

PRELIMINARY  
INSTALLATION INSTRUCTIONS  
for the  
IBM 7631 FILE CONTROL  
IBM 1301 DISK STORAGE  
IBM 7320 DRUM STORAGE

Prepared by  
IBM CE Installation Publications  
Department B-97  
Data Systems Division  
Poughkeepsie, New York

Revised: January 22, 1964

## PREFACE

This publication is intended to serve as a guide for the installation of the IBM 7631 File Control, and the IBM 1301 Disk Storage and/or 7320 Drum Storage Unit, in a 7000/1410 series IBM system. It presents mechanical data and preliminary test procedures relevant to making the equipment operational in the customer's office.

For detailed maintenance and test procedures, refer to the IBM CE Reference Manuals for that particular system.

Other manuals that pertain to the 7631/1301 are:

CE Reference Manual	1301 Disk Storage	227-5581
CE Manual of Instructions	1301 Disk Storage	227-5582
CE Manual of Instructions	7631 File Control	R23-2606

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## SAFETY

All Customer Engineers are thoroughly indoctrinated in IBM Safety practices during the early phases of their training. It is expected that this training has become a part of routine practice. However, personal safety cannot be over-emphasized. Follow the safety practices outlined in the CE Safety Practices card, IBM Form 124-0002-1, issued to all Customer Engineers. This section contains some reminders of general safety practices as well as some items peculiar to 7000 series packaging.

As a safety precaution, no man should work alone on the machine whenever power is on. At least two men should be present in the room whenever work is performed on the machine.

Every man should wear safety glasses.

Don't use ungrounded tools or test equipment. They can kill!  
Also, ungrounded wire-wrap guns have caused extreme SMS card damage when used to install Engineering Changes.

Check to see that there are fire extinguishers available in each room where frames of the system are set up. These should be of the CO<sub>2</sub> type, which are recommended for electrical fires.

Specific items for SMS modules are:

- A. Keep fingers clear of gate slides when sliding a gate into the module, to prevent pinching of fingers between the gate and slide frame members. Also, when unlocking a slide, remove the Allen wrench after turning the latch to prevent catching your finger between the wrench and the slide.
- B. Use caution when lowering a tailgate. When unlatched, the gate will free-fall to the stop limit.



## SAFETY

- C. On "cube" type SMS modules, open flip-covers all the way before pulling down swinging gates, to prevent skinned knuckles.
- D. Watch your head. When working on the lower part of a frame, or a B module, don't forget that an overhanging gate may be in your way when you arise.
- E. Turn DC power off when removing or inserting an SMS card. It is possible to cause component damage by shorting to an adjacent card during this process.
- F. When sliding a gate in or out, alternately observe each side to avoid hitting the laminar bus connections.
- G. 208 volts, 400 cycles, and 120 volts, 60 cycles are still present inside the SMS frame on Power-Off. If it is necessary to work near live power connectors, convenience outlets, or inside the MG unit or Core Storage Control, disconnect the power cables, or turn off the wall circuit breakers.
- H. Discharge capacitors before working on DC power supplies.
- J. Always turn off power before replacing any fuse.
- K. Replace any safety covers that have been removed before going on to another operation. Hazardous voltages are present in this equipment; forgetfulness could be fatal.
- L. Always use fuse pullers to remove or insert fuses. Replace the protective covers as soon as possible.
- M. Before adjusting any power supply, remove the line cord from the power receptacle and wait at least 15 seconds.

1 INTRODUCTION

CHAPTER 1 CHECK LIST

1 INTRODUCTION

1. General Information

1-1

2. CE Machine Room Checks

1-2



## 1. INTRODUCTION

### 1. GENERAL INFORMATION

Each 7631 controls up to five 1301's Models 1 and 2 in any combination. In addition, 7631 Mod. 2 controls a combination of 1301's and 7320's\*\* While this manual is primarily concerned with the attachment of this feature to all 7000 series systems\*, some information pertaining to other systems has been included to provide a better overall understanding of this feature's adaptability.

7631 Models: Model 1--for a 1410 or 7010. Model 2--for any 7000 systems\*. Model 3--for shared use by a 1410 or 7010 and a 7000 system\*. Model 4--for shared use by two 7000 systems\*. Model 5--for shared use by two 1410's, two 7010's, or a 1410 and 7010.

Each system has its own adapter unit through which it is coordinated with the File Control and other I/O equipment.

Become familiar with the particular 7631 model which you are to install, and the configuration of the system to which it will be added. Pay particular attention to cabling instructions.

You should also be aware of any special features ordered for the system because they may require special instructions, not covered in this manual.

Cables and special equipment peculiar to the new units should be inventoried and checked so that any discrepancies or damaged items, should they occur, may be adjusted quickly.

Wherever practicable, this manual groups specific information; however, there are some intermediate areas that should be looked for. Seemingly unimportant procedures such as attaching corner brackets, trim installation,

\*Except 7010 and 7072 systems

\*\*Refer to Appendix I, 7320 Drum Storage Unit

## 1 INTRODUCTION

### 1. GENERAL INFORMATION (continued)

cabling and other mechanical detail, when not done at the proper time in the over-all installation, could result in loss of time and much irritation.

Preliminary operations consist chiefly of planning placement of individual units, checking power facilities, and supervising the placement of sub-floor cables.

When the units arrive at the site, the CE in charge advises the movers on the placement of machines so that they can be unpacked, checked, and repaired if necessary. At this time, install any hardware and trim that cannot be installed after modules are placed together.

Modules are then moved to final positions, leveled, and connected to external cables. Appendage frames are installed on those modules that require them, and the rest of the cabling operation is completed.

Auxiliary equipment may be unpacked and checked concurrently with module unpacking.

When the system check has been satisfactorily completed, using the added feature, the system may be considered ready for customer use.

### 2. CE MACHINE ROOM CHECKS

Installation time can be held to a minimum if site preparations are complete before the arrival of the system. IBM has specified certain minimum physical planning requirements that the customer must meet to assure proper operation of peripheral equipment. These basic requirements are set forth in the I/O Components Physical Planning Installation Manual, Form C22-6681. Also, an installation floor plan or layout has been drawn



2. CE MACHINE ROOM CHECKS (continued)

up as part of the physical planning procedure. Obtain a copy of the Physical Planning Manual and installation layout from your Branch Office or local Sales Engineering representative.

The customer is responsible for having the installation site properly prepared for the machine; however, you should familiarize yourself with the over-all requirements to insure that items which have been overlooked or need correction do not become last minute delays that hold up machine placement or other installation procedures. Note and report these items to local CE management.

Check the following items:

- A. See that proper sub-floor has been installed.
- B. External cables routed at floor level require protective ramps to prevent their being damaged. Also, provision must be made for them to be routed in the step-cover area and for them to exit through an opening provided in special end-covers at each end of the front base section.
- C. Secure wall circuit breakers in the OFF position:

NOTE

It is suggested that signs reading "DO NOT TURN ON POWER" be prepared and attached to each wall panel supplying machine power. They should be kept in place during installation until the CE is ready for power to be applied to a machine unit or the system.



## 1 INTRODUCTION

### 2. CE MACHINE ROOM CHECKS (continued)

1. Check for common connection between receptacle ground pin, receptacle case and building ground.
2. Check for a high resistance (one megohm or more) between the points in the preceding paragraph and any voltage phase pin of the receptacle.

#### CAUTION

Conduit is not considered adequate grounding, according to IBM specifications. Also, some IBM installations require special grounding methods in order to meet the electrical requirements of a particular system. Refer to the I/O Components Physical Planning Installation Manual, Form C22-6681.

DO NOT turn power on at wall panel if the receptacle ground pin, receptacle case and building ground are not all commoned together, or if a low resistance exists between these points and any voltage phase pin in a receptacle.

DO NOT attempt to correct any improper ground or phase condition which exists in any building power outlets. These conditions must be corrected by the electrical contractor.

- D. Check all three-phase AC power receptacles for proper phasing.

#### CAUTION

The 7631 uses single-phase power, however, do not connect I/O equipment until phasing is correct.

1. Turn on power.
2. Check that correct voltage is supplied.

## 1 INTRODUCTION

### 2. CE MACHINE ROOM CHECKS (continued)

3. Check the phase voltages on the receptacle pins. Phase 1, red wire; phase 2, white; phase 3, black; ground green. See Figure 1-1.
4. Turn off power, replace warning sign.

#### NOTE

If a phase meter is unavailable an oscilloscope can be used to check phasing. Make certain that it is grounded to the power receptacle. Connect the sync lead to phase 1 and adjust the oscilloscope for one wave form, phase 2 should occur  $120^{\circ}$  later than phase 1. Phase 3 should occur  $240^{\circ}$  later than phase 1.

- E. Mark the floor with removable tape to show frame locations.
- F. See that proper tools and test equipment (oscilloscopes, meters, etc.) are available, and in operating conditions. As a rule equipment normally found at a Data Processing installation is adequate to check out the 7631.

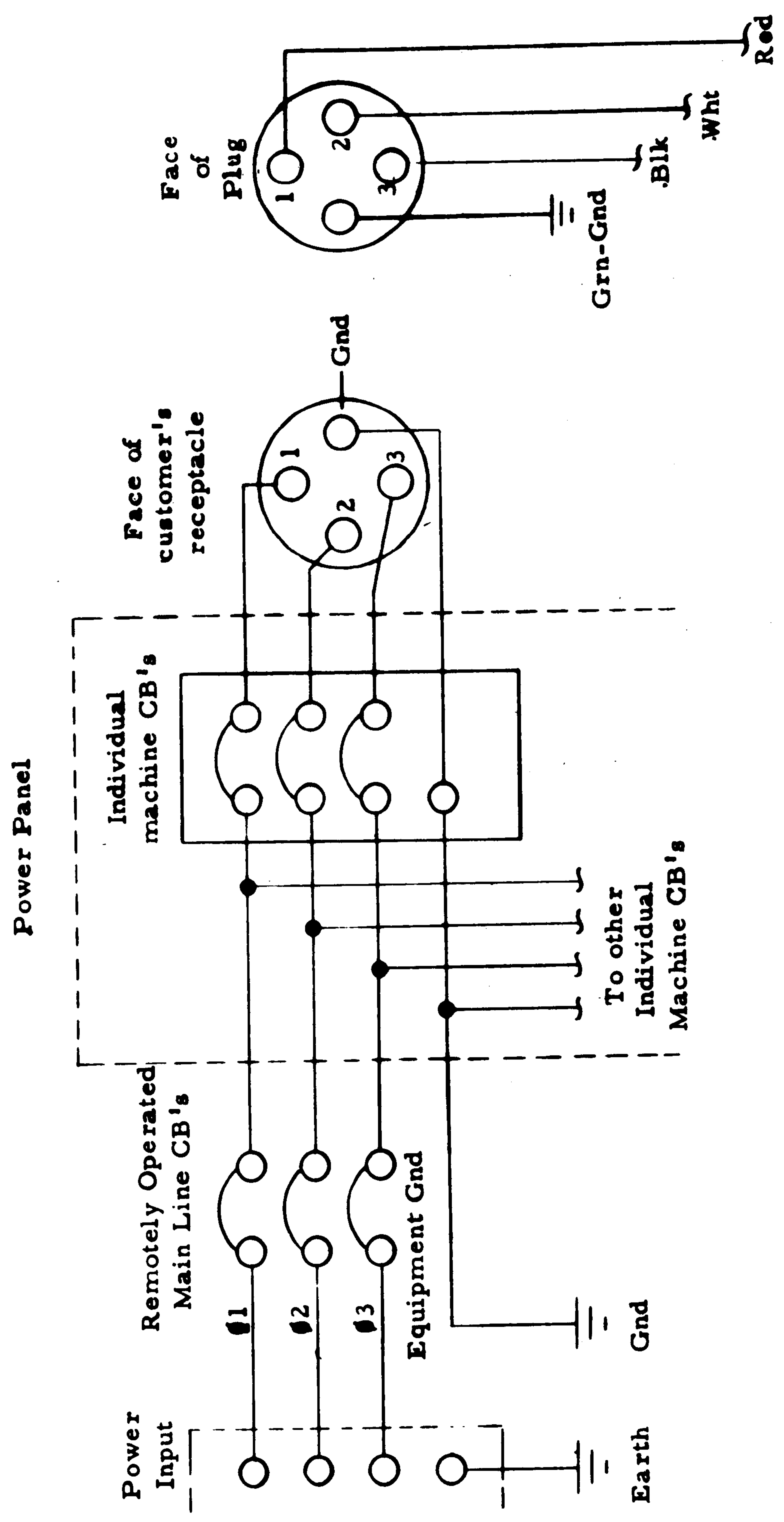


FIGURE 1-1 TYPICAL POWER SYSTEM



2 PLACEMENT AND MECHANICAL  
ASSEMBLY - GENERAL

CHAPTER 2 CHECK LIST

2 PLACEMENT AND MECHANICAL ASSEMBLY -  
GENERAL

- |  |     |                          |
|--|-----|--------------------------|
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| 1.1 Mechanical Inspection and Leveling | 2-2 | <input type="checkbox"/> |
| 2. End Base-Covers and Step-Covers     | 2-3 | <input type="checkbox"/> |
| 3. Preliminary Checks - 7631           | 2-5 | <input type="checkbox"/> |
| 4. General Information - 1301          | 2-5 |                          |
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| 5. Assembly - 1301                     | 2-9 | <input type="checkbox"/> |

## 2 PLACEMENT AND MECHANICAL ASSEMBLY - GENERAL

### 1. UNPACKING

Unpacking IBM equipment depends on how critical their internal adjustments are, the fragility of components and the manner in which they have been transported. Most modules are shipped with a minimum of packing in a padded van. However, critical items of Disk File mechanisms require special packaging. The carrier will normally provide movers to unload the frame from the van and move it into the machine area. To prevent injury to personnel, damage to equipment, and damage to the unit, check that the carrier is informed of the following requirements for handling the equipment:

#### CAUTION

- A. All machine movements are to be made on tempered masonite or plywood to prevent damage to floor areas.
- B. Sufficient manpower must be used in handling and moving the frame to prevent injury to personnel and damage to equipment. Caution must be observed when moving the frame on ramps or where obstructions such as cables and cable floor holes exist. If a caster should drop into a floor opening or off the side of a ramp, it would be very difficult, because of the height and weight of the frame, to prevent it from tipping over, resulting in possible serious injury to personnel and damage to the frame.
- C. When moving a frame, avoid twisting it on its casters. When approaching or leaving a ramp, the frame must be aligned with the ramp. If not aligned, a twisting force is applied to the frame and weight may be absorbed on only three casters, causing caster damage.

2 PLACEMENT AND MECHANICAL  
ASSEMBLY - GENERAL

1. UNPACKING (continued)

- D. Check each frame as it is being unloaded, for obvious signs of physical damage.

Remove plastic and paper covering, and any nylon tape or wooden wedges securing the covers. Refer to Section 4 of this chapter for special unpacking instructions. Check all spare parts and other equipment against order forms and shipping bills.

1.1 Mechanical Inspection and Leveling

- A. Check power and signal connectors for:

1. Breakage, correct assembly.
2. Pins bent, pushed out or broken.
3. Loose strands where wires enter connector pins.
4. Frayed insulation.
5. Mechanical tightness.

- B. Check other mechanical components:

1. Accidental grounds or shorts on terminals.
2. Imperfect ground connections.
3. Do safety devices work?
4. Are casters or pads securely in place?
5. Check lubrication where indicated.

- C. Check the equipment for damage not readily observed with covers on.

1. Check cables for cuts.



## 2 PLACEMENT AND MECHANICAL ASSEMBLY - GENERAL

### 1.1 Mechanical Inspection and Leveling (continued)

2. Check SMS cards for proper placement, inter-card shorts, and breakage.
  3. Check laminar bus assemblies for bent, broken, shorted or loose pins.
- D. After unpacking and inspecting the 7631, move the unit to its final location and install the leveling pads, adjusting them so that the casters are just clear of the floor. (Refer to section 5 of this chapter for 1301 leveling.) Place a carpenter's level atop the frame, level the unit from side to side and front to rear, by further adjusting the leveling pads.

### 2. END BASE-COVERS AND STEP COVERS - 7631

These covers are part of the Shipping Group. Step covers are installed after the cables are in position and connected. Figure 2-1 shows early model, one-piece step covers. Figure 2-2 shows step covers used on current models.

- A. End base-covers are installed flush with the side covers. Each one has four threaded lugs welded to the inside, and must be installed before the step covers by inserting the four lugs into the proper holes on the lower frame and securing it in place with four nuts and lockwashers.

#### NOTE

It may be necessary to shim out the bottom lugs to properly align these covers.

Special end covers with openings to allow entry and exit of cables are ordered for installations whose cables run at floor level. (See Figure 2-2).

- B. Install one-piece step covers as illustrated in Figure 2-1:

2 PLACEMENT AND MECHANICAL  
ASSEMBLY - GENERAL

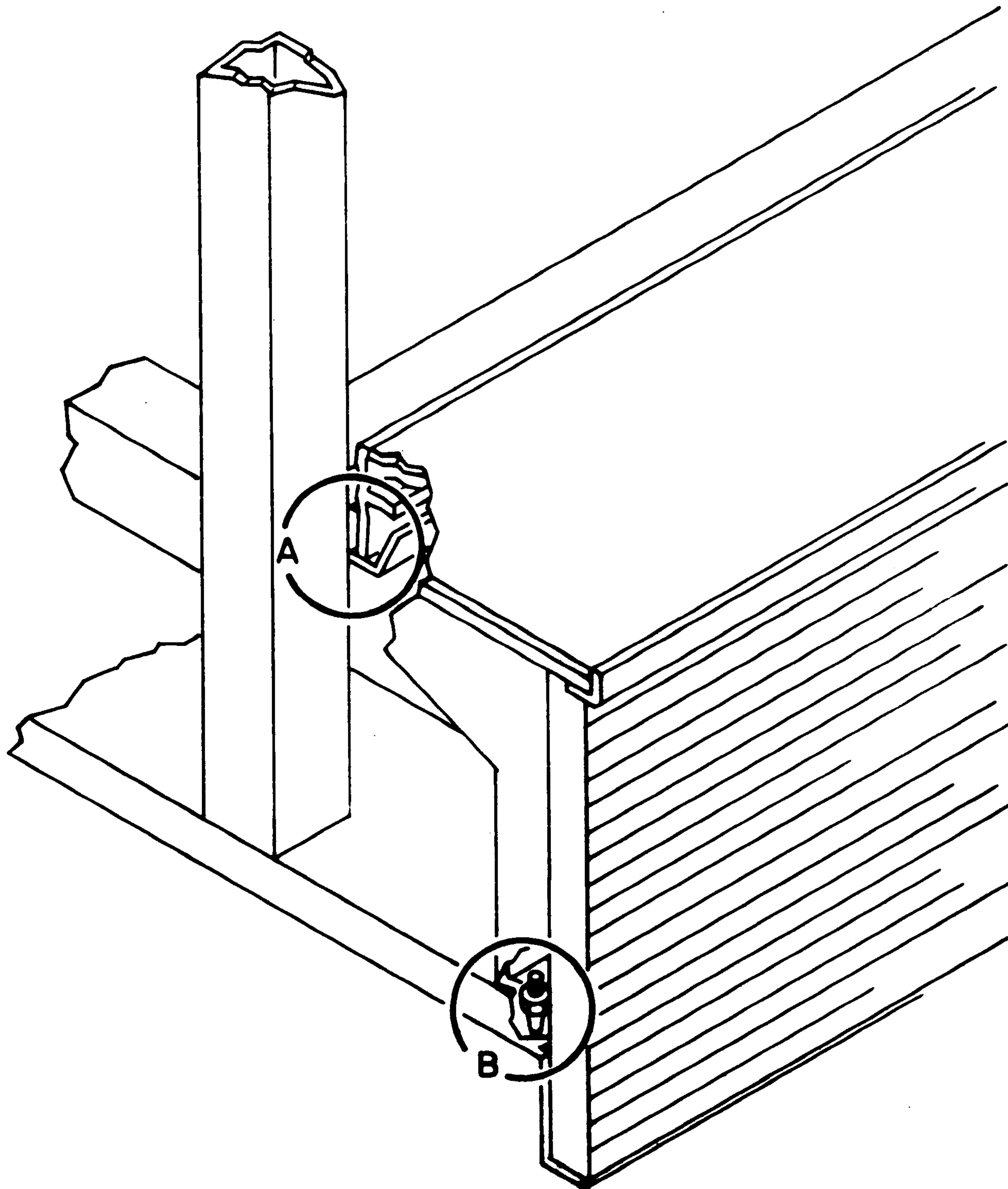


FIGURE 2-1 STEP COVERS - 7631

2 PLACEMENT AND MECHANICAL  
ASSEMBLY - GENERAL

2. END BASE-COVERS AND STEP COVERS - 7631

B. (continued)

1. Place the top inside edge of the cover in the channel groove (A), mounted on the frame.
2. Set two pins (B) located at either side of the cover, into the locating holes on the frame.
3. Apply a sharp push on the top of the cover snapping it into place.

C. Install two-piece step covers as illustrated in Figure 2-2:

1. Install louver screws A, pins and filter stops B, in frame.
2. Install air filters C and D (on rear of machine only).  
  
Filter D is inserted into top channel of step cover frame and rests against the filter stops.
3. Attach Step cover E, to louver screws A.
4. Attach louver F, to step cover frame.

3. PRELIMINARY CHECKS-7631

Prior to cabling the following checks should be made:

- A. Check that power has been turned off at the customer's receptacle.
- B. Using an ohmmeter, check that the resistance between frame ground and electronic ground is at least one megohm.
- C. Using an ohmmeter, check the laminar bus for possible shorts



2 PLACEMENT AND MECHANICAL ASSEMBLY

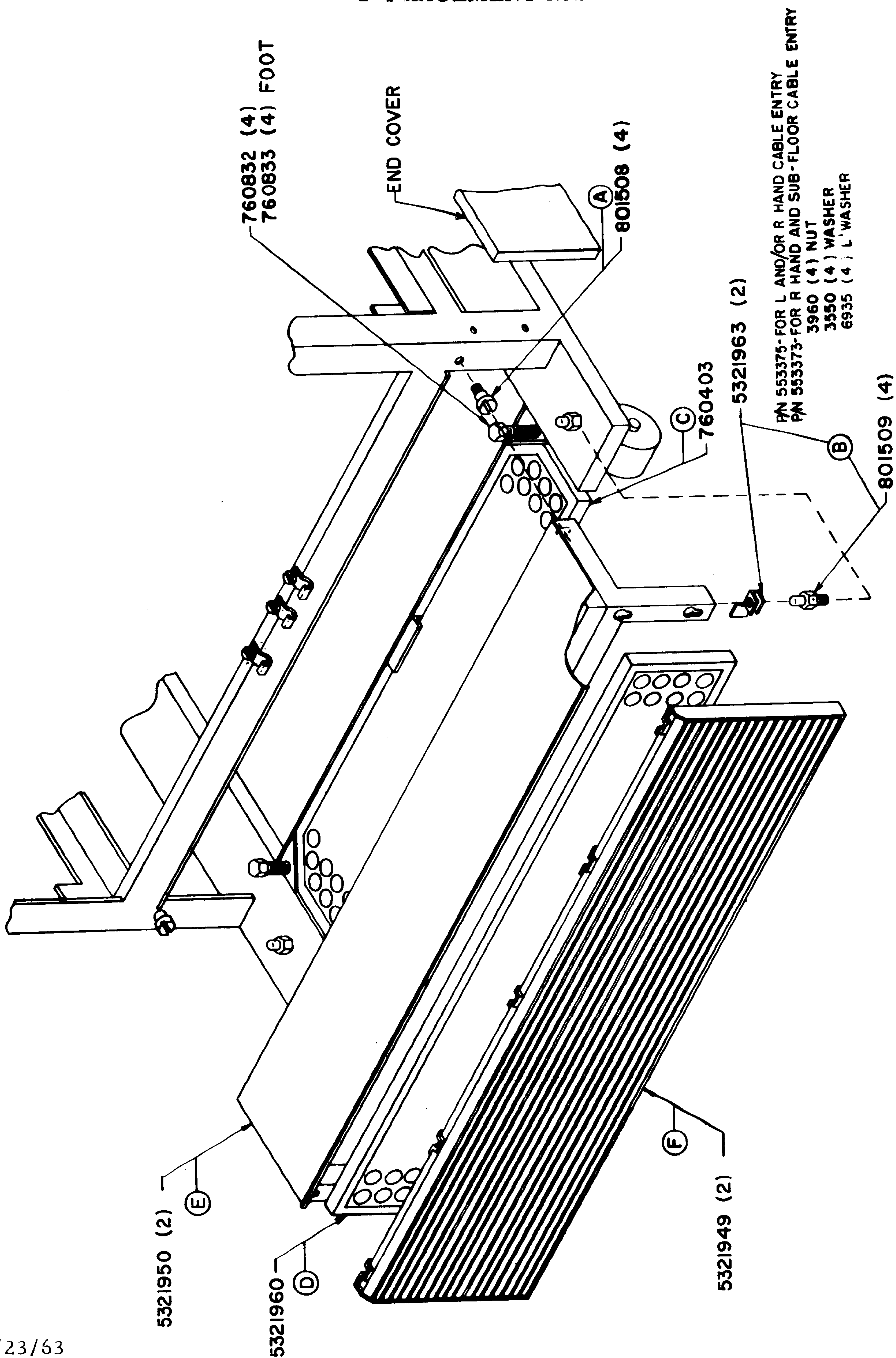


FIGURE 2-2 PLACEMENT OF BASE COVERS AND AIR FILTERS-7631

## 2 PLACEMENT AND MECHANICAL ASSEMBLY - GENERAL

### 3. PRELIMINARY CHECKS-7631

#### C. Continued

that may have occurred during shipment. Check for shorts between each segment and electronic ground. The -12 volt supply should read approximately 1.0 ohm.

### 4. GENERAL INFORMATION-1301

This section will guide you in the mechanical set-up of a 1301 Disk Storage, Model I or II. Subsequent chapters will complete the installation instructions in the following sequence:

#### A. 1301 Mechanical Checkout

#### B. 1301 Electrical Checkout

#### C. 7631 Checkout - Note that most of this can be done concurrently with the 1301 Electrical Checkout.

#### D. 7631 - 1301 System Checkout

For detailed servicing and test procedures consult the IBM 1301 CE Reference Manual, Form No. 227-5581-2, and the latest Disk Storage Devices CE Memos.

#### 4.1 Safety - 1301

The following advice is peculiar to the 1301 and is supplement to the safety information in the front of this manual. Read it! Heed it! The one thing you remember may save you from a painful injury.

Use caution when working around moving parts of the machine. Keep all parts of the body and loose clothing clear of areas where machine motion



## 2 PLACEMENT AND MECHANICAL ASSEMBLY - GENERAL

### 4.1 Safety - 1301 (continued)

can occur. Because of the unpredictable motion of the access mechanism, you can be injured if the machine starts unexpectedly.

High voltages exist in many areas of the machine; on transformers, terminal boards, convenience outlets, etc. Contactors carry high voltages and can be checked with power on only when absolutely necessary and with caution.

Potential difference within the power contactor gate is -48v DC to +208v AC. Potential difference within the electronic gates, printed cards, and display back panel is -48v DC to +30v DC.

When a DC failure is sensed, a DC off sequence is initiated; however, power remains on at the hydraulic power supply, convenience outlets, and disk drive motor. Do not depend on this feature as safety protection.

Shields and guards protect only when they are firmly in place. Do not short out or bypass safety features. One such item is the actuator shield safety switch. Never allow the access to run with this door open by manually energizing this cover safety switch. Also note that, although the actuator is electronically interlocked with this door open, if for any reason the solenoid DC power goes off, the actuator will attempt to go "home".

### 4.2 Special Equipment Required

Special equipment or supplies not normally found at an installation site is included in the 1301 Shipping Group.



2 PLACEMENT AND MECHANICAL  
ASSEMBLY - GENERAL

4.3 Unpacking - 1301 Electronic Unit

- A. Carefully remove all external tape, cardboard, and plastic cover from unit.
- B. Remove drawer shipping containers from inside unit and store them until the drawers are to be installed.
- C. Remove tape from logic gate latch and from bottom of gate and frame.
- D. Open gate and remove tape from air-baffle panels.
- E. Remove tape from latch of CE and power sequencing panel.

4.4 Unpacking - 1301 Mechanical Module

- A. Carefully remove cardboard hood from unit; use a small knife to cut tape between frame and hood to avoid damage to hood.
- B. Carefully remove plastic cover from unit. Do not remove insulating cover from actuator thermal switch.

NOTE

If disk file was shipped by van, proceed to next step; if shipped by air-freight, proceed to step F.

2 PLACEMENT AND MECHANICAL  
ASSEMBLY - GENERAL

4.4 Unpacking - 1301 Mechanical Module (continued)

- C. Remove glass door protector panels from front and rear of unit;
- D. use small knife to cut tape between panels and frame to avoid damage to panels.
- D. Remove tape used to secure glass doors together and remove filler pad from between edge of doors and frame.
- E. Remove all external tape.
- F. Cut steel bands holding hydraulic power supply to oil pan; remove felt padding and wooden block from top of power supply, and three rubber blocks from bottom of supply.
- G. Remove four rubber blocks from under the corners of the disk base casting. Return the seven rubber blocks to San Jose in the box provided.
- H. Remove tape from upper and lower module Format switch boxes; set Format switches to Read position.
- J. Remove plastic clock head cover; remove desiccant paper; remove supporting rubber block from clock head arm; replace cover.
- K. Remove tape from fuse and resistor panels.
- L. Remove tape from module shield latches; open module shield doors and remove desiccant paper from access units.
- M. Using vacuum cleaner, thoroughly clean interior and exterior of unit.

5. ASSEMBLY--1301

Because it is easier to install the interframe cables before bolting the two modules together, we recommend the following procedure:

- A. Roll the open end of the electronic module to within 10 inches of the open end of the mechanical module and install the interframe cables. Refer to 1301 Interframe Cabling in Chapter 3.
- B. After cabling, move the electronic module up to the mechanical module and align the two by turning the caster head bolts in the electronic module with a 1/2 inch Allen wrench. Use a carpenter's level to check alignment.
- C. Insert the four bolts (in 1301 Shipping Group) through the two frames. Use the grounding washers between the frames, and be sure to tighten the nuts so that a good inter-frame electrical bond is formed.

WARNING

Before tightening interframe bolts, make sure that cables are not caught between the frames.

- D. Remove tape from power cable coiled at bottom of unit and route this cable under the mechanical and electronic frames, into the floor opening.
- E. Cut the lacing cord that secures the yoke to the actuator and remove foam rubber pad from between yoke and actuator housing of each module.
- F. Remove tape holding each module at inner track position.



2 PLACEMENT AND MECHANICAL  
ASSEMBLY - GENERAL

5. ASSEMBLY--1301 (continued)

- G. Loosen two nuts that secure hydraulic power supply (on lower right side, front and rear). Roll out supply, verify that oil level is between 1/2" and 3/4" below FULL mark on sight gage. Wipe supply and oil drip pan clean of excess oil, using a soft cloth. With torque wrench, tighten drip pan plug to  $250 \pm 25$  inch-pounds. Check underside of drain for seepage, then roll in supply. Tighten locking nuts.
- H. With a vacuum cleaner, thoroughly clean the inside and outside of the unit.
- J. Mount air duct (in 1301 shipping group) with opening down, to rear of hydraulic power supply, with wing nuts.

WARNING

Intake duct provides air circulation to cool power supply. Running machine with duct off may cause thermal failures. Also, make sure to clean heat-exchanger core regularly.

CHAPTER 3 CHECK LIST

3 CABLING

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| 4. Interframe Cables - 1301 | 3-12 | <input type="checkbox"/> |

### 3 CABLING

#### 1. GENERAL INFORMATION

This chapter provides information for the placement of external cables from the 7631 to the Data Channel of the using system and the 1301/7320. Cable connections between the mechanical and electronic frames of the 1301 are also included.

External cable placement presents no problem if the machine-room floor is prepared and sufficient time allocated before the machine arrives.

The remaining operations are done during the various stages of mechanical assembly.

If external cables are to be installed at floor level, they should be unpacked and sorted, ready for quick installation when the machine arrives. Cables placed at floor level require protective ramps to prevent their being damaged. Contact the Physical Planning Engineer if more cables are required, or if any are the wrong length. Also, cable installations made at floor level require the 7631 to have special end-covers.

Y and Z dimensions, called out on cable charts, refer to the length of cables needed to reach from the floor cut-out to the cable plugging location on the machine. Y and Z dimensions are indicated by a one-inch tape band, placed the proper distance from the "FROM and "TO" ends of the cable, respectively.

When placing the cables, see that the correct ends are in their proper locations. It is difficult and time consuming to reverse a cable after the modules are positioned and cable connection is in process.



## 2. CABLE IDENTIFICATION

To facilitate cabling, a red or white label is attached to each end of every cable.

Red identifies the "FROM" end of the cable; white, the "TO" end.

Each label carries a key or reference number. Key numbers identify external or sub-floor cables. Reference numbers identify interframe cables.

See Figure 3-1.

Part No. _____ Length _____	Part No. _____ Length _____
EC Level _____	EC Level _____
Key No. _____	Ref No. _____
From _____ To _____	From _____ To _____
Customer Code _____	Customer Code _____

FIGURE 3-1 CABLE LABELS

Both the "FROM" and "TO" labels are coded to show the cable designation, frame number, tailgate identification and plugging location. Thus, on a 7070 system, code K02H09C on a "FROM" label and KU09 (or 09U) on a "TO" label would indicate in the first case that this was an external cable from frame 02, tailgate H, plugging location 09C; and in the second case that the external cable was to be connected to a Simplex Interface tailgate (on the 7631) position 09, Upper section.

## 3. EXTERNAL CABLES-7631

Although there are few cables between the 7631 and 1301/7320, it is still good practice to connect an ohmmeter from electronic ground to frame ground so that any short circuits occurring between them during cabling may be detected immediately. However, this check does not apply to cabling between 7631/1301/7320 and other system components.

Inspect all cable connectors and tailgate pins before connecting them, to insure that none are broken or bent.

Use caution in aligning connectors and receptacles properly so that pins are not bent or pushed out of position. Also, make sure that cables are put into the proper locations.

Refer to Table 3-1 for cable connections between 7631 and Data Channels. Table 3-2 lists cable connections between 7631 and 1301; 1301 and next 1301 (or between 7320's, or 1301's and 7320's).

Figures 3-2 and 3-3 show 7631 component locations. Figure 3-4 illustrates 7631 tailgate configurations for the different models, and Figure 3-5 is a composite cable diagram of the 7631-1301/7320 features.

- A. EPO (Emergency Power Off) cables are plugged in C-1 connector located on the left end of the tailgate. See Figure 3-2.
- B. A dummy plug, IBM Part No. 553298, is in the Shipping Group. Plug it into EPO receptacle C-2 when only one system is being used with the File Control. The dummy plug is not used when a shared system is plugged into C-2.
- C. Cable K-406 is plugged into C-3 when two or more interface control units are used with the system.







