Contract No. FA64WA-5223

IBM Field Engineering

Installation Manual

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9020 D/E System

SFN-0106-2

PREFACE

This manual is a guide for installing the IBM 9020D/E System. It provides pre-system planning, external cabling, and system tests information.

Installation manuals are supplied with each system. The system installation manual, together with the applicable unit manuals, provides a complete installation package for either system.

Keep these manuals with the system for possible use when reinstalling the equipment. New or revised installation manuals obtained at the time of re-installation may lack information pertinent to system or units.

Second Edition (June 1971)
This is a minor revision of, and obsoletes, SFN-0106-1. Information is added pertaining to the 2314-A1 Direct Access Storage Facility. In addition, new pre-installation and external cabling information have been added in Chapters 1 and 2.

Changes to the text are indicated by a vertical line to the left of the change; a changed illustration is denoted by the symbol • to the left of the caption.

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SAFETY

In addition to the safety practices outlined in CE Safety Practices card, Form 229-1264, observe the following precautions:

Do not work alone on equipment that has power on.

Wear Safety glasses when performing maintenance and repair work. Be sure that fire extinguishers are readily available and of the right type (CO_2).

When it is necessary to work near power connectors, convenience outlets, or power supplies, disconnect the power cables or turn off the main circuit breakers and remove the pull-type fuse holder from the battery box. Convenience outlets are live unless you pull the emergency power off switch or trip the main circuit breaker.

Discharge capacitors before working on dc power supplies.

Turn off power and use a fuse puller when replacing fuses.

Replace any safety covers that have been removed.

Use only grounded tools and test equipment. Undergrounded equipment is dangerous and can cause serious SLT card damage. An example of such a hazard is ungrounded Wire-Wrap* guns.

Learn location of emergency exists.

Train personnel in:

1. Procedures to shut off all power and air conditioning.
2. Handling fire extinguishers.
3. Evacuting records and personnel.
4. Calling the fire department.
5. Administration of first aid.

Power phasing of all units is critically important to your safety. Before turning power on, be sure to follow to the letter all instructions on power phasing.

Before working on the 9020 system battery package become familiar with the following safety instructions.

DANGER

The full dc potential of the batteries is present across the red and black binding posts on the power control box inside the battery cabinet when both battery switches are ON and 24 vdc is applied to the EPO contactor coil. This voltage ranges from

300 to 350 vdc and can cause dangerous electrical shock. Interrupting the 24 vdc to the contactor coil, turning off both battery switches or removal of the pull type fuse holder will remove the battery potential from the binding posts if the battery charger is not active. However, if J1 is connected and the charger is active, full charger potential (450 to 500 vdc) is present at the binding posts even when the battery switches and contactor are inactive and the pull type fuse holder is removed.

DANGER

Outriggers (safety legs) are used to move the CE, DE and SE power wall frames; the CE DAT and battery frames; and the CC Console power wall frame. Do not remove outriggers until frames are placed at designated floor locations.

CHAPTER 1. INTRODUCTION

This manual provides installation instructions for the IBM 9020D and the 9020E Systems. The following information is included:

1. System Configuration
2. Element and unit installation reference
3. Installation planning
4. Unloading and unpacking
5. External Cables
6. System testing

Separate element and unit installation manuals are available; they provide installation instructions for each system component and should be used in conjunction with this manual.

1.1 SYSTEM CONFIGURATION

The 9020D triplex system configuration consists of:

Three IBM 7201-02 Computing Elements (CEs). A fourth CE can be added for maximum expansion. CEs are numbered 1 through 4 and are assigned physical locations on the main wall complex. See Figure 1-1 for the CE locations and their expansion order.

Three IBM 7231-02 Input/Output Control Elements (IOCEs). IOCEs are numbered 1 through 3.

Five IBM 7251-09 Storage Elements (SEs). Five more SEs can be added for maximum expansion. SEs are numbered 1 through 10 and are assigned physical locations on the main wall complex. See Figure 1-1 for the SE locations and their expansion order.

One IBM 7265-02 System Console.

Three IBM 7289-02 Peripheral Adapter Modules (PAMs). PAMs are numbered 1 through 3.

Two IBM 1052-07 Printer Keyboards (located on the System Console)

One IBM 2821-01 Control Unit.

One IBM 2821-02 Control Unit.

Two IBM 1403 Printers.

One IBM 2540 Card Read Punch.

Three IBM 2314-A1 Direct Access Storage Facilities (DASF) which comprise of 2314's (SCU's) and 2312's or 2318's (DSU's). The DASF's are numbered 1 through 3.

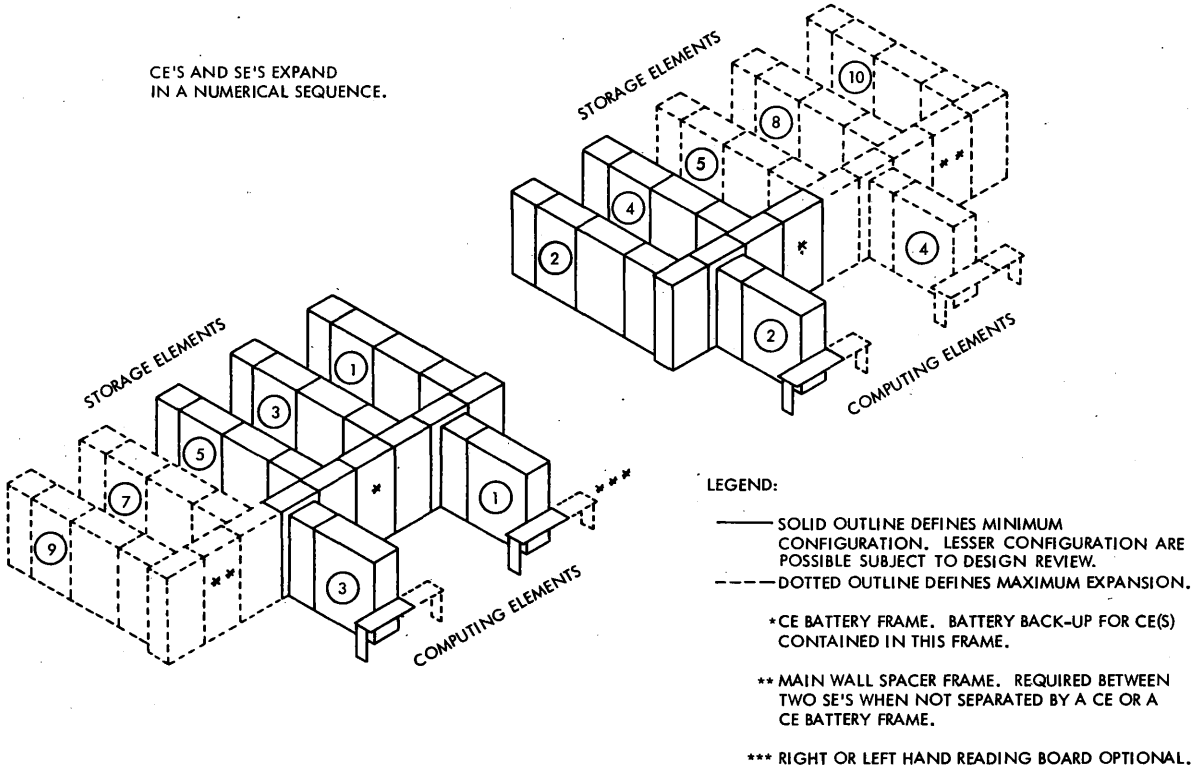


Figure 1-1. 9020D CE and SE Element Numbering and Order of Expansion

Three IBM 2803A-01 Tape Control Units (TCUs). TCUs are numbered 1 through 3.

Eighteen IBM 2401 Magnetic Tape Units (expandable to 8 tape units per TCU).

The 9020E triplex system configuration consists of:

Three IBM 7201-02 Computing Elements (CEs). A fourth CE can be added for maximum expansion. CEs are numbered 1 through 4 and are assigned physical locations on the main wall complex. See Figure 1-2 for the CE locations and their expansion order.

Two IBM 7231-02 Input/Output Control Elements (IOCEs). A third IOCE can be added for maximum expansion. IOCEs are numbered 1 through 3.

Three IBM 7251-09 Storage Elements (SEs). Two more SEs can be added for maximum expansion. SEs are numbered 1 through 5 and are assigned physical locations on the main wall complex. See Figure 1-2 for the SE locations and their expansion order.

One IBM 7265-03 Configuration Console.

Three IBM 7289-04 Display Elements (DEs). Two more DEs can be added for maximum expansion, DEs are numbered 1 through 5 and are assigned physical locations on the main wall complex. See Figure 1-2 for the DE locations and their expansion order.

Two IBM 1052-07 Printer Keyboards (located on the Configuration Console).

Two IBM 2701 Data Adapter Units (DAUs)

One IBM 2821-01 Control Unit

One IBM 1403 Printer

One IBM 2540 Card Read Punch

Two IBM 2803A-01 Tape Control Units (TCUs). One more TCU can be added for maximum expansion. TCUs are numbered 1 through 3.

Two IBM 2401 Magnetic Tape Units (expandable to 8 tape units per TCU).

1.2 9020 ELEMENT AND UNIT INSTALLATION REFERENCES

Separate installation manuals are available for each system component. They facilitate assembly and test of individual units. Unit assembly, interframe cabling, and test procedure information is contained in the following manuals:

IBM 7201-02 Computing Element, Form SFN-0204

IBM 7231-02 I/O Control Element, Form 123,9513

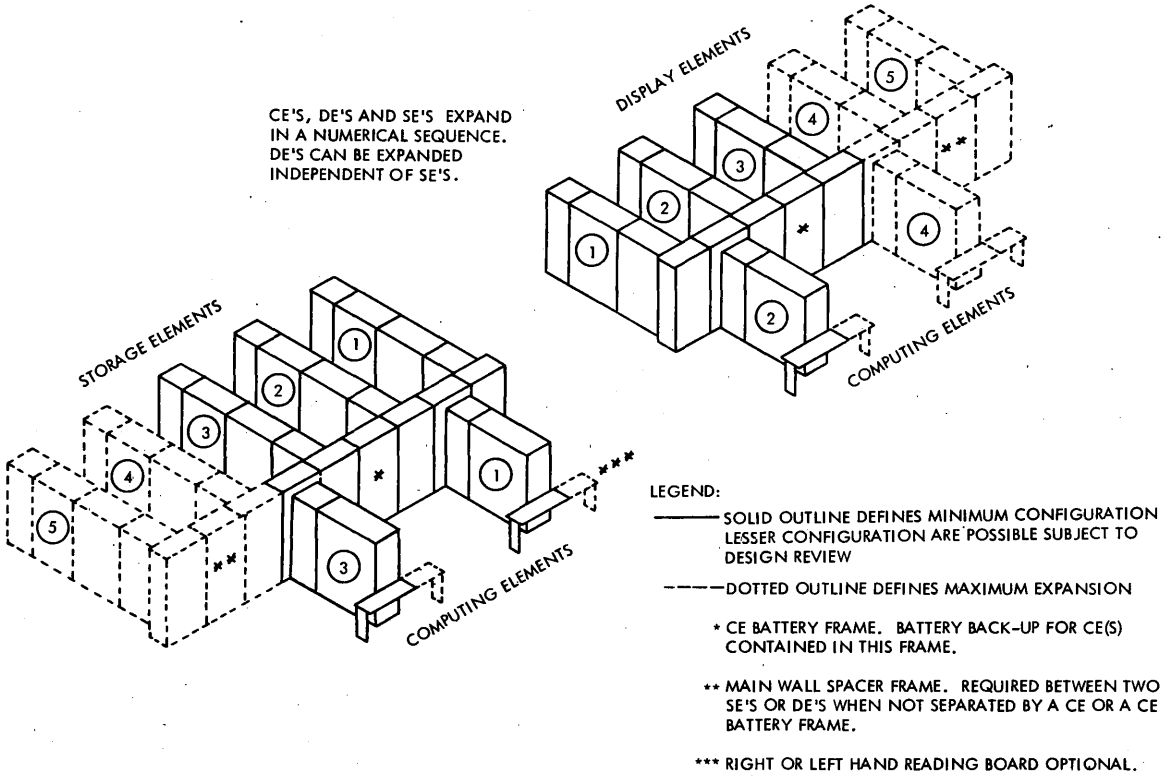


Figure 1-2. 9020E CE, SE and DE Element Numbering and Order of Expansion

IBM 7251-09 Storage Element, Form SFN-0304

IBM 7265-02 System Console, and IBM 1052 Printer Keyboard, Form 123-9517

IBM 7265-03 Configuration Console, and IBM 1052 Printer Keyboard, Form SFN-0504

IBM 7289-02 Peripheral Adapter Module, Form 123-9515

IBM 7289-04 Display Element, Form SFN-0404

IBM 2314-A1 Direct Access Storage Facility Installation Manual, Form SY27-2309

IBM 2701 Data Adapter Unit, Form SFN-0904

IBM 9020 I/O Unit Installation Manual, Form 123-9516 includes:
2803 Tape Control, 2401 Magnetic Tape Units
2821 Control Unit, 1403 Printer, and 2540 Card Read Punch

IBM 2401/02/03/04, 2420, 2803/04 Magnetic Tape Units and Controls, Form SY22-9506

1.3 INSTALLATION PLANNING

Installation time for the 9020D/E System can be shortened if site preparations are completed before the system arrives. This section provides the customer engineer with a guide for these preparations.

