

INSTALLATION INSTRUCTIONS
for the
IBM 7040 and 7044
DATA PROCESSING SYSTEMS

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PREFACE

This publication is intended to serve as a guide for installing an IBM 7040/44 Data Processing System. This publication contains mechanical data and preliminary test procedures for making the equipment operational in the customer's office.

Information on the following machine units and systems is included in this manual:

| | | | |
|------|------------------------|---------|--------------------------------------|
| 729 | Magnetic Tape Unit | 1414 | Tape Adapter Unit |
| 1009 | Data Transmission Unit | 1622 | Card Read Punch |
| 1014 | Remote Inquiry Unit | 7106/07 | Processing Unit |
| 1301 | Disk Storage Unit | 7320 | Drum Storage Unit |
| 1302 | Disk Storage Unit | 7330 | Magnetic Tape Unit |
| 1401 | Data Processing System | 7631 | File Control Unit |
| 1402 | Card Read Punch | 7740 | Communication Control System |
| 1403 | Printer | 7750 | Programmed Transmission Control Unit |
| 1414 | I/O Synchronizer | 7904 | Data Channel |

For detailed maintenance and test procedures, refer to the IBM 7040/44 CE Maintenance Manual

All IBM Customer Engineers are thoroughly indoctrinated in IBM safety procedures during the early phases of their training. This training should now be a part of routine practice, however, personal safety cannot be over-emphasized. Here are a few reminders of general safety when installing a system:

1. At least two men should be working on the system when power is ON.
2. Wear your safety glasses when soldering or performing other operations which may endanger your eyes.
3. If it is necessary to work near live power connectors or convenience outlets disconnect power cables or turn OFF wall circuit breakers.
4. Discharge capacitors before working on DC power supplies.
5. Always turn power OFF before replacing a fuse.
6. Replace safety covers that have been removed before proceeding to another operation.
7. Know the location of fire extinguishers, emergency exit doors, master power switch and emergency phone numbers.

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1. GENERAL CONTENTS OF MANUAL

This manual provides the necessary instructions for installing a maximum 7040 or 7044 Data Processing System. The main objective of the manual is to guide Customer Engineers through a safe, efficient installation of the equipment.

The outline of the manual follows closely the actual installation sequence. The installation sequence consists of preliminary machine room checks, unloading and unpacking of units, mechanical assembly of units, complete cable installation of both sub-floor and interframe cables and a final check-out procedure for the system. After this has been accomplished, the system is ready for customer use.

The CE should be aware of special features ordered for the system to be installed, as information on items such as this may require special instructions that have not been specifically covered in this manual. By becoming familiar with the system configuration, the CE can take exception to information provided in the manual which is not applicable to his installation.

Cabling and testing of the Direct Couple Feature (7040/44 to 7090/94) is explained in Appendix B. You will also need the applicable 7090 or 7094 installation manual to complete the connections for the Direct Couple Feature.

Read the manual and study the diagrams before supplies or equipment are received, so you have a full understanding of the information and the sequence of installation procedures.

2. PRELIMINARY PREPARATION

Be sure you have a copy of the 7040/44 Physical Planning Manual (Form No. J22-6658) and a copy of the floor plan for your installation.

Installation time can be kept to a minimum if all preliminary preparation has been completed before the system arrives. The following items should be checked:

A. Floor Area

1. The floor should be marked to show the location of all units.
2. The sub-floor should be checked to insure that all floor openings are located properly.
3. If external cables are not to be routed in a sub-floor, be certain provision has been made to route the cables through the step cover area. Special end covers and floor ramps are available for above-floor installation.

B. Power Facilities

1. Test the wall circuit breakers for proper operation.
2. Check for proper grounding at receptacle case and the building.
3. Check that the correct voltage is supplied for the system.
4. Check the three phase AC power receptacles for correct phase orientation (See system testing, Chapter 5).

2. PRELIMINARY PREPARATION (continued)

C. Tools

1. Special tools are not required to install a 7040/44 system.
2. Be sure that all the standard CE tools are available, including oscilloscopes and meters.
3. A step ladder will be required to route cables across the tops of the frames and a carpenter's level should be used to level the frames prior to bolting or butting them together.

3. UNLOADING AND UNPACKING UNITS

The units are moved into the Machine Room under Customer Engineering supervision. Exercise caution when moving units. Avoid rolling into floor openings or striking cables protruding from the sub-floor. All units should be moved on hardboard or plywood to prevent floor damage,

Inspect for damage as the units are brought in. Move frames as close to their assigned floor positions as practical and remove all packing material. Make a thorough check for damage after all packing material has been removed. Avoid using the units as workbenches during installation. The top surfaces can be easily damaged. This applies particularly to the console.

Obtain a copy of the manifest from carrier and check for receipt of all units, boxes, and pieces. This is for IBM information; you are cautioned not to sign for, or accept, shipments for the customer.

4. GENERAL CABLING INFORMATION

4.1 External (Floor) Cables

The external (floor) cables interconnect the 7106/07 processing unit with the 7904 Data Channel and I/O units. These cables should arrive in advance of the system (usually 2 weeks) so that they may be placed in their proper locations under the sub-floor. Keep the ends of the cables below floor level to prevent damage to the cables as the units are moved into position. When the units are placed in their final positions, cables may be terminated. Clamp mounting bars, located in front of the tailgate connector panels, may be fitted with cable clamps to secure the cables coming from the sub-floor.

The external cables required depend upon a particular configuration previously selected by the Customer. All figures and tables showing cable terminations are for maximum configurations, so you may disregard any equipment which does not apply to your installation.

4.2 Interframe Cables

Interframe cables are the cables interconnecting the various modules (A, B, C, D, and E) in the 7106/07 processing unit and the cables interconnecting the 1414 modules. These cables are shipped with the units and are only disconnected at points where it was necessary to disassemble and ship the frames separately.

4.3 Cable Identification

- A. Labels are attached to each end of external floor cables. These labels contain a "key" (reference) number, cable part number, and "From - To" designation. Cables are identified as follows:
1. A RED label indicates the "from" end.
 2. A WHITE label indicates the "to" end.
- B. Interframe cables are identified by labels similar to those on the external cables. The label includes the cable part number.
- C. Interframe cable wires are identified by small labels, referred to as "Quick labels". These labels are used to identify the wire number or the terminating position of the wire.
- D. Some external cables with two paddle card connectors on one end may be labeled "A" and "B", instead of the actual plugging location. This represents the plugging sequence as listed in Table 3-1 on page 3-7. For example: key no. 103e has plugging locations L37 and L38; the paddle connectors may be labeled "A" (L37) and "B" (L38).

1. 7106/07 PROCESSING UNIT

1.1 Frame Assembly

- A. Remove all packing material from each frame. Untape all cables and remove protective coverings from paddle connectors.
- B. Remove all top, front and rear covers, before proceeding.
- C. Place the frames in their assigned positions and remove the mounting hardware located at the top and bottom of the frames.
- D. Locate the disconnected ends of all cables, and using the routing diagrams in Chapter 3, pull the cables through to their assigned frames. Straighten the jumper cables so that the frames can be butted. Be sure all cables are now easily reached and not caught between frames.
- E. Install the four leveling pads in each frame, but do not adjust them.
- F. With all the frames in their assigned positions, bolt the frames together; but do not tighten. Use the longer bolts for the top portion of the frames.
- G. Lower the leveling pads until the casters are off the floor and all frames are level.
- H. Tighten all mounting bolts.

1.2 Operator's Console 7106, 7107

Refer to Figure 2-1 on page 2-3 and assemble the console as follows:

- A. Remove packing material from reading boards, legs, paper rack, support cover, and typewriter.
- B. Bolt the paper rack to the table legs.
- C. Attach legs to table and secure table to the right support arm.
- D. Remove typewriter shipping wing bolts and install circular feet. Install bottom cover and place typewriter in cutout provided.
- E. Run typewriter cables through trough and over the left support arm. Terminate cable. Secure reading board to the left support arm.
- F. Bolt plate 5237153 in place.
- G. Slide connector cover 5235146 in position and bolt in place.
- H. Assemble connectors under console table (Fig. 2-1).

1.3 Covers and Air Filters

- A. End covers, step covers, and air filters are packaged separately along with the necessary mounting hardware for installation. Figure 2-2 shows the old style cover and air filter parts and Figure 2-3 shows the newer style. Appearance of both after installation is identical. Install the end covers first, to insure a proper fit with the mating step cover.
- B. Top covers, front and rear covers, and electronic panel doors on the card side of the frames should be removed until cabling of the 7106/07 has been completed.

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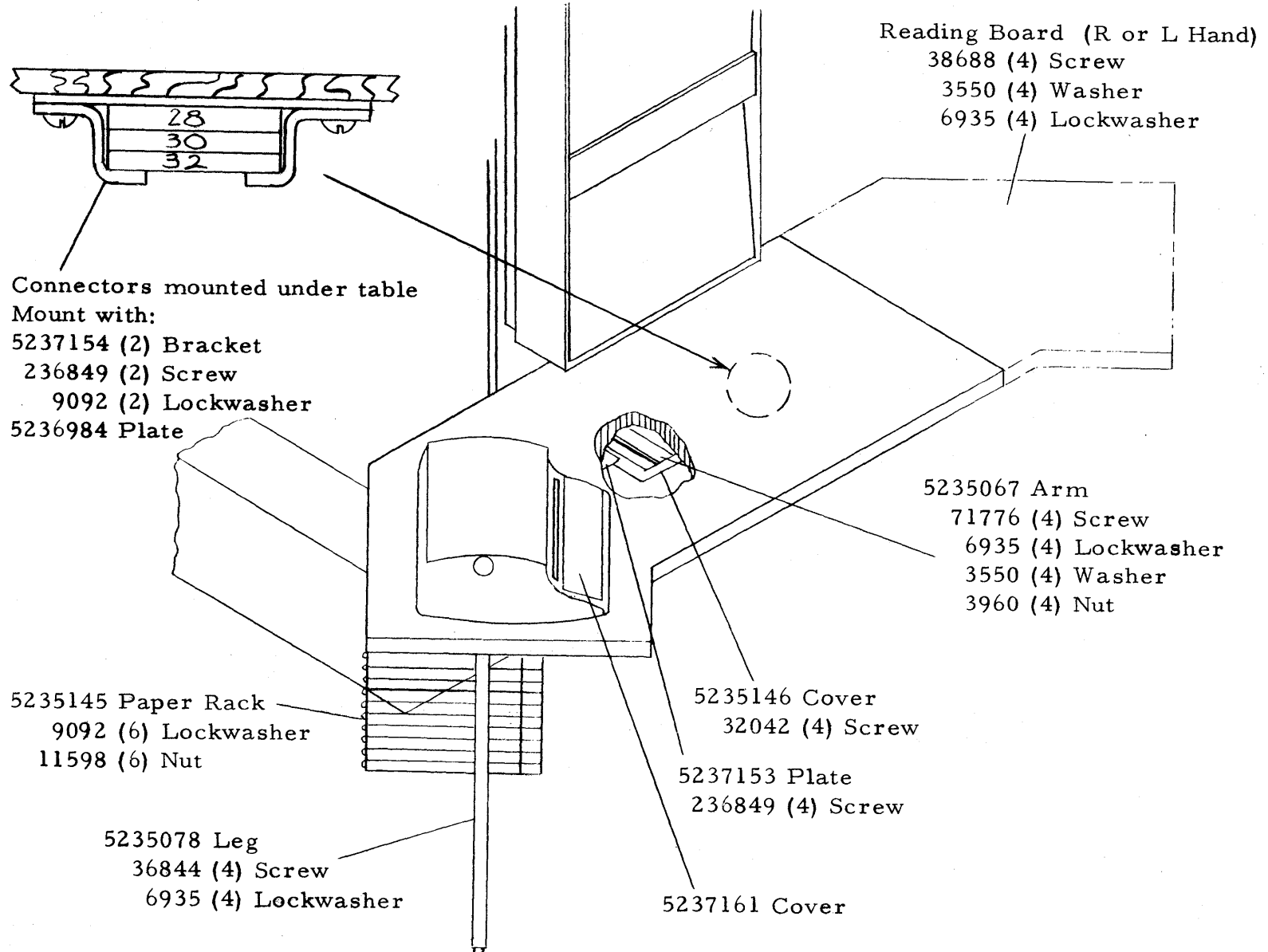
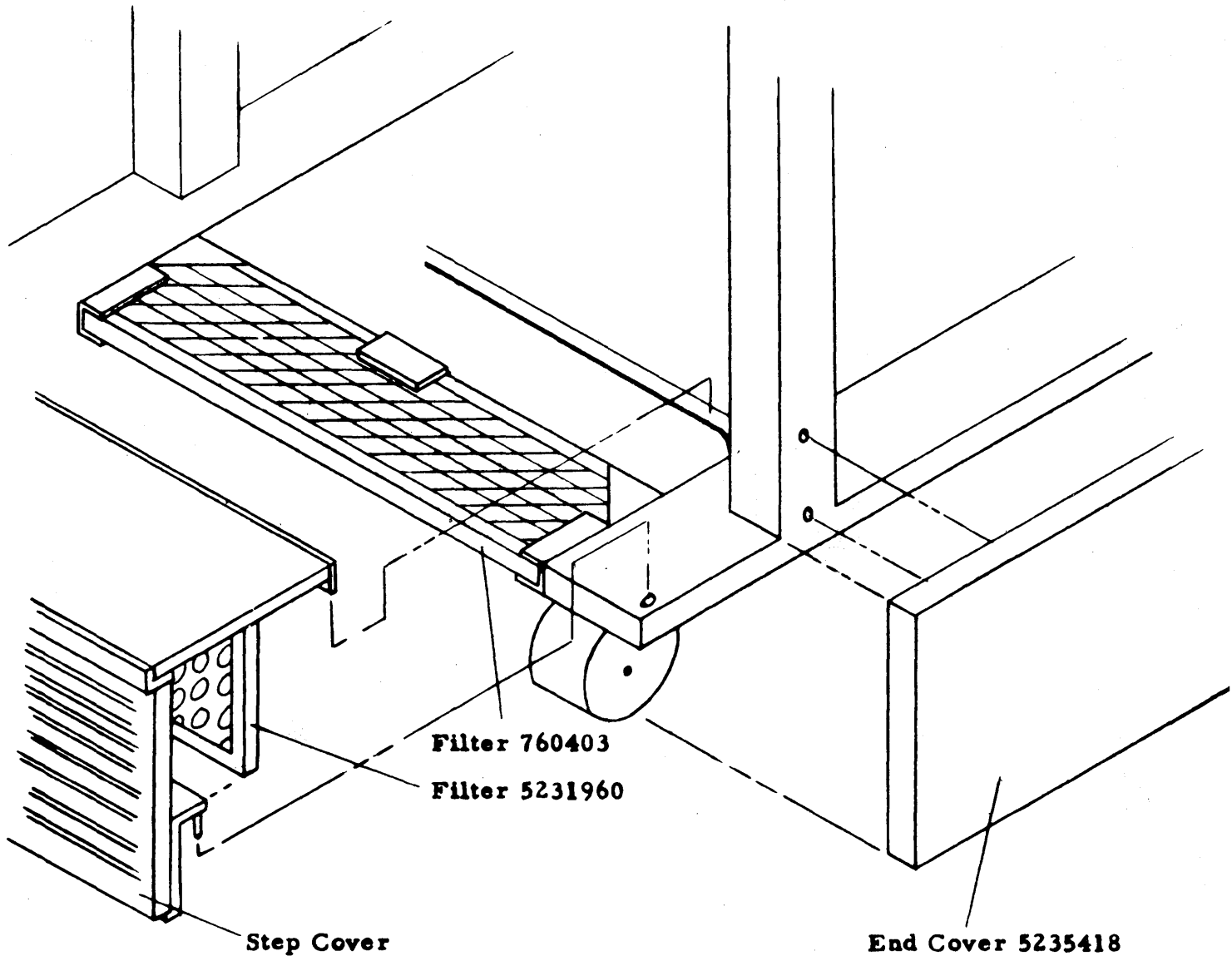


FIGURE 2-1 OPERATOR'S CONSOLE - 7106/07

2-3



NOTES:

1. For Left Hand Cable Entry
2. For Right Hand Cable Entry
3. For R and L Hand Cable Entry
4. For Sub Floor Cable Entry

- End Cover 5235418**
 (Notes 1 & 3)
End Cover 523373
 (Notes 2 & 4)
 3960 (4) Nut
 3550 (4) Wshr
 6935 (4) Lckw

FIGURE 2-2 PLACEMENT OF COVERS AND AIR FILTERS (Old Style)

1/1/64

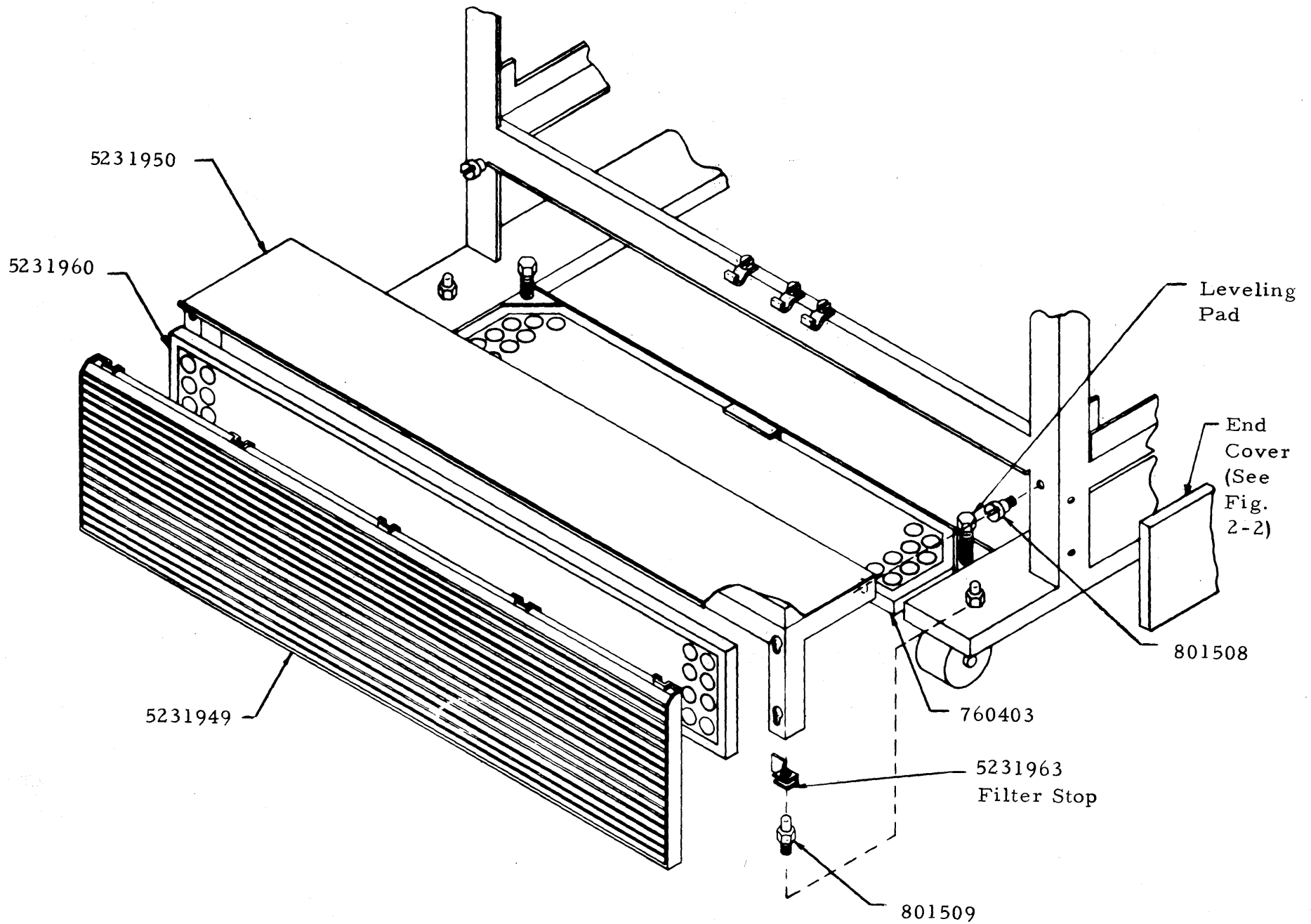


FIGURE 2-3 PLACEMENT OF COVERS AND AIR FILTERS (NEW STYLE)

2-5

1.4 Interframe Ground Jumpers

Install the ground jumpers located on the wiring side at the base of the frames. These are green wires with ring type terminals.

1.5 CPU Use Meter

The meter, mounted on top of the console panel, must be sealed before the system is turned over to the customer. Complete the cabling as shown on page 3-40. Before tamper-proofing the meter with seal (P/N 740489), meter operation should be checked in accordance with instructions on page 5-47.

2. 7904 DATA CHANNEL

If more than one 7904 is used, they are bolted together in the same manner as the 7106/07. Data Channels may also be butted and bolted with similar rack and panel units, such as a 1414 I/O Synchronizer.

3. 1414 I/O SYNCHRONIZER

Position the first frame and level it using the leveling pads. If a second frame is used, level and bolt the frames together in the same manner as the 7106/07.

4. 1414 TAU (FRAME D)

Position the D frame and level it, using the leveling pads. If two D frames are used, butt them together. These units may be bolted together.

5. 729/7330 MAGNETIC TAPE UNITS

- A. Remove all packing material and position the units in their assigned locations .
- B. During the unpacking and physical placement of the units a visual check of cables and connections should be made for broken pins and loose connections.
- C. If more than one unit is used, connect them in series; 729's and 7330's cannot be connected in the same line. Be sure terminator is installed before power is applied. See page 3-20 for further cable information.
- D. Clean the entire tape transport and chamber, filter chamber, and the top of the door screen. See applicable CE reference manual.
- E. Certain checks should be made on all tape units during installation. See page 5-43.

6. 1403 PRINTER

- A. Make a quick visual check for parts broken in transit.
- B. Check knobs, levers and covers for correct operation.
- C. Check for fluid in hydraulic reservoir (1 gallon P/N 477567).
- D. Check for oil in the reservoir (IBM 6) in the right end of the T-casting.
- E. Check for oil in the plastic reservoir (IBM 9) under the rear of the T-casting. Oiler must lightly contact idler gear.
- F. Be sure that the summary punch connectors are not interchanged. The connector with the gold-plated pins should be in the front receptacle.

7. 1402 CARD READ PUNCH

- A. Remove shipping braces, tape, and blocks under feed shock mounts.
- B. Install the upper magazine of the file feed.
- C. Remove front and rear covers over the sides of hopper casting.
- D. Just above the file feed drive shaft is a split shaft held by a set screw; slip both halves of the shaft to the center so they are inside the casting.
- E. Put upper magazine in position and slip both halves of the split shaft from the center so they will hold the magazine in place. The ends of the split shaft should be flush with the end of the magazine holes.
- F. Turn split shafts so the setscrew bites both halves and tighten the setscrew.
- G. Replace the two covers.
- H. Check operation of file feed. Adjust hopper delay potentiometer so approximately 1 1/2" to 2" of cards enter the hopper before feeding begins.
- I. Examine all relays (without removing) for displaced armatures.
- J. Trip the clutches and turn machine by hand, checking for any binding conditions in the feeds or card transport.
- K. Check covers for proper fit and appearance.
- L. Tighten the screws in all CB contact stacks.

2 MECHANICAL ASSEMBLY

8. 1301/1302/7320-7631 UNITS

- A. Extreme care cannot be overemphasized in the unpacking of units and in the handling of the disk receiver, drawer assemblies, and heads during the mechanical preparation of the units.
- B. The complete installation procedure for these units as well as a final check-out procedure with the system, is in a separate manual, 1301/1302/7320-7631 Preliminary Installation Instructions.
- C. The 1301 CE Maintenance Manual may also be useful during installation for adjustments, cleaning and servicing procedures.

9. 7740 COMMUNICATION CONTROL SYSTEM

A copy of the "IBM 7740 Preliminary Installation Instructions" is packed with every 7740. Some cabling information for the 7740 is included in chapter 3, in this manual.

1. SYSTEM CABLE ROUTING

Plug the external cables for the system using Table 3-1 on page 3-2.

This Table can also be used to lay the cables in the sub-floor prior to the system arrival, since connections for both ends of each cable are listed.

Figure 3-1 shows pictorially how the cables run between units. Additional information about external cables and specific units will be found in the following paragraphs.

2. EXTERNAL CABLE CONNECTIONS

2.1 7106/07 Processing Unit

Figure 3-6 shows the connector panel layout for the 7106/07 frames.

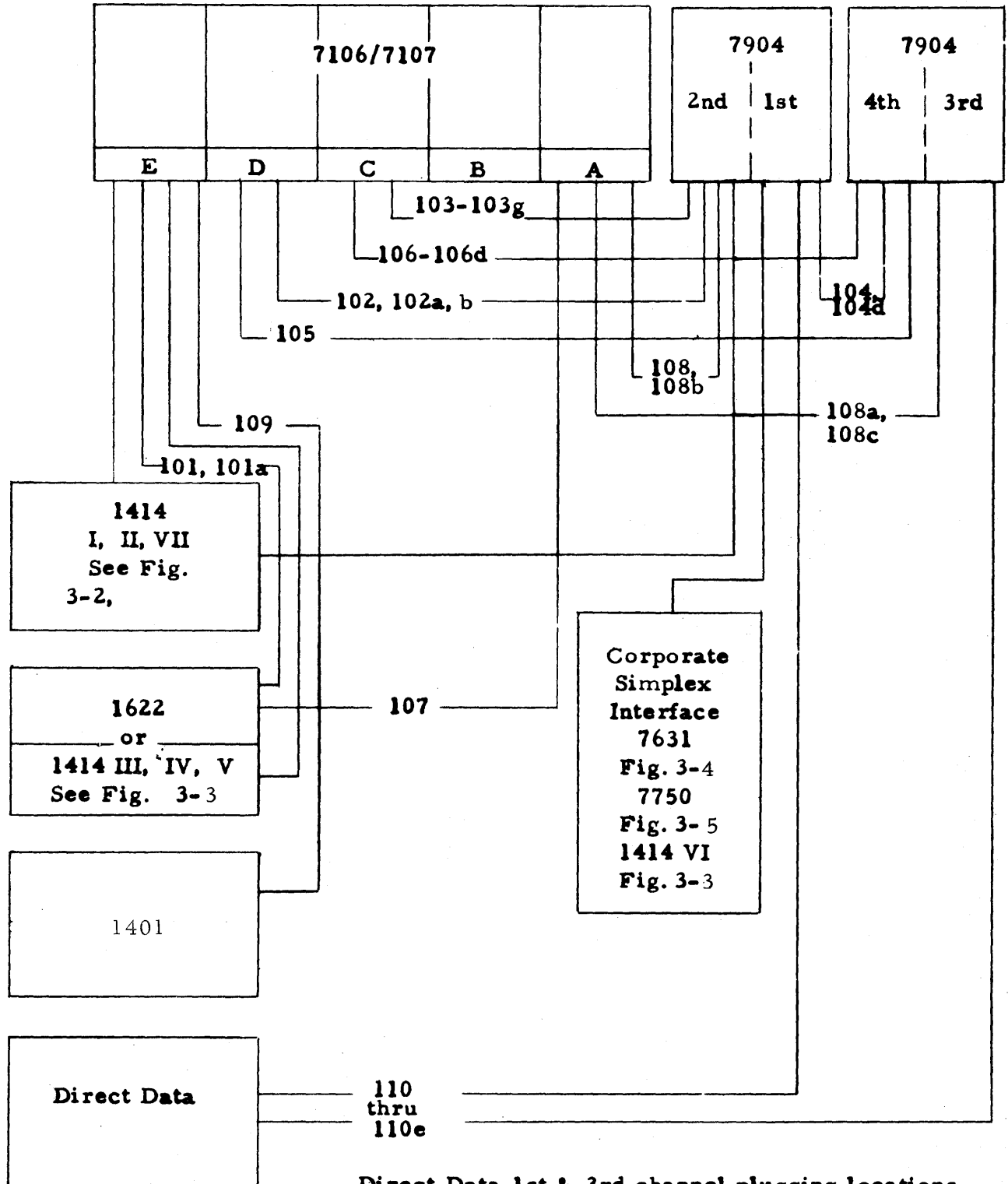
All external cables going to the 7106/07 terminate at these panels. They are located at the bottom of each frame on the wiring side. On the A frame tailgate connector panel, cables are terminated at positions 1 through 6 and 9 with Burndy Connectors. After aligning the connector so that it may be inserted into the receptacle, position the hood (attached to the cable) so that the flat portion is at the top of the connector parallel to a horizontal frame member.

2.2 7904 Data Channel

On the last 7904 Data Channel used, DQT card terminators (P/N 372148) are required. They are plugged in connector panel locations U33 through U41.

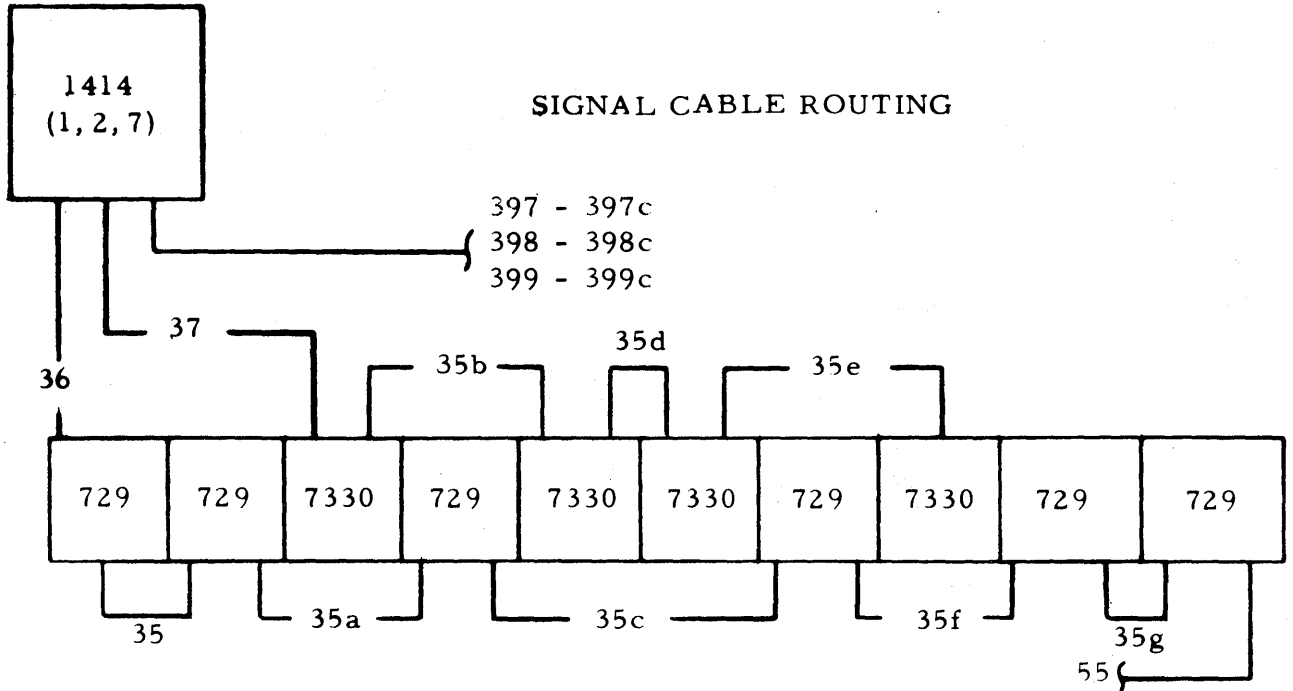
See Figure 3-7.

3. CABLE INSTALLATION

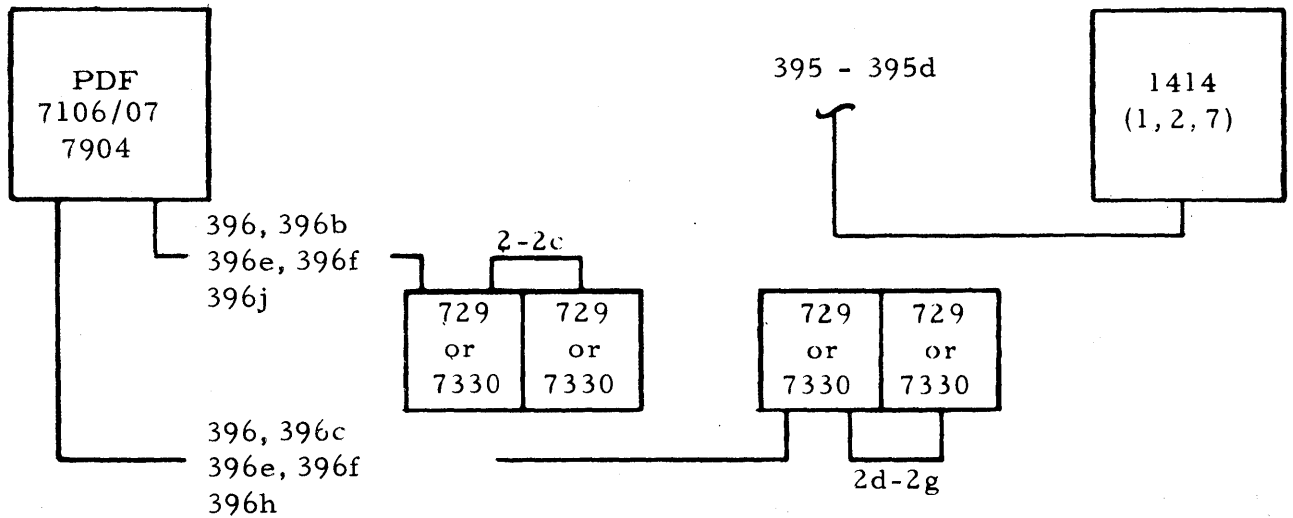


Direct Data 1st & 3rd channel plugging locations for 7904: L9-L20. 2nd & 4th channel plugging locations 7904: L33-L44. See Table 3-1 for further details.

FIGURE 3-1 EXTERNAL CABLE ROUTING DIAGRAM 7040/44 SYSTEM



POWER CABLE ROUTING

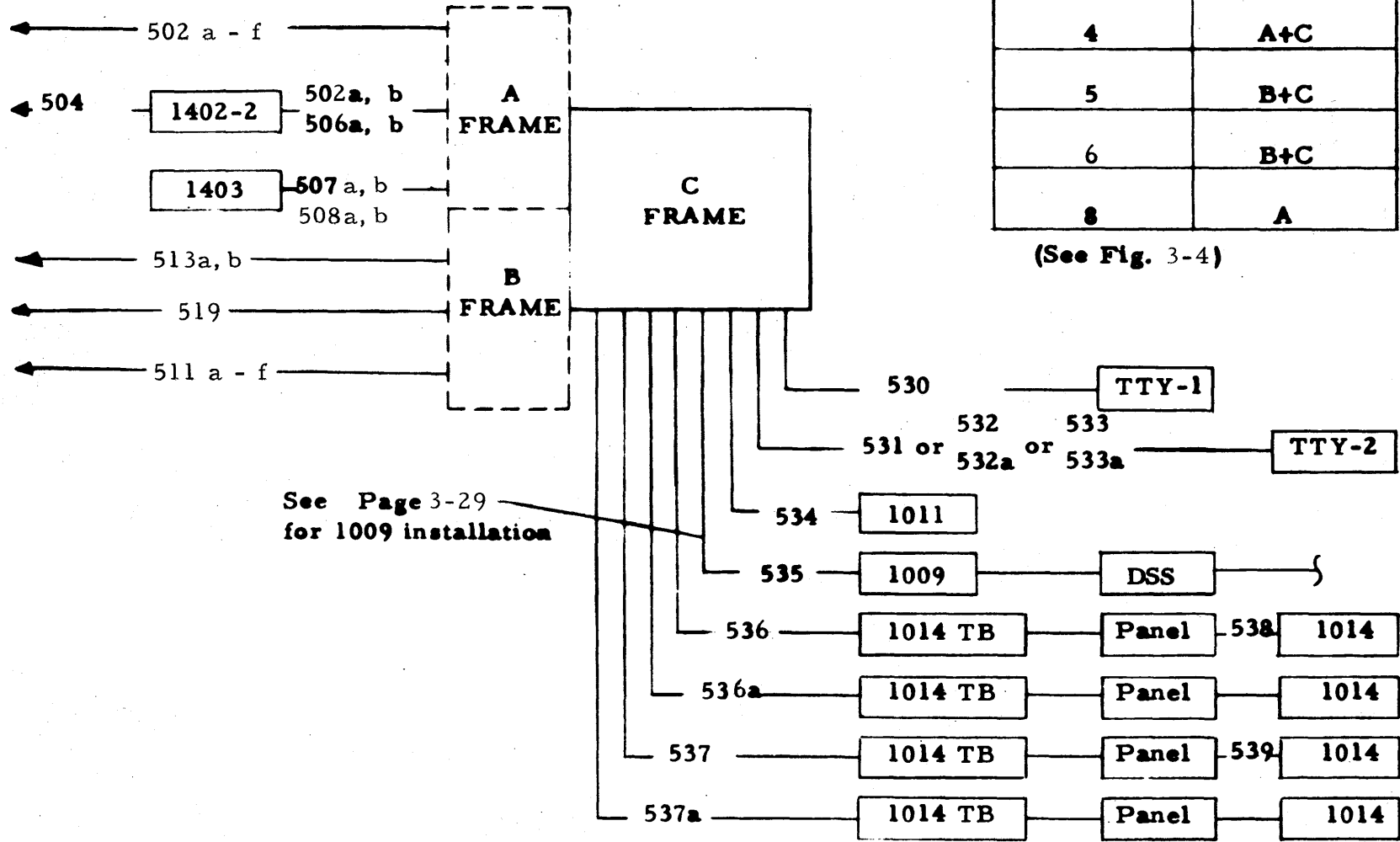


NOTE:

729 tape units are models 2, 4, 5 or 7.
 Each key no. is prefixed with the customer assigned channel no. on each cable label.
 Channel assignments in Table 3-1 are for reference only.

FIGURE 3-2 EXTERNAL CABLE ROUTING 1414 (1, 2, 7)

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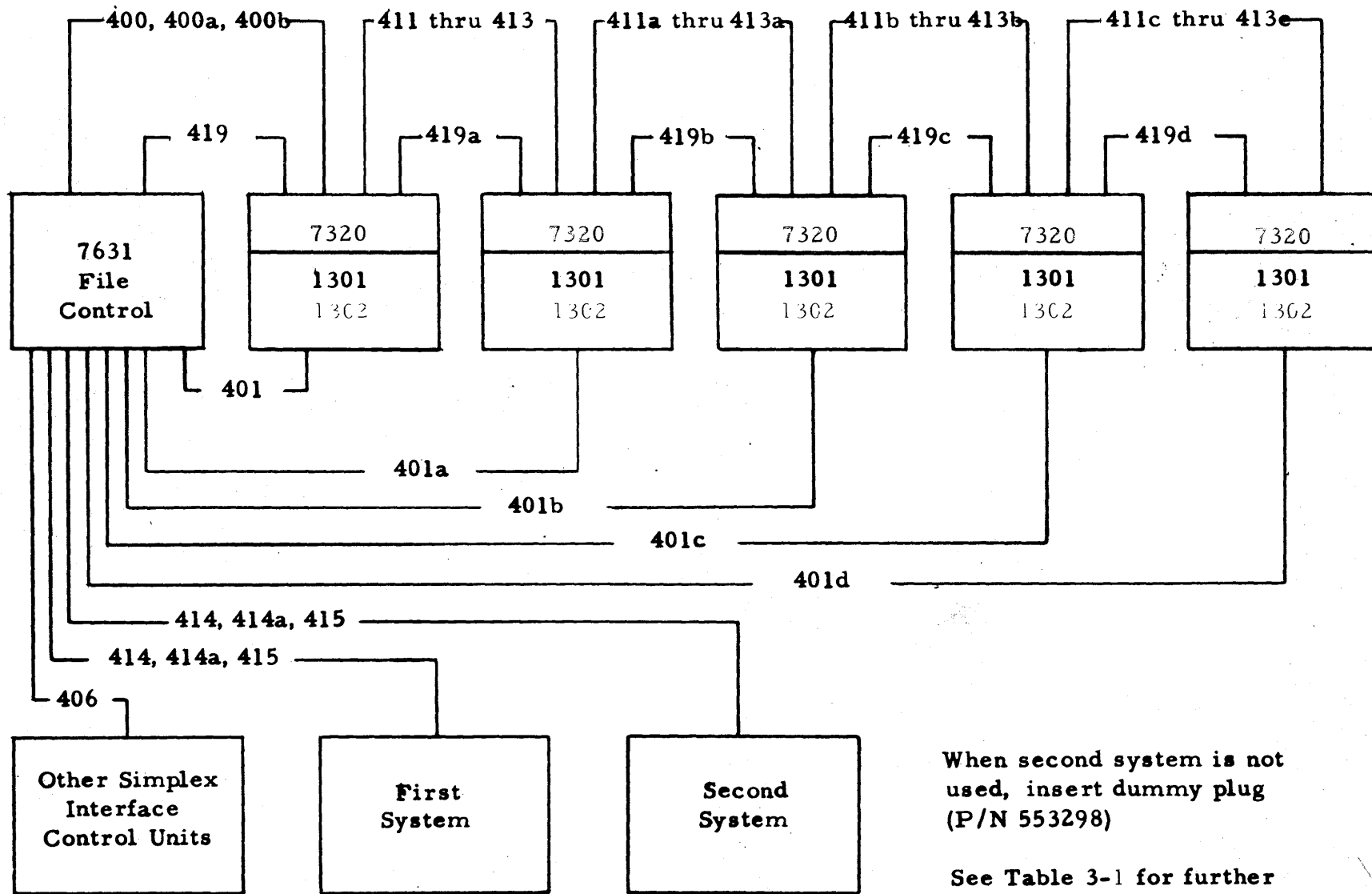


| FRAME CONFIGURATIONS | |
|----------------------|--------|
| MODEL | FRAMES |
| 3 | A |
| 4 | A+C |
| 5 | B+C |
| 6 | B+C |
| 8 | A |

(See Fig. 3-4)

FIGURE 3-3 EXTERNAL CABLE ROUTING - 1414 I/O SYNCHRONIZER

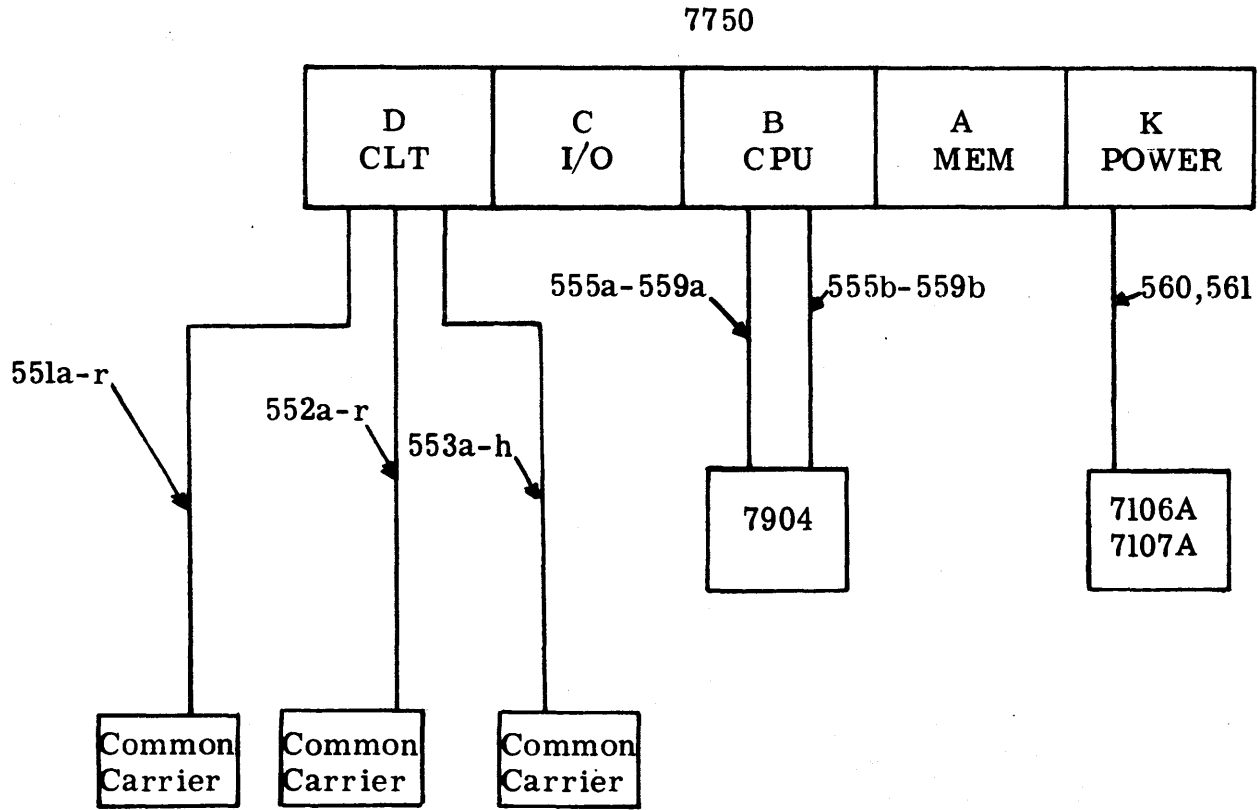
3-4



When second system is not used, insert dummy plug (P/N 553298)

See Table 3-1 for further details.

FIGURE 3-4 1301/1302/7320--7631 EXTERNAL CABLE ROUTING



See Table 3-1 for further details

FIGURE 3-5 EXTERNAL CABLE ROUTING DIAGRAM - IBM 7750

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TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|---------|--|----------------|---------|--------------|
| 2/2d | 535098 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 2a/2e | 535098 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 2b/2f | 535098 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 2c/2g | 535098 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35 | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35a | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35b | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35c | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35d | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35e | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35f | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 35g | 535099 | 729/7330 | 729/7330 | | See Fig. 3-2 |
| 36 | 761354 | ✓ 1414D L01, 02, 03, 04 ✓ U01, 02, 03, 04 ✓ | 729 | 1/2 | See Fig. 3-2 |
| 37 | 761354 | 1414D L07, 08, 09, 10 U07, 08, 09, 10 | 7330 | 1/2 | See Fig. 3-2 |

(continued)

3 CABLE INSTALLATION

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E.C. 704252

TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|---------|-----------------|---------------------------------|---------|-------------------------|
| 55 * | 352464 | 729/7330 | Other Controls or Systems | | See Fig. 3-2 |
| 101 | 553343 | 1622 AYA | U10 (Blk) 7106/07E U11 (yel) | A | See Fig. 3-1 |
| 101a | 553343 | 1622 AZA | L10 (Blk) 7106/07E L11 (Yel) | A | See Fig. 3-1 |
| 102 | 5235334 | 7904A U17, 18 ✓ | 7106/07D L01, 02 ✓ | 1st | See Fig. 3-1 |
| 102a | 5235334 | 7904A U19, 20 ✓ | 7106/07D L03, 04 ✓ | 1st | See Fig. 3-1 |
| 102b | 5235334 | 7904A U21, 22 ✓ | 7106/07D L05, 06 ✓ | 1st | See Fig. 3-1 |
| 103 | 5235334 | 7904A U11, 12 ✓ | 7106/07C L01, 02 ✓ | 1st | See Fig. 3-1 |
| 103a | 5235334 | 7904A U13, 14 ✓ | 7106/07C L03, 04 ✓ | 1st | See Fig. 3-1 |
| 103b | 5235334 | 7904A U28, 27 ✓ | 7106/07C L05, 06 ✓ | 1st | Note Change in Sequence |
| 103c | 5235334 | 7904A U26, 25 ✓ | 7106/07C L07, 08 ✓ | 1st | Note Change in Sequence |
| 103d | 5235334 | 7904A U24, 23 ✓ | 7106/07C L09, 10 ✓ | 1st | Note Change In Sequence |
| 103e | 5235334 | 7904A U15, 16 ✓ | 7106/07C L37, 38 ✓ | 1st | See Fig. 3-1 |
| 103f | 5235334 | 7904A U09, 10 ✓ | 7106/07C ** | 1st | See Fig. 3-1 |
| 103g | 5235334 | 7904A U43, 44 ✓ | 7106/07C ** | 2nd | See Fig. 3-1 |

* Used for manual tape switching; use special terminator

** Connections vary; see page 3-17

(continued)

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E. C. 704252

TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|---------|--------------------|-------------------|---------|-------------------------|
| 104 | 5235334 | 7904B U11, 12 | 7904A U33, 34 | 3rd | See Fig. 3-1 |
| 104a | 5235334 | 7904B U13, 14 | 7904A U35, 36 | 3rd | See Fig. 3-1 |
| 104b | 5235334 | 7904B U15, 16 | 7904A U37, 38 | 3rd | See Fig. 3-1 |
| 104c | 5235334 | 7904B U17, 18 | 7904A U39, 40 | 3rd | See Fig. 3-1 |
| 104d | 5235334 | 7904B U19, 20 | 7904A U41, 42 | 3rd | See Fig. 3-1 |
| 105 | 5235334 | 7904B U21, 22 | 7106/07D L07, 08 | 3rd | See Fig. 3-1 |
| 106 | 5235334 | 7904B U28, 27 | 7106/07C L11, 12 | 3rd | Note Change in Sequence |
| 106a | 5235334 | 7904B U26, 25 | 7106/07C L13, 14 | 3rd | Note Change in Sequence |
| 106b | 5235334 | 7904B U24, 23 | 7106/07C L15, 16 | 3rd | Note Change in Sequence |
| 106c | 5235334 | 7904B U09, 10 | 7106/07C * | 3rd | See Fig. 3-1 |
| 106d | 5235334 | 7904B U43, 44 | 7106/07C * | 4th | See Fig. 3-1 |
| 107 | 624073 | 1622 Pwr | 7106/07A 23 Pwr | A | See Fig. 3-1 |
| 108 | 5235357 | 7904A Conn 1 ✓ Pwr | 7106/07A 12 ✓ Pwr | 1 and 2 | See Fig. 3-1 |
| 108a | 5235357 | 7904B Conn 1 ✓ Pwr | 7106/07A 13 ✓ Pwr | 3 and 4 | See Fig. 3-1 |

* Connections vary; see page 3-17

(continued)

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3 CABLE INSTALLATION

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TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|---------|---------------------------|-------------------------------------|----------------------------|----------|
| 108b | 5235358 | 7904A Conn. 2 Pwr. | 7106/07A 14 Pwr. | 1 and 2 | Fig. 3-1 |
| 108c | 5235358 | 7904B Conn. 2 Pwr. | 7106/07A 15 Pwr. | 3 and 4 | Fig. 3-1 |
| 109 | 5236410 | 1401 200 Pos. Conn. | 7106/07E L12, 13, 14 U12, 13, 14 | A | Fig. 3-1 |
| 110 | 5235334 | 7904 L09, L10 L33, L34 | Direct L13, L14 Data L37, L38 | 1st and 3rd 2nd and 4th | Fig. 3-1 |
| 110a | 5235334 | 7904 L11, L12 L35, L36 | Direct L15, L16 Data L39, L40 | 1st and 3rd 2nd and 4th | Fig. 3-1 |
| 110b | 5235334 | 7904 L13, L14 L37, L38 | Direct L09, L10 Data L33, L34 | 1st and 3rd 2nd and 4th | Fig. 3-1 |
| 110c | 5235334 | 7904 L15, L16 L39, L40 | Direct L11, L12 Data L35, L36 | 1st and 3rd 2nd and 4th | Fig. 3-1 |
| 110d | 5235334 | 7904 L17, L18 L41, L42 | Direct L19, L20 Data L43, L44 | 1st and 3rd 2nd and 4th | Fig. 3-1 |
| 110e | 5235334 | 7904 L19, L20 L43, L44 | Direct L17, L18 Data L41, L42 | 1st and 3rd 2nd and 4th | Fig. 3-1 |
| 199b | 352303 | 7106A | 7741A | | |
| 199c | 352303 | 7107A | 7741A | | |
| 201a | 587330 | 7904A L05 L49 | 7741B L49 | 1 2 | |
| 201b | 587330 | 7904A L01 L45 | 7741B U49 | 1 2 | |
| 395 | 760739 | 7106/07A Conn. 2 | 1414D | A | Fig. 3-2 |
| 395a | 760739 | 7106/07A Conn. 3 | 1414D | 1st | Fig. 3-2 |
| 395b | 760739 | 7106/07A Conn. 4 | 1414D | 2nd | Fig. 3-2 |
| 395c | 760739 | 7106/07A Conn. 5 | 1414D | 3rd | Fig. 3-2 |
| 395d | 760739 | 7106/07A Conn. 6 | 1414D | 4th | Fig. 3-2 |

(continued)

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TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|---------|------------------|---|-----------|--------------|
| 396 | 5235359 | 7904 Conn 3 | 729/7330 | 1st | See Fig. 3-2 |
| 396a | 5235359 | 7904 Conn 4 | 729/7330 | 1st | See Fig. 3-2 |
| 396b | 5235359 | 7904 Conn 5 | 729/7330 | 2nd | See Fig. 3-2 |
| 396c | 5235359 | 7904 Conn 6 | 729/7330 | 2nd | See Fig. 3-2 |
| 396d | 5235359 | 7904 Conn 3 | 729/7330 | 3rd | See Fig. 3-2 |
| 396e | 5235359 | 7904 Conn 4 | 729/7330 | 3rd | See Fig. 3-2 |
| 396f | 5235359 | 7904 Conn 5 | 729/7330 | 4th | See Fig. 3-2 |
| 396g | 5235359 | 7904 Conn 6 | 729/7330 | 4th | See Fig. 3-2 |
| 396h | 5235359 | 7106/07A Conn 16 | 729/7330 | A | See Fig. 3-2 |
| 396j | 5235359 | 7106/07A Conn 17 | 729/7330 | A | See Fig. 3-2 |
| 397 | 5235682 | 7904A U45, 46 ✓ | 1414D L12, 13 ✓ | 2nd & 4th | See Fig. 3-2 |
| 397a | 5235682 | 7904A U47, 48 ✓ | 1414D L14, 15 ✓ | 2nd & 4th | See Fig. 3-2 |
| 397b | 5235682 | 7904A U49, 50 ✓ | 1414D L16, 17 ✓ | 2nd & 4th | See Fig. 3-2 |
| 397c | 5235682 | 7904A U51, 52 ✓ | 1414D ^{L18, 19} L17, 18 ✓ | 2nd & 4th | See Fig. 3-2 |

(continued)

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3 CABLE INSTALLATION

TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|---------|-------------------|----------------------|-----------|--------------|
| 398 | 5235682 | 7904A U01, 02 ✓ | 1414D L12, 13 | 1st & 3rd | See Fig. 3-2 |
| 398a | 5235682 | 7904A U03, 04 ✓ | 1414D L14, 15 | 1st & 3rd | See Fig. 3-2 |
| 398b | 5235682 | 7904A U05, 06 ✓ | 1414D L16, 17 | 1st & 3rd | See Fig. 3-2 |
| 398c | 5235682 | 7904A U07, 08 ✓ | 1414D L18, 11 | 1st & 3rd | See Fig. 3-2 |
| 399 | 5235682 | 7106/07E U15, L15 | 1414D L17, 18 | A | See Fig. 3-2 |
| 399a | 5235682 | 7106/07E U16, L16 | 1414D L15, 16 | A | See Fig. 3-2 |
| 399b | 5235682 | 7106/07E U17, L17 | 1414D L13, 14 | A | See Fig. 3-2 |
| 399c | 5235682 | 7106/07E U18, L18 | 1414D L11, 12 | A | See Fig. 3-2 |
| 400 | 553379 | 7631 U01 ✓ | 1302 1301 05D | 7320 D11 | See Fig. 3-4 |
| 400a | 553379 | 7631 L01 ✓ | 1302 1301 09D | 7320 D13 | See Fig. 3-4 |
| 400b | 553379 | 7631 L03 ✓ | 1302 1301 07D | 7320 D09 | See Fig. 3-4 |
| 401 | 587387 | 7631 U03 ✓ | 1302 1st 1301 11D | 7320 D15 | See Fig. 3-4 |
| 401a | 587387 | 7631 L05 | 1302 2nd 1301 11D | 7320 D15 | See Fig. 3-4 |
| 401b | 587387 | 7631 U05 | 1302 3rd 1301 11D | 7320 D15 | See Fig. 3-4 |

(continued)

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TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | | To (White Tag) | | Channel | Notes |
|----------|---------|------------------|----------|----------------------|--------------------|--------------------|-----------------|
| 401c | 587387 | 7631 L07 | | 1302 4th 1301 11D | 7320 D15 | | See Fig 3-4 |
| 401d | 587387 | 7631 U07 | | 1302 5th 1301 11D | 7320 D15 | | See Fig. 3-4 |
| 406 | 352303 | 7631 EPO C-3 | | Other S. I. C. U. | | | See Fig. 3-4 |
| 411a,b,c | 553379 | 1302 1301 05A | 7320 D05 | 1302 1301 05D | 7320 D11 | | See Fig. 3-4 |
| 412a,b,c | 553379 | 1302 1301 09A | 7320 D07 | 1302 1301 09D | 7320 D13 | | See Fig. 3-4 |
| 413a,b,c | 553379 | 1302 1301 07A | 7320 D03 | 1302 1301 07D | 7320 D09 | | See Fig. 3-4 |
| 414 | 587330 | 7631 L09 ✓ | | 7904 | 02A L01 02A L45 | 1 and 3 2 and 4 | See Fig. 3-4 |
| 414a | 587330 | 7631 U09 ✓ | | 7904 | 02A L05 02A L49 | 1 and 3 2 and 4 | See Fig. 3-4 |
| 415 | 352303 | 7631 ✓ | | 7106/07 D-H | | | See Fig. 3-4 |
| 419 * | 5342370 | 7631 ✓ | | 1st 1301 or 1302 | | | See Fig. 3-4 |
| 419a * | 5342370 | 1st 1301 or 1302 | | 2nd 1301 or 1302 | | | See Fig. 3-4 |
| 419b * | 5342370 | 2nd 1301 or 1302 | | 3rd 1301 or 1302 | | | See Fig. 3-4 |
| 419c * | 5342370 | 3rd 1301 or 1302 | | 4th 1301 or 1302 | | | See Fig. 3-4 |
| 419d * | 5342370 | 4th 1301 or 1302 | | 5th 1301 or 1302 | | | See Fig. 3-4 |

* Key numbers 419 through 419d are required with
7631 serial numbers 12,000 and above only.

(continued)

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3 CABLE INSTALLATION

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E. C. 253434

TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|-----------|--|-------------------|---------|-----------------------|
| 502a | 5235682 | 1414A L33, 34 ✓ | 7106/07E **** | | Basic M 3, 4, 8 |
| 502b | 5235682 | 1414A U33, 34 ✓ | 7106/07E **** | | Basic M 3, 4, 8 |
| 502c | 5235682 | 1414A L32, U30 ✓ | 7106/07E **** | | Basic Prio M 3, 4, |
| 502d | 5235682 | 1414A L25, SPARE ✓ | 7106/07E **** | | Printer M 3, 4, 8 |
| 502e | 5235682 | 1414A L30, 31 | 7106/07E **** | | M 4 |
| 502f | 760736 | 7106/07**** | 1414A CC2 | | M 8 |
| 504c | 760736 | 7106/07**** | 1402-2 CC2 *** | | M 3, 4 |
| 505a | 760737 | 1402-2 CC6 ** | 1414A CC6 | | Basic M 3, 4 |
| 505b | 760741 ** | 1402-2 DC 2 & 4 *** | 1414A TBA2 3-4 | | Basic M 3, 4 |
| 506a | 760672 | 14A L36, 37, 39, 40, 42, 43 U36, 37, 39, 40, 42, 43 | 1402-2 PC *** | | Basic M 3, 4 |
| 506b | 760671 | 14A L45, 46, 48, 49, 51, 52 U45, 46, 48, 49, 51, 52 | 1402-2 RC *** | | Basic M 3, 4 |
| 507 | 760754 * | 1414A TBA2-3 * | 1403 Burndy Conn. | | Basic M 3, 4, 8 |
| 508a | 760674 | 14A L18, 19, 21, 22, 24 U18, 19, 21, 22, 24, 25 | 1403 SC-2 | | Basic M 3, 4, 8 |
| 508b | 760673 | 14A L10, 12, 13, 15, 16 U09, 10, 12, 13, 15, 16 | 1403 SC-1 | | Basic M 3, 4, 8 |

* See page 3-23 for further information. **** See page 3-17 for connections.

** See page 3-24 for further information.

*** See page 3-27 for further information.

(continued)

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3 CABLE INSTALLATION

1/1/64

E. C. 253434

TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|-------|---------|----------------|----------------|--|------------------|
| 511a | 5235682 | 1414B L33, 34 | 7106/07E * | | Basic M 5 |
| 511b | 5235682 | 1414B U33, 34 | 7106/07E * | | Basic M 5 |
| 511c | 5235682 | 1414B L32, U30 | 7106/07E * | | Basic & Prior |
| 511d | 5235682 | 1414B L30, 31 | 7106/07E * | | M 5 |
| 511f | 763337 | 7106/07* | 1414B CC6 | | M 5 |
| 513a | 587330 | 1414B CA1 | 7904 | 02A L01 02A L45 1 and 3 2 and 4 | CIF, M 6 |
| 513b | 587330 | 1414B CA2 | 7904 | 02A L05 02A L49 1 and 3 2 and 4 | CIF, M 6 |
| 519 | 352303 | 1414B E1 | 7106/07A D-H | | EPO, M 6 |
| 530 | 762735 | 1414C A1, B1 | TTY 1 Send/Rec | | Signal |
| 531 | 762735 | 1414C A2, B2 | TTY 2 Send/Tec | | Signal |
| 532 | 762733 | 1414C A2 | TTY 2 1st Send | | Signal |
| 532a | 762733 | 1414C B2 | TTY 2 2nd Send | | Signal |
| 533 | 762732 | 1414C A2 | TTY 2 1st Rec | | Signal |
| 533a | 762732 | 1414C B2 | TTY 2 2nd Rec | | Signal |

* See page 3-17 for connections

(continued)

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3 CABLE INSTALLATION

TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| Key # | Cable # | From (Red Tag) | To (White Tag) | Channel | Notes |
|--------|---------|---|-----------------------|---------|-----------------|
| 534 | 760683 | 1414C L1, 3 | 1011 Paper Tape | | Signal |
| 535 * | 763345 | 1414C L12,14,17,18,20 | 1009 Data Trans. * | | Signal |
| 536 ** | 761289 | 1414C L30, 31 | 1014 22 Pos. Term Box | | Signal |
| 536a** | 761289 | 1414C L33, 34 | 1014 22 Pos. Term Box | | Signal |
| 537 ** | 761289 | 1414C L36, 37 | 1014 22 Pos. Term Box | | Signal |
| 537a** | 761289 | 1414C L39, 40 | 1014 22 Pos. Term Box | | Signal |
| 538 ** | 761290 | 1014 4 Pos. Term Box | 1014 Station | 1st | Signal |
| 539 ** | 761290 | 1014 4 Pos. Term Box | 1014 Station | 2nd | Signal |
| 555a | 587330 | 7904 02A L01(B & C Ch) 02A L45(B & D Ch) | 7750 B45L | | See Fig. 3-5 |
| 555b | 587330 | 7904 02A L05(B & C Ch) 02A L49(B & D Ch) | 7750 B49L | | See Fig. 3-5 |
| 560 | 352303 | 7106A D-H | 7750 K Frame | | See Fig. 3-5 |
| 561 | 352303 | 7107A D-H | 7750 K Frame | | See Fig. 3-5 |

* See page 3-29 for further details.

** See page 3-28 for further details.

TABLE 3-1 7040/44 EXTERNAL CABLE PLUGGING CHART (continued)

| 7106/07 Connections for Key Nos. 103f, 103g, 106c, 106d | | | | | |
|---|-----------------|-------------------|----------|----------|----------|
| 7904 | Key # | Channel Selection | | | |
| | | E | D | C | ✓ B |
| 1st Channel | ✓ 103f "B" | L45, L46 | L47, L48 | L49, L50 | L51, L52 |
| 2nd Channel | ✓ 103g "C" | L45, L46 | L47, L48 | L49, L50 | L51, L52 |
| 3rd Channel | 106c | L45, L46 | L47, L48 | L49, L50 | L51, L52 |
| 4th Channel | 106d | L45, L46 | L47, L48 | L49, L50 | L51, L52 |

| Signal - "To" Column | | | |
|----------------------|----------|------------|------------|
| Key # | 1st 1414 | 2nd 1414 | 3rd 1414 |
| 502a | U9, L9 ✓ | U25, L25 ✓ | U30, L30 ✓ |
| 502b | U8, L8 ✓ | U24, L24 ✓ | U29, L29 ✓ |
| 502c | U5, L5 ✓ | U21, L21 ✓ | U26, L26 ✓ |
| 502d | U7, L7 ✓ | U23, L23 ✓ | U28, L28 ✓ |
| 502e | U6, L6 ✓ | U22, L22 ✓ | U27, L27 ✓ |
| 511a | U9, L9 | U25, L25 | U30, L30 |
| 511b | U8, L8 | U24, L24 | U29, L29 |
| 511c | U5, L5 | U21, L21 | U26, L26 |
| 511d | U6, L6 | U22, L22 | U27, L27 |

| Power - "From" Column | | | |
|-----------------------|-------------|-------------|-------------|
| Key # | To 1st 1414 | To 2nd 1414 | To 3rd 1414 |
| 502f | A01 | A07 | A08 |
| 504c | A01 | A07 | A08 |
| 511f | A01 | A07 | A08 |

7040 FR. A

For "other end" connections see pages 3-8, 3-9, 3-14, 3-15.

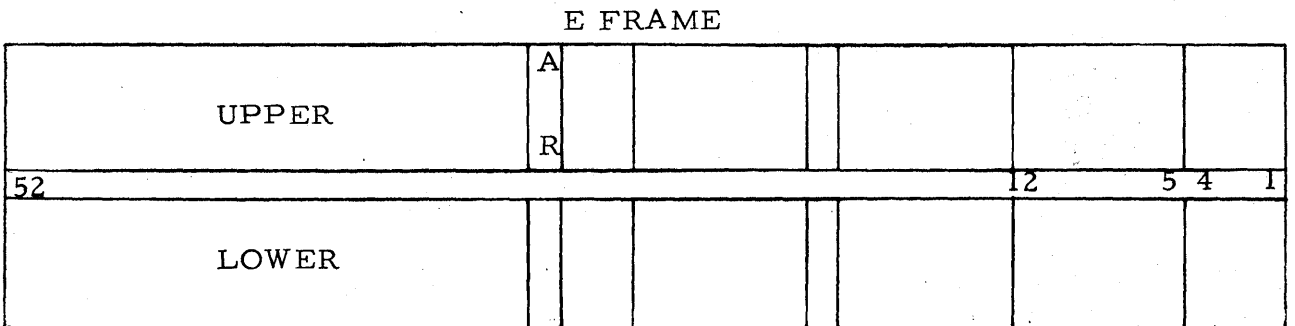
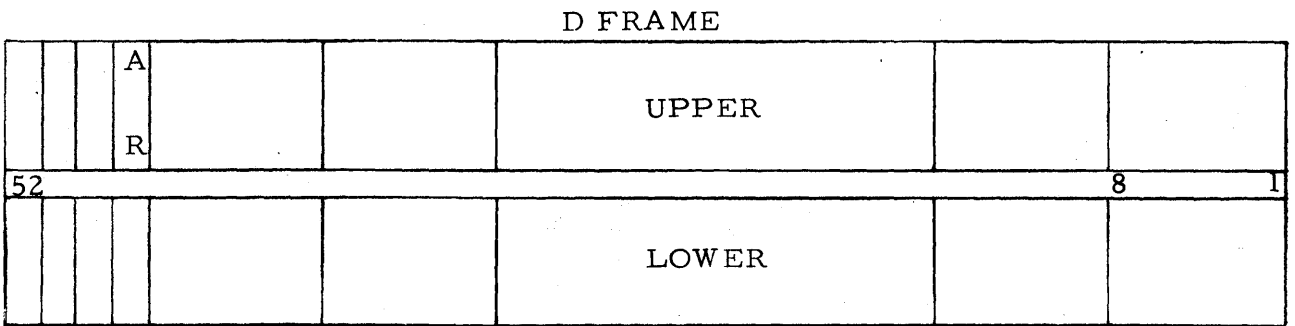
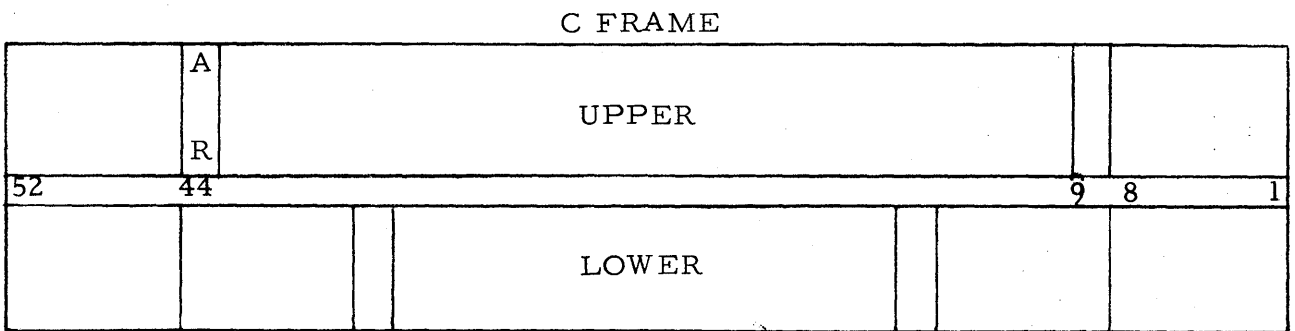
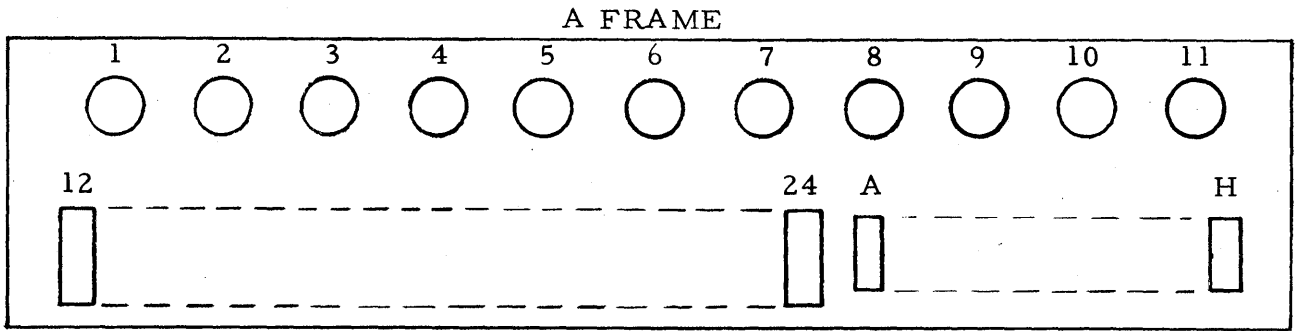
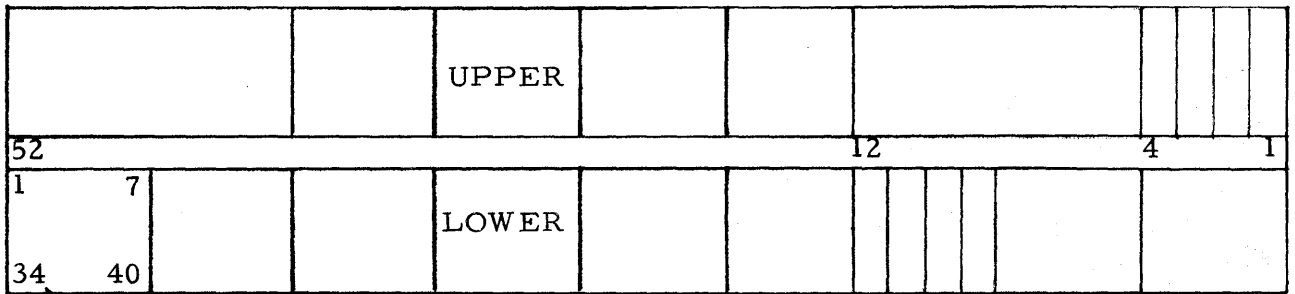


FIGURE 3-6 CONNECTOR PANELS, 7106/7107



Typical pin location for all connectors.

DQT card terminators (P/N 372148) are required on the last 7904 Data Channel. They are plugged in locations U33 through U41.

FIGURE 3-7 CONNECTOR PANEL - 7904

2.3 1414 I/O Synchronizer

- A. Following the plugging sequence in Table 3-1 plug power cables 760754 and 760741 to terminal boards TB A1, A2, A3 and A4 in the 1414 "A" frame. Figure 3-8 shows the location of these terminal blocks.
- B. Refer to the following illustrations for additional external cabling information:

| | |
|-------------|---------------------------|
| Figure 3-8 | 1414 Frame Configurations |
| Figure 3-9 | 1414 Connector Panels |
| Figure 3-10 | Cable 760754 Terminations |
| Figure 3-11 | Cable 760741 Terminations |

2.4 729/7330 Magnetic Tape Units

- A. All external cable connections to the 729/7330 units are to the rear of the units. See Figure 3-12.
- B. Attach dummy shoe (terminator) to the last tape unit in a series. The 729 and 7330 terminators are interchangeable physically, but not electrically. The terminators should be properly labeled to identify the correct tape unit.

CAUTION

Serious machine damage can be caused by application of power without terminator shoe installed.

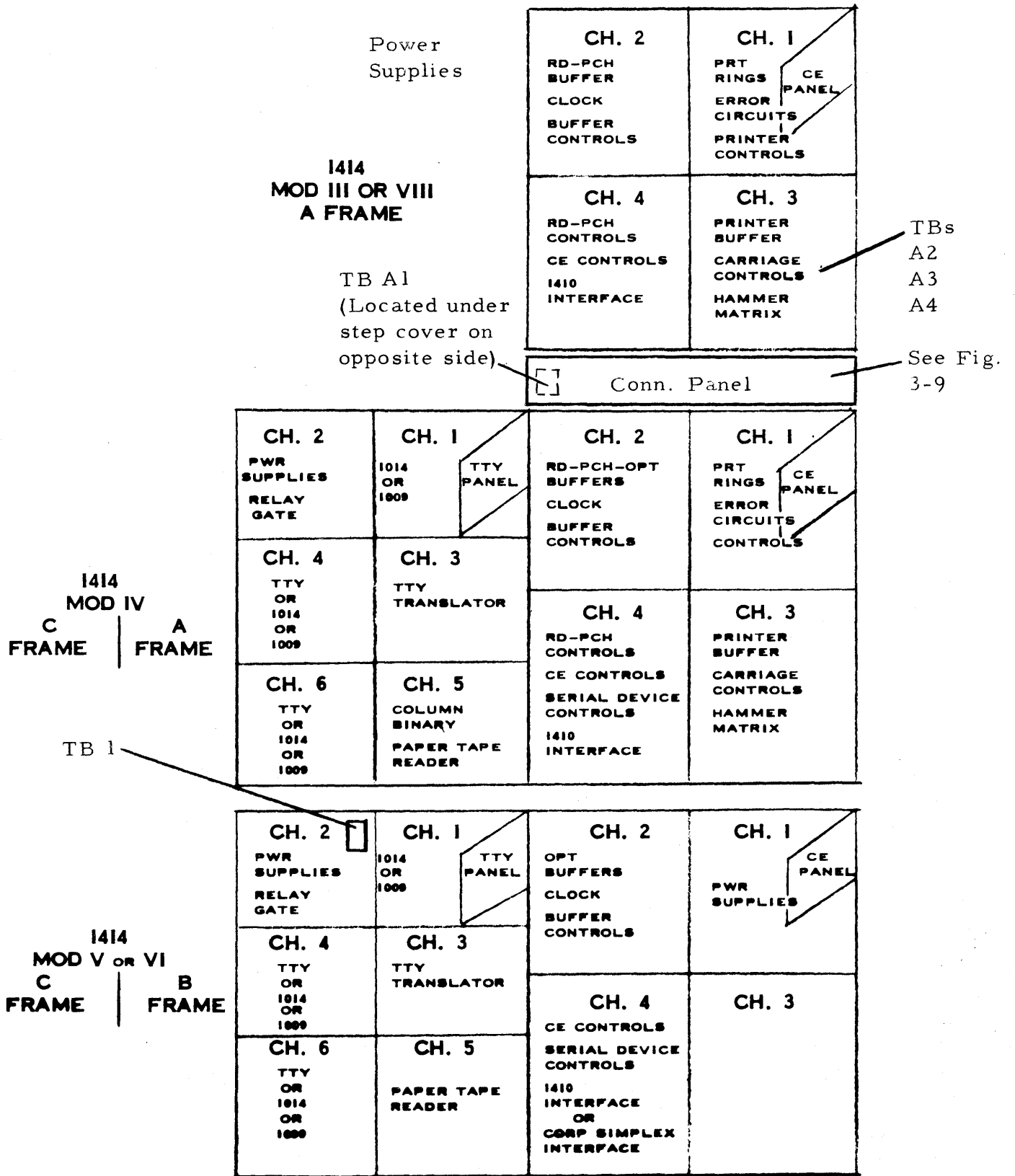
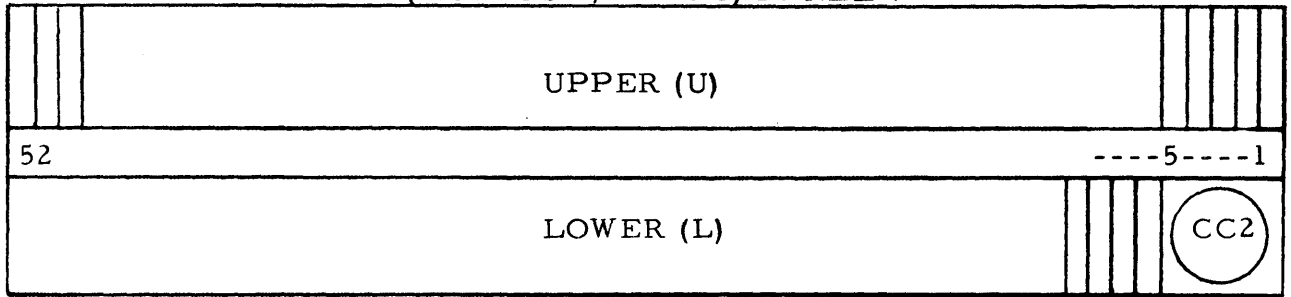
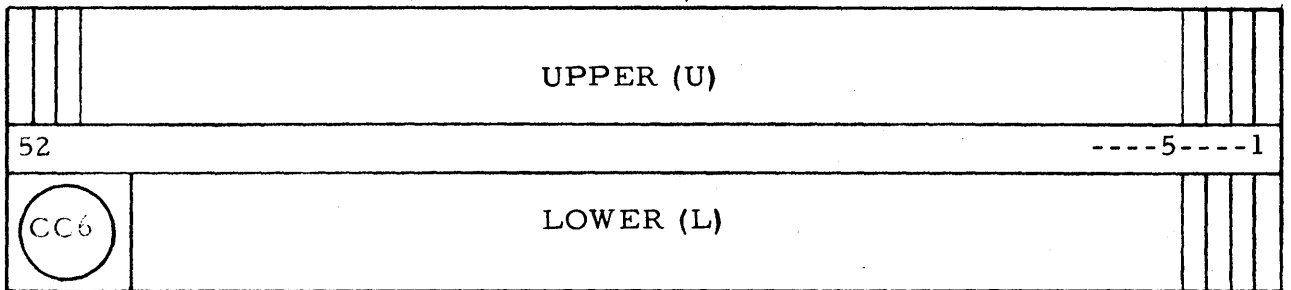


FIGURE 3-8 IBM 1414 FRAME CONFIGURATIONS

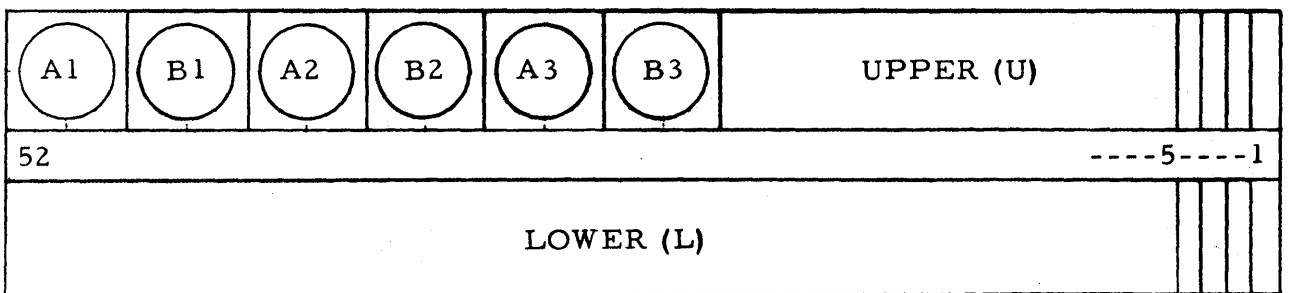
A FRAME (MODELS 3, 4 and 8) PANEL 7



B FRAME (MODELS 5 and 6) PANEL 7*



C FRAME (MODELS 4, 5 and 6) PANEL 7



* TAU (D frame) connector panel is similar to the B frame connector panel.

FIGURE 3-9 1414 CONNECTOR PANELS

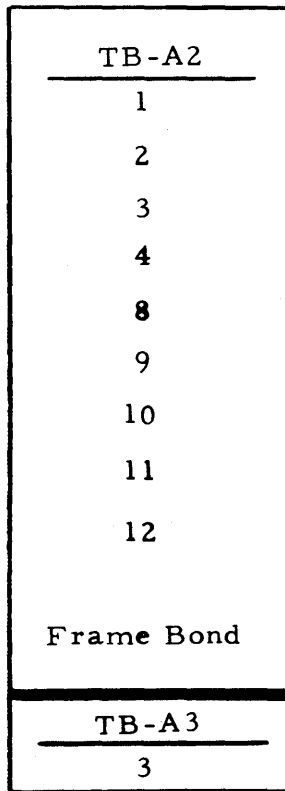
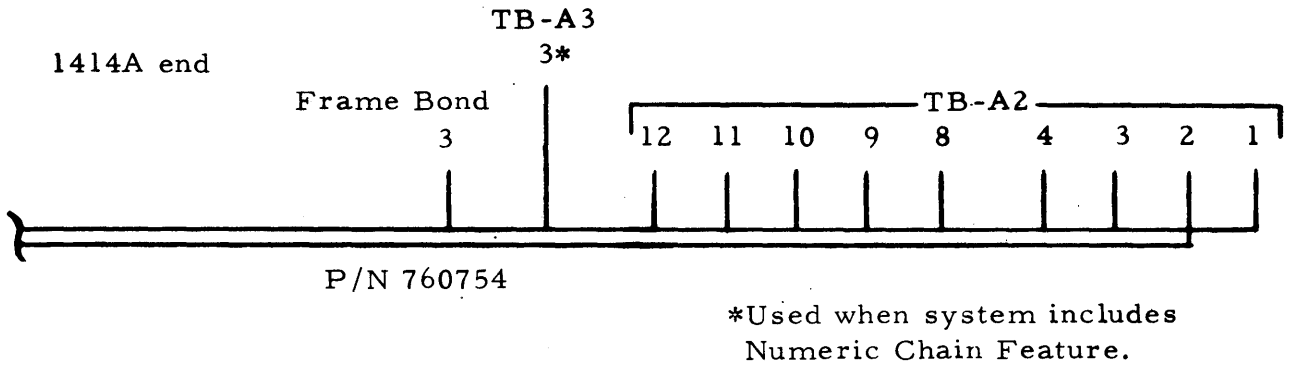


FIGURE 3-10 CABLE 760754 TERMINATIONS

3 CABLE INSTALLATION

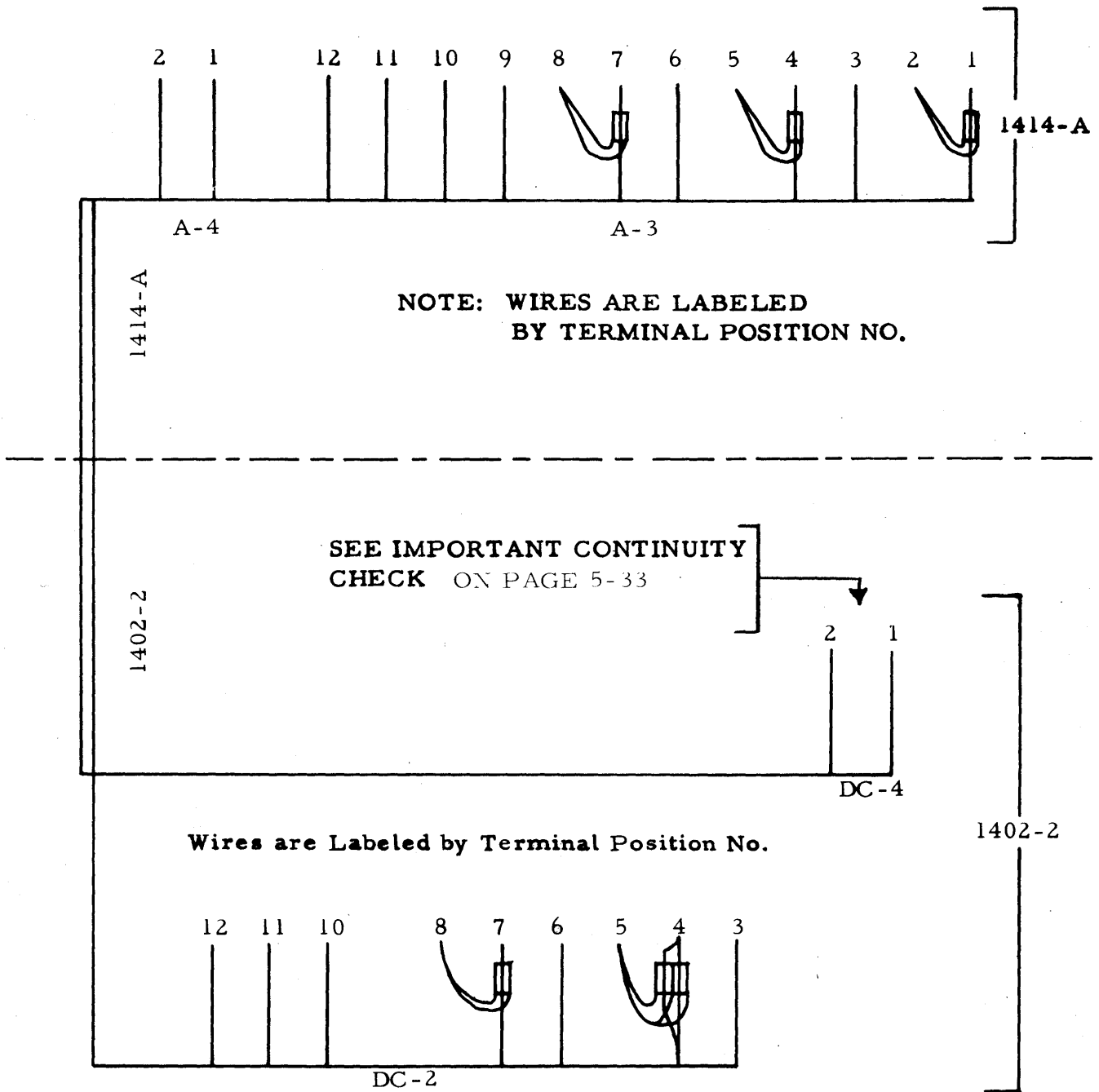
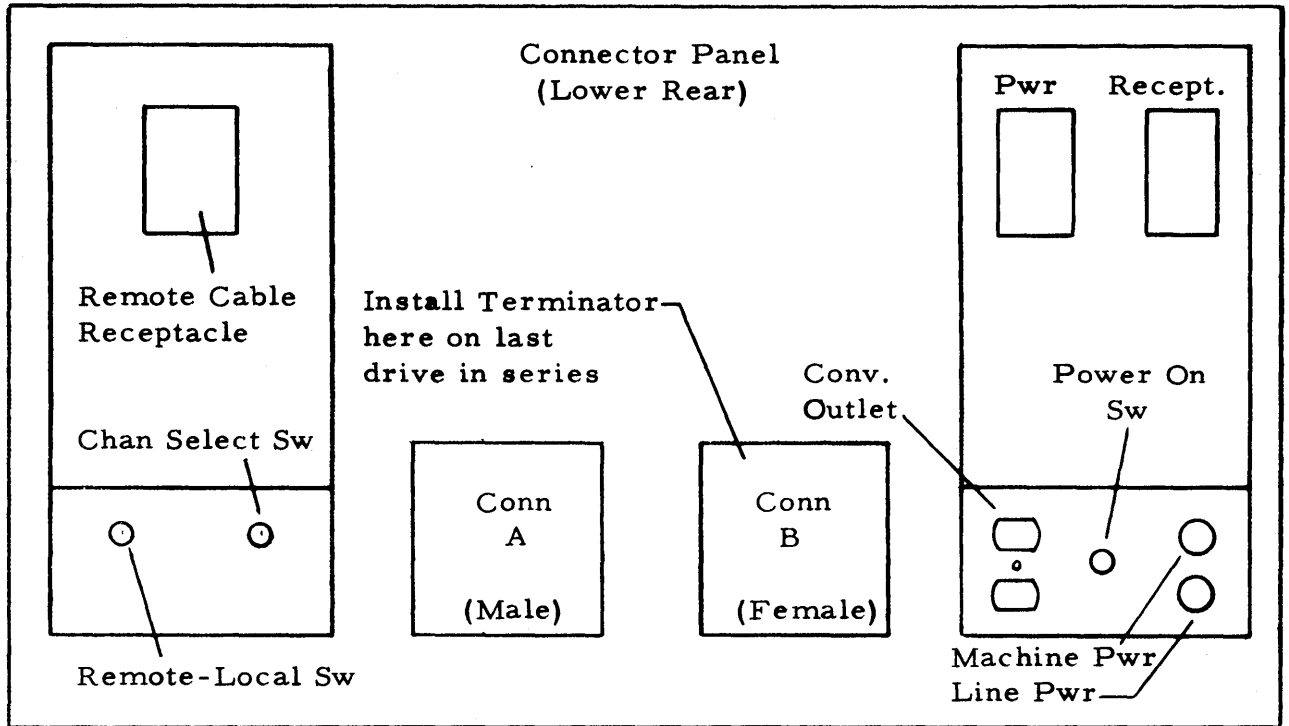


FIGURE 3-11 CABLE 760741 (Key 505b) TERMINATIONS

729 CONNECTORS



7330 CONNECTORS

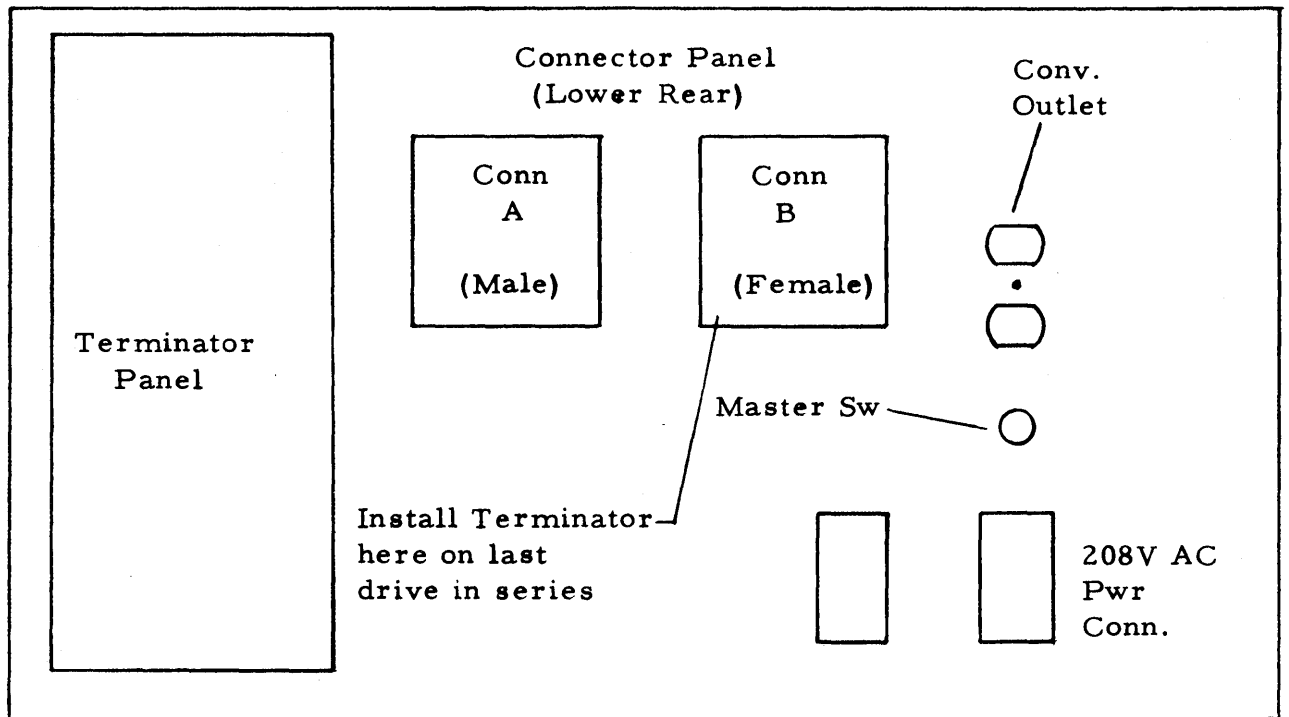


FIGURE 3-12 TAPE UNIT CONNECTOR PANEL S

2.5 1402 Card Read Punch

- A. External cable connections for the 1402 are to the rear of the unit. See Figure 3-13. Also see Figure 3-11 for a layout of power distribution cable 760741. After installing the cables, check that the cable clamp is securely fastened (Figure 3-13).
- B. To avoid the possibility of blowing hammer driver fuses, and/or hammer drive coils, make the following continuity check before applying power:

Between 1402 DC4-1 and 1414-3 TBA4-2 *

Between 1402 DC4-2 and 1414-3 TBA4-1 *

2.6 1403 Printer

- A. Connect the following cables:

Key 507 760754

508a 760674

508b 760673

- B. Check continuity between TBA4-2 and TBA3-12. This is the -60V DC return for the printer.

2.7 1014 Remote Inquiry Unit

The detailed installation cabling for the 1014 Remote Inquiry Unit is illustrated in Figure 3-14. Connections are listed in Table 3-1. If the 1414 I/O Synchronizer is operational, the 1014 unit(s) can be tested as soon as installation is completed. Step by step instructions are given in Chapter 5.

* To prevent a false reading through the power supply, disconnect both ends of these wires before checking continuity.

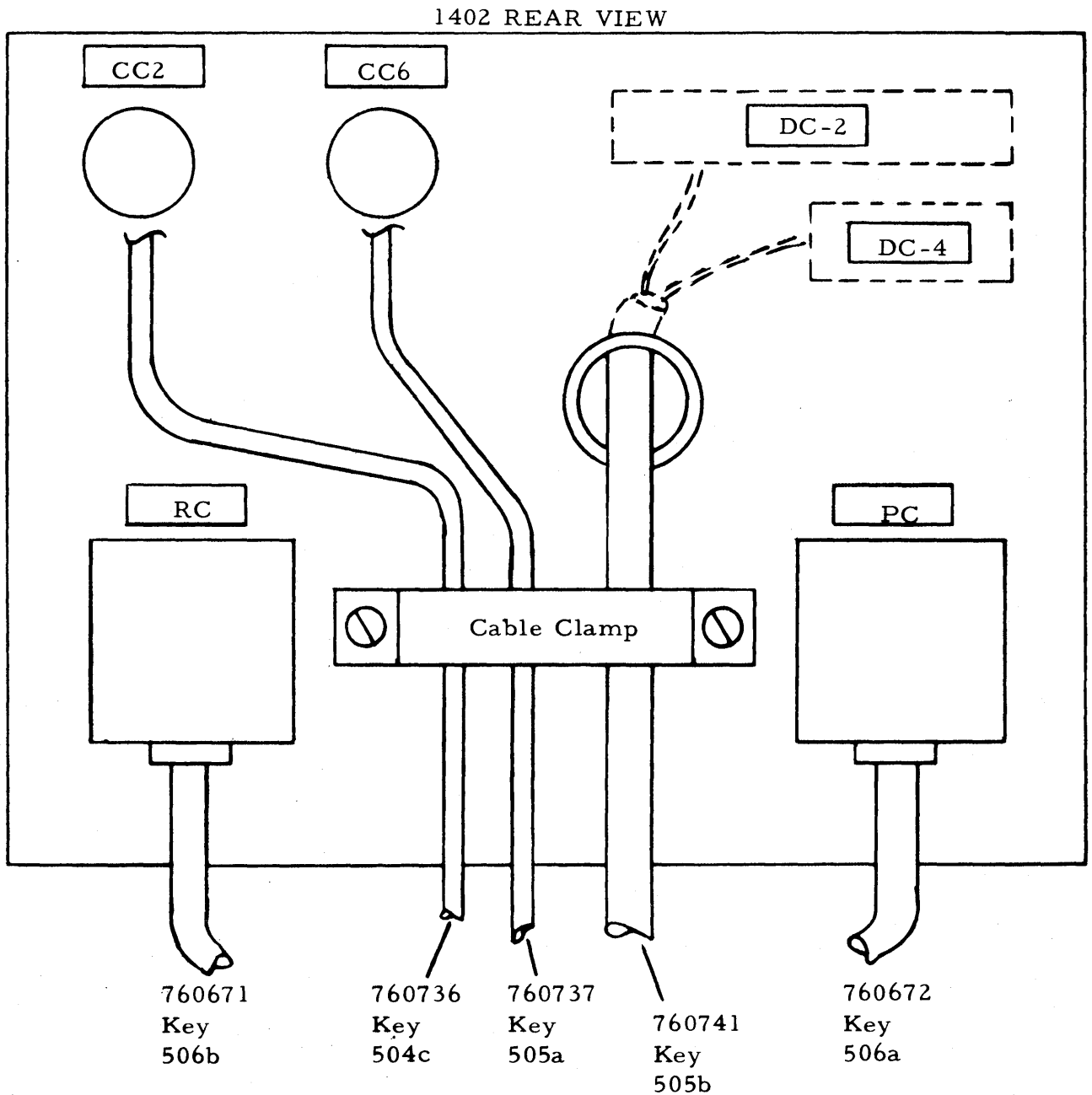


FIGURE 3-13 CONNECTOR LOCATIONS AND CABLE ROUTING - 1402

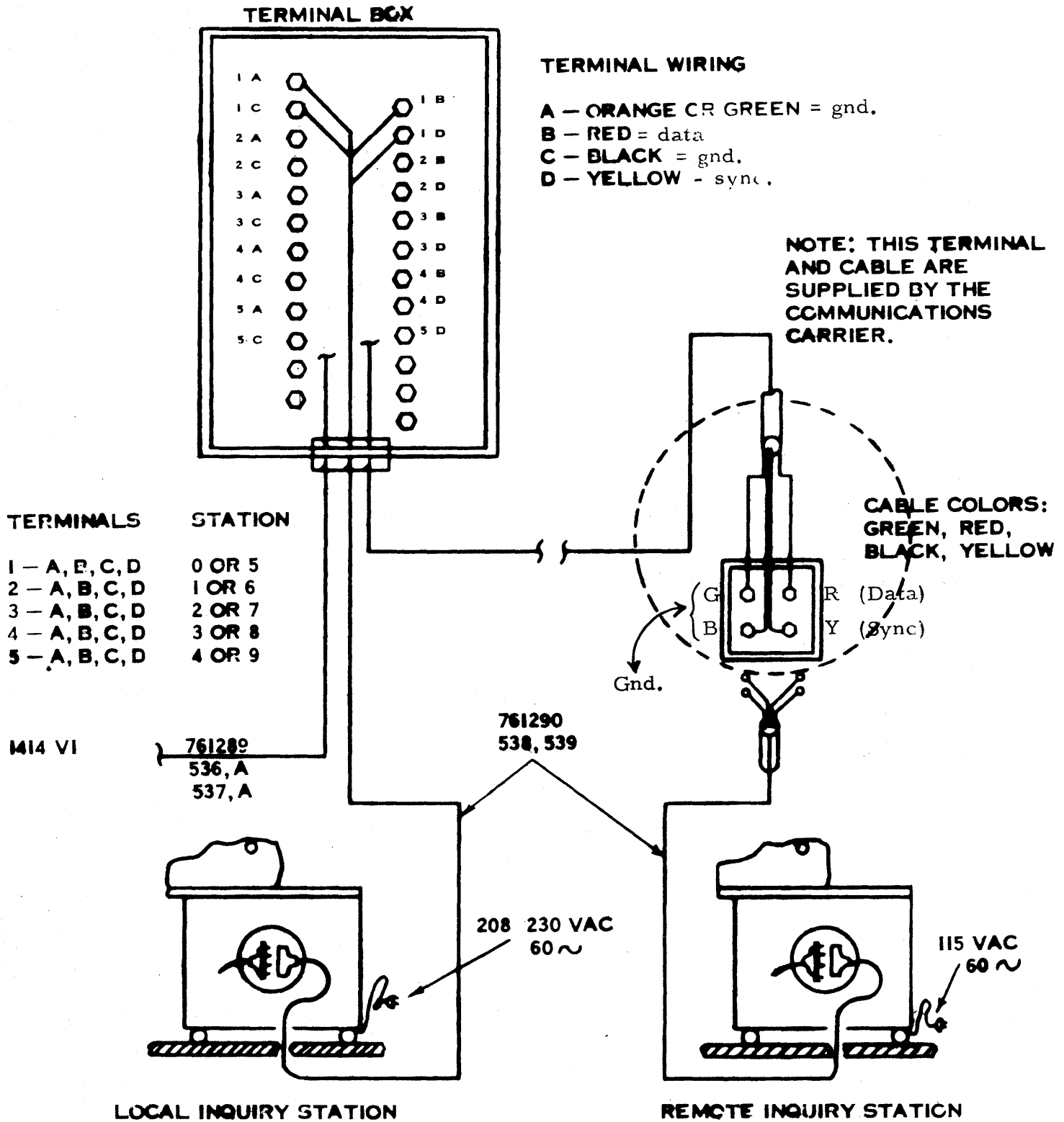


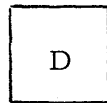
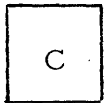
FIGURE 3-14 1014 EXTERNAL CABLING

2.8 1009 Data Transmission Unit

Only one external cable is needed to connect the 1009 to the 1414 I/O Synchronizer. This cable is connected as follows:

| KEY NO. | PART NO. | RED TAG - FROM | WHITE TAG - TO |
|---------|----------|----------------|----------------|
| 535 | 763345 | 1414C7 | 1009 C and D |

Data sub-set (DSS)
when used, plugs into
"A" connector



Connector positions
of the 1009 unit

If plugs at the 1009 end of cable 763345 are not labeled, connector "C" can be distinguished by the 34 active connections; "D" has 38 wires connected to it.

2.9 1301/1302/7320-7631 Units

Use Table 3-1 to connect the external cables. Figure 3-4 illustrates the cables and their connections. The same cables are used for the 1301/1302 Disk Storage and the 7320 Drum Storage Units

2.10 7740 Communication Control System

Connections to the 7040/44 are from the 7741 main frame to a 7904 data channel. For the complete installation instructions for installing a 7740 system, refer to the "IBM 7740 Preliminary Installation Instructions".

The following cables are required (see table 3-1):

Cable 587330 Key nos. 201a, 201b

Cable 352303 Key nos. 199b, 199c

✓ 3. INTERNAL CABLING - 7106/7107

Cables interconnecting the six frames of the 7106/7107 are terminated after the frames are assembled. Certain ends of each cable are disconnected to facilitate shipment of the 7106/7107 as individual frames.

For easier cable routing and installation, particularly jumper cables, remove the outer doors and the electronic panel (inner) doors on the card side of the frames. Replace the doors after internal cabling has been completed.

✓ 3.1 Interpanel Jumper Cables

These are short paddle connector cables, P/N 539494, and are all connected on the card side of the frames. The paddle connectors are marked with the plugging locations or tables 3-2 and 3-3 can be used to connect the 7106 and 7107 respectively. Briefly, all jumpers connect columns 1-28 and 2-27, except between frames B and C of the 7107, where columns 1-16 and 2-15 are utilized.

✓ 3.2 Power Distribution Cable 5235317 *Not connected in Model*

This cable is disconnected completely and packaged separately for shipment. Cable connectors are labeled by terminating position. Use caution when installing the cable. Panel and connector pins are easily bent. Unlatch the tailgate panels to install the cable, and connect it as shown in Figure 3-15 page 3-34. For 50 cycle systems the cable P/N is 5236722.

Install this cable before cables 5235677, 5235678 and 5235679 are installed.

TABLE 3-2 JUMPER CABLE CONNECTIONS - 7106

| FROM | | TO | | | FROM | | TO | | |
|-------|------|-------|------|---|-------|------|-------|------|---|
| Panel | Term | Panel | Term | | Panel | Term | Panel | Term | |
| B4 | B27 | C3 | B02 | ✓ | C2 | F27 | D1 | F02 | ✓ |
| B4 | C27 | C3 | C02 | ✓ | C2 | F28 | D1 | F01 | ✓ |
| B4 | C28 | C3 | C01 | ✓ | C2 | G27 | D1 | G02 | ✓ |
| B4 | D27 | C3 | D02 | ✓ | C2 | G28 | D1 | G01 | ✓ |
| B4 | D28 | C3 | D01 | ✓ | C2 | H27 | D1 | H02 | ✓ |
| B4 | E27 | C3 | E02 | ✓ | C2 | H28 | D1 | H01 | ✓ |
| B4 | E28 | C3 | E01 | ✓ | C2 | J27 | D1 | J02 | ✓ |
| B4 | F27 | C3 | F02 | ✓ | C2 | J28 | D1 | J01 | ✓ |
| B4 | F28 | C3 | F01 | ✓ | C2 | K27 | D1 | K02 | ✓ |
| B4 | G27 | C3 | G02 | ✓ | C2 | K28 | D1 | K01 | ✓ |
| B4 | G28 | C3 | G01 | ✓ | C4 | A27 | D3 | A02 | ✓ |
| B4 | H27 | C3 | H02 | ✓ | C4 | A28 | D3 | A01 | ✓ |
| B4 | H28 | C3 | H01 | ✓ | C4 | B27 | D3 | B02 | ✓ |
| C2 | A28 | D1 | A01 | ✓ | C4 | B28 | D3 | B01 | ✓ |
| C2 | B28 | D1 | B01 | ✓ | C4 | C27 | D3 | C02 | ✓ |
| C2 | C28 | D1 | C01 | ✓ | C4 | C28 | D3 | C01 | ✓ |
| C2 | D27 | D1 | D02 | ✓ | C4 | D27 | D3 | D02 | ✓ |
| C2 | D28 | D1 | D01 | ✓ | C4 | D28 | D3 | D01 | ✓ |
| C2 | E27 | D1 | E02 | ✓ | C4 | E27 | D3 | E02 | ✓ |
| C2 | E28 | D1 | E01 | ✓ | C4 | E28 | D3 | E01 | ✓ |

(Continued)

3 CABLE INSTALLATION

TABLE 3-2 JUMPER CABLE CONNECTIONS - 7106 (continued)

| FROM | | TO | |
|-------|------|-------|------|
| Panel | Term | Panel | Term |
| C4 | F27 | D3 | F02 |
| C4 | F28 | D3 | F01 |
| C4 | G27 | D3 | G02 |
| C4 | G28 | D3 | G01 |
| C4 | H27 | D3 | H02 |
| C4 | H28 | D3 | H01 |
| C4 | J28 | D3 | J01 |
| C4 | K27 | D3 | K02 |
| C4 | K28 | D3 | K01 |
| D2 | A27 | E1 | A02 |
| D2 | A28 | E1 | A01 |
| D2 | B28 | E1 | B01 |
| D2 | C27 | E1 | C02 |
| D2 | C28 | E1 | C01 |
| D2 | D27 | E1 | D02 |
| D2 | D28 | E1 | D01 |
| D2 | E27 | E1 | E02 |
| D2 | E28 | E1 | E01 |
| D2 | F27 | E1 | F02 |
| D2 | F28 | E1 | F01 |

Handwritten checkmarks and a large bracket on the right side of the first table, spanning rows 1 through 10.

| FROM | | TO | |
|-------|------|-------|------|
| Panel | Term | Panel | Term |
| D2 | G28 | E1 | G01 |
| D2 | H27 | E1 | H02 |
| D2 | H28 | E1 | H01 |
| D2 | J28 | E1 | J01 |
| D2 | K28 | E1 | K01 |
| D4 | A28 | E3 | A01 |
| D4 | B27 | E3 | B02 |
| D4 | B28 | E3 | B01 |
| D4 | C27 | E3 | C02 |
| D4 | C28 | E3 | C01 |
| D4 | D27 | E3 | D02 |
| D4 | D28 | E3 | D01 |
| D4 | E27 | E3 | E02 |
| D4 | E28 | E3 | E01 |
| D4 | F27 | E3 | F02 |
| D4 | F28 | E3 | F01 |
| D4 | G27 | E3 | G02 |
| D4 | G28 | E3 | G01 |
| D4 | H27 | E3 | H02 |
| D4 | H28 | E3 | H01 |

Handwritten checkmarks and a large bracket on the right side of the second table, spanning rows 1 through 18.

D4 J27 E3 J2

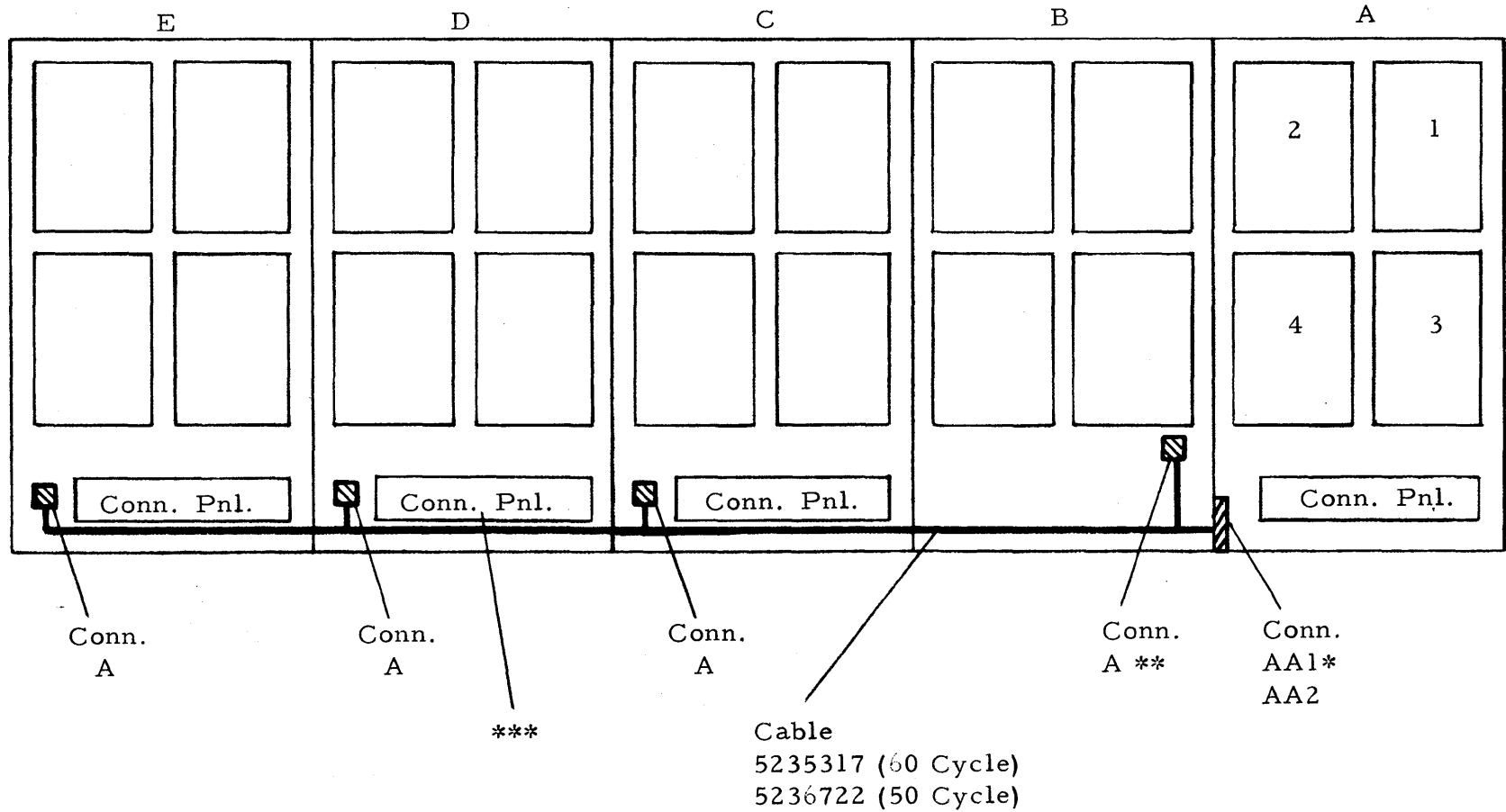
TABLE 3-3 JUMPER CABLE CONNECTIONS - 7107

| FROM | | TO | |
|-------|------|-------|------|
| Panel | Term | Panel | Term |
| D2 | A27 | E1 | A02 |
| D2 | A28 | E1 | A01 |
| D2 | B28 | E1 | B01 |
| D2 | C27 | E1 | C02 |
| D2 | C28 | E1 | C01 |
| D2 | D27 | E1 | D02 |
| D2 | D28 | E1 | D01 |
| D2 | E27 | E1 | E02 |
| D2 | E28 | E1 | E01 |
| D2 | F27 | E1 | F02 |
| D2 | F28 | E1 | F01 |
| D2 | G28 | E1 | G01 |
| D2 | H27 | E1 | H02 |
| D2 | H28 | E1 | H01 |
| D2 | J28 | E1 | J01 |
| D2 | K28 | E1 | K01 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| FROM | | TO | |
|-------|------|-------|------|
| Panel | Term | Panel | Term |
| B4 | B15 | C3 | B02 |
| B4 | C15 | C3 | C02 |
| B4 | C16 | C3 | C01 |
| B4 | D15 | C3 | D02 |
| B4 | D16 | C3 | D01 |
| B4 | E15 | C3 | E02 |
| B4 | E16 | C3 | E01 |
| B4 | F15 | C3 | F02 |
| B4 | F16 | C3 | F01 |
| B4 | G15 | C3 | G02 |
| B4 | G16 | C3 | G01 |
| B4 | H15 | C3 | H02 |
| B4 | H16 | C3 | H01 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

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WIRING SIDE
7106/07



- * Cable lead has longest breakout to AA1. Plug to outside Burndy Conn.
- ** Cable lead to Conn. A in B frame is 24 inches; Frames C, D and E, 2 inches.
- *** Unlatch connector panels to route and connect cable.

FIGURE 3-15 CABLE 5235317 - ROUTING AND TERMINATIONS

3-34

✓ 3.3 Signal Cables 5235677, 5235678, 5235679

These cables consist of ribbon cables with paddle connectors on one end. The paddle connectors are labeled by terminating position. Figure 3-16 page 3-36 shows the routing of the cables and Table 3-4 lists the connections for both ends. The frame routing of the cables is as follows:

- ✓ 5235677 Frame A to C, D and E (Install First)
- ✓ 5235678 Frame A to D (Install Second)
- ✓ 5235679 Frame A to C (Install Last)

✓ 3.4 Memory Cables 5235656 and 5236513

These cables provide DC power to the memory frames. The cable is routed across the top of the frames from A to B. Cable 5235656 is a 7106 cable and terminates at the Laminar Bus terminal block in the B frame. Cable 5236513 is a 7107 cable and terminates at Laminar Bus TB1 and TB2. Figure 3-17 shows the routing of the cables and Table 3-5 lists the terminations for the B frame end of the cables.

✓ 3.5 Array Thermistor Cables 5236606 and 5236607

These cables are two wire, black and yellow twisted pairs. Cable 5236606 is used on the 7106 and cable 5236607 is used on the 7107. Route the cable adjacent to the memory cable on top of the frames, from A to B.

Terminations are as follows: (see Figure 3-17)

| <u>Cable</u> | <u>A Frame</u> | <u>B Frame</u> |
|--------------|----------------|------------------|
| 5236606 | P. S. 1 TB3 | B1A01 |
| 5236607 | P. S. 1 TB3 | Array Thermistor |

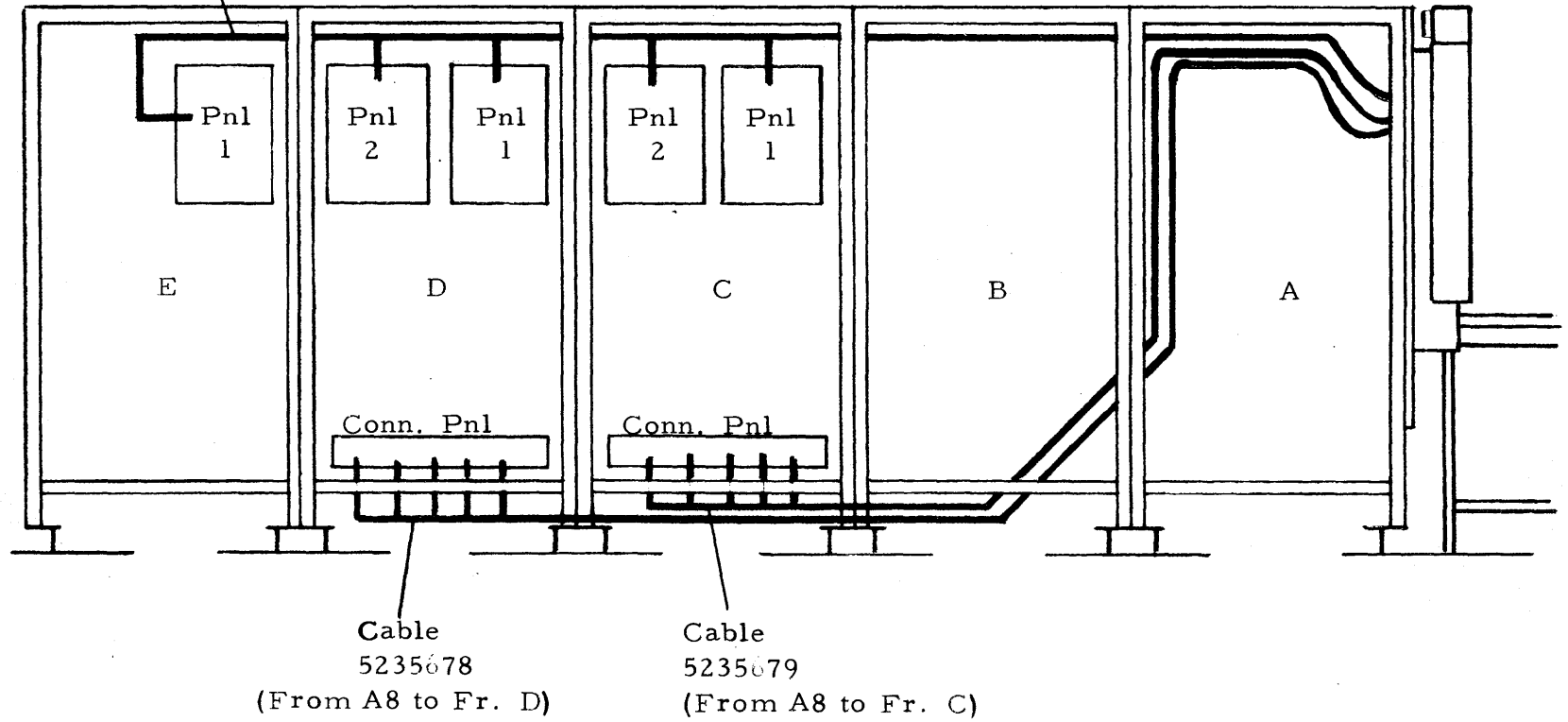
CAUTION

If these cables are not plugged, the X-Y supply will operate without thermistor control (approximately 80 volts) and may damage driver cards even though the over-voltage device takes power down.

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Cable 5235677
(From A8 to Frames C, D, E)

WIRING SIDE
7106/07



Cable terminations are listed in Table 3-4.

FIGURE 3-16 SIGNAL CABLE ROUTING

3-36

MJ + GP

TABLE 3-4 SIGNAL CABLE TERMINATIONS

| Cable Assembly 5235677 | | | Cable Assembly 5235678 | | |
|------------------------|--------|-------------|------------------------|--------|-------|
| Cable # | From | To | Cable # | From | To |
| ✓ 5236466 | A8 B20 | C1 Y 01, 02 | 5236487 | A8 A14 | D U08 |
| ✓ 5236467 | A8 B19 | C1 Y 03, 04 | 5236486 | A8 A15 | D U09 |
| ✓ 5236468 | A8 B18 | C1 Y 05, 06 | 5236485 | A8 A17 | D U28 |
| ✓ 5236469 | A8 B17 | C1 Y 07, 08 | 5236484 | A8 A18 | D U29 |
| ✓ 5236470 | A8 B16 | C1 Y 09, 10 | 5236483 | A8 A19 | D U30 |
| ✓ 5236471 | A8 B14 | C1 Y 17, 18 | 5236482 | A8 A20 | D U31 |
| ✓ 5236472 | A8 B13 | C1 Y 19, 20 | Cable Assembly 5235679 | | |
| ✓ 5236473 | A8 B12 | C1 Y 21, 22 | 5236501 | A8 A01 | C U01 |
| ✓ 5236474 | A8 B10 | C1 Y 23, 24 | 5236499 | A8 A02 | C U02 |
| ✓ 5236475 | A8 B09 | C2 Y 05, 06 | 5236498 | A8 A03 | C U03 |
| ✓ 5236476 | A8 B08 | C2 Y 07, 08 | 5236497 | A8 A04 | C U04 |
| ✓ 5236477 | A8 B07 | D1 Y 15, 16 | 5236496 | A8 A05 | C U05 |
| ✓ 5236478 | A8 B06 | D1 Y 19, 20 | 5236495 | A8 A06 | C U07 |
| ✓ 5236479 | A8 B05 | D2 Y 03, 04 | 5236494 | A8 A07 | C U08 |
| ✓ 5236480 | A8 B04 | D2 Y 05, 06 | 5236493 | A8 A08 | C U45 |
| X 5236481 | A8 B03 | E1 Y 25, 26 | 5236492 | A8 A09 | C U46 |
| | | | 5236491 | A8 A10 | C U47 |
| | | | 5236490 | A8 A11 | C U48 |
| | | | 5236489 | A8 A12 | C U49 |
| | | | 5236488 | A8 A13 | C U50 |

Follow the routing diagram, Fig. 3-16 Page 3-36 to install cables.

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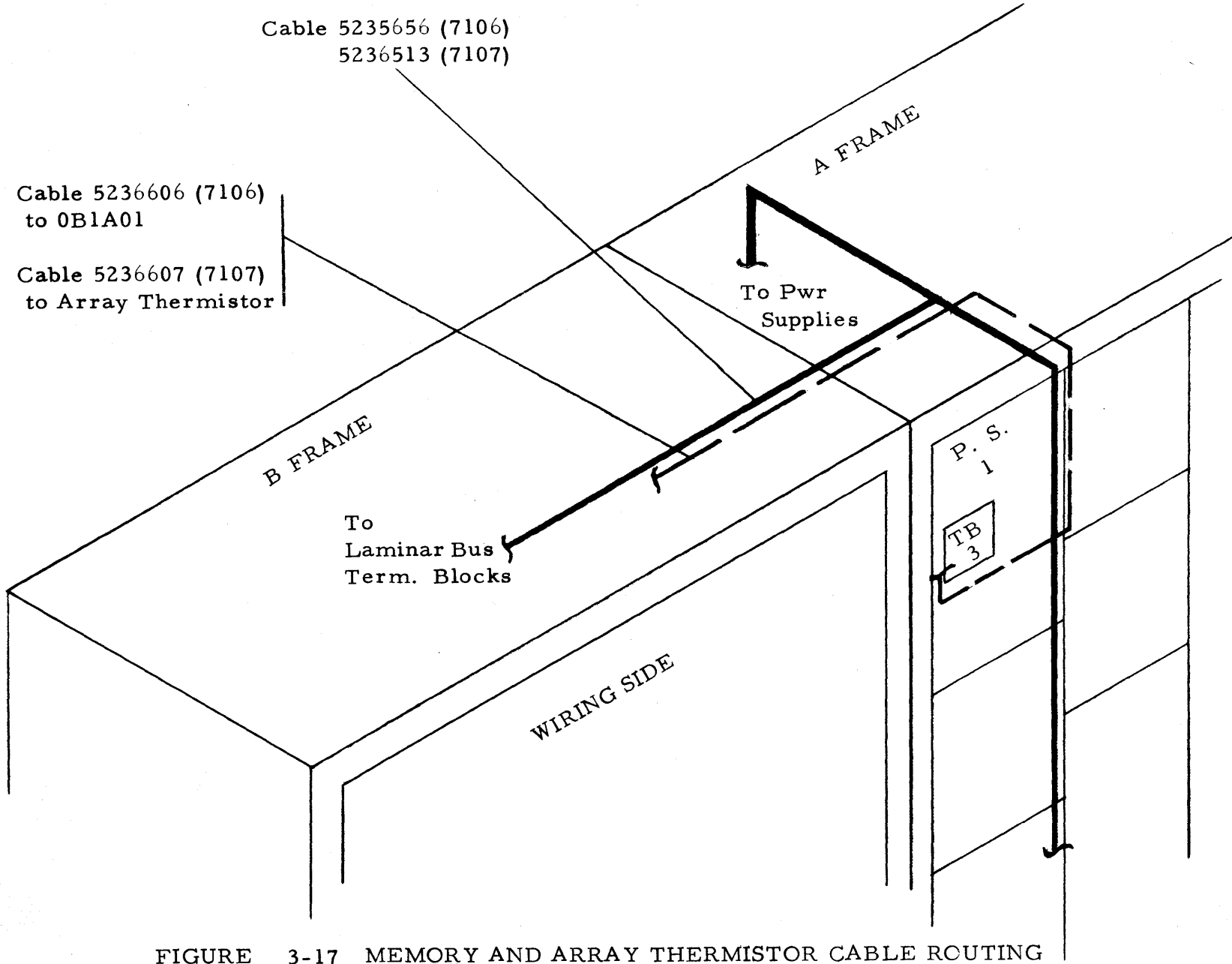


FIGURE 3-17 MEMORY AND ARRAY THERMISTOR CABLE ROUTING

3-38

TABLE 3-5 MEMORY CABLES - B FRAME TERMINATIONS

| Cable 5235656 (7106) | | |
|-------------------------|--------------|----------|
| Laminar Bus Term. Block | | |
| Wire # | Color Coding | Position |
| 2, 7 | Black | 1 |
| 8 | Blue | 2 |
| 3 | Orange | 3 |
| 4, 6 | Purple | 4 |
| 5 | Grey | 5 |
| 6 | Purple | 6 |
| 9 | White | 7 |
| 10 | White/Red | 8 |

| Cable 5236513 (7107) | | | | | |
|----------------------|-----------|----------|---------------------|-----------|----------|
| Laminar Bus T. B. 1 | | | Laminar Bus T. B. 2 | | |
| Wire # | Color | Position | Wire # | Color | Position |
| 11 | Black | 1 | 1 | Black | 1 |
| 2 | Orange | 2 | 2 | Orange | 2 |
| 13 | Orange | 2 | 3 | Purple | 3 |
| 4 | Purple | 3 | 18 | Grey | 4 |
| 19 | Grey | 4 | 5 | Wh/Purple | 5 |
| 5 | Wh/Purple | 5 | 7 | Wh/Red | 7 |
| 14 | Wh/Purple | 5 | 12 | Wh/Red | 8 |
| 8 | Wh/Red | 7 | 9 | Black | 9 |
| | | | 10 | Wh/Red | 10 |
| Sw. and Jack TB | | | | | |
| 17 | Aqua | 1 | | | |
| 20 | Aqua | 2 | | | |

Wires may be labeled by wire no. or terminating position no. Follow the color coding; cable and laminar bus color codings must agree.

3.6 PDU Cables 5236461 and 5236462

For shipment, these cables are secured to the console table top supports on the A frame. Route the cables under the floor, adjacent to the A Frame tailgate connector panel, and connect to the customer's power source.

✓ 3.7 Connectors to Tailgate - Cable 5236457

This cable connects the A frame with the connectors under the console table. Three paddle cards, labeled positions 28, 30 and 32 are plugged to the three connectors under the console table. The typewriter cable paddle cards plug to the other side of the connectors. Mate the connections, 28 to 28, 30 to 30, and 32 to 32 (see Figure 2-1 page 2-3).

✓ 3.8 CPU Use Meter - Cable 5237060

The cable is connected and coiled in the D frame. To complete the connections, run the cable across the top of the frames and terminate as follows:

| <u>Wire No.</u> | <u>Color</u> | <u>Termination</u> | <u>Location</u> |
|-----------------|--------------|--------------------|-----------------|
| 3 | Black/Yellow | TB-2 Pos. 1 | Console |
| 1 | Green | Bond Screw | Meter |
| 2 | Yellow | TB Pos. 5 | Meter |
| 2 | Black | TB Pos. 6 | Meter |
| 3 | Yellow | TB Pos. 7 | Meter |
| 3 | Black | TB Pos. 8 | Meter |

All cable wires are labeled by terminating position. Replace meter cover and seal with part number 740489 after cable is installed.

✓ 3.9 7106 Memory Array Connections

| <u>Upper Stack</u> | | <u>Lower Stack</u> | |
|--------------------|----------------|--------------------|----------------|
| <u>Receptacles</u> | <u>Paddles</u> | <u>Receptacles</u> | <u>Paddles</u> |
| B1 - B8 | 2 - 9 | A1 | 1 |
| C1 - C8 | 10 - 17 | B1 - B8 | 2 - 9 |
| D1 - D8 | 18 - 26 | C1 - C8 | 10 - 17 |
| E1 - E8 | 27 - 34 | D1 - D8 | 18 - 26 |
| F1 - F8 | 35 - 41 | E1 - E8 | 27 - 34 |
| G1 - G4 | 42 - 45 | F1 - F8 | 35 - 41 |
| | | J1 - J2 | 43, 42 * |
| | | K1 - K2 | 45, 44 * |

* Note sequence change.

✓ 3.10 Laminar Bus Jumper Cable - D to E Frame

Connect 11 wires to corresponding laminar bus TB positions in the D frame. Wire no. 11 is connected to position 10 in the D frame and also position 10 in the C frame. Wires are not labeled, but color coding is as follows:

| <u>Wire #</u> | <u>Color</u> |
|---------------|--------------|
| 5, 6 | Grey |
| 1, 2 | Orange |
| 3, 4, 7, 8, | Black |
| 10, 11 | Violet |
| 9 | Aqua |

✓ 3.11 Panel to Tailgate - Cable 5236454

This cable is a D frame cable. Two yellow wires go to the E frame connector panel and are connected as follows:

- Wire No. 22 to E U18K
- Wire No. 23 to E U18M

3.12 Address Interrogation Device Cables*QWTH* 3.12.1 Cable 5237278 (for 7106 and 7107).

This is a 5-wire cable connecting A and C frame. The cable is connected to the Address Stop and Step Mode switches in A frame. All leads are labeled by wire number. The C frame connections are:

| | |
|--------------|--------|
| Wire No. 1 ✓ | C1Y13B |
| Wire No. 2 ✓ | C1Y13C |
| Wire No. 3 ✓ | C1Y13D |
| Wire No. 4 ✓ | C1Y13E |

QWTH 3.12.2 Cable 5237279 (for 7107 only) and Cable 5237280 (for 7106 only).

These cables connect B and C frames in the 7106 and 7107. The cables are connected in the B frame for shipment. All leads are labeled by wire number. The C frame connections, identical for both the 7106 and 7107, are:

| <u>Wire No.</u> | <u>Termination</u> | <u>Wire No.</u> | <u>Termination</u> |
|-----------------|--------------------|-----------------|--------------------|
| 1 ✓ | C1Y16G | 16 ✓ | C1Y15F |
| 2 ✓ | C1Y16H | 17 ✓ | C1Y14E |
| 3 ✓ | C1Y15G | 18 ✓ | C1Y14F |
| 4 ✓ | C1Y15H | 19 ✓ | C1Y13F |
| 5 ✓ | C1Y14G | 20 ✓ | C1Y12E |
| 6 ✓ | C1Y14H | 21 ✓ | C1Y12F |
| 7 ✓ | C1Y13G | 22 ✓ | C1Y11E |
| 8 ✓ | C1Y13H | 23 ✓ | C1Y11F |
| 9 ✓ | C1Y12G | 24 ✓ | C1Y16C |
| 10 ✓ | C1Y12H | 25 ✓ | C1Y16D |
| 11 ✓ | C1Y11G | 26 ✓ | C1Y15C |
| 12 ✓ | C1Y11H | 27 ✓ | C1Y15D |
| 13 ✓ | C1Y16E | 28 ✓ | C1Y14C |
| 14 ✓ | C1Y16F | 29 ✓ | C1Y14D |
| 15 ✓ | C1Y15E | 30 ✓ | C1Y12C |

4. INTERNAL CABLING - 1414 I/O SYNCHRONIZER

4.1 Laminar Bus Cable - 730301

This cable connects the Laminar Bus TB3 and 4 with Laminar Bus TB C3 and C4, respectively.

4.2 Cable 760744

This is a 1414 A Frame Cable. For Emergency Off, Paper Tape Printer and 1009 Unit, four wires of this cable are routed to the C frame to complete the following connections in order to tie-off:

| <u>A Frame</u> | <u>C Frame</u> | |
|----------------|----------------|------------------------------|
| CC6W | 07 L01Q | } 1st tie-off |
| CC6X | 07 L01R | |
| CC6L | 07 L14Q | } 2nd tie-off (last 2 wires) |
| CC6Sb | 07 L14R | |

4.3 Power Cable - 761394

This is a five-wire cable connecting the A frame power supply with TB-1 in the C frame power supply. Connect the cable as follows in the order of wire tie-off:

| | | |
|------------|------|----------|
| 1st wire | ---- | Term. #1 |
| 2nd wire | ---- | Term. #2 |
| 3rd wire | ---- | Term. #3 |
| 4th wire | ---- | Term. #4 |
| Green wire | ---- | Term. #8 |

4.4 Power Distribution Cable - 761396

This cable connects to the C frame Laminar Bus. Connect the cable as follows in the order of wire tie-off;

| | | |
|----------|-------|-----------|
| 1st wire | ----- | Term. #10 |
| 2nd wire | ----- | Term. # 9 |
| 3rd wire | ----- | Term. # 8 |
| 4th wire | ----- | Term. # 7 |
| 5th wire | ----- | Term. # 6 |
| 6th wire | ----- | Term. # 5 |

4.5 Thermal Sense Cable - 762460

This connects to the Thermal Sense switch connector.

4.6 Cable 763341

This is a 1414 B frame cable. With respect to Emergency Off, Paper Tape Printer, and 1009 Unit, it performs the same function as cable 760744.

The C frame connections are the same.

4.7 Cable 762723

This is a frame C cable. Connect one wire in the A frame as follows:

For 1414 Mod. 4 - TBA-3 Terminal #10

For 1414 Mod. 5 - TD Relay N/O B side

4.8 I/O Synchronizer Feature Cables

Frame configurations (different models of the 1414) have different combinations of frames as shown in Figure 4-1. Optional features available also lead to different frame configurations as shown in Figure 3-8 page 3-21. Cabling instructions for various sets of conditions are indexed in the following table:

| <u>Feature</u> | <u>Model</u> | <u>Frames</u> | <u>Shown In</u> | <u>On Page</u> |
|---------------------|--------------|---------------|-----------------|----------------|
| 1014 Remote Inquiry | 4 | A & C | Table 3-6 | 3-45 |
| 1014 Remote Inquiry | 5/6 | B & C | Table 3-7 | 3-46 |
| 1009 Data Trans. | 4 | A & C | Table 3-8 | 3-47 |
| 1009 Data Trans. | 5/6 | B & C | Table 3-9 | 3-48 |
| Column Binary | 4 | A & C | Table 3-10 | 3-49 |
| 1011 Paper Tape | 4 | A & C | Fig. 3-18 | 3-50 |
| 1011 Paper Tape | 5/6 | B & C | Fig. 3-19 | 3-51 |
| Teletype | 4, 5, 6 | A & C | Fig. 3-20 | 3-52 |

4.9 Use Meter Tamper-proofing - 1414

A. Many connections in the system relating to use meters have been tamper-proofed at the factory. Some connections which are made during installation must also be tamper-proofed. Appendix A explains the use of various tamper-proofing devices. Seal the following components with the device indicated:

| <u>Model</u> | <u>Device</u> | <u>Component</u> | <u>See Appendix A</u> |
|--------------|---------------|------------------|-----------------------|
| 3 & 4 | 362915 Stamp | TB Blower AC | Fig. A-3 |
| 5 & 6 | 362915 Stamp | TB B2 | Fig. A-3 |
| 8 | 362915 Stamp | TB A2 | Fig. A-3 |
| 1, 2, 7 | 362610 Lock | D7 U03, U04, L18 | Fig. A-1 |
| 1, 2, 7 | 362915 Stamp | TB Blower AC | Fig. A-3 |

B. Check operation of use meters per instructions in Chapter 5.

3 CABLE INSTALLATION

TABLE 3-6 1414 (4) CABLING FOR 1014 UNIT

| CHASSIS 14C1 CABLES | | | CHASSIS 14C6 CABLES | | |
|---------------------|------------|------------|---------------------|------------|------------|
| PART NO. | FROM | TO | PART NO. | FROM | TO |
| 762792 | 14C1C26 | CE Panel | 762729 | 14C6C26 | CE Panel |
| 762771 | 14C1A01 | 14A2F27 | 762255 | 14C6A01 | 14A2G28 |
| 762772 | 14C1B01 | 14A4B27 | 762731 | 14C6B01 | 14A4F27 |
| | 14C1B02 | 14A4A28 | | 14C6B02 | 14A4E28 |
| | 14C1C01 | 14A4A27 | | 14C6C01 | 14A4E27 |
| Note | 14C1C02 | 14A4A27 | Note | 14C6C02 | 14A4E27 |
| 763215 | 14C1D26 | 14C2 Row F | 763336 | 14C6D26 | 14C2 Row F |
| Note | 14C1D26 | 14C2 Row G | Note | 14C6D26 | 14C2 Row G |
| 763214 | 14C2 Row F | 14C7L30 | 763214 | 14C2 Row F | 14C7L30 |
| | | 14C7L31 | | | 14C7L31 |
| | | 14C7L33 | | | 14C7L33 |
| | | 14C7L34 | | | 14C7L34 |
| Note | 14C2 Row G | 14C7L36 | Note | 14C2 Row G | 14C7L36 |
| | | 14C7L37 | | | 14C7L37 |
| | | 14C7L39 | | | 14C7L39 |
| | | 14C7L40 | | | 14C7L40 |

| CHASSIS 14C4 CABLES | | | PART NO. | TYPE | INQUIRY | |
|---------------------|------------|------------|----------|---------|---------|------------|
| PART NO. | FROM | TO | 763213 | Power | INQ 1 | |
| | | | 763440 | Power | INQ 2 | |
| PART NO. | FROM | TO | PART NO. | FROM | TO | STATION |
| 762728 | 14C4C26 | CE Panel | 761289 | 14C7L30 | * | Inq 1 1-5 |
| 762771 | 14C4A01 | 14A2H28 | | 14C7L31 | | |
| 762730 | 14C4B01 | 14A4D27 | 761289 | 14C7L33 | * | Inq 1 6-10 |
| | 14C4B02 | 14A4C28 | | 14C7L34 | | |
| | 14C4C01 | 14A4C27 | 761289 | 14C7L36 | * | Inq 2 1-5 |
| Note | 14C4C02 | 14A4C27 | | 14C7L37 | | |
| 763216 | 14C4D26 | 14C2 Row F | 761289 | 14C7L39 | * | Inq 2 6-10 |
| Note | 14C4D26 | 14C2 Row G | | 14C7L40 | | |
| 763214 | 14C2 Row F | 14C7L30 | | | | |
| | | 14C7L31 | | | | |
| | | 14C7L33 | | | | |
| | | 14C7L34 | | | | |
| Note | 14C2 Row G | 14C7L36 | | | | |
| | | 14C7L37 | | | | |
| | | 14C7L39 | | | | |
| | | 14C7L40 | | | | |

| | | | | | |
|--|--|--|--|--|--|
| NOTE IF SECOND INQUIRY IS INSTALLED, SUBSTITUTE THESE CONNECTIONS FOR THOSE IMMEDIATELY PRECEDING. | | | | | |
| * WALL BOX | | | | | |

TABLE 3-7 1414 (5, 6) CABLING FOR 1014 UNIT

| CHASSIS 14C1 CABLES | | | CHASSIS 14C6 CABLES | | |
|---------------------|------------|------------|---------------------|------------|------------|
| PART NO. | FROM | TO | PART NO. | FROM | TO |
| 762792 | 14C1C26 | CE Panel | 762729 | 14C6C26 | CE Panel |
| 762771 | 14C1A01 | 14B2F27 | 762255 | 14C6A01 | 14B2G28 |
| 762772 | 14C1B01 | 14B4B27 | 762731 | 14C6B01 | 14B4F27 |
| | 14C1B02 | 14B4A28 | | 14C6B02 | 14B4E28 |
| | 14C1C01 | 14B4A27 | | 14C6C01 | 14B4E27 |
| Note | 14C1C02 | 14B4A27 | Note | 14C6C02 | 14B4E27 |
| 763215 | 14C1D26 | 14C2 Row F | 763336 | 14C6D26 | 14C2 Row F |
| Note | 14C1D26 | 14C2 Row G | Note | 14C6D26 | 14C2 Row G |
| 763214 | 14C2 Row F | 14C7L30 | 763214 | 14C2 Row F | 14C7L30 |
| | | 14C7L31 | | | 14C7L31 |
| | | 14C7L33 | | | 14C7L33 |
| | | 14C7L34 | | | 14C7L34 |
| Note | 14C2 Row G | 14C7L36 | Note | 14C2 Row G | 14C7L36 |
| | | 14C7L37 | | | 14C7L37 |
| | | 14C7L39 | | | 14C7L39 |
| | | 14C7L40 | | | 14C7L40 |

| CHASSIS 14C4 CABLES | | | PART NO. | TYPE | INQUIRY | |
|---------------------|------------|------------|----------|---------|---------|------------|
| PART NO. | FROM | TO | 763213 | Power | Inq 1 | |
| | | | 763440 | Power | Inq 2 | |
| PART NO. | FROM | TO | PART NO. | FROM | TO | STATION |
| 762728 | 14C4C26 | CE Panel | 761289 | 14C7L30 | * | Inq 1 1- 5 |
| 762771 | 14C4A01 | 14B2H28 | | 14C7L31 | | |
| 762730 | 14C4B01 | 14B4D27 | 761289 | 14C7L33 | * | Inq 1 6-10 |
| | 14C4B02 | 14B4C28 | | 14C7L34 | | |
| | 14C4C01 | 14B4C27 | 761289 | 14C7L36 | * | Inq 2 1- 5 |
| Note | 14C4C02 | 14B4C27 | | 14C7L37 | | |
| 763216 | 14C4D26 | 14C2 Row F | 761289 | 14C7L39 | * | Inq 2 6-10 |
| Note | 14C4D26 | 14C2 Row G | | 14C7L40 | | |
| 763214 | 14C2 Row F | 14C7L30 | | | | |
| | | 14C7L31 | | | | |
| | | 14C7L33 | | | | |
| | | 14C7L34 | | | | |
| Note | 14C2 Row G | 14C7L36 | | | | |
| | | 14C7L37 | | | | |
| | | 14C7L39 | | | | |
| | | 14C7L40 | | | | |

NOTE IF SECOND INQUIRY IS INSTALLED, SUBSTITUTE THESE CONNECTIONS FOR THOSE IMMEDIATELY PRECEDING.

* WALL BOX

TABLE 3-8 1414 (4) CABLING FOR 1009 UNIT

| CHASSIS 14C1 | | |
|--------------|---------|----------|
| PART NO. | FROM | TO |
| 762792 | 14C1C26 | CE Panel |
| 762771 | 14C1A01 | 14A2F27 |
| 762771 | 14C1A02 | 14A2E28 |
| 762772 | 14C1B01 | 14A4B27 |
| | 14C1B02 | 14A4A28 |
| | 14C1C01 | 14A4A27 |
| 763344 | 14C1D01 | 14C7L12 |
| | 14C1E01 | 14C7L14 |
| | 14C1E02 | 14C7L17 |
| | 14C1F01 | 14C7L18 |
| | 14C1F02 | 14C7L20 |
| 763345 | 14C7 | 1009 |
| CHASSIS 14C6 | | |
| 762729 | 14C6C26 | CE Panel |
| 762255 | 14C6A01 | 14A2G28 |
| 762255 | 14C6A02 | 14A2E28 |
| 762731 | 14C6B01 | 14A4F27 |
| | 14C6B02 | 14A4E28 |
| | 14C6C01 | 14A4E27 |
| 763342 | 14C6D26 | 14C7L12 |
| | 14C6E26 | 14C7L14 |
| | 14C6E25 | 14C7L17 |
| | 14C6F26 | 14C7L18 |
| | 14C6F25 | 14C7L20 |
| 763345 | 14C7 | 1009 |
| CHASSIS 14C4 | | |
| 762728 | 14C4C26 | CE Panel |
| 762771 | 14C4A01 | 14A2H28 |
| 762771 | 14C4A02 | 14A2E28 |
| 762730 | 14C4B01 | 14A4D27 |
| | 14C4B02 | 14A4C28 |
| | 14C4C01 | 14A4C27 |
| 763343 | 14C4D26 | 14C7L12 |
| | 14C4E26 | 14C7L14 |
| | 14C4E25 | 14C7L17 |
| | 14C4F26 | 14C7L18 |
| | 14C4F25 | 14C7L20 |
| 763345 | 14C7 | 1009 |

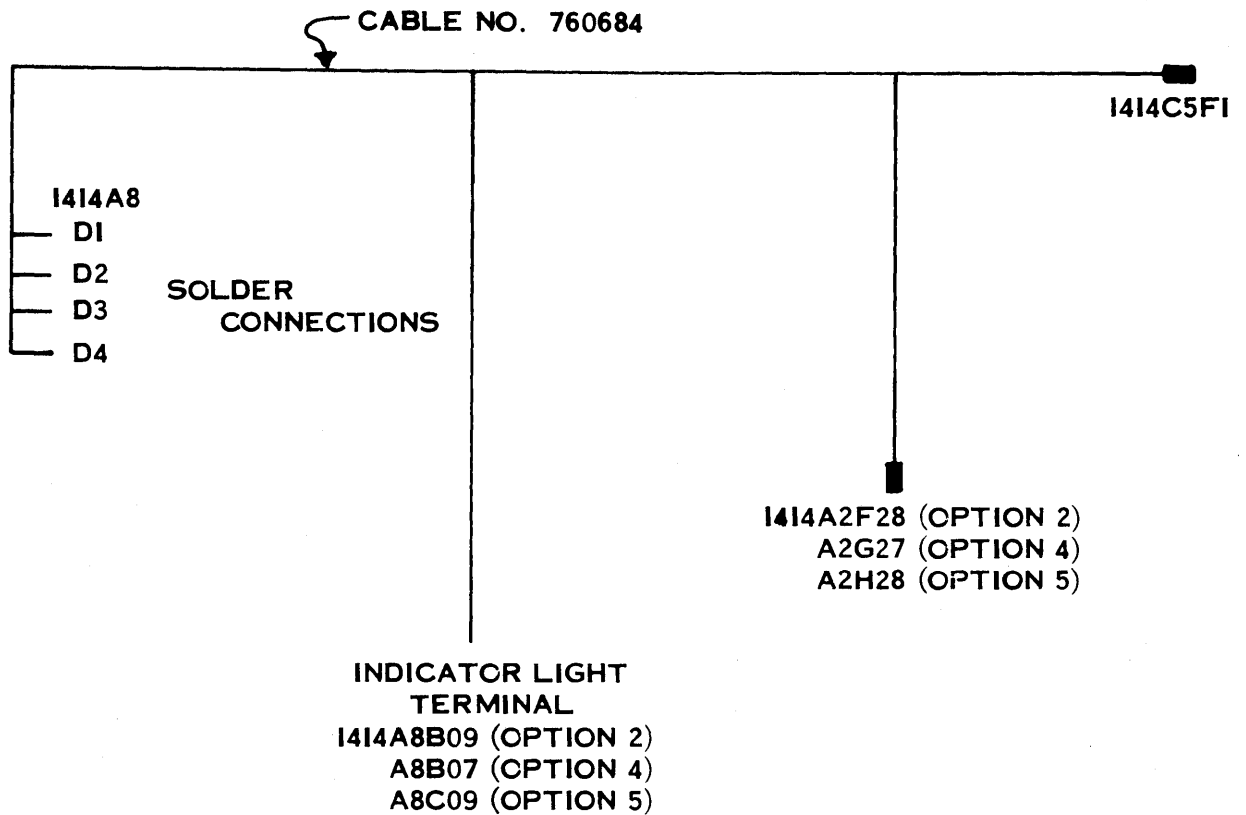
TABLE 3-9 1414 (5, 6) CABLING FOR 1009 UNIT

| CHASSIS 14C1 | | |
|--------------|---------|----------|
| PART NO. | FROM | TO |
| 762792 | 14C1C26 | CE Panel |
| 762771 | 14C1A01 | 14B2F27 |
| 762771 | 14C1A02 | 14B2E28 |
| 762772 | 14C1B01 | 14B4B27 |
| | 14C1B02 | 14B4A28 |
| | 14C1C01 | 14B4A27 |
| 763344 | 14C1D01 | 14C7L12 |
| | 14C1E01 | 14C7L14 |
| | 14C1E02 | 14C7L17 |
| | 14C1F01 | 14C7L18 |
| | 14C1F02 | 14C7L20 |
| 763345 | 14C7 | 1009 |
| CHASSIS 14C6 | | |
| 762729 | 14C6C26 | CE Panel |
| 762255 | 14C6A01 | 14B2G28 |
| 762255 | 14C6A02 | 14B2E28 |
| 762731 | 14C6B01 | 14B4F27 |
| | 14C6B02 | 14B4E28 |
| | 14C6C01 | 14B4E27 |
| 763342 | 14C6D26 | 14C7L12 |
| | 14C6E26 | 14C7L14 |
| | 14C6E25 | 14C7L17 |
| | 14C6F26 | 14C7L18 |
| | 14C6F25 | 14C7L20 |
| 763345 | 14C7 | 1009 |
| CHASSIS 14C4 | | |
| 762728 | 14C4C26 | CE Panel |
| 762771 | 14C4A01 | 14B2H28 |
| 762771 | 14C4A02 | 14B2E28 |
| 762730 | 14C4B01 | 14B4D27 |
| | 14C4B02 | 14B4C28 |
| | 14C4C01 | 14B4C27 |
| 763343 | 14C4D26 | 14C7L12 |
| | 14C4E26 | 14C7L14 |
| | 14C4E25 | 14C7L17 |
| | 14C4F26 | 14C7L18 |
| | 14C4F25 | 14C7L20 |
| 763345 | 14C7 | 1009 |

TABLE 3-10 1414 (4) CABLES FOR COLUMN BINARY

(Column Binary available in Mod 4, only)

| CHASSIS 14C5 CABLE | | | | |
|--------------------|----------|----------|----------|----------|
| PART NO. | FROM | TO | | |
| | | OPTS 1&4 | OPTS 2&3 | OPTS 5&6 |
| 761114 | 14C5 B01 | 14A2 J27 | 14A2 J27 | 14A2 J27 |
| 761113 | 14C5 B02 | 14A4 B27 | 14A4 F27 | 14A4 D27 |
| 761115 | 14C5 B03 | 14A2 F27 | 14A2 G28 | 14A2 H28 |
| 760247 | 14C5 C01 | 14A4 G26 | 14A4 G26 | 14A4 G26 |
| 761114 | 14C5 C02 | 14A4 A28 | 14A4 E28 | 14A4 C28 |
| 761304 | 14C5 C03 | 14A8 CE | 14A8 CE | 14A8 CE |
| 760247 | 14C5 D02 | 14A4 H27 | 14A4 H27 | 14A4 H27 |
| 761113 | 14C5 D03 | 14A4 H26 | 14A4 H26 | 14A4 H26 |
| 760248 | 14A2 K01 | 14A4 A01 | 14A4 A01 | 14A4 A01 |
| 760247 | 14C5 D01 | 14A4 H28 | 14A4 H28 | 14A4 H28 |
| 761304 | 14C5 C03 | 14A4 A27 | 14A4 E27 | 14A4 C27 |

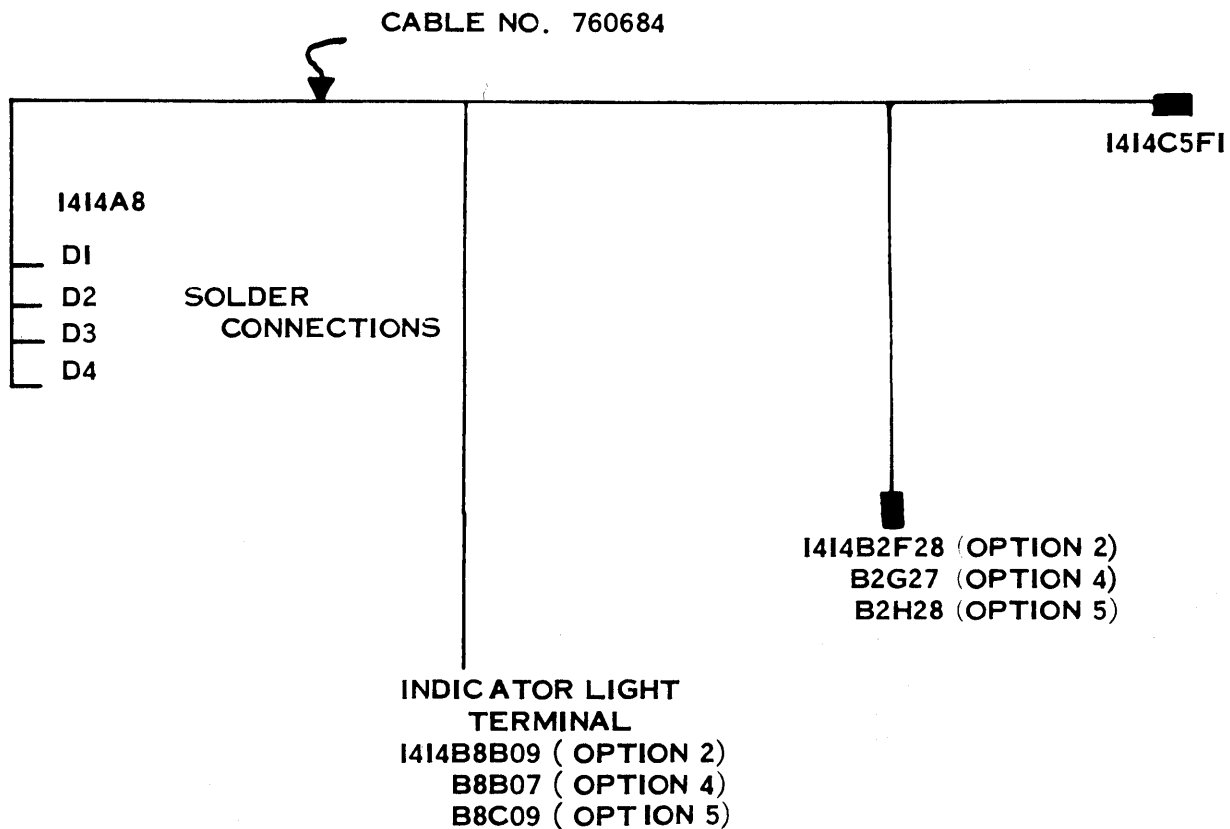


OPTION 2 – TTY BASIC (ONLY), OR
TTY BASIC AND TTY SECOND FEATURE INSTALLED.

OPTION 4 – TTY BASIC FEATURE,
TTY SECOND FEATURE, AND
TTY THIRD FEATURE INSTALLED.

OPTION 5 – TTY NOT INSTALLED.

FIGURE 3-18 CABLE 760684 FOR 1414 (4) AND 1011 PAPER TAPE READER

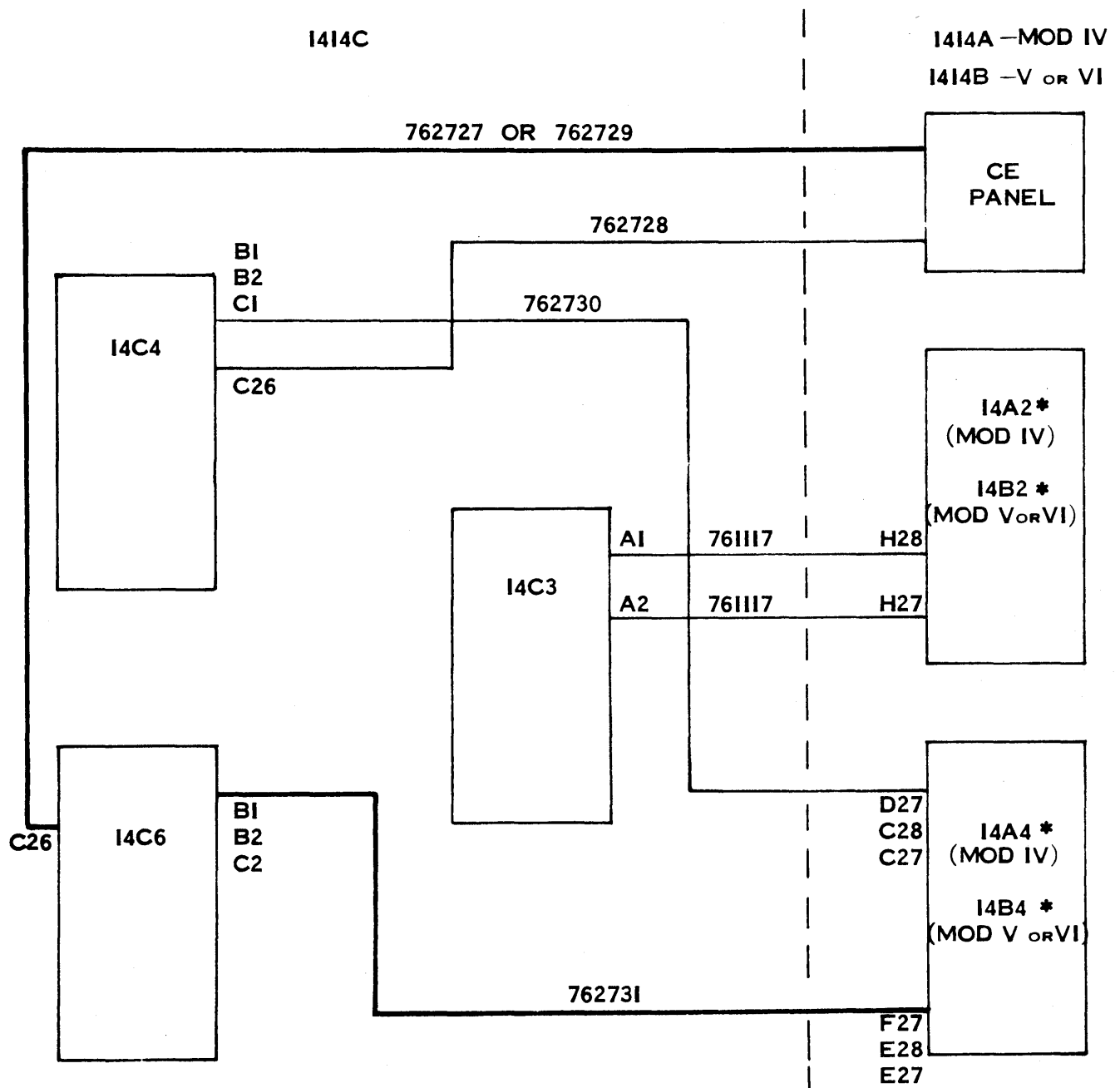


OPTION 2 - TTY BASIC (ONLY), OR
TTY BASIC AND TTY SECOND FEATURE INSTALLED.

OPTION 4 - TTY BASIC FEATURE,
TTY SECOND FEATURE, AND
TTY THIRD FEATURE INSTALLED.

OPTION 5 - TTY NOT INSTALLED.

FIGURE 3-19 CABLE 760684 FOR 1414 (5, 6) AND 1011 PAPER TAPE READER



———— = BASIC AT AND T AND W. U. - ELECTROMECHANICAL
 ———— = OPTION AT AND T AND W. U. - ELECTROMECHANICAL (2ND CHASSIS)

*(NOTE THAT CONNECTIONS ARE TO A FRAME FOR MOD IV, AND TO B FRAME FOR MOD V OR VI. PANEL ETC. DESIGNATIONS ARE IDENTICAL FOR EITHER FRAME.)

FIGURE 3-20 I414 CABLES FOR TELETYPE

1. GENERAL INFORMATION

- A. Equipment to be disassembled and shipped from a customer's office to another location must be dismantled and packed with the same care given factory shipments. The information presented here is intended to serve as a guide for the disassembling of equipment and as an aid for installing new equipment.
- B. Customer Engineering memorandums and local CE policy concerning conversions and transfer of equipment will supercede any information given here.

2. FIELD CONVERSIONS - PROCESSING UNIT

Conversion of a 7040 to a 7044 processing system requires the complete removal of all frames, A through E, including the console table and typewriter. To speed conversion time, provided space is available, a processing unit to be installed may be assembled and cabled internally off-location while the existing equipment is being disassembled. The processing unit may then be rolled into location as one unit. This, of course, depends upon space and manpower available. Retain the plastic covers from the new units. They can be used on equipment being transferred.

2.1 Disassembly of 7106/07 Processing Unit

The following procedure is a relative sequence, but it can be accomplished by more than one man starting at any point in the procedure:

TO DO —
SKIP X

4 FIELD CONVERSIONS
AND TRANSFERS

2.1 Disassembly of 7106/07 Processing Unit (continued)

- A. Disconnect PDU cables 5236461 and 5236462 from customer's power source.
- B. Remove all ~~top covers and~~ doors from both wiring and card sides. This will facilitate cable disassembly.
- Disconnect upper ribbon cable assembly, 5235677, per Table 4-1, page 4-4.
- Disconnect interframe power jumpers 5236561/5236513, 5236606/5236607, and 5236651 per Table 4-1.
- Secure top covers in place.
- Disconnect cable 5236457. Remove the console table; disassemble and package. See paragraph 2.2 for this procedure.
- Wind the PDU cables (Step A) around the table support arms on frame A and secure with tape.
- Remove and package step and lower end covers.
- Disconnect lower ribbon cable assemblies 5235678 and 5235679 per Table 4-1.
- Disconnect power cable 5235317, completely, and pack in separate carton.
- Disconnect signal jumpers, 539494, per Table 4-1.
- L. Remove external cable connections. Be sure all connectors are plainly and correctly labeled for the new processing unit

2.1 Disassembly of 7106/07 Processing Unit (continued)

- ~~M.~~ Remove interframe ground jumpers. Disconnect the jumper between frames A and B at B and leave in frame A.
- ~~N.~~ Center and secure roller gates in frames C and D. Secure snap lock with reinforced tape.
- ~~O.~~ Remove wires to EU18K and M in cable 5236454.
- 7 P. Disconnect use meter cable, 5237060, per Table 4-1.
- ~~X.~~ Loosen all bolts between frames and remove all leveling pads.
- ~~X.~~ Remove all mounting bolts.
- S. Units may now be rolled off-location and then prepared for shipment per paragraph 2.3.

2.2 Disassembly of Console and Typewriter

- ~~X.~~ Refer to Figure 2-1 page 2-3 and remove or disconnect the following parts:
 1. Connector Cover 5235146.
 2. Plate 5237153.
 3. Cable 5236457.
 4. Typewriter Cable
 5. Bottom Cover (Black)

4 FIELD CONVERSIONS
AND TRANSFERS

TABLE 4-1 7106/07 CABLE DISCONNECT CHART

| Cable P/N | Frame Routing | Disconnect From Frame | Store In Frame | ✓ |
|-----------|---------------|--------------------------|----------------|---|
| 539494 | B to C | C | B | |
| 539494 | C to D | D | C | |
| 539494 | D to E | E | D | |
| 5215679 | C to D | D | C | |
| 5235317 | A thru E | Remove and Pack Separate | | |
| 5235656 | A to B | B | A | |
| 5235677 | A to C, D, E | A | C, D, E | |
| 5235678 | A to C, D | C, D | A | |
| 5235679 | A to C, D | C, D | A | |
| 5236454 | D to E | E | D | |
| 5236457 | Console | Console | Typewriter | |
| 5236461 | PDU-Pwr | Pwr. Source | A | |
| 5236462 | PDU-Pwr | Pwr. Source | A | |
| 5236513 | A to B | B | A | |
| 5236606 | A to B | B | A | |
| 5236607 | A to B | B | A | |
| 5236651 | D to E | D | E | |
| 5237060 | Meter to D | Meter | D | |
| 5237278 | A to C | C | A | |
| 5237279 | B to C | C | B | |
| 5237280 | B to C | C | B | |

2.2 Disassembly of Console and Typewriter (continued)

- B. Remove the typewriter from the table cutout and remove the following typewriter parts:
 - 1. Covers
 - 2. Platen
 - 3. Guide Rollers
 - 4. End Knobs and Platen
- C. Pack typewriter and parts into carton.
- D. Remove connectors and brackets from under Table top.
- E. Remove legs and paper rack.
- F. Remove table from support arms and wrap carefully with padded paper.
- G. Pack all other parts into cartons; tape secure.

2.3 Preparation for Shipment - 7106/7107

A shipping material package may be available from the plant; however, existing materials can be used such as tape, cardboard and padded paper.

- A. Be sure all cables are coiled back into their respective frames and taped securely.
- B. Where cables are stored against back panel pins, use cardboard between the cables and pins for protection.
- C. Cover all cable paddle connectors with cloth bags.

2.3 Preparation for Shipment - 7106/7107 (continued)

- D. Replace all covers and be sure the cover clip is used on the top hinge of front and rear covers.
- E. Be sure all inner electronic panel doors are fastened securely.
- F. Tape up all front and rear doors with reinforced tape.
- G. Place plastic covers over frames.

1. GENERAL

This chapter contains instructions for checking and determining the proper operation of the IBM 7040/44 system. The information is arranged in the basic sequence for the various operations from an overall systems standpoint, with special instructions provided for specific units.

2. POWER CHECKS

When all cables have been terminated and clamped, the system input power cables can be connected to the customer's outlets.

✓ 2.1 Phase Orientation Check

Check the three phase AC power receptacles for correct phase orientation. If a phase meter is unavailable, a scope can be used to check phasing. Connect the Sync lead to phase 1 and adjust the scope for one wave form. Phase 2 should occur 120° later than phase 1. Phase 3 should occur 240° later than phase 1. Phase orientation can also be checked at Contactor K21 in frame A.

2.2 Preliminary Steps

- ✓ A. Set circuit breakers in the main frame power supplies and the power distribution frame to ON position, except CB No. 6 in the power distribution frame.
- ✓ B. Set the main frame wall switch to ON.

2.3 Power Controls Check

Correct functioning of the operator's station power controls should be checked in accordance with the following descriptions of control operation:

2.3.1 Master Power Connect button

- ✓ A. Check that the emergency interlock jumper circuitry is complete. i. e. connectors A, B and C on the power distribution frame must have jumpers and frame E connector. 14 upper, must have jumper card inserted.
- ✓ B. Depress the Master Connect pushbutton; it should light.
- ✓ C. Check that 60 cycle power is available in the circuit breaker and contactor panels.
- ✓ D. Determine that the 48 volt supply, and the 24 volt and convenience transformers are energized.
- ✓ E. Emergency off relays R71 and R72 and Master Connect relay R73 must be energized.

2.3.2 Normal Power On button

Depressing the Normal Power On button must initiate DC power and blower sequence, namely: C, D and E frames, memory standard and special voltages.

- ✓ A. Depress the Power On button; it should light. Note the condition of the following indicators:
 - ✓ 1. All fuse indicators on circuit breaker panel should be out.
 - ✓ 2. Power On indicators on the CE panel should light in the following sequence: E D C, B/A

2.3.2 Normal Power On button (continued)

3. All circuit breaker and Thermal indicators on the CE panel must be OFF.

B. Check that the following Thermal Sense relays are picked:

R55 (E frame), R56 (D frame), R57 (C frame) and R58 (B frame).

C. Check muffin fan and blower operation. Muffin fan operation

can be checked by placing an IBM card at the bottom of each gate power supply assembly. The card should be drawn upward against the muffin fan intake vent. Blower operation can be checked similarly by opening the inner cover doors and observing that air flow is upward through the module.

2.3.3 Emergency Power Off button

Depress Normal Power Off (put machine in Master Connect status).

Then pull Emergency Power Off button. Activating Emergency Power Off must immediately remove all primary power by dropping main power contactor K21*. Line power must be confined to the following enclosed and labeled components: circuit breaker panels and primary side of 24 volt transformers.

NOTE

Line power can be confined to the CB panels by turning Master Control switch to OFF.

Reset the EMO switch by opening the console door and manually retracting the leaf spring while depressing the EMO switch.

*Phase orientation can be checked at contactor K21 in Frame A.

2.3.4 Normal Power Off button

With power available at all frames, depressing the Normal Power Off button must remove power from frames B, C, D and E. All power must be confined to frame A, except for convenience outlets, -48VDC, and 24 VAC.

A. Depress Normal Power Off button. Normal Power On indicator will go off.

B. Check that the following relays and contactors open:

| | | | |
|---------|-----------------------|----|-------------------------|
| R31, 32 | Ferro Time | K3 | C, D, and E frame power |
| R33 | Power On Start | K5 | A/B frame power |
| R1 | Memory Sequence Start | K6 | A/B frame power |

2.3.5 Master Power Disconnect button

Depress the Master Power Disconnect button and observe the following:

A. Master Power Connect indicator will go out.

B. Main power contactor, K21, must open, removing all primary power from the system.

C. Emergency Off relays, R71 and R72, must remain picked.

2.4 Power Off Checks

A. If any over-temperature thermal opens, or if a circuit breaker associated with a DC power supply in any frame, trips, a normal power off must be initiated. The corresponding CB or Thermal indicator on the CE panel must light, indicating the frame where the Thermal or CB is located.

2.4 Power Off Checks (continued)

- B. Test for normal power off by momentarily and individually turning a power CB off in each module and check the appropriate CB trip indicator.

2.5 DC Power for Peripheral Equipment

Remote-Local, DC on and DC off switches are located on the CE Panels of peripheral equipment attached to the main frame. By setting the Remote-Local switch in the REMOTE position, power for the unit is controlled from the console switches; in LOCAL position, DC power is controlled by the DC ON and DC OFF switches on the unit.

The 1622 does not have a Remote-Local switch and is therefore under control of the console switches. If a power or thermal failure occurs, remove the power cable before attempting to investigate the trouble. When the unit has been repaired, the main frame must be given a normal power-off and a normal power-on sequence to bring the 1622 back on line.

✓3. VOLTAGE CHECKS - FRAMES C, D, E AND 7904 UNIT

Voltage for each level must be set while reading on the Gate Laminar Bus as indicated in Table 5-1. Power supplies for Frame E are physically located in Frame D. A compromise voltage reading must be used between Frames D and E to allow for voltage drops.

CAUTION

The Line Filter on the 7904 is grounded to the building service equipment or main line ground, and not to machine ground. A grounding current of 5.0 ma may be conducting through the line filter ground. A potential may therefore exist between this main line ground and the machine ground.

4. SINGLE SHOT AND VARIABLE DELAY LINE TIMING

All single shot timings and variable delays shall be set to the values specified on Systems Reference Page 00.00.02.0.

✓ TABLE 5-1 VOLTAGE REQUIREMENTS, FRAMES C, D, E AND 7904

| Frame C and 7904 Power Supply *** | Voltage ** | Read at Laminar Bus Location |
|--------------------------------------|------------|--|
| 1 | -12V | Center of LB on Position 9 |
| 2 | +12V | Center of Upper Panels 1 and 2 on LB position 5 on C frame and position 6 on 7904 |
| 3 | + 6V | Center of Lower Panels 3 and 4 on LB position 2 |
| 4* | +12V | Center of Lower Panels 3 and 4 on LB position 6 on C frame and position 5 on 7904 |
| 5 | + 6V | Center of Upper Panels 1 and 2 on LB position 1 |

* EC 703749 removes P.S. 4 on 7904 only.

At this level adjust P.S. 2 for best average reading on TB positions 5 and 6.

** All voltages must be set within 4%.

*** Power supplies for frames D and E are physically located in Frame D. Voltages must be measured and adjusted per table. A compromise in voltage between frames D and E must be used to allow for voltage drop.

5. CONSOLE OPERATION CHECK

The tests described in this section check the reliability of operating controls and indicators on the 7106/7107 main frames. Tests performed at the console check machine function as well as control reliability.

✓ 5.1 Reset

This key should be tested in both Automatic and Manual modes for resetting SR, AC, MQ, index registers, accumulator overflow, divide check and I/O check. (See sections 3.00.01 and 4.00.00.A.1 for definitions of channel reset). All channels should be reset and the typewriter should carriage return. Core storage should not be affected by this switch.

✓ 5.2 Clear

This switch should be active in Automatic Mode only. Test for same function as "reset" plus setting all core storage locations to zero.

✓ 5.3 Automatic

With this switch off (light off), test to see if the computer stops after the completion of the instruction being processed unless a channel is in use. In this case, the computer waits for all channels to be disconnected and then reverts to true manual status. "Single Step", "Multiple Step", "Enter Instruction", "Enter Storage", and "Display Storage" are inactive in Automatic Mode (light on). In Automatic Mode, the CPU should continue to execute instructions until an HPR instruction is executed.

5.4 Start

In Manual Mode, Program Stop, if ON, is turned OFF. In Automatic Mode, resets Master Program Stop and Program Stop causing program continuation at the address specified in the instruction counter.

The Start Key should allow continuation of operation at high speed if the computer has stopped at the program stop, or if the CPU has been returned to automatic after having been in manual status. If switching from automatic to manual status takes place at a program stop, depressing the Start Key should allow action from keys normally active in manual status.

5.5 Load

In Manual Mode, this key will allow 30 milliseconds for completion of the instruction being executed and then resets address register, program register, position register, tag register, program stop, parity inhibit, trap inhibit, channel trap control and memory protect.

In Automatic Mode, with a read select instruction in the entry keys addressing a tape unit, a card reader, or an on-line 1401, the same reset occurs and then the first record is read into core storage with the first word in address 00100. When the channel in use indicator is turned off, the computer will transfer to location 00101 and continue to execute instructions.

✓ 5.6 Step Mode, Single Step

In true Manual Mode, test to see if "Single Step" causes the CPU to execute a Single Instruction, Cycle, or Pulse in the respective switch setting. Cycle and Pulse Modes are inactive with the "Interval Timer" on. If tape on a channel is selected tape movement begins and if the RCHX does not follow immediately tape will appear to "run away". If the RCHX follows immediately the CPU should operate in the Automatic mode until the unit is disconnected and then revert to the Manual mode. Any device other than tape, if selected, will operate in Manual Mode until execution of the RCHX at which time the CPU will operate in Automatic Mode until the unit is disconnected and then revert to the Manual Mode.

✓ 5.7 Multiple Step

Same as "Single Step" except the operation continues as long as the button is held depressed.

✓ 5.8 Enter Instruction

Test for operation in Manual Mode only; during which the computer should execute the instruction in the word bank of the entry keys.

✓ 5.9 Enter Storage

Test for operation in Manual status only. In this mode depressing the "Enter Storage" key should cause the contents of the word bank of the "Entry" keys to be stored in the address specified in the location bank of the "Entry" keys.

✓ 5.10 Display Storage

Test for operation in Manual Mode only. Depressing this key should display, in the Storage Register Indicators, the contents of the address specified by the location bank of the "Entry" keys.

✓ 5.11 Input-Output Interlock Control

Test in Manual Status with this switch on (lighted) for execution of the specified select instruction and remaining in Manual Status. With this switch off (light off), the CPU reverts to Automatic Status for the completion of the I/O instruction. Test for no effect in Automatic mode.

✓ 5.12 Continuous Enter-Instruction

In Automatic mode, turning this switch on (Light on) and depressing "Start" forces the CPU to continuously execute the instruction in the word bank of the "Entry" keys.

✓ 5.13 Sense Switches 1-6

Test all switches in both Automatic and Manual Modes to see if the SWT instruction works correctly.

✓ 5.14 Entry Keys

- A. Word bank - In manual mode, test the word bank by entering storage with patterns of all zeros, ones, twos, threes, fours, fives, sixes, and sevens while observing the storage register.

5.14 Entry Keys (continued)

B. Location switches - After clearing memory store the following program in memory:

| | | |
|--------|--------------|-----|
| 77772 | 002000077773 | TRA |
| 77773 | 062100077774 | STA |
| *77774 | 062100077774 | STA |
| 77775 | 040000077777 | ADD |
| 77776 | 002000077772 | TRA |
| 77777 | 000000000001 | |

*Address portion of this instruction is changed by program.

TRA to 77772, go automatic then start. When address register appears to stop at 77772, go manual. Any location, except the five highest order locations, when displayed should contain its address in bits 21 to 35.

5.15 Storage Clock

Test by turning the switch on and observing stepping of storage register.

A more detailed test is conducted by running the interval timer diagnostic (4M59).

5.16 Tape Density Switch

Test all switches by running the Tape Diagnostic 4T52 referring to the Service Aids in the write-up.

5.17 Index Registers A, B, C

Using the AXT instruction test each register with patterns of all zero-ones.

✓ 5.18 Instruction Counter, Address Register

In Manual Mode, TRA to location 52525 and check for IC and AR indicators containing a one-zero pattern, then transfer to 25252 and check for a zero-one pattern.

✓ 5.19 Instruction Register

In Manual Mode, place the instruction +0525 in the entry keys and "Enter Instruction". A zero-one pattern should be observed in the Instruction Register Indicators.

Similarly, enter -0252 and observe a one-zero pattern.

✓ 5.20 Shift Counter

In Manual Mode, enter an I/O select instruction to unit 00125 and check for a zero-one pattern in the shift counter indicators, then reset and enter Unit Address 00252 and check for a one-zero pattern.

✓ 5.21 Storage Register, Accumulator, MQ

In Manual Mode enter storage location 00100 with a 252525252525 pattern. Check the Storage Register for a zero/one pattern. CLA and LDQ location 00100 and check the Accumulator and MQ for a zero/one pattern. Repeat the above sequence using a -125252525252 pattern and check the Storage, Accumulator and MQ regs. for a one/zero pattern. AC bits Q and P remain clear during the tests in this section.

✓ 5.22 Clock Pulses (A0-A5)

In pulse Mode single pulse an instruction and check for turn-on and turn-off of appropriate indicators.

5.23 Program Stop, Master Stop

In Automatic Mode run some loop containing a H PR instruction.

Both Program Stop and Master Stop should be turned-on when the HPR is processed and turned-off when Start is depressed unless the next instruction is a HPR. In Manual mode, depressing Start turns off Program Stop only.

5.24 9 Overflow

Stored the following program in memory:

| | | |
|-------|--------------|-----|
| 00100 | 000400000000 | K |
| 00101 | 050000000100 | CLA |
| 00102 | 076700000001 | ALS |
| 00103 | 002000000101 | TRA |

TRA to 00101, start and while multiple-stepping in pulse mode,

observe the turn-on of the above indicator.

5.25 Ready

In Automatic Mode this indicator should turn-on when POWER is up and turn off with a Normal Power off.

6. MEMORY UNIT CHECKS

✓ 6.1 Service Voltages - 7106

Under dynamic conditions, with all service voltages present (+6, -6, +12, -12), check that output voltages are within 2%. These are measured at the Laminar Bus terminal blocks, on top of the frames.

6.2 Standard Power Supplies - 7107

When all standard power supplies are turned on, the +6, +12 and -12 VDC supplies must be $\pm 2\%$ of their nominal value.

The -20VDC supply must be within $\pm 8\%$.

6.3 Special Power Supplies - 7107

The X and Y driver supplies and the Z driver supplies must be continuously variable between +42VDC and +62VDC $\pm 2\%$.

Special supplies must not cycle up until the standard supplies are operating when normal power-on is initiated.

6.4 Marginal Checking Requirements - 7107

- A. With any program in process, the memory must operate without error while the X-Y and Z driver voltages are individually varied $\pm 5\%$ from their nominal operating points.

NOTE

The operating point depends upon array temperature.

6.4 Marginal Checking Requirements - 7107 (continued)

- B. With any program in process the memory must operate without error while the -12m voltage is varied +3V from its nominal value.

6.5. Temperature and Blower Checks - 7107

- A. The operating ambient temperature must be between 60° F and 90° F with relative humidity between 10% and 80%.
- B. The Main Blower and the Z Resistor Blower must rotate ccw and cw when viewed from panel 1 and 3 end of the frame.

7. 7904 TAPE INTERFACE FEATURE TESTS

7.1 Single Shot Timing

Adjust the following single-shots to the indicated time duration.

| <u>Name</u> | <u>Systems</u> | <u>Nominal Duration</u> | <u>Acceptance Duration</u> |
|-------------------|----------------|-------------------------|----------------------------|
| Tape Indicators | 06. 15. 00. 1 | 1. 0us | . 09-1. 1us |
| Redundancy Checks | 06. 15. 02. 1 | 800ns | 700-900ns |

7.2 Indicator Checks

- A. Execute a Write Select (WRS) instruction using a BCD tape address from the CPU, with computer in Continuous Enter Instruction status. The following indicators should be on:

7.2 Indicator Checks

A. (continued)

| <u>Name</u> | <u>Systems</u> | <u>Location</u> |
|-------------|----------------|-----------------|
| Chan WRS | 06.20.00.1 | 02A1B22-9 |
| Tape Select | 06.30.00.1 | 02A1B27-9 |
| Chan Busy | 06.20.02.1 | 02A1B16-9 |
| Char Cntr 1 | 06.17.00.1 | 02A1H11-9 |
| BCD Mode | 06.20.02.1 | 02A1B19-9 |
| WC Zero | 06.12.15.1 | 02A1B12-9 |
| Rd Par Gen | 06.18.01.1 | 02A3B04-9 |

Depressing the Reset button should turn off all indicators except WC Zero, Char Cntr 1 and Rd Par Gen.

B. Repeat the procedure in A, executing a Read Select (RDS) instruction, using a binary tape address. All of the indicators listed in Paragraph A should be on except BCD Mode and Chan WRS. In addition, the following indicators will be on:

| <u>Name</u> | <u>Systems</u> | <u>Location</u> |
|-------------|----------------|-----------------|
| Chan RDS | 06.20.00.1 | 02A1B21-9 |
| 1st Binary | 06.20.27.1 | 02A1B01-9 |

C. Execute a Sense Select (SEN) instruction, using a binary tape address with computer in Continuous Enter Instruction status. The Cntl Sense indicator (06.40.02.1), at a location 02A1B20-9, should to on.

7.2 Indicator Checks (continued)

- D. To test the Char Cntr indicator, place the following instructions in core storage and execute the loop in Manual Mode Multiple step:

```

LDL          Y
TRA         *-1

```

Each LDL instruction should step the Char Cntr indicator once.

It should step from 000 to 111 and then be set to 000.

7.3 Program Check

- A. Run program 4CH1 without error.
- B. With a 1414 Model I or VII attached to the tape interface, run program 9T51 without error.

8. 7904 CORPORATE INTERFACE FEATURE TEST

8.1 Single Shot Timing

Adjust the Operational Out single shot (logic page 06.40.01.1), to

10 us \pm 1 us.

8.2 Indicator Checks

- A. Execute a Write Select (WRS) instruction, using a BCD standard interface address from the CPU. With machine in Continuous Enter Instruction status, the following indicators should be on:

8.2 Indicator Checks

A. (continued)

| <u>Name</u> | <u>Systems</u> | <u>Location</u> |
|-------------|----------------|-----------------|
| Chan WRS | 06.20.00.1 | 1B22-9 |
| SI Select | 06.40.02.1 | 1B26-9 |
| Chan Busy | 06.20.02.1 | 1B16-9 |
| Char Cntr 1 | 06.17.00.1 | 1H11-9 |
| BCD Mode | 06.20.02.1 | 1B19-9 |
| WC Zero | 06.12.15.1 | 1B12-9 |
| RD Par Gen | 06.18.01.1 | 3B04-9 |

Depressing Reset button should turn off all indicators, except WC Zero, Char Cntr 1 and RD Par Gen.

- B. Repeating the procedure in Paragraph A, execute a Read Select (RDS) instruction, using a binary standard interface address. The indicators listed in Paragraph A should go on, except BCD Mode and Chan WRS. The Chan RDS indicator, located at 1B21, should turn on. (Systems 06.20.00.1).
- C. Execute a Sense Select (SEN) instruction using a binary standard interface address. Cntl Sense indicator, located at 02A1B20, should go on. (Systems 06.40.02.1).
- D. To test the Char Cntr indicator, place the following instructions in core storage and execute the loop in Manual mode, Multiple step:

```
LDL          Y
TRA          *-1
```

Each LDL instruction will step the Char Cntr indicator once.

It should step from 000 to 111 and then be set at 000.

8.3 Program Test

- A. Run program 4CH1 without error.
- B. With a SCI device attached to the channel, run an appropriate diagnostic. For example, run program 4F01 for the 1301 Disk Storage Unit.

9. 7904 DIRECT DATA FEATURE TEST

9.1 Single Shot Timing

Adjust the single shots in accordance with systems page 00.00.02.0.

9.2 Indicator Checks

- A. Execute a Write Select (WRS) instruction using a BCD direct data address from the CPU. With computer in Continuous Enter Instruction status, the following indicators should be on:

| <u>Name</u> | <u>Systems</u> | <u>Location</u> |
|-------------|----------------|-----------------|
| Chan WRS | 06.20.00.1 | 1B22-9 |
| DD Select | 06.51.02.1 | 1B25-9 |
| Chan Busy | 06.20.02.1 | 1B16-9 |
| BCD Mode | 06.20.02.1 | 1B19-9 |
| WC Zero | 06.12.15.1 | 1B12-9 |

Depressing Reset button should turn off all indicators except WC Zero.

- B. Using the same procedure as in Paragraph A, execute a Read Select (RDS) instruction, using a binary direct data address. The same indicators, as in Paragraph A, should be on except BCD Mode, and Chan WRS. The Chan RDS indicator, located at 02A1B21, should be on. (Systems 06.20.00.1).

9.3 Program Test

- A. Run program 4CH1 without error.
- B. With either a DD device or a DD simulator attached to the channel, run an appropriate diagnostic.

10. CE PANEL TESTS

10.1 Remote Start/Reset Switch

- Don't have*
- A. Plug the Remote Start/Reset plug in the socket located in the Remote Control panel at the operator's station. This should allow remote Start/Reset action but should disable the Enter Instruction, Start, Reset, Continuous Enter Instruction, Load, Multiple Step and Single Step switches at the operator's station.
 - B. Unplug the Remote Start/Reset cable; plug in Dummy Remote Plug. Normal control is now returned in the operator's station.

✓ 10.2 Storage Test Switch

- A. Go into manual mode.
- B. Put all "ones" in keys.
- C. Turn on Storage Test switch.
- D. Push Enter Storage key on console.
- E. Flashing lights in SR indicates "ones" being put into memory.
- F. Reset Computer.
- G. Push Display Storage key on console.

10.2 Storage Test Switch (continued)

- H. Flashing lights in SR indicates "ones" being read out of memory.
- J. Turn off Storage Test switch.

10.3 Stop-On-Storage-Test-Parity Switch

- A. Perform steps A through F in section 10.2.
- B. Place a jumper between 01C3E07D and 01C3E07J to tie down one input to the parity tree but not to the SR.
- C. Turn on Stop-on-Storage-Test-Parity switch.
- D. Push Display Storage key on console.
- E. Parity error will halt the read operation and the Parity Check light will come on.
- F. Turn off both the switches (Storage Test and Stop-on-Storage-Test Parity).
- G. Remove Jumper.

11. TAU MANUAL CHECKS

11.1 Check Write Compare Circuit

- A. Write a continuous record of all ones from the CE panel in manual off-lines status.

11.1 Check Write Compare Circuit (continued)

- B. While writing, remove and replace the following cards one at a time:

| | |
|---------|---------|
| 14D6D05 | 14D6D13 |
| 14D6D07 | 14D6D15 |
| 14D6D09 | 14D6D17 |
| 14D6D11 | |

- C. The compare check circuits should turn on the compare check latch and its corresponding indicator on the CE panel.

NOTE

Skew, A-Reg and Error indicators will also come on since cards designated are the final amp hi clip outputs, System Page 90.40.10.1.

11.2 Test R-W VRC Trigger

- A. Write any length record of all ones with odd redundancy from the CE panel in manual off-line status.
- B. Reset and rewind the selected tape unit.
- C. Change the odd redundancy switch to the opposite mode and read the same record, which was just written.
- D. The R-W VRC trigger, A-Reg Error trigger, Error trigger and their corresponding indicators should be turned ON.

11.3 Test Gating of Skew Reg B to R-W Reg (When a Reg is Redundant)

- A. Follow same procedure as in 11.1.

11.3 Test Gating of Skew Reg B to R-W Reg (continued)

- B. Same indicators should be turned on as in Write compare circuit test 11.1. Absence of the R-W VRC indicator and presence of A-Reg Error indicator show that the B-Reg was gated to the R-W Reg. (System Page 90.40.20.1).

11.4 Test Echo Check Circuit

- A. Write a record or record in which a character is all zeroes (including the "C" Bit) from the CE panel in manual off-line status with Even Redundancy switch ON.
- B. The Echo Error Trigger and indicator should come on when each or any character written is all zeroes.

11.5 Test Skew Error Circuits

- A. Write any length record of all ones from the CE panel in manual off-line status.
- B. Rewind and turn on the Early Sample switch on the CE panel.
- C. Read the same record just written from the CE panel.
- D. Place Jumper between ground and pin 6D22A.
- E. The Skew Error Trigger and indicator should be turned on.
- F. Remove Jumper.

11.6 Test LRCR Error Gating Error Trigger

- A. Write a record of any length and composition from the CE panel in manual off-line status.
- B. While writing, place a jumper from ground to the following pins (inputs to LRCR) one at a time:
- | | |
|----------|------------------------------|
| 14D6C20A | 14D6D25A |
| 14D6C20B | 14D6D25B |
| 14D6C20C | 14D6D25C |
| 14D6C20H | Logic Pages 90.50.40.1, 41.1 |
- C. Push Reset button after each test.
- D. Only the Error indicator on the CE panel should come on as each test is made.
- E. Remove jumper from panel.

12. DIAGNOSTIC PROGRAMS

This section lists the diagnostic programs to be run to assure the quality and reliability of a 7040/44 system. The following sections will list the programs to be run and the requirements for these programs.

12.1 Program Requirements

- A. The programs must operate error free for the specified time with all power supply voltages at normal.

12.1 Program Requirements (continued)

B. Sense switches will have the following definitions for all diagnostic programs listed:

| <u>Sense Switch</u> | <u>Position</u> | <u>Definition</u> |
|---------------------|-----------------|--|
| 1 | Off | Proceed |
| 1 | On | Loop in Routine |
| 2 | Off | Print or Halt on Error |
| 2 | On | Bypass Error Indications |
| 3 | Off | Proceed, Bypass error halt |
| 3 | On | Halt on Error |
| 4 | Off | Long Print on error. Do Normal Prints |
| 4 | On | Bypass Long Error Prints. Bypass Normal Prints |
| 5 | Off | Proceed |
| 5 | On | Gate Service-aid halt or end |
| 6 | Off | Next Program |
| 6 | On | Loop in Program |

12.2 Diagnostic and Utility Program Index

12.2.1 Diagnostic Programs

4M51 Basic CPU Operations
 4M52 Basic CPU Operations
 4M53 Basic CPU Operations
 4M54 Basic CPU Operations
 4M55 Basic CPU Operations
 4M56 Extended performance operations and traps
 4M58 Memory protect option and traps
 4M59 Interval Timer option and traps
 4M61 Single precision floating point instructions and traps
 4M63 Double precision floating point instructions and traps
 4S51 2.5us - 8K - storage - high order addresses
 4S52 2.5us - 8K - storage - low order addresses
 4S53 2.5us - 16K - storage - high order addresses
 4S54 2.5us - 16K - storage - low order addresses
 4S55 2.5us - 32K - storage - high order addresses
 4S56 2.5us - 32K - storage - low order addresses
 4S81 8.0us - 4K - storage - high order addresses
 4S82 8.0us - 4K - storage - low order addresses

12.2.1 Diagnostic Programs (continued)

4S83 8.0us - 8K - storage - high order addresses
4S84 8.0us - 8K - storage - low order addresses
4S85 8.0us - 16K - storage - high order addresses
4S86 8.0us - 16K - storage - low order addresses
4S87 8.0us - 32K - storage - high order addresses
4S88 8.0us - 32K - storage - low order addresses
4TY1 Typewriter and common area, channel A
4C51 1401 option 7040/44 master program
4C52 1401 option 1401 slave program
4C55 Direct Data, chan. B-E, 7040/44 - 7040/44
4CH1 Overlap (B-E) channels without I/O usage
4F01 1301 - 7631 file, channel B-E
4F09 1301 utility program
4F10 1301 surface analysis
4RP2 1402 reader punch on 1414 III, IV (Channel A)
4RP6 1622 reader punch (Channel A)
4PT1 1011 paper tape reader on 1414 IV, V (Channel A)
4MQ1 1014 manual inquiry on 1414 IV, V (Channel A)
4C56 1009 data transmission unit on 1414 IV, V (Channel A)
4T51 Tapes on channels A-E I
4T52 Tapes on channels A-E II
4T55 Inter-record gap test, 729 tapes - channels A-E
4T57 Tapes compatibility test Channels A-E
4SY1 System test for 16K/32K and extended performance
4SY3 System test for 4K/8K and no extended performance I
4SY4 System test for 4K/8K and no extended performance II
4C70 7040/44-7740 Interface Diagnostic

12.2.2 Utility Programs

4DC1 Binary card load and control
4DC2 BCD card load and control
4DC 3 Dump tape load and control
4UT1 Generate dump tape from binary cards

12.3 Program Operating Procedures

Table 5-2 lists the tests performed and reliability runs with Sense and Density switch settings.

12.4 Marginal Checking

Table 5-3 lists, by module, the programs to be run while applying a ± 3 volt margin to that module. Only one module is to be checked at a time, Refer to section 12.2 for program titles. Margins impressed on Module D are simultaneously impressed on Module E.

TABLE 5-2 DIAGNOSTIC PROGRAM OPERATING PROCEDURES

| Program | Reliability Run | Sense Switch # | Test Performed |
|---------|-----------------|----------------|---|
| 4M56 | 5 min | 6 on | All extended performance instructions |
| 4M58 | 15 | 6 ▲ | Memory protect feature |
| 4M59 | 10 | 6 | Interval timer feature |
| 4S55 | 60 | 6 | 32K, 2.5 usec memory |
| 4S56 | 60 | 6 | 32K, 2.5 usec memory |
| 4S85 | 60 | 6 | 16K, 8.0 usec memory |
| 4S86 | 60 | 6 | 16K, 8.0 usec memory |
| 4S87 | 60 | 6 | 32K, 8.0 usec memory |
| 4S88 | 60 min | 6 | 32K, 8.0 usec memory |
| 4TY1 | 10 passes | 6 | Typewriter and channel A common logic |
| 4CH1 | 10 min/ch. | 6 ▼ | Overlap channels (B-E) w/o the use of I/O devices |
| 4F01 | 10 min | 6 on | 7631, FCU, 1301 disk file and channel traps |
| 4F10 | 2 passes | -- | Performs surface analysis of 1301 |
| 4PR3 | 5 passes | 6 on | 1403 I or 1403 II data transfer and control logic |
| 4RP2 | 4 passes | 6 off | 1402 data transfer and control logic |

(continued)

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5 SYSTEM TESTING

TABLE 5-2 DIAGNOSTIC PROGRAM OPERATING PROCEDURES (continued)

| Program | Reliability Run | Sense Switch # | Test Performed |
|---------|-----------------|----------------|---|
| 4RP6 | 3 passes | 6 on | 1622 data transfer and control logic |
| 4T51 | 20 p/dr | | Tape unit logic and information flow-all channels |
| 4T52 | * | | Extension of 4T51. Also contains an option to test the Console Bit Density switches * |
| 4SY1 | * | | System test - varies per configuration |
| 4C70 | 2 hrs. | | Loads JRR5 program into the 7740 and conducts an interface test by running both programs concurrently |

* 4T52 Reliability run - 20 complete passes on each drive. Density switches - complete 2 passes on each drive per Density switch setting.

4SY1 Reliability run - all applicable routines and devices for 8 hours with Sense switch 6 ON. Do not exceed the allowable tape errors.

TABLE 5-3 DIAGNOSTIC PROGRAMS - MARGINAL CHECK

| Program | Applicable Module | | | | | Program | Applicable Module | | | | | Program | Applicable Module | | | | |
|---------|-------------------|---|---|---|-------|---------|-------------------|---|---|---|-------|---------|-------------------|---|---|---|-------|
| | B* | C | D | E | 7904* | | B* | C | D | E | 7904* | | B* | C | D | E | 7904* |
| 4M51 | | X | | | | 4S54 | X | | | | | 4C56 | | | X | X | |
| 4M52 | | X | | | | 4S55 | X | | | | | 4T51 | | | X | X | X |
| 4M53 | | X | | | | 4S56 | X | | | | | 4T52 | | | X | X | X |
| 4M54 | | X | | | | 4TY1 | | | X | X | | 4T55 | | | X | X | X |
| 4M55 | | X | | | | 4C55 | | | | | X | 4T57 | | | X | X | X |
| 4M56 | | X | | | | 4CH1 | | | | | X | 4SY1 | X | X | X | X | X |
| 4M58 | | X | | | | 4F01 | | | | | X | 4SY3 | X | X | X | X | X |
| 4M59 | | X | | | | 4F10 | | | | | X | 4SY4 | X | X | X | X | X |
| 4M61 | | | X | X | | 4RP2 | | | X | X | | | | | | | |
| 4M63 | | | X | X | | 4RP6 | | | X | X | | | | | | | |
| 4S51 | X | | | | | 4PR3 | | | X | X | | | | | | | |
| 4S52 | X | | | | | 4PT1 | | | X | X | | | | | | | |
| 4S53 | X | | | | | 4MQ1 | | | X | X | | | | | | | |

* Module B - 7107 only

7904 - Run appropriate program for existing channel devices

1/1/64

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5 SYSTEM TESTING

13. PERIPHERAL UNIT CHECK-OUT PROCEDURES

13.1 1414 I/O Synchronizer

13.1.1 1414 (3, 4, 5, 6, 8) Voltage Checks

Measure all I/O logic supply voltages as shown below; adjust as required. Repeat for 1414 Channel 2 when applicable.

| <u>Power Supply</u> | <u>Voltage</u> | <u>Test Point</u> | <u>Notes</u> |
|---------------------|------------------|-------------------|--------------|
| 1 | - 6V \pm .24V | 1414 A2D15K | |
| 2 | + 6V \pm .24V | 1414 A2D15L | |
| 3 | -12V \pm .48V | 1414 C Frame only | |
| 1402 | -12V \pm .48V | 1414 A2D15M | |
| 1402 | +12VM \pm .48V | 1414 A2E15N | |
| 1402 | -20V \pm .80V | 1414 A2A28Q | |
| 1402 | -60V \pm 2.40V | TBA 4-1 | |

13.1.2 1414 (1, 2, 7) TAU Voltage Checks

Measure the TAU logic supply voltages as shown below; adjust as required.

| <u>Power Supply</u> | <u>Voltage</u> | <u>Test Point</u> | |
|---------------------|------------------|-------------------|--|
| 1 | +12VM \pm .48V | 1414 B4A26N | |
| 2 | - 6V \pm .24V | 1414 B4A26K | |
| 3 | -12V \pm .48V | 1414 B4A26M | |

13.2 1402 Card Read Punch

13.2.1 Continuity Check, Cable 760741

To avoid the possibility of blowing hammer driver fuses, and/or hammer drive coils, make the following continuity checks before applying power:

1402 DC4-1 and 1414-III TBA4-2. *

1402 DC4-2 and 1414-III TBA4-1. *

13.2.2 Voltage Checks

Check the power supply voltages at the CE service panel.

13.2.3 Test Run

Run test decks to verify correct machine operation. For any required adjustments, refer to the CE Instruction - Reference Manual.

13.3 1403 Printer

13.3.1 Three Phase Motor Rotation

- A. When the system is ready, bring up system power.
- B. Check carriage motor rotation by observing rotation of forms stacker rolls. Correct rotation would cause paper to be stacked properly.
- C. Check direction of rotation of type array drive motor. The motor rotation is correct if the chain moves counter-clockwise when viewed from the top.

* To prevent a false reading through the power supply, disconnect both ends of these wires before checking continuity.

13. 3. 1 Three Phase Motor Rotation (continued)

- D. Check that the hammer unit blower is blowing air normally into the hammer unit. Some air flow will be felt even if the blower is turning in the wrong direction.
- E. Turn off system power. Do not use the main line switch on the 1403 (toggle switch inside rear cover). This switch should be used only if system power is off.
- F. If all three-phase motors are rotating in the correct direction, proceed to step H. If one motor is rotating incorrectly, go to step G. If all motors are rotating incorrectly, proceed as follows:
1. Turn off the system power.
 2. Turn off the power to the wall receptacle.
 3. Reverse any two leads at the wall plug.
 4. Bring up the system power and recheck the motor direction.
- G. If one of the three-phase motors is turning in a direction of rotation that is incorrect:
1. Check that the system power is off.
 2. Interchange any two of the three leads of the motor.
 3. Recheck motor rotation.
- H. If three-phase motors are turning in the correct direction of rotation, proceed to Unit Check-Out, paragraph 13. 3. 3.

13.3.2 Continuity Check

Check continuity between TBA4-2 and TBA3-12. This is the -60v DC return for the printer.

13.3.3 Unit Check-Out

- A. Check or correct the operation of all printer interlocks.
- B. Give the printer a complete operational test.
- C. For any required adjustments, refer to the CE Reference Manual.

13.4 1014 Remote Inquiry Unit

13.4.1 Common Carrier Polarity

As a routine check, or if testing the 1014 reveals trouble, the polarity of the incoming cables (supplied by the common carrier) can be checked with an oscilloscope. This may be necessary to insure that the lines have not been reversed somewhere between the processor location and the Remote Inquiry Unit.

- A. Connections to the scope should be floating, with the scope ground connected to the 1014 communications line common.
- B. When polling, the request sample pulse appears on the data line as a 20 Ms negative pulse.
- C. If terminal has request, it sends an a. c. ripple on the sync line consisting of 8 pulses, the first of which is negative.

13.4.1 Common Carrier Polarity (continued)

As an alternate method, the lines could be continuity checked with an ohmmeter. This would require telephone communication between the two locations, and a man at each end.

- A. Disconnect both ends of the four wires.
- B. Connect an ohmmeter to the green and yellow wires at one end. Ask that the green and yellow wires be shorted at the other end.
- C. Connect the ohmmeter to black and red at one end. Have black and red shorted at the other end.
- D. Continuity (3400 ohms, max.) in both instances shows that the lines are o.k. Lack of continuity either or both times indicates reversed wires, or open circuit in the common carrier lines.

13.4.2 Testing Procedure

- A. For the off-line reply operation the buffer may be loaded with any type of data to be sent to the station continuously or a record at a time.
- B. Select the option switch setting required according to the following list.

Chassis 14C1 - Opt 4

Chassis 14C4 - Opt 5

Chassis 14C6 - Opt 2

13.4.2 Testing Procedure (continued)

- C. With the switch on single operation, depress the start once to clear the buffer.
- D. Each successive depression of the start button will load a new character into the output buffer. (These characters are determined by the bit switch settings on the CE Panel). A maximum of eighty (80) characters may be loaded in this manner. The first character loaded must be the station number and the last character must be a group mark.
- E. With the switch on Ctin Operation, depress the start button once more with a valid character set on the bit switches. This should initiate the reply to the station and continuously transmit the message previously loaded in the buffer. Depressing the stop button should terminate the operation. Depressing the start button will again repeat the above operation.

The off-line request operation may be accomplished in the following manner. (Input data is not transmitted to the 7040/44 system, and therefore a reply is not sent back to the station.)

- F. Set the buffer switch to selected, and the option switch according to the following list.

Chassis 14C1 - Opt 1

Chassis 14C4 - Opt 6

Chassis 14C6 - Opt 3

13.4.2 Testing Procedure (continued)

G. Depressing the start button will allow any request operation to be initiated at the station, including release and cancel.

A check should be made to see that there are no buffer errors while making successive requests, releases, cancels, etc.

The "Stop on Error" switch may be used for this check.

H. For a complete check, perform the remote inquiry diagnostic function test number M010.

13.5 1009 Data Transmission Unit

The 1009 Data Transmission Unit can be tested in accordance with the following procedure as soon as installation is complete, provided the IBM 1414 I/O Synchronizer is operational.

With the 1414 off-line, there are two modes of operation with the 1009. The jumper card (CBZ-) located in position A25 on the 1009 Adapter Chassis will control the mode of operation. If this jumper card is plugged into position A26 the 1009 must be in a diagnostic loop and will automatically be operating in full duplex (same 1009 receiving and sending to the processor). Location A26 is an unwired position and is plugged only to prevent loss of the jumper card. If the jumper card is plugged into position A25 the 1009 must be in a normal point to point operation. With each of these off line conditions either transmit or receive status may be used depending on the option switch setting of the CE Panel buffer select switch. The option switch settings are as follows:

13.5 1009 Data Transmission Unit (continued)

| <u>Chassis Location</u> | <u>Status</u> | <u>Buffer Select Switch Setting</u> |
|-------------------------|---------------|---|
| 14C1 | Transmit | Option 1 |
| 14C1 | Receive | Option 4 |
| 14C4 | Transmit | Option 6 |
| 14C4 | Receive | Option 5 |
| 14C6 | Transmit | Option 3 |
| 14C6 | Receive | Option 2 |

The transmit test procedure may be set up as follows after 1009-1414 power is brought up:

- A. Place the 1009 in a test tie-back condition or if used with a data set place the 1009 in an operate condition with the data set in a data condition.
- B. On the 1009 operator's panel the switches should be:
 - Binary - BCD in Binary
 - Test - Normal to Normal
 - Transmit - Receive in Transmit
 - Speed Select at 1200
- C. The CE Panel switches should be:
 - Data Entry - Off-Send EOTR in Off
 - Operate - Diag. Test in Diag. Test
 - Operate - Manual Test in Operate
 - Stop Select in Normal
 - Half-Duplex - Full Duplex in Half Duplex

13.5 1009 Data Transmission Unit (continued)

- D. The 1414 should be operated off line. Remove the jumper card located in the 1009 Adapter Chassis, position A25 and plug it into A26.
- E. To initialize data transmission to the 1009 the following steps must be done in the sequence in which they are given.
- F. On the 1414 CE Panel the switches should be:
- Check Stop On - Off in Off
 - Single Oper - Ctin Oper in Single Oper
 - Off-Line Mode Switch in Selected Buffer
 - Buffer Select Switch in the Transmit
- Option (See Page 5-39)
- G. Depress the 1009 start button and wait for an accepted record and ready for data condition to show on the 1009 operator's panel.
- H. Depress the 1414 reset and then start. This initializes (fills) the 1414 A and B buffers with lower Y's (LY). Notice that the 1009 has now gone into a data condition.
- I. Place the valid bit configuration in the 1414 CE Panel bit switches. (e. g., BA8, bit code for H).

13.5 1009 Data Transmission Unit (continued)

- J. Now depress the 1414 start button (do not depress reset). Each depression of the start button loads one character into the A buffer. If the start button is depressed 10 times, buffer positions 00 through 09 will be loaded.

After loading the message (maximum length of message is 158 characters), load two pound (#) signs (8, 2 and 1 bits) into the buffer. This is the coding for an end of message.

- K. Place the single operation - Ctin Operation switch in Ctin Oper. Turn off all bit switches except the C bit (Blank) and depress the start button. This loads the rest of the 160 positions in the A and B buffers with blanks. Transmission of the loaded message now takes place as can be seen by the alternating data lights on the 1009.

- L. To stop the message depress the stop button. To restart it, depress start. If for any reason the 1414 reset button is depressed (after step H) the loaded message is lost and the procedure starting at step H must be done again.

- M. Let the transmit test run for approximately five minutes.

The receive test procedure may be set up as follows:

- N. Depress the 1414 stop button and end the transmit program.
- O. Depress the POR (Power On Reset) button on the 1009 CE Panel, and set the transmit - receive switch on the 1009 operators panel to receive.

13.5 1009 Data Transmission Unit (continued)

- P. Set the buffer select switch on the 1414 CE Panel in the receive option
- Q. Place a valid bit configuration in the 1414 CE Panel bit switches. (e. g., BA8, bit code for H).
- R. Depress the 1009 start button.
- S. Depress the 1414 start. The 1009 will now go into a data condition.
- T. The lights on the 1009 operator's panel will be on solid as there is no end of message (two pound signs) being sent to the 1009. The 1009 is receiving the character set up on the 1414 CE Panel bit switches and then transmitting them back into the 1414 A and B buffers.
- U. The fact that data is flowing into the 1414 buffers may be verified by scoping the serial scan advance trigger (D11A) and the transfer scan advance trigger (D11L) on the 1009 Adapter Chassis. With the 1009 speed select switch set at 1200 these trigger outputs will be going positive and negative at about a 500 ms. rate. These triggers are selecting the 1414 buffer (A or B) to be loaded with the information being received from the 1009.

13.5 1009 Data Transmission Unit (continued)

If there is remote equipment connected to the 1009 the following procedure may be used:

- V. Place the jumper card into position A25. The 1009 may then be operated in the normal manner using either the transmit or receive mode, depending on the option settings. The transmit condition is operated the same as the diagnostic mode except that you now transmit to a remote location instead of using a 1009 loop. In the receive condition you need only to select the correct option and depress the start button. When the 1009 is ready to receive, the buffers will start filling.

For further off-line testing CE Manual Data Transmission Unit attachment to the 1414-4 and 5 (R23-2557) may be used.

On line tests should be performed using the diagnostic function test number M009.

13.6 Magnetic Tape Units

Detailed adjustment, and servicing procedures are beyond the scope of this manual. However, certain checks should be made during every tape unit installation. Use the applicable CE reference manual and CE memorandums for details on the following adjustments.

13.6.1 729 Magnetic Tape Units

Check the following items during installation of any new 729 tape unit:

- A. Remove the rubber shipping stops on the capstan motor
- B. Check the adjustment of the capstan In-Out Sensing switches
- C. Check line voltage, DC supply voltages, and prolay neutral drive currents
- D. Check High Speed Rewind, Load and Unload operations
- E. Scope and adjust, if necessary, the prolay Start-Stop
- F. Run Inter-record Gap test diagnostic
- G. Check and adjust, if necessary, Preamplifier output, Skew and Asymmetry (Model 5 & 6)
- H. Run tape unit reliability diagnostics

13.6.2 7330 Magnetic Tape Units

Check the following items during installation of any new 7330 tape unit:

- A. Check the High Speed Rewind operation
- B. Check and adjust, if necessary, Preamplifier output and Skew
- C. Run Inter-record Gap test diagnostic
- D. Run tape unit reliability diagnostics

14. USE METER TESTING

14.1 1414 I/O Synchronizer

14.1.1 Preparation

- A. Record 1414, 1402 and 1403 clock reading to nearest 1/500 hour.
- B. Load typical CPU diagnostic. Note that "Meter Check Program" is not satisfactory due to times programmed halts.

14.1.2 On-Line Operation Check, 1414, 1402 and 1403 Clocks

- A. Enable 1414 synchronizer
- B. Load card equipment.
- C. Set 1414 sync to off-line mode.
- D. