:

- a. Proper method and sequence of shutting off all electrical power.
- b. Shutting off air conditioning system.
- c. Handling fire extinguishers in the approved manner.
- d. Properly operating a small-diameter fire hose.
- e. Evacuating records.
- f. Evacuating personnel.
- g. Calling fire company.
- h. First aid.
- i. Location of shut-off valves for steam lines, water pipes, sprinkler systems, etc.

The 9020 System is designed to operate from a 208-volt, three-phase, four-wire, 60-Hertz supply. The four wires consist of three phase wires and one equipment ground. The line-to-line voltage tolerances must be maintained within plus or minus 10 percent, measured at the receptacles when the system is operating. The line frequency must be maintained at 60 Hertz plus or minus 2 percent (except 2701, plus or minus 1 cycle).

A separate feeder connected to the main building distribution panel should provide a suitable supply. However, in cases where the building power fluctuates in excess of plus or minus 10 percent, a separate transformer or motor alternator may be necessary. If a transformer is used, it should be fed from the highest primary source readily available. The feeder for the computer system should feed no other loads and should be protected by a main line circuit breaker. (The "Safety and Fire Precautions" section carries additional pertinent details.)

Note: Considering the desired reliability of the 9020 System, it might be advisable to group branch circuits in separate load centers, each fed from the main line circuit breaker. Thus, total outage of the system could be avoided in the case of individual branch circuit CB failure.

The individual branch circuits on the distribution panel should be protected by suitable circuit breakers properly derated according to manufacturer specifications. Three-phase thermomagnetic circuit

breakers are used in all of the main 9020 units, except the 2701 and, 7265-03 which are single phase. The ratings are:

- 2314 Storage Control Unit: 40 amps
- 2701 Data Adapter Unit: 15 amps
- 2803 Tape Control Model 1: 50 amps
- 2821 Control Unit Model 1/2: 30 amps
- 7201-01 Computing Element: 30 amps
- 7201-02 Computing Element: 50 amps
- 7231-02 I/O Control Element: 30 amps
- 7251-03/04/08 Storage Element: 30 amps
- 7251-09 Storage Element: 40 amps
- 7265-02 Systems Control Console: 20 amps
- 7265-03 Configuration Console: 25 amps (two)
- 7289-02 Peripheral Adapter Module: 50 amps
- 7289-03 Flight Strip Printer Control Module: 40 amps
- 7289-04 Display Element: 40 amps

The power distribution panel should be located in an unobstructed, well-lighted area in the computer room. Branch circuits should terminate under the raised floor as close as possible to the machine they supply. However, they should not be located directly beneath the cabling access holes because of interference with the installation of the signal cabling. The receptacle or connector should in all cases be within 10 feet of the cable access hole and be under a freely removable cover.

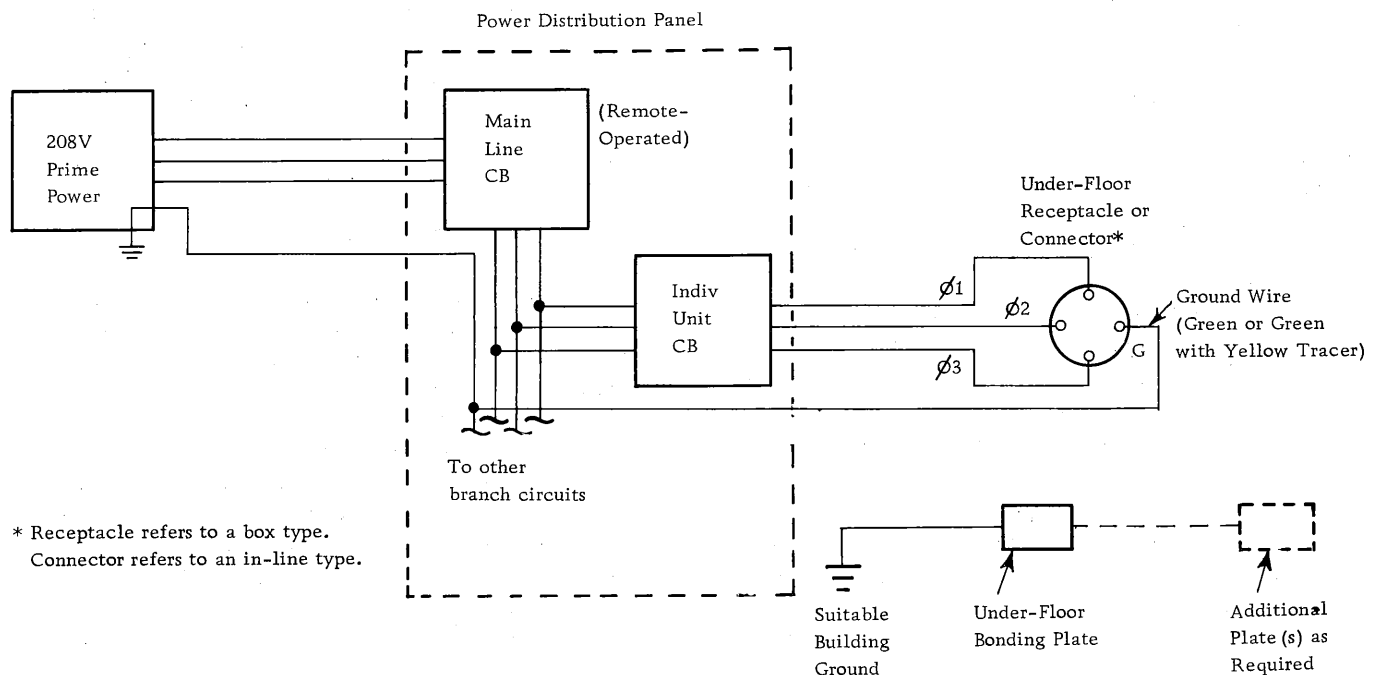


Figure 4. Prime Power Distribution

PHASE ROTATION

The three-phase power receptacles used with this system must be wired for correct phase rotation. Looking at the face of the receptacle and running counterclockwise from the ground pin, the sequencing will be phase 1, phase 2, and phase 3. See Figure 4.

CONVENIENCE OUTLETS

A suitable number of convenience outlets should be installed in the Computer Room and Maintenance Room for use by building maintenance personnel, porter service, field engineers, etc. Recommendations for the Maintenance Room are shown in Figure 1. Convenience outlets should be on the lighting or other building circuits, not on the computer power panel or riser.

LIGHTNING PROTECTION

It is recommended that the customer install lightning protection on his secondary power source when:

1. The utility company installs lightning protectors on the primary.
2. Primary power is supplied by an overhead power service.
3. The area is subject to electrical storms or equivalent type power surges.

The determination as to whether lightning protection is desirable, the selection of the service protector needed, and its proper installation are to be made by the FAA.

SYSTEM GROUNDING

A central ground point is required at the power distribution panel. An insulated green (or green with yellow trace) grounding wire should be carried from this point directly back to the service ground or suitable building ground. Conduit must not be used as the only means of grounding. No neutral wire is required. From the central tie point at the power distribution panel, individual grounding wires accompany the 3 phase wires of the branch circuit to each element or to other units requiring primary power of the 9020 system.

There will be an additional equipment bond system between frames: Each 2314, 2701, 2803, 2821, 7289, 7201, 7231, 7251, and 7265 is furnished with a #6 wire 30-foot bonding cable. Element and unit tie points are described in the "Element and Unit

Installation" manuals. Each cable from these units must be bolted to a copper (or cadmium finished steel) plate, minimum 36 square inches x 1/2 inch thick. (See Figure 4). The plate, furnished by the customer, must have a sufficient number of holes (drill and tap 1/4-20) to accommodate the number of cables. Additional plates will be installed as needed to reach those units beyond the fixed cable length. The bus connecting the plates in series to the nearest suitable building ground should be at least a #4/0 wire.

Signal ground reference between boxes is accomplished through the coax shielding. When external I/O devices are connected to the 9020 System, signal ground reference will be accomplished through the interconnecting signal cable shielding. As in the case of the 9020 elements, it should be possible to separate or join the power and signal grounds inside the external I/O devices.

SURGE CURRENTS

To minimize the effects of system surge currents, each of the following elements contains a time-delay relay:

7201-01/02 Computing Element
7231-02 I/O Control Element
7251-03/04/08/09 Storage Element
7265-02 Systems Control Console
7289-02 Peripheral Adapter Module
7289-04 Display Element

The purpose of the time-delay relay is to provide a sequencing of main line power to the elements. The time-delay relays, adjustable from 5 to 30 seconds, will be set to a value to obtain a staggered power-on sequence of the various system elements.

The following is a listing of approximate element and unit power factors:

2314 Storage Control Unit	0.70
2701 Data Adapter Unit	0.86
2803 Tape Control Model 1	0.77
2821 Control Unit Model 1/2	0.71
7201-01 Computing Element	0.77
7201-02 Computing Element	0.81
7231-02 I/O Control Element	0.81
7251-03/04 Storage Element	0.73
7251-08 Storage Element	0.80
7251-09 Storage Element	0.92
7265-02 Systems Control Console	0.70
7265-03 Configuration Console	0.95
7289-02 Peripheral Adapter Module	0.94
7289-03 Flight Strip Printer Control Module	0.77
7289-04 Display Element	0.90

The maximum harmonic content of the phase voltage waveforms is not to be in excess of 5 percent with the equipment not operating.

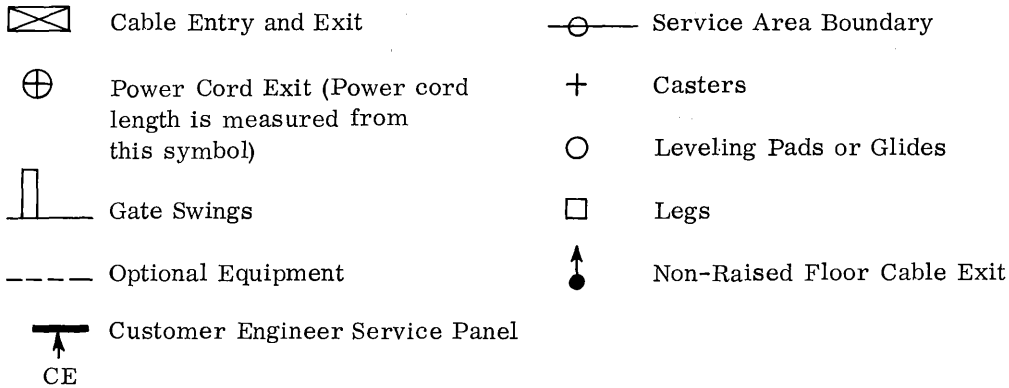
The following table supplies information about attachment cord plugs and their mating branch circuit connectors or receptacles used for supplying 208V to the 9020 systems. The number of wires includes one insulated grounding conductor (green or green with yellow trace).

Plug	Connector	Receptacle	Rating
Russell and Stoll, FS3720	FS3913	FS3743	15 amp, 1 phase, 3 wire
Russell and Stoll, FS3750	FS3933	FS3753	30 amp, 1 phase, 3 wire
Russell and Stoll, FS3760	FS3934	FS3754	30 amp, 3 phase, 4 wire
Russell and Stoll, SC7328	SC7428	SC7324	60 amp, 3 phase, 4 wire

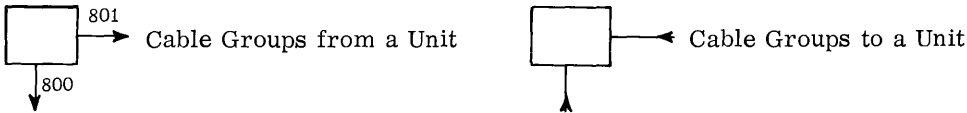
UNIT SPECIFICATIONS

STANDARD SYMBOLS

In Plan Views



In Cabling Schematics



Unless otherwise noted on individual unit specification pages, the following statement applies: All systems components can be reduced to 29-1/2 inches by 60 inches or smaller sections for shipment.

Unless otherwise noted on individual unit specification pages, the environmental specifications are:

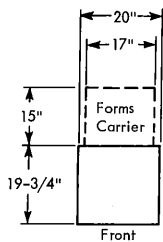
Environment Operating:
 Temperature 60°-90°F
 Rel Humidity 20-80%
 Max Wet Bulb 78°F

Environment Nonoperating:
 Temperature 50°-110°F
 Rel Humidity 8-80%
 Max Wet Bulb 80°F

Environment Shipping:
 Temperature -40° to 140°F
 Rel Humidity 5-100% (no condensation)
 Wet Bulb Range 33°-85°F

1052 PRINTER-KEYBOARD MODEL 7

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
23*	19-3/4	9

Service Clearances (Inches)

F	R	Rt	L
0	0	0	0

Weight: 65 pounds

BTU/Hr: 570

CFM: 0

Power: 0.17 kVA**

Environment Operating:

Temperature 50-110°F
 Rel Humidity 10-80%
 Max Wet Bulb 80°F

Environment Nonoperating:

Temperature 50-110°F
 Rel Humidity 10-80%
 Max Wet Bulb 80°F

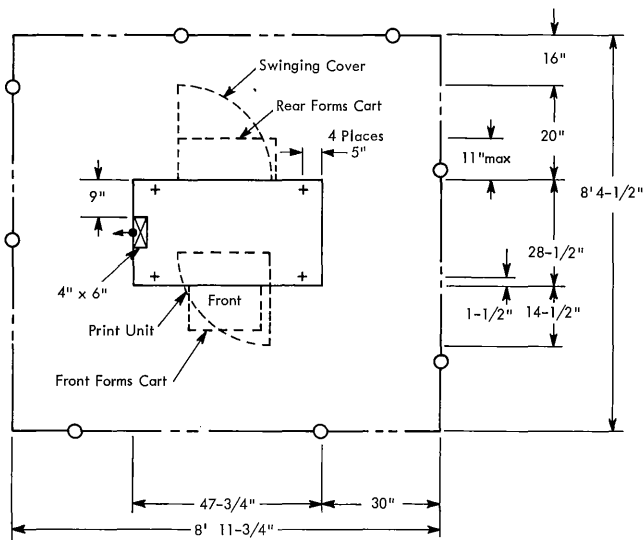


Notes:

- * Includes 1-1/2 inches for knobs on ends of platen.
- ** 9020A/D--powered from System Console.
- 9020E--powered from 7201-02.

1403 PRINTER MODEL 2

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
47-3/4	28-1/2	53-1/4

Service Clearances (Inches)

F	R	Rt	L
36	36	30	30

Weight: 750 pounds

BTU/Hr: 3,000

CFM: 310

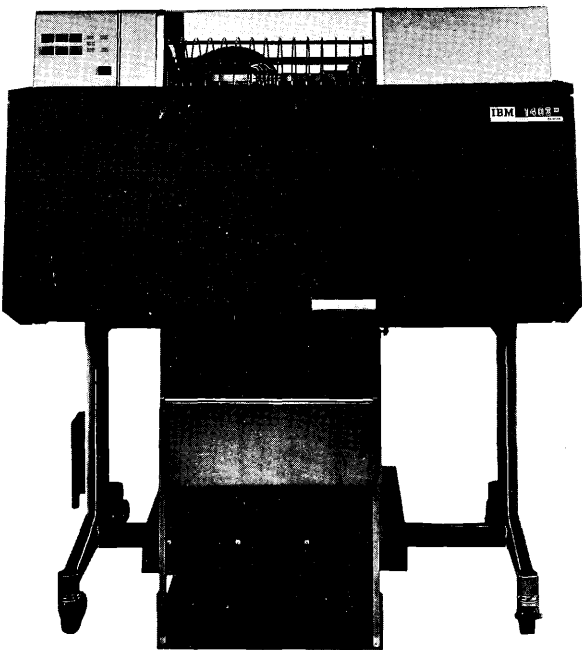
Power: 1.0 kVA*

Cable Limitations:

See section on cabling.

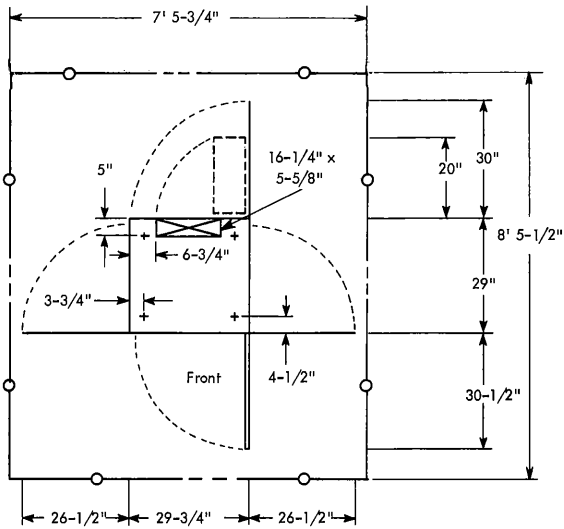
Note:

*Powered from 2821.



2401 MAGNETIC TAPE UNIT MODELS 2 AND 3

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
29-3/4	29	67

Service Clearances (Inches)

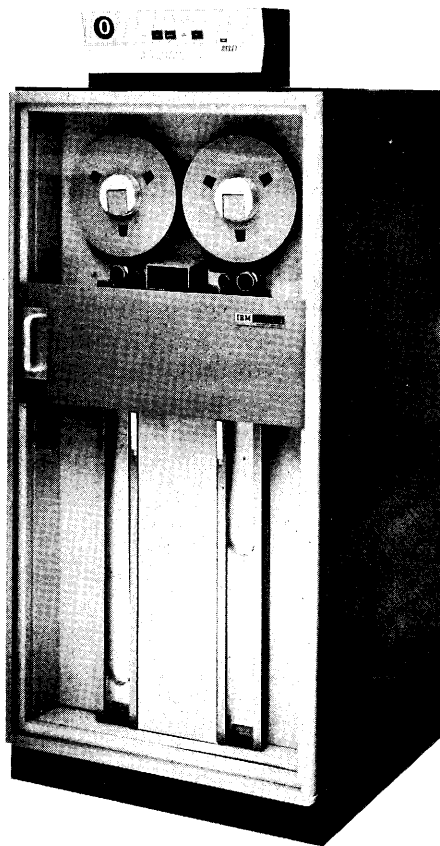
F	R	Rt	L
36	36	30*	30*

Weight: 800 pounds

BTU/Hr: 3,500

CFM: 500

Power: 1.6 kVA**



Cable Limitations:

See section on cabling.

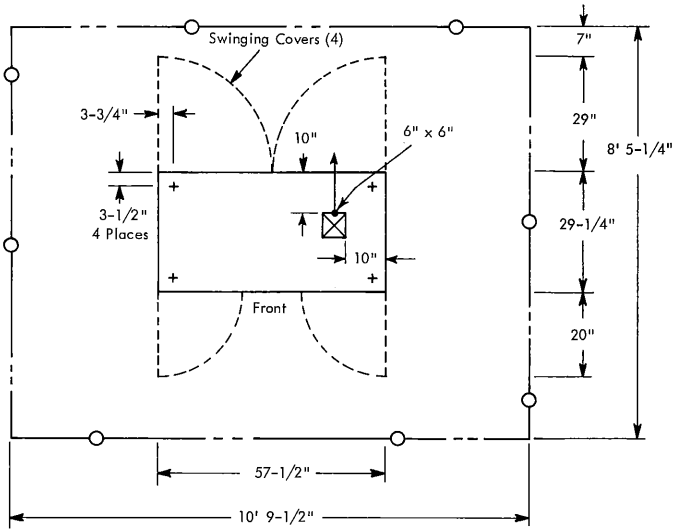
Notes:

*When not abutted to another tape unit or tape control unit.

**Powered from control unit.

2540 CARD READ PUNCH

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
57-1/2	29-1/4	45-1/4*

Service Clearances (Inches)

F	R	Rt	L
36	36	36	36

Weight: 1,050 pounds

BTU/Hr: 3,000

CFM: 50

Power: 1.2 kVA**

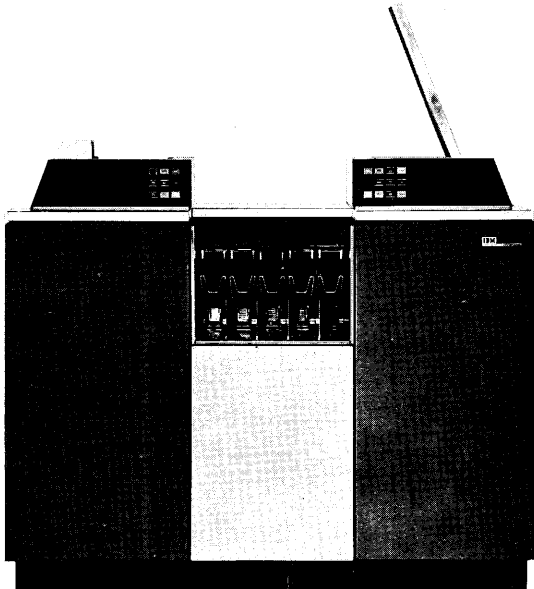
Cable Limitations:

See section on cabling.

Notes:

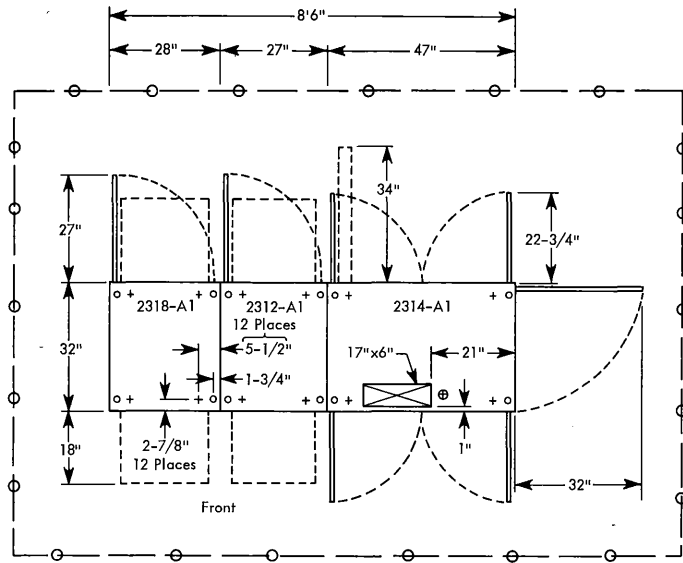
*Add 20-1/4 inches for read file feed.

**Powered from 2821.

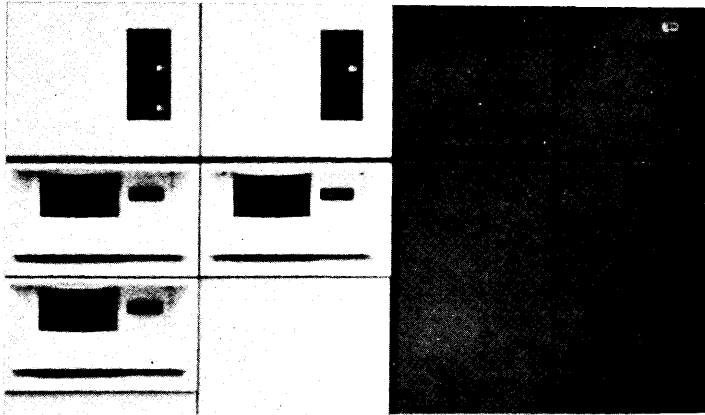


●2314 DIRECT ACCESS STORAGE FACILITY - A SERIES

PLAN VIEW



●2314 DIRECT ACCESS STORAGE FACILITY - A SERIES



SPECIFICATIONS

Dimensions (Inches)

F S H

(See Plan View.) 60

Service Clearances (Inches)

F R Rt L

36 48 42 24

Weight: See Table

Power Requirements:

Phases	3
Plug	R & S FS3760
Connector	R & S FS3934
Receptacle	R & S FS3754

INDIVIDUAL UNIT SPECIFICATIONS

UNIT	BTU/hr	KVA*	CFM	Length	Width	Weight
2314-A1	3,100	1.1	1,000	47	32	950 LBS
2312-A1	1,900	0.7	200	28	32	500 LBS
2318-A1	3,800	1.4	200	28	32	690 LBS

Cable Limitations:

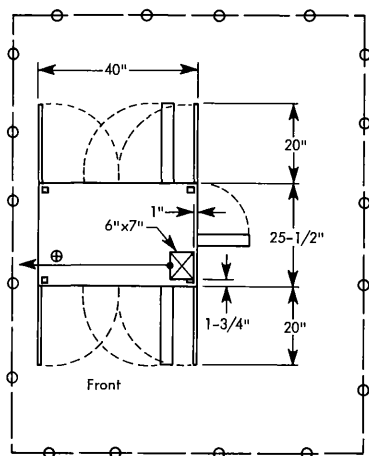
See section on cabling.

Note:

* 2312 and 2318 powered from the 2314 Control Unit.

2701 DATA ADAPTER UNIT

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
40	25-1/2	40

Service Clearances (Inches)

F	R	Rt	L
42	42	42	6*

Weight: 600 pounds

BTU/hr: 3,000

CFM: 120

Power: 1.0 kVA

Phases 1
 Plug R&S FS3720
 Connector R&S FS3913
 Receptacle R&S FS3743

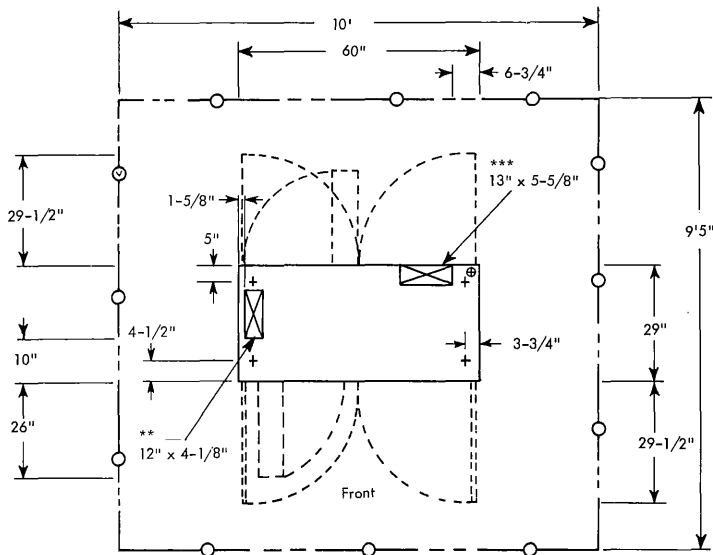
Cable Limitations:
 See section on Cabling.

Note:
 * For air circulation.



2803 TAPE CONTROL MODEL 1

●PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
60	29	60

Service Clearances (Inches)

F	R	Rt	L
42	42	30*	30

Weight: 1,400 pounds

BTU/Hr: 2,500

CFM: 500

Power: 1.0 kVA

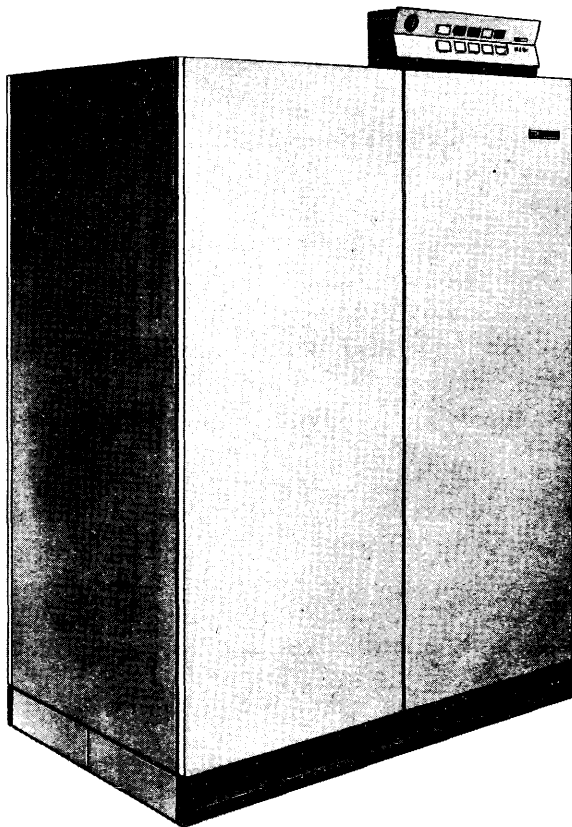
Phases	3
Plug	R&S SC7328
Connector	R&S SC7428
Receptacle	R&S SC7324

Cable Limitations:

See section on cabling.

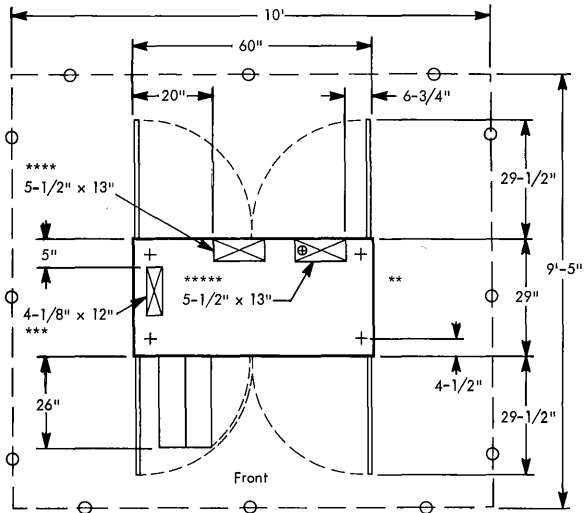
Note:

- * Can abut tape unit this side only.
- ** Secondary Interface and Tape Drive Signal Cables.
- *** Primary Interface; Indicator; SCON; EPO and Power Cables.



2803A TAPE CONTROL MODEL 1*

●PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
60	29	60

Service Clearances (Inches)

F	R	Rt	L
42	42	30**	30

Weight: 1,130 pounds

BTU/hr: 3,000

CFM: 500

Power: 1.2 kVA

Phases 3

Plug R&S SC7328

Connector R&S SC7428

Receptacle R&S SC7324

Cable Limitations:

See section on Cabling.

Note:

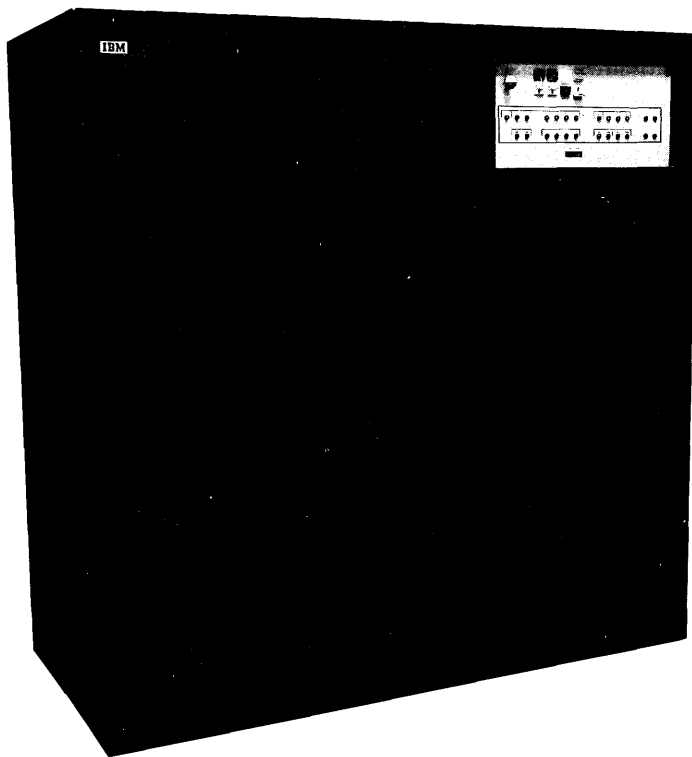
* A is a designation to identify SLT version--serial numbers from 11,001 - 13,999.

** Can abut tape unit this side only.

*** Primary and Secondary Interface; Tape Drive Signal Cables.

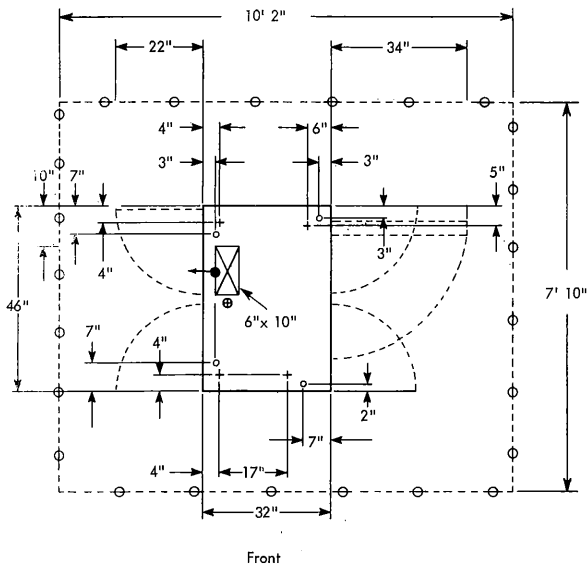
**** Indicator and SCOM Cables.

***** EPO and Power Cables.



2821 CONTROL UNIT MODELS 1 AND 2

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
32	46	60

Service Clearances (Inches)

F	R	Rt	L
30	18	48	30

	Model 1	Model 2
Weight:	1,000 lbs	1,000 lbs

BTU/Hr:	7,500	6,000
---------	-------	-------

CFM:	500	400
------	-----	-----

Power:	3.2 kVA	2.4 kVA
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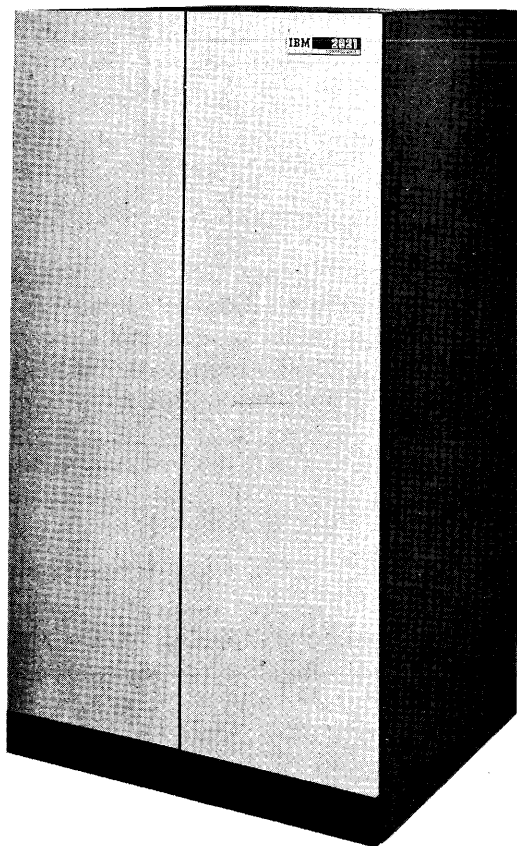
Phases	3
Plug	R&S FS3760
Connector	R&S FS3934
Receptacle	R&S FS3754

Environment Operating:

Temperature	60-90°F
Rel Humidity	8-80%
Max Wet Bulb	78°F

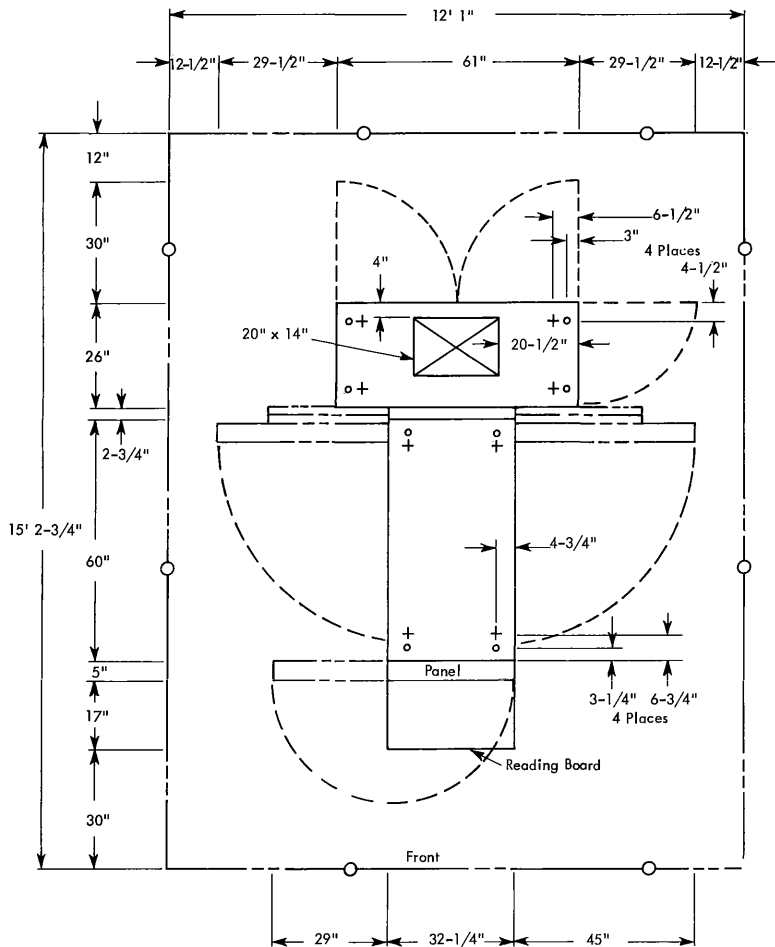
Cable Limitations:

See section on cabling.