Physical planning environmental requirements of an area for the installation of the IBM 9020D/E System are specified in the IBM 9020 System Physical Planning Manual, Form ZC22-6878.

The customer is responsible for proper preparation of the installation site. However, before the system is delivered, a check of the facility should be made by the customer engineer in charge and the physical planning coordinator to ensure that the computer area is complete and ready to receive the system.

1.3.1 Records

The account customer engineers must maintain the following records and files:

Spare parts tub file
Engineering change history card for each machine
Systems log
Diagnostic test decks, tapes, and writeups
(Duplicate diagnostic card decks and tapes should be maintained.)

1.3.2 Manpower Allocations

The efficient installation of a triplex system requires careful use of available manpower. During the initial phase of the installation, assemblage of the IOCE's and I/O units should be completed first. This will allow them to be unit tested and ready for bring up of the system.

For bring up of the system, checkpoints must be established for simplex testing and carefully observed so that various simplex systems arrive at a checkpoint at approximately the same time. For example, if one simplex system is lagging the others, the situation can be spotted before the checkpoint and more effort expended on this lagging system so that all systems reach the checkpoint together.

1.3.3 Maintenance Room

Arrange the furniture to make best use of power outlets and provide space for units that will be serviced in the maintenance room. See Figure 1-3 for a suggested maintenance room layout. The room must have both 115 and 208 volt ac outlets adequate for any unit that will be serviced there.

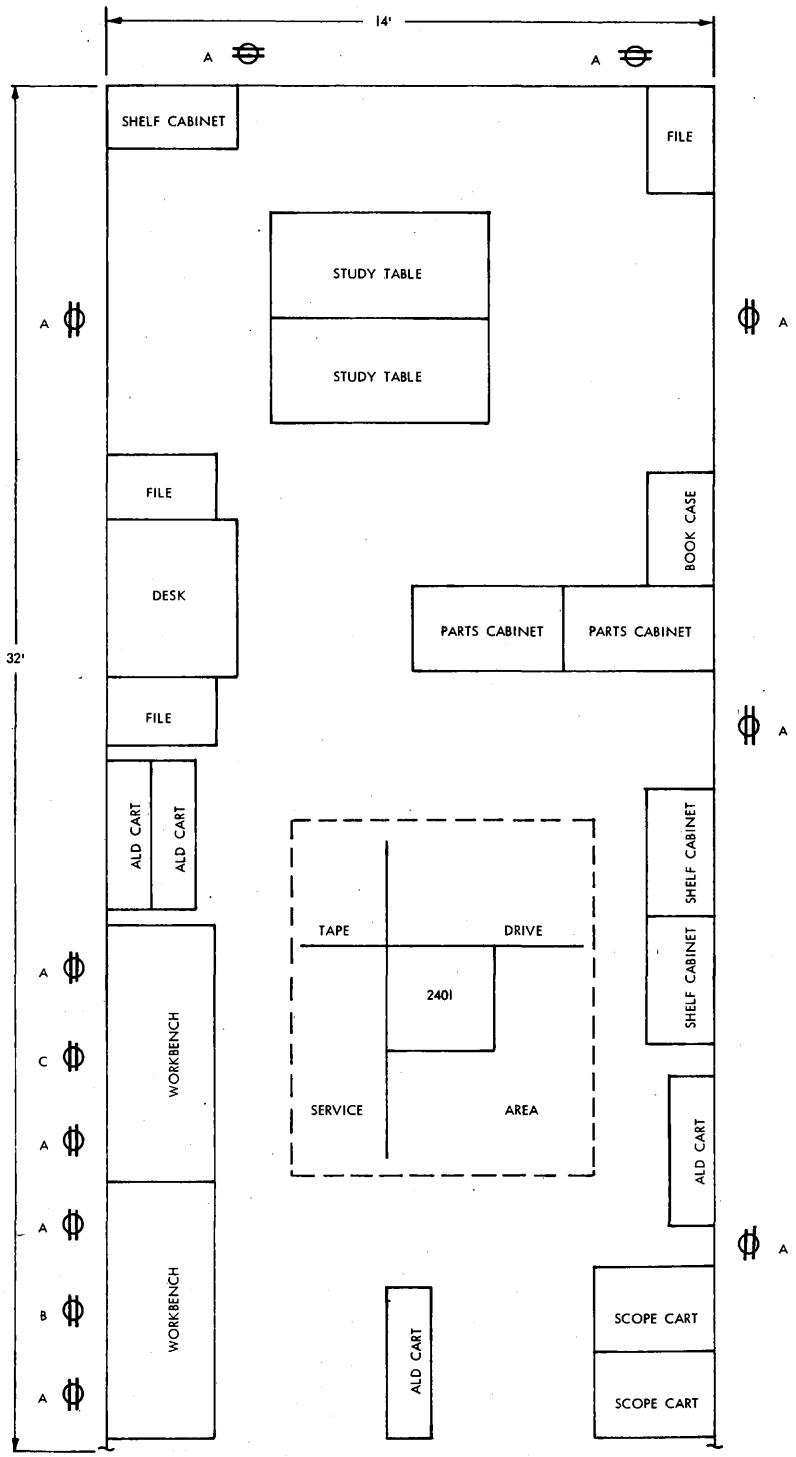
Dimensions in inches of typical maintenance room furniture and fixtures follows:

Item	Length	Width	Height
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

1.3.4 Pre-Installation Checks

1.3.4.1 Air Conditioning

Before the system arrives, make sure the air conditioning system is adequate and is functioning properly. Optimum power on conditions are: temperature 75°F, relative humidity 50 percent. The customer should balance the air conditioning as soon as possible after the installation.



A. 115VAC DUPLEX CONVENIENCE OUTLET
B. 115VAC 10 OUTLET (P&S 5661 OR EQUIVALENT)
C. 208VAC 30 OUTLET (P&S 7250 OR EQUIVALENT)

Figure 1-3. Typical Maintenance Room

1.3.4.2 Power Requirements

Check power source for conformity to specifications and safety regulations. The IBM 9020 System Physical Planning Manual, Form ZC22-6878 can be used as a guide.

Identify the circuit breakers for each element/unit in the power distribution wall panel. Display "Do not turn on power" signs while the machines are being installed.

Ensure that the correct size and type receptacle or connector is provided for each element or unit. They should be located under the false floor within 10 feet of where the power line cord exits the machine.

Check the building supply source at the receptacle or connector for ground, shorts, and phasing per instructions contained in the individual element/unit FEIM manuals.

1.3.4.3 System Bond

Check the under floor locations of the system bond plates furnished by the customer. Each plate must have a sufficient amount of 1/4 x 20 tapped holes to accommodate a bond cable from each element or unit located within a 30 foot radius.

1.3.4.4 System Floor Preparation

Check that the floor cut-outs match the floor plan. The front corner of the extreme left or right wall frame element (refer to Figure 1-1 and 1-2) should be used as a reference point for locating the CE, DE and SE cable holes on each CE/SE or CE/DE wall complex.

Use masking tape to mark the unit name on the floor near its respective cable cut-out. If area under raised floor is used as an air plenum, make sure it is clean. Clean under-floor area with vacuum cleaner if necessary and install under-floor cables before the system arrives.

1.3.4.5 Check List

To insure that the site is prepared to receive the system, the following sequence of tasks should be completed.

1. Prepare maintenance room.
2. Set up files.
3. Set up logic carts and books.
4. Inventory and store spare parts.
5. Ensure that the air conditioning meets requirements.
6. Mark machine outline, by frame, on floor.
7. Identify machine serial number within outline.

8. Check cable hole cutouts, using floor plan.
9. Mark machine designations on floor near respective cable hole.
10. Check power source for each machine, have problems corrected immediately.
11. Locate system bond plates.
12. Designate external cable storage drop-off areas.
13. Inventory and place cables in drop-off areas.
14. Label and remove necessary floor panels for cabling.
15. Lay external cables.
16. Lay bond cables and terminate to bond plate.
17. Replace floor panels
18. Inventory and identify the cables ends at each hole.
19. Place cable ends under floor.
20. Plan and layout floor for cover shipment.

1.4 UNLOADING AND UNPACKING

1.4.1 Cover Shipment

To prevent damage to the covers during shipment and to facilitate handling, most covers and exterior hardware have been removed and packed in separate crates. They are received at the site prior to the system.

Upright wooden crates, 31"x39"x81" are used which can be passed through normal doorway openings. The quantity of crates for each system is dependent on the configuration. Each crate is identified by an element and designation code. I/O unit and devices are shipped with covers and ship groups attached.

A storage area should be designated for these crates within the computer room. They should be located where they are accessible for use and not in the way during the installation.

1.4.2 System Shipment

The customer engineer should assist in placing the elements and units. Individual frames should be placed in the same locations they occupied at the factory. Labels have been placed on the frames, prior to shipping, to identify these locations.

The CE, DE/SE wall section complex should be position first when possible, starting with the elements on the extreme ends, i.e., the higher numbered elements first. Each element shipping frame must be identified, placed in position according to serial number and frame position. Refer to the individual element FEIM's for these positions.

Outriggers (safety legs) are required to move the CE, DE and SE power wall frames; the CE DAT and battery frames; and the CC console power wall frame. These frames should be positioned before the outriggers are removed.

Check units for damage (bent frame members, damaged cards or gates, broken wires, etc.). If damage is found, report it immediately.

1.4.3 Shipping Groups

All parts removed from the units prior to shipment, additional parts required at installation, maintenance documents, and reference drawings are all components of the shipping group. Each unit within the system has a shipping group. For packaging convenience, these groups are combined. These groups should be inventoried and shortages reported immediately. Cartons which contain documentation should be opened first.

CHAPTER 2. EXTERNAL CABLES

2.1 CABLE SHIPMENT

External cables should arrive about two weeks before the system. Upon receipt, the cables should be inventoried and checked for damage. Any discrepancy or damage must be reported immediately and corrective action taken before arrival of the system.

All external cables must be installed before the system components are brought into the computer room.

2.2 FLOOR PREPARATION

Using the system floor plan and the Physical Planning Manual, Form ZC22-6878 as reference, check that all cable access holes are properly located and of correct dimensions. Indicate, on the floor near the respective cable access holes, the outline of each system component; use masking tape and a marking pen. This will aid in cable installation and system component placement. The floor marking should indicate machine type as well as number designation, e.g., CE-1, SE-1, 2803#1, etc.