TABLE 3-1 (continued) I/O CABLE CONNECTIONS--7631 TO DATA CHANNELS

Data Chan.	Channels	Cable Key No.	Tailgate Connectors	FROM 7631 - MODEL																Cable P/N																					
				I				II				III				IV																									
				7607	7608	7609	7610	7611	7612	7613	7614	7615	7616	7617	7618	7619	7620	7621	7622	7623	7624	7625	7626	7627	7628	7629	7630	7631													
7907	Ch. 4 Ext. 2	407a	02H 09A	X								X					X											X	587330												
7908		403	7804 EPO																										352303												
	Ch. 40	408	06A U05						X																				X 587330												
	Ch. 40	408a	U01						X																																
	Ch. 41	408	U13						X																																
	Ch. 41	408a	U09						X																																
	Ch. 44	408	U21						X																																
	Ch. 44	408a	U17						X																																
	Ch. 45	408	U29						X																																
	Ch. 45	408a	U25						X																																
	Ch. 46	408	U37						X																																
	Ch. 46	408a	U33						X																																
	Ch. 47	408	U45						X																																
7908	Ch. 47	408a	06A U41						X																																
7909		404	7909 EPO																																						
	Int. 1	409	05A L01																																						
	Int. 1	409a	U01						X																																
	Int. 2	409	L05																																						
7909	Int. 2	409a	05A U05																																						
		406	7631 EPO C-3 To Other Control Unit																																						

(continued)





TABLE 3-2 I/O CABLES--7631 and 1301/7320

CABLE KEY NO.	FROM	TO	CABLE PART NO.	REMARKS
400	7631 U01	1301 or 05D 7320 D11	553379	
400a	L01	1301 or 09D 7320 D13	553379	
400b	L03	1301 or 07D 7320 D09	553379	
401	U03	1301-1 or 11D 7320-1 D15	587387	
401a	L05	1301-2 or 7320-2		
401b	U05	1301-3 or 7320-3		
401c	L07	1301-4 or 7320-4		
401d	7631 U07	1301-5 or 11D 7320-5 D15	587387	
411, a, b, c	1301 or 05A 7320 D05	1301 or 05D 7320 D11	553379	
412, a, b, c	1301 or 09A 7320 D07	1301 or 09D 7320 D13	553379	
413, a, b, c	1301 or 07A 7320 D03	1301 or 07D 7320 D09	553379	
*419	7631 P1	1301 or P1-In 7320 E02	5342370	
*419a, b, c, d	1301 or P2-Out 7320 E01	1301 or P1-In 7320 E02	5342370	

\*Only used on 7631, Serial No. 12000 and above.



3. CABLING

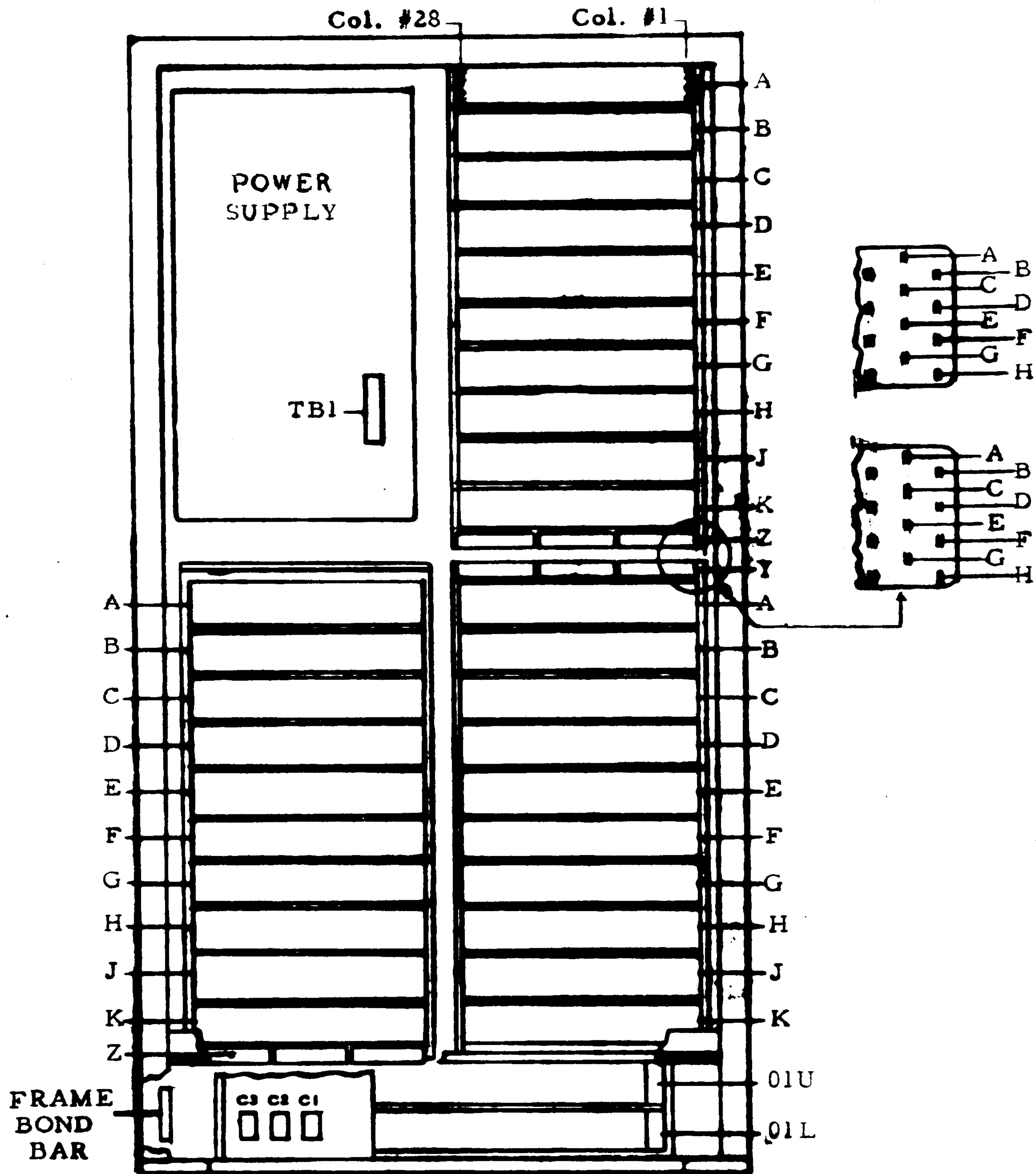


FIGURE 3-2 COMPONENT LOCATIONS -7631 (FRONT)

3. CABLING

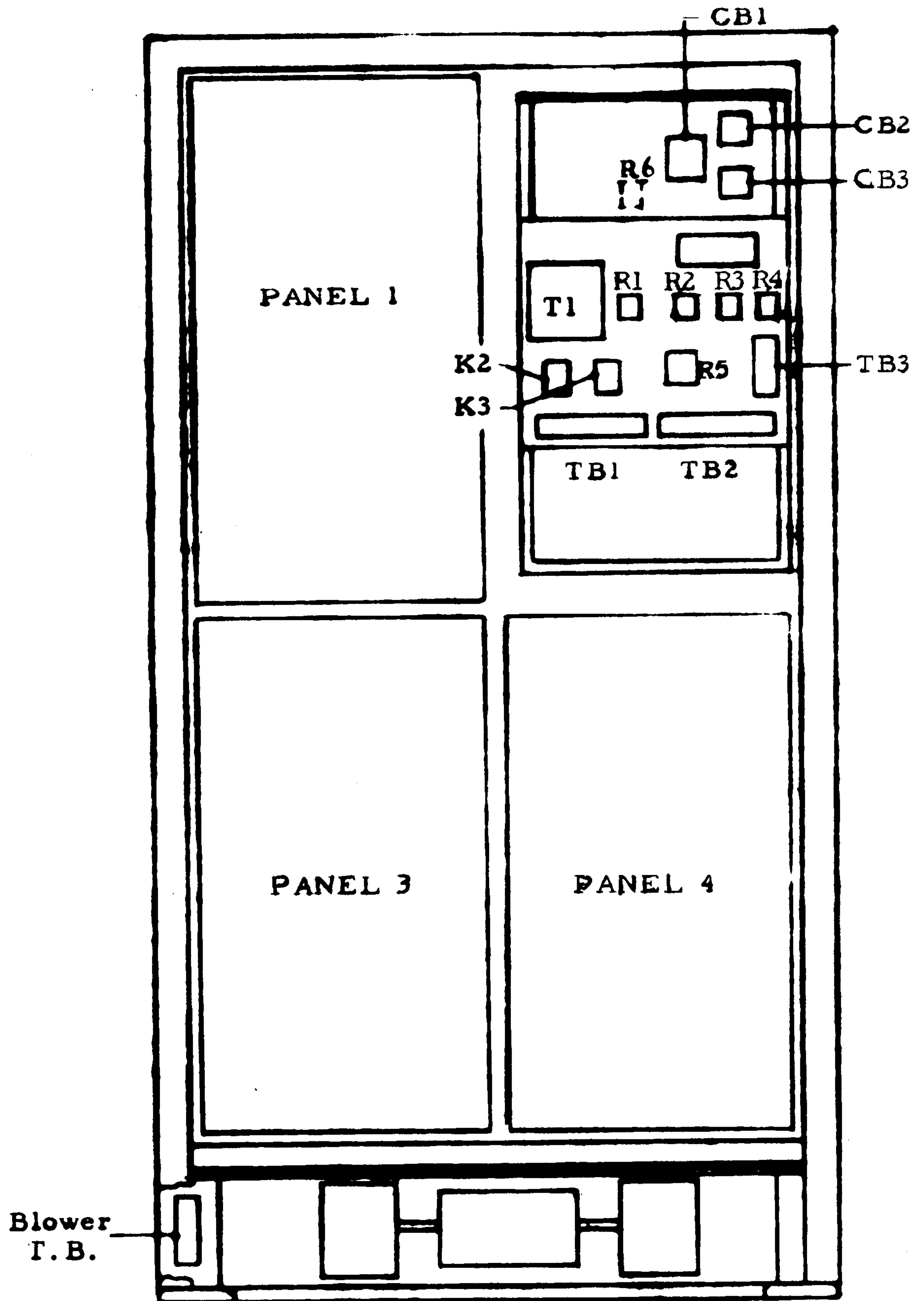
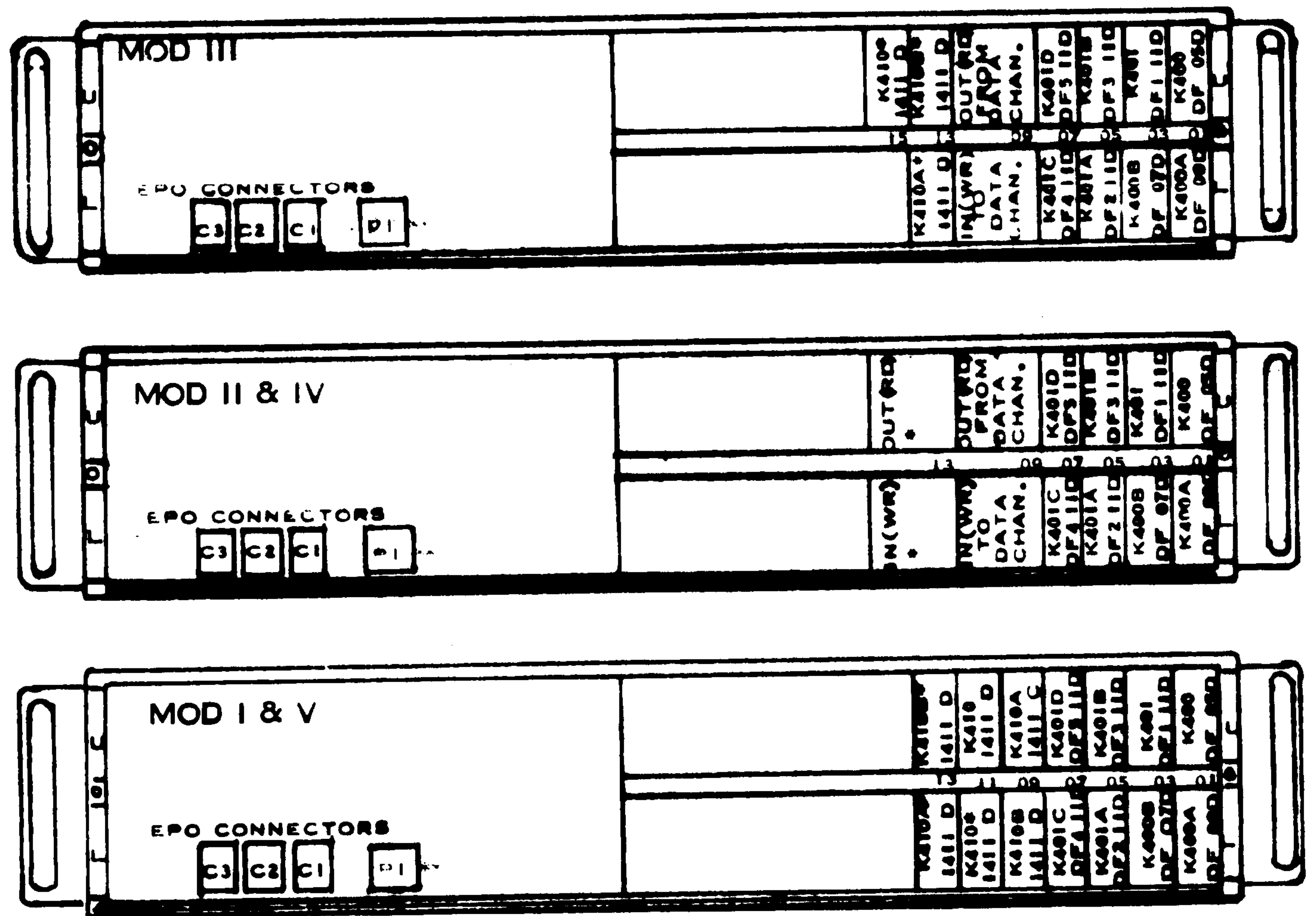


FIGURE 3-3 COMPONENT LOCATIONS-7631 (REAR)

### 3. CABLING

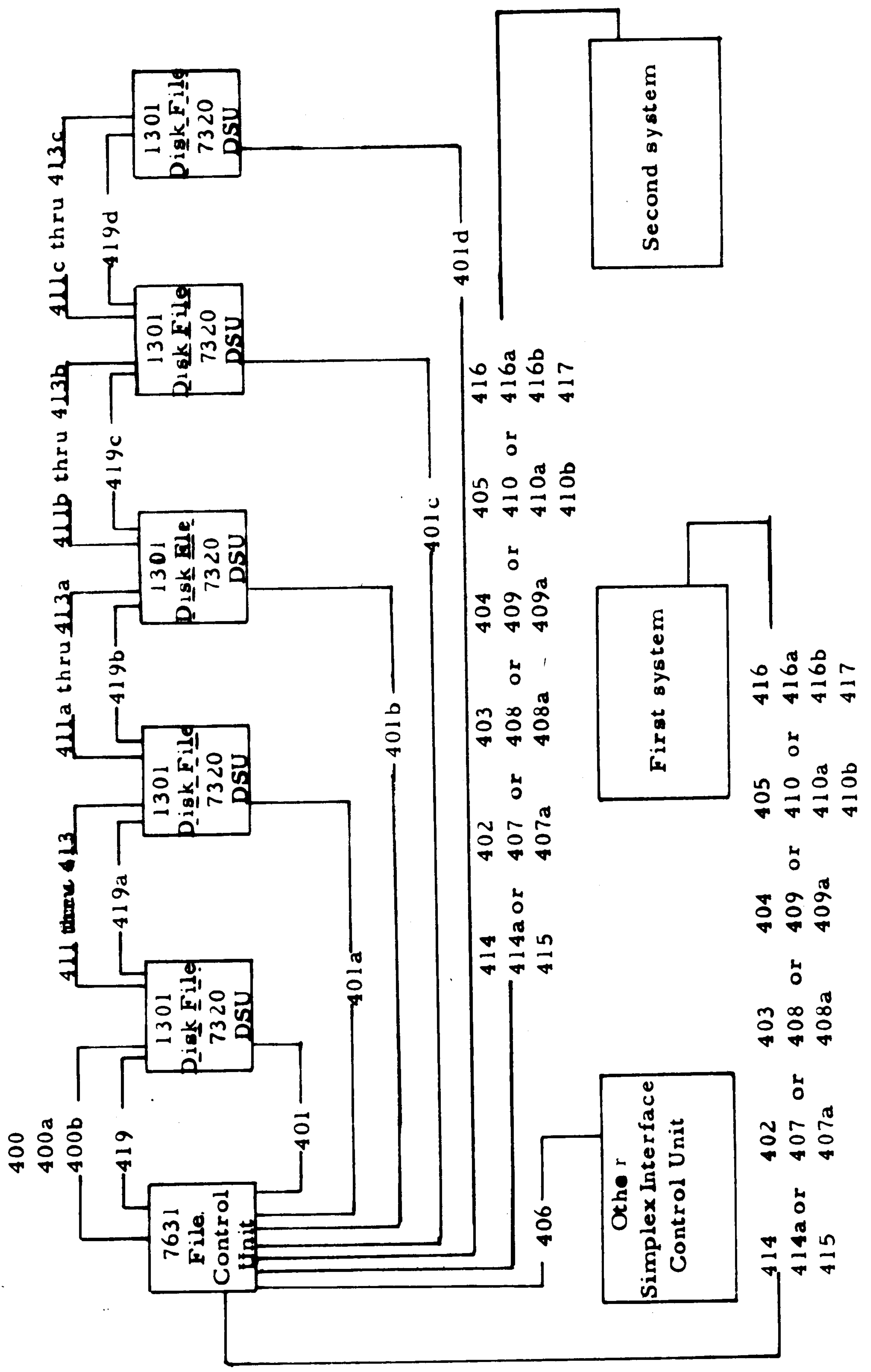


- \* THESE CONNECTORS ARE USED WHEN INSTALLING ADDITIONAL SYSTEMS.
- \*\* 40 POSITION CONNECTORS U13 AND L13 ARE NOT USED ON MODEL II.
- \*\* 32 POSITION CONNECTORS L11, U13 AND L13 ARE NOT USED ON MODEL I.
- \*\* P1 IS USED TO ATTACH CABLE K419 ON 7631, SERIAL NO. 12000 AND ABOVE.

FIGURE 3-4 7631 TAILGATE CONFIGURATIONS



3. CABLING



NOTE: When second system is not used, insert dummy plug 553298 into EPO receptacles. Cable key numbers 402, 403, 404, 405, or 415, are required only when the 7631 is attached directly to the system EPO. K406 is required only when the 7631 is attached to other Simplex Interfaces Control Units EPO. K419 is used with 7631, Serial No. 12000 and above.

FIGURE 3-5 EXTERNAL CABLE ROUTING--7631-1301/7320

## 4. INTERFRAME CABLES - 1301

The electronic and mechanical frames of the Disk Storage are separated for easier handling during shipment. Do not bolt them together before installing the interframe cables. Refer to Chapter 2 for mechanical assembly instructions.

Paddle connectors are stamped with information regarding frame, panel, and row. Other cable connectors have stick-on labels that correspond to the receptacle into which they are plugged.

- A. Refer to Table 3-3 for a list of interframe cables. Check off each cable on the list as it is plugged -- it is easy to overlook plugging some of them -- and embarrassing when the machine is closed up.
- B. Make sure that the terminators, shown in Figure 3-6, are in their proper positions.
- C. Refasten the 60 amp. power cable, P/N 2122396, located at the bottom left of the mechanical frame. The bracket, P/N 2122352, extends down from the frame and is removed for shipping but left secured to the cable. The mounting screws are left in the holes in the bottom of the frame.
- D. Figures 3-7, 3-8, and 3-9 show the plugging locations for the interframe cables.



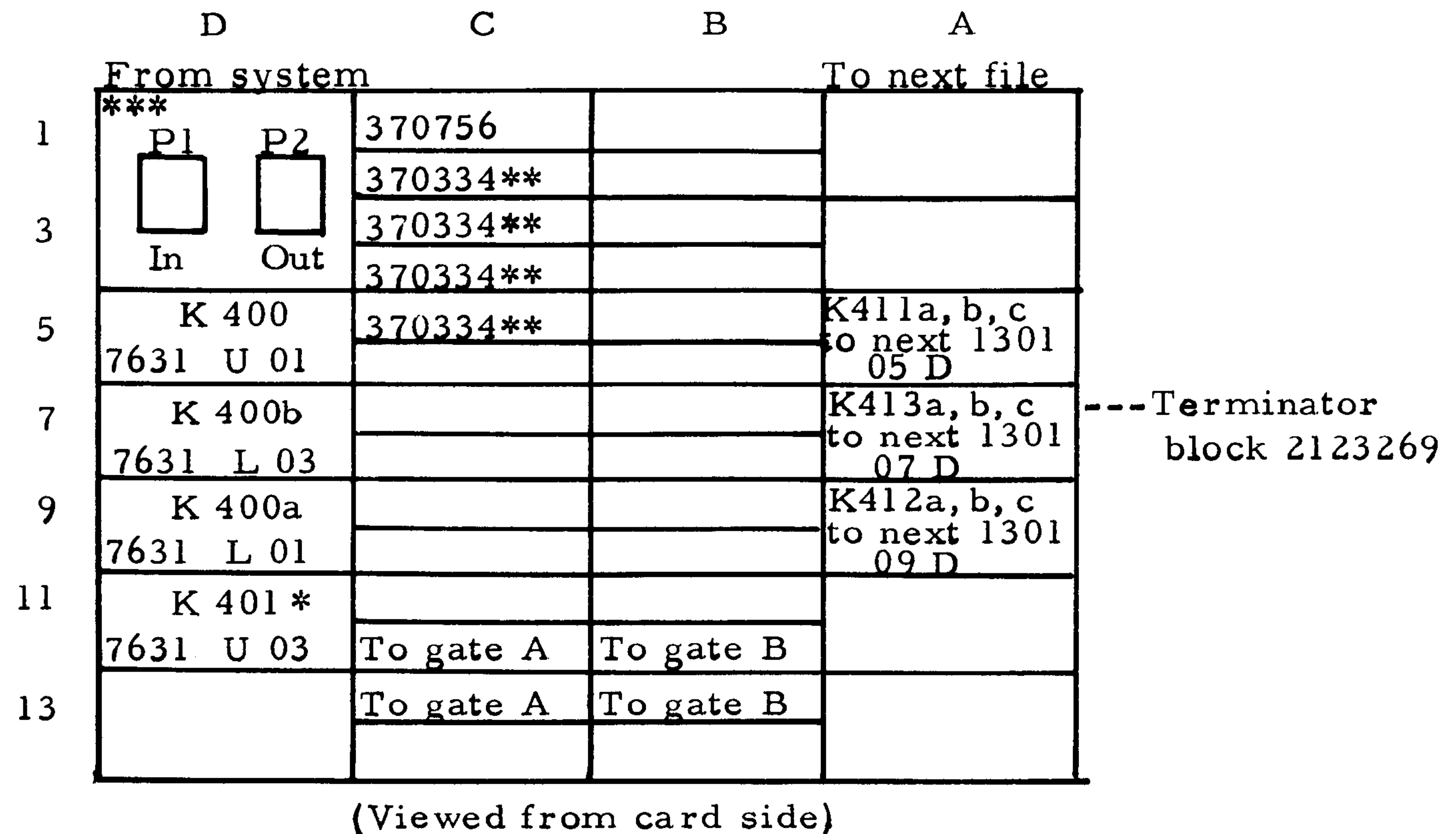
TABLE 3-3 1301 INTERFRAME CABLE CONNECTIONS

CONNECTOR NUMBER	FROM FRAME	TO FRAME	CABLE NUMBER	REMARKS
S 302	Mech.	Electronic	2123481	For power supply blower. Bottom of Elect. Frame.
S 303	Mech.	Elect.	2122273 2122650	For gate A blower. For gate A & B blowers.
E 01, 02, 03	Mech.	Elect. gate A-5	2123297	Paddle Connector.
A 02	Mech.	Elect. gate A-5	2122267	Paddle Connector. Format Sw.
A 01 B 01, 02	Mech.	Elect. gate A-5	2122222	Paddle Connector.
E 01, 02, 03	Mech.	Elect. gate A-3	2123298	Paddle Connector.
A 02	Mech.	Elect. gate A-3	2122037	Paddle Connector. Format Sw.
A 01 B 01, 02	Mech.	Elect. gate A-3	2122008	Paddle Conn.
H 03 H 04 H 06 H 07	Elect. Elect. Elect. Elect.	Mech. Mech. Mech. Mech.	2122007 (2122828)	Connections for Module 0 are shown here. Module 1 connections are: H 13, H 14, H 16, H 17. Plastic covers may have to be removed from H03, H13. Secure these cables with clamps already in place. Replace covers.
G 01 G 02	Elect. Elect.	Mech. Mech.	2122006 2122006	To Clock head, 5 pin conn. To Clock head, 7 pin conn.
S 08, 09	Mech.	Elect.	2122268	Route between 48V and sms power supplies.
S 301	Mech.	Elect.	2122269	From contactors to top of power supply.
Ground strap	Mech.	Elect.	2101376	Between bottoms of two frames.
Gnd. lead, Blk.	Elect.	Mech.	--	Single tie-out, to be affixed to file casting.

\*

\* Not on ser. #500 and above.





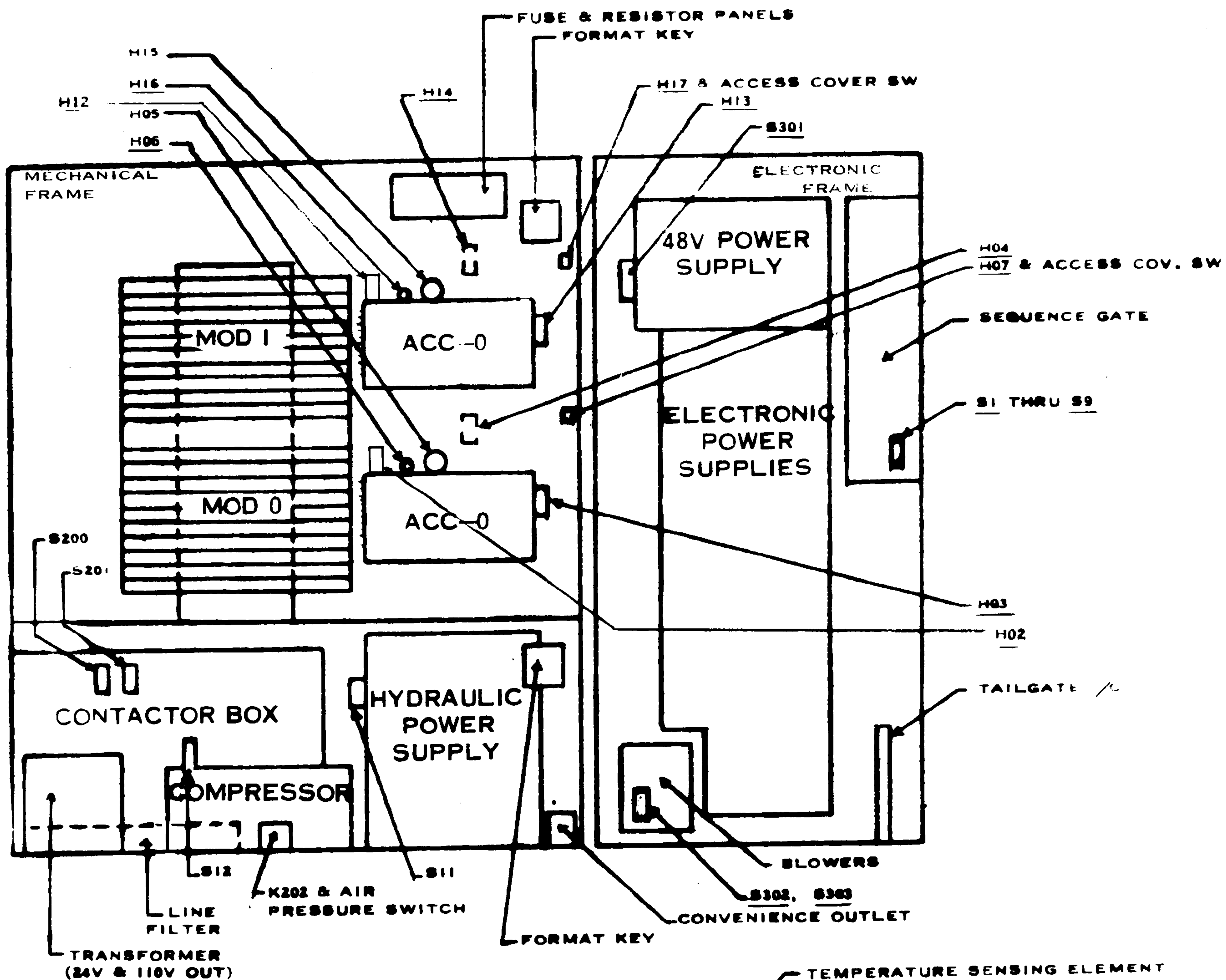
\*K401 is for the first 1301. K401a, b, or c, are plugged into the same connector (11 D), on 2nd, 3rd, 4th, and 5th 1301, but come from 7631--L05, U05, L07, U07, respectively.

\*\*These are TCK terminator cards. Three are sent in the 7631 Shipping Group; they are used only in the last file in line. In addition, each 1301 shipped from San Jose will have a card in position 5C; this card must remain in place on all 1301's.

\*\*\*K419, used with 7631, Serial No. 12000 and above.

FIGURE 3-6 1301 TAILGATE CABLING

3 CABLING



PLUGS THAT ARE IDENTICAL BUT ARE SHOWN ONLY ON LOGIC WITH THE  $M_0 A_0$  DESIGNATION CONVERSION MUST BE MADE WHEN WORKING ON SECOND ACCESS.

$M_0 A_0$	$M_1 A_0$
G03	G13
H02	H12
H03	H13
H04	H14
H05	H15
H06	H16
H07	H17

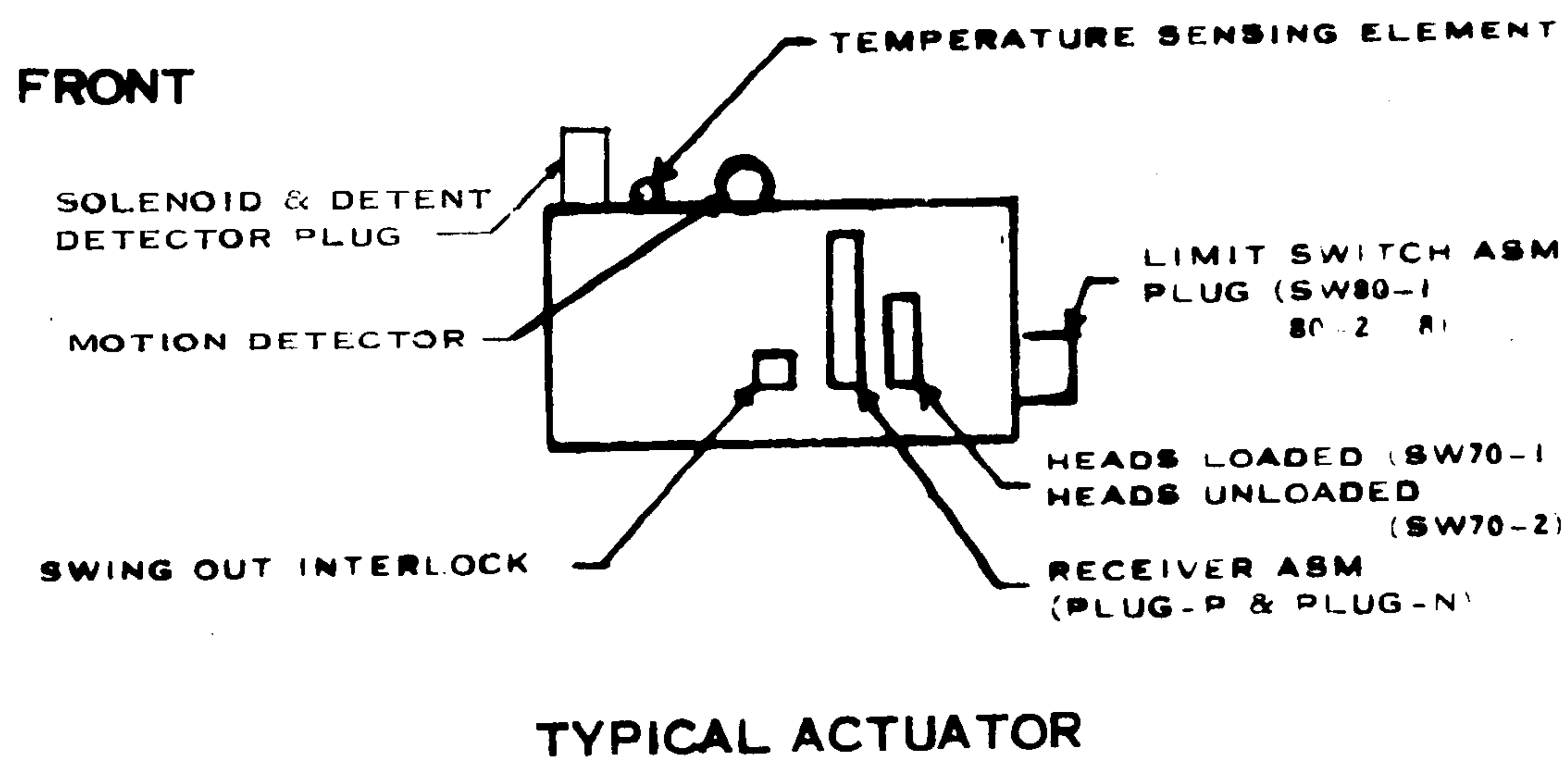


FIGURE 3-7 1301 COMPONENT LOCATIONS (FRONT)