7201-01 COMPUTING ELEMENT

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

	F	S	H
(1)*	32-1/4	84-3/4	70
(2)*	61	26	72

Service Clearances (Inches)

	F	R	Rt	L
	30	42	42	42

Weight: 4,000 pounds

BTU/Hr: 10,240

CFM: 1,800

Power: 3.82·kVA

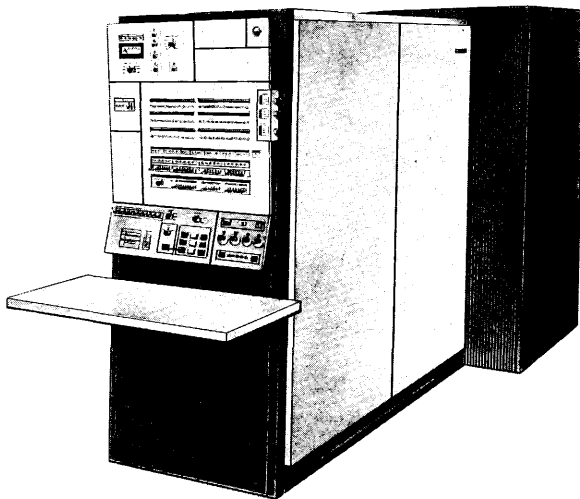
Phases	3
Plug	R&S FS3760
Connector	R&S FS3934
Receptacle	R&S FS3754

Cable Limitations:

See section on cabling.

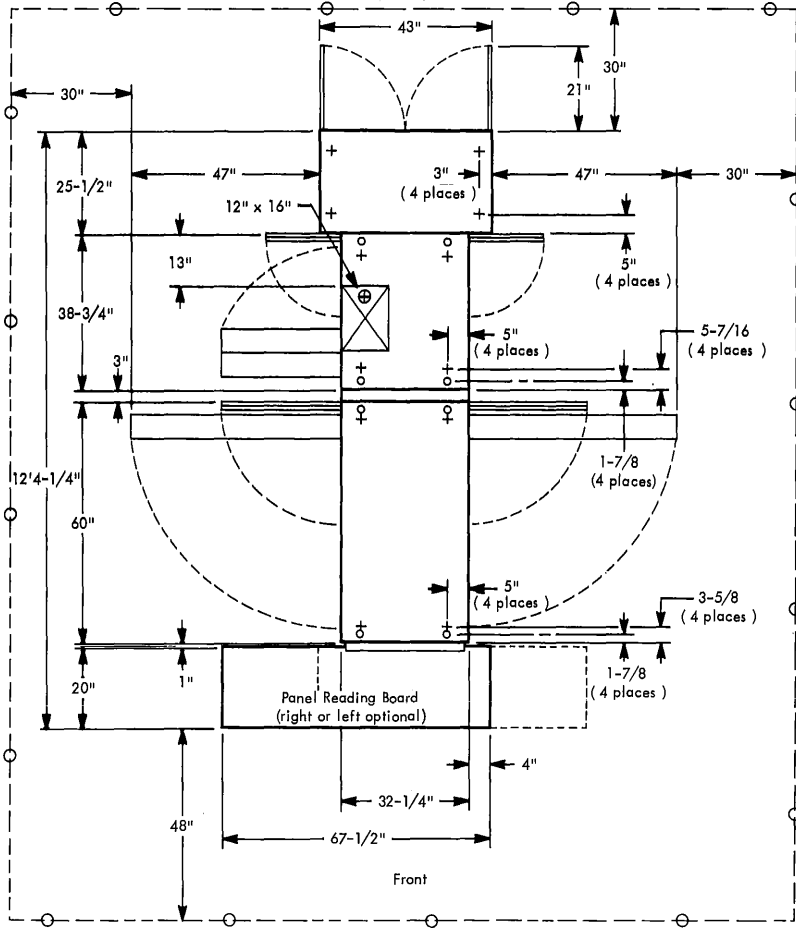
Note:

*Line 1 is for main frame and line 2 for power wall.

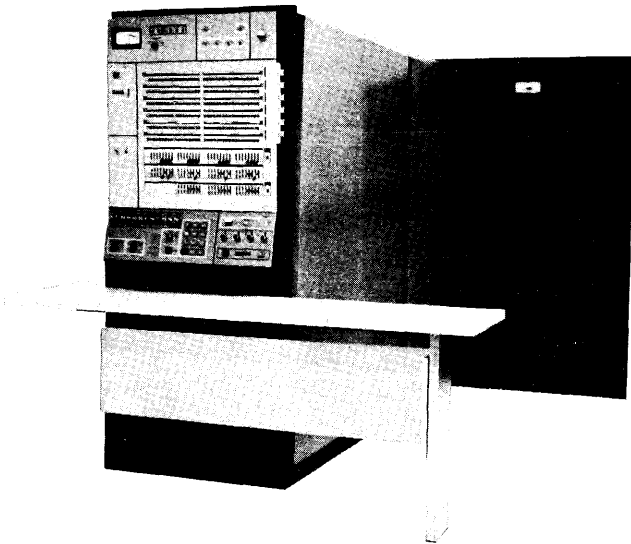


7201-02 COMPUTING ELEMENT

PLAN VIEW



7201-02 COMPUTING ELEMENT



SPECIFICATIONS

Dimensions (Inches)

F	S	H
*	*	72-1/2

Service Clearances (Inches)

F	R	Rt	L
48	30	*	*

Weight: 3,647 pounds

| BTU/hr: 19,600

CFM: 4,620

| Power: 6.0 kVA
 Phases 3
 Plug R&S SC7328
 Connector R&S SC7428
 Receptacle R&S SC7324

Cable Limitations:
 See section on cabling.

Notes:

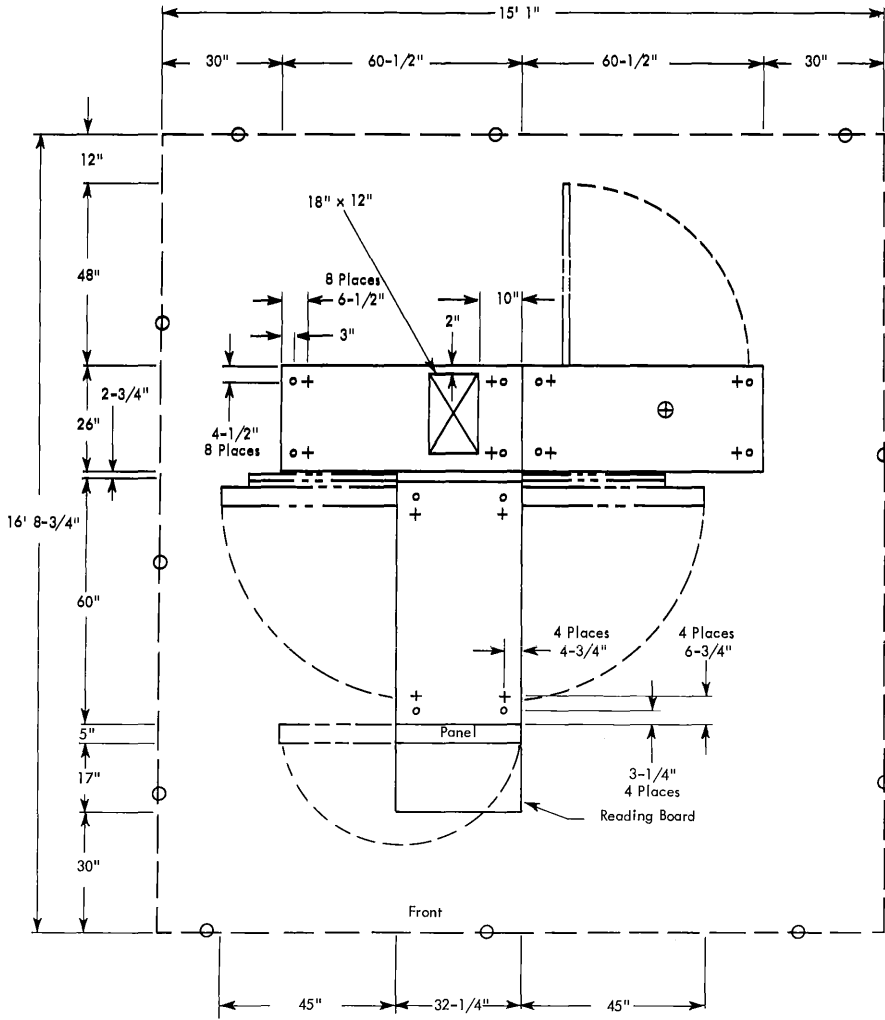
* See plan view.

| Logic Frame Shipping Dimensions:

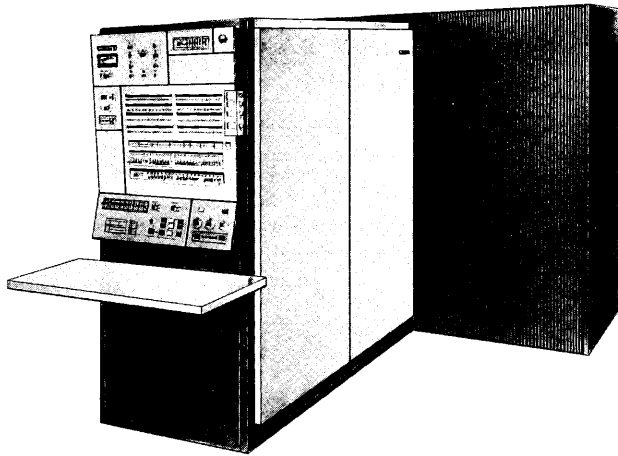
Length: 78 inches
 Width: 30 inches

7231-02 I/O CONTROL ELEMENT

PLAN VIEW



7231-02 I/O CONTROL ELEMENT



SPECIFICATIONS

Dimensions (Inches)

	F	S	H
(1)*	32-1/4	84-3/4	70
(2)*	121	26	72

Service Clearances (Inches)

	F	R	Rt	L
	30	57	30**	30**

Weight: 5,200 pounds

BTU/Hr: 13,200

CFM: 2,550

Power: 4.75 kVA

Phases	3
Plug	R&S FS3760
Connector	R&S FS3934
Receptacle	R&S FS3754

Cable Limitations:

See section on cabling.

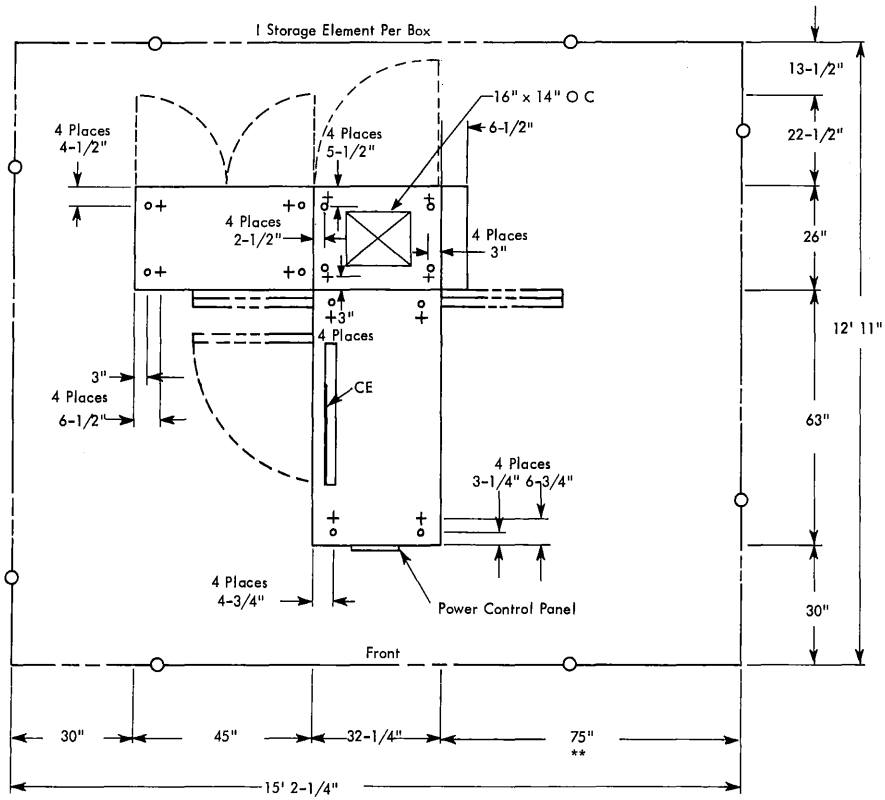
Notes:

*Line 1 is for main frame and line 2 for power wall.

**Power walls can be butted to reduce floor space and cable length.

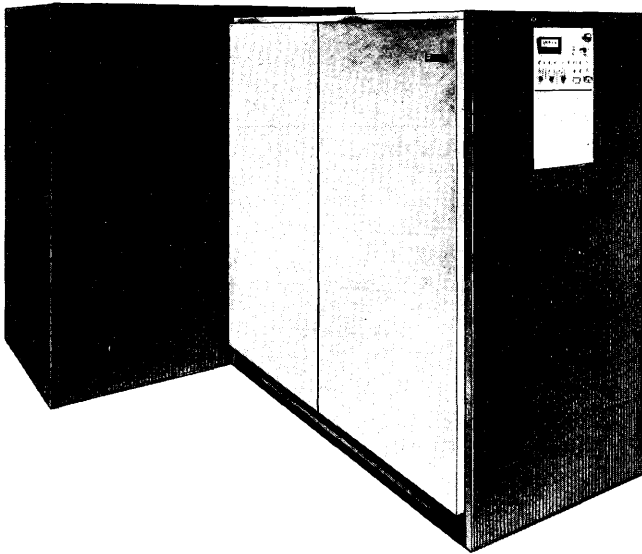
7251-03 STORAGE ELEMENT

PLAN VIEW



** Includes 30" service clearance and 45" for expansion.

7251-03 STORAGE ELEMENT



SPECIFICATIONS

Dimensions (Inches)

	F	S	H
(1)*	32-1/4	63	70
(2)*	77-1/4	26	72

Service Clearances (Inches)

F	R	Rt	L
30	36	30	30

Weight: 1,500 pounds

BTU/Hr: 5,600

CFM: 1,000

Power: 2.15 kVA

Phases	3
Plug	R&S FS3760
Connector	R&S FS3934
Receptacle	R&S FS3754

Cable Limitations:

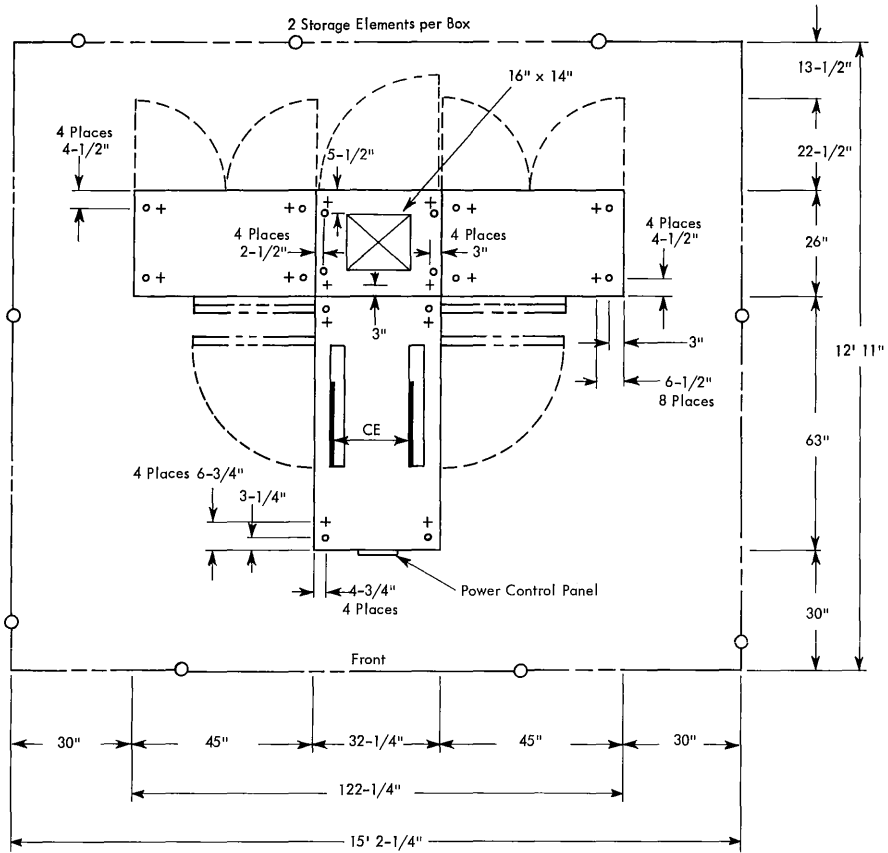
See section on cabling.

Note:

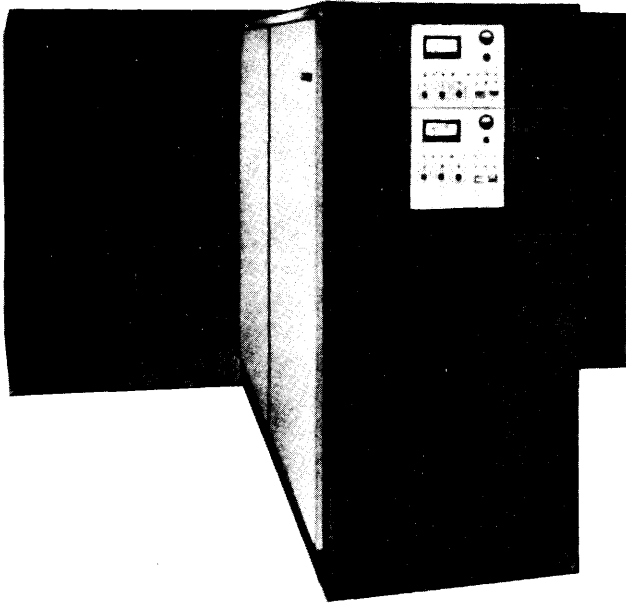
*Line 1 is for main frame and
line 2 for power wall.

7251-04 STORAGE ELEMENT

PLAN VIEW



7251-04 STORAGE ELEMENT



SPECIFICATIONS

Dimensions (Inches)

	F	S	H
(1)*	32-1/4	63	70
(2)*	122-1/4	26	72

Service Clearances (Inches)

F	R	Rt	L
30	36	30**	30**

Weight: 2,650 pounds

BTU/Hr: 11,200

CFM: 1,500

Power (Total): 4.3 kVA

Phases	3
Plugs (2)	R&S FS3760
Connectors	R&S FS3934
Receptacles	R&S FS3754

Cable Limitations:

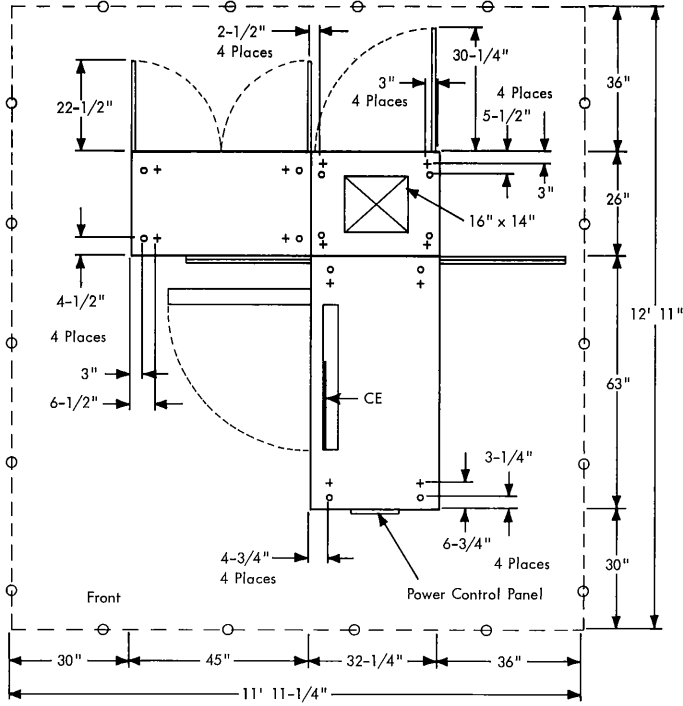
See section on cabling.

Notes:

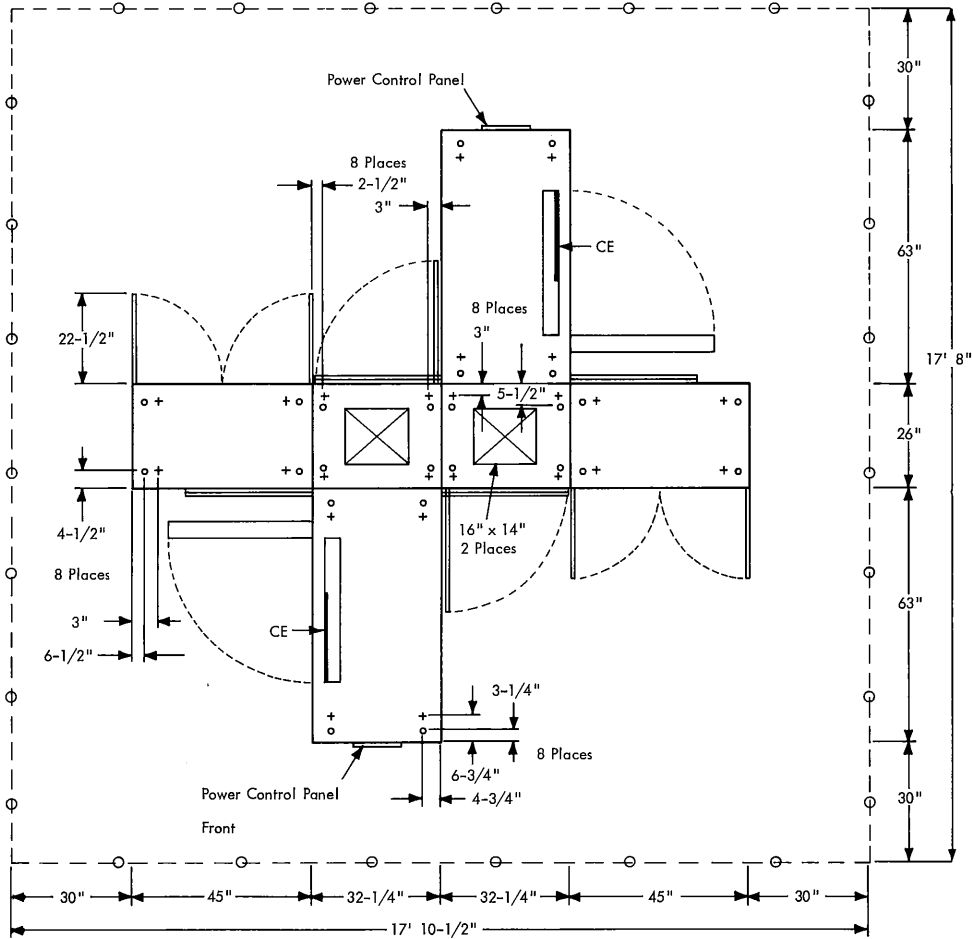
*Line 1 is for main frame
and line 2 for power wall.

**Power walls can be butted
to reduce floor space and
cable length.

7251-08 STORAGE ELEMENT (PLAN VIEW 1)



TWO 7251-08 STORAGE ELEMENTS ABUTTED (PLAN VIEW 2)



7251-08 STORAGE ELEMENT

SPECIFICATIONS

Dimensions (Inches)

F	S	H
* 32-1/4	63	70
**77-1/4	26	72

Service Clearances (Inches)

F	R	Rt	L
(1) 30	36	36	30
(2) 30	30	30	30

Weight: 1,750 pounds

BTU/Hr: 8,000

CFM: 1,250

Power: 3.80 kVA

Phases	3
Plug	R&S FS3760
Connector	R&S FS3934
Receptacle	R&S FS3754

Cable Limitations:

See section on cabling.

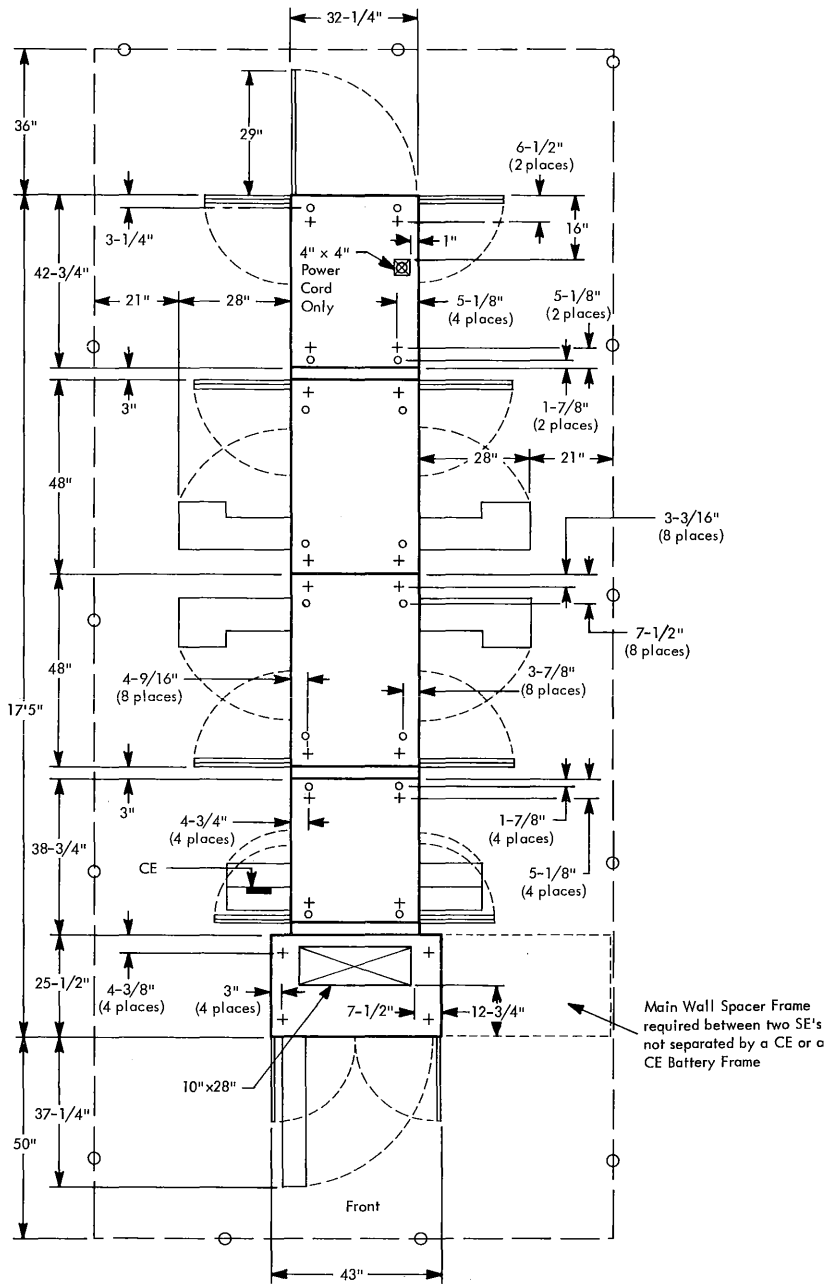
Notes:

*For main frame.

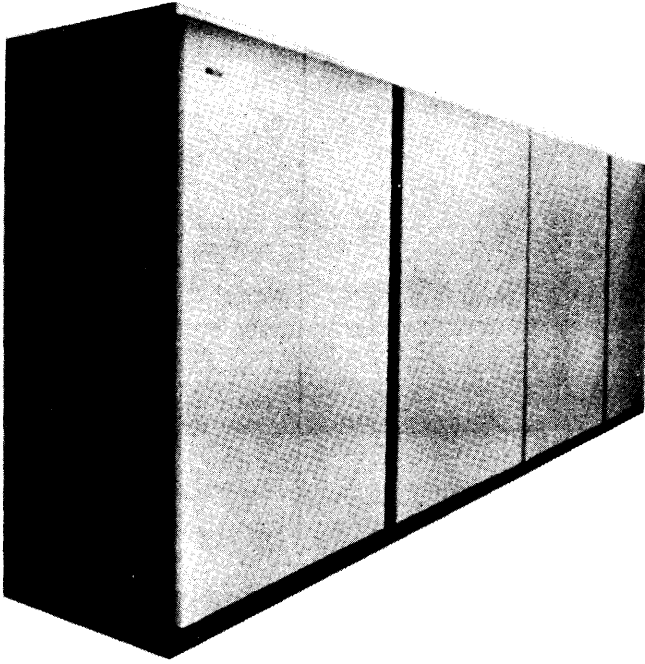
**For power wall.

7251-09 STORAGE ELEMENT

● PLAN VIEW



7251-09 STORAGE ELEMENT



SPECIFICATIONS

Dimensions (Inches)

F	S	H
43	209	72-1/2

Service Clearances (Inches)

F	R	Rt	L
50	36	49	49

Weight: 4,620 pounds

| BTU/hr: 21,170

CFM: 4,000

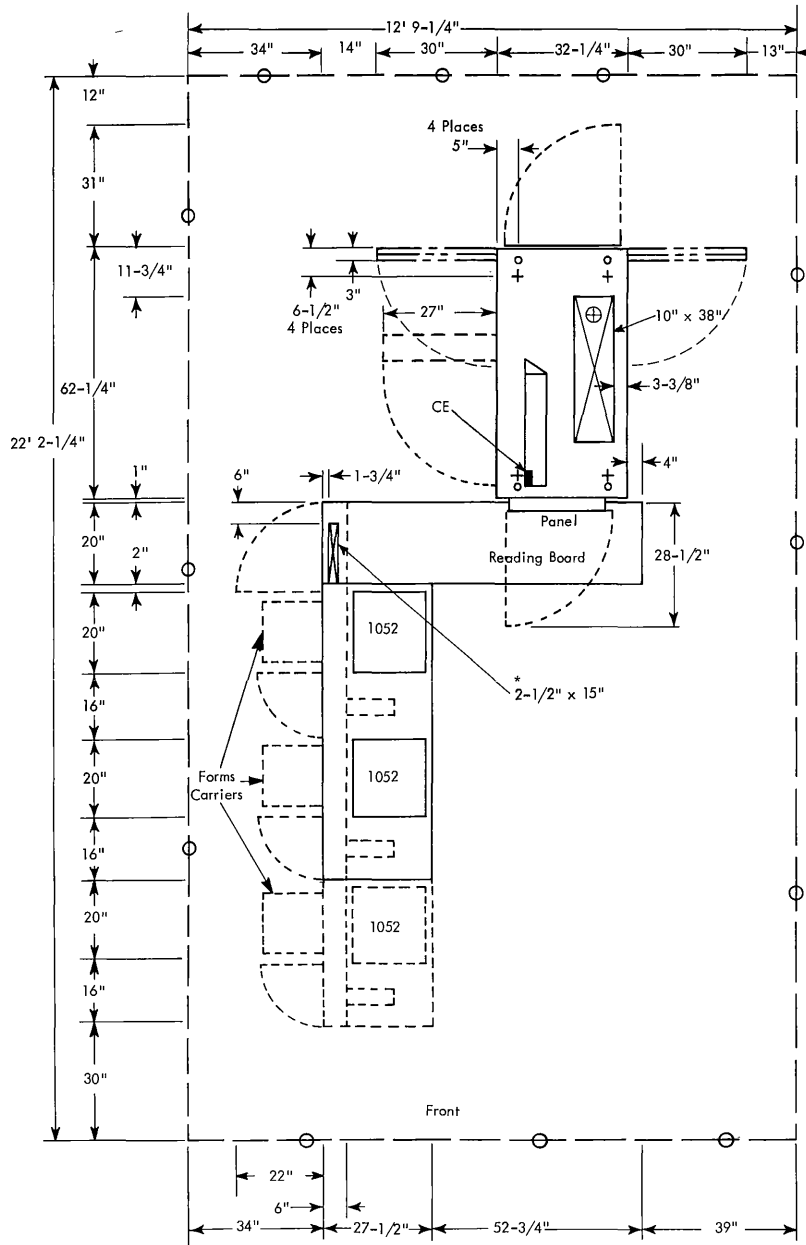
| Power: 6.7 kVA
 Phases 3
 Plug R&S SC7328
 Connector R&S SC7428
 Receptacle R&S SC7324

Cable Limitations:

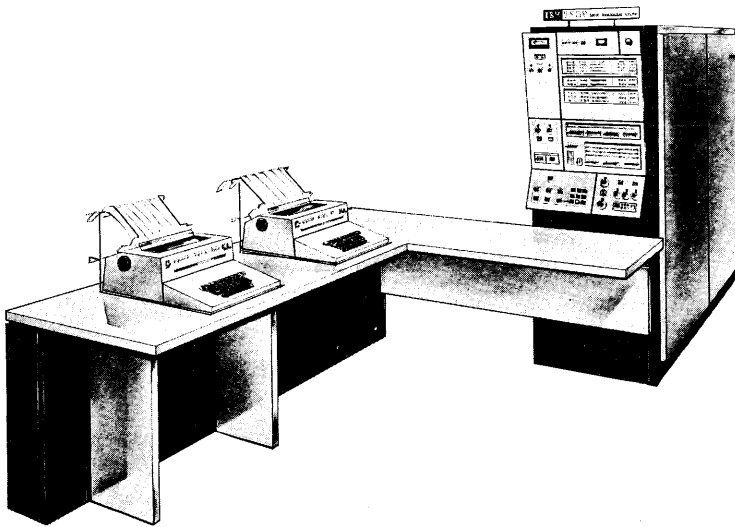
See section on cabling.

7265-02 SYSTEMS CONTROL CONSOLE

● PLAN VIEW



7265-02 SYSTEMS CONTROL CONSOLE



SPECIFICATIONS

Dimensions (Inches)

F	S	H
(See Plan View.)		70-3/4

Service Clearances (Inches)

F	R	Rt	L
30	43	39	34

Weight: 1,850 pounds

BTU/Hr: 3,450

CFM: 350

Power: 1.4 kVA

Phases	3
Plug	R&S FS3760
Connector	R&S FS3934
Receptacle	R&S FS3754

Cable Limitations:

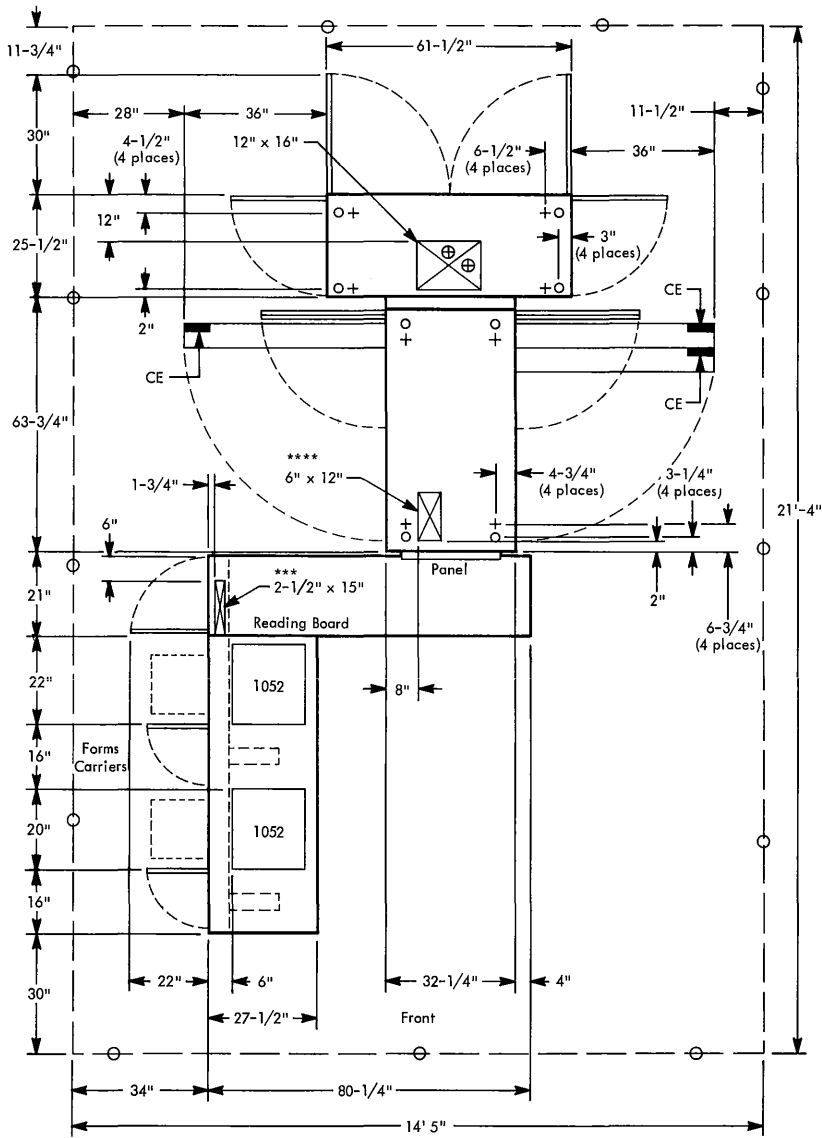
See section on cabling.

Note:

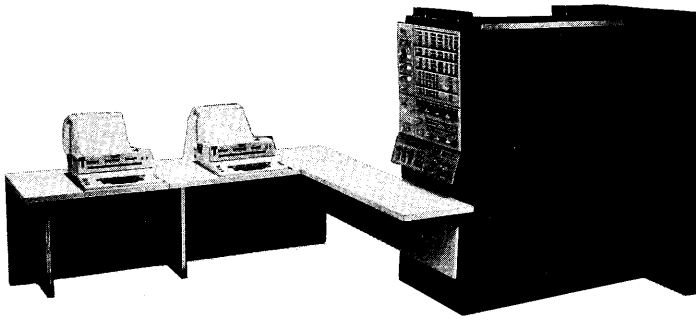
| * 1052 Cables

7265-03 CONFIGURATION CONSOLE

●PLAN VIEW



7265-03 CONFIGURATION CONSOLE



SPECIFICATIONS

Dimensions (Inches)

F	S	H
*	*	72-1/2

Service Clearances (Inches)

F	R	Rt	L
30	41-3/4	47-1/2	34

Weight: 3,300 pounds

BTU/hr: 11,300

CFM: 1,750

Power:** Line 1 Line 2
 kVA 2.05 (avg) 2.05 (avg)
 Phases 1
 Plug R&S FS3750 (two)
 Connector R&S FS3933 (two)
 Receptacle R&S FS3753 (two)

Cable Limitations:
 See section on cabling.

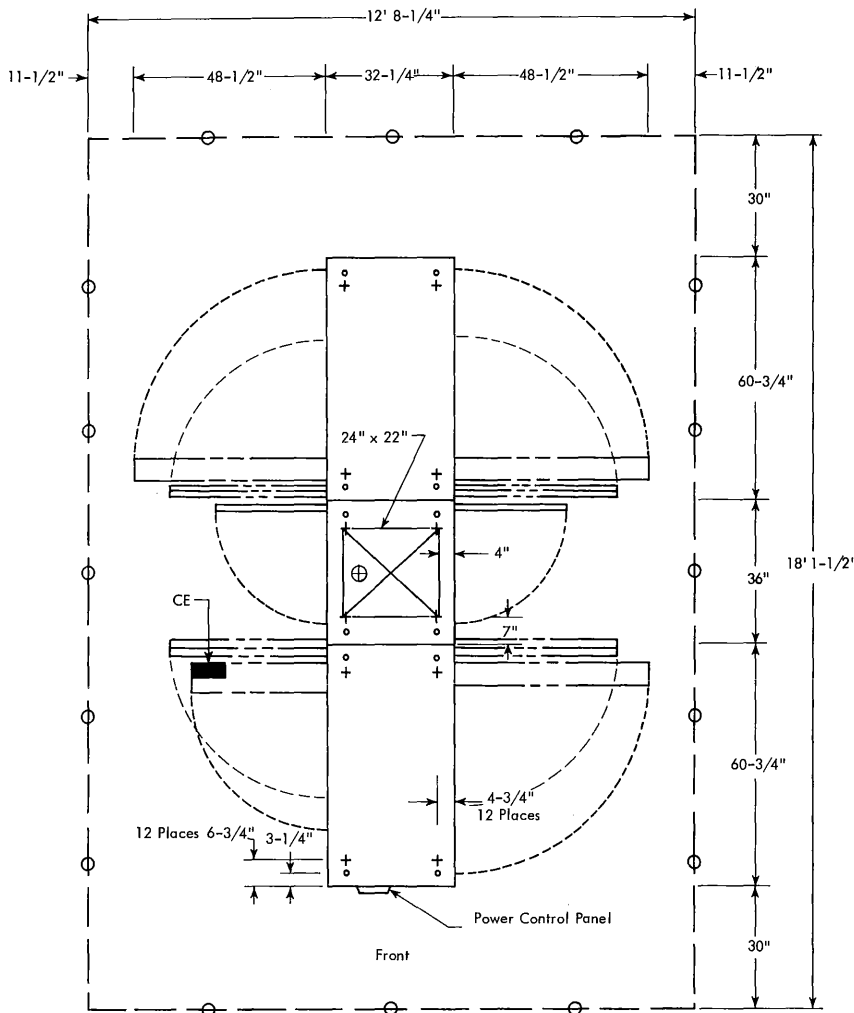
Notes:

- * See plan view.
- ** Two individual branch circuits are required for this unit. Power requirements will be either 1.6 or 2.5 kVA per line, depending on the power source selected for the System Console control portion of the Configuration Console.
- *** 1052 Cables
- **** EPO Cables

Logic Frame Shipping Dimensions:
 Length: 68-1/2 inches
 Width: 30 inches

7289-02 PERIPHERAL ADAPTER MODULE

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
32- ¹ / ₄	157- ¹ / ₂	70

Service Clearances (Inches)

F	R	Rt	L
30	30	60	60

Weight (lb.): 3,850*

BTU/Hr: 14,300*

CFM: 2,760 *

Power: 6.0kVA*

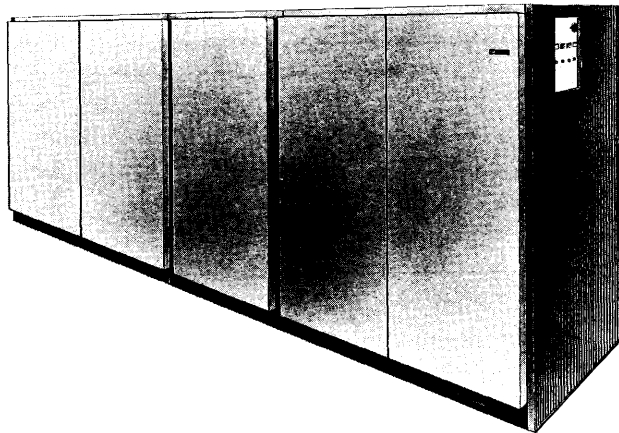
Phases 3
 Plug R&S SC7328
 Connector R&S SC7428
 Receptacle R&S SC7324

Cable Limitations:

See section on cabling.

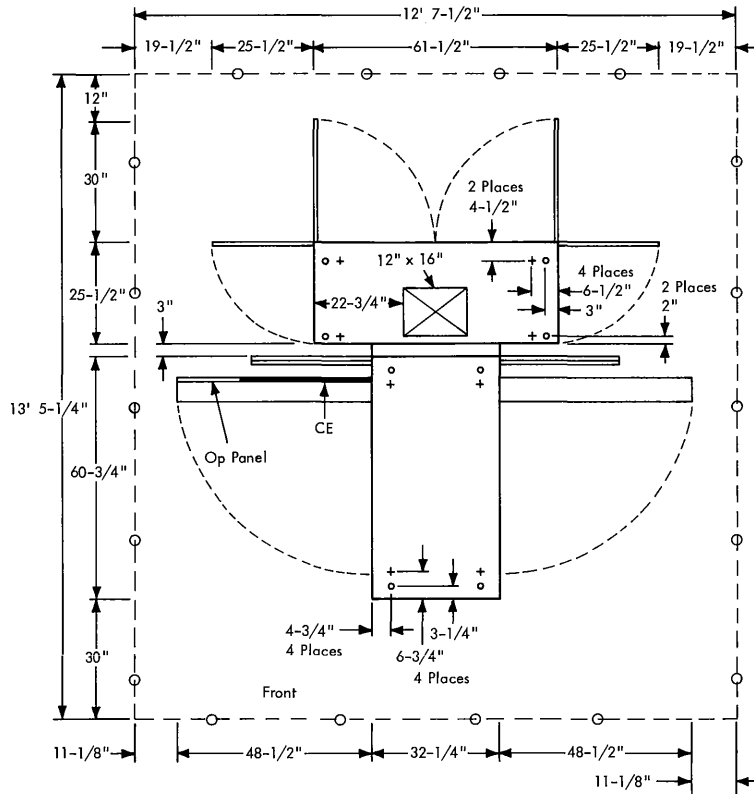
Note:

* Maximum value given.
 Requirements vary according
 to the quantity of adapters contained
 in the unit.



7289-03 FLIGHT STRIP PRINTER CONTROL MODULE

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

	F	S	H
(1) *	32-1/4	63-3/4	70
(2) *	61-1/2		72

Service Clearances (Inches)

	F	R	Rt	L
	30	42	45	45

Weight: 2,940 pounds

BTU/Hr: 12,000

CFM: 1,560

Power: 4.0 kVA

Phases	3
Plug	R&S SC7328
Connector	R&S SC7428
Receptacle	R&S SC7324

Cable Limitations:

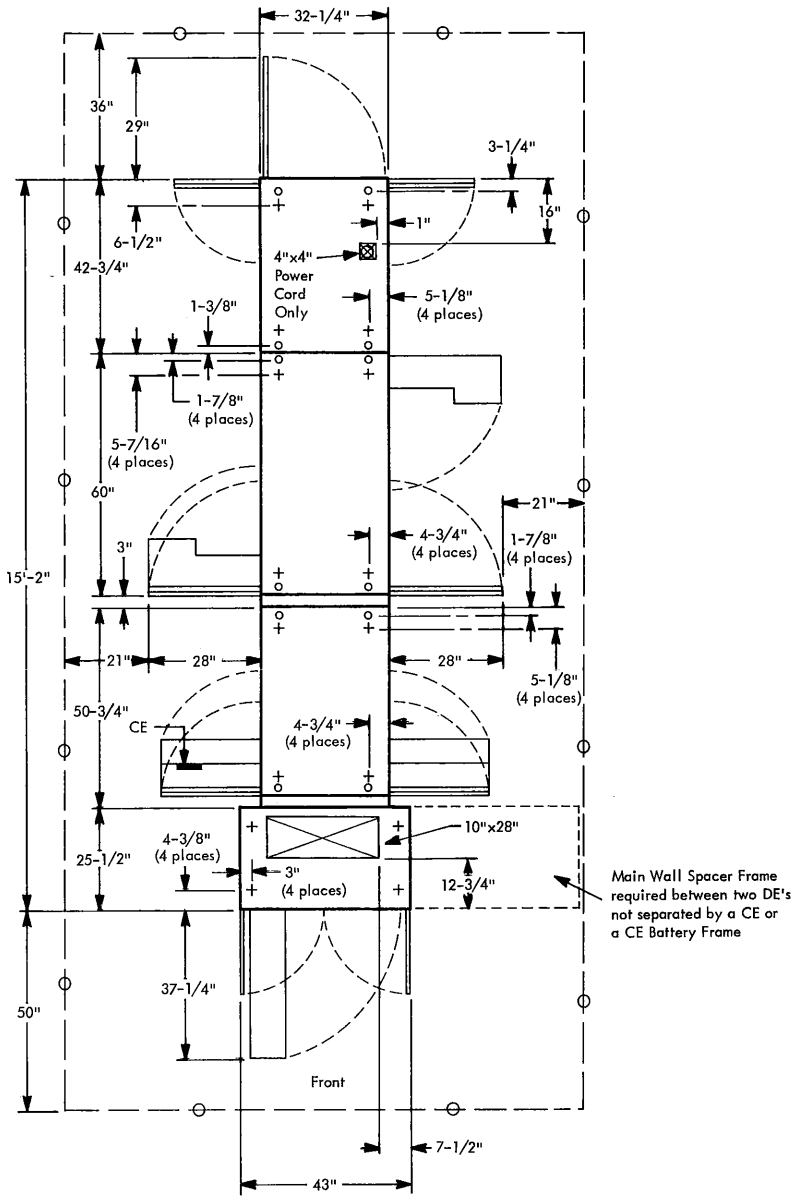
See section on cabling.

Note:

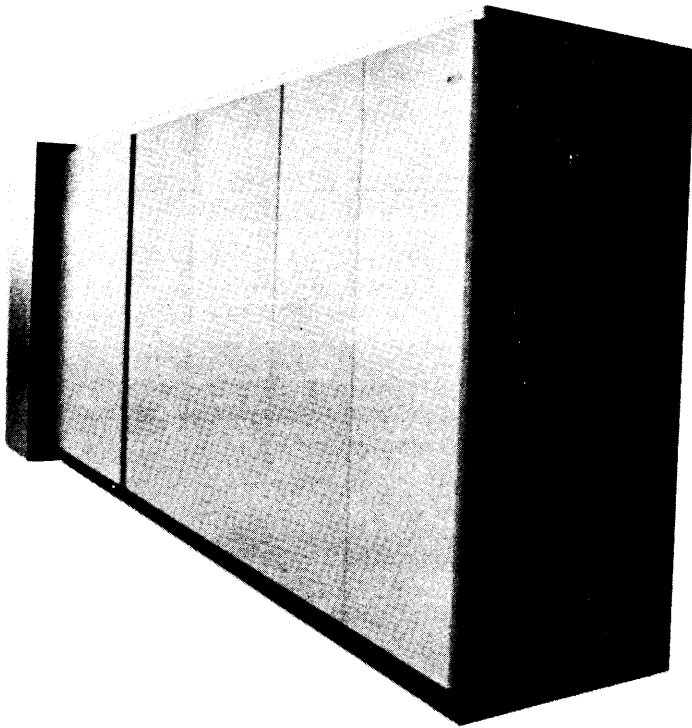
*Line 1 is for main frame and line 2 for power wall.

7289-04 DISPLAY ELEMENT

● PLAN VIEW



7289-04 DISPLAY ELEMENT



SPECIFICATIONS

Dimensions (Inches)

F	S	H
43	182	72-1/2

Service Clearances (Inches)

F	R	Rt	L
50	36	49	49

Weight: 3,500 pounds

| BTU/hr: 18,150

CFM: 3,300

| Power: 5.9 kVA
 Phases 3
 Plug R&S SC7328
 Connector R&S SC7428
 Receptacle R&S SC7324

Cable Limitations:
 See section on cabling.

ELEMENT NUMBERING AND ORDER OF EXPANSION (9020D SYSTEM)

One minimum 9020D (triplex) wall configuration and the maximum system expansion is shown in Figure 5.

The Computing and Storage Elements are assigned numbers (Figure 5) which define the physical location and the (sequential) order of expansion for each type of element. The I/O Control Element is a stand-alone unit and does not require a special numbering scheme.

Main Wall Spacer Frames are used for Storage Element (SE) expansion. See "CE (7201-02) Main Wall Spacer Frame".

Because of cable limitations, it is essential to physically locate Storage Elements 1 and 2 as close together as practical. In no case should the distance between the I/O cable entry holes exceed 30 feet.

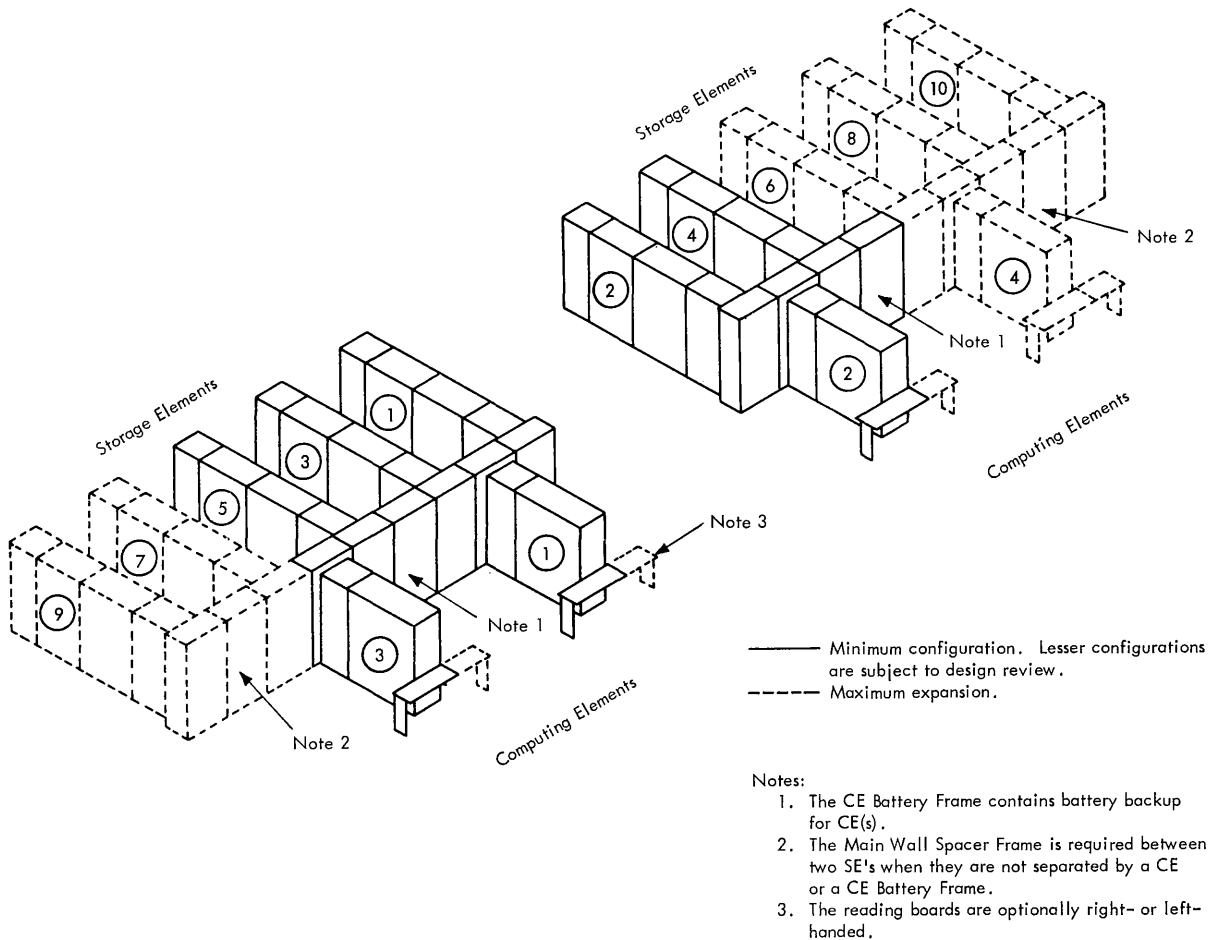


Figure 5. Numeric Sequence for CE and SE Expansion

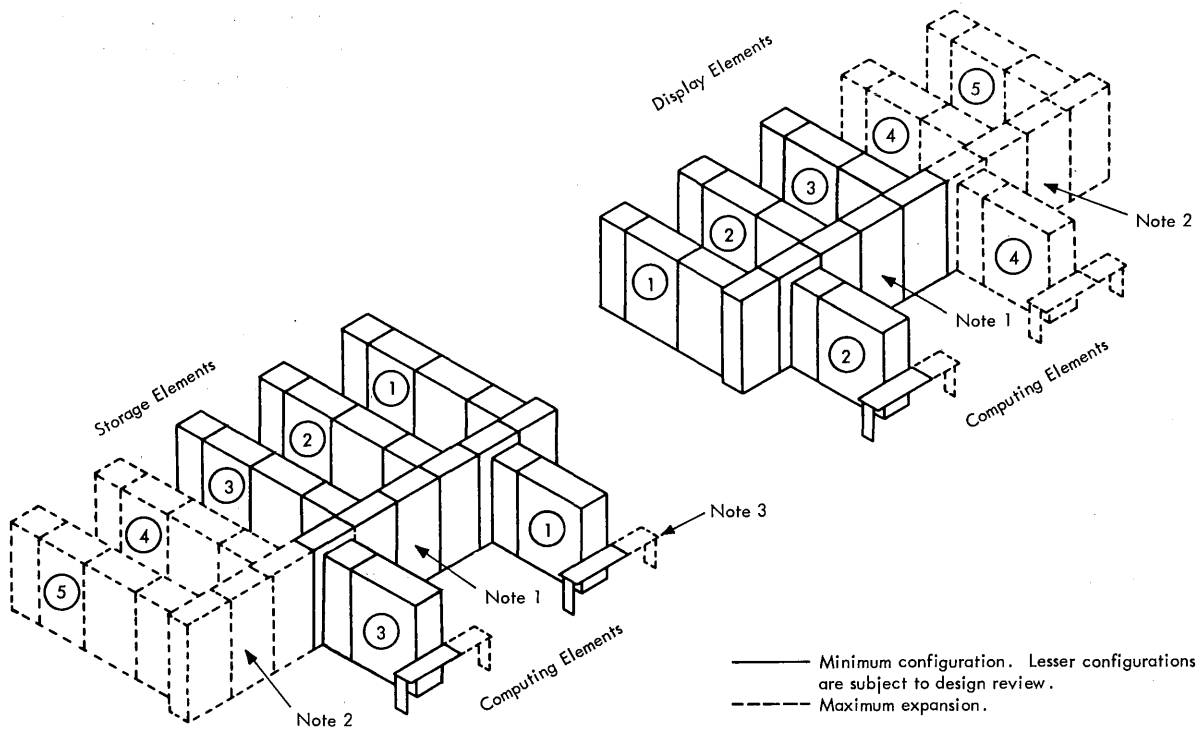
ELEMENT NUMBERING AND ORDER OF EXPANSION (9020E SYSTEM)

One minimum 9020E (triplex) wall configuration and the maximum system expansion is shown in Figure 6.

The Computing, Storage, and Display Elements are assigned numbers (Figure 6) which define the physical location and the (sequential) order of expansion for each type of element. The I/O Control Element is a stand-alone unit and does not require a special numbering scheme.

Main Wall Spacer Frames are used for Storage Element (SE) and display Element (DE) expansion. See "CE (7201-02) Main Wall Spacer Frame".

Because of cable limitations, it is essential to physically locate Storage Element 1 and Display Element 1 as close together as practical. In no case should the distance between the I/O cable entry holes exceed 30 feet.

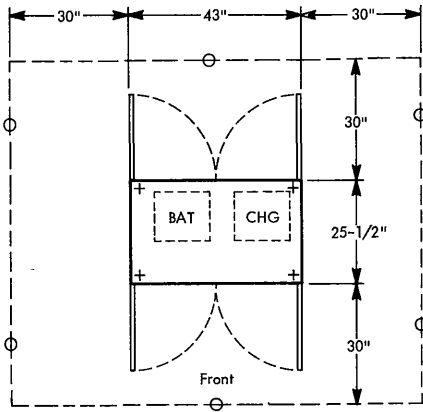


- Notes:
1. The CE Battery Frame contains battery backup for CE(s).
 2. The Main Wall Spacer Frame is required between two SE's or DE's when they are not separated by a CE or a CE Battery Frame.
 3. The reading boards are optionally right- or left-handed.

Figure 6. Numeric Sequence for CE, DE, and SE Expansion (DE Expansion Independent of SE Expansion)

CE (7201-02) BATTERY FRAME

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
43	25-1/2	72-1/2

Service Clearances (Inches)

F	R	Rt	L
30	30	30	30

Weight:

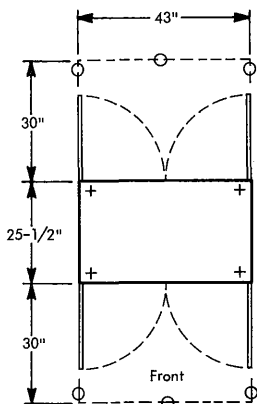
with 1 battery pack	350 pounds
with 2 battery packs	450 pounds

Notes:

Contains battery backup for one or two CE's.
 Front access required to service batteries; rear access required for interframe cabling.

CE (7201-02) MAIN WALL SPACER FRAME

PLAN VIEW



SPECIFICATIONS

Dimensions (Inches)

F	S	H
43	25-1/2	72-1/2

Service Clearances (Inches)

F	R	Rt	L
30	30	0	0

Weight: 250 pounds

Notes:

Required between two SE's or DE's on the main wall, when they are not separated by a CE or a CE Battery Frame.
 Front and rear access required for interframe cabling.

CABLE CONNECTOR ILLUSTRATIONS

Figures 7-12 are representative of cable connectors used in the 9020 Computer System. The dimensions given for plugs are maximum overall measurements and may be used in calculations concerning subfloor clearances.

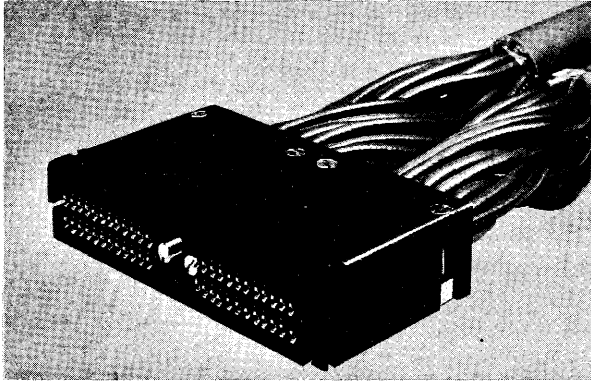


Figure 7. System/360 Interface Connector (4 inches wide, 1 inch high)

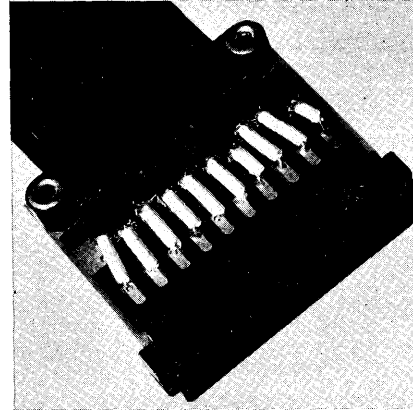


Figure 8. System/360 Card Connector (1-5/8 inches wide, 7/16 inches high)

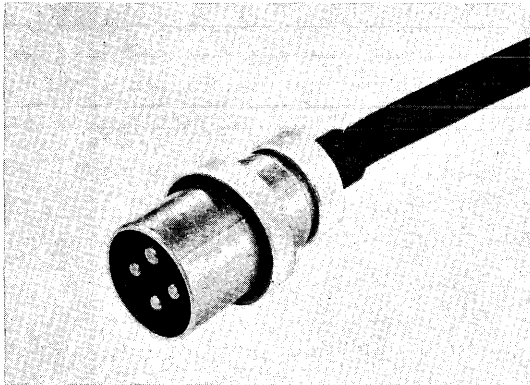


Figure 9. Power Cord Plug, R&S FS3760 (3-phase, 30-ampere, 4-wire; O D 2-1/4 inches, 4-1/2 inches long)

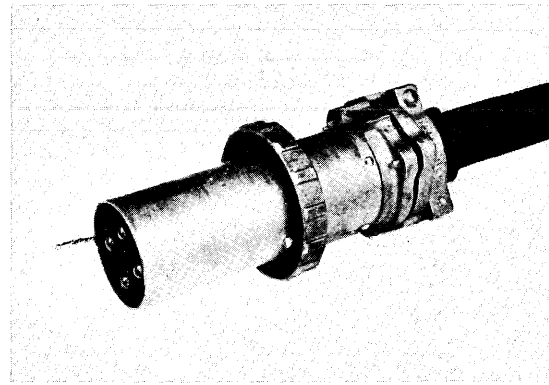


Figure 10. Power Cord Plug, R&S SC7328 (3-phase, 60-ampere, 4-wire; O D 3-3/4 inches, 9 inches long)

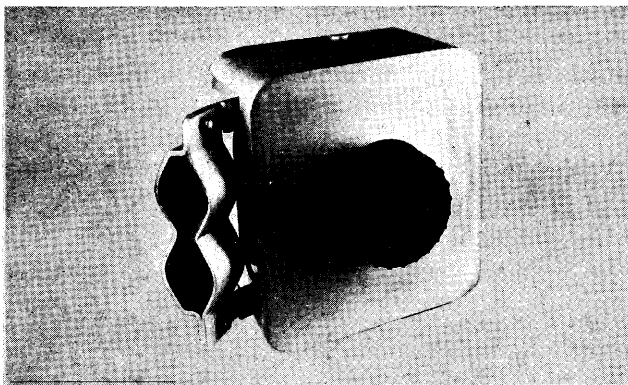


Figure 11. 200-Pin Signal Connector (7-11/16 inches high, 4-1/8 inches deep, 5-15/16 inches wide)

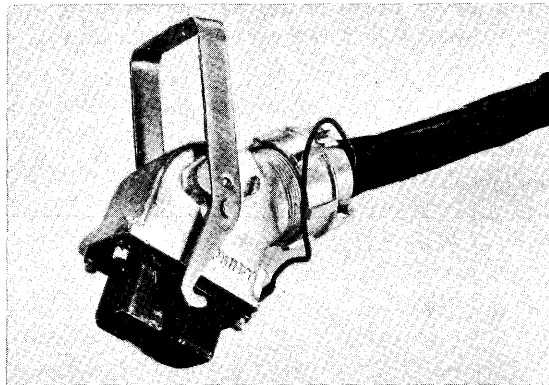


Figure 12. Tape Power Cable Connector (3-5/8 inches high, 4-1/2 inches deep, 2-1/16 inches wide)

CABLING

9020A SYSTEM ONLY

The following list of cables represents all combinations of external cables required to interconnect the units in the 9020A System. Limitations in cable lengths are in subsequent figures.

These cables are identified at each end with a label containing information as shown in each column. The abbreviations represent card socket (S), socket location (LC), block type (BT), vertical height above the floor in inches (Y) for the "from" machine, and (Z) vertical height for the "to" machine.

Notes are provided where necessary to clarify special cable usage and various assignments.

9020A SYSTEM EXTERNAL CABLE LISTING

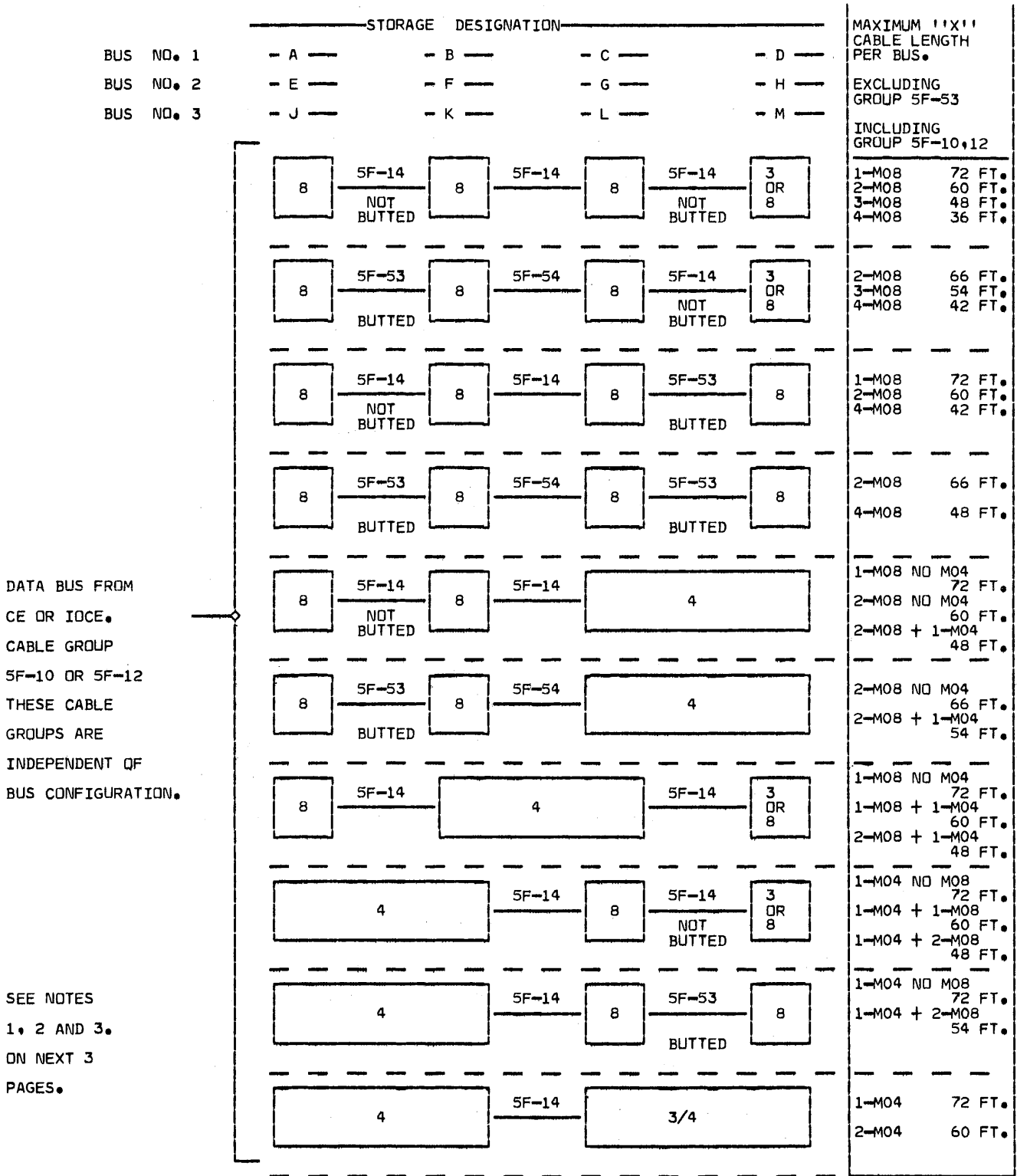
GROUP NO	KEY NO	PART NO	FROM				TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
SE DISTRIBUTED SIMPLEX BUS 1 TO CE AND IOCE - REF. CHART H1-7 SEE B/M 5402266 FOR TERMINATORS REQUIRED WITH EACH 5F-10 GROUP AND 5F-12 GROUP													
5F-10	5F-10A	5372931	7251-		H1	B	72		7201-1	G	K8	B	24
	5F-10B	5372931	7251-		H7	B	30		7201-1	G	K7	B	30
	5F-10A	5372931	7251-		G1	B	72		7201-2	G	K8	B	24
	5F-10B	5372931	7251-		G7	B	30		7201-2	G	K7	B	30
	5F-10A	5372931	7251-		F1	B	72		7201-3	G	K8	B	24
	5F-10B	5372931	7251-		F7	B	30		7201-3	G	K7	B	30
	5F-10A	5372931	7251-		E1	B	72		7201-4	G	K8	B	24
	5F-10B	5372931	7251-		E7	B	30		7201-4	G	K7	B	30
5F-12	5F-12A	5372931	7251-		G2	B	66		7231-1	G	H6	B	37
	5F-12B	5372931	7251-		G8	B	24		7231-1	G	G6	B	37
	5F-12A	5372931	7251-		F2	B	66		7231-2	G	H6	B	37
	5F-12B	5372931	7251-		F8	B	24		7231-2	G	G6	B	37
	5F-12A	5372931	7251-		E2	B	66		7231-3	G	H6	B	37
	5F-12B	5372931	7251-		E8	B	24		7231-3	G	G6	B	37

NOTE: Y AND Z IN INCHES

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO							
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z			
SE DISTRIBUTED SIMPLEX BUS 2 TO CE AND IOCE - REF. CHART J1-7															
5F-10	5F-10A	5372931	7251-					H1	B	72	7201-1	G	L8	B	24
	5F-10B	5372931	7251-					H7	B	30	7201-1	G	L7	B	30
	5F-10A	5372931	7251-					G1	B	72	7201-2	G	L8	B	24
	5F-10B	5372931	7251-					G7	B	30	7201-2	G	L7	B	30
	5F-10A	5372931	7251-					F1	B	72	7201-3	G	L8	B	24
	5F-10B	5372931	7251-					F7	B	30	7201-3	G	L7	B	30
	5F-10A	5372931	7251-					E1	B	72	7201-4	G	L8	B	24
	5F-10B	5372931	7251-					E7	B	30	7201-4	G	L7	B	30
5F-12	5F-12A	5372931	7251-					G2	B	66	7231-1	G	K6	B	37
	5F-12B	5372931	7251-					G8	B	24	7231-1	G	J6	B	37
	5F-12A	5372931	7251-					F2	B	66	7231-2	G	K6	B	37
	5F-12B	5372931	7251-					F8	B	24	7231-2	G	J6	B	37
	5F-12A	5372931	7251-					E2	B	66	7231-3	G	K6	B	37
	5F-12B	5372931	7251-					E8	B	24	7231-3	G	J6	B	37
SE DISTRIBUTED SIMPLEX BUS 3 TO CE AND IOCE - REF. CHART K1-7															
5F-10	5F-10A	5372931	7251-					H1	B	72	7201-1	G	M8	B	24
	5F-10B	5372931	7251-					H7	B	30	7201-1	G	M7	B	30
	5F-10A	5372931	7251-					G1	B	72	7201-2	G	M8	B	24
	5F-10B	5372931	7251-					G7	B	30	7201-2	G	M7	B	30
	5F-10A	5372931	7251-					F1	B	72	7201-3	G	M8	B	24
	5F-10B	5372931	7251-					F7	B	30	7201-3	G	M7	B	30
	5F-10A	5372931	7251-					E1	B	72	7201-4	G	M8	B	24
	5F-10B	5372931	7251-					E7	B	30	7201-4	G	M7	B	30
5F-12	5F-12A	5372931	7251-					G2	B	66	7231-1	G	M6	B	37
	5F-12B	5372931	7251-					G8	B	24	7231-1	G	L6	B	37
	5F-12A	5372931	7251-					F2	B	66	7231-2	G	M6	B	37
	5F-12B	5372931	7251-					F8	B	24	7231-2	G	L6	B	37
	5F-12A	5372931	7251-					E2	B	66	7231-3	G	M6	B	37
	5F-12B	5372931	7251-					E8	B	24	7231-3	G	L6	B	37

9020A SYSTEM EXTERNAL CABLE LISTING



NUMBERS IN BLOCKS ARE 7251 MODEL NUMBERS. USE CABLE GROUPS ON BUS AS INDICATED. ANY OF THE ABOVE CONFIGURATIONS POSSIBLE ON A SINGLE BUS REGARDLESS OF CONFIGURATION ON ANY OTHER BUS. (IE; INDEPENDENT BUS).

Figure 13. Distributed Simplex IOCE/CE to Storage Bus

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z		
SE TO SE DISTRIBUTED SIMPLEX CABLES FOR CE AND IOCE ORDER AS NEEDED PER BUS CONFIGURATION. SEE FIGURE 13.														
GROUP 5F-14														
FOR CE 1														
5F-14	5F-14A	5372931	7251-					D1	B	72	7251-	H1	B	72
	5F-14B	5372931	7251-					D7	B	30	7251-	H7	B	30
FOR CE 2														
	5F-14A	5372931	7251-					C1	B	72	7251-	G1	B	72
	5F-14B	5372931	7251-					C7	B	30	7251-	G7	B	30
FOR CE 3														
	5F-14A	5372931	7251-					B1	B	72	7251-	F1	B	72
	5F-14B	5372931	7251-					B7	B	30	7251-	F7	B	30
FOR CE 4														
	5F-14A	5372931	7251-					A1	B	72	7251-	E1	B	72
	5F-14B	5372931	7251-					A7	B	30	7251-	E7	B	30
FOR IOCE 1														
	5F-14A	5372931	7251-					D2	B	66	7251-	G2	B	66
	5F-14B	5372931	7251-					D8	B	24	7251-	G8	B	24
FOR IOCE 2														
	5F-14A	5372931	7251-					C2	B	66	7251-	F2	B	66
	5F-14B	5372931	7251-					C8	B	24	7251-	F8	B	24
FOR IOCE 3														
	5F-14A	5372931	7251-					B2	B	66	7251-	E2	B	66
	5F-14B	5372931	7251-					B8	B	24	7251-	E8	B	24

NOTE 1: THE USAGE OF THIS CABLE GROUP IS DETERMINED ON A DISTRIBUTED SIMPLEX BUS BASIS DEPENDING ON CONFIGURATION OF THAT BUS.

FOR EXAMPLE: REFERRING TO FIGURE 13. ASSUME FOUR (4) MO8 ON BUS NUMBER 1, NONE BUTTED. THIS IS TOP LINE OF FIGURE 13. GROUP 5F-14 IS NEEDED THREE (3) TIMES FOR BUS NUMBER 1. ONCE BETWEEN SE-A AND SE-B, ONCE BETWEEN SE-B AND SE-C, AND ONCE BETWEEN SE-C AND SE-D. BUS NUMBERS 2 AND 3 ARE LIKEWISE, AND INDEPENDENTLY EVALUATED.

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO			
			MACH	S	LC	BT	Y	MACH	S	LC

SE TO SE DISTRIBUTED SIMPLEX CABLES FOR CE AND IOCE.
 ORDER AS NEEDED PER BUS CONFIGURATION. SEE FIGURE 13.

GROUP 5F-53 FOR BUTTED 7251-M08 ONLY. ***** NO X DIMENSION ON THIS GROUP *****

GROUP 5F-53

FOR CE 1

5F-53	5F-53A	5372931	7251-		D1	B	30	7251-	D1	B	20
	5F-53B	5372931	7251-		D7	B	30	7251-	D7	B	20

FOR CE 2

	5F-53A	5372931	7251-		C1	B	30	7251-	C1	B	20
	5F-53B	5372931	7251-		C7	B	30	7251-	C7	B	20

FOR CE 3

	5F-53A	5372931	7251-		B1	B	30	7251-	B1	B	20
	5F-53B	5372931	7251-		B7	B	30	7251-	B7	B	20

FOR CE 4

	5F-53A	5372931	7251-		A1	B	30	7251-	A1	B	20
	5F-53B	5372931	7251-		A7	B	30	7251-	A7	B	20

FOR IOCE 1

	5F-53A	5372931	7251-		D2	B	30	7251-	D2	B	20
	5F-53B	5372931	7251-		D8	B	30	7251-	D8	B	20

FOR IOCE 2

	5F-53A	5372931	7251-		C2	B	30	7251-	C2	B	20
	5F-53B	5372931	7251-		C8	B	30	7251-	C8	B	20

FOR IOCE 3

	5F-53A	5372931	7251-		B2	B	30	7251-	B2	B	20
	5F-53B	5372931	7251-		B8	B	30	7251-	B8	B	20

NOTE 2: THE USAGE OF THIS CABLE GROUP IS DETERMINED ON A DISTRIBUTED SIMPLEX BUS BASIS DEPENDING ON CONFIGURATION OF THAT BUS AND IS NEEDED ONLY IF BUTTED M08 EXIST.

FOR EXAMPLE: REFERRING TO FIGURE 13. ASSUME FOUR (4) M08 ON BUS NUMBER 2. FIRST TWO BUTTED. THIS IS THE SECOND LINE OF FIGURE 13. GROUP 5F-53 IS NEEDED ONCE BETWEEN SE-E AND SE-F ON BUS NUMBER 2. BUS NUMBERS 1 AND 3 ARE LIKewise, AND INDEPENDENTLY EVALUATED.

ALSO NOTE THAT THIS EXAMPLE REQUIRES ONE (1) GROUP 5F-54 AND ONE (1) GROUP 5F-14 ON BUS NUMBER 2.

● 9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO					
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
SE TO SE DISTRIBUTED SIMPLEX CABLES FOR CE AND IOCE, ORDER AS NEEDED PER BUS CONFIGURATION. SEE FIGURE 13.													
GROUP 5F-54 NEEDED WITH BUTTED 7251-M08 ONLY.													
GROUP 5F-54													
FOR CE 1													
5F-54	5F-54A	5372931	7251-				H1	B	72	7251-	H1	B	72
	5F-54B	5372931	7251-				H7	B	30	7251-	H7	B	30
FOR CE 2													
	5F-54A	5372931	7251-				G1	B	72	7251-	G1	B	72
	5F-54B	5372931	7251-				G7	B	30	7251-	G7	B	30
FOR CE 3													
	5F-54A	5372931	7251-				F1	B	72	7251-	F1	B	72
	5F-54B	5372931	7251-				F7	B	30	7251-	F7	B	30
FOR CE 4													
	5F-54A	5372931	7251-				E1	B	72	7251-	E1	B	72
	5F-54B	5372931	7251-				E7	B	30	7251-	E7	B	30
FOR IOCE 1													
	5F-54A	5372931	7251-				G2	B	66	7251-	G2	B	66
	5F-54B	5372931	7251-				G8	B	24	7251-	G8	B	24
FOR IOCE 2													
	5F-54A	5372931	7251-				F2	B	66	7251-	F2	B	66
	5F-54B	5372931	7251-				F8	B	24	7251-	F8	B	24
FOR IOCE 3													
	5F-54A	5372931	7251-				E2	B	66	7251-	E2	B	66
	5F-54B	5372931	7251-				E8	B	24	7251-	E8	B	24

NOTE 3: THE USAGE OF THIS CABLE GROUP IS DETERMINED ON A DISTRIBUTED SIMPLEX BUS BASIS DEPENDING ON CONFIGURATION OF THAT BUS AND IS NEEDED ONLY IF BUTTED M08 EXIST. FOR EXAMPLE: REFERING TO FIGURE 13. ASSUME TWO (2) M08 BUTTED AND ONE (1) M04 ON BUS NUMBER 3 (M08 FIRST). THIS IS THE SIXTH LINE OF FIGURE 13. GROUP 5F-54 IS NEEDED ONCE BETWEEN SE-K AND SE-L ON BUS NUMBER 3. BUS NUMBERS 1 AND 2 ARE LIKEWISE, AND INDEPENDENTLY EVALUATED. ALSO NOTE THAT THIS EXAMPLE REQUIRES ONE (1) GROUP 5F-53 ON BUS NUMBER 3.

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO					
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
SIMPLEX CABLES												
SE TO CE/IOCE												
SE-1 (MOD 4 OR MOD 8) TO CE - REF. CHART L1-4 OR N1-4												
5F-11	5F-11A	5372932	7251-1		H3	B	60	7201-1	G	T6	B	37
	5F-11B	5372932	7251-1		H5	B	44	7201-1	G	N7	B	30
	5F-11A	5372932	7251-1		G3	B	60	7201-2	G	T6	B	37
	5F-11B	5372932	7251-1		G5	B	44	7201-2	G	N7	B	30
	5F-11A	5372932	7251-1		F3	B	60	7201-3	G	T6	B	37
	5F-11B	5372932	7251-1		F5	B	44	7201-3	G	N7	B	30
	5F-11A	5372932	7251-1		E3	B	60	7201-4	G	T6	B	37
	5F-11B	5372932	7251-1		E5	B	44	7201-4	G	N7	B	30
SE-2 (MOD 4) TO CE - REF. CHART L1-4												
5F-11	5F-11A	5372932	7251-2		D3	B	60	7201-1	G	S6	B	37
	5F-11B	5372932	7251-2		D5	B	44	7201-1	G	P7	B	30
	5F-11A	5372932	7251-2		C3	B	60	7201-2	G	S6	B	37
	5F-11B	5372932	7251-2		C5	B	44	7201-2	G	P7	B	30
	5F-11A	5372932	7251-2		B3	B	60	7201-3	G	S6	B	37
	5F-11B	5372932	7251-2		B5	B	44	7201-3	G	P7	B	30
	5F-11A	5372932	7251-2		A3	B	60	7201-4	G	S6	B	37
	5F-11B	5372932	7251-2		A5	B	44	7201-4	G	P7	B	30
SE-2 (MOD 8) TO CE - REF. CHART N1-4												
5F-11	5F-11A	5372932	7251-2		H3	B	60	7201-1	G	S6	B	37
	5F-11B	5372932	7251-2		H5	B	44	7201-1	G	P7	B	30
	5F-11A	5372932	7251-2		G3	B	60	7201-2	G	S6	B	37
	5F-11B	5372932	7251-2		G5	B	44	7201-2	G	P7	B	30
	5F-11A	5372932	7251-2		F3	B	60	7201-3	G	S6	B	37
	5F-11B	5372932	7251-2		F5	B	44	7201-3	G	P7	B	30
	5F-11A	5372932	7251-2		E3	B	60	7201-4	G	S6	B	37
	5F-11B	5372932	7251-2		E5	B	44	7201-4	G	P7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO					
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
SE-3 (MOD 4 OR MOD 8) TO CE - REF. CHART L1-4 OR N1-4												
5F-11	5F-11A	5372932	7251-3		H3	B	60	7201-1	G	R6	B	37
	5F-11B	5372932	7251-3		H5	B	44	7201-1	G	Q7	B	30
	5F-11A	5372932	7251-3		G3	B	60	7201-2	G	R6	B	37
	5F-11B	5372932	7251-3		G5	B	44	7201-2	G	Q7	B	30
	5F-11A	5372932	7251-3		F3	B	60	7201-3	G	R6	B	37
	5F-11B	5372932	7251-3		F5	B	44	7201-3	G	Q7	B	30
	5F-11A	5372932	7251-3		E3	B	60	7201-4	G	R6	B	37
	5F-11B	5372932	7251-3		E5	B	44	7201-4	G	Q7	B	30
SE-4 (MOD 4) TO CE - REF. CHART L1-4												
5F-11	5F-11A	5372932	7251-4		D3	B	60	7201-1	G	Q6	B	37
	5F-11B	5372932	7251-4		D5	B	44	7201-1	G	R7	B	30
	5F-11A	5372932	7251-4		C3	B	60	7201-2	G	Q6	B	37
	5F-11B	5372932	7251-4		C5	B	44	7201-2	G	R7	B	30
	5F-11A	5372932	7251-4		B3	B	60	7201-3	G	Q6	B	37
	5F-11B	5372932	7251-4		B5	B	44	7201-3	G	R7	B	30
	5F-11A	5372932	7251-4		A3	B	60	7201-4	G	Q6	B	37
	5F-11B	5372932	7251-4		A5	B	44	7201-4	G	R7	B	30
SE-4 (MOD 8) TO CE - REF. CHART N1-4												
5F-11	5F-11A	5372932	7251-4		H3	B	60	7201-1	G	Q6	B	37
	5F-11B	5372932	7251-4		H5	B	44	7201-1	G	R7	B	30
	5F-11A	5372932	7251-4		G3	B	60	7201-2	G	Q6	B	37
	5F-11B	5372932	7251-4		G5	B	44	7201-2	G	R7	B	30
	5F-11A	5372932	7251-4		F3	B	60	7201-3	G	Q6	B	37
	5F-11B	5372932	7251-4		F5	B	44	7201-3	G	R7	B	30
	5F-11A	5372932	7251-4		E3	B	60	7201-4	G	Q6	B	37
	5F-11B	5372932	7251-4		E5	B	44	7201-4	G	R7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO				
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
SE-5 (MOD 4 OR MOD 8) TO CE - REF. CHART L1-4 OR N1-4												
5F-11	5F-11A	5372932	7251-5		H3	B	60	7201-1	G	P6	B	37
	5F-11B	5372932	7251-5		H5	B	44	7201-1	G	S7	B	30
	5F-11A	5372932	7251-5		G3	B	60	7201-2	G	P6	B	37
	5F-11B	5372932	7251-5		G5	B	44	7201-2	G	S7	B	30
	5F-11A	5372932	7251-5		F3	B	60	7201-3	G	P6	B	37
	5F-11B	5372932	7251-5		F5	B	44	7201-3	G	S7	B	30
	5F-11A	5372932	7251-5		E3	B	60	7201-4	G	P6	B	37
	5F-11B	5372932	7251-5		E5	B	44	7201-4	G	S7	B	30
SE-6 (MOD 4) TO CE REF. CHART L1-4												
5F-11	5F-11A	5372932	7251-6		D3	B	60	7201-1	G	N6	B	37
	5F-11B	5372932	7251-6		D5	B	44	7201-1	G	T7	B	30
	5F-11A	5372932	7251-6		C3	B	60	7201-2	G	N6	B	37
	5F-11B	5372932	7251-6		C5	B	44	7201-2	G	T7	B	30
	5F-11A	5372932	7251-6		B3	B	60	7201-3	G	N6	B	37
	5F-11B	5372932	7251-6		B5	B	44	7201-3	G	T7	B	30
	5F-11A	5372932	7251-6		A3	B	60	7201-4	G	N6	B	37
	5F-11B	5372932	7251-6		A5	B	44	7201-4	G	T7	B	30
SE-6 (MOD 8) TO CE REF. CHART N1-4												
5F-11	5F-11A	5372932	7251-6		H3	B	60	7201-1	G	N6	B	37
	5F-11B	5372932	7251-6		H5	B	44	7201-1	G	T7	B	30
	5F-11A	5372932	7251-6		G3	B	60	7201-2	G	N6	B	37
	5F-11B	5372932	7251-6		G5	B	44	7201-2	G	T7	B	30
	5F-11A	5372932	7251-6		F3	B	60	7201-3	G	N6	B	37
	5F-11B	5372932	7251-6		F5	B	44	7201-3	G	T7	B	30
	5F-11A	5372932	7251-6		E3	B	60	7201-4	G	N6	B	37
	5F-11B	5372932	7251-6		E5	B	44	7201-4	G	T7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO							
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z			
SE-7 (MOD 4 OR MOD 8) TO CE - REF. CHART L1-4 OR N1-4															
5F-11	5F-11A	5372932	7251-7					H3	B	60	7201-1	G	T5	B	44
	5F-11B	5372932	7251-7					H5	B	44	7201-1	G	N8	B	24
	5F-11A	5372932	7251-7					G3	B	60	7201-2	G	T5	B	44
	5F-11B	5372932	7251-7					G5	B	44	7201-2	G	N8	B	24
	5F-11A	5372932	7251-7					F3	B	60	7201-3	G	T5	B	44
	5F-11B	5372932	7251-7					F5	B	44	7201-3	G	N8	B	24
	5F-11A	5372932	7251-7					E3	B	60	7201-4	G	T5	B	44
	5F-11B	5372932	7251-7					E5	B	44	7201-4	G	N8	B	24
SE-8 (MOD 4) TO CE - REF. CHART L1-4															
5F-11	5F-11A	5372932	7251-8					D3	B	60	7201-1	G	S5	B	44
	5F-11B	5372932	7251-8					D5	B	44	7201-1	G	P8	B	24
	5F-11A	5372932	7251-8					C3	B	60	7201-2	G	S5	B	44
	5F-11B	5372932	7251-8					C5	B	44	7201-2	G	P8	B	24
	5F-11A	5372932	7251-8					B3	B	60	7201-3	G	S5	B	44
	5F-11B	5372932	7251-8					B5	B	44	7201-3	G	P8	B	24
	5F-11A	5372932	7251-8					A3	B	60	7201-4	G	S5	B	44
	5F-11B	5372932	7251-8					A5	B	44	7201-4	G	P8	B	24
SE-8 (MOD 8) TO CE - REF. CHART N1-4															
5F-11	5F-11A	5372932	7251-8					H3	B	60	7201-1	G	S5	B	44
	5F-11B	5372932	7251-8					H5	B	44	7201-1	G	P8	B	24
	5F-11A	5372932	7251-8					G3	B	60	7201-2	G	S5	B	44
	5F-11B	5372932	7251-8					G5	B	44	7201-2	G	P8	B	24
	5F-11A	5372932	7251-8					F3	B	60	7201-3	G	S5	B	44
	5F-11B	5372932	7251-8					F5	B	44	7201-3	G	P8	B	24
	5F-11A	5372932	7251-8					E3	B	60	7201-4	G	S5	B	44
	5F-11B	5372932	7251-8					E5	B	44	7201-4	G	P8	B	24
SE-9 (MOD 4 OR MOD 8) TO CE - REF. CHART L1-4 OR N1-4															
5F-11	5F-11A	5372932	7251-9					H3	B	60	7201-1	G	R5	B	37
	5F-11B	5372932	7251-9					H5	B	44	7201-1	G	Q8	B	30
	5F-11A	5372932	7251-9					G3	B	60	7201-2	G	R5	B	37
	5F-11B	5372932	7251-9					G5	B	44	7201-2	G	Q8	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
	5F-11A	5372932	7251-9		F3	B	60		7201-3	G	R5	B	37
	5F-11B	5372932	7251-9		F5	B	44		7201-3	G	Q8	B	30
	5F-11A	5372932	7251-9		E3	B	60		7201-4	G	R5	B	37
	5F-11B	5372932	7251-9		E5	B	44		7201-4	G	Q8	B	30
SE-10 (MOD 4) TO CE - REF. CHART L1-4													
5F-11	5F-11A	5372932	7251-10		D3	B	60		7201-1	G	Q5	B	44
	5F-11B	5372932	7251-10		D5	B	44		7201-1	G	R8	B	24
	5F-11A	5372932	7251-10		C3	B	60		7201-2	G	Q5	B	44
	5F-11B	5372932	7251-10		C5	B	44		7201-2	G	R8	B	24
	5F-11A	5372932	7251-10		B3	B	60		7201-3	G	Q5	B	44
	5F-11B	5372932	7251-10		B5	B	44		7201-3	G	R8	B	24
	5F-11A	5372932	7251-10		A3	B	60		7201-4	G	Q5	B	44
	5F-11B	5372932	7251-10		A5	B	44		7201-4	G	R8	B	24
SE-10 (MOD 8) TO CE - REF. CHART N1-4													
5F-11	5F-11A	5372932	7251-10		H3	B	60		7201-1	G	Q5	B	44
	5F-11B	5372932	7251-10		H5	B	44		7201-1	G	R8	B	24
	5F-11A	5372932	7251-10		G3	B	60		7201-2	G	Q5	B	44
	5F-11B	5372932	7251-10		G5	B	44		7201-2	G	R8	B	24
	5F-11A	5372932	7251-10		F3	B	60		7201-3	G	Q5	B	44
	5F-11B	5372932	7251-10		F5	B	44		7201-3	G	R8	B	24
	5F-11A	5372932	7251-10		E3	B	60		7201-4	G	Q5	B	44
	5F-11B	5372932	7251-10		E5	B	44		7201-4	G	R8	B	24
SE-11 (MOD 4 OR MOD 8) TO CE - REF. CHART L1-4 OR N1-4													
5F-11	5F-11A	5372932	7251-11		H3	B	60		7201-1	G	P5	B	44
	5F-11B	5372932	7251-11		H5	B	44		7201-1	G	S8	B	24
	5F-11A	5372932	7251-11		G3	B	60		7201-2	G	P5	B	44
	5F-11B	5372932	7251-11		G5	B	44		7201-2	G	S8	B	24
	5F-11A	5372932	7251-11		F3	B	60		7201-3	G	P5	B	44
	5F-11B	5372932	7251-11		F5	B	44		7201-3	G	S8	B	24
	5F-11A	5372932	7251-11		E3	B	60		7201-4	G	P5	B	44
	5F-11B	5372932	7251-11		E5	B	44		7201-4	G	S8	B	24

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
SE-12 (MOD 4) TO CE - REF. CHART L1-4													
5F-11	5F-11A	5372932	7251-12		D3	B	60		7201-1	G	N5	B	44
	5F-11B	5372932	7251-12		D5	B	44		7201-1	G	T8	B	24
	5F-11A	5372932	7251-12		C3	B	60		7201-2	G	N5	B	44
	5F-11B	5372932	7251-12		C5	B	44		7201-2	G	T8	B	24
	5F-11A	5372932	7251-12		B3	B	60		7201-3	G	N5	B	44
	5F-11B	5372932	7251-12		B5	B	44		7201-3	G	T8	B	24
	5F-11A	5372932	7251-12		A3	B	60		7201-4	G	N5	B	44
	5F-11B	5372932	7251-12		A5	B	44		7201-4	G	T8	B	24
SE-12 (MOD 8) TO CE - REF. CHART N1-4													
5F-11	5F-11A	5372932	7251-12		H3	B	60		7201-1	G	N5	B	44
	5F-11B	5372932	7251-12		H5	B	44		7201-1	G	T8	B	24
	5F-11A	5372932	7251-12		G3	B	60		7201-2	G	N5	B	44
	5F-11B	5372932	7251-12		G5	B	44		7201-2	G	T8	B	24
	5F-11A	5372932	7251-12		F3	B	60		7201-3	G	N5	B	44
	5F-11B	5372932	7251-12		F5	B	44		7201-3	G	T8	B	24
	5F-11A	5372932	7251-12		E3	B	60		7201-4	G	N5	B	44
	5F-11B	5372932	7251-12		E5	B	44		7201-4	G	T8	B	24
SE-1 (MOD 4 OR MOD 8) TO IOCE - REF. CHART L5-7 OR N5-7													
5F-13	5F-13A	5372932	7251-1		G4	B	52		7231-1	G	M5	B	44
	5F-13B	5372932	7251-1		G6	B	37		7231-1	G	M7	B	30
	5F-13A	5372932	7251-1		F4	B	52		7231-2	G	M5	B	44
	5F-13B	5372932	7251-1		F6	B	37		7231-2	G	M7	B	30
	5F-13A	5372932	7251-1		E4	B	52		7231-3	G	M5	B	44
	5F-13B	5372932	7251-1		E6	B	37		7231-3	G	M7	B	30
SE-2 (MOD 4) TO IOCE - REF. CHART L5-7													
5F-13	5F-13A	5372932	7251-2		D4	B	52		7231-1	G	L5	B	44
	5F-13B	5372932	7251-2		D6	B	37		7231-1	G	L7	B	30
	5F-13A	5372932	7251-2		C4	B	52		7231-2	G	L5	B	44
	5F-13B	5372932	7251-2		C6	B	37		7231-2	G	L7	B	30
	5F-13A	5372932	7251-2		B4	B	52		7231-3	G	L5	B	44
	5F-13B	5372932	7251-2		B6	B	37		7231-3	G	L7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO				
			MACH	S	LC	BT	Y	MACH	S	LC	BT
SE-2 (MOD 8) TO IOCE - REF. CHART N5-7											
5F-13	5F-13A	5372932	7251-2		G4	B	52	7231-1	G	L5	B 44
	5F-13B	5372932	7251-2		G6	B	37	7231-1	G	L7	B 30
	5F-13A	5372932	7251-2		F4	B	52	7231-2	G	L5	B 44
	5F-13B	5372932	7251-2		F6	B	37	7231-2	G	L7	B 30
	5F-13A	5372932	7251-2		E4	B	52	7231-3	G	L5	B 44
	5F-13B	5372932	7251-2		E6	B	37	7231-3	G	L7	B 30
SE-3 (MOD 4 OR MOD 8) TO IOCE - REF. CHART L5-7 OR N5-7											
5F-13	5F-13A	5372932	7251-3		G4	B	52	7231-1	G	K5	B 44
	5F-13B	5372932	7251-3		G6	B	37	7231-1	G	K7	B 30
	5F-13A	5372932	7251-3		F4	B	52	7231-2	G	K5	B 44
	5F-13B	5372932	7251-3		F6	B	37	7231-2	G	K7	B 30
	5F-13A	5372932	7251-3		E4	B	52	7231-3	G	K5	B 44
	5F-13B	5372932	7251-3		E6	B	37	7231-3	G	K7	B 30
SE-4 (MOD 4) TO IOCE - REF. CHART L5-7											
5F-13	5F-13A	5372932	7251-4		D4	B	52	7231-1	G	J5	B 44
	5F-13B	5372932	7251-4		D6	B	37	7231-1	G	J7	B 30
	5F-13A	5372932	7251-4		C4	B	52	7231-2	G	J5	B 44
	5F-13B	5372932	7251-4		C6	B	37	7231-2	G	J7	B 30
	5F-13A	5372932	7251-4		B4	B	52	7231-3	G	J5	B 44
	5F-13B	5372932	7251-4		B6	B	37	7231-3	G	J7	B 30
SE-4 (MOD 8) TO IOCE - REF. CHART N5-7											
5F-13	5F-13A	5372932	7251-4		G4	B	52	7231-1	G	J5	B 44
	5F-13B	5372932	7251-4		G6	B	37	7231-1	G	J7	B 30
	5F-13A	5372932	7251-4		F4	B	52	7231-2	G	J5	B 44
	5F-13B	5372932	7251-4		F6	B	37	7231-2	G	J7	B 30
	5F-13A	5372932	7251-4		E4	B	52	7231-3	G	J5	B 44
	5F-13B	5372932	7251-4		E6	B	37	7231-3	G	J7	B 30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
SE-5 (MOD 4 OR MOD 8) TO IOCE - REF. CHART L5-7 OR N5-7													
5F-13	5F-13A	5372932	7251-5		G4	B	52		7231-1	G	H5	B	44
	5F-13B	5372932	7251-5		G6	B	37		7231-1	G	H7	B	30
	5F-13A	5372932	7251-5		F4	B	52		7231-2	G	H5	B	44
	5F-13B	5372932	7251-5		F6	B	37		7231-2	G	H7	B	30
	5F-13A	5372932	7251-5		E4	B	52		7231-3	G	H5	B	44
	5F-13B	5372932	7251-5		E6	B	37		7231-3	G	H7	B	30
SE-6 (MOD 4) TO IOCE - REF. CHART L5-7													
5F-13	5F-13A	5372932	7251-6		D4	B	52		7231-1	G	G5	B	44
	5F-13B	5372932	7251-6		D6	B	37		7231-1	G	G7	B	30
	5F-13A	5372932	7251-6		C4	B	52		7231-2	G	G5	B	44
	5F-13B	5372932	7251-6		C6	B	37		7231-2	G	G7	B	30
	5F-13A	5372932	7251-6		B4	B	52		7231-3	G	G5	B	44
	5F-13B	5372932	7251-6		B6	B	37		7231-3	G	G7	B	30
SE-6 (MOD 8) TO IOCE - REF. CHART N5-7													
5F-13	5F-13A	5372932	7251-6		G4	B	52		7231-1	G	G5	B	44
	5F-13B	5372932	7251-6		G6	B	37		7231-1	G	G7	B	30
	5F-13A	5372932	7251-6		F4	B	52		7231-2	G	G5	B	44
	5F-13B	5372932	7251-6		F6	B	37		7231-2	G	G7	B	30
	5F-13A	5372932	7251-6		E4	B	52		7231-3	G	G5	B	44
	5F-13B	5372932	7251-6		E6	B	37		7231-3	G	G7	B	30
SE-7 (MOD 4 OR MOD 8) TO IOCE - REF. CHART L5-7 OR N5-7													
5F-13	5F-13A	5372932	7251-7		G4	B	52		7231-1	G	F5	B	44
	5F-13B	5372932	7251-7		G6	B	37		7231-1	G	F7	B	30
	5F-13A	5372932	7251-7		F4	B	52		7231-2	G	F5	B	44
	5F-13B	5372932	7251-7		F6	B	37		7231-2	G	F7	B	30
	5F-13A	5372932	7251-7		E4	B	52		7231-3	G	F5	B	44
	5F-13B	5372932	7251-7		E6	B	37		7231-3	G	F7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
SE-8 (MOD 4) TO IOCE - REF. CHART L5-7													
5F-13	SF-13A	5372932	7251-8		D4	B	52		7231-1	G	E5	B	44
	SF-13B	5372932	7251-8		D6	B	37		7231-1	G	E7	B	30
	SF-13A	5372932	7251-8		C4	B	52		7231-2	G	E5	B	44
	SF-13B	5372932	7251-8		C6	B	37		7231-2	G	E7	B	30
	SF-13A	5372932	7251-8		B4	B	52		7231-3	G	E5	B	44
	SF-13B	5372932	7251-8		B6	B	37		7231-3	G	E7	B	30
SE-8 (MOD 8) TO IOCE - REF. CHART N5-7													
5F-13	SF-13A	5372932	7251-8		G4	B	52		7231-1	G	E5	B	44
	SF-13B	5372932	7251-8		G6	B	37		7231-1	G	E7	B	30
	SF-13A	5372932	7251-8		F4	B	52		7231-2	G	E5	B	44
	SF-13B	5372932	7251-8		F6	B	37		7231-2	G	E7	B	30
	SF-13A	5372932	7251-8		E4	B	52		7231-3	G	E5	B	44
	SF-13B	5372932	7251-8		E6	B	37		7231-3	G	E7	B	30
SE-9 (MOD 4 OR MOD 8) TO IOCE - REF. CHART L5-7 OR N5-7													
5F-13	SF-13A	5372932	7251-9		G4	B	52		7231-1	G	D5	B	44
	SF-13B	5372932	7251-9		G6	B	37		7231-1	G	D7	B	30
	SF-13A	5372932	7251-9		F4	B	52		7231-2	G	D5	B	44
	SF-13B	5372932	7251-9		F6	B	37		7231-2	G	D7	B	30
	SF-13A	5372932	7251-9		E4	B	52		7231-3	G	D5	B	44
	SF-13B	5372932	7251-9		E6	B	37		7231-3	G	D7	B	30
SE-10 (MOD 4) TO IOCE - REF. CHART L5-7													
5F-13	SF-13A	5372932	7251-10		D4	B	52		7231-1	G	C5	B	44
	SF-13B	5372932	7251-10		D6	B	37		7231-1	G	C7	B	30
	SF-13A	5372932	7251-10		C4	B	52		7231-2	G	C5	B	44
	SF-13B	5372932	7251-10		C6	B	37		7231-2	G	C7	B	30
	SF-13A	5372932	7251-10		B4	B	52		7231-3	G	C5	B	44
	SF-13B	5372932	7251-10		B6	B	37		7231-3	G	C7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
SE-10 (MOD 8) TO IOCE - REF. CHART N5-7													
5F-13	5F-13A	5372932	7251-10		G4	B	52		7231-1	G	C5	B	44
	5F-13B	5372932	7251-10		G6	B	37		7231-1	G	C7	B	30
	5F-13A	5372932	7251-10		F4	B	52		7231-2	G	C5	B	44
	5F-13B	5372932	7251-10		F6	B	37		7231-2	G	C7	B	30
	5F-13A	5372932	7251-10		E4	B	52		7231-3	G	C5	B	44
	5F-13B	5372932	7251-10		E6	B	37		7231-3	G	C7	B	30
SE-11 (MOD 4 OR MOD 8) TO IOCE - REF. CHART L5-7 OR N5-7													
5F-13	5F-13A	5372932	7251-11		G4	B	52		7231-1	G	B5	B	44
	5F-13B	5372932	7251-11		G6	B	37		7231-1	G	B7	B	30
	5F-13A	5372932	7251-11		F4	B	52		7231-2	G	B5	B	44
	5F-13B	5372932	7251-11		F6	B	37		7231-2	G	B7	B	30
	5F-13A	5372932	7251-11		E4	B	52		7231-3	G	B5	B	44
	5F-13B	5372932	7251-11		E6	B	37		7231-3	G	B7	B	30
SE-12 (MOD 4) TO IOCE - REF. CHART L5-7													
5F-13	5F-13A	5372932	7251-12		D4	B	52		7231-1	G	A5	B	44
	5F-13B	5372932	7251-12		D6	B	37		7231-1	G	A7	B	30
	5F-13A	5372932	7251-12		C4	B	52		7231-2	G	A5	B	44
	5F-13B	5372932	7251-12		C6	B	37		7231-2	G	A7	B	30
	5F-13A	5372932	7251-12		B4	B	52		7231-3	G	A5	B	44
	5F-13B	5372932	7251-12		B6	B	37		7231-3	G	A7	B	30
SE-12 (MOD 8) TO IOCE - REF. CHART N5-7													
5F-13	5F-13A	5372932	7251-12		G4	B	52		7231-1	G	A5	B	44
	5F-13B	5372932	7251-12		G6	B	37		7231-1	G	A7	B	30
	5F-13A	5372932	7251-12		F4	B	52		7231-2	G	A5	B	44
	5F-13B	5372932	7251-12		F6	B	37		7231-2	G	A7	B	30
	5F-13A	5372932	7251-12		E4	B	52		7231-3	G	A5	B	44
	5F-13B	5372932	7251-12		E6	B	37		7231-3	G	A7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO				
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
SE TO SC REF. CHART L-N 22												
SEE NOTE 4 -	5F-15	5F-15A	5372932	7251-1		H6	B	37	7265	S1	F1	B 29
	5F-15	5F-15B	352303	7251-1		J9		52	7265	S2	J9	32
	5F-01	5F-01A	352303	7251-2		J9		52	7265	S2	J10	32
SEE NOTE 4 -	5F-15	5F-15A	5372932	7251-3		H6	B	37	7265	S1	Q2	B 20
	5F-15	5F-15B	352303	7251-3		J9		52	7265	S2	J11	33
	5F-01	5F-01A	352303	7251-4		J9		52	7265	S2	J12	33
SEE NOTE 4 -	5F-15	5F-15A	5372932	7251-5		H6	B	37	7265	S1	L2	B 24
	5F-15	5F-15B	352303	7251-5		J9		52	7265	S2	J13	30
	5F-01	5F-01A	352303	7251-6		J9		52	7265	S2	J14	30
SEE NOTE 4 -	5F-15	5F-15A	5372932	7251-7		H6	B	37	7265	S1	K2	B 25
	5F-15	5F-15B	352303	7251-7		J9		52	7265	S2	J15	31
	5F-01	5F-01A	352303	7251-8		J9		52	7265	S2	J16	31
SEE NOTE 4 -	5F-15	5F-15A	5372932	7251-9		H6	B	37	7265	S1	H2	B 27
	5F-15	5F-15B	352303	7251-9		J9		52	7265	S2	J17	28
	5F-01	5F-01A	352303	7251-10		J9		52	7265	S2	J18	28
SEE NOTE 4 -	5F-15	5F-15A	5372932	7251-11		H6	B	37	7265	S1	G2	B 28
	5F-15	5F-15B	352303	7251-11		J9		52	7265	S2	J19	29
	5F-01	5F-01A	352303	7251-12		J9		52	7265	S2	J20	29
SEE NOTE 5 FOR 7251-08 NOT BUTTED.												
	5F-52	5F-52A	5736191	7251-		A	07		7251-		H6	B 37

FOR 7251-08 ONLY

5F-55 5F-55A 5789760

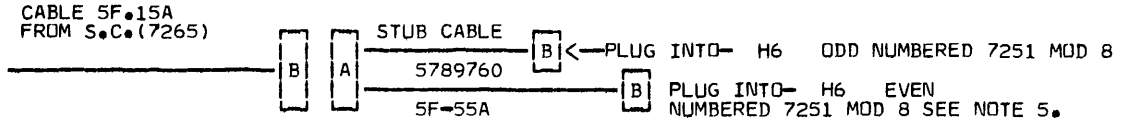
SEE NOTE 4 FOR FULL DETAILS.
CABLE PRINT SPECIFIES ALL
DIMENSIONS.