2.3 CABLE IDENTIFICATION

Cables connecting two machines constitute a cable group; more than one group may be used to connect these machines. Each external cable has a group number consisting of a prefix, key number, and a suffix letter. A "6F" prefix is used to identify 9020D/E groups.

Identifying labels are attached to both ends of each external cable. A red striped label is attached to the "From" end and a plain label to the "To" end. The label contains the following identifying information:

Part Numbers - Part number of the cable assembly, including connectors.

Key Number - Provides the correlation between the associated cable and the external cabling ID reference charts, part number 5781406.

The ID cabling chart contains the number of the cable group to which the cable belongs, cable part number, the element or unit to which the cable "FROM" and "TO" ends connect, and the cable plugging terminations within each element or unit.

In addition to the above, the label also contains the EC number and cable length information. To further identify cable groups that

are configuration dependent and/or require special application, an additional label is used on both ends of the cable assembly to identify the dependent unit by designation and/or describes the application. An example of cable labeling is shown in Figure 2-1.

2.4 CABLE INSTALLATION

Because of the large volume of external cables used on a 9020 D/E System, it is important that the cables be installed in a predetermined manner. The following can be used as a guide for installing cables.

1. Establish cable storage drop-off areas. One area for each element or unit. I/O device cables (Printer, Tapes, etc.) can be stored together.

2. Segregate cables using the "FROM" end (red label) of the cable to identify what drop-off area to place cable. Example: Cable labeled, Group 6F-01A, "FROM" SE-1 "TO" CE-2 would be placed in the SE-1 drop-off area.

3. Account for each cable group using the cable order and check the contents of the groups against the ship packaging list. The 9020 D/E Cable ID Reference Drawing, P/N 5781406 can be referenced for pertinent information.

4. Install cables, starting with the SE's and DE's, followed by the CE's, then the IOCE's. The System or Configuration Console can be cabled next. I/O units and devices should be cabled last.

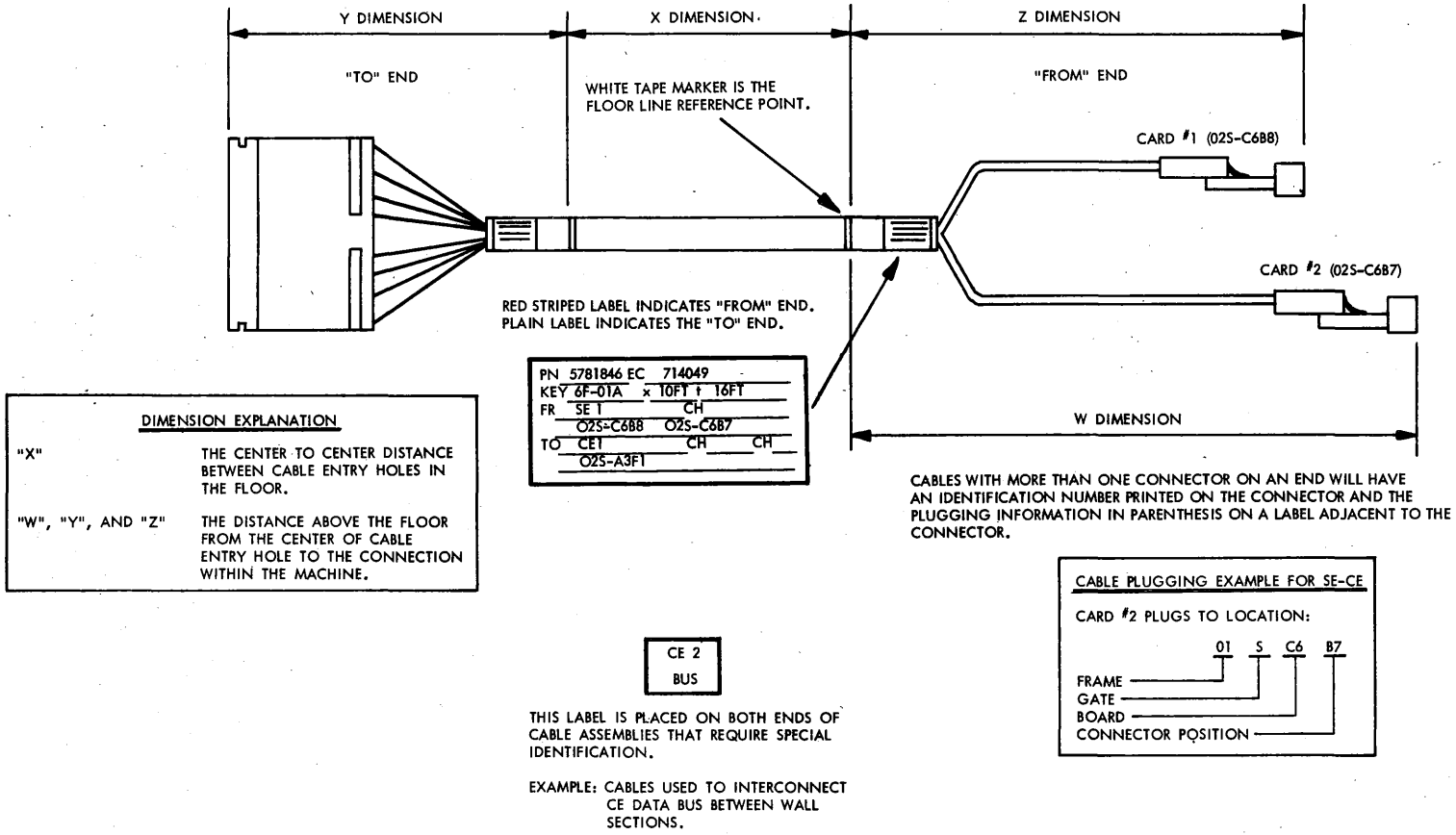
To reduce the amount of floor tiles to be removed for cabling, the sequence for installing cables can be varied.

2.5 CABLE PLUGGING

Check each machine cable hole to ensure that all required cables are there and that the ends extend to the white tape marker at floor level. The distance from the white marker to the connector ends is the YZ dimensions or the cable length needed from the floor to the tailgate plugging positions.

Do not plug in the external cables until all interframe cabling on the unit is completed. Do not plug in power cables until preliminary unit checks and tests are made in accordance with the test sections of the unit installation manuals.

The following is Computing, Storage, Display Element and Configuration Console cable plugging information which supplements ALD logic and maintenance documentation. It can be used as a guide for plugging external cables and terminators or troubleshooting during the installation.



• Figure 2-1. External Cable Identification

2.5.1 Computing Element (CE)

Because of the limited tailgate access, special attention should be given to routing and plugging CE external cables. The following is a guide for plugging these cables.

1. Sort cables into four groups as depicted in Figure 2-2. Identify cables using CE tailgate layout, ALD, Volume 3, page A7021.

2. Route the cables contained in these groups to the areas defined within the cable entry hole.

3. Plug cables, starting with the bottom inside cable of Group One, working outward, across the row, continue plugging the above rows and groups in the same manner.

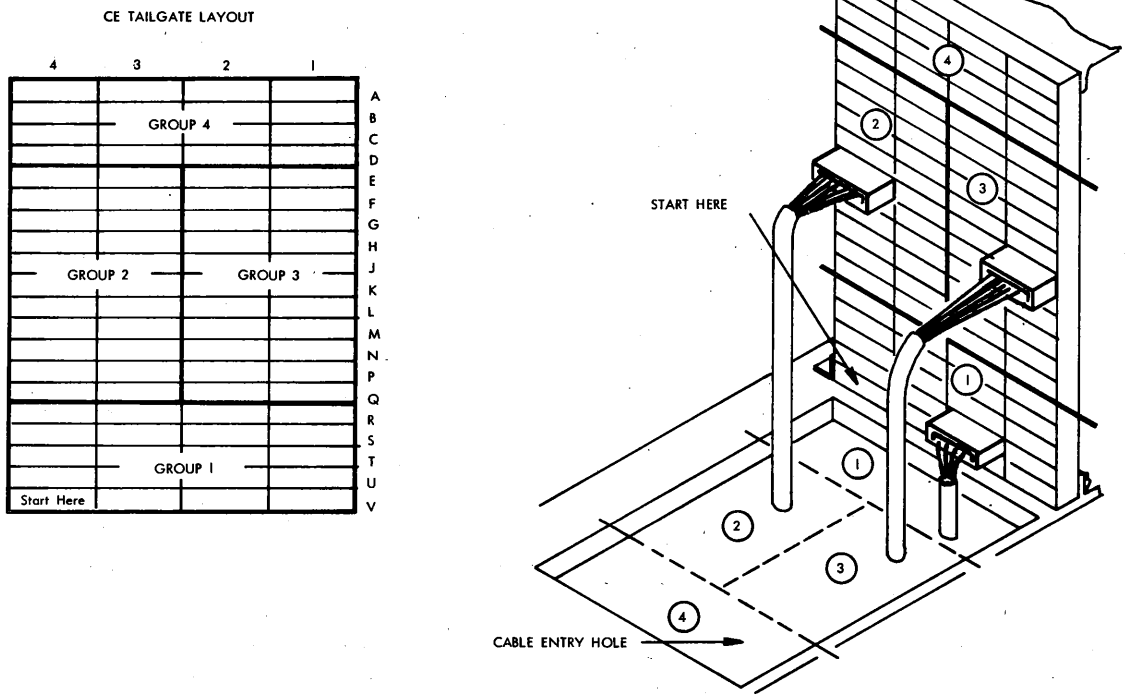


Figure 2-2.CE Cabling

2.5.2 Storage Element (SE)

Inter-wall and external cables plug into the SE tailgate. The inter-wall cables are furnished with the SEs and the external cables with the system.

The Computing Element Installation Manual, Form SFN-0204 and IBM reference drawings, Part No. 5781377 (9020D) and 5781400 (9020E) contain information related to inter-wall cabling.

External cable information can be found on IBM reference drawing Part No. 5781406.

2.5.2.1 Storage Element Tailgate Layouts

Figure 2-3 is a typical SE-1 tailgate layout for either a 9020D or 9020E System and can be used as a guide for plugging external cables. Figure 2-4 is a typical SE-2 tailgate layout for a 9020D System only. Figure 2-5 is a typical tailgate layout for SE-3 through SE-10 on a 9020D System and SE-2 through SE-5 for a 9020E System.

Each layout furnishes the group, key and connector number for each tailgate plugging position that may contain an external cable. The amount of cables that plug into the tailgate is dependent on the system configuration.

Terminator locations for the Computing and the I/O Control Element buses are also given and can be used as a guide for terminating the buses, using Part No. 5807046.