3 CABLING

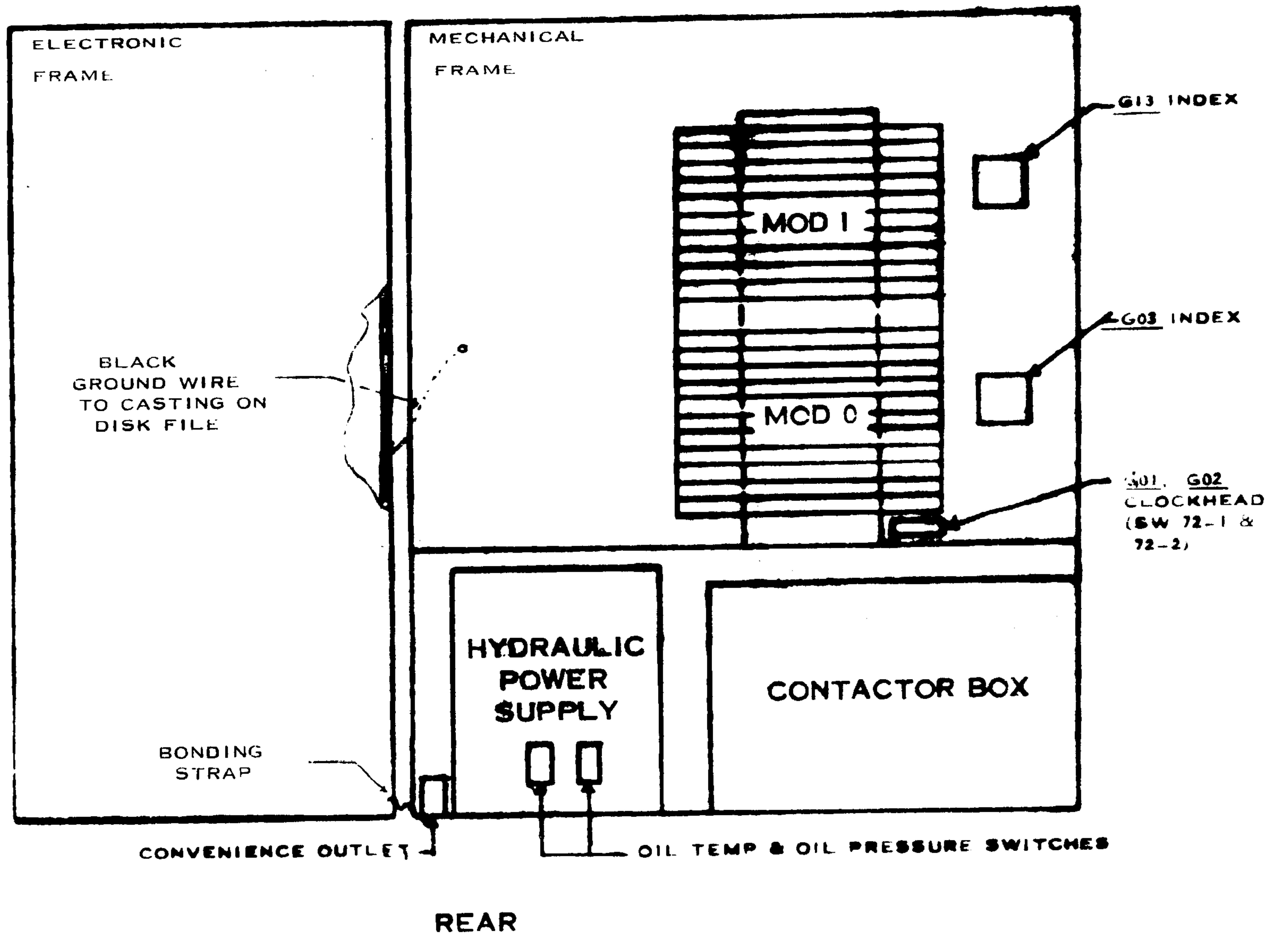


FIGURE 3-8 COMPONENT LOCATIONS



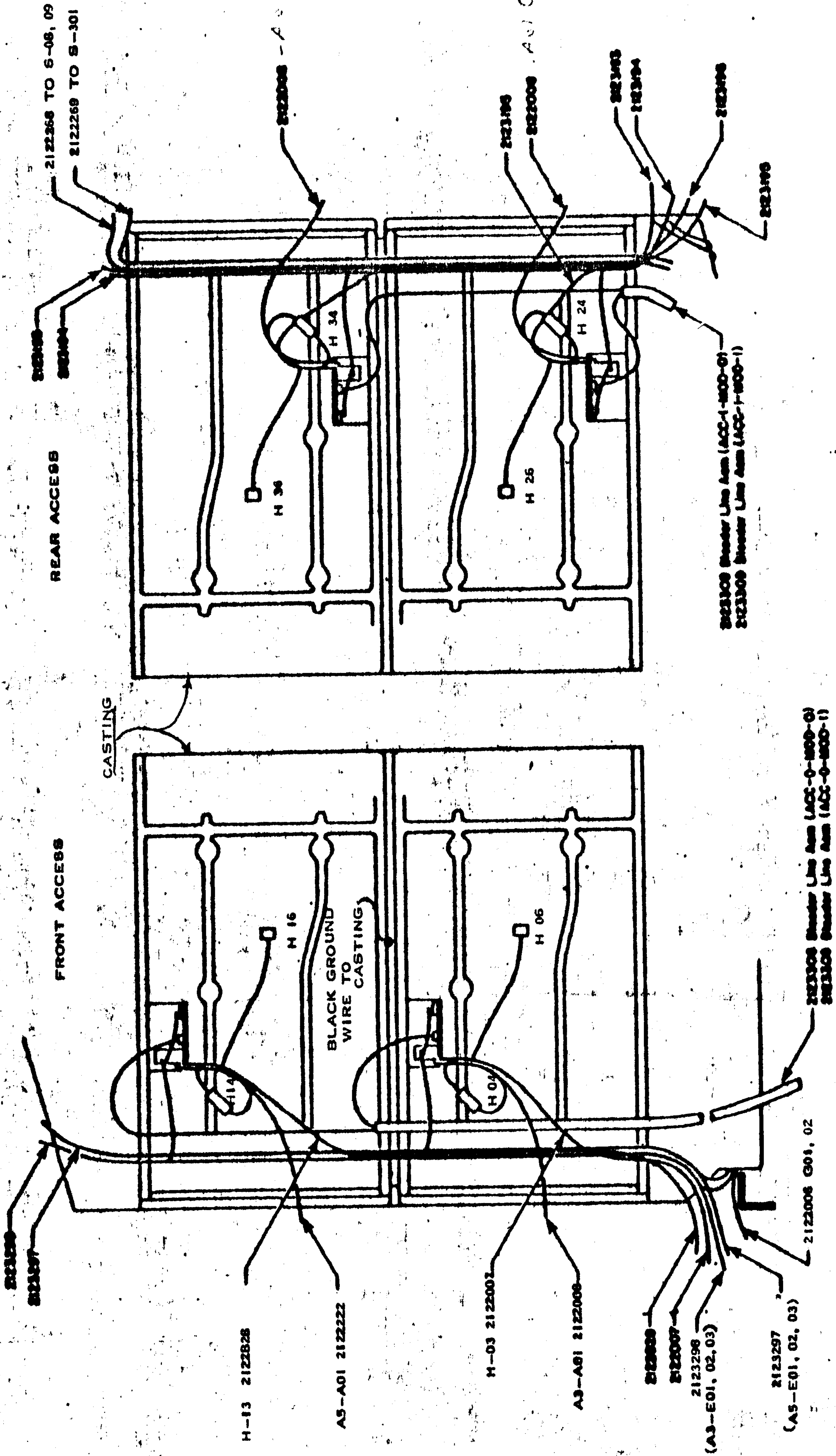


FIGURE 3-9 1301 PLUGGING LOCATIONS MECH. FRAME RIGHT SIDE

## CHAPTER 4 CHECK LIST

4	TESTING	Page	
	1. Preliminary Instructions-1301	4-1	
	1.1 Factory-Written Format Track	4-1	<input type="checkbox"/>
	1.2 Power On Preparation	4-3	<input type="checkbox"/>
	1.3 Five Minute Purge	4-4	<input type="checkbox"/>
	2. Mechanical Preparation-1301	4-4	
	2.1 Receiver Swing-Out	4-4	<input type="checkbox"/>
	2.2 Disk Cleaning	4-5	<input type="checkbox"/>
	2.3 Drawer Installation and Head Cleaning	4-6	<input type="checkbox"/>
	2.4 Receiver Swing-In	4-7	<input type="checkbox"/>
	3. Unit Testing	4-7	
	3.1 Power-On-7631	4-7	<input type="checkbox"/>
	3.2 Power-On-1301	4-8	<input type="checkbox"/>
	3.3 Voltage Checks	4-10	<input type="checkbox"/>
	3.4 Bias Checks	4-12	<input type="checkbox"/>
	4. Diagnostic Testing	4-12	<input type="checkbox"/>



## 1. PRELIMINARY INSTRUCTIONS 1301

Prior to any mechanical preparation (disk and head cleaning, drawer installation and adjustment, perform a five-minute purge to insure removal of airborne foreign particles from the disk array chamber. The purge can be done by powering the 1301 independently.

1.1 Power-On Preparation

## DANGER

Check phasing before power-on. (See Chapter 1.) Also make sure that the ground connection between 7631/1301/7320 is common and electromechanically stable.

To bring up power on the 1301, without power up on the 7631 (all cables connected on both units, 7631 connected to customer power), temporarily jumper EPO plugs C1 and C2 on the 7631 using the EPO cable. If only one I/O Channel on the 7631 is being used, (EPO cable plugged into C1) it will also be necessary to have a terminating jumper plug P/N 553298 installed in Emergency Off plug C2. Installation of this jumper will complete the Emergency Off circuit enabling power to be brought up on the 1301.

## 1.2 Five Minute Purge

- A. Assure that the power cable is connected to customer's 208 volts receptacle. If not, set CB1 and CB2 to OFF and connect power.
- B. Set CB1 and CB2 to ON.
- C. Set Auto Control switch to LOCAL.  
Set Sequence Control to MANUAL.
- D. Depress Auto Start switch.



1.2 Five Minute Purge (continued)

- E. Depress Disk Drive On switch. Disk Drive On indicator will light and disks will be running in a counter-clockwise direction, in accordance with directional arrow on machine.

WARNING

Clock-wise rotation will result in having no hydraulic pressure. Manual loading of heads may result in damage to disks.

- F. Remove paper cover over access aperture.
- G. With covers on, allow to run for five minutes, then proceed to next step.
- H. Depress Disk Drive Off switch.
- I. Depress Auto Stop switch.
- J. Set CB1 and CB2 to OFF.

2. MECHANICAL PREPARATION 1301

This section contains the procedures relevant to the mechanical preparation of drawer assemblies, disk and head cleaning, and receiver operation. A more detailed description with photographs can be found in the IBM 1301 C. E. Reference Manual (Form #227-5581-2).

WARNING

Use extreme care in the handling of the receiver, drawer assemblies and heads during the mechanical preparation of the disk storage. They are easily damaged. Also dust and debris in the machine and its environment can damage the disks.

2.1 Receiver Swing Out

- A. Remove module receiver shields.

## 2.1 Receiver Swing Out (continued)

- B. Push carriage to outer track limit stop and retract upper and lower locking pins.
- C. Move linkage release lever to unlocked position toward receiver hinge shaft. Move rail linkage so that it clears roller on rack assembly.
- D. Carefully swing out receiver.
- E. Use the stabilizing arm provided in the 1301 Shipping Group to hold the receiver in the swung-out position. Place the stud end of the arm into the actuator diamond-pin hole. The hole on the other end of the arm engages the receiver diamond-pin.
- F. Check locknuts on yoke and tie rods for security. Check motion transducer, with a non-magnetic feeler gauge, for a clearance of  $.006 \pm .002$ ". Check inner, center and outer positions.
- G. Check carriage-ways and actuator housings for proper lubrication.
- H. Check to insure that all E rings are in place.

## 2.2 Disk Cleaning

- A. With disk cleaning paddle, Part No. 2108474 wrapped in lint-free tissue and moistened with isopropyl alcohol, place paddle (through access aperture in plastic shield) between disks, and rotate array manually; work from the top down.
- B. Replace tissue on paddle as oxide pickup shows on tissue.

2.2 Disk Cleaning (continued)

- C. Replace paper covering over access aperture until heads are ready for installation.

2.3 Drawer Installation and Head Cleaning

NOTE:

Do not discard data drawer shipping containers.  
You will need them to store spare drawers.

- A. Inspect drawer assemblies for proper engagement of torsion spring fingers with arms. Head signal cable should not interfere with gimbals action of head.
- B. Take pitch and roll torque measurements of each head. The CE Reference Manual describes this procedure in detail. CEM Service Aid No. 13 contains the latest torque specifications and supplements information in the CE Manual concerning pitch and roll torque measurements.
- C. Clean head assemblies with lint-free tissue moistened with isopropyl alcohol. Clean and lubricate paddle connectors,
- D. Insert drawer assemblies and drawer retaining pins, in accordance with instructions in the CE Reference Manual. Also make sure that dummy drawers, P/N 2123341\*, are installed in position for alternate surface 3, 4, 5, 6 if there are no flagged tracks.

NOTE

Avoid embarrassment, do not interpose Format and Data drawers.

\* New model dummy drawers will have P/N 2155989



2.4 Receiver Swing-In

- A. Raise the diamond pin and swing the receiver. Insure that the nylon roller is engaged in the channel and that the locking lever is forward.
- B. Secure diamond pins while pressing in on front of receiver. Do not apply pressure to drawer assemblies.
- C. Insure that clock head is in an unload position.
- D. Load heads manually. Then unload heads and manually rotate disk array while checking for an even amount of clearance between disks and drawer assemblies. Be sure heads are not cocked.
- E. Return carriage to outer track limit stop. Install module receiver shields. Carefully push carriage to inner CE track.

3. UNIT TESTING

3.1 Power on 7631

- A. Assure that power cables for both the 1301 and 7631, are connected to customer's 208 volt receptacle.
- B. On the 1301:
  - 1. Set CB1 and CB2 ON.
  - 2. Set Auto Control switch to LOCAL.
  - 3. Set Sequence Control to MANUAL.

3.1 Power on 7631 (continued)

C. On the 7631:

1. Set CB1 to ON.
2. Depress Power On switch. Power On and DC On indicators will light.
3. After DC On indicator lights, the 7631 will receive an automatic reset and the following indicators will light:

Availability 1 and Availability 2\*

Digit Ring On

5 + 6 and

Bit Rings BS + O and B7 + 8

3.2 Power On 1301

With the 7631 powered, perform the following operations on the 1301:

- A. Depress Auto Start switch. The following indicators will light:
  1. Remote Stop
  2. Air Press Normal
  3. Heads Unloaded
- B. Depress Disk Drive On switch. The following indicators will light:
  1. Timer
  2. Disk Drive

\* On mod III, IV and V only.

3.2 Power On 1301 (continued)

C. Depress the following switches. Their respective indicators will light:

1. Elec DC On
2. Sol DC On
3. Oil Pump

D. At this point, allow to purge for one hour. During this time, all voltage, oil pressure and temperature checks can be performed.

WARNING

Inspect fittings for oil leakage.

(Sect. 3.3 and 3.4). Upon completion of the purge, proceed:

E. Depress Head Load switch. The following will occur:

1. Heads Unloaded indicator will go off.
2. Access Retracted indicator will light. (This indicator will be lit only as long as Head Load switch is depressed).

F. Depress HL Check switch. Observe the following indicators:

1. Heads Loaded
2. File Ready

G. Set Auto Control switch to REMOTE and Sequence Control to AUTO.

WARNING

The unit should be left in "AUTO" when unattended so that a partial machine failure will cause the machine to turn off.



## 3.2 Power on 1301 (continued)

- H. At this point, allow unit to run for 30 minutes with heads loaded. Any off-line file operations may be performed during this time. Upon completion, continue:
- I. Depress Power Off switch on the 7631. Indicators on both units should go off. Check to be sure all heads unload.
- J. Check and record the coast-down time against that measured at the factory. That information is noted on a sticker located on the CE panel door, behind the right-side cover of the electronic module.
- K. Clean the heads and array. Check for oxide build-up. Perform another purge for 30 minutes with heads unloaded. Upon completion of this, continue sequencing file completely.
- L. Prior to systems testing, check that EPO cables and connectors are in place. Refer to Chapter 3, Section 3 for cabling information.

## 3.3 Voltage Checks

- A. 7631. Check all back Panel DC voltages measured at the laminar bus. The voltages should be within - 2% of the given value.
- B. 1301. (Continued on next page).

3.3 Voltage Checks (continued)

B. 1301. Check voltages measured at the laminar bus for a tolerance of  $\pm 2\%$  of the values. Table 4-1 gives the voltage requirements.

TABLE 4-1 1301 VOLTAGE CHECKS

Terminal	Color	Voltage	Remarks
1	Black	GND	
2	Blue	-6	
3	Orange	+6	
4	Black	GND	
5	Violet	-12	
6	Black	GND	
7	White	+12M	
8	Brown	-36	
9	Gray	+12	
10	Pink	+30	

3.4 Bias Checks

- A. 7631. Plug Bias Box (P/N 210860) into AC outlet and insert jack into the +12M receptacle. The receptacle is located below the power supply C.B. Check the +12M volts on the SMS panel for a maximum variation of  $\pm 1.5$  volts.
- B. 1301. The +12M receptacle is located above the power supply blower. Check the +12M volts on the SMS panel for a maximum variation of  $\pm 3$  volts.
- C. Check Read and Format amplifiers in 1301. Adjust only if necessary, referring to read amplifier adjustment procedure, page 2-44 of the CE Reference Manual, Form 227-5581.

## NOTE

Clock head signal amplitude must be checked before proceeding with diagnostic testing. Refer to instructions in the CE Reference Manual.

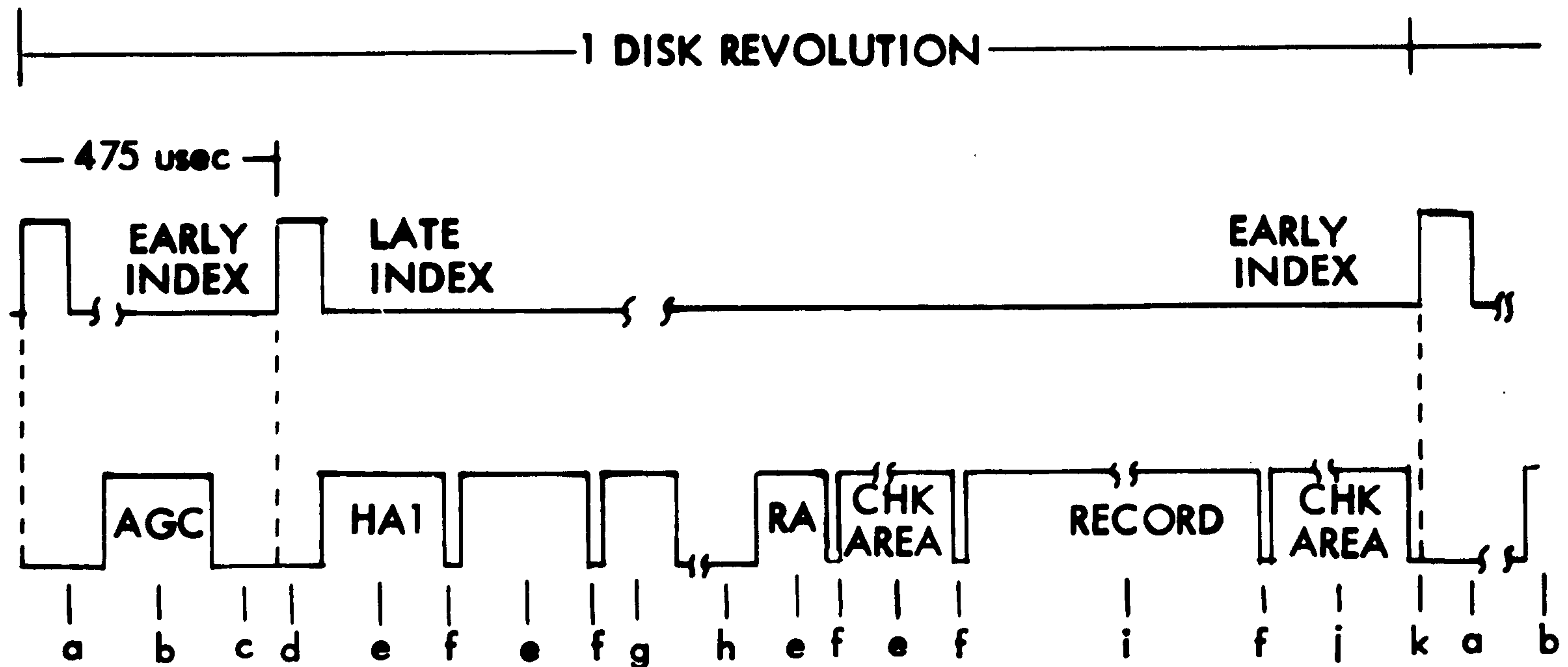
## 4. DIAGNOSTIC TESTING

Refer to the respective control unit CE Installation Manual (7907, 7908, 7909), or the 1410 system CEIM for diagnostic programs to be run.

4.1 Factory-Written Format Track

All 1301's shipped after September 1, 1963 have a format track written on cylinder 222. This format track (see Figure 4-1), permits testing from the 7631 CE panel during the installation of the 1301, reducing the system hours required for preliminary testing.





Note: 2288 characters are written in an 8-bit mode (9 bits per character), 1.6 microseconds per bit. This includes "no bit" characters.

Code: a - 300 microseconds from early index to AGC burst.  
 b - 100 microseconds AGC burst  
 c - 75 microseconds  $\pm$  15 microseconds  
 d - 27 "no bits"  
 e - 90 bits (character 1 through 10, 12-21, 41-50 and 52-61)  
 f - 9 "no bits" (character 11, 22, 51, 62 and 2203)  
 g - 54 bits (character 23 through 28)  
 h - 108 "no bits" (character 29 through 40)  
 i - 19, 260 bits (character 63 through 2202)  
 j - 765 bits (character 2204 through 2288)  
 k - approximately 10 microseconds (disk speed and early index to late index relationship will affect this timing)

FIGURE 4-1 CYLINDER 222 FORMAT TRACK PATTERN

## 4.1.1 Writing Addresses at Location 8888

Use the following procedure, from the CE panel, to write HA1, HA2, RA and record at location 8888. RUN THE FOLLOWING IN 8-BIT MODE:

- A. Jumper the following positions on the 7631:  
  
From 01B1E03D to 01B1E03J for 11000 Series Serial Numbers  
From 01B1A10D to 01B1A10J for 12000 Series Serial Numbers
- B. Seek to address 8888.
- C. Turn on "CE" HAO and customer HAO switches.
- D. Perform a write HAO with the "4" bit switch On.
- E. Turn off "CE" HAO switch.
- F. Perform a write HAO with the "2, 3, and 5" bit switches On.
- G. Turn off customer HAO switch.
- H. Load address of 8888DD and perform a write TRO with the "6" bit switch On.
- J. Address 8888 now has an HA1 containing 8's, an HA2 containing D's and a record address containing 2's. All 7631 read and write operations can now be tested, using address 8888. e. g., An SRO operation may be performed using a record address of all 2's.
- K. REMOVE JUMPER THAT WAS INSTALLED IN STEP "A".

## NOTE

This procedure will allow only the use of head 8 on cylinder 222. Using any other address results in an error because of the absence of HA1's and HA2's. Refer to disk storage devices CEM Service Aid #7 for detailed operating instructions of the 7631 CE panel.

APPENDIX I  
IBM 7320 DRUM STORAGE UNIT

APPENDIX I CHECK LIST

1	INTRODUCTION	AI-1	
2	GENERAL INFORMATION	AI-1	
3.	SAFETY	AI-3	
4	UNPACKING	AI-6	<input type="checkbox"/>
5	MECHANICAL PREPARATION		
	5.1 Mechanical Inspection	AI-7	<input type="checkbox"/>
	5.2 Cabling	AI-8	<input type="checkbox"/>
	5.3 Power-On Checks	AI-10	<input type="checkbox"/>
	5.4 Cleaning Drum Surface	AI-14	<input type="checkbox"/>
	5.5 Dynamic Check of Components	AI-16	<input type="checkbox"/>
	5.5.1 Local Status	AI-16	<input type="checkbox"/>
	5.5.2 Remote Status	AI-17	<input type="checkbox"/>
	5.6 Replace Covers	AI-18	<input type="checkbox"/>
6	PRELIMINARY TESTS		
	6.1 Attachment feature, Single-Shot Timing	AI-19	<input type="checkbox"/>
	6.2 Format and Delay-Line Adjustment	AI-21	<input type="checkbox"/>
	6.3 Command Channel Test	AI-22	<input type="checkbox"/>
	6.4 Format Write Switch	AI-23	<input type="checkbox"/>

(continued)



APPENDIX I  
IBM 7320 DRUM STORAGE UNIT

APPENDIX I CHECK LIST (continued)

7 DIAGNOSTIC TESTING

7.1 Format, Home Address, and Surface

Analysis Test

AI-23

7.2 Vibration Test

AI-24

7.3 Bias Test

AI-24

7.4 Reliability Test

AI-25

APPENDIX I  
IBM 7320 DRUM STORAGE UNIT

1. INTRODUCTION

This section provides instructions for installing an IBM 7320 Drum Storage Unit with a 7090/94 data processing system.

The 7320 feature communicates with the system through a 7631 Mod. 2 serial no. 12000 and above, with a Drum Storage Adapter (#3451). See Figure AI-1.

2. GENERAL INFORMATION

The 7320 is easy to install and operate; however, great stress is placed on the need for operating the drum in a dust-free environment. If construction work is being done near where the unit is to be tested, e. g., floor sanding, paint spraying, or any condition which exists that could contaminate the upper enclosure, do not unpack the unit.

Additional information about the 7320 will be found in:

CE Reference Manual	G22-6717
Physical Planning Bulletin	J22-6727
System Diagrams	5247320
7320 Drum Storage Bulletin and Newsletter	A22-6747 N22-0089

APPENDIX I  
 IBM 7320 DRUM STORAGE UNIT

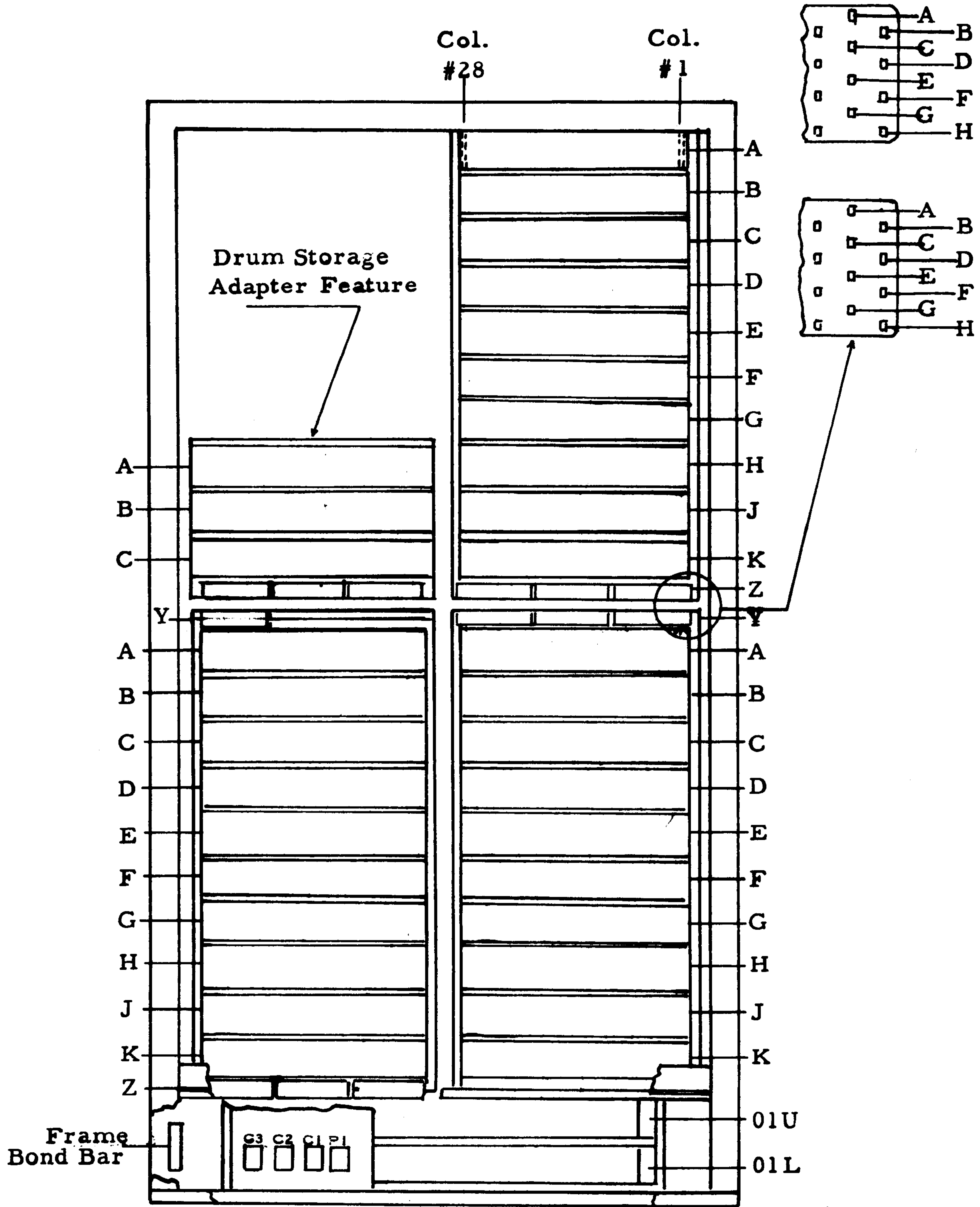


FIGURE AI-1 COMPONENT LOCATION--7631 WITH DSU ADAPTER  
 (FRONT)



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3. SAFETY

Be careful when working around moving parts of the machine, specifically at the drum assembly. The safety cover, located on top of the drum assembly, must not be removed or installed unless the drum rotor has come to a complete stop. If service or maintenance is necessary in this area, turn drum motor circuit breaker (CB 2) to Off and tag. See Figure AI-2.

Air pressure which is used to load the drum heads is stored in a pressure tank. There can be as much as 58 psig \* present, from the tank to the head air solenoid. Before servicing this area, slowly exhaust air out of tank by using petcock located at bottom of tank. See Figure AI-3.

Potential difference within the power gate can be as high as 253V AC. Potential difference within the logic gate can be 24V DC and as high as 290V AC in the gate blower area. Do not remove "High Voltage" or "Line Voltage Present With Machine Power Off" safety covers; or any other covers before determining what potentials exist and how they may be normally de-energized. If there is any doubt, remove AC line cord.

On Emergency Off, 24 volts AC can be present at I/O panel C04H and at K1-Y on the power gate )if the signal cables to the File Control Unit are plugged in) with line cord removed. Checking these points may be done only if absolutely necessary and with caution.

With Main Line switch (CB 1) off, 209V AC is still present at: input and output terminals of line filters; input terminals L1, L2, and L3 of CB 1.

With Local Power Off, 208V AC is still present at points mentioned

\* Psi--as indicated on gauge.

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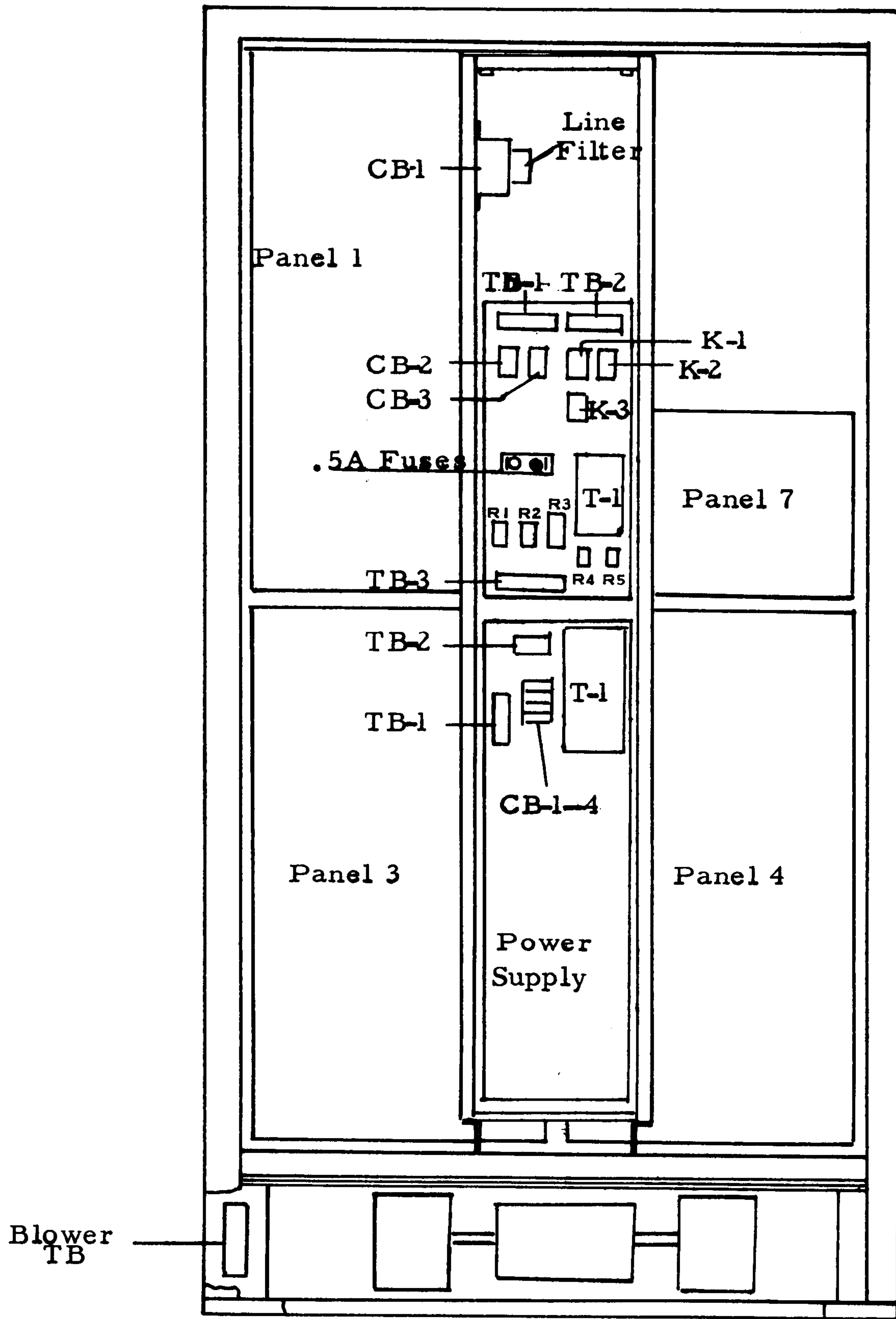


FIGURE AI-2 COMPONENT LOCATION--7631 WITH DSU ADAPTER  
 (REAR)

8/2/63

AI-4

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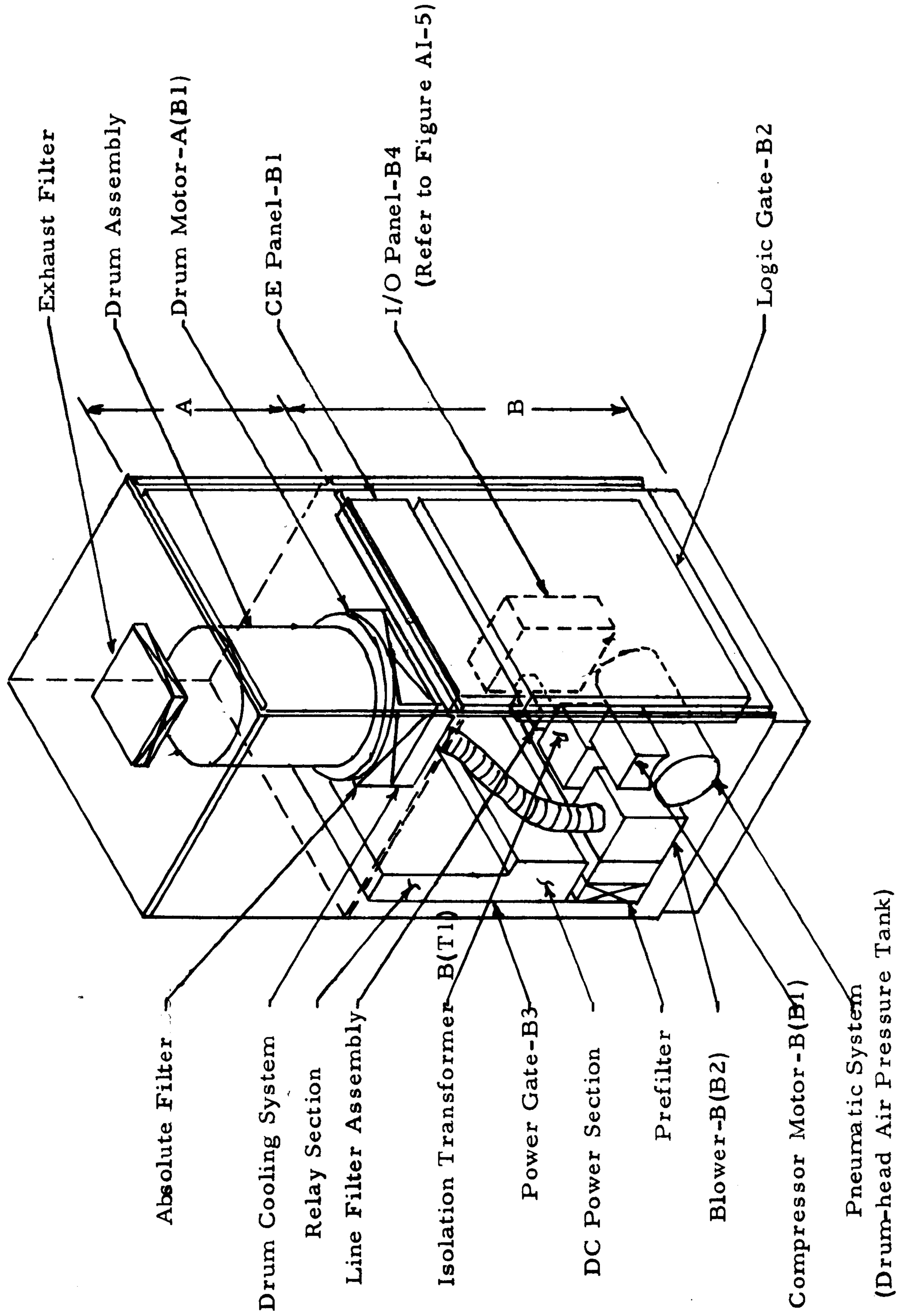


FIGURE AI-3 COMPONENT LOCATION-7320 DSU



3. SAFETY (continued)

above; output terminals of CB 1; input and output terminals of K1; input terminals of K4; input terminals of T1; terminals A and B of fuses F1 and F3.

110 V AC is present at: convenience outlet; output terminal 5 of T1; TB3-1; TB3-2; TB3-3; B(TB 1)1; terminals 1-a and 1-c of B1D19 and B1D24; terminals 3-b and 5-b of K4; terminals a and b of fuses F5 and F7.

24 V AC is present throughout the power gate and associated circuits.

A voltage which can be in excess of 300V RMS is present at TB 1 which has a safety warning tag on the protective cover.

4. UNPACKING

WARNING

Inspect protective plastic shipping cover on top of the unit for damage. If it is torn, perform step D of Section 5.3 in the proper sequence.

NORMAL PROCEDURE

1. Remove shipping tape and outer plastic cover.
2. Vacuum clean top of unit.
3. Do not open top enclosure doors until performing step D of Section 5.3.

CAUTION

Drum rotor is locked with shipping bolts. Do not remove these bolts until the proper time in the installation sequence, to prevent injury or damage to personnel or to the machine.

5. MECHANICAL PREPARATION

The upper enclosure of the drum unit cannot tolerate any dirt or moisture. Keep a clean environment at all times. Upper enclosure doors must be kept closed unless the drum blower is ON. With drum blower ON, doors can be opened (one at a time) for service only. A Drum Maintenance Blower switch is provided to allow the drum blower to operate with normal Local Power switch OFF. See component locations on Figures AI-1, AI-2, AI-3.

- A. Open lower doors and remove shipping pin on the latches of power gate and logic gate.
- B. Drop CE Panel by unlocking fasteners located at the top corners of the panel, with a screw driver.
- C. Reach inside through CE Panel opening and rotate the latch handle located at the upper corners of the side panel.
- D. Swing out power gate, again rotate the latch handles located at the top corners of the side panel while holding the panel to prevent it from falling.
- E. Remove side panels by lifting out and upward.

5.1 Mechanical Inspection

Visually inspect entire unit for loose components, wire and hardware.

- A. Vacuum clean lower interior.
- B. Check the prefilter and logic gate filter to insure they are intact.
- C. Check the absolute filter and assembly by exerting hand pressure to assembly. This must be tight; if loose, tighten the two nuts holding the plenum and filter assembly.

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5.1 Mechanical Inspection (continued)

- D. Check seal from prefilter chassis to drum blower.
- E. Check hose from blower to filter assembly for tight connection.

5.2 Cabling

- A. Remove the cable entrance plate at the bottom of the drum unit in front of the I/O panel.
- B. Remove the AC Line Cord from its shipping position and feed it down through the cable entrance.  
  
DO NOT PLUG INTO AC POWER AT THIS TIME.
- C. Remove the cable clamp bar from the I/O panel assembly, and install the following key-numbered cables, feeding them up through the entrance slot and around the clamp bar before plugging them in. Also, plug appropriate TCK terminator cards (PN 370334, in 7631 Shipping Group), into C05, 06, 07, 08. The YEQ card, PN 370756 comes plugged into C01. See figure AI-4.

<u>Key</u>	<u>From</u>	<u>To</u>
400	7631 U03	7320 D11
400a	7631 L01	7320 D13
400b	7631 L03	7320 D09
401	7631 U03	7320 D15
*419	7631 P1	7320 E02

\*Power cannot come on 7320 unless this cable is in place. Refer to Table 3-2 and Figure 3-5 for additional cable information.  
  
Replace the clamp bar and bottom plate. Tighten the bottom



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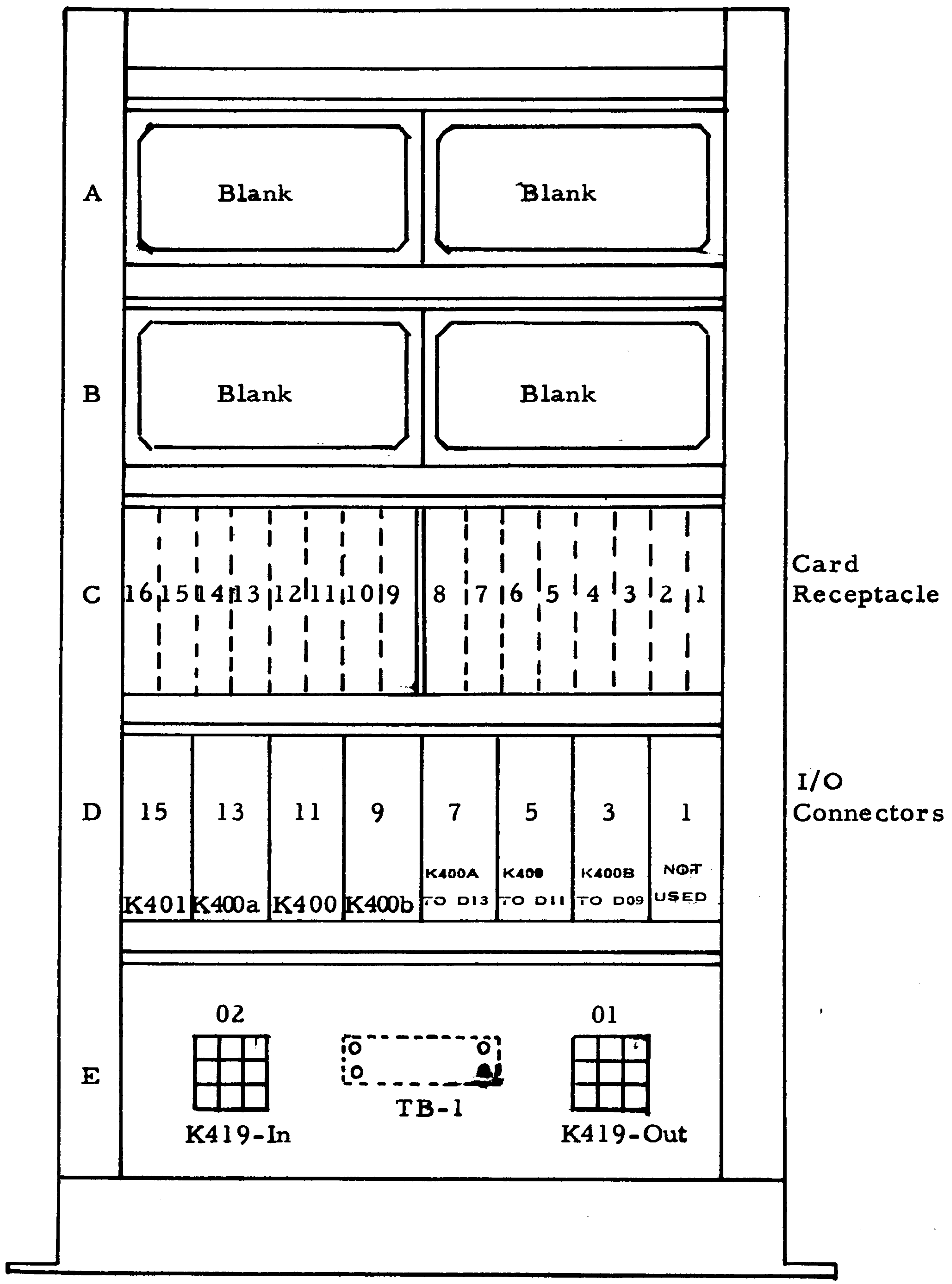


FIGURE AI-4 COMPONENT LOCATION-7320 I/O CONNECTORS

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5.2 Cabling

C. (continued)

plate as much as possible, making sure that the line cord does not make contact with the signal cable.

5.3 Power-On Checks

CAUTION

When installing a 7320 in-line with 1301's temporarily disconnect cable K401 from U03 on 7631 until assured that only the DSU is being selected as required. This will prevent inadvertent writing on disk.

- A. Set switches on the service panel to the Off position, set Local/Remote switch to Local position.
- B. Turn DC Brake switch and circuit breakers CB 1 and CB 2, located on power gate panel to Off.
- C. On the 7631, turn CB 1 and CB 2 to OFF.
- D. Open one upper enclosure door and remove masking tape from bottom of plastic cover. Close door.

NOTE

If outer cover was damaged as noted in Section 3, remove exhaust filter assembly and thoroughly vacuum clean housing and filter prior to removing tape from plastic cover.

- E. Connect line cord to 208 3Ø AC and close main line circuit breakers CB 1 and CB 2.
- F. Connect the 7631 power line cord to 208 volt. 60 cycle, single phase, and turn CB 1 and CB 2 to ON.
- G. Turn Drum Blower and Drum Maintenance Blower switches ON. The "Voltage Present Indicator" should be ON. "Drum Blower" indicator should be ON.

NOTE

If any malfunctions occur, refer to index of reference manual for information regarding type of failure. With drum blower ON, open one door of the upper enclosure and remove plastic cover.

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5.3 Power-On Checks (continued)

- H. Remove safety cover from upper drum assembly by removing one screw from middle of cover. Place cover on top of drum unit.

CAUTION

Do not drop or leave anything in rotor. Do not jostle the rotor in a vertical direction. This movement may damage index slugs, and require installation of a new rotor.

Remove the two tagged rotor locks by first loosening and removing the inner bolts. Then unscrew and remove the two large bolts. Inspect top of drum for contamination and vacuum-clean if required. Reach through top end-bell and slowly rotate drum rotor several revolutions to insure it is free of any obstruction. Replace safety cover and secure.

- J. Vacuum-clean interior of upper enclosure, then close door.
- K. Insure that Drum Motor switch (CB 2) and DC Brake switch (S3) are OFF.

WARNING

Drum must rotate in a clockwise direction when viewed from the top or severe damage to drum recording surface and heads will occur.

- L. Check for proper drum rotation as follows: Turn Head Air switch Off. Open upper enclosure door and observe rotor surface through slot S. (Refer to Figure AI-5). While observing drum surface, switch CB 2 On momentarily and Off. THIS IS THE ONLY POSITIVE CHECK OF ROTATION. A supplementary method of checking rotation is to scope the Early and Late indexes (A33H and A32H respectively) at the transducer output as follows:



5.3 Power-On Checks

L. (continued)

1. Set up scope to sync on the Early Index.
2. Set the Local-Remote switch to Local.
3. Set all other switches in the rear of the 7320 to On.
4. Switch CB 2 momentarily On and Off and observe at least one cycle on the scope.

CAUTION

Do not use the supplementary (scope) check exclusively, during installation. Obviously, a wiring or phasing error can result in a misleading interpretation of the signal observed. Early Index must occur before Late Index. If Late Index occurs first, drum is rotating backwards. Check power phasing.

5. When assured of clockwise rotation, close door, turn Local File Switch to Off and leave CB 2 On.
- M. Allow the drum to run without heads loaded while adjusting all power supplies to their prescribed voltages. All measurements are taken using B2Z46-1 as a DC ground reference point. Refer to 7320 logic page 02.05.40.0 and 02.01.50.1.
1. Place drum in Local status.
  2. Turn On: local power, local file, and local DC switches.
  3. Measure the service voltages between the points indicated in Table AI-1 and the J pin on the same card. (For -10.4v, measure between the two points indicated).

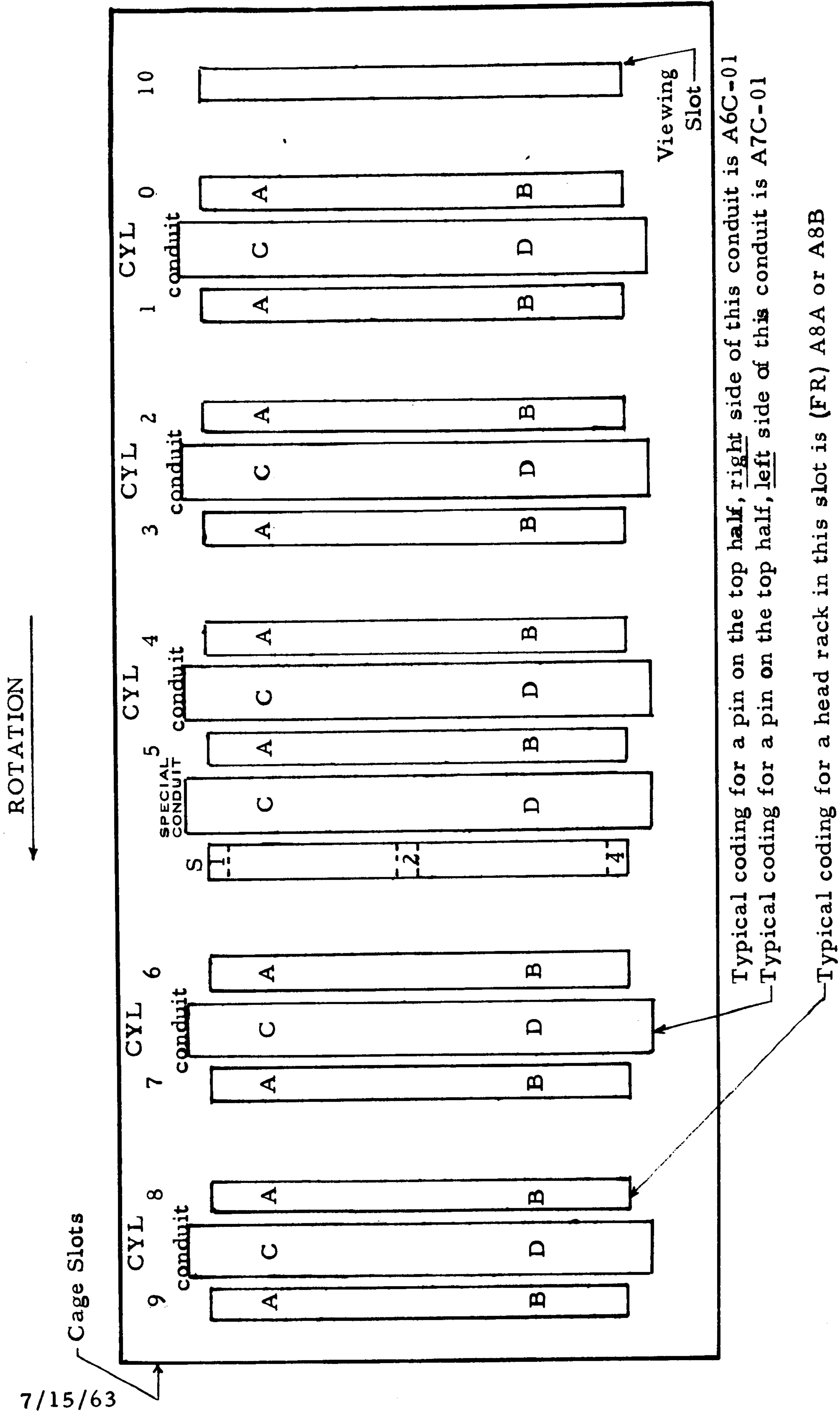


FIGURE AI-5 DRUM CAGE AND CONDUIT LOCATION  
 (Detail of Figure AI-3)

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5.3 Power-On Checks (continued)

TABLE AI-1 SUPPLY POWER VOLTAGES

-6V $\pm$ .24 (Blue)	-----	B2C21K
+6V $\pm$ .24 (Orange)	-----	B2C17L
-12V (A) $\pm$ .48 (Violet)	-----	B2C21M
-12V (8) $\pm$ .48 (Violet)	-----	B2D21M
+12V $\pm$ .48 (Gray)	-----	B2C21N
-10.4V $\pm$ .40	-----	B2A12M Ground @ B2A13J

4. If a power supply requires adjustment refer to the procedures in the CE Instruction and Reference Manual.

5.4 Cleaning Drum Surface

- A. Remove viewing window from slot 10.

WARNING

When removing or inserting drum head racks, single heads and/or plastic windows, drum rotor must be completely stopped. Remove screws with 3/32 Allen wrench. Hold window with one hand, so that the window cannot twist and fall into slot. Any contact with the drum surface can result in damage. The same applies in handling tools that are used inside the enclosure.

- B. With Head Air Off, turn Local File switch On for 15 seconds, then Off, letting drum coast for 60 seconds. Turn Local File On for 15-20 sec. Use lint free paper (Kingston Raw Material code 72-0-504-047), rubber block (P/N 5246316), and Freon\* (these items are part of shipping group), in the following manner:

\* TM - E. I. DuPont Corporation.



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5.4 Cleaning Drum Surface (continued)

Fold paper into a suitable size pad that can be wrapped around rubber block, and will cover the edge of the block that will be used against the drum surface. Rubber block must not touch rotor surface; paper area that will come in contact with rotor surface must not be wrinkled. Saturate paper with prescribed Freon (P/N 5246313); then, holding rubber block and paper firmly, insert in slot and exert a few pounds pressure on a portion of the drum surface, while the drum is coasting. Remove and reapply pad to all areas of the drum surface. DO NOT SLIDE PAD VERTICALLY ON DRUM SURFACE. Repeat cleaning procedure three times, using a new sheet of paper each time. Drum should be "restarted" during cleaning process to insure it is rotating during actual cleaning. Examine paper after third cleaning, if not clean repeat until paper is clean. After drum is clean, repeat process with drum operating at nearly full speed. Close upper enclosure door, leave drum running. Freon will evaporate rapidly; very little time should be taken from saturating paper to applying to surface. DO NOT SPILL FREON ON DRUM UNIT.

- C. Turn Local File switch Off, DC Brake On. When drum stops (approximately four minutes) reinstall slot 10 cover and turn DC Brake Off.

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5.5 Dynamic Check of Components

5.5.1 Local Status

- A. Turn on Gate and DC Blowers, then Local DC switch. DC indicator should be On. Using a DC voltmeter with a tolerance better than 1%, measure the DC supply voltages and adjust if necessary. See Section 5.3 M of Appendix.

NOTE

-6 and +6 indicators will glow less than the -12, +12 and -10.4 indicators.

- B. Switch Compressor to On. If compressor fails to start because of high tank pressure, bleed air by slowly opening petcock on tank until compressor starts, then close tightly. Observe Tank and Head Air Pressure gauge after compressor stops. Pressures indicated should coincide with pneumatic system specifications.
- C. PURGE DRUM BY ALLOWING IT TO RUN FOR 15 MINUTES  
Make sure that the Head Air switch is Off. Turn Local File switch On, allow drum to run for 15 minutes to purge. After purging, open upper door and observe the surface through slot 10 for any existing polish or scratch marks on the surface. While observing the surface, turn Head Air switch On. If any new marks appear, turn Head Air switch Off immediately, refer to CE Reference Manual for corrective action.

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5.5.1 Local Status (continued)

- D. Turn off all Track Address Register Head and Cylinder switches. Depress Head Deselect, and then Head Select. File Off-Line and Head Select should light. All head address and cylinder indicators should be Off.
- Check Track Address Register by manually selecting head and Cylinder. Depress Deselect, then Select when changing selection.
- E. Check Write Control by depressing Deselect, then Select push-buttons. Turn Write Control switch On. Write Gate indicator should go On. Turn Write Control Off.

5.5.2 Remote Status

- A. With power on at 7631, depress and hold Local/Remote Interlock. Switch File Statue to Remote, then release interlock, File Off-Line and Local indicator should be Off, Remote indicator should be On. Turn off Local Power, File and DC switches. Drum Operative indicator should stay On.
- B. Turn DC Off at 7631; Drum Operative and DC On indicators should go Off. Restore DC at 7631.
- C. Turn Power Off at 7631; all 7320 indicators should be Off except "Voltage Present".



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5.5.2 Remote Status (continued)

- D. Drop main line CB at 7631; (Emergency Off condition) no components in the 7320 unit should be operating and Voltage Present indicator is Off.

NOTE

Drum surface must be checked at least every hour until "Head Air On" time equals eight hours. The first few hours of operation after installation are the most critical in regard to head failure as a result of contamination. Refer to CE Manual for further maintenance instructions on surface check.

5.6 Replace Covers

- A. Insure unit is in desired physical location.
- B. Lock casters by tightening hex bolt on side of each wheel.
- C. Install kick plates, referring to instructions or drawings included in shipping group.
- D. Replace side panels, insuring locks are properly engaged.
- E. Close all hinged gates and covers.

6. PRELIMINARY TESTS

6.1 Attachment Feature Single Shot Timing

NOTE:

The setting of a gap sensor is to be measured from the fall of the last pulse of a series of pulses, at the input to the rise of the output of the gap sensor.

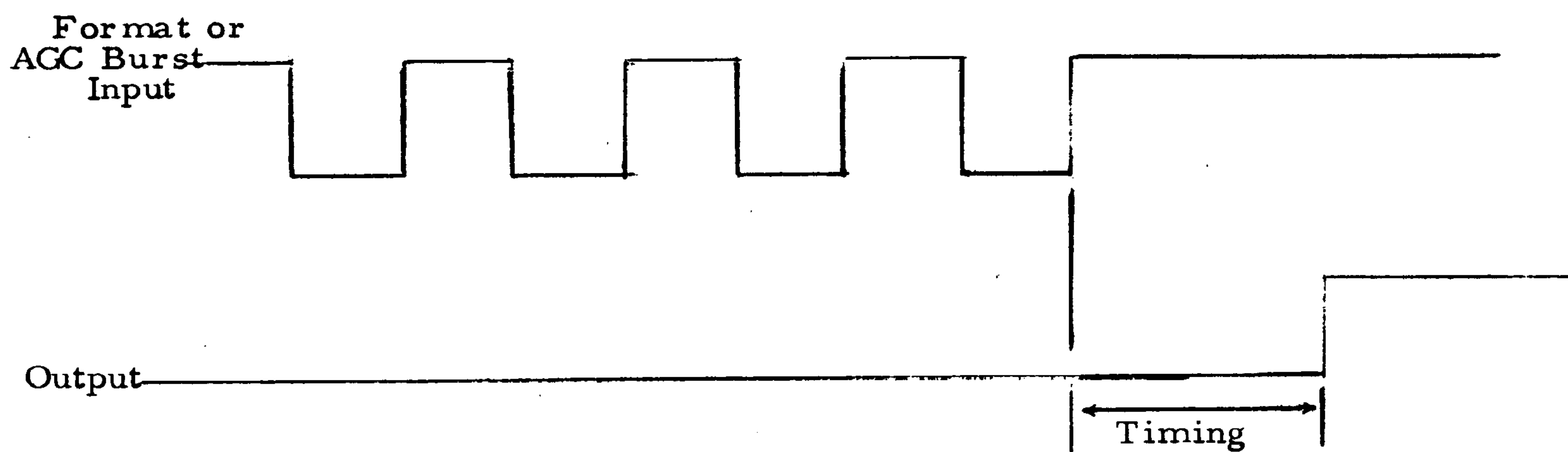


FIGURE AI-6 SINGLE SHOT TIMING

TABLE AI-2 SINGLE SHOT ADJUSTMENTS

Input = C		Output = H
S. S.	Location	Nominal Limits
Data Gap	B7-C8	3.0us $\pm$ 0.1 us
Long Gap	B7-C7	10.0us $\pm$ 0.2 us
Short Gap	B7-C6	3.8us $\pm$ 0.1 us

6.1 Attachment Feature Single Shot Timing (continued)

- A. Run in Format Write operation, using the appropriate diagnostic program; perform the format operation and loop on format write check while adjusting long and short gap single shots, refer to Figure AI-6 and Table AI-2. Sync scope on index holdover at B1-C17-B.
- B. Proceed with Format Write and loop on write check of HAO while adjusting data gap. Refer to Figure AI-6 and Table AI-2.

6.2 Format and Data Delay Line Adjustment

The following adjustment procedure should always be followed after:

Initial Installation

Any change in the cables between the 7631 and the 7320.

Any circuit changes, or logic card replacements that could affect delays in the read or write paths of the 7631 and 7320.

NOTE

Refer to logic pages 02.02.20.1 in the 7320 logics and 01.10.15.1 in the 7631 logics.

- A. Run in Format Write Program; perform the Format Write operation and loop on Format Write Check.
- B. Sync scope "+" on Early Index at 1D16C; observe output of Data Trigger A at 1G09F with probe A, and -Y Sample Data Trigger signal at 1G09E with probe B in the middle of a long burst of one bits. Both are negative going signals.
- C. Adjust the Format Data Delay Line on 7320 at B2 C24, C25 and C28 so the leading edge of the Data Trigger A signal



6.2 Format and Data Delay Line Adjustment

C. (continued)

(probe A) is  $450 \pm 30$  nanoseconds before the trailing edge of the -Y Sample Data Trigger signal (probe B). Use the 10% transition point as the time reference as shown in Figure AI-7.

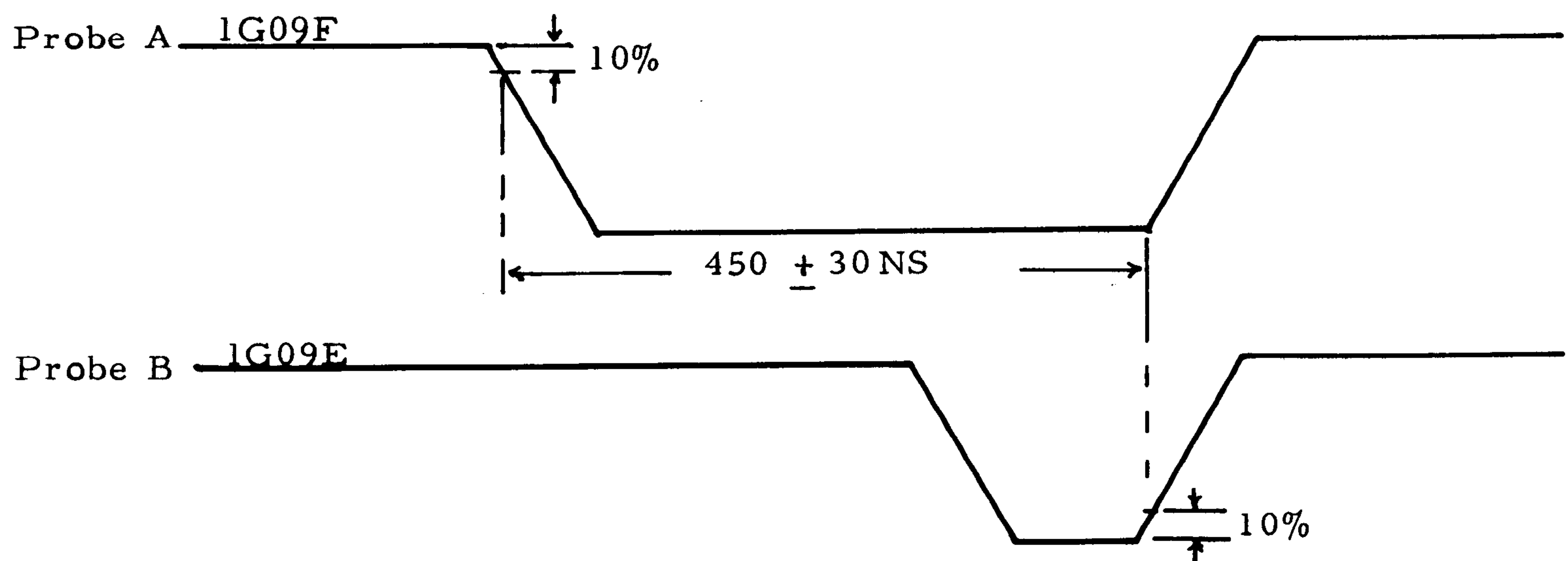
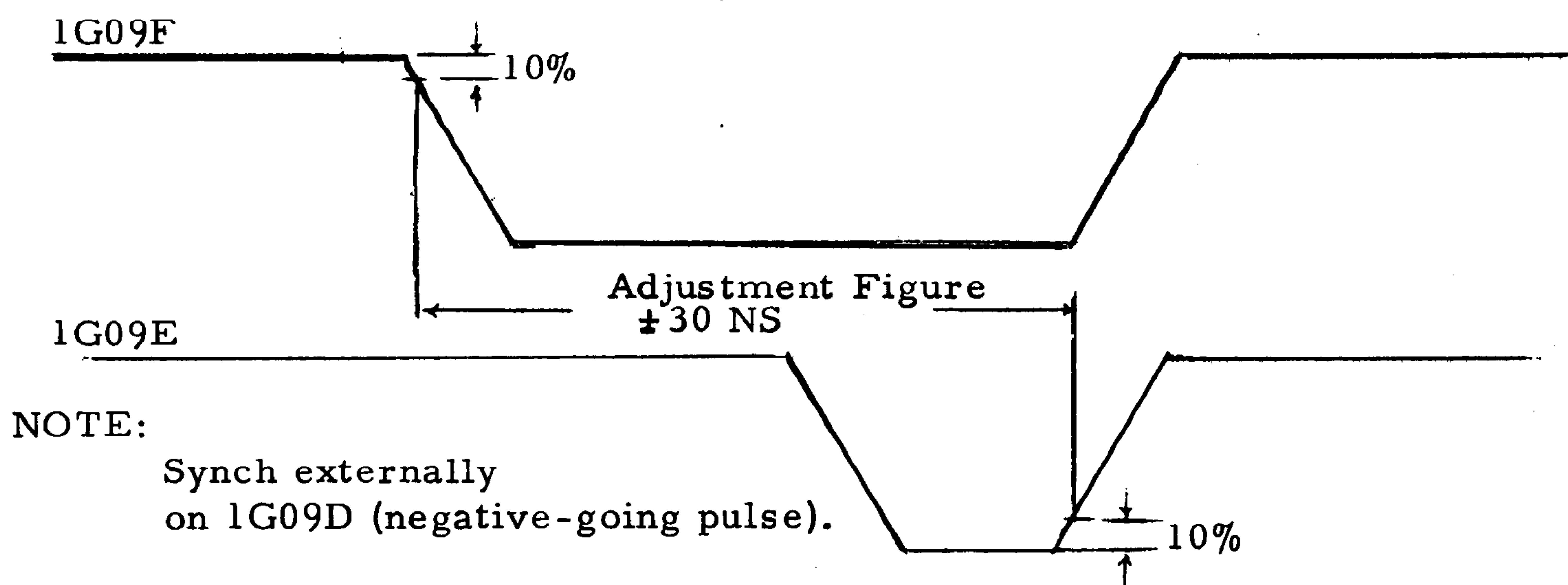


FIGURE AI-7 PROBE TIMING

D. Referring to the 7320 logic page 02.01.63.0, obtain the maximum head-to-head delay variation and divide by 2 to get the midpoint head delay time. Obtain the delay time of any one of the heads given in the table, subtract this delay from the midpoint delay and add the difference to 450 NS to obtain the adjustment figure. (If head delay is greater than the midpoint delay, subtract the difference from 450 NS to obtain the adjustment figure as follows:

6.2 Format and Data Delay Line Adjustment (continued)

- E. Loop the program on read HAO using the selected head.
- F. Observing the same points as above (1G09F and 1G09E) in the 7631 adjust the Read Data Delay Lines at 2B24, 2B25, and 2B26 in the 7320 for the adjustment figure obtained in step D,  $\pm 30$  NS from the leading edge of Data Trigger A to the trailing edge of Sample Data Trigger signal. Refer to Figure AI-8.



NOTE:  
Synch externally  
on 1G09D (negative-going pulse).

FIGURE AI-8 READ DATA DELAY LINE TIMING

6.3 Command Channel Test

Reference logics for 7320 - 02.01.25.1 and for 7631 - 01.70.15.1 and 01.09.23.1.

- A. Jumper B 2-E 40A to B2-E 19E, on 7320.

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6.3 Command Channel Test (continued)

- B. Jumper B1-A12E to B1-A10E on 7631.
- C. Place scope probe in Test jack; with internal sync On, index pulse should be seen approximately every 17 milliseconds.

6.4 Format Write Switch Test

- A. With scope free-running, probe B2-D14D.
- B. Place the Format switch to Write; the scope should indicate a +Y condition.

7. DIAGNOSTIC TESTING

7.1 Format, Home Address, and Surface Analysis Test

- A. Run appropriate program, as determined by the using system, and proceed as per program instructions.
- B. Depress the Interlock Local/Remote pushbutton on the 7320 CE panel while transferring the File Status gang switch to Local.
- C. Turn off, in sequence, the switches marked Head Air, DC, File, and Power.
- D. Turn on Drum Maint Blower and DC Brake; when drum comes to rest, turn off DC Brake.

WARNING

The doors in the upper section should never be opened unless the drum blower is on, and then only one at a time. After closing door, assure a purge time of 5 minutes prior to loading heads.



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7.1 Format, Home Address, and Surface Analysis Test (continued)

E. Exchange Slot S drum leads as follows:

Position S1 - 1 with 4 and 2 with 5.

Position S2 - 1 with 4 and 2 with 5.

F. Close upper doors and turn drum maint. blowers Off.

G. Turn on, in sequence, the switches marked Power, File, DC,  
and Head Load.

H. Depress Interlock Local/Remote pushbutton while transferring the  
File Status gang switch to Remote.

J. Rerun the diagnostic, one pass, error free on each drum in the  
configuration.

K. Repeat steps (B) through (D).

L. Replug to their original positions, the leads exchanged in steps  
(E) and (F).

M. Repeat steps (G) through (K) to conclude Surface Analysis.

7.2 Vibration Test

A. Run the appropriate diagnostic and proceed as per program  
instructions.

B. During the first part of this program vibrate SMS cards in the  
7320 and 7631 panels with a felt mallet.

7.3 Bias Test

A. Run the appropriate diagnostic and proceed as per program  
instructions.

7.3 Bias Test (continued)

B. Bias the 7631 to  $\pm 1.5V$  from nominal. This program shall run error free for 5 minutes at each extreme.

C. Repeat steps A and B using supplementary program, if required.

7.4 Reliability Test

Run diagnostic appropriate for the using system.