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO				
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z

NOTE 4 - 7251 MOD 8 TO BE CONNECTED AS SHOWN BELOW

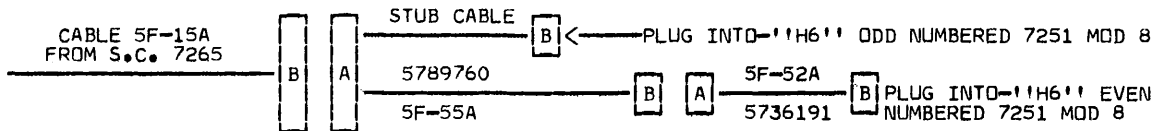
7251 MOD 8- BUTTED



REQUIRED QUANTITIES OF CABLE P/N 5789760 (PER SYSTEM)

NUMBER OF M08	NUMBER OF P/N 5789760
1 OR 2	1
3 OR 4	2
5 OR 6	3
7 OR 8	4
9 OR 10	5
11 OR 12	6

NOTE 5: THE LAST EVEN NUMBERED CONNECTOR OF STUB CABLE P/N 5789760 IS LEFT UNPLUGGED IF THE TOTAL NUMBER OF 7251 MOD 8 ON A SYSTEM IS ODD. IF THERE ARE ALSO 7251 MOD 3 OR 4 MACHINES ON THE SYSTEM REFER TO SYSTEM CONSOLE LADS PAGE 'PL050' FOR CONNECTING SE INDICATORS ON THE SYSTEM CONSOLE OPERATORS PANEL.



REQUIRED QUANTITIES OF CABLE P/N 5736191 (PER SYSTEM)
GROUP 5F-52.

ONE CABLE IS REQUIRED FOR EACH UNBUTTED PAIR OF 7251-M08 ON THE SYSTEM. ROUND THE NUMBER OF STAND ALONE (UN-BUTTED) 7251-M08 ON THE SYSTEM TO THE NEXT LOWER EVEN NUMBER, DIVIDE BY 2 TO ARRIVE AT THE NUMBER OF CABLES REQUIRED.

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO					
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
SC TO CE-1 - REF. CHART A-22												
5F-16	5F-16A	5372932	7265	S1	Q1	B	20	7201-1	G	G6	B	37
5F-16	5F-16B	5372932	7265	S3	E1	B	71	7201-1	G	G7	B	30
5F-16	5F-16C	5372932	7265	S3	K2	B	43	7201-1	G	H6	B	37
5F-16	5F-16D	5372932	7265	S3	H1	B	68	7201-1	G	H7	B	30
5F-02	5F-02A	5372932	7265	S3	K1	B	66	7201-1	G	H8	B	24
5F-02	5F-02B	352303	7265	S2	J1		36	7201-1	G	J1		36
SC TO CE-2 - REF. CHART B-22												
5F-02	5F-02A	5372932	7265	S1	P1	B	21	7201-2	G	G6	B	37
5F-02	5F-02B	352303	7265	S2	J2		36	7201-2	G	J1		36
CE-1 TO CE-2 FOR SC TO CE-REF. CHART B-22												
5F-17	5F-17A	5372932	7201-1		G8	B	24	7201-2		G7	B	30
5F-17	5F-17B	5372932	7201-1		J6	B	37	7201-2		H6	B	37
5F-17	5F-17C	5372932	7201-1		J7	B	30	7201-2		H7	B	30
5F-17	5F-17D	5372932	7201-1		J8	B	24	7201-2		H8	B	24
SC TO CE-3 - REF. CHART C-22												
5F-02	5F-02A	5372932	7265	S1	P2	B	21	7201-3		G6	B	24
5F-02	5F-02B	352303	7265	S2	J3		37	7201-3		J1		36
CE-2 TO CE-3 FOR SC TO CE - REF. CHART C-22												
5F-17	5F-17A	5372932	7201-2		G8	B	24	7201-3		G7	B	30
5F-17	5F-17B	5372932	7201-2		J6	B	37	7201-3		H6	B	37
5F-17	5F-17C	5372932	7201-2		J7	B	30	7201-3		H7	B	30
5F-17	5F-17D	5372932	7201-2		J8	B	24	7201-3		H8	B	24
SC TO CE-4 - REF. CHART D-22												
5F-02	5F-02A	5372932	7265	S1	J2	B	26	7201-4		G6	B	37
5F-02	5F-02B	352303	7265	S2	J4		37	7201-4		J1		36
CE-3 TO CE-4 FOR SC TO CE - REF. CHART D-22												
5F-17	5F-17A	5372932	7201-3		G8	B	24	7201-4		G7	B	30
5F-17	5F-17B	5372932	7201-3		J6	B	37	7201-4		H6	B	37
5F-17	5F-17C	5372932	7201-3		J7	B	30	7201-4		H7	B	30
5F-17	5F-17D	5372932	7201-3		J8	B	24	7201-4		H8	B	24

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO						
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z	
LAST CE TO SC - REF. CHART SC*													
5F-16	5F-16A	5372932	7201	-	LAST	G8	B	24	7265	S3	F1	B	70
5F-16	5F-16B	5372932	7201	-	LAST	J6	B	37	7265	S3	J2	B	44
5F-16	5F-16C	5372932	7201	-	LAST	J7	B	30	7265	S3	G1	B	69
5F-16	5F-16D	5372932	7201	-	LAST	J8	B	24	7265	S3	J1	B	67
CE TO CE FOR 2ND CE - REF. CHART B-1													
5F-18	5F-18A	5372931	7201	-	1	A2	B	66	7201-2	B2	B	66	
5F-18	5F-18B	5372931	7201	-	1	A3	B	60	7201-2	D2	B	66	
5F-18	5F-18C	5372931	7201	-	1	A4	B	52	7201-2	F5	B	44	
5F-18	5F-18D	5372931	7201	-	1	B4	B	52	7201-2	E5	B	44	
CE TO CE FOR 2ND CE (DUPLEX ONLY) REF. CHART B-1													
5F-50	5F-50A	5372931	7201	-	1	D2	B	66	7201-2	A3	B	60	
5F-50	5F-50B	5372931	7201	-	1	F5	B	44	7201-2	A4	B	52	
5F-50	5F-50C	5372931	7201	-	1	E5	B	44	7201-2	B4	B	52	
CE TO CE FOR 3RD CE (TRIPLEX ONLY) REF. CHART C-1													
5F-51	5F-51A	5372931	7201	-	1	E3	B	60	7201-2	E2	B	66	
5F-51	5F-51B	5372931	7201	-	1	F6	B	37	7201-2	D5	B	44	
5F-51	5F-51C	5372931	7201	-	1	E6	B	37	7201-2	C5	B	44	
5F-51	5F-51A	5372931	7201	-	1	D2	B	66	7201-3	A3	B	60	
5F-51	5F-51B	5372931	7201	-	1	F5	B	44	7201-3	A4	B	52	
5F-51	5F-51C	5372931	7201	-	1	E5	B	44	7201-3	B4	B	52	
5F-51	5F-51D	5372931	7201	-	1	E2	B	66	7201-3	E3	B	60	
5F-51	5F-51E	5372931	7201	-	1	D5	B	44	7201-3	F6	B	37	
5F-51	5F-51F	5372931	7201	-	1	C5	B	44	7201-3	E6	B	37	
CE TO CE FOR 3RD CE - REF. CHART C-1													
5F-03	5F-03A	5372931	7201	-	2	A3	B	60	7201-3	D2	B	66	
5F-03	5F-03B	5372931	7201	-	2	A4	B	52	7201-3	F5	B	44	
5F-03	5F-03C	5372931	7201	-	2	B4	B	52	7201-3	E5	B	44	
5F-03	5F-03D	5372931	7201	-	2	C2	B	66	7201-3	A2	B	66	
5F-03	5F-03E	5372931	7201	-	2	E3	B	60	7201-3	E2	B	66	
5F-03	5F-03F	5372931	7201	-	2	E6	B	37	7201-3	C5	B	44	
5F-03	5F-03G	5372931	7201	-	2	F6	B	37	7201-3	D5	B	44	
5F-03	5F-03A	5372931	7201	-	1	C2	B	66	7201-3	C3	B	66	

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO							
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z			
CE TO CE FOR 4TH CE - REF. CHART D-1															
5F-04	5F-04A	5372931	7201-1					A5	B	44	7201-4	C6	B	37	
5F-04	5F-04B	5372931	7201-1					B3	B	60	7201-4	C3	B	66	
5F-04	5F-04C	5372931	7201-1					B5	B	44	7201-4	D6	B	37	
5F-04	5F-04D	5372931	7201-1					C5	B	44	7201-4	E6	B	37	
5F-04	5F-04E	5372931	7201-1					D2	B	66	7201-4	A3	B	60	
5F-04	5F-04F	5372931	7201-1					D5	B	44	7201-4	F6	B	37	
5F-04	5F-04G	5372931	7201-1					E2	B	66	7201-4	E3	B	60	
5F-04	5F-04H	5372931	7201-1					F5	B	44	7201-4	A4	B	52	
5F-04	5F-04I	5372931	7201-1					F2	B	66	7201-4	F3	B	60	
5F-04	5F-04J	5372931	7201-1					E5	B	44	7201-4	B4	B	52	
5F-04	5F-04A	5372931	7201-1					C6	B	37	7201-2	A5	B	44	
5F-04	5F-04B	5372931	7201-1					D6	B	37	7201-2	B5	B	44	
5F-04	5F-04C	5372931	7201-1					E3	B	60	7201-2	E2	B	66	
5F-04	5F-04D	5372931	7201-1					E6	B	37	7201-2	C5	B	44	
5F-04	5F-04E	5372931	7201-1					F3	B	60	7201-2	F2	B	66	
5F-04	5F-04F	5372931	7201-1					F6	B	37	7201-2	D5	B	44	
5F-04	5F-04A	5372931	7201-2					C6	B	37	7201-3	A5	B	44	
5F-04	5F-04B	5372931	7201-2					D6	B	37	7201-3	B5	B	44	
5F-04	5F-04C	5372931	7201-2					F3	B	60	7201-3	F2	B	66	
5F-04	5F-04A	5372931	7201-2					B3	B	60	7201-4	A2	B	66	
5F-04	5F-04A	5372931	7201-3					A3	B	60	7201-4	D2	B	66	
5F-04	5F-04B	5372931	7201-3					A4	B	52	7201-4	F5	B	44	
5F-04	5F-04C	5372931	7201-3					E6	B	37	7201-4	C5	B	44	
5F-04	5F-04D	5372931	7201-3					B3	B	60	7201-4	D3	B	66	
5F-04	5F-04E	5372931	7201-3					B4	B	52	7201-4	E5	B	44	
5F-04	5F-04F	5372931	7201-3					C6	B	37	7201-4	A5	B	44	
5F-04	5F-04G	5372931	7201-3					D6	B	37	7201-4	B5	B	44	
5F-04	5F-04H	5372931	7201-3					E3	B	60	7201-4	E2	B	66	
5F-04	5F-04I	5372931	7201-3					F3	B	60	7201-4	F2	B	66	
5F-04	5F-04J	5372931	7201-3					F6	B	37	7201-4	D5	B	44	
CE TO IDCE FOR 1ST CE - REF. CHART E-G-1															
5F-19	5F-19A	5372931	7201-1					A8	B	24	7231-1	K	A2	B	46
5F-19	5F-19A	5372931	7201-1					B8	B	24	7231-2	K	A2	B	46
5F-19	5F-19A	5372931	7201-1					C8	B	24	7231-3	K	A2	B	46

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9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO							
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z			
CE TO CE FOR 1ST IOCE - REF. CHART E-2-4															
5F-20	5F-20A	5372931	7201-1					D8	B	24	7201-2	A8	B	24	
5F-20	5F-20A	5372931	7201-2					D8	B	24	7201-3	A8	B	24	
5F-20	5F-20A	5372931	7201-3					D8	B	24	7201-4	A8	B	24	
CE TO CE FOR 2ND IOCE - REF. CHART F-2-4															
5F-20	5F-20A	5372931	7201-1					E8	B	24	7201-2	B8	B	24	
5F-20	5F-20A	5372931	7201-2					E8	B	24	7201-3	B8	B	24	
5F-20	5F-20A	5372931	7201-3					E8	B	24	7201-4	B8	B	24	
CE TO CE FOR 3RD IOCE - REF. CHART G-2-4															
5F-20	5F-20A	5372931	7201-1					F8	B	24	7201-2	C8	B	24	
5F-20	5F-20A	5372931	7201-2					F8	B	24	7201-3	C8	B	24	
5F-20	5F-20A	5372931	7201-3					F8	B	24	7201-4	C8	B	24	
IOCE-1 TO CE -REF. CHART E-1-4															
5F-21	5F-21A	5372931	7231-1					G	F3	B	60	7201-1	C4	B	52
5F-21	5F-21B	5372931	7231-1					G	F4	B	52	7201-1	D4	B	52
5F-21	5F-21C	5372931	7231-1					K	F1	B	51	7201-1	A7	B	30
5F-21	5F-21A	5372931	7231-1					G	E3	B	60	7201-2	C4	B	52
5F-21	5F-21B	5372931	7231-1					G	E4	B	52	7201-2	D4	B	52
5F-21	5F-21C	5372931	7231-1					K	G1	B	51	7201-2	A7	B	30
5F-21	5F-21A	5372931	7231-1					G	D3	B	60	7201-3	C4	B	52
5F-21	5F-21B	5372931	7231-1					G	D4	B	52	7201-3	D4	B	52
5F-21	5F-21C	5372931	7231-1					K	H1	B	51	7201-3	A7	B	30
5F-21	5F-21A	5372931	7231-1					G	C3	B	60	7201-4	C4	B	52
5F-21	5F-21B	5372931	7231-1					G	C4	B	52	7201-4	D4	B	52
5F-21	5F-21C	5372931	7231-1					K	J1	B	51	7201-4	A7	B	30

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO					
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
IOCE TO IOCE FOR 1ST CE - REF. CHART F-G-1												
5F-22	5F-22A	5372931	7231-1	G	F1	B	72	7231-2	G	F3	B	60
5F-22	5F-22B	5372931	7231-1	G	F2	B	66	7231-2	G	F4	B	52
5F-22	5F-22C	5372931	7231-1	K	B1	B	51	7231-2	K	F1	B	51
5F-22	5F-22A	5372931	7231-2	G	F1	B	72	7231-3	G	F3	B	60
5F-22	5F-22B	5372931	7231-2	G	F2	B	66	7231-3	G	F4	B	52
5F-22	5F-22C	5372931	7231-2	K	B1	B	51	7231-3	K	F1	B	51
IOCE TO IOCE FOR 2ND CE - REF. CHART F-G-2												
5F-22	5F-22A	5372931	7231-1	G	E1	B	72	7231-2	G	E3	B	60
5F-22	5F-22B	5372931	7231-1	G	E2	B	66	7231-2	G	E4	B	52
5F-22	5F-22C	5372931	7231-1	K	C1	B	51	7231-2	K	G1	B	51
5F-22	5F-22A	5372931	7231-2	G	E1	B	72	7231-3	G	E3	B	60
5F-22	5F-22B	5372931	7231-2	G	E2	B	66	7231-3	G	E4	B	52
5F-22	5F-22C	5372931	7231-2	K	C1	B	51	7231-3	K	G1	B	51
IOCE TO IOCE FOR 3RD CE - REF. CHART F-G-3												
5F-22	5F-22A	5372931	7231-1	G	D1	B	72	7231-2	G	D3	B	60
5F-22	5F-22B	5372931	7231-1	G	D2	B	66	7231-2	G	D4	B	52
5F-22	5F-22C	5372931	7231-1	K	D1	B	51	7231-2	K	H1	B	51
5F-22	5F-22A	5372931	7231-2	G	D1	B	72	7231-3	G	D3	B	60
5F-22	5F-22B	5372931	7231-2	G	D2	B	66	7231-3	G	D4	B	52
5F-22	5F-22C	5372931	7231-2	K	D1	B	51	7231-3	K	H1	B	51
IOCE TO IOCE FOR 4TH CE - REF. CHART F-G-4												
5F-22	5F-22A	5372931	7231-1	G	C1	B	72	7231-2	G	C3	B	60
5F-22	5F-22B	5372931	7231-1	G	C2	B	66	7231-2	G	C4	B	52
5F-22	5F-22C	5372931	7231-1	K	E1	B	51	7231-2	K	J1	B	51
5F-22	5F-22A	5372931	7231-2	G	C1	B	72	7231-3	G	C3	B	60
5F-22	5F-22B	5372931	7231-2	G	C2	B	66	7231-3	G	C4	B	52
5F-22	5F-22C	5372931	7231-2	K	E1	B	51	7231-3	K	J1	B	51

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO				
			MACH	S	LC	BT	Y	MACH	S	LC	BT
IOCE TO CE PER IOCE AND-OR CE - REF. CHART E-G-1-4											
5F-23	5F-23A	5372932	7231-1	K	B2	B	46	7201-1	B7	B	30
5F-23	5F-23A	5372932	7231-1	K	C2	B	46	7201-2	B7	B	30
5F-23	5F-23A	5372932	7231-1	K	D2	B	46	7201-3	B7	B	30
5F-23	5F-23A	5372932	7231-1	K	E2	B	46	7201-4	B7	B	30
5F-23	5F-23A	5372932	7231-2	K	B2	B	46	7201-1	C7	B	30
5F-23	5F-23A	5372932	7231-2	K	C2	B	46	7201-2	C7	B	30
5F-23	5F-23A	5372932	7231-2	K	D2	B	46	7201-3	C7	B	30
5F-23	5F-23A	5372932	7231-2	K	E2	B	46	7201-4	C7	B	30
5F-23	5F-23A	5372932	7231-3	K	B2	B	46	7201-1	D7	B	30
5F-23	5F-23A	5372932	7231-3	K	C2	B	46	7201-2	D7	B	30
5F-23	5F-23A	5372932	7231-3	K	D2	B	46	7201-3	D7	B	30
5F-23	5F-23A	5372932	7231-3	K	E2	B	46	7201-4	D7	B	30

IOCE TO SC PER IOCE - REF. CHART E-F-22

5F-24	5F-24A	5372932	7231-1	G	F6	B	37	7265	S1	L1	B	24
5F-24	5F-24B	352303	7231-1	J1			40	7265	S2	J5		34
5F-24	5F-24A	5372932	7231-2	G	F6	B	37	7265	S1	K1	B	25
5F-24	5F-24B	352303	7231-2	J1			40	7265	S2	J6		34
5F-24	5F-24A	5372932	7231-3	G	F6	B	37	7265	S1	N2	B	22
5F-24	5F-24B	352303	7231-3	J1			40	7265	S2	J7		35

PAM TO CE - REF. CHART R-1-4 SEE B/M 5443301 FOR TERMINATORS REQUIRED WITH EACH 5F-25 GROUP

5F-25	5F-25A	5372931	7289-1	S1	E1	B	48	7201-1	F4	B	52
5F-25	5F-25A	5372931	7289-1	S1	E2	B	48	7201-2	F4	B	52
5F-25	5F-25A	5372931	7289-1	S1	E3	B	48	7201-3	F4	B	52
5F-25	5F-25A	5372931	7289-1	S1	G5	B	32	7201-4	F4	B	52

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO					
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
PAM TO PAM FOR CE-1 - REF. CHART S-T-1												
5F-26	5F-26A	5372931	7289-1	S1	F1	B	39	7289-2	S1	E1	B	48
5F-26	5F-26A	5372931	7289-2	S1	F1	B	39	7289-3	S1	E1	B	48
PAM TO PAM FOR CE-2 - REF. CHART S-T-2												
5F-26	5F-26A	5372931	7289-1	S1	F2	B	39	7289-2	S1	E2	B	48
5F-26	5F-26A	5372931	7289-2	S1	F2	B	39	7289-3	S1	E2	B	48
PAM TO PAM FOR CE-3 - REF. CHART S-T-3												
5F-26	5F-26A	5372931	7289-1	S1	F3	B	39	7289-2	S1	E3	B	48
5F-26	5F-26A	5372931	7289-2	S1	F3	B	39	7289-3	S1	E3	B	48
PAM TO PAM FOR CE-4 - REF. CHART S-T-4												
5F-26	5F-26A	5372931	7289-1	S1	H5	B	26	7289-2	S1	G5	B	32
5F-26	5F-26A	5372931	7289-2	S1	H5	B	26	7289-3	S1	G5	B	32
IDCE -MULTIPLEX CHANNEL- FOR PAM AND SC												
MULTIPLEX CHANNEL TO 1ST CTRL DEVICE - REF CHART R-T												
5F-27	5F-27B	5353920	7231	G	M2	B	66	CTRL	NOTE 6	A	32	
5F-27	5F-27T	5353920	7231	G	L2	B	66	CTRL	NOTE 6	A	26	
CTRL TO CTRL - REF. CHART R-S												
5E-28	5F-28B	5353920	CTRL	NOTE 7	B	32	CTRL	NOTE 6	A	32		
5F-28	5F-28T	5353920	CTRL	NOTE 7	B	26	CTRL	NOTE 6	A	26		

NOTE 6 FOLLOWING ARE THE LOCATIONS FOR THE TO END OF THE CABLE, DEPENDING ON THE CONTROL UNIT MODEL NUMBER.

CTRL	KEY	PRIM	SEC
7289	B	S1-G1	S1-G3
7289	T	S1-H1	S1-H3
2821-2	B	1C-A1	1C-A5 - -2821 MUST HAVE TWO CHANNEL SWITCH FEATURE
2821-2	T	1C-A2	1C-A6 TO HAVE SECONDARY LOCATIONS FOR MPX CHANNEL CABLES

CTRL	KEY	MPX CH	MPX CH	MPX CH
		7231-1	7231-2	7231-3
7265	B	S3-N3	22 S3-J3	26 S3-E3 30
7265	T	S3-M3	23 S3-H3	27 S3-D3 31

9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO			
			MACH	S	LC	BT	Y	MACH	S	LC

NOTE 7 FOLLOWING ARE THE LOCATIONS FOR THE FROM END OF THE CABLE, DEPENDING ON THE CONTROL UNIT MODEL NUMBER.

CTRL	KEY	PRIM	SEC
7289	B	S1-G2	S1-G4
7289	T	S1-H2	S1-H4
2821-2	B	1C-A3	1C-A7
2821-2	T	1C-A4	1C-A8

CTRL	KEY	MPX CH		
		7231-1	7231-2	7231-3
7265	B	S3-L3 24	S3-G3 28	S3-C3 32
7265	T	S3-K3 25	S3-F3 29	S3-B3 33

PAM TO SC - REF. CHART R-T-2I

5F-31	5F-31A	5372932	7289-1	S1 F4 B 39	7265	S1 N1 B 22
5F-31	5F-31B	352303	7289-1	S4 R4 54	7265	S2 J21 26
5F-31	5F-31A	5372932	7289-2	S1 F4 B 39	7265	S1 M1 B 23
5F-31	5F-31B	352303	7289-2	S4 R4 54	7265	S2 J22 26
5F-31	5F-31A	5372932	7289-3	S1 F4 B 39	7265	S1 M2 B 23
5F-31	5F-31B	352303	7289-3	S4 R4 54	7265	S2 J23 27

TCU TO CE - REF. CHART U-1-4 SEE B/M 5443301 FOR TERMINATORS REQUIRED WITH EACH 5F-32 GROUP

5F-32	5F-32A	5372931	2803-1	2 1 B 14	7201-1	G E4 B 52
5F-32	5F-32A	5372931	2803-1	2 3 B 14	7201-2	G E4 B 52
5F-32	5F-32A	5372931	2803-1	2 5 B 14	7201-3	G E4 B 52
5F-32	5F-32A	5372931	2803-1	2 7 B 14	7201-4	G E4 B 52
5F-32	5F-32A	5372931	2803A-1	T-A4A1 B 22	7201-1	G E4 B 52
5F-32	5F-32A	5372931	2803A-1	T-A4C1 B 20	7201-2	G E4 B 52
5F-32	5F-32A	5372931	2803A-1	U-A4A1 B 16	7201-3	G E4 B 52
5F-32	5F-32A	5372931	2803A-1	U-A4C1 B 14	7201-4	G E4 B 52

TCU TO TCU FOR 1ST CE - REF. CHART U-V-1

5F-33	5F-33A	5372931	2803-1	2 2 B 14	2803-2	2 1 B 14
5F-33	5F-33A	5372931	2803-2	2 2 B 14	2803-3	2 1 B 14
5F-33	5F-33A	5372931	2803A-1	T-A4B1 B 22	2803A2	T-A4A1 B 22
5F-33	5F-33A	5372931	2803A-2	T-A4B1 B 22	2803A-3	T-A4A1 B 22

●9020A SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO					
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z
TCU TO TCU FOR 2ND CE - REF. CHART U-V-2												
5F-33	5F-33A	5372931	2803-1	2	4	B	14	2803-2	2	3	B	14
5F-33	5F-33A	5372931	2803-2	2	4	B	14	2803-3	2	3	B	14
5F-33	5F-33A	5372931	2803A-1	T-A4D1	B	20	2803A-2	T-A4C1	B	20		
5F-33	5F-33A	5372931	2803A-2	T-A4D1	B	20	2803A-3	T-A4C1	B	20		
TCU TO TCU FOR 3RD CE - REF. CHART U-V-3												
5F-33	5F-33A	5372931	2803-1	2	6	B	14	2803-2	2	5	B	14
5F-33	5F-33A	5372931	2803-2	2	6	B	14	2803-3	2	5	B	14
5F-33	5F-33A	5372931	2803A-1	U-A4B1	B	16	2803A-2	U-A4A1	B	16		
5F-33	5F-33A	5372931	2803A-2	U-A4B1	B	16	2803A-3	U-A4A1	B	16		
TCU TO TCU FOR 4TH CE - REF. CHART U-V-4												
5F-33	5F-33A	5372931	2803-1	2	8	B	14	2803-2	2	7	B	14
5F-33	5F-33A	5372931	2803-2	2	8	B	14	2803-3	2	7	B	14
5F-33	5F-33A	5372931	2803A-1	U-A4D1	B	14	2803A-2	U-A4C1	B	14		
5F-33	5F-33A	5372931	2803A-2	U-A4D1	B	14	2803A-3	U-A4C1	B	14		
SCU TO CE - REF CHART Y-1-4 SEE B/M 5443301 FOR TERMINATORS REQUIRED WITH EACH 5F-57 GROUP												
5F-57	5F-57A	5372931	2314A	T	A1	B	12	7201-1	G-G2-B-66			
5F-57	5F-57A	5372931	2314A	T	A2	B	12	7201-2	G-G2-B-66			
5F-57	5F-57A	5372931	2314A	T	A3	B	12	7201-3	G-G2-B-66			
5F-57	5F-57A	5372931	2314A	T	A4	B	12	7201-4	G-G2-B-66			
SCU TO SCU FOR 1ST CE REF. CHART Y-Z-1												
5F-58	5F-58A	5372931	2314A-1	T	B1	B	12	2314-2	T	A1	B	12
5F-58	5F-58A	5372931	2314A-2	T	B1	B	12	2314-3	T	A1	B	12
SCU TO SCU FOR 2ND CE REF. CHART Y-Z-2												
5F-58	5F-58A	5372931	2314A-1	T	B2	B	12	2314A-2	T	A2	B	12
5F-58	5F-58A	5372931	2314A-2	T	B2	B	12	2314A-3	T	A2	B	12
SCU TO SCU FOR 3RD CE REF CHART Y-Z-3												
5F-58	5F-58A	5372931	2314A-1	T	B3	B	12	2314A-2	T	A3	B	12
5F-58	5F-58A	5372931	2314A-2	T	B3	B	12	2314A-3	T	A3	B	12
SCU TO SCU FOR 4TH CE REF CHART Y-Z-4												
5F-58	5F-58A	5372931	2314A-1	T	B4	B	12	2314A-2	T	A4	B	12
5F-58	5F-58A	5372931	2314A-2	T	B4	B	12	2314A-3	T	A4	B	12

●9020 SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO			
			MACH	S	LC	BT	Y	MACH	S	LC

IOCE -SELECTOR CHANNEL- -FOR TCU, 2701, 6006A AND 2314A

SELECTOR CHANNEL TO 1ST CONTROL DEVICE - REF. CHARTS U-W(TCU) Y-ZA(SCU)

5F-34	5F-34B	5353920	7231	NOTE 8	B	37	CTRL	NOTE 9
5F-34	5F-34T	5353920	7231	NOTE 8	B	37	CTRL	NOTE 9

CONTROL DEVICE TO CONTROL DEVICE REF. CHARTS U-W(TCU) Y-ZA(SCU)

5F-36	5F-36B	5353920	CTRL	NOTE 10			CTRL	NOTE 9
5F-36	5F-36T	5353920	CTRL	NOTE 10			CTRL	NOTE 9

NOTE 8 FOLLOWING ARE THE LOCATIONS FOR THE FROM END OF THE CABLES
DEPENDING ON IOCE CHANNEL NUMBER

KEY	CH 1	CH 2	CH3
B	G A6 37	G C6 37	K F2 50
T	G B6 37	G D6 37	K G2 50

NOTE 9 FOLLOWING ARE THE LOCATIONS FOR THE TO END OF THE CABLE DEPENDING
ON THE CONTROL UNIT MODEL NUMBER.

KEY	CTRL	PRI LOC	SEC LOC	BT	Z	
B	2803	2 9	1 1	A	18	
T	2803	2 11	1 2	A	18	
B	2803A	T-A2A1	U-A2A1	A	18	
T	2803A	T-A2B1	U-A2B1	A	18	
B	2701	2 A3	2 B3	A	18	
T	2701	2 A4	2 B4	A	18	
B	2314A	S A1	S B1	A	20	
T	2314A	S A2	S B2	A	20	
B	7231	G G4	- - - -	A	52	Y INTERFACE FOR CHANNEL TO CHANNEL
T	7231	G H4	- - - -	A	52	ADAPTER INSTALLED ON SELECTOR CHANNEL 1 SEE NOTE 11
B	7231	G G3	- - - -	A	60	Y INTERFACE FOR CHANNEL TO CHANNEL
T	7231	G H3	- - - -	A	60	ADAPTER INSTALLED ON SELECTOR CHANNEL 2 SEE NOTE 11

●9020 SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM					TO				
			MACH	S	LC	BT	Y	MACH	S	LC	BT	Z

NOTE 10 FOLLOWING ARE THE LOCATIONS FOR THE FROM END OF THE CABLE DEPENDING ON THE CONTROL UNIT MODEL NUMBER.

KEY	CTRL	PRI	LOC	SEC	LOC	BT	Y	
B	2803	2	10	1	3	B	18	
T	2803	2	12	1	4	B	18	
B	2803A	T-A2C1		U-A2C1		B	18	
T	2803A	T-A2D1		U-A2D1		B	18	
B	2701	2	A5	2	B5	B	18	
T	2701	2	A6	2	B6	B	18	
B	2314A	S	A3	S	B3	B	20	
T	2314A	S	A4	S	B4	B	20	
B	7231	G	J4	-	-	B	52	Y INTERFACE FOR CHANNEL TO CHANNEL
T	7231	G	K4	-	-	B	52	ADAPTER INSTALLED ON SELECTOR CHANNEL 1 SEE NOTE 11
B	7231	G	J3	-	-	B	60	Y INTERFACE FOR CHANNEL TO CHANNEL
T	7231	G	K3	-	-	B	60	ADAPTER INSTALLED ON SELECTOR CHANNEL 2 SEE NOTE 11

NOTE 11 - CHANNEL TO CHANNEL ADAPTER IS IDENTIFIED AS MACHINE TYPE 6006A. WHEN 6006A IS INSTALLED IN THE 7231-02, THE X INTERFACE IS CABLED INTERNALLY TO THE HOST 7231-02; THE CONNECTOR LOCATIONS FOR THE 'FROM' END OF THE X INTERFACE ARE THE SAME AS THE LOCATIONS SPECIFIED FOR A SELECTOR CHANNEL AS PER NOTE 8

TCU TO SC FOR TCU-1 - REF. CHART U-22

5F-37	5F-37A	5372932	2803-1	2	13	B	14	7265	S1	J1	B	26
5F-37	5F-37B	352303	2803-1	2	J1		14	7265	S2	J25		24
5F-37	5F-37A	5372932	2803A-1	S-A4D1		B	24	7265	S1	J1	B	26
5F-37	5F-37B	352303	2803A-1	2	J1		14	7265	S2	J25		24

TCU TO SC FOR TCU-2 - REF. CHART V-22

5F-37	5F-37A	5372932	2803-2	2	13	B	14	7265	S1	H1	B	27
5F-37	5F-37B	352303	2803-2	2	J1		14	7265	S2	J26		24
5F-37	5F-37A	5372932	2803A-2	S-A4D1		B	24	7265	S1	H1	B	27
5F-37	5F-37B	352303	2803A-2	2	J1		14	7265	S2	J26		24

TCU TO SC FOR TCU-3 - REF. CHART W-22

5F-37	5F-37A	5372932	2803-3	2	13	B	14	7265	S1	G1	B	28
5F-37	5F-37B	352303	2803-3	2	J1		14	7265	S2	J27		25
5F-37	5F-37A	5372932	2803A-3	S-A4D1		B	24	7265	S1	G1	B	28
5F-37	5F-37B	352303	2803A-3	2	J1		14	7265	S2	J27		25

● 9020 SYSTEM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO				
			MACH	S	LC	BT	Y	MACH	S	LC	BT
SCU TO SC FOR SCU 1 REF CHART Y-22											
5F-59	5F-59A	5372932	2314A-1	T	A5	B	8	7265	S1	D2	B 31
5F-59	5F-59B	352303	2314A-1	PC	1		24	7265	S2	J36	36
SCU TO SC FOR SCU 2 REF CHART Z-22											
5F-59	5F-59A	5372932	2314A-2	T	A5	B	8	7265	S1	E2	B 30
5F-59	5F-59B	352303	2314A-2	PC	1		24	7265	S2	J37	36
SCU TO SC FOR SCU 3 REF CHART ZA-22											
5F-59	5F-59A	5372932	2314A-3	T	A5	B	8	7265	S1	F2	B 29
5F-59	5F-59B	352303	2314A-3	PC	1		24	7265	S2	J38	36
SC TO 2821-1 SEE NOTE 6 AND NOTE 7 FOR CTRL TO CTRL CABLES IF ADDITIONAL CTRL. UNITS ARE TO BE ATTACHED WITH 2821-1 ON THE SYSTEM CONSOLE SWITCHABLE MPX CHANNEL											
5F-38	5F-38B	5353920	7265	S3	Q3	B	20	2821	A1	A	30
5F-38	5F-38T	5353920	7265	S3	P3	B	21	2821	A2	A	30
5F-38	5F-38A	352303	7265	S2	J24		27	2821	JP1		
SC TO 2821-2 SEE NOTE 6 AND NOTE 7 FOR CTRL TO CTRL CABLES											
5F-38	5F-38A	352303	7265	S4	J1		27	2821	JP1		
PAM TO 1052 FOR PAM-1											
5F-39	5F-39A	5393079	7289-1	S1	E5	A	48	1052	F	CE	A 12
5F-39	5F-39B	5392810	7289-1	S4	R1		54	1052	G	J6	16
5F-39	5F-39C	5392809	7289-1	S1	F5	A	39	1052	KEY	B	A 12
								1052	PRT	B	12
PAM TO 1052 FOR PAM-2											
5F-39	5F-39A	5393079	7289-2	S1	E5	A	48	1052	F	CE	A 12
5F-39	5F-39B	5392810	7289-2	S4	R1		54	1052	G	J7	16
5F-39	5F-39C	5392809	7289-2	S1	F5	A	39	1052	KEY	B	A 12
								1052	PRT	B	12
PAM TO 1052 FOR PAM-3											
5F-39	5F-39A	5393079	7289-3	S1	E5	A	48	1052	F	CE	A 12
5F-39	5F-39B	5392810	7289-3	S4	R1		54	1052	G	J8	16
5F-39	5F-39C	5392809	7289-3	S1	F5	A	39	1052	KEY	B	A 12
								1052	PRT	B	12

● 9020A SYSTEM EXTERNAL CABLE LISTING

GROUP KEY PART FROM TO
 NO NO NO MACH S LC BT Y MACH S LC BT Z
 SYSTEM ELEMENTS TO SYSTEM BOND PLATE

5F-56 5F-56A 5421305 NOTE 12 FRAME 9020 SYSTEM BOND PLATE

NOTE 12 BOND CABLE P/N 5421305 HAS A TOTAL FIXED LENGTH OF 33.0 FEET. THE TOTAL 'X' LENGTH IS 30 FEET. ONE BOND CABLE IS REQUIRED FOR EACH OF THE FOLLOWING 9020 SYSTEM ELEMENTS AND CONNECTS THE ELEMENT FRAME TO THE SYSTEM BOND PLATE UNDER THE FLOOR 7201-01, 7231-02, 7251-03, 7251-04, 7251-08, 7265-02, 7289-02, 7289-03, 2803-01, 2803A-01, 2821 AND 2314-A1. ONLY ONE BOND CABLE IS REQUIRED WHEN TWO 7251-08 ELEMENTS ARE BUTTED TOGETHER.

CABLE GROUP (PREFIX 5F-) NUMBER REFERENCE CHART --PART ONE--

	A	B	C	D	E	F	G	H	J	K	L
	CE 1	CE 2	CE 3	CE 4	IOCE 1	IOCE 2	IOCE 3	SE BUS 1	SE BUS 2	SE BUS 3	EACH SE-M04
01 CE 1 NOTE I	-----	18+50	03+51	04	19-21-23	19-22-23	19-22-23	10	10	10	11
02 CE 2 NOTE I	B1	-----	C1	D1	20-21-23	20-22-23	20-22-23	10	10	10	11
03 CE 3 NOTE I	C1	C1	-----	D1	20-21-23	20-22-23	20-22-23	10	10	10	11
04 CE 4	D1	D1	D1	-----	20-21-23	20-22-23	20-22-23	10	10	10	11
05 IOCE 1	E1	E2	E3	E4	-----	F1 - 4	G1 - 4	12	12	12	13
06 IOCE 2	F1	F2	F3	F4	F1 - 4	-----	G1 - 4	12	12	12	13
07 IOCE 3	G1	G2	G3	G4	G1 - 4	G1 - 4	-----	12	12	12	13
08 SE BUS 1	H1	H2	H3	H4	H5	H6	H7	-----	-----	-----	-----
09 SE BUS 2	J1	J2	J3	J4	J5	J6	J7	-----	-----	-----	-----
10 SE BUS 3	K1	K2	K3	K4	K5	K6	K7	-----	-----	-----	-----
11 EACH SE M04	L1	L2	L3	L4	L5	L6	L7	-----	-----	-----	-----
12 EACH SE M03	M1	M2	M3	M4	M5	M6	M7	-----	-----	-----	-----
13 EACH SE M08	N1	N2	N3	N4	N5	N6	N7	-----	-----	-----	-----
14								-----	-----	-----	-----
15								-----	-----	-----	-----
16 PAM-DCU 1 *R	R1	R2	R3	R4	R5 - 7	S5 - 7	T5 - 7	-----	-----	-----	-----
17 PAM-DCU 2 *S	S1	S2	S3	S4	R5 - 7	S5 - 7	T5 - 7	-----	-----	-----	-----
18 PAM-DCU 3 *T	T1	T2	T3	T4	R5 - 7	S5 - 7	T5 - 7	-----	-----	-----	-----
19 TCU 1 *U	U1	U2	U3	U4	U5 - 7	V5 - 7	W5 - 7	-----	-----	-----	-----
20 TCU 2 *V	V1	V2	V3	V4	U5 - 7	V5 - 7	W5 - 7	-----	-----	-----	-----
21 TCU 3 *W	W1	W2	W3	W4	U5 - 7	V5 - 7	W5 - 7	-----	-----	-----	-----
22 SC	*16-02	17-02	17-02	17-02	24	24	24	-----	-----	-----	15-01
23 SCU 1 *Y	Y1	Y2	Y3	Y4	Y5 - 7	Z5 - 7	ZA5 - 7	-----	-----	-----	-----
24 SCU 2 *Z	Z1	Z2	Z3	Z4	Y5 - 7	Z5 - 7	ZA5 - 7	-----	-----	-----	-----
25 SCU 3 *ZA	ZA1	ZA2	ZA3	ZA4	Y5 - 7	Z5 - 7	ZA5 - 7	-----	-----	-----	-----

CABLE GROUP (PREFIX 5F-) NUMBER REFERENCE CHART —PART TWO—

	M	N	P	Q	R *	S *	T *	U *	V *	W *	X *
	EACH SE M03	EACH SE M08			DCU 1 PAM 1	DCU 2 PAM 2	DCU 3 PAM 3	TCU 1	TCU 2	TCU 3	SC
01 CE 1	11	11			25	26	26	32	33	33	A22
02 CE 2	11	11			25	26	26	32	33	33	B22
03 CE 3	11	11			25	26	26	32	33	33	C22
04 CE 4	11	11			25	26	26	32	33	33	D22
05 IOCE 1	13	13			27 *	27 *	27 *	34 *	34 *	34 *	E22
06 IOCE 2	13	13			27 *	27 *	27 *	34 *	34 *	34 *	F22
07 IOCE 3	13	13			27 *	27 *	27 *	34 *	34 *	34 *	G22
08 SE BUS 1											H22
09 SE BUS 2											J22
10 SE BUS 3											K22
11 EACH SE M04											L22
12 EACH SE M03											M22
13 EACH SE M08											N22
14											
15											
16 PAM-DCU 1 *						S1 - 4	28 *				R22
17 PAM-DCU 2 *					28 *		T1 - 4				S22
18 PAM-DCU 3 *						28 *					T22
19 TCU 1 *									36 *		U22
20 TCU 2 *										36 *	V22
21 TCU 3 *								36 *			W22
22 SC	* 15	15-01			28-31*	28-31*	28-31*	37	37	37	
23 SCU 1 *											
24 SCU 2 *											
25 SCU 3 *											

* DCU-PAM-TCU SCU ARE MULTIPLEX AND SELECTOR CHANNELS FOR IOCE. IT IS NECESSARY TO KNOW CONFIGURATION DESIRED. SEE NOTES IN APPROPRIATE CABLE GROUP(S) OF LISTING.
 * SC REQUIRES 5F-16 LAST CE TO SC -ONE TIME FOR 9020 SYSTEM- IN ADDITION TO INDICATED CABLE GROUP(S).

INSTRUCTIONS

NUMBER(S) AT MATRIX INTERSECTION = CABLE GROUP(S) REQUIRED FOR INTERFACE. 5F PREFIX ASSUMED.

LETTER AND NUMBER IN LOCATION = INDICATES LOCATION THAT CABLE GROUP(S) MAY BE FOUND FOR INTERFACE DEFINED BY MATRIX. NOTE FOR EXAMPLE THAT N1-7 MEANS N1 THRU N7.

CROSSHATCHED LOCATIONS = ARE INVALID INTERFACES

* = REQUIRES FURTHER DEFINITION BY NOTES LOCATED UNDER CHART.

NOTE: THIS CHART DOES NOT CONTAIN ANY INPUT OR OUTPUT EQUIPMENT. EQUIPMENT INCLUDED:

- | | |
|--------------|--------------------|
| CE 7201-01 | PAM 7289-02 |
| IOCE 7231-02 | FSP 7289-03 |
| SE 7251-03 | DCU 2701-01 |
| SE 7251-04 | TCU 2803-01 'SMS' |
| SE 7251-08 | TCU 2803A-01 'SLT' |
| SCU 2314-A1 | SC 7265-02 |

NOTE 1 GROUP 5F-50 IS REQUIRED WITH DUPLEX; GROUP 5F-51 WITH TRIPLEX.

●9020A SYSTEM EXTERNAL CABLE LISTING

CABLE GROUP (PREFIX 5F-) NUMBER REFERENCE CHART —PART THREE—

	Y*	Z*	ZA*
	SCU 1	SCU 2	SCU 3
01 CE 1	57	58	58
02 CE 2	57	58	58
03 CE 3	57	58	58
04 CE 4	57	58	58
05 IDCE 1	34*	34*	34*
06 IDCE 2	34*	34*	34*
07 IDCE 3	34*	34*	34*
08 SE BUS 1			
09 SE BUS 2			
10 SE BUS 3			
11 EACH SE MOD 4			
12 EACH SE MOD 3			
13 EACH SE MOD 8			
14			
15			
16 PAM DCU-1 *			
17 PAM-DCU 2 *			
18 PAM-DCU 3 *			
19 TCU 1	36*	36*	36*
20 TCU 2	36*	36*	36*
21 TCU 3	36*	36*	36*
22 SC	59	59	59
23 SCU 1		36*	
24 SCU 2			36*
25 SCU 3	36*		

● 9020A SYSTEM EXTERNAL CABLE LISTING

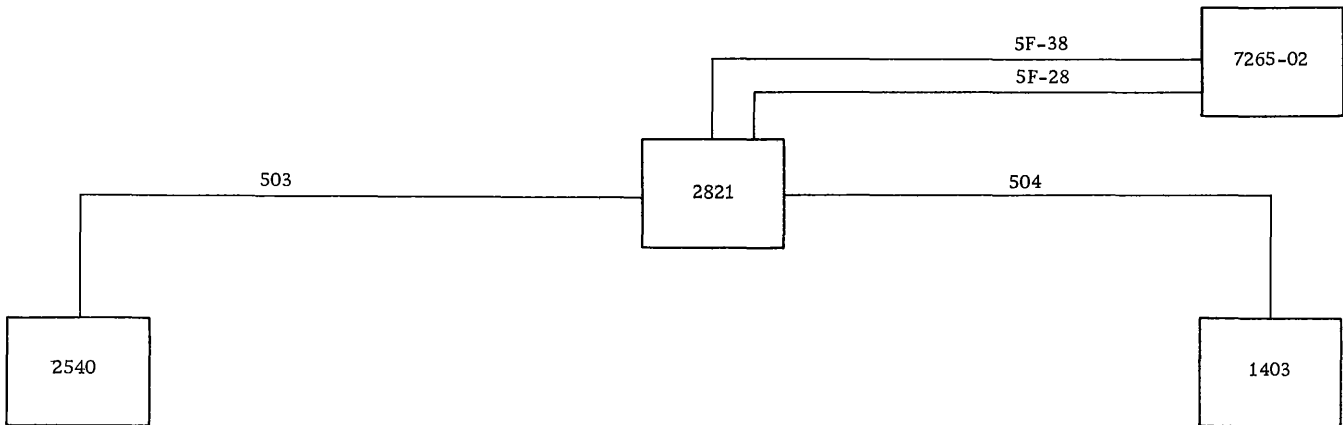
CABLE GROUP (PREFIX 5F-) B/M REFERENCE CHART.

B/M NUMBER	QUANT. AND P/N OF CABLES	CABLE GROUP(S) IN B/M
5402266	2-5372931	5F- 10 - 12
	2-5399735 TERMINATORS	
5402267	2-5372932	5F- 11 - 13
5402269	4-5372931	5F- 18
5402270	2-5372931	5F- 14 - 53 - 54
5402272	3-5372931	5F- 21 - 22 - 50
5402279	2-5353920	5F- 27 - 28 - 34 - 36
5402284	1-5372931	5F- 19 - 20 - 26 - 33 - 58
5402287	4-5372932	5F- 16 - 17
5402288	1-5372932	1-352303 5F- 02 - 15 - 24 - 31 - 37 - 59
5402292	30-5372931	5F- 04
5402293	8-5372931	5F- 03
5402295	1-352303	5F- 01
5402296	1-5392809	1-5392810
	1-5393079	5F- 39
5402297	2-5353920	1-352303 5F- 38
5402278	1-5716132	1-5716134
	1-5716136	1-5716198
	1-5716197	5F- 40
5443301	1-5372931	5F- 25- 32 - 57
	1-5399735 TERMINATOR	
5447611	9-5372931	5F- 51
5447612	1-5736191	5F- 52
5789760	1-5789760	5F- 55
5447616	1-5372932	5F-23

UNUSED GROUP NUMBERS: NONE
 OBSOLETE '5F-40 GROUP - SC TO 1052'

————— END OF DOCUMENT —————

2821 Control Unit Model 1 Cabling Schematic



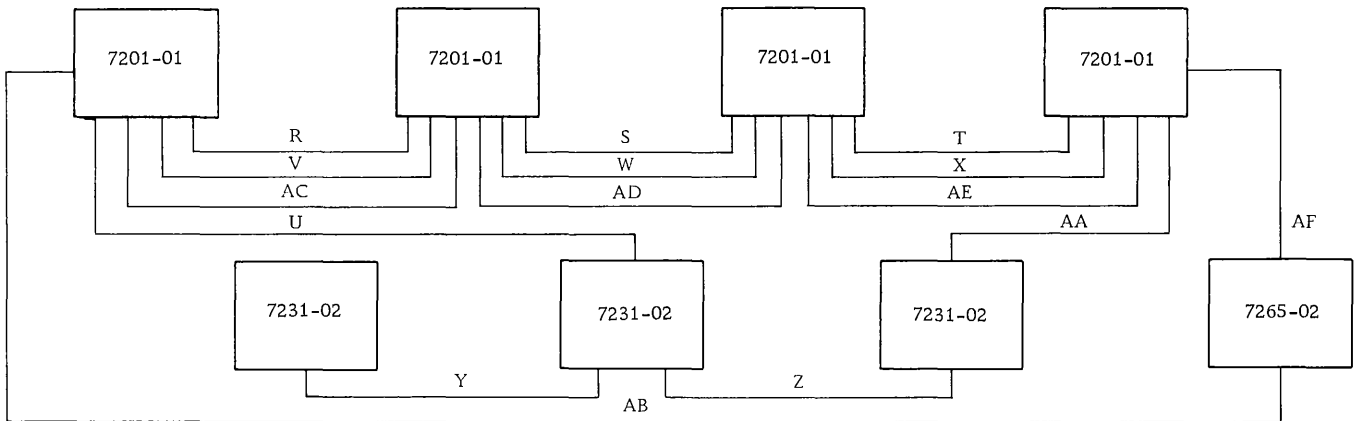
Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
503	2	2540	First 2821	25	
504	3	1403	First 2821	25	
5F-28	2	Second 2821	7265-02	50	1
5F-38	3	First 2821	7265-02	50	

NOTE:

1. Second 2821 only requires this cable in addition to 5F-38 for two-channel switch feature. See cable listing for 5F-28 and associated Note 6 in this section.

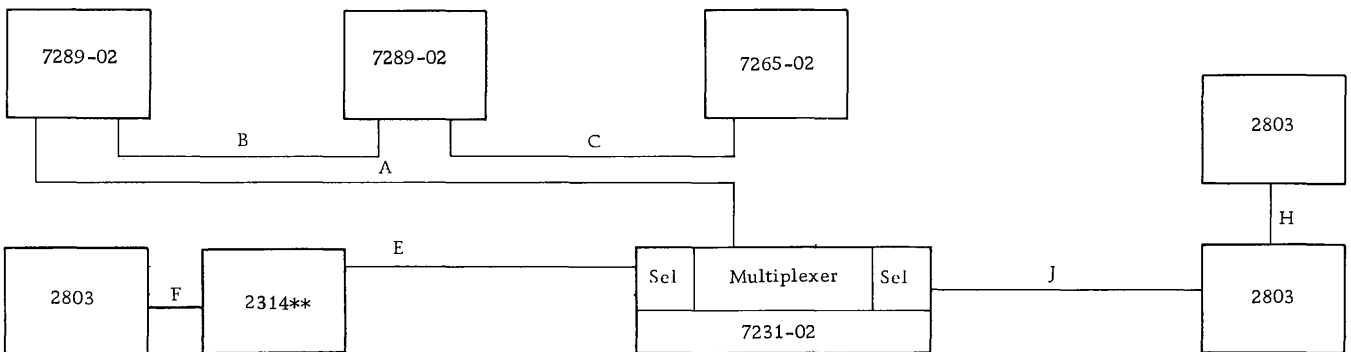
FA64WA-5223

Maximum Serial or Loop Cabling Length

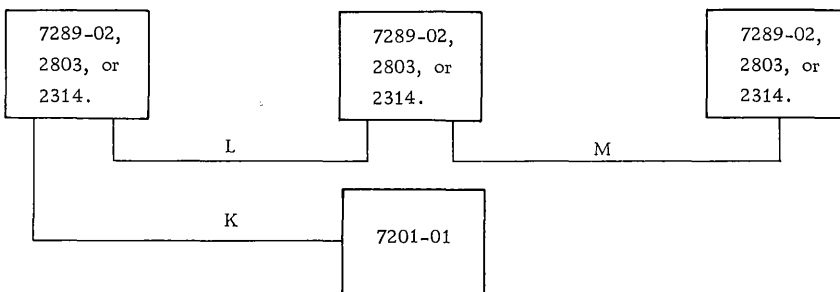


Maximum Cable Length Floor to Floor: $R+S+T = 100'$; $U+V+W+X = 150'$; $Y+Z+AA = 150'$; $AB+AC+AD+AE+AF = 150'$

See Figure 13 for maximum allowable distributed simplex cable IOCE and CE to storage bus for various combinations of 7251 Models 3, 4, and 8.



Maximum Cable Length Floor to Floor: $A + B + C = 200'*$; $H + J = 200'*$; $E + F = 200'$



Maximum Cable Length Floor to Floor: $K + L + M = 150'$

* The 200-foot maximum is for the units shown and should also be used as a planning guide when attaching other external devices to the 9020 System selector channels. However, there may be specific instances where greater distances are required. In these instances, consult the planning coordinator at the FAA Project Office.

** Last 2314 must be within 100 feet the 7231-02.

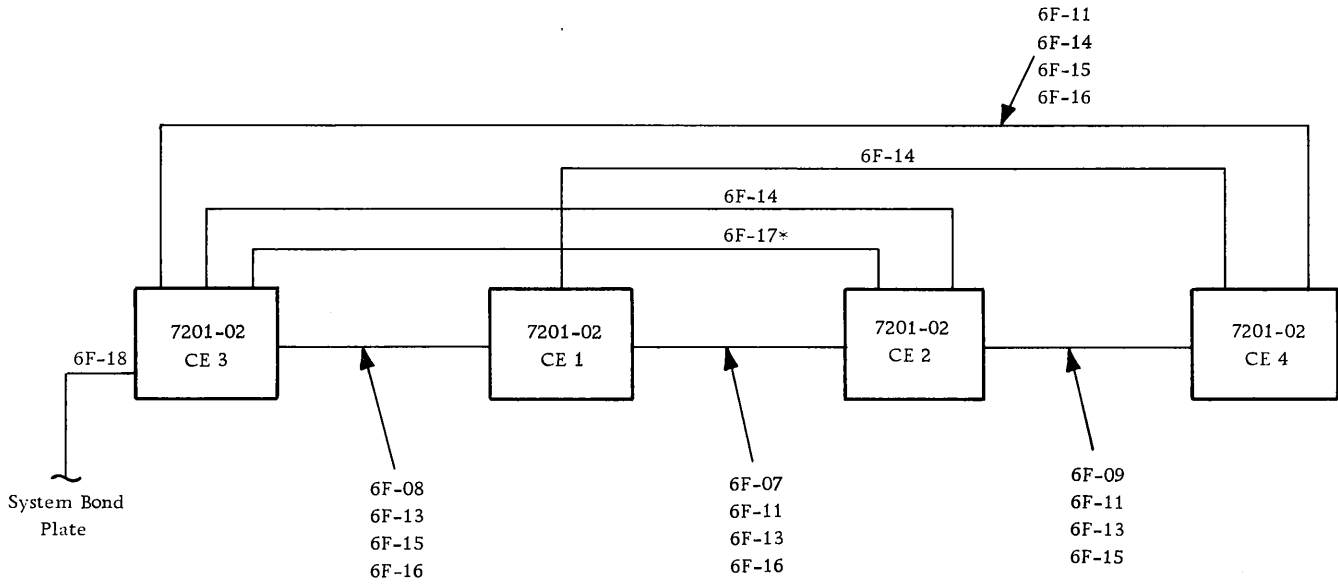
9020D/E SYSTEMS ONLY

In this section, cabling schematic diagrams are provided for each element, I/O unit, and group of elements or units. Each cable group and its paths are depicted on the schematic. A line may represent a path for one or more groups.

"From" and "to" designations, cable quantities, and significant notes are given for each cable group. The notes represent pertinent information necessary for ordering cables.

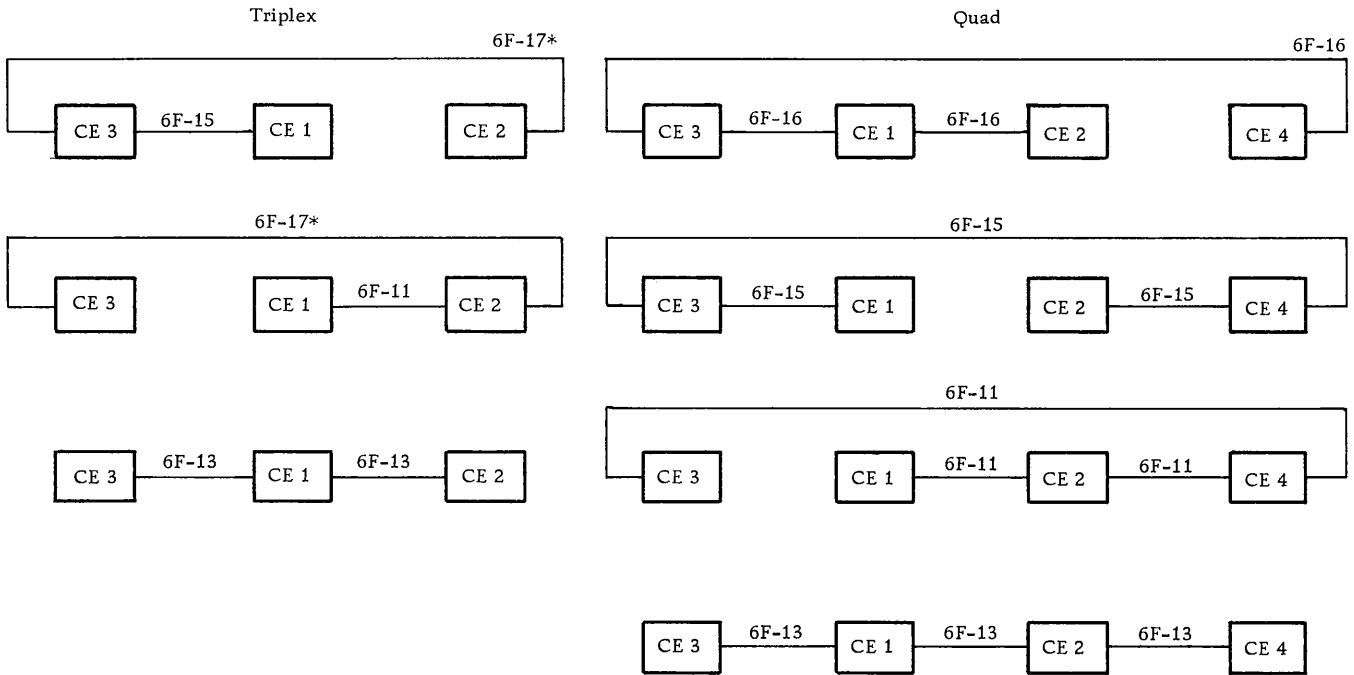
A system cable order form for 9020D/E systems is provided in the Appendix. To order cables, identify the groups required for your configuration and list the "x" length in the appropriate column on the form. The cabling schematics and related notes define the cable groups needed to interconnect all elements and units of a 9020D or 9020E system.

7201-02 Computing Element Cabling Schematic



Cable Length Limitations for CE-CE Distributed Simplex Buses

The maximum serial length of cable allowed for any of the following configurations is 100 feet. For example, the serial cable used for the 6F-13 groups in either configuration cannot exceed 100 feet.



*Group 6F-17 is used only with triplex configurations.

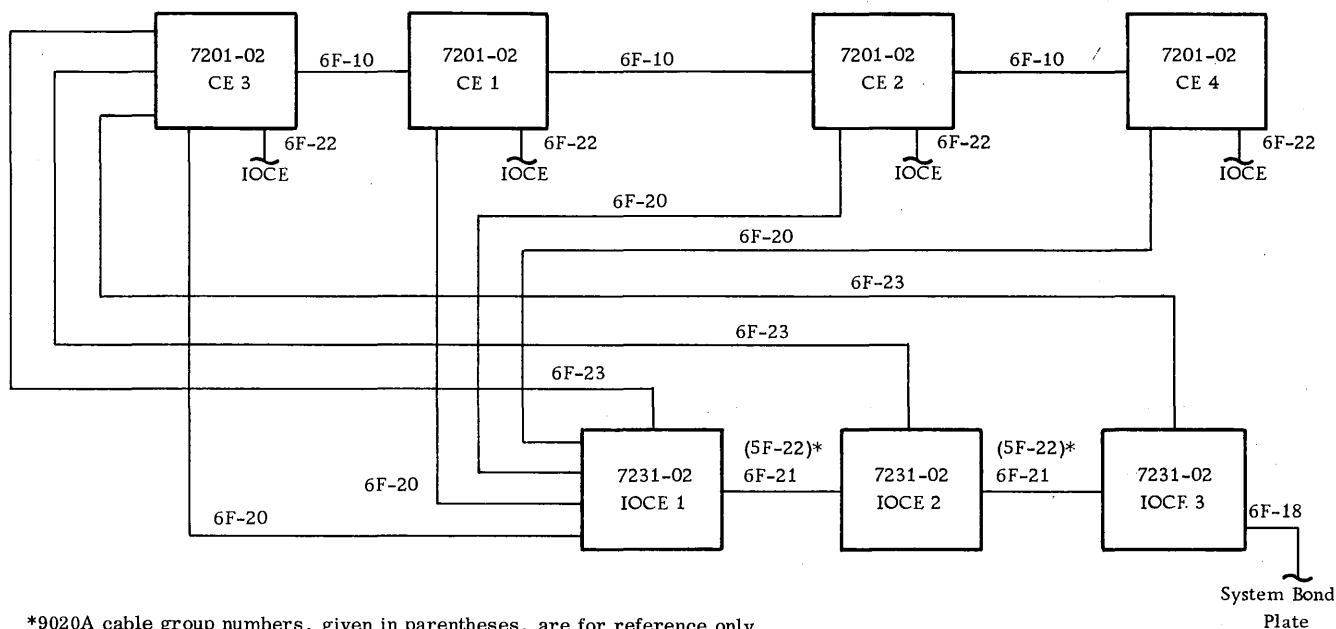
7201-02 Computing Element Cabling Schematic

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-07	1	CE 2	CE 1		1
6F-08	1	CE 3	CE 1		1
6F-09	1	CE 4	CE 2		1
6F-11	3	CE	CE		2, 3
6F-13	3	CE	CE		2, 3
6F-14	1	CE	CE		1
6F-15	3	CE	CE		2, 3
6F-16	3	CE	CE		2, 3, 5
6F-17	6	CE 3	CE 2		2, 3, 4
6F-18	1	CE	Bond Plate		6

NOTES:

1. The "x" length can be no greater than the straight-line distance from the center of the cable exit to the center of the cable entry hole plus twice the height of the raised floor.
2. One group required where shown. The total number of groups needed depends on the number of CE's in the configuration.
3. Part of a CE-CE distributed simplex bus; refer to "Cable Length Limitations for CE-CE Distributed Simplex Buses" for the total length of serial cable allowed for any combination of these groups.
4. Used only on a triplex configuration.
5. Used only on a quad configuration.
6. The bond cable has a fixed "x" length of 30 feet. One bond cable is required between each CE and a system bond plate under the floor.

7201-02 Computing Element
 7231-02 I/O Control Element
 Cabling Schematic (for 9020D/E Systems)



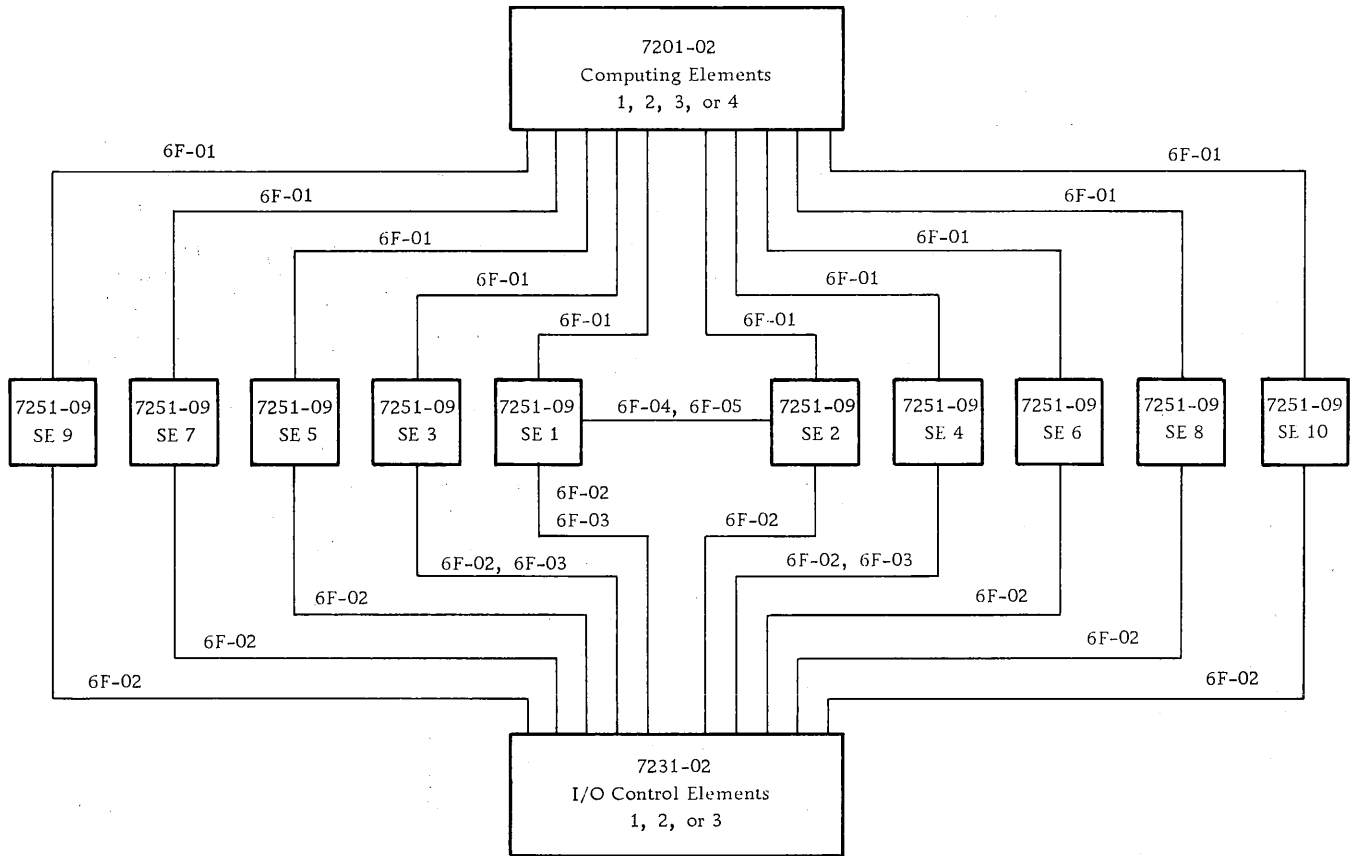
*9020A cable group numbers, given in parentheses, are for reference only.

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-10	1	CE	CE		1,2
6F-18	1	IOCE	Bond Plate		3
6F-20	3	IOCE 1	CE		4,5
6F-21	3	IOCE	IOCE		5,6
6F-22	1	IOCE	CE	100	7
6F-23	1	IOCE	CE 3		2,8

NOTES:

1. One group required between CE 3 and CE 1, CE 2 and CE 1, CE 4 and CE 2 (QUAD only) for each IOCE in the configuration.
2. The maximum serial length of cable allowed for group 6F-23 plus the total length of the 6F-10 groups used cannot exceed 150 feet.
3. The bond cable has a fixed "x" length of 30 feet. One bond cable is required between each IOCE and a system bond plate under the floor.
4. One group required from IOCE 1 to each CE in the configuration.
5. The maximum serial length of cable allowed for group 6F-20 plus the total length of the 6F-21 groups used cannot exceed 150 feet.
6. One group required between IOCE's for each CE in the configuration.
7. One group to each CE from each IOCE in the configuration.
8. One group required from each IOCE to CE 3.

7251-09 Storage Element
Cabling Schematic (for 9020D System)

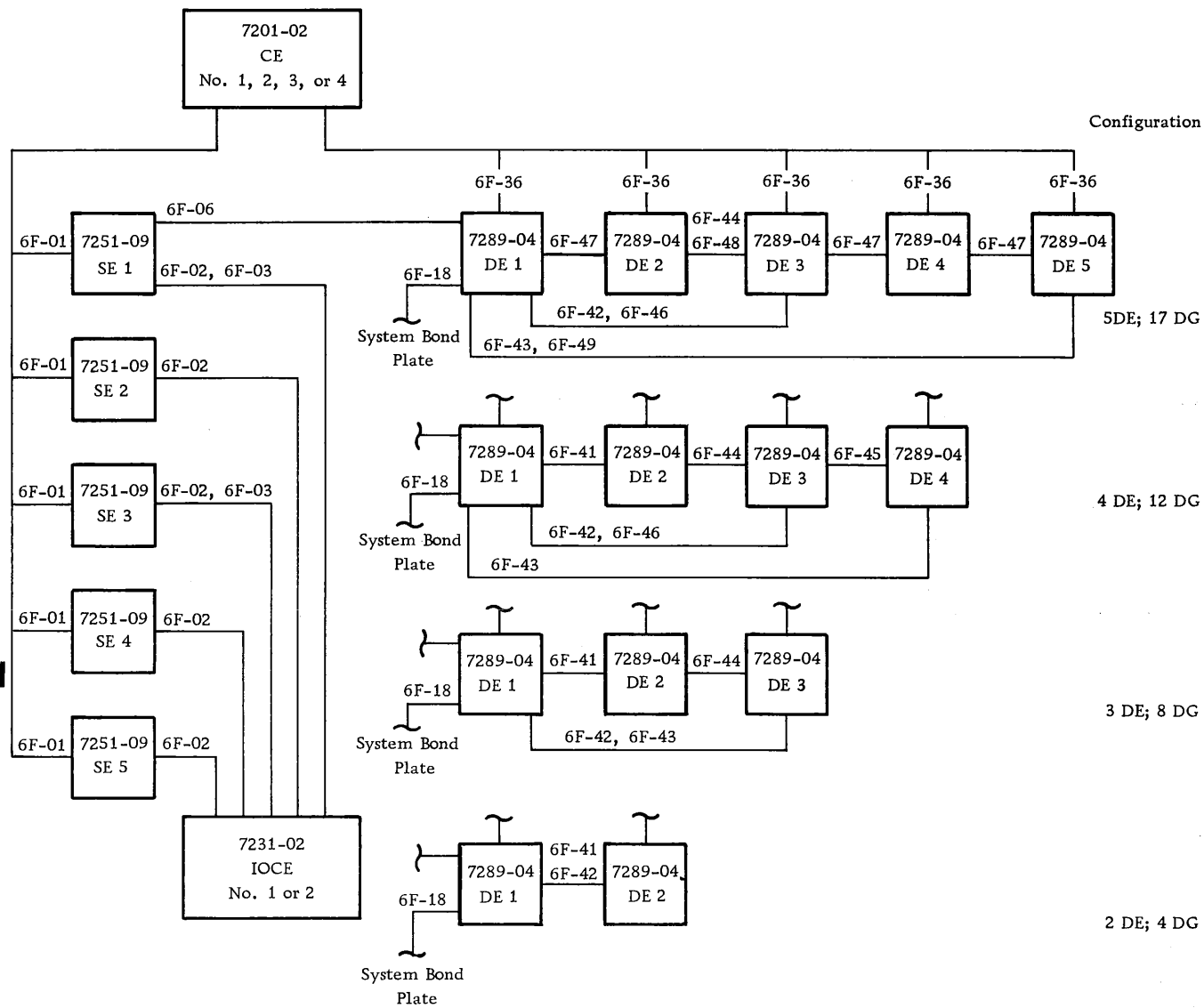


Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-01	1	SE	CE		1, 7
6F-02	2	SE	IOCE	75	2
6F-03	2	SE 1	IOCE		3, 4
6F-03	2	SE 3	IOCE	70	4
6F-03	2	SE 4	IOCE	70	4
6F-04	2	SE 1	SE 2		3, 5
6F-05	12	SE	SE	30	6
6F-18	1	SE	Bond Plate		8

NOTES:

- One group from each SE to each CE in the configuration.
- One group from each SE to each IOCE in the configuration.
- The total serial length of groups 6F-03 and 6F-04 cannot exceed 85 feet.
- One group from SE 1, SE 3, and SE 4 to each IOCE in the configuration.
- One group required for each IOCE in the configuration to connect one contiguous wall section with another.
- One group required for each CE in the configuration to connect one contiguous wall section with another.
- The "x" length cannot be larger than the straight-line distance from the center of the cable exit to the center of the cable entry hole plus twice the height of the raised floor.
- The bond cable has a fixed "x" length of 30 feet. One bond cable is required between each SE and a system bond plate under the floor.

7251-09 Storage Element
7289-04 Display Element
Cabling Schematic (9020 E System)



Notes:

DG to DE cabling is not shown; see the 9020 D/E system installation manual (FEIM) for specific plugging locations for DG cables.

Cable Ordering Instructions

For an original system order, specify the groups required for your configuration.

For expansion to less than four DE's:

- Specify the additional groups required.
- Relocate the "from" end of cable group 6F-42, when expanding from two DE's to three DE's.
- Relocate the "from" end of cable group 6F-43, when expanding from three DE's to four DE's.

For expansion to a five-DE configuration, see "Special Instructions for Expanding to a Five-DE, 17-DG Configuration."

7251-09 Storage Element, 7289-04 Display Element, Cabling Schematic (9020E System)

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-01	1	SE	CE		1,6
6F-02	2	SE	IOCE	75	2
6F-03	2	SE 1	IOCE	75	3
6F-03	2	SE 3	IOCE	75	3
6F-06	12	SE/DE	DE/SE	30	4
6F-18	1	DE	Bond Plate		7
6F-36	2	DE	CE		5,6

For a two-DE configuration with 1, 2, 3, or 4 DG's:

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-41	3	DE 2	DE 1	12	
6F-42	1	DE 2	DE 1	18	11,13

For a three-DE configuration with 5, 6, 7, or 8 DG's:

6F-41	3	DE 2	DE 1	12	
6F-42	1	DE 3	DE 1	18	
6F-43	2	DE 3	DE 1	34	12,14
6F-44	2	DE 3	DE 2	12	

For a four-DE configuration with 9, 10, 11, or 12 DG's:

6F-41	3	DE 2	DE 1	12	
6F-42	1	DE 3	DE 1	18	
6F-43	2	DE 4	DE 1	34	12,14
6F-44	2	DE 3	DE 2	12	
6F-45	3	DE 4	DE 3	12	8
6F-46	1	DE 3	DE 1	18	10

For a five-DE configuration with 13, 14, 15, 16, or 17 DG's:

6F-42	1	DE 3	DE 1	18	
6F-43	2	DE 5	DE 1	34	
6F-44	2	DE 3	DE 2	12	
6F-46	1	DE 3	DE 1	18	10
6F-47	3	DE 5	DE 4	12	9
6F-47	3	DE 4	DE 3	12	9
6F-47	3	DE 2	DE 1	12	9
6F-48	1	DE 3	DE 2	12	9
6F-49	1	DE 5	DE 1	34	9

NOTES:

- One group from each SE to each CE in the configuration.
- One group from each SE to each IOCE in the configuration.
- One group from SE 1 and SE 3 to each IOCE in the configuration.
- One group required for each CE in the system, to connect contiguous wall sections.
- One group from each DE to each CE in the configuration.
- The "x" length cannot be longer than the straight-line distance from the center of the cable exit hole to the center of the cable entry hole plus twice the height of the raised floor.
- The bond cable has a fixed "x" length of 30 feet. One bond cable is required between each DE and a system bond plate under the floor.
- Used only on a four-DE configuration.
- Used only on a five-DE configuration.
- Used on both four-DE and five-DE configurations.
- Specify one group for an original two-DE or three-DE system order; reuse when expanding to a three-DE configuration by relabeling and relocating the "from" end of the group.
- Specify one group for an original three-DE or four-DE system order; reuse when expanding to a four-DE or five-DE configuration by relabeling and relocating the "from" end of the group.
- Must be ordered at maximum length (18 feet).
- Must be ordered at maximum length (34 feet).

Special Instructions for Expanding to a Five-DE,
17-DG Configuration

To expand from a two-DE, four-DG configuration:

1. Convert group 6F-41 to group 6F-47 by re-labeling cables, and relocate the group to new tailgate positions on DE 1.
2. Relabel and relocate the "from" end of cable group 6F-42 on the tailgate of DE 3.
3. Order cable groups 6F-43, 6F-44, 6F-46, 6F-47 (two groups, for DE 5 to DE 4 and DE 4 to DE 3), 6F-48, and 6F-49.

To expand from a three-DE, eight-DG configuration:

1. Convert group 6F-41 to 6F-47 by relabeling cables, and relocate it to new tailgate positions on DE 1.

2. Relabel the "from" end of cable group 6F-43, relocating it to a new tailgate position from DE 5.

3. Order cable groups 6F-46, 6F-47 (twice, for DE 5-DE 4 and DE 4-DE 3), 6F-48, and 6F-49.

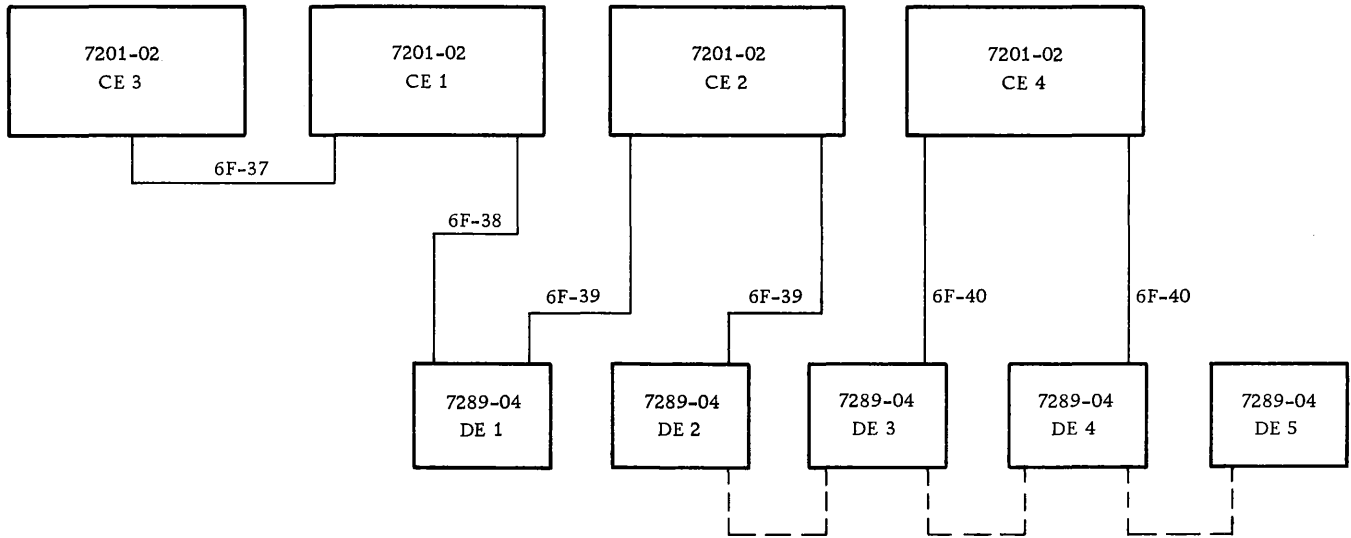
To expand from a four-DE, 13-DG configuration:

1. Convert group 6F-41 and group 6F-45 to two 6F-47 groups by relabeling cables, and relocate the groups to their new positions on the tailgates of DE's 1 and 2 and DE's 4 and 5, respectively.

2. Relabel the "from" end of group 6F-43, relocating it to its new tailgate position on DE 5.

3. Order cable groups 6F-47 (for connecting DE 5 and DE 4), 6F-48, and 6F-49.

7289-04 Display Element Wrap Bus Cabling Schematic



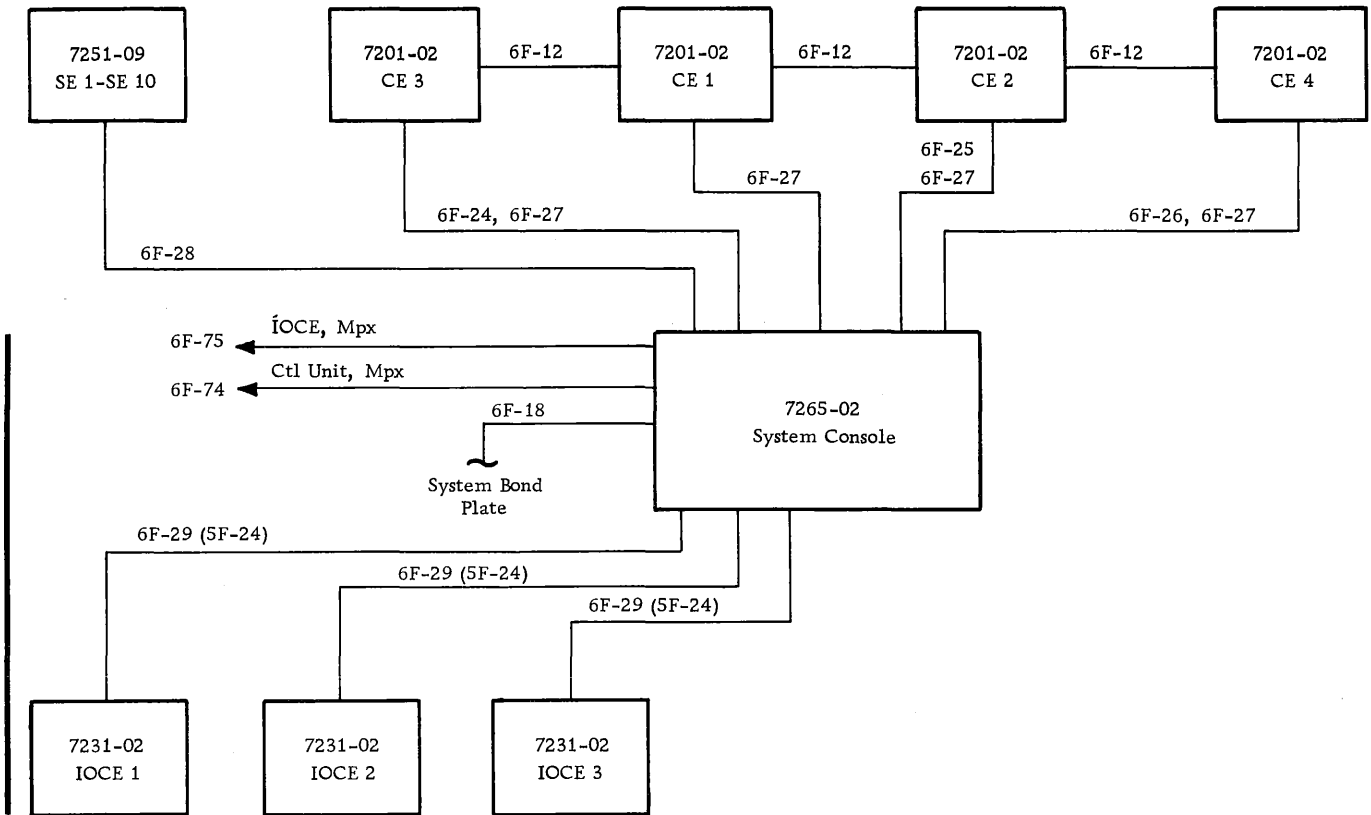
--- Internal cabling required to complete the serial bus. Internal cabling between DE 3 and DE 4 is used only when a fourth CE is not in the configuration.

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-37	1	CE 3	CE 1	20	
6F-38	1	CE 1	DE 1	40	
6F-39	1	DE 1 and DE 2	CE 2	12	1
6F-40	1	DE 3 and DE 4	CE 4	12	2

NOTES:

1. One group required from DE 1 and DE 2 to CE 2.
2. One group required from DE 3 and DE 4 to CE 4.

7265-02 System Console Cabling Schematic



9020A cable group numbers, enclosed in parentheses, for reference only.

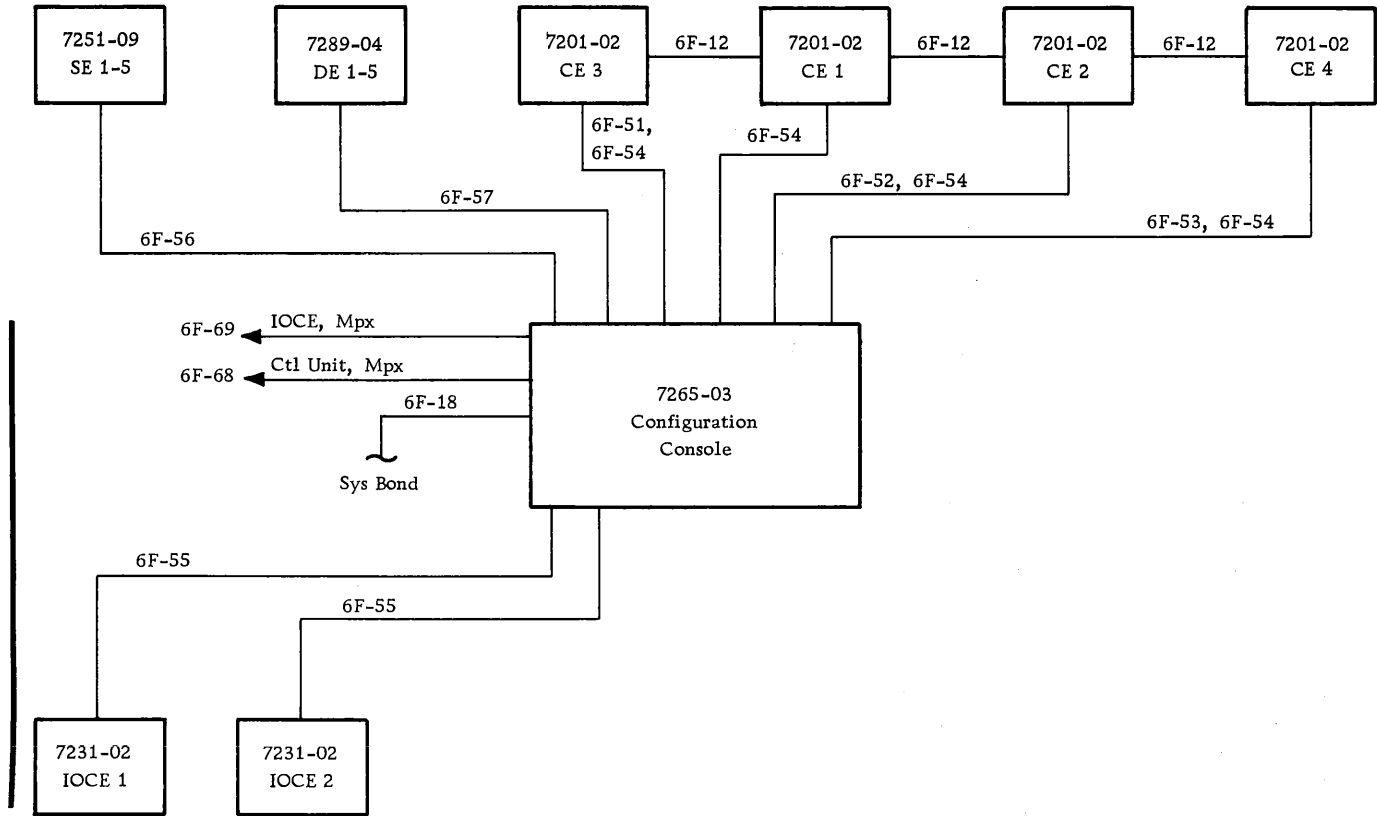
7265-02 System Console Cabling Schematic

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-12	4	CE	CE		3
6F-18	1	SC	Bond Plate		10
6F-24	4	SC	CE 3		3
6F-25	4	SC	CE 2		3, 4
6F-26	4	SC	CE 4		3, 5
6F-27	2	CE	SC	100	2, 6
6F-28	2	SE	SC	100	1, 2
6F-29	2	IOCE	SC	100	2, 7
6F-74	2	SC	Ctl Unit		8, 9
6F-75	2	SC	IOCE		8, 9

NOTES:

1. One group required from each SE to the System Console.
2. Contains one EPO cable.
3. The total cable length allowed for group 6F-24 + (6F-25 or 6F-26) plus the number of 6F-12 groups used between the CE's is 150 feet.
4. Used only on a triplex system.
5. Used only on a quad system.
6. One group from each CE to the System Console.
7. One group from each IOCE to the System Console.
8. Multiplexer channel cabling.
9. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation must be exceeded.
10. The bond cable has a fixed "x" length of 30 feet. One bond cable is required between the System Console and a system bond plate under the floor.

7265-03 Configuration Console Cabling Schematic



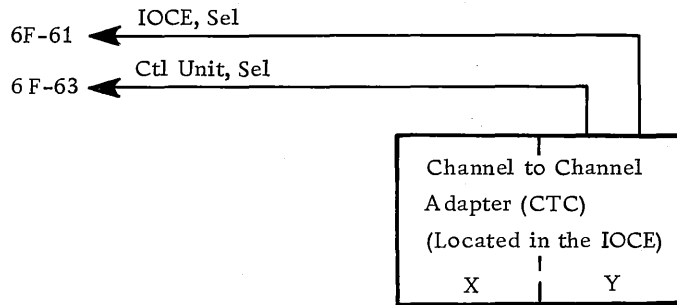
7265-03 Configuration Console
Cabling Schematic

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-12	4	CE	CE		4
6F-18	1	CC	Bond Plate		10
6F-51	4	CC	CE 3		4
6F-52	4	CC	CE 2		4, 5
6F-53	4	CC	CE 4		4, 6
6F-54	3	CE	CC	100	3, 7, 9
6F-55	2	IOCE	CC	100	3, 8, 9
6F-56	2	SE	CC	100	1, 3, 9
6F-57	2	DE	CC	100	2, 3, 9
6F-68	2	CC	Ctl Unit		11, 12
6F-69	2	CC	IOCE		11, 12

NOTES:

1. One group required from each SE to the Configuration Console.
2. One group required from each DE to the Configuration Console.
3. Contains one EPO cable.
4. The total cable length allowed for group 6F-51 + (6F-52 or 6F-53) plus the length of the 6F-12 groups between the CE's is 150 feet.
5. Used only on a triplex system.
6. Used only on a quad system.
7. One group from each CE to the Configuration Console.
8. One group from each IOCE to the Configuration Console.
9. Cables enter configuration console at two different holes; specify length (distance) to the furthest hole.
10. The bond cable has a fixed "x" length of 30 feet. One bond cable is required between the Configuration Console and a system bond plate under the floor.
11. Multiplexer channel cabling.
12. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation must be exceeded.

● 6006A Channel to Channel Adapter (CTC)
Cabling Schematic



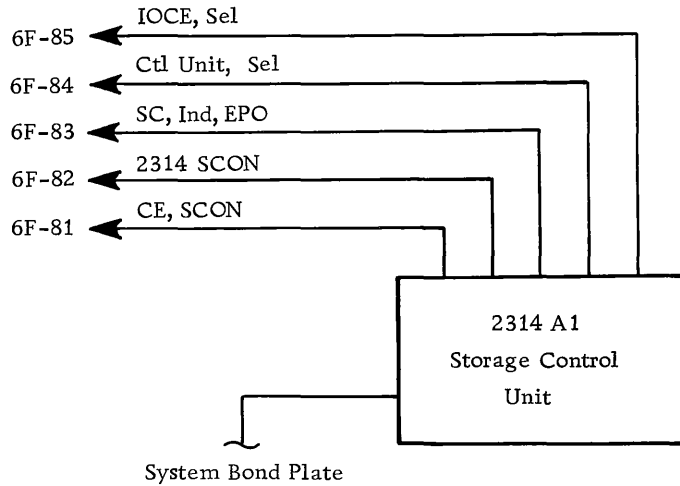
Channel-Channel Adapters (CTC) are installed in the IOCE. The "X" interface is cabled internally. The same connector positions specified for the selector channel without an adapter are used for the "TO" end of cable groups. The "Y" is the CTC connection and the "FROM" end for cable groups.

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-61	2	IOCE/CTC	IOCE		1, 2
6F-63	2	IOCE/CTC	Ctl Unit		1, 2, 3

NOTES:

1. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation must be exceeded.
2. The Channel-to-Channel Adapter (CTC) is considered as a control unit on each of the channels involved.
3. When this group connects to a 2803, measure the distance to the appropriate cable entry hole and specify 2803 or 2803A on order form.

● 2314 (SCU) of Direct Access Storage Facility - A Series
Cabling Schematic

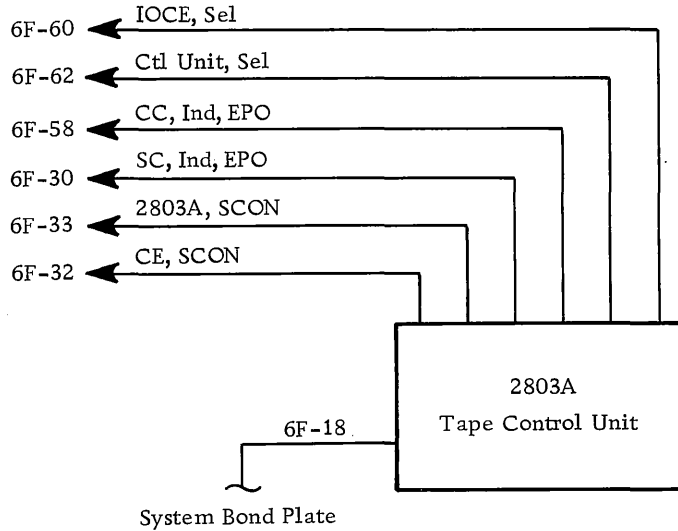


Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-18	1	2314	Bond Plate		1
6F-81	1	2314	CE		2, 3
6F-82	1	2314	2314		3, 4
6F-83	2	2314	SC	100	5, 6
6F-84	2	2314	Ctl Unit		7, 8
6F-85	2	2314	IOCE		7, 8

NOTES:

1. The bond cable has a fixed "X" length of 30 feet. One bond cable is required between each 2314 and the system bond plate under the floor.
2. SCON interface; one group from 2314 #1 to each CE in the configuration.
3. The total cable length allowed for group 6F-81 plus the number of 6F-82 groups serially connected cannot exceed 150 feet.
4. SCON interface; one group required between 2314s for each CE in the configuration.
5. One group from each 2314 to the System Console (SC).
6. One EPO cable included in this group.
7. Last 2314 must be within 100 feet from IOCE.
8. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation is exceeded.

● 2803A Tape Control Unit
Cabling Schematic



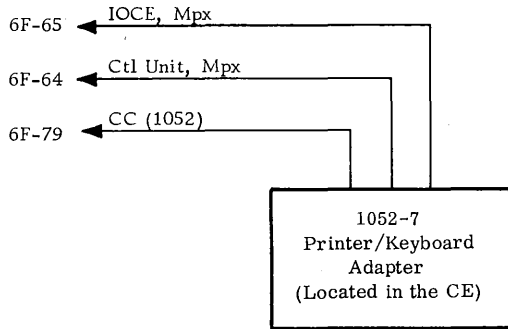
Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-18	1	2083A	Bond Plate		1
6F-30	2	2803A	SC	100	2, 3
6F-32	1	2803A	CE		4, 5
6F-33	1	2803A	2803A		5, 6
6F-58	2	2803A	CC	100	3, 7
6F-60	2	2803A	IOCE		8
6F-62	2	2803A	Ctl Unit		8

NOTES:

1. The bond cable has a fixed "X" length of 30 feet. One bond cable is required between each 2803A and a system bond plate under the floor.
2. One group from each 2803A to the System Console (SC).
3. One EPO cable included in this group.
4. SCON interface; one group from 2803A #1 to each CE in the configuration.
5. The total cable length allowed for group 6F-32 plus the number of 6F-33 groups serially connected cannot exceed 150 feet.
6. SCON interface; one group required between 2803s for each CE in the configuration.
7. One group from each 2803A to the Configuration Console (CC). Cables enter CC at two different holes; specify length (distance) to the furthest hole.
8. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation is exceeded.

Refer to the 2401 Tape Unit Cabling Schematic (page 121) for Tape Unit Cabling. These cable groups are common to all 9020 Systems.

1052-7 Printer/Keyboard Adapter
Cabling Schematic

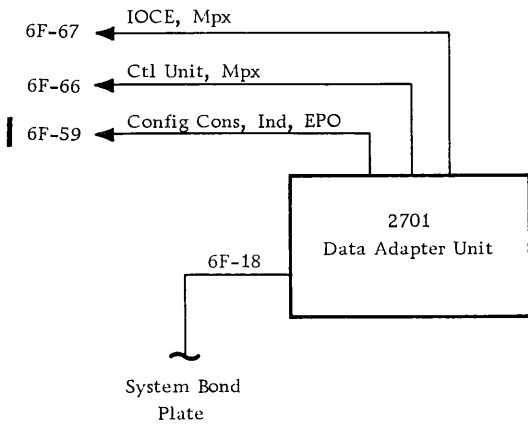


Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-64	2	1052 Adapter	Ctl Unit		2, 3
6F-65	2	1052 Adapter	IOCE		2, 3
6F-79	3	1052 Adapter	CC	75	1, 4

NOTES:

1. One group required from each 1052 Adapter to the Configuration Console patch panel. Measure distance to hole under reading board.
2. Multiplexer channel cabling.
3. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation must be exceeded.
4. One power cable included in this group.

2701 Data Adapter Unit
Cabling Schematic

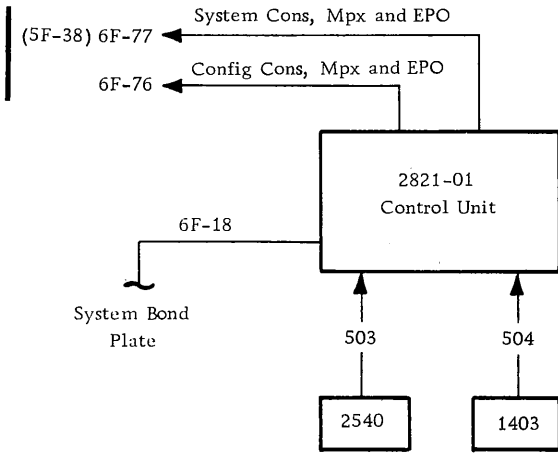


Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-18	1	2701	Bond Plate		1
6F-59	2	2701	CC	100	2, 5, 6
6F-66	2	2701	Ctl Unit		3, 4
6F-67	2	2701	IOCE		3, 4

NOTES:

1. The bond cable has a fixed "X" length of 30 feet. One bond cable is required between each 2701 and a system bond plate under the floor.
2. One group required from each 2701 to the Configuration Console.
3. Multiplexer channel cabling.
4. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation must be exceeded.
5. Contains one EPO cable.
6. Cables enter Configuration Console at two different holes; specify length (distance) to the furthest hole.

2821-01 Control Unit
Cabling Schematic



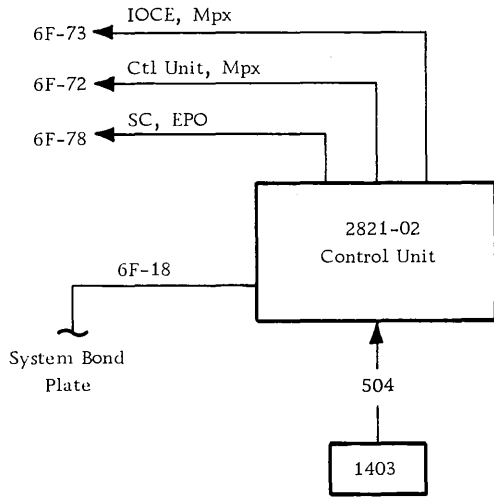
9020A cable group number, enclosed in parentheses, is for reference only.

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-18	1	2821-01	Bond Plate		1
6F-76	3	2821-01	CC	50	2, 3, 5
6F-77	3	2821-01	SC	50	2, 3
503	2	2540	2821-01	25	4
504	3	1403	2821-01	25	4

NOTES:

1. The bond cable has a fixed "X" length of 30 feet. One bond cable is required between each 2821-01 and a system bond plate under the floor.
2. One group required from the 2821-01 to either the System Console or Configuration Console.
3. Contains one EPO cable.
4. One group required for each I/O device.
5. Cables enter Configuration Console (CC) at two different holes; specify length (distance) to the furthest hole.

2821-02 Control Unit
Cabling Schematic

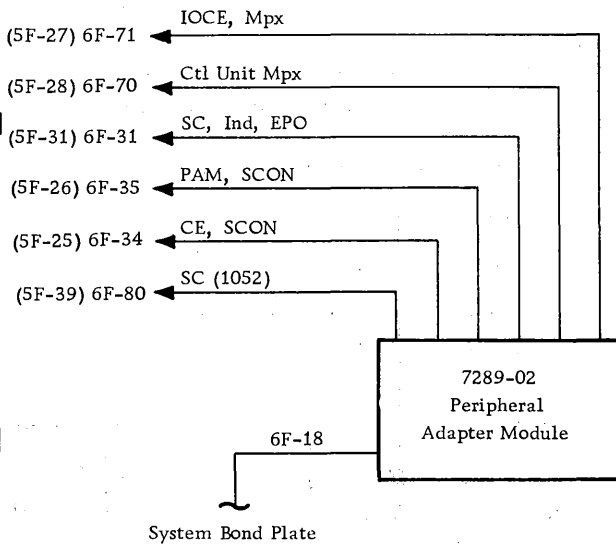


Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-18	1	2821-02	Bond Plate		5
6F-72	2	2821-02	Ctl Unit		1, 2
6F-73	2	2821-02	IOCE		1, 2
6F-78	1	2821-02	SC	100	3
504	3	1403	2821-02	25	4

NOTES:

1. Multiplexer channel cabling.
2. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation must be exceeded.
3. Contains one EPO cable.
4. One group required for each I/O device.
5. The bond cable has a fixed "X" length of 30 feet. One bond cable is required between each 2821-02 and a system bond plate under the floor.

7289-02 Peripheral Adapter Module
Cabling Schematic



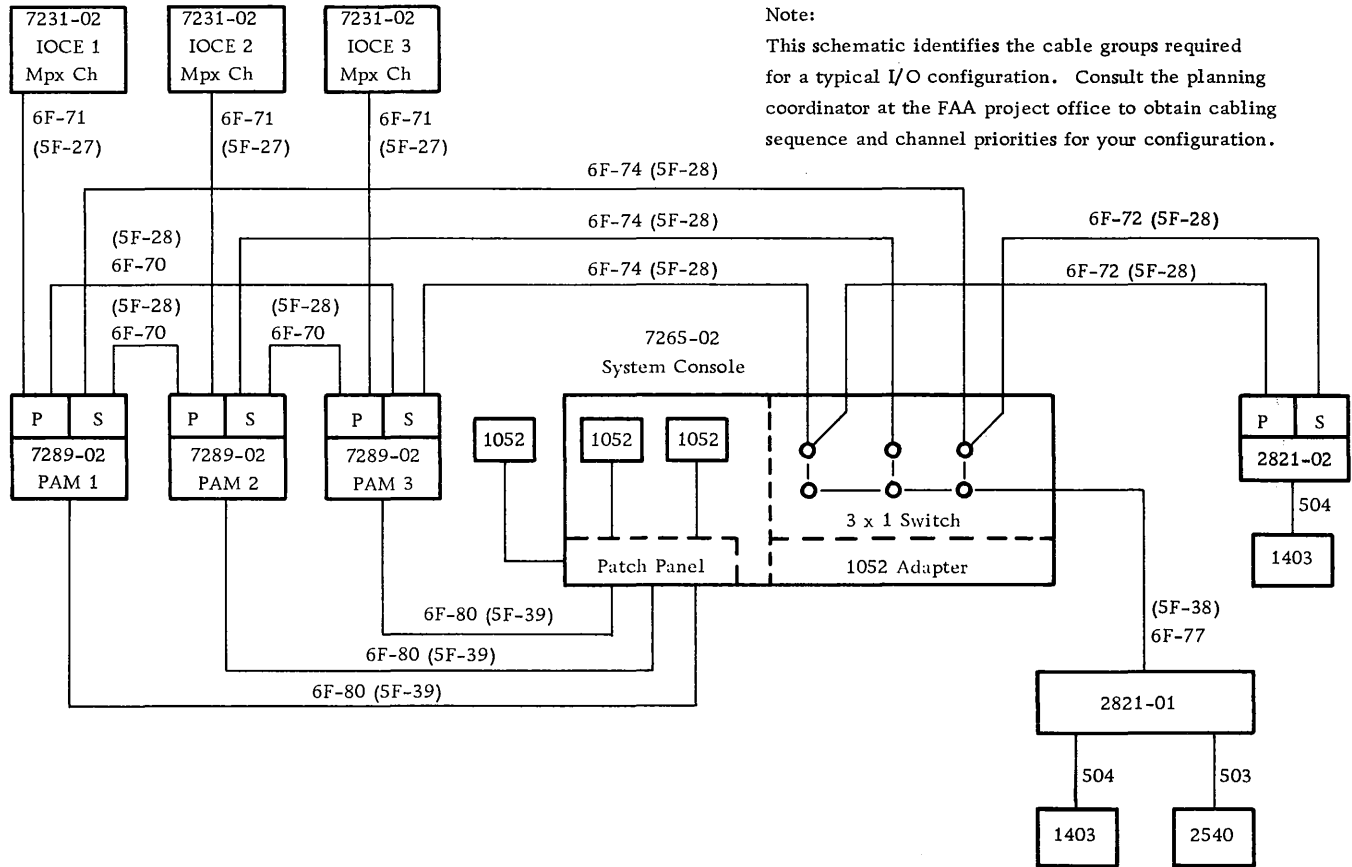
9020A cable group numbers, enclosed in parentheses are for reference only.

Group No.	No. of Cables	From	To	Maximum Length (ft)	Notes
6F-18	1	PAM	Bond Plate		9
6F-31	2	PAM	SC	100	4, 5
6F-34	1	PAM #1	CE		1, 2
6F-35	1	PAM	PAM		2, 3
6F-70	2	PAM	Ctl Unit		6, 7
6F-71	2	PAM	IOCE		6, 7
6F-80	3	PAM	SC	75	8

NOTES:

1. SCON interface: one group from PAM #1 to each CE in the configuration.
 2. The total cable length allowed for group 6F-34 plus the length of the 6F-35 groups serially connected, cannot exceed 150 feet.
 3. SCON interface: one group required between PAM's for each CE in the configuration.
 4. One group required from each PAM to the System Console.
 5. Contains one EPO cable.
 6. Multiplexer channel cabling.
 7. The total length of 200 feet is available to attach up to eight control units. Consult the planning coordinator at the FAA Project Office if this limitation must be exceeded.
 8. One group required from each 1052 Adapter to System Console patch panel. Measure distance to hole under reading board.
 9. The bond cable has a fixed "X" length of 30 feet. One bond cable is required between each PAM and a system bond plate under the floor.
- Refer to the 1052 PAM-to-PAM external cable listing for duplex cabling of the 1052 Adapters.

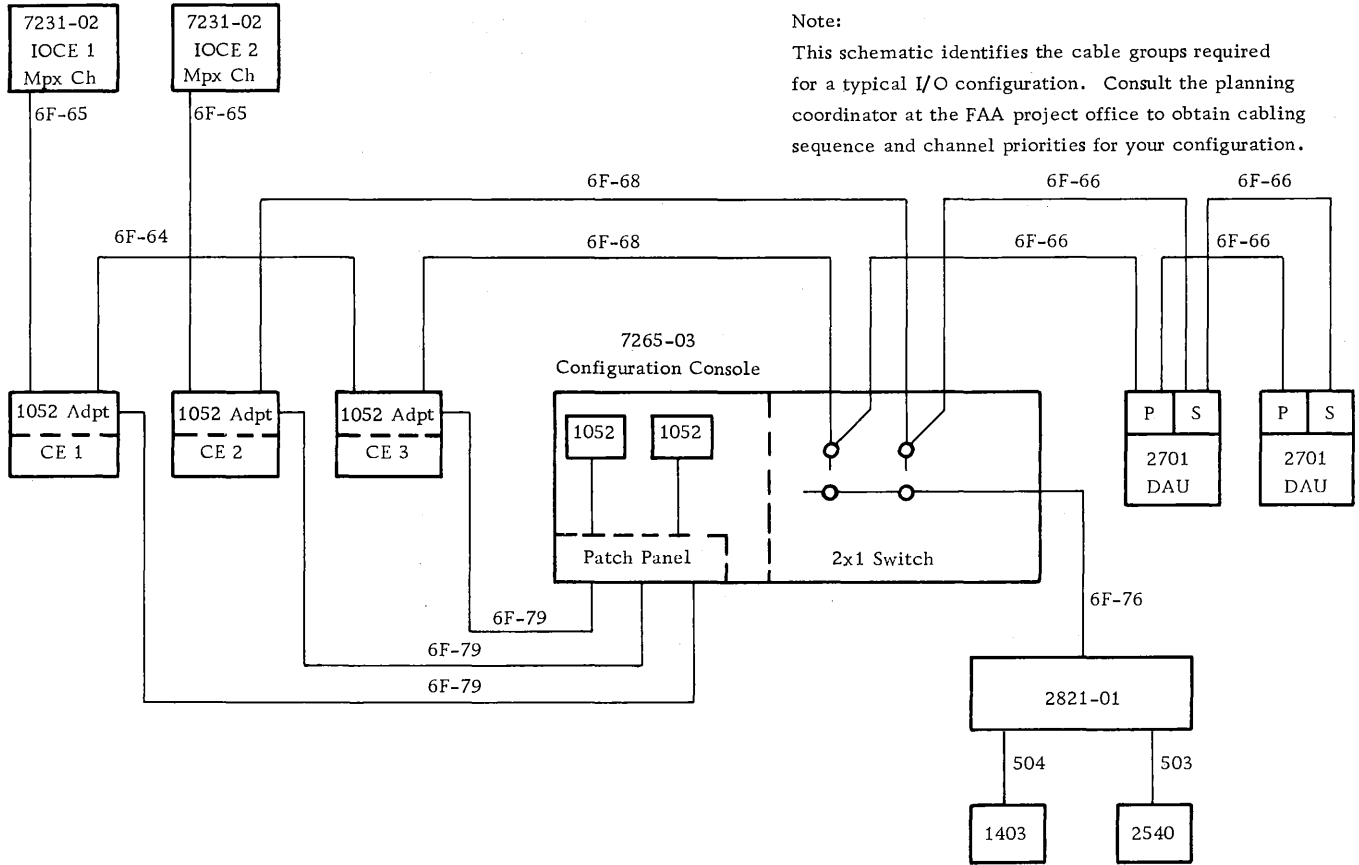
9020D Multiplexer Channel Cabling
Typical I/O Configuration



Note:
 This schematic identifies the cable groups required for a typical I/O configuration. Consult the planning coordinator at the FAA project office to obtain cabling sequence and channel priorities for your configuration.

9020A cable group numbers, enclosed in parentheses, for reference only.

9020E Multiplexer Channel Cabling
Typical I/O Configuration



Note:
 This schematic identifies the cable groups required for a typical I/O configuration. Consult the planning coordinator at the FAA project office to obtain cabling sequence and channel priorities for your configuration.

9020A AND 9020D/E SYSTEMS

1052 PAM-TO-PAM EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM				TO				
			MACH	S	LC	BT Y	MACH	S	LC	BT Z	
5F-42	A	5393077	7289-02-__			B	72	7289-02-__		A	72
	C	5392825	7289-02-__			B	72	7289-02-__		A	72
5F-42	A	5393077	7289-02-__			B	72	7289-02-__		A	72
	C	5392825	7289-02-__			B	72	7289-02-__		A	72
5F-42	A	5393077	7289-02-__			B	72	7289-02-__		A	72
	C	5392825	7289-02-__			B	72	7289-02-__		A	72
5F-42	A	5393077	7289-02-__			B	72	7289-02-__		A	72
	C	5392825	7289-02-__			B	72	7289-02-__		A	72
5F-42	A	5393077	7289-02-__			B	72	7289-02-__		A	72
	C	5392825	7289-02-__			B	72	7289-02-__		A	72
5F-42	A	5393077	7289-02-__			B	72	7289-02-__		A	72
	C	5392825	7289-02-__			B	72	7289-02-__		A	72
5F-05	A	5392810	7289-02-1	S4S4	72	7289-02-2	S4R3			72	
5F-05	A	5392810	7289-02-2	S4S4	72	7289-02-3	S4R3			72	
5F-05	A	5392810	7289-02-3	S4S4	72	7289-02-1	S4R3			72	

NOTE: PLANNING COORDINATOR AT FAA PROJECT OFFICE WILL
 ASSIGN ADDRESSES FOR EACH 5F-42 GROUP CABLE AND IDENTIFY
 LOCATION (LC) POINTS ON THE "FROM" AND "TO" END OF EACH CABLE.

● 7289-03 (FSPCM) EXTERNAL CABLE LISTING

GROUP NO	KEY NO	PART NO	FROM MACH	LOCATION Y	TO MACH	LOCATION Z	CONTROL UNIT POSITION
5F-46	A	5736191	7289-03-__	01U-B5A 72	7289-02-__	72	1
5F-46	A	5736191	7289-03-__	01U-B4A 72	7289-02-__	72	2
5F-46	A	5736191	7289-03-__	01U-B3A 72	7289-02-__	72	3
5F-46	A	5736191	7289-03-__	01U-B2A 72	7289-02-__	72	4
5F-46	A	5736191	7289-03-__	01U-B1A 72	7289-02-__	72	5
5F-46	A	5736191	7289-03-__	01U-A5A 72	7289-02-__	72	6
5F-46	A	5736191	7289-03-__	01U-A4A 72	7289-02-__	72	7
5F-46	A	5736191	7289-03-__	01U-A3A 72	7289-02-__	72	8
5F-46	A	5736191	7289-03-__	01U-A2A 72	7289-02-__	72	9
5F-46	A	5736191	7289-03-__	01U-A1A 72	7289-02-__	72	10
5F-46	A	5736191	7289-03-__	01T-B5A 72	7289-02-__	72	11
5F-46	A	5736191	7289-03-__	01T-B4A 72	7289-02-__	72	12
5F-46	A	5736191	7289-03-__	01T-B3A 72	7289-02-__	72	13
5F-46	A	5736191	7289-03-__	01T-B2A 72	7289-02-__	72	14
5F-46	A	5736191	7289-03-__	01T-B1A 72	7289-02-__	72	15
5F-46	A	5736191	7289-03-__	01T-A5A 72	7289-02-__	72	16
5F-46	A	5736191	7289-03-__	01T-A4A 72	7289-02-__	72	17
5F-46	A	5736191	7289-03-__	01T-A3A 72	7289-02-__	72	18
5F-46	A	5736191	7289-03-__	01T-A2A 72	7289-02-__	72	19
5F-46	A	5736191	7289-03-__	01T-A1A 72	7289-02-__	72	20
5F-49	A	352303	7289-03-1	01S-C22 24	7265	01S-S2J30 36	
5F-49	A	352303	7289-03-2	01S-C22 24	7265	01S-S2J31 36	
5F-49	A	352303	7289-03-3	01S-C22 24	7265	01S-S2J32 36	
5F-49	A	352303	7289-03-4	01S-C22-24	7265	01S-S2J33 36	
5F-49	A	352303	7289-03-5	01S-C22-24	7265	01S-S2J34 36	

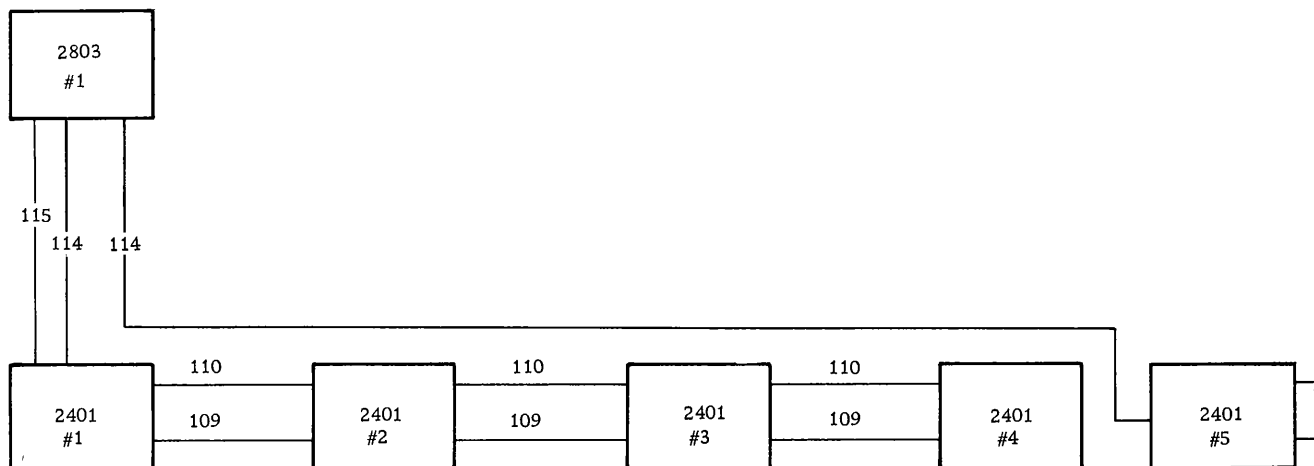
NOTE: PLANNING COORDINATOR AT FAA
PROJECT OFFICE WILL ASSIGN PAM GPO
ADDRESS AND LOCATION POINT FOR EACH CABLE.

●7289-03 (FSPCM) EXTERNAL CABLE LISTING PAM-TO-PAM

GROUP NO	KEY NO	PART NO	FROM MACH	LOCATION Y	TO MACH	LOCATION Z	CONTROL UNIT POSITION
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	1
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	2
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	3
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	4
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	5
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	6
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	7
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	8
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	9
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	10
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	11
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	12
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	13
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	14
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	15
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	16
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	17
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	18
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	19
5F-43	A	5736191	7289-02-__	72	7289-02-__	72	20

NOTE: PLANNING COORDINATOR AT FAA PROJECT OFFICE WILL
ASSIGN PAM GPO ADDRESS AND LOCATION POINT FOR EACH CABLE.

●2401 Model 2/3 Cabling Schematic



Maximum of eight tape drives (2401) may be attached to each TCU (2803)

<u>Group No.</u>	<u>No. of Cables</u>	<u>From</u>	<u>To</u>	<u>Notes</u>
109	1	2401	2401	1
110	1	2401	2401	2
114	1	2401	2803	2
115	1	2401	2803	1

NOTES:

1. For eight units the maximum total length of group 115 and all groups 109, should not exceed 100 feet.
2. For four units the maximum total length of group 114 and all groups 110, should not exceed 100 feet.

• APPENDIX: 9020D/E SYSTEM CABLE ORDER FORM

ORDER NOMENCLATURE

Alphanumeric designations, such as CE 1 and IOCE 1, are used for units unique to the 9020D/E systems; numeric designations, such as 2821 and 1403, are used for I/O units. The following table can be used to convert the alphanumeric designations to numeric designations.

Unit Identification	Alphanumeric	Numeric
Computing Element	CE 1-CE 4	7201-02#1-7201-02#4
I/O Control Element	IOCE 1-IOCE 3	7231-02#1-7231-02#3
Storage Element	SE 1-SE 10	7251-09#1-7251-09#10
System Console	SC	7265-02
Configuration Console	CC	7265-03
Peripheral Adapter Module	PAM 1-PAM 3	7289-02#1-7289-02#3
Display Element	DE 1-DE 5	7289-04#1-7289-04#5

INSTRUCTIONS

1. Determine the cable groups required for your configuration; refer to the cabling section of this manual for group numbers, maximum group lengths, and restrictions for each cable group.
2. Measure the distances between the cable entry holes and the cable exit holes for the cables required.
3. When a raised floor is used, add twice the height of the floor.
4. Round off the total length of cables required to the nearest foot and enter it under "Length Req (ft)".
5. Where applicable insert unit type and number in the appropriate FROM or TO column. Example 2314#1, 2701#1, etc.
6. For Selector Channel Cabling:
 - GROUP 6F-60, 62, 63, 84, and 85
 - a. Use a P or S in the P/S columns to specify primary and secondary tailgate positions for the control units. Use a number in the CHAN column to specify the Channel or Channel-to-Channel (CTC) positions.
 - GROUP 6F-61
 - b. Use a number in the FROM P/S to specify the CTC "FROM" tailgate positions and another number in the CHAN column to specify the "TO" channel positions.
7. For Multiplexer Channel Cabling:
 - a. Use a P or S in the FROM and TO P/S columns to specify primary and secondary tailgate positions for the control units and the IOCE designation (number) in the IOCE column to identify tailgate positions for the System or Configuration Console.
8. Include a system layout showing the numbers assigned to the various elements/units with your cable order, Examples are: IOCE#1, 2314#2. . . . 2401#2.

Customer No.				System No.				Plant Order No.				9020 D/E					
Location								Prepared By				Date					
GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ (ft)	GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ (ft)
				UNIT	NO.	UNIT	NO.						UNIT	NO.	UNIT	NO.	
6F-01				SE	1	CE	1		6F-01				SE	7	CE	4	
6F-01				SE	2	CE	1		6F-01				SE	8	CE	4	
6F-01				SE	3	CE	1		6F-01				SE	9	CE	4	
6F-01				SE	4	CE	1		6F-01				SE	10	CE	4	
6F-01				SE	5	CE	1		6F-02				SE	1	IOCE	1	
6F-01				SE	6	CE	1		6F-02				SE	2	IOCE	1	
6F-01				SE	7	CE	1		6F-02				SE	3	IOCE	1	
6F-01				SE	8	CE	1		6F-02				SE	4	IOCE	1	
6F-01				SE	9	CE	1		6F-02				SE	5	IOCE	1	
6F-01				SE	10	CE	1		6F-02				SE	6	IOCE	1	
6F-01				SE	1	CE	2		6F-02				SE	7	IOCE	1	
6F-01				SE	2	CE	2		6F-02				SE	8	IOCE	1	
6F-01				SE	3	CE	2		6F-02				SE	9	IOCE	1	
6F-01				SE	4	CE	2		6F-02				SE	10	IOCE	1	
6F-01				SE	5	CE	2		6F-02				SE	1	IOCE	2	
6F-01				SE	6	CE	2		6F-02				SE	2	IOCE	2	
6F-01				SE	7	CE	2		6F-02				SE	3	IOCE	2	
6F-01				SE	8	CE	2		6F-02				SE	4	IOCE	2	
6F-01				SE	9	CE	2		6F-02				SE	5	IOCE	2	
6F-01				SE	10	CE	2		6F-02				SE	6	IOCE	2	
6F-01				SE	1	CE	3		6F-02				SE	7	IOCE	2	
6F-01				SE	2	CE	3		6F-02				SE	8	IOCE	2	
6F-01				SE	3	CE	3		6F-02				SE	9	IOCE	2	
6F-01				SE	4	CE	3		6F-02				SE	10	IOCE	2	
6F-01				SE	5	CE	3		6F-02				SE	1	IOCE	3	
6F-01				SE	6	CE	3		6F-02				SE	2	IOCE	3	
6F-01				SE	7	CE	3		6F-02				SE	3	IOCE	3	
6F-01				SE	8	CE	3		6F-02				SE	4	IOCE	3	
6F-01				SE	9	CE	3		6F-02				SE	5	IOCE	3	
6F-01				SE	10	CE	3		6F-02				SE	6	IOCE	3	
6F-01				SE	1	CE	4		6F-02				SE	7	IOCE	3	
6F-01				SE	2	CE	4		6F-02				SE	8	IOCE	3	
6F-01				SE	3	CE	4		6F-02				SE	9	IOCE	3	
6F-01				SE	4	CE	4		6F-02				SE	10	IOCE	3	
6F-01				SE	5	CE	4										
6F-01				SE	6	CE	4										

Customer No.				System No.				Plant Order No.				9020 D/E						
Location								Prepared By				Date						
GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ (ft)	GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ (ft)	
				UNIT	NO.	UNIT	NO.						UNIT	NO.	UNIT	NO.		
6F-03				SE	1	IOCE	1		6F-12				CE	4	CE	2		
6F-03				SE	1	IOCE	2		6F-12				CE	3	CE	1		
6F-03				SE	1	IOCE	3		6F-12				CE	2	CE	1		
6F-03				SE	3	IOCE	1		6F-13				CE	4	CE	2		
6F-03				SE	3	IOCE	2		6F-13				CE	3	CE	1		
6F-03				SE	3	IOCE	3		6F-13				CE	2	CE	1		
6F-03				SE	4	IOCE	1		6F-14				CE	4	CE	3		
6F-03				SE	4	IOCE	2		6F-14				CE	4	CE	1		
6F-03				SE	4	IOCE	3		6F-14				CE	3	CE	2		
6F-04	1			SE	1	SE	2		6F-15				CE	4	CE	3		
6F-04	2			SE	1	SE	2		6F-15				CE	4	CE	2		
6F-04	3			SE	1	SE	2		6F-15				CE	3	CE	1		
6F-05		1		SE	1	SE	2		6F-16				CE	4	CE	3		
6F-05		2		SE	2	SE	1		6F-16				CE	3	CE	1		
6F-05		3		SE	1	SE	2		6F-16				CE	2	CE	1		
6F-05		4		SE	2	SE	1		6F-17				CE	3	CE	2		
6F-06		1		SE	1	DE	1		6F-18	SEE NOTE BELOW - SYSTEM BOND CABLE								
6F-06		2		DE	1	SE	1		6F-19									
6F-06		3		SE	1	DE	1		6F-20				IOCE	1	CE	1		
6F-06		4		DE	1	SE	1		6F-20				IOCE	1	CE	2		
6F-07				CE	2	CE	1		6F-20				IOCE	1	CE	3		
6F-08				CE	3	CE	1		6F-20				IOCE	1	CE	4		
6F-09				CE	4	CE	2		6F-21	1			IOCE	3	IOCE	2		
6F-10	1			CE	4	CE	2		6F-21	2			IOCE	3	IOCE	2		
6F-10	1			CE	3	CE	1		6F-21	3			IOCE	3	IOCE	2		
6F-10	1			CE	2	CE	1		6F-21	4			IOCE	3	IOCE	2		
6F-10	2			CE	4	CE	2		6F-21	1			IOCE	2	IOCE	1		
6F-10	2			CE	3	CE	1		6F-21	2			IOCE	2	IOCE	1		
6F-10	2			CE	2	CE	1		6F-21	3			IOCE	2	IOCE	1		
6F-10	3			CE	4	CE	2		6F-21	4			IOCE	2	IOCE	1		
6F-10	3			CE	3	CE	1											
6F-10	3			CE	2	CE	1											
6F-11				CE	4	CE	3											
6F-11				CE	4	CE	2											
6F-11				CE	2	CE	1											

SPECIFY GROUP 6F-18 FOR EACH ELEMENT AND/OR UNIT IN THE SYSTEM. LIST THE QUANTITY OF GROUPS REQUIRED TOTAL _ _ _

Customer No.				System No.				Plant Order No.				9020 D/E					
Location								Prepared By				Date					
GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ. (ft)	GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ. (ft)
				UNIT	NO.	UNIT	NO.						UNIT	NO.	UNIT	NO.	
6F-22				IOCE	1	CE	1		6F-30				2803A	1	SC		
6F-22				IOCE	1	CE	2		6F-30				2803A	2	SC		
6F-22				IOCE	1	CE	3		6F-30				2803A	3	SC		
6F-22				IOCE	1	CE	4		6F-31				PAM	1	SC		
6F-22				IOCE	2	CE	1		6F-31				PAM	2	SC		
6F-22				IOCE	2	CE	2		6F-31				PAM	3	SC		
6F-22				IOCE	2	CE	3		6F-32				2803A	1	CE	1	
6F-22				IOCE	2	CE	4		6F-32				2803A	1	CE	2	
6F-22				IOCE	3	CE	1		6F-32				2803A	1	CE	3	
6F-22				IOCE	3	CE	2		6F-32				2803A	1	CE	4	
6F-22				IOCE	3	CE	3		6F-33		1		2803A	3	2803A	2	
6F-22				IOCE	3	CE	4		6F-33		1		2803A	2	2803A	1	
6F-23				IOCE	1	CE	3		6F-33		2		2803A	3	2803A	2	
6F-23				IOCE	2	CE	3		6F-33		2		2803A	2	2803A	1	
6F-23				IOCE	3	CE	3		6F-33		3		2803A	3	2803A	2	
6F-24				SC		CE	3		6F-33		3		2803A	2	2803A	1	
6F-25				SC		CE	2		6F-33		4		2803A	3	2803A	2	
6F-26				SC		CE	4		6F-33		4		2803A	2	2803A	1	
6F-27				CE	1	SC			6F-34				PAM	1	CE	1	
6F-27				CE	2	SC			6F-34				PAM	1	CE	2	
6F-27				CE	3	SC			6F-34				PAM	1	CE	3	
6F-27				CE	4	SC			6F-34				PAM	1	CE	4	
6F-28				SE	1	SC			6F-35		1		PAM	3	PAM	2	
6F-28				SE	2	SC			6F-35		1		PAM	2	PAM	1	
6F-28				SE	3	SC			6F-35		2		PAM	3	PAM	2	
6F-28				SE	4	SC			6F-35		2		PAM	2	PAM	1	
6F-28				SE	5	SC			6F-35		3		PAM	3	PAM	2	
6F-28				SE	6	SC			6F-35		3		PAM	2	PAM	1	
6F-28				SE	7	SC			6F-35		4		PAM	3	PAM	2	
6F-28				SE	8	SC			6F-35		4		PAM	2	PAM	1	
6F-28				SE	9	SC											
6F-28				SE	10	SC											
6F-29				IOCE	1	SC											
6F-29				IOCE	2	SC											
6F-29				IOCE	3	SC											

Customer No.				System No.				Plant Order No.				9020 D/E					
Location								Prepared By				Date					
GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ (ft)	GROUP NO.	IOCE	CE	CHAN	FROM		TO		LENGTH REQ (ft)
				UNIT	NO.	UNIT	NO.						UNIT	NO.	UNIT	NO.	
6F-36				DE	1	CE	1		6F-47				DE	5	DE	4	
6F-36				DE	2	CE	1		6F-47				DE	4	DE	3	
6F-36				DE	3	CE	1		6F-47				DE	2	DE	1	
6F-36				DE	4	CE	1		6F-48				DE	3	DE	2	
6F-36				DE	5	CE	1		6F-49				DE	5	DE	1	
6F-36				DE	1	CE	2		6F-50								
6F-36				DE	2	CE	2		6F-51				CC		CE	3	
6F-36				DE	3	CE	2		6F-52				CC		CE	2	
6F-36				DE	4	CE	2		6F-53				CC		CE	4	
6F-36				DE	5	CE	2		6F-54				CE	1	CC		
6F-36				DE	1	CE	3		6F-54				CE	2	CC		
6F-36				DE	2	CE	3		6F-54				CE	3	CC		
6F-36				DE	3	CE	3		6F-54				CE	4	CC		
6F-36				DE	4	CE	3		6F-55				IOCE	1	CC		
6F-36				DE	5	CE	3		6F-55				IOCE	2	CC		
6F-36				DE	1	CE	4		6F-55				IOCE	3	CC		
6F-36				DE	2	CE	4		6F-56				SE	1	CC		
6F-36				DE	3	CE	4		6F-56				SE	2	CC		
6F-36				DE	4	CE	4		6F-56				SE	3	CC		
6F-36				DE	5	CE	4		6F-56				SE	4	CC		
6F-37				CE	3	CE	1		6F-56				SE	5	CC		
6F-38				CE	1	DE	1		6F-57				DE	1	CC		
6F-39				DE	1	CE	2		6F-57				DE	2	CC		
6F-39				DE	2	CE	2		6F-57				DE	3	CC		
6F-40				DE	3	CE	4		6F-57				DE	4	CC		
6F-40				DE	4	CE	4		6F-57				DE	5	CC		
6F-41				DE	2	DE	1		6F-58				2803A	1	CC		
6F-42				DE	2	DE	1		6F-58				2803A	2	CC		
6F-42				DE	3	DE	1		6F-58				2803A	3	CC		
6F-43				DE	3	DE	1		6F-59				2701	1	CC		
6F-43				DE	4	DE	1		6F-59				2701	2	CC		
6F-43				DE	5	DE	1										
6F-44				DE	3	DE	2										
6F-45				DE	4	DE	3										
6F-46				DE	2	DE	1										

Customer No.				System No.				Plant Order No.				9020 D/E					
Location								Prepared By				Date					
GROUP NO.	IO	CE	CHAN	FROM		TO		LENGTH REQ (ft)	GROUP NO.	IO	CE	CHAN	FROM		TO		LENGTH REQ (ft)
				UNIT	NO.	UNIT	NO.						UNIT	NO.	UNIT	NO.	
6F-81				2314	1	CE	1										
6F-81				2314	1	CE	2										
6F-81				2314	1	CE	3										
6F-81				2314	1	CE	4										
6F-82		1		2314	3	2314	2										
6F-82		1		2314	2	2314	1										
6F-82		2		2314	3	2314	2										
6F-82		2		2314	2	2314	1										
6F-82		3		2314	3	2314	2										
6F-82		3		2314	2	2314	1										
6F-82		4		2314	3	2314	2										
6F-82		4		2314	2	2314	1										
6F-83				2314	1	SC											
6F-83				2314	2	SC											
6F-83				2314	3	SC											

SELECTOR CHANNEL AND
TAPE DRIVE GROUPS

Customer No.				System No.				Plant Order No.				9020 D/E					
Location								Prepared By				Date					
GROUP NO.	CHAN	FROM P/S	TO P/S	FROM		TO		LENGTH REQ. (ft)	GROUP NO.	CHAN	FROM P/S	TO P/S	FROM		TO		LENGTH REQ. (ft)
				UNIT	NO.	UNIT	NO.						UNIT	NO.	UNIT	NO.	
6F-60				2803A		IOCE			110				2401		2401		
6F-60				2803A		IOCE			110				2401		2401		
6F-60				2803A		IOCE			110				2401		2401		
6F-61				IOCE		IOCE			110				2401		2401		
6F-61				IOCE		IOCE			110				2401		2401		
6F-61				IOCE		IOCE			110				2401		2401		
6F-62				2803A					110				2401		2401		
6F-62				2803A					110				2401		2401		
6F-62				2803A					110				2401		2401		
6F-63				IOCE					110				2401		2401		
6F-63				IOCE					110				2401		2401		
6F-63				IOCE					110				2401		2401		
6F-63				IOCE					110				2401		2401		
109				2401		2401			110				2401		2401		
109				2401		2401			110				2401		2401		
109				2401		2401			114				2401		2803A		
109				2401		2401			114				2401		2803A		
109				2401		2401			114				2401		2803A		
109				2401		2401			114				2401		2803A		
109				2401		2401			114				2401		2803A		
109				2401		2401			114				2401		2803A		
109				2401		2401			114				2401		2803A		
109				2401		2401			115				2401		2803A		
109				2401		2401			115				2401		2803A		
109				2401		2401			115				2401		2803A		
109				2401		2401											
109				2401		2401			6F-84				2314				
109				2401		2401			6F-84				2314				
109				2401		2401			6F-84				2314				
109				2401		2401			6F-85				2314		IOCE		
109				2401		2401			6F-85				2314		IOCE		
109				2401		2401			6F-85				2314		IOCE		
109				2401		2401											
110				2401		2401											
110				2401		2401											
110				2401		2401											

MULTIPLEXOR CHANNEL AND I/O DEVICE GROUP

Customer No.			System No.			Plant Order No.			9020 D/E								
Location						Prepared By			Date								
GROUP NO.	IOCE	FROM P/S	TO P/S	FROM		TO		LENGTH REQ. (ft)	GROUP NO.	IOCE	FROM P/S	TO P/S	FROM		TO		LENGTH REQ. (ft)
				UNIT	NO.	UNIT	NO.						UNIT	NO.	UNIT	NO.	
6F-64				1052	CE				6F-76				2821-01		CC		
6F-64				1052	CE				6F-77				2821-01		SC		
6F-64				1052	CE				6F-78				2821-02		SC		
6F-65				1052	CE		IOCE		6F-79				CE		CC		
6F-65				1052	CE		IOCE		6F-79				CE		CC		
6F-65				1052	CE		IOCE		6F-79				CE		CC		
6F-66				2701					6F-79				CE		CC		
6F-66				2701					6F-80				PAM		SC		
6F-66				2701					6F-80				PAM		SC		
6F-67				2701			IOCE		6F-80				PAM		SC		
6F-67				2701			IOCE		6F-80				PAM		SC		
6F-67				2701			IOCE		503				2540		2821		
6F-68				CC					503				2540		2821		
6F-68				CC					504				1403		2821		
6F-68				CC					504				1403		2821		
6F-69				CC			IOCE										
6F-69				CC			IOCE										
6F-69				CC			IOCE										
6F-70				PAM													
6F-70				PAM													
6F-70				PAM													
6F-71				PAM			IOCE										
6F-71				PAM			IOCE										
6F-71				PAM			IOCE										
6F-72				2821-02													
6F-72				2821-02													
6F-72				2821-02													
6F-73				2821-02			IOCE										
6F-73				2821-02			IOCE										
6F-73				2821-02			IOCE										
6F-74				SC													
6F-74				SC													
6F-74				SC													
6F-75				SC			IOCE										
6F-75				SC			IOCE										
6F-75				SC			IOCE										

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