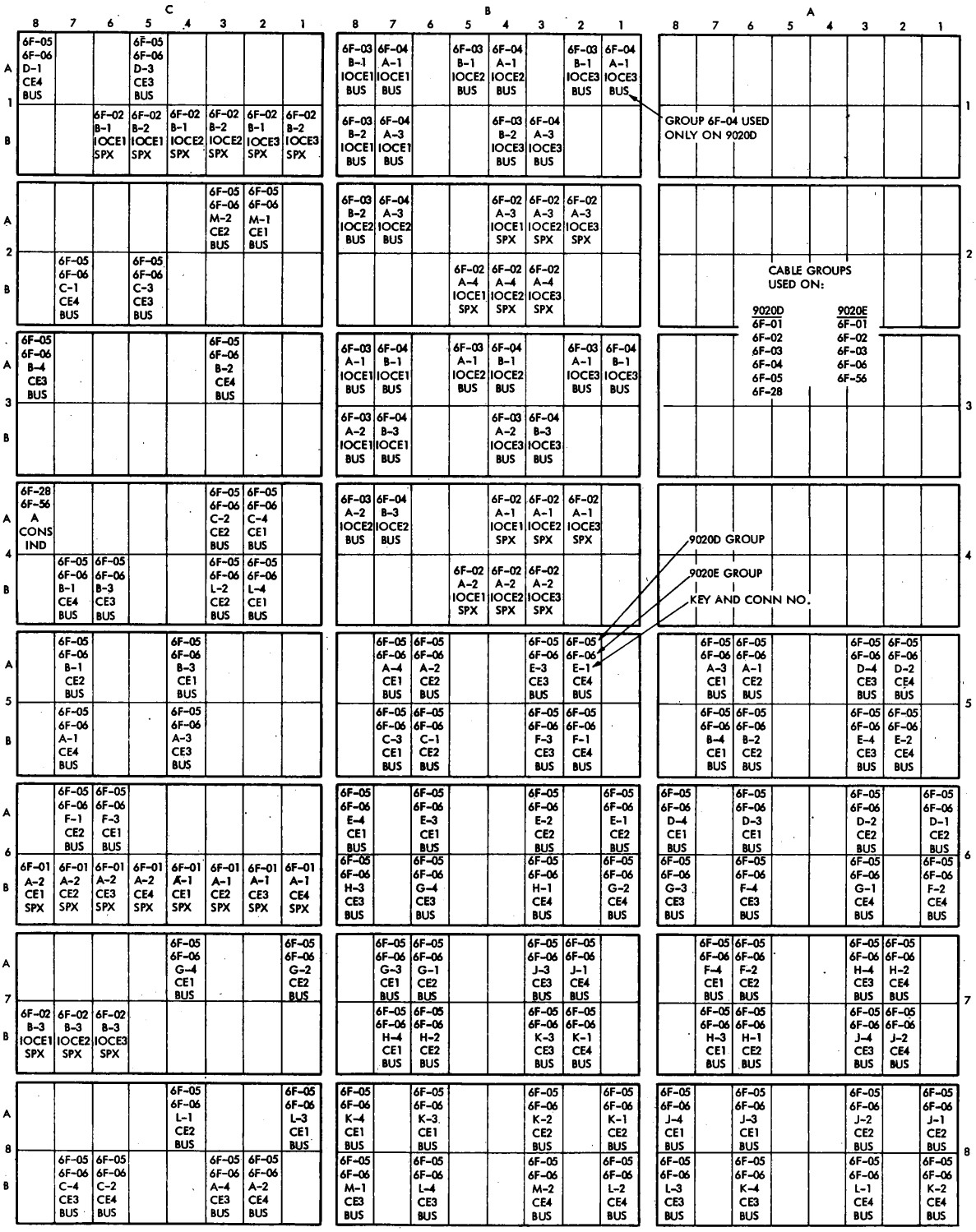
2.5.2.2 SE-1 and SE-2 Cable Plugging

A special frame (ladder) is installed in SE-1 (9020 D/E) and SE-2 (9020D) for supporting the IOCE's large coax cables, groups 6F-02, 6F-03 and 6F-04. CE bus, small coax (ribbon) cables, group 6F-05 and 6F-06 are supported by using existing tailgate hardware.

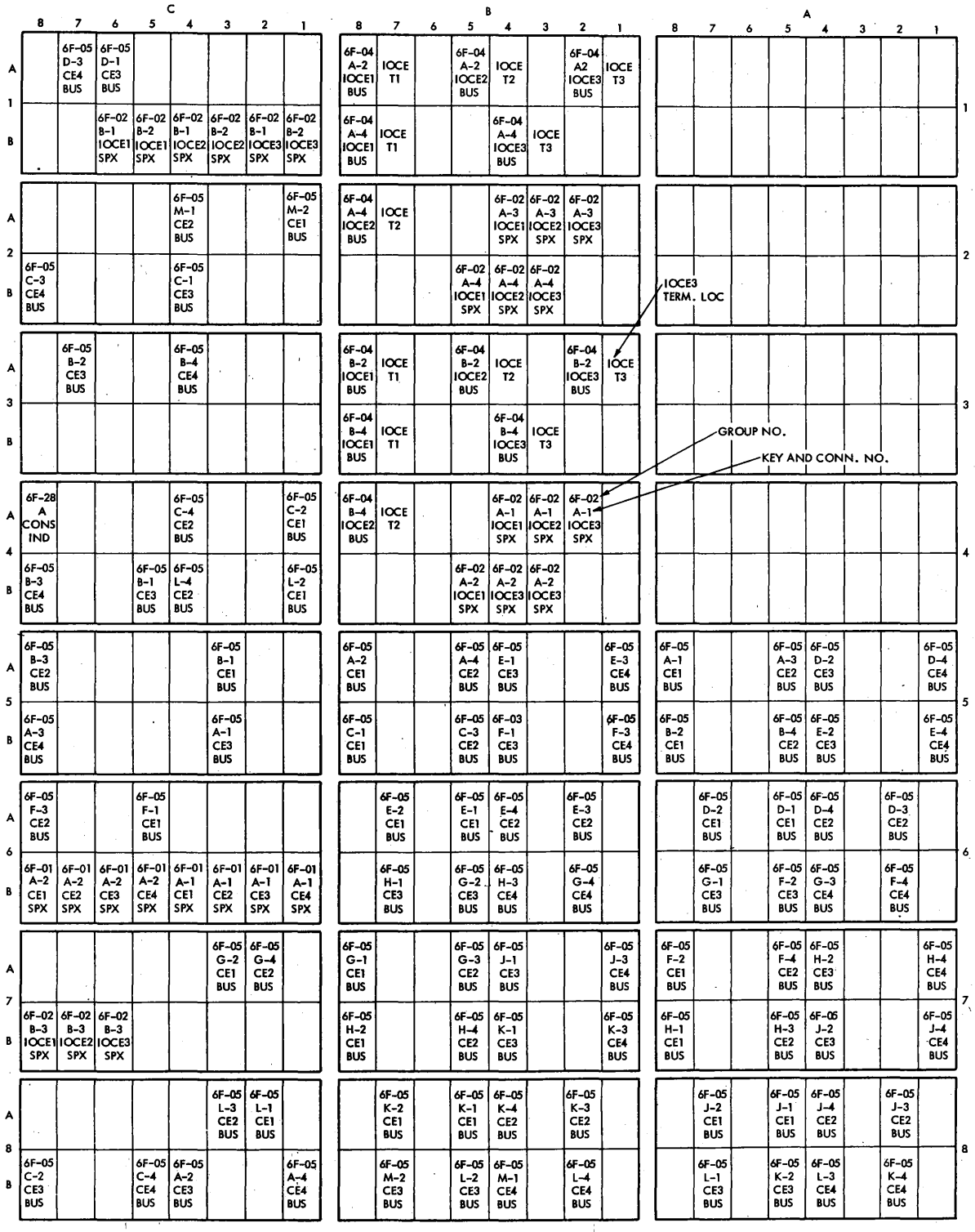
The following can be used as a guide for plugging SE-1 and SE-2 tailgates:

1. Segregate the small coax cables from the large coax cables and sort them into groups by row designations.

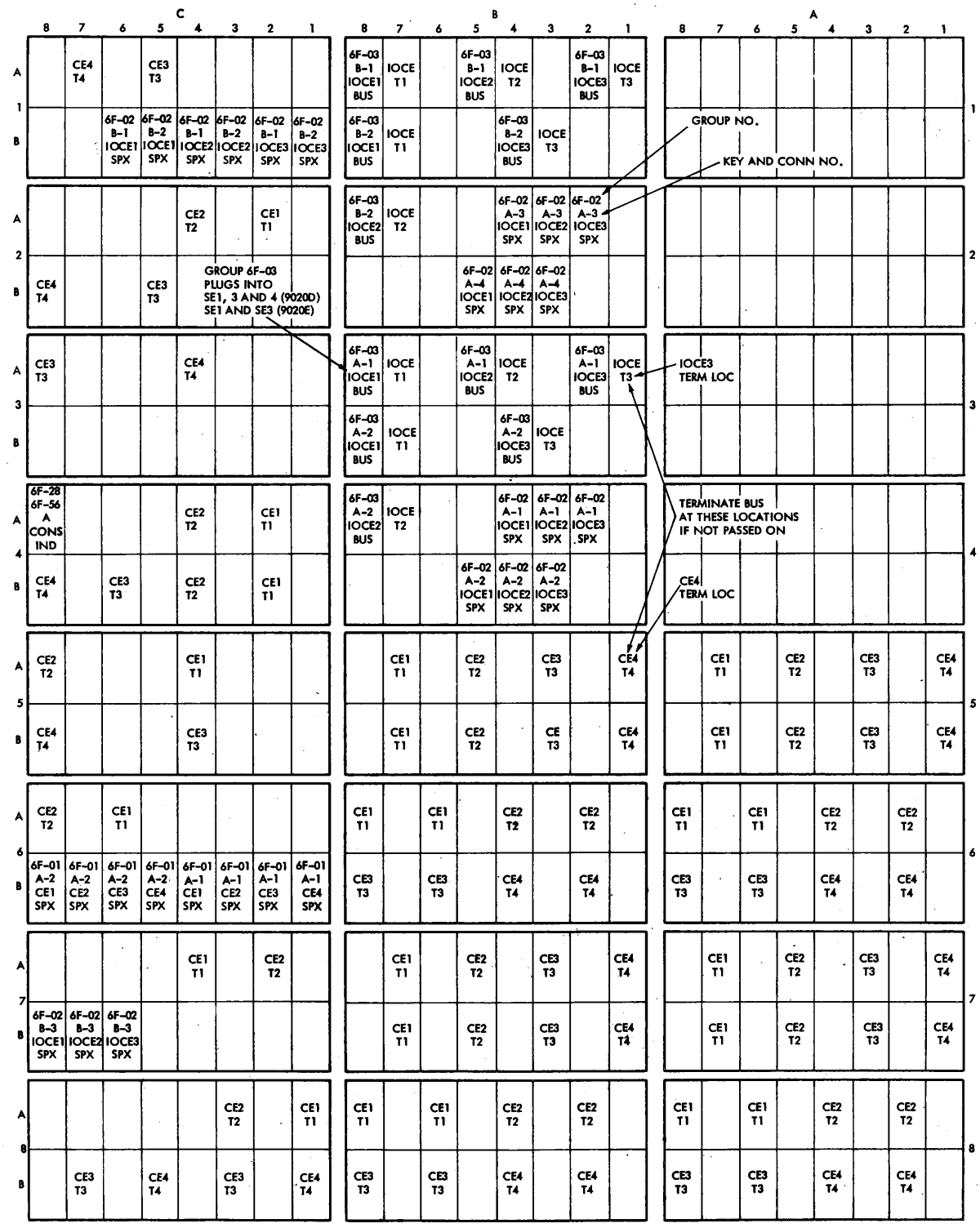
2. Route the bottom row group of small coax cables to their respective tailgate plugging locations, through the clamp provided at that row. For SE-1, route the cables up the right side of the tailgate and for SE-2, use the left side of the tailgate.



• Figure 2-3. SE1 Tailgate Layout for 9020D/E Systems (External Cables)



• Figure 2-4. SE2 Tailgate Layout for a 9020D System (External Cables)

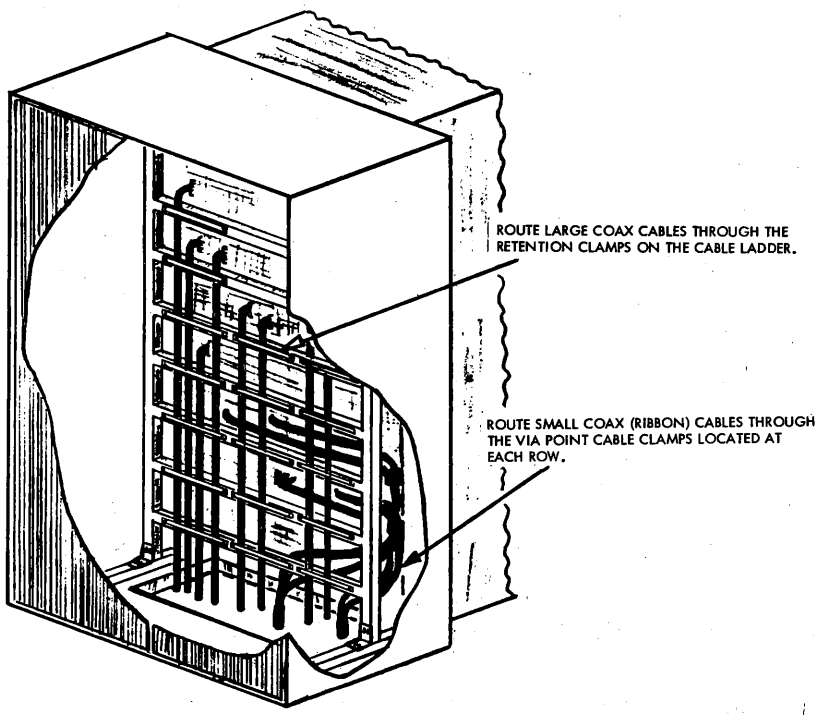


• Figure 2-5. SE Tailgate Layout for SE2-SE5 (9020E) or SE3-SE10 (9020D) External Cables

3. Plug these cables using the tailgate layouts, Figure 2-3 and 2-4. Continue installing the other groups (rows) in the same manner. Secure each clamp after all the cables have been installed.

4. Arrange the large coax cables in an orderly fashion and route them up the support ladder, through the retention clamps on each rung. Plug cables and tighten clamps after all the cables have been installed. Figure 2-6 is an example of how the cables are routed and where they are clamped.

The cable support ladder is not used in other SE's since a lesser amount of IOCE large coax cables terminate in them. The cables that do terminate in these SE's can be contained in the tailgate cable via channels with the interwall cables. Rubber retention straps are used to hold them in place.



• Figure 2-6. SE Cable Support Ladder

2.5.3 Display Element (DE)

Inter-wall and external cables plug into the DE tailgate. The inter-wall cables are furnished with the DE's and the external cables with the System.

The IBM 7201-02 Computing Element Installation Manual, Form SFN-0204 and IBM reference drawing Part No. 5781400 contain information related to inter-wall cabling.

External cable information can be found on IBM reference drawing Part No. 5781406.

2.5.3.1 Display Element Tailgate Layout

Figure 2-7 is a typical DE-1 tailgate layout and can be used as a guide for plugging external cables.

The layout furnishes the group, key and connector number for each tailgate plugging position that may contain an external cable. The amount of cables that plug into the tailgate is dependent on the system configuration.

CE simplex cables, Group 6F-36 and the Configuration Console cable, Group 6F-56, plug into same tailgate locations on all DEs.

Cabling for the Display Generator interface and the Multiplex Wrap Bus are cabled according to DE configurations and are described separately.

2.5.3.2 Display Generator (DG) Interface

The DG interface serially interconnects a Display Generator with two Display Elements (DEs). The DG is cabled into the first DE and out to the second DE via external cables.

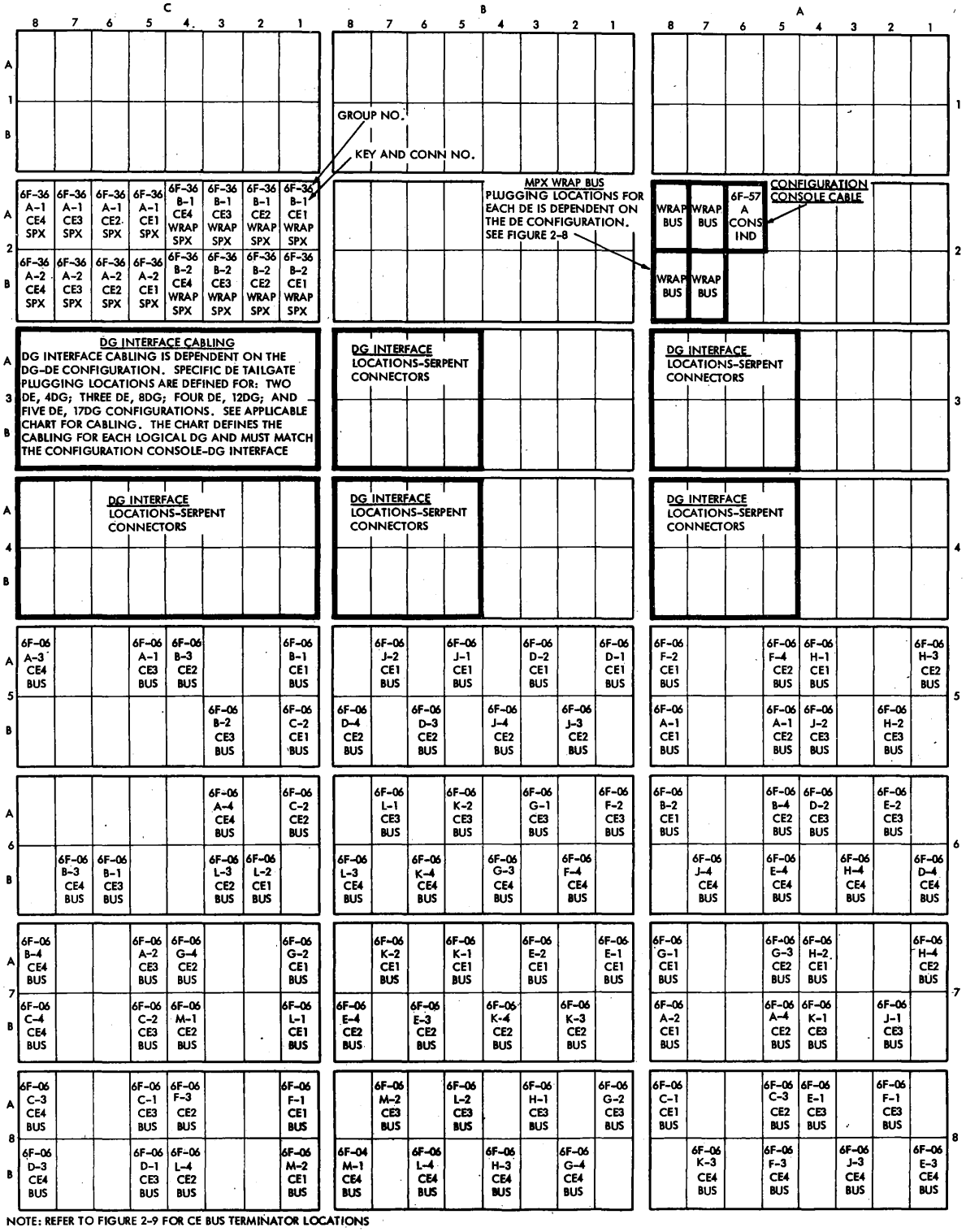
Cabling for each DG interface is dependent on the DG-DE configuration. Tables 2-1 to 2-4 define cabling and DE plugging locations for these configurations.

The first column on the chart defines the logical DGs in the configuration, the next three columns are where their cables plug in the first DE.

The four middle columns define what cable groups connect the first DE with the second and the out tailgate locations for these groups.

The last four columns are where the cable groups plug into the second DE and terminate.

The "To" end of all cable groups, plug into the lower numbered DE on all configurations.



NOTE: REFER TO FIGURE 2-9 FOR CE BUS TERMINATOR LOCATIONS

• Figure 2-7. DE1 Tailgate Layout (External Cables)

• Table 2-1. Two DE, 4 DG Configuration

* DG	DE	CONN 1 02S-	CONN 2 02S-
SP	1	B3A5	
			C3A5
2	1	A3A5	
			C3A1
3	1	A3A7	
			C3A3
4	1	B4A5	
			C4A5

GROUP NUMBER	DE	CONN 2 02S-	CONN 4 02S-
6F-42A	1	B3A6	
			C3A6
6F-41A	1	A3A6	
			C3A2
6F-41B	1	A3A8	
			C3A4
6F-41C	1	B4A6	
			C4A6

DE	CONN 1 02S-	CONN 3 02S-	TERM 02S-
2	B3A5		B3A6
		C3A5	C3A6
2	A4A5		A4A6
		C4A1	C4A2
2	A4A7		A4A8
		C4A3	C4A4
2	A3A5		A3A6
		C3A1	C3A2

* LOGICAL DG, MUST BE CABLED TO MATCH CONFIGURATION CONSOLE INTERFACE.

• Table 2-2. Three DE, 8 DG Configuration

* DG	DE	CONN 1 02S-	CONN 2 02S-
SP	1	B3A5	
			C3A5
2	1	A4A5	
			C4A1
3	1	A4A7	
			C4A3
4	1	A3A5	
			C3A1
5	1	A3A7	
			C3A3
6	1	B4A5	
			C4A5
7	2	A3A7	
			C3A3
8	2	B4A5	
			C4A5

GROUP NUMBER	DE	CONN 2 02S-	CONN 4 02S-
6F-42A	1	B3A6	
			C3A6
6F-43A	1	A4A6	
			C4A2
6F-43B	1	A4A8	
			C4A4
6F-41A	1	A3A6	
			C3A2
6F-41B	1	A3A8	
			C3A4
6F-41C	1	B4A6	
			C4A6
6F-44A	2	A3A8	
			C3A4
6F-43C	2	B4A6	
			C4A6

DE	CONN 1 02S-	CONN 3 02S-	TERM 02S-
3	B3A5		B3A6
		C3A5	C3A6
3	A3A7		A3A8
		C3A3	C3A4
3	B4A5		B4A6
		C4A5	C4A6
2	A4A5		A4A6
		C4A1	C4A2
2	A4A7		A4A8
		C4A3	C4A4
2	A3A5		A3A6
		C3A1	C3A2
3	B4A5		A4A6
		C4A1	C4A2
3	A4A7		A4A8
		C4A3	C4A4

* LOGICAL DG, MUST BE CABLED TO MATCH CONFIGURATION CONSOLE INTERFACE.

• Table 2-3. Four DE, 12 DG Configuration

* DG	DE	CONN 1 02S-	CONN 2 02S-	GROUP NUMBER	DE	CONN 2 02S-	CONN 4 02S-	DE	CONN 1 02S-	CONN 3 02S-	TERM 02S-
SP	1	B3A5		6F-42A	1	B3A6		3	B3A5		B3A6
			C3A5				C3A6			C3A5	C3A6
SP	1	B3A7		6F-46A	1	B3A8		3	B3A7		B3A8
			C3A7				C3A8			C3A7	C3A8
3	1	A4A5		6F-43A	1	A4A6		4	A3A7		A3A8
			C4A1				C4A2			C3A3	C3A4
4	1	A4A7		6F-43B	1	A4A8		4	B4A5		B4A6
			C4A3				C4A4			C4A5	C4A6
5	1	A3A5		6F-41A	1	A3A6		2	A4A5		A4A6
			C3A1				C3A2			C4A1	C4A2
6	1	A3A7		6F-41B	1	A3A8		2	A4A7		A4A8
			C3A3				C3A4			C4A3	C4A4
7	1	B4A5		6F-41C	1	B4A6		2	A3A5		A3A6
			C4A5				C4A6			C3A1	C3A2
8	2	A3A7		6F-44A	2	A3A8		3	A4A5		A4A6
			C3A3				C3A4			C4A1	C4A2
9	2	B4A5		6F-44B	2	B4A6		3	A4A7		A4A8
			C4A5				C4A6			C4A3	C4A4
10	3	A3A5		6F-45A	3	A3A6		4	A4A5		
			C3A1				C3A2			C4A1	C4A2
11	3	A3A7		6F-45B	3	A3A8		4	A4A7		A4A8
			C3A3				C3A4			C4A3	C4A4
12	3	B4A5		6F-45C	3	B4A6		4	A3A5		A3A6
			C4A5				C4A6			C3A1	C3A2

*LOGICAL DG, MUST BE CABLED TO MATCH CONFIGURATION CONSOLE INTERFACE.

• Table 2-4. Five DE, 17 DG Configuration

* DG	DE	CONN 1 02S-	CONN 2 02S-
SP	1	B3A5	
			C3A5
SP	1	B3A7	
			C3A7
3	1	A4A5	
			C4A1
4	1	A4A7	
			C4A3
5	1	A3A5	
			C3A1
6	1	A3A7	
			C3A3
7	1	B4A5	
			C4A5
8	1	B4A7	
			C4A7
9	2	A3A7	
			C3A3
10	2	B4A5	
			C4A5
11	2	B4A7	
			C4A7
12	3	A3A7	
			C3A3
13	3	B4A5	
			C4A5
14	3	B4A7	
			C4A7
15	4	A3A7	
			C3A3
16	4	B4A5	
			C4A5
17	4	B4A7	
			C4A7

GROUP NUMBER	DE	CONN 2 02S-	CONN 4 02S-
6F-42A	1	B3A6	
			C3A6
6F-46A	1	B3A8	
			C3A8
6F-43A	1	A4A6	
			C4A2
6F-43B	1	A4A8	
			C4A4
6F-49A	1	A3A6	
			C3A2
6F-47A	1	A3A8	
			C3A4
6F-47B	1	B4A6	
			C4A6
6F-47C	1	B4A8	
			C4A8
6F-44A	2	A3A8	
			C3A4
6F-44B	2	B4A6	
			C4A6
6F-48A	2	B4A8	
			C4A8
6F-47A	3	A3A8	
			C3A4
6F-47B	3	B4A6	
			C4A6
6F-47C	3	B4A8	
			C4A8
6F-47A	4	A3A8	
			C3A4
6F-47B	4	B4A6	
			C4A6
6F-47C	4	B4A8	
			C4A8

DE	CONN 1 02S-	CONN 3 02S-	TERM 02S-
3	B3A5		B3A6
		C3A5	C3A6
3	B3A7		B3A8
		C3A7	C3A8
5	A3A7		A3A8
		C3A3	C3A4
5	B4A5		B4A6
		C4A5	C4A6
5	B4A7		B4A8
		C4A7	C4A8
2			A4A6
		C4A1	C4A2
2	A4A7		A4A8
		C4A3	C4A4
2	A3A5		A3A6
		C3A1	C4A2
3	A4A5		A4A6
		C4A1	
3	A4A7		A4A8
		C4A3	C4A4
3	A3A5		A3A6
		C3A1	C3A2
4	A4A5		A4A6
		C4A1	C4A2
4	A4A7		A4A8
		C4A3	C4A4
4	A3A5		A3A6
		C3A1	C3A2
5	A4A5		A4A6
		C4A1	C4A2
5	A4A7		A4A8
		C4A3	C4A4
5	A3A5		A3A6
		C3A1	C3A2

* LOGICAL DG, MUST BE CABLED TO MATCH CONFIGURATION CONSOLE INTERFACE.

2.5.3.3 DE Multiplex Wrap Bus

The DE Wrap Bus interconnects Computing and Display Elements.

Group 6F-37 connects CE-3 and CE-1 and group 6F-38, CE-3 with the DE wall section. Figure 2-8 describes the Wrap Bus cabling on the DE wall section.

2.5.3.4 CE Bus Terminator Locations

Terminator locations for the Computing Element buses are given in Figure 2-9 and can be used as a guide for terminating the buses, using Part No. 5807046.

2.5.3.5 DE-1 Cable Plugging

A cable ladder similar to the one used in SE-1 is also used for DE-1. It is used to support the DG Interface cables rather than IOCE large coax cables. No IOCE cables terminate in the DE's. The CE bus, small coax (ribbon) cables, group 6F-05 and 6F-06 are supported by using existing tailgate hardware.

Install the CE bus cables using the same procedure used for SE-2. Route them up the left side of the tailgate. The DG Interface cables are routed and clamped to the cable ladder as the IOCE cables in SE-2.

The cable support ladder is not used in other DE's since a lesser amount of DG cables terminate in them. The cables that do terminate in these DE's can be contained in the tailgate cable via channels with the interwall cables. Rubber retention straps are used to hold them in place.

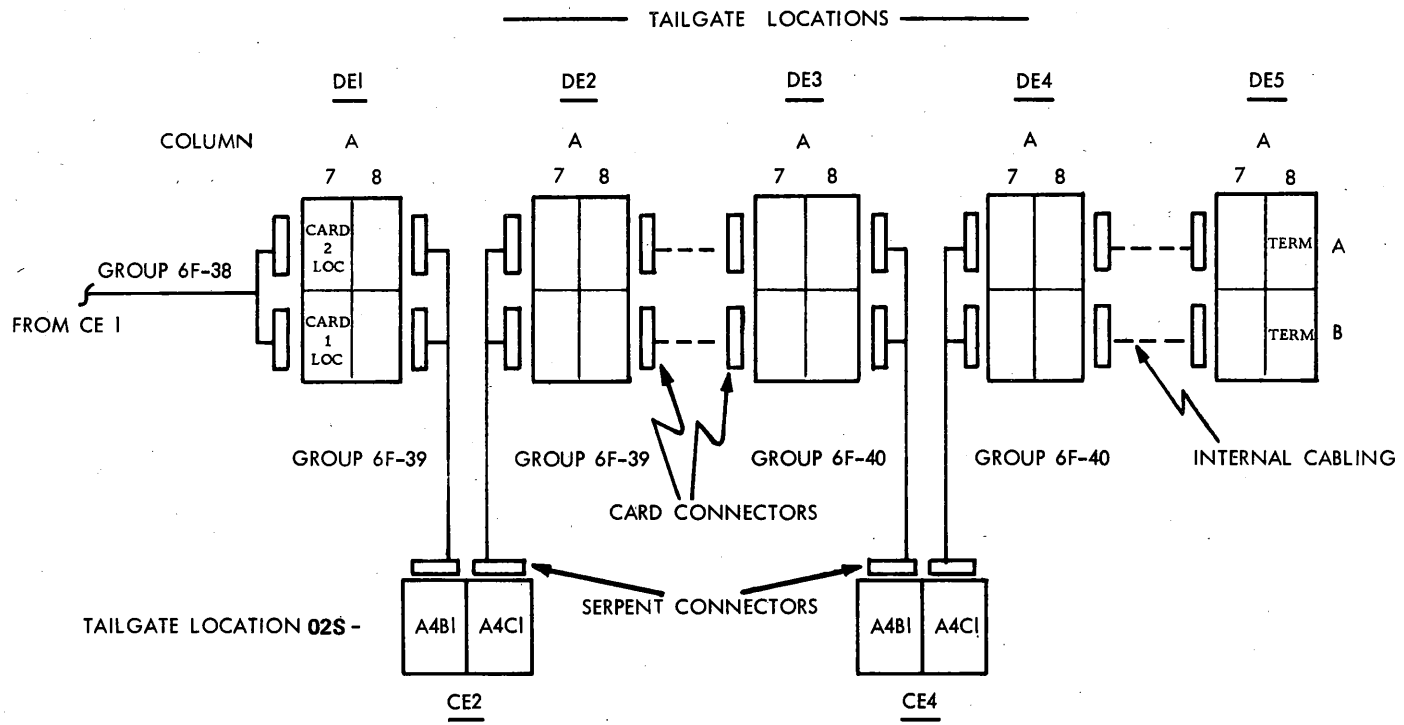
2.5.4 Configuration Console (CC)

Figure 2-10 shows the CC tailgate plug locations for the Display Generator (DG), Radar Keyboard Multiplexor (RKM) and System Maintenance Monitor Console (SMMC).

Additional cable plugging information is contained in the following documentation:

CE (7201-02) ALD Logic
IOCE (7231-02) - ALD Logic
SE (7251-09) - Maintenance Manual
PAM - (7289-02) - ALD Logic
DE (7289-04) - Maintenance Manual
System Console (7265-02) - ALD Logic
Configuration Console (7265-03) - ALD Logic
Direct Access Storage Facility (2314-A1) - ALD Logic

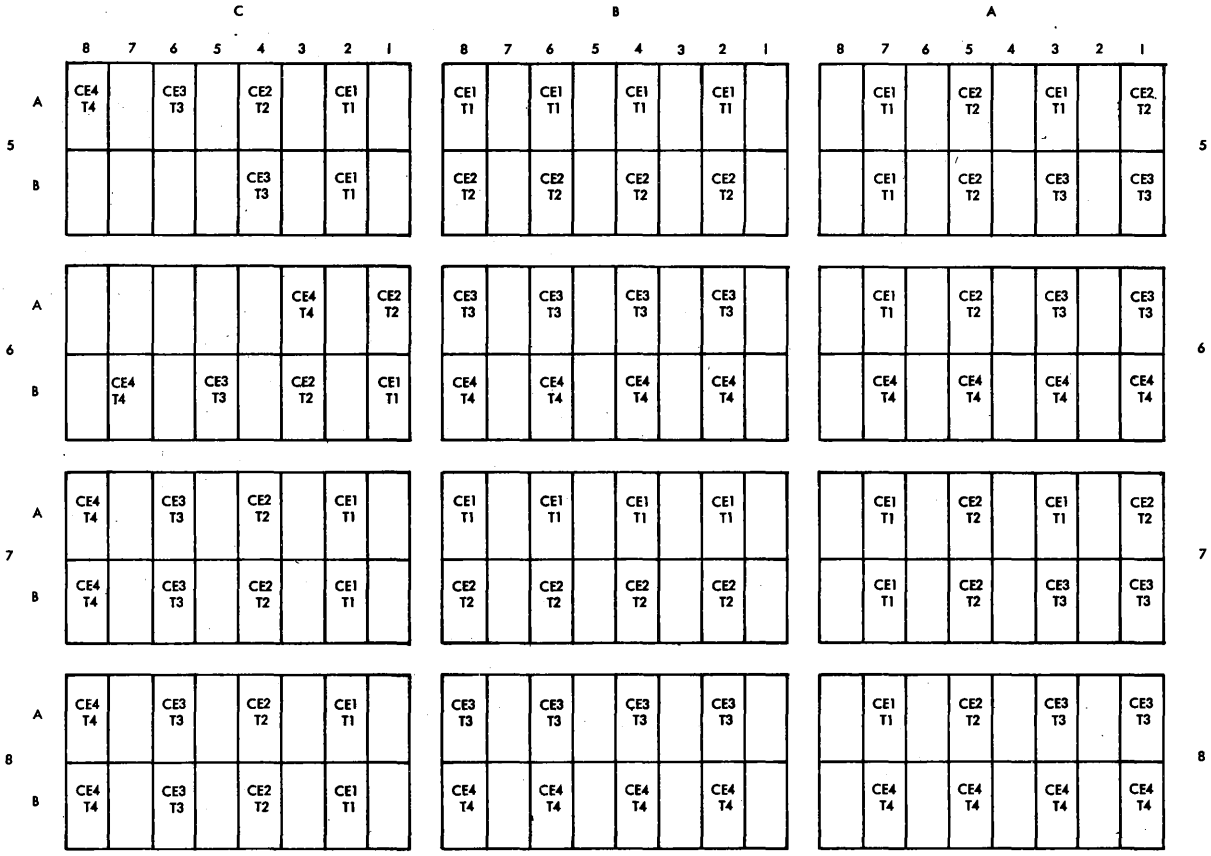
The 9020 I/O Unit Installation Manual, Form 123-9516, 2701 Installation Manual, Form SFN-0904, and the 2314-A1 Installation Manual, Form SY27-2309 contain sufficient tailgate information for the I/O units.



NOTES:

1. Internal cabling used between DE3 and DE4 when the fourth CE is not present.
2. Terminate bus in A8 location using P/N 5800549 in DE's or 02S-A4C1 in CE4 using P/N 5440649.

• Figure 2-8. DE MPLX Wrap Bus Cabling



• Figure 2-9. DE Tailgate, CE Bus Terminator Locations

01T-A

	C	B	A
1	RKM-4	RKM-5	DG-13
2	RCON-1	RCON-2	RCON-3
3	RKM-1	RKM-2	RKM-3
4	DG-10	DG-11	DG-12
5	DG-7	DG-8	DG-9
6	DG-4	DG-5	DG-6
7	DG-1	DG-2	DG-3

01S-A

	C	B	A
1			
2	DG-16	DG-17	
3	DG-14	DG-15	
4	DE-4	SE-4	
5	DE-3	SE-3	SMMC
6	DE-2	SE-2	DE-5
7	DE-1	SE-1	SE-5

01T-B

	C	B	A
1	2701-1	2701-2	TCU-3 STATUS
2	TCU-2 STATUS	TCU-1 STATUS	IOCE-3 STATUS
3	SCON-4 IN	SCON-4 OUT	CE-4 STATUS
4	SCON-1 OUT	SCON-2 OUT	SCON-3 OUT
5	SCON-1 IN	SCON-2 IN	SCON-3 IN
6	IOCE-1 TAG-IN	IOCE-2 TAG-IN	IOCE-3 TAG-IN
7	IOCE-1 BUS-IN	IOCE-2 BUS-IN	IOCE-3 BUS-IN

01S-B

	C	B	A
1	IOCE-2 STATUS	IOCE-1 STATUS	CE-3 STATUS
2	CE-2 STATUS	CE-1 STATUS	CE-LAST
3	CE-1ST	CE-LAST	CE-LAST
4	CE-LAST	CE-1ST	CE-1ST
5	CE-1ST	2821 BUS	2821 TAG
6	IOCE-3 TAG-OUT	IOCE-2 TAG-OUT	IOCE-1 TAG-OUT
7	IOCE-3 BUS-OUT	IOCE-2 BUS-OUT	IOCE-1 BUS-OUT

Figure 2-10. CC Tailgate Layout

CHAPTER 3. IBM 7231-02 IOCE SYSTEM TEST

The following tests will apply primarily to the 7231-02 IOCE. However, all diagnostic sections applicable to the devices and control units attached to the IOCE will be run. Therefore, the following units should be included in the configuration: CE, TCU, Tape drives, 1052 printer, DAU (E System), SC (D System), CC (E System), ICU, 1403 Printer, Reader, Punch, PAM (D System), DASF (D System), SEs and DEs (E System).

3.1 MACH STORAGE RIPPLE TESTS

1. Set rotary switch to worst position; set Write toggle switch down to write worst case into MACH storage.

2. Set Write toggle switch to Read position; set Stop On Check toggle switch down. If no stop occurs, worst case is stored correctly.

3. Repeat steps 1 and 2, setting the rotary switch to zeros position.

4. Repeat steps 1 and 2, setting the rotary switch to ones position.

3.2 FAULT LOCATING TESTS (IOCE)

FLT tapes 1-3 contain the following IOCE tests:

FLT-1	FLT-2	FLT-3
MSHC	MSHC	MSHC
ROSBIT	ROSHC	ROSHC
ROSHC	LO	LO
6XCROSRIPL	SEG 1-7	LSA/R
	ROSHC	CH MON
	LSA/R/B	MPX
	ROSHC	SEL
	SXROSHC	ROSHC
		SXROSHC

Run FLT tapes 1-3 after performing the MACH storage ripple tests. (See IBM Data Processing System Off-Line Maintenance Programs Manual - Fault Locating Tests, Part 5443371, for detailed information on FLTs.)

3.3 INTERNAL IPL (DIAGNOSTIC MODE)

3.3.1 IPL Diagnostic Mode

1. Enter device address into Load Unit rotary switches.
2. Enter an address stop in ROS address 4AB.
3. Depress Load switch; after stopping at address 4AB, see that the condition code is set to 11 and the Load indicator is off.

3.3.2 IPL Troubleshooting

The following CAS pages and comments may aid in IPL troubleshooting:

Page	Address	Comments
QU100	240	First microprogram address.
QU100	6A9	First address of UCW area reset loop.
QK800	119	Start I/O to common channel.
QK801	180	No hang-up due to channel and unit status analysis.
QK801	B8E	Start of load PSW routine.
QJ200	4AA	Load indicator off.
AJ200	52B	PSW restored to address 1 with condition code set to 11.

3.4 BRING-UP PROGRAMS

3.4.1 Go/No-Go Test

This test checks the 14 basic instructions and the ability to form an effective address. A failure is indicated by a hung-up condition (IAR displays the failing area address). Register three contains the address of the initial instruction of each routine. This test also provides tracing ability if an error causes loss of control.

3.4.2 Basic Storage Test

This test is loaded with the go/no-go test provides a worst pattern test for the MACH storage.

3.4.3 Programs Run Under IDM

Run these tests after the go/no-go and basic storage tests run error-free.

3.4.4 Programs Run Under SDM

Run these tests after the IDM programs have run error-free. Run all sections appropriate to the devices and control units attached to the IOCE.

NOTE: IOCE Processor test will be run during CE system test under MDM.

3.5 INTERFACE AND NORMAL MODE TESTS

Perform the tests under heading 3.5 only if CE-IOCE communications fail.

3.5.1 IOCE to CE Interface Check (condition code)

1. Store the following data in the specified locations:

Data	Location
00 00 00 01	General register 1
00 00 00 00	General register 2
00 00 01 00	General register 3
19 11 07 F3 (compare and branch instruction)	Location 100 (hex)

2. Set IAR to 100 hex.

3. Depress Start switch; scope J-D1L6B02 (CC position 1) and J-D1L6D02 (CC position 0) for a minus level (no bits). Display the condition code for verification.

4. Store 19 12 07 F3 in location 100.

5. Scope the test points specified in step 3 and verify a condition code of 10.

6. Store 19 21 07 F3 in location 100.

7. Scope the test points specified in step 3 and verify a condition code of 01.

3.5.2 Response

1. Set ROS address to OB8C (block C9 on QK801).

2. Set Repeat ROS Instruction switch to on position.

3. Scope J-D1L7B13 (BB047) for a plus level.

3.5.3 FLT Complete

1. Repeat steps 1 and 2 of paragraph 3.5.2.
2. Scope J-D1L7B02(BB037, FLT complete) for a plus level.

3.5.4 Reset Time Out

1. Ground J-E2C2D06.
2. Repeat ROS address F28 (QY310).
3. Observe a positive level at J-D1L7D13(BB047).

3.5.5 PSBAR Lockout

1. Load the CE1 bit in the CCR and turn the Test switch off.
2. Ground J-D1H6B10(KA009) and J-E2H4B02(KT007).
3. Repeat ROS address B2A(QK705).
4. Observe a positive level at J-D1L6B13.

3.5.6 Element Check

1. Load the CE1 bit in the CCR and turn the Test switch off.
2. Set the Rate rotary switch to Process position and press the Logout pushbutton.
3. Observe a minus element check at J-D1L7D02(BB037) and a minus machine check interrupt request at J-E2J7B02(BB057). Observe log status trigger B (CLU roller 2).

3.5.7 Subsystem Reset

1. Set the IOCE for address stop on ROS address 6AB (QU100).
2. Momentarily ground J-D1H6B07 (KM097); the IOCE will start the reset sequence and stop at current ROS address 6AB.

3.5.8 System Reset

1. Set the IOCE for address stop on ROS address 6AB (QU100).
2. Momentarily ground J-D1K5D10 (KM107); the IOCE will start the reset sequence and stop at current ROS address 6AB. Check that the SCON field of the CCR is set to ones.

3.5.9 FLT Load (External)

1. Place IOCE in halt loop (QT 200) by pressing the Reset switch.

2. Set Rate switch to single cycle position.

3. Jumper J-E2L5D11 (KM117) to ground. Single-cycle the IOCE out of the halt loop to the micro-programs as shown on QK807, QK907, and QK800. Initial sequence is 28F, B4C, BD5, etc. If not accepted by channel, test will end by looping on B50 (QK800).

3.5.10 IPL (External)

1. Place IOCE in halt loop (QT200) by pressing the Reset switch.

2. Set Rate switch to Single Cycle position.

3. Jumper J-E2L5 D10 (KM117) to ground. See that the micro-program advances through the addresses shown on QK807 and QK800. Initial sequence is 28F, B4D, etc. If not accepted by channel, test will end by looping on B50 (QK800).

3.5.11 CCR Checks

1. With the Test switch set to on position, enter E0 FC 00 (hex) into the Data keys.

2. Depress the Register Set switch and see that the CCR displays the data entered in step 1 with parity bits of: P1=0, P2=1, P3=1.

3. Set the Test switch to off position and see that the state bits have been reset to zeros.

4. Jumper J-E2E3B08 (KM057) to ground and verify the following:

   a. CCR contains all zeros when displayed.

   b. CCR parity error is a minus level on J-E1E6D04 (RC138) and the CCR indicator in the error register at CLU2, roller position 8, is on.

   c. ELC signal at J-D1L7D02 (BB037) is at a minus level.

   d. Diagnostic mode signal at J-E2J5D09 (DA007) is at a plus level and the diagnostic mode indicator is on.

3.6 DISABLING OF MANUAL CONTROLS

This section contains lists of controls and the states in which they are operative. Correct operation of the controls may be checked either in an IOCE-CE subsystem with the proper state bits or by manually forcing the various states in the IOCE.

3.6.1 CLU Controls Operative in All States

1. Monitor Voltage Select rotary switch.
2. Marginal Voltage Select rotary switch.
3. Emergency Power Off (EPO) switch.
4. Roller switches 1, 2, 3, 4 (PL041, PL051).
5. Lamp Test toggle switch (PS121).
6. Selector Channel Display switch (PK081).
7. MC voltage adjust potentiometers.

3.6.2 CLU Controls Operative in State 1 or 0 and Diagnostic Mode

3.6.2.1 Pushbuttons:

Load	PK001, PK021, PL031
Interrupt	PK001, PK031, PL031
Display	PK001, PK021
Set IC	PK001, PK021
Store	PK001, PK011
PSW Restart	PK001, PK031
Check Reset	PK001, PK021
Start	PK001, PK011

3.6.2.2 Rotary Switches:

Load Unit	PL001
Rate	PK041, KS701
Storage Select	PK041
FLT Control	PK041

3.6.2.3 Lever Switches:

Address Keys	PA111, PA131
Data Keys	PD001, PD031
Reverse Data Parity	PK041
FLT force indicator	PK041
FLT Mode	PK041

Address Compare IAR	PK041
*Disable Interval Timer	PK041

*The interval timer (address 50 hex in mach storage) should update only in diagnostic mode, states 1 or 0 with the disable interval timer switch off.

3.6.3 CLU Controls Operative in State 0 and Diagnostic Mode

3.6.3.1 Pushbuttons:

Stop	PK001
Element Reset	PK001
Logout	PK001

3.6.3.2 Rotary Switches:

Check Control	PK041

3.6.3.3 Lever Switches:

Repeat Instruction	PK041
Address Compare(ROS)	PK041
Repeat Instruction(ROS)	PK041
Test Switch	PK041
Invert SAR Bit 17	PK071

3.6.4 CLU Controls Operative in State 0 with Test Switch On

3.6.4.1 Lever Switches:

Register Set (CCR)	PK041
Power On/Off	

3.7 TEST STATE LATCHED

The CLU test level should remain up when in state 0 with Test switch on regardless of the value of the CCR state bits. Check as follows:

1. Place CLU in test state with Test switch on.
2. Set CCR state bits to 1,1 by using the Register Set switch and the Data keys.
3. Scope 01C-A4B5B02 for a plus level; manual control usage should not be affected.
4. Set CCR state bits to 1,0.
5. Repeat step 3.

CHAPTER 4. IBM 7201-02 SYSTEM TEST

The following tests will apply primarily to the 7201-02 CE. However, all diagnostic sections applicable to the devices and control units attached to the CE will be run. Therefore, the following units should be included in the Configuration: IOCE, TCU, Tape Drives, 1052 Printer, DAU (E System), SC (D System), CC (E System), ICU 1403 Printer, Reader, Punch, PAM (D System), DASF (D System), SE's and DE's (E System).

4.1 BRING UP AID (QY051)

To Write any bit pattern, in all locations of an SE or DE, as determined by the Data Keys, do the following:

1. Reset machine, then set ATR and CCR to SEs and/or DEs in use; set PSBAR.
2. Place Storage Select switch in Main position.
3. Set 80 00 06_{16} in Storage Address Keys.
4. Depress ROS Transfer pushbutton. Observe D Register Stepping (Roller One, Position two). Allow to run approximately 10 sec.
5. Place Storage Select switch in Local position.
6. Depress System Reset pushbutton.
7. To check results, display any main storage location.
8. To ripple DE:
   a. Remove Card at 01A-C3F7 in CE.
   b. Jumper 01A-B3B3D12 to ground in CE.
   c. Set ATR slot 0 to corresponding DE to be rippled.
   d. Repeat steps 2-8 for each DE.
   e. Replace Card and remove jumper installed in 8 a & b.

4.2 RESET

4.2.1 Subsystem Reset

1. Manually configure all available elements to one controlling CE.

2. Verify Test switch OFF on all elements.

3. Activate OTC switch on all elements in subsystem.

4. Observe DAR on Roller five, Position six of CE. Bits corresponding to elements configured, plus "CE OWN OTC", should be ON.

5. Depress System Reset.

6. Observe DAR indicators off (P bits ON), and CE should be in Stop Loop.

4.2.2 System Reset

1. In the CE jumper 01C-A3H5B10 to 01E-E1M4D09. (This will enable Stop on ROS Address Compare).

2. Set ROS Address Compare keys to 033E.

3. Set Main Storage Select and Load Unit Rotary switches to any valid setting.

4. Verify that all elements have Test switch OFF.

5. System Interlock key ON.

6. Depress Load pushbutton.

7. CE should stop at ROS Address 033E.

8. Check the CCR of all IOCEs, CEs, TCUs, SEs, RCUs, DASFs and PAMs (DEs if 9020E System), for zeros with only the four SCON bits on.

9. Depress System Reset on CE.

10. Remove jumper installed in Step 1.

4.3 MAIN STORAGE RIPPLE TEST

4.3.1 Write All Ones

1. Set ATR and CCR for SEs.

2. Depress Address keys 8, 29 and 30.

3. Set all Data switches to Ones.

4. Set Storage Select switch to Main.

5. Set Rate switch to Process.

6. Depress ROS Transfer pushbutton.

7. Run at nominal voltage for ½ minute.

8. To stop test, place Storage Select switch in Local and depress System Reset.

9. For the above operation in a DE:

   a. In the CE remove Card at 01A-L3F7.

   b. Tie 01A-B3B3D12 to ground in the CE.

   c. Set ATR slot 0 to corresponding DE to be rippled.

   d. Repeat steps 2-8 for each DE.

   e. Replace Card and remove jumper installed in 9 a & b.

4.3.2 Read All Ones

1. Set Address key 8 to One. Set all other Address keys to Zero.

2. Set CPU Check switch to Stop.

3. Depress ROS Transfer pushbutton.

4. Run at nominal voltage for ½ minute.

5. To stop test, place Storage Select switch in Local and depress System Reset.

4.3.3 Write/Read All Zeros

Repeat procedures given in paragraphs 4.3.1 and 4.3.2, with Data switches set to Zero.

4.3.4 Write/Read Alternate Pattern

1. Repeat procedures given in paragraphs 4.3.1 and 4.3.2 with Data switches set to AA_{16} in bytes 0-7.

2. Repeat procedures given in paragraphs 4.3.1 and 4.3.2 with Data switches set to 55_{16} in bytes 0-7.

4.4 READ ONLY STORAGE (ROS) AND FAULT LOCATING TEST's (FLT's)

ROS test's and FLT's are located on tapes 8 and 9 respectively.

Set up a simplex subsystem consisting of a CE, IOCE, SE, DASF, TCU, and tape unit. Refer to CE LADS for ROS and FLT operating procedures.

4.5 IPL SUBSYSTEM CHECK

1. Set the Main Storage Select switch to 10; set the Load Unit switches to 7FF. Load ATR slot 1 to A; remainder of ATR to 0s. System Interlock key off.

2. Press Load; check the External register for: 0-7 = FF, 8-15 = 14, 16-23 = 07, 24-31 = 00.

3. See that physical PSBAR contains (1010), logical PSBAR (0000), and ATR-1 position 1 (1010). The CCR should not change. ROS should be in a loop at Address 0B9A and the Load indicator On.

4.6 LOAD PSW AND ADDRESS COMPARE

4.6.1 Load PSW

1. Set ATR and CCR in CE and CCR in SE.

2. Store the following data at the specified Addresses:

DATA	ADDRESS
00 00 00 00 00 00 08 00	0000
82 00 00 00 00 00 00 00	0800

3. Set Main Storage Select switch to SE being used.

4. Depress PSW Restart switch; the Load PSW instruction should loop on itself.

4.6.2 Address Compare

1. Store the following program at the specified Addresses:

Description	Data	Address
Initial PSW	00 00 00 00 00 00 01 00	0000
LPSW	02 00 04 00 00 00 00 00	0100
LPSW(B)	82 00 05 00 00 00 00 00	0200
LPSW(C)	82 00 06 00 00 00 00 00	0300
(A)	00 00 00 00 00 00 02 00	0400
(B)	00 00 00 00 00 00 03 00	0500
(C)	00 00 00 00 00 00 03 00	0600

2. Set Rate switch to Process position; set Main Store select switch to SE being used.

3. Depress Reset, then PSW Restart switches; machine will loop on the LPSW instruction at Address 300.

4. Set Address switches to 0300; observe storage address sync pulses at jack directly behind Console Panel.

5. Set Storage Address Compare lever switch to Stop position; Machine should enter Stop loop with the IC at 0600 (next Instruction Address).

6. Set Data switches 40-63 to 00 02 00; Set Address switches to 0200.

7. Set the Storage Address Compare lever switch to Loop position.

8. Depress Stop, Reset and PSW Restart switches in sequence; machine will continuously execute the LPSW instruction at Address 0200.

9. Set the Storage Address Compare lever switch to Process position.

4.7 CONFIGURATION CHECK, CE-TCU-IOCE-SE-PAM-DASF-DE-RCU INTERFACE

1. Set the CE Main Storage Select and Load Unit rotary switches to select a valid SE, IOCE and TCU.

2. Load an MDM tape on the selected tape drive.

3. Set CE Rate switch to Instruction Step position.

4. Turn System Interlock key to ON position and Press Load switch; system reset and load will occur.

5. Check TCU, IOCE, SE, PAM, DASF and DE for CCR Equal to State Three, SCON Bit and communicate bits corresponding to CE and IOCE used for IPL.

NOTE: To reset State to Zero: On all units in State Three turn test switch on. Turn System Interlock key on CC or SC to on position and depress Load pushbutton.

4.8 CE BRING-UP PROGRAMS

Using a simplex subsystem, perform an IPL from the CE to load and run all unit and system diagnostics under SDM and MDM. Refer to Diagnostic Program Manuals for operating instructions.

4.9 SYSTEM CONSOLE CHECK (9020D)

Do the tests under this heading if System Console diagnostic fails. The diagnostic does not perform Control CE switches and activate button check. Perform this test manually.

4.9.1 Store and Display Button, Local Storage Switch, and Storage Data Keys Check

1. Set CE Console Test switch to Off position, then select a CE using the CE Select switch.
2. Enter all Fs into the Storage Data keys.
3. Enter 3F into Instruction Address keys 22-27.
4. Set Storage select switch to Local position.
5. Turn System Interlock key to On position.
6. Press the Stop then the Store switches; check the T Register for all Fs on the selected CE.

4.9.2 Address Keys and Set IC Button Check

1. Select a CE with the CE Select switch.
2. Enter all Fs into the Address keys.
3. Depress Stop, then the Set IC switches; check D Register for all Fs and IC for 00000F on the selected CE. (IC has been updated by 8).

4.9.3 Control CE Switches and Activate Button Check

1. Set all control CE switches to On position.
2. Select a CE with the CE Select switch.
3. Turn System Interlock key to On position.
4. Depress the Stop, then the Activate switches; check the CCR for all SCON bits on the selected CE. There should be no change in other CCR positions.

4.9.4 Main Storage and Unit Select Switches, and Load Button

1. Jumper 02E-A2C2D06 to ground in the selected CE (prevents resets to other units).
2. Select a CE with the CE Select switch.

3. Set Main Storage select and Load unit switches according to Table 4-1.

4. Turn System Interlock key to On position.

5. Depress the Stop, then the Load switches; check physical PSBAR and external register positions for results as shown in Table 4-1.

6. Repeat steps 3-5 for all values of Main Storage and Load Unit select switches shown in Table 4-1.

7. Remove jumper installed in step 1.

Table 4-1. Select Switch Check

MS Select*	Unit Switches	Phys. PSBAR Bits 9-12	Ext Reg Bits 0-7	Ext Reg Bits 20-23
1	0 1 2	0001	1 2	0
2	1 2 3	0010	2 3	1
3	2 3 4	0011	3 4	2
4	3 4 5	0100	4 5	3
5	4 5 6	0101	5 6	4
6	5 6 7	0110	6 7	5
7	6 7 8	0111	7 8	6
8	7 8 9	1000	8 9	7
-	8 9 A	-	9 A	8
-	9 A B	-	A B	9
-	A B C	-	B C	A
-	B C D	-	C D	B
-	C D E	-	D E	C
-	D E F	-	E F	D
-	E F 0	-	F 0	E
-	F 0 1	-	0 1	F

* Positions 1-8 for System Console; 1-4 for Configuration Console.

4.10 CONFIGURATION CONSOLE CHECK (9020E)

Do the tests under this heading if Configuration Console diagnostic fails. This diagnostic does not perform Control CE switches and button check. Perform this test manually.

4.10.1 Store and Display Button, Storage Select Switch, Address Keys and Storage Data Keys

1. Select a CE using the CE Select switch.

2. Enter data in Storage Data keys.

3. Enter valid storage address in the Instruction Address keys.

4. Place Storage switch in Main position.

5. Turn System Interlock key On.

6. Depress Stop, then Store pushbuttons.

7. Depress Display pushbutton; Storage Data indicators should correspond to Storage Data keys.

4.10.2 Control CE Switch and Activate Pushbuttons

1. Set the desired configuration for the SCON bits in the Control CE switches.

2. Select the desired CE using the CE Select switch.

3. Turn System Interlock key On.

4. Depress Stop pushbutton.

5. Depress the Control CE Activate pushbutton. The SCON bits will be set with the contents of the Control CE switches, and the State bits reset to 00.

4.10.3 Address Keys and Set IC Pushbutton

1. Select a CE with the CE Select switch.

2. Set the desired contents of the IC in the Instruction Address keys.

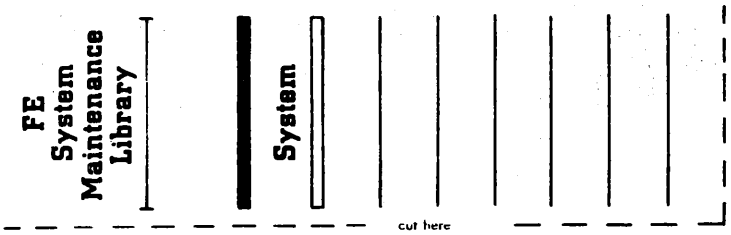
3. Turn System Interlock key On.

4. Depress Stop pushbutton.

5. Depress the Set IC pushbutton. The address in the Instruction Address keys (plus 8 Hex) will appear in the selected CE's IC.

4.10.4 Main Storage and Load Unit Select Switches, and Load Button

1. Refer to System Console Check, para. 4.9.4.



SFN-0106-2

Printed in U.S.A. SFN-0106-2

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Federal Systems Division, FAA Project Office
18100 Frederick Pike, Gaithersburg, Maryland 20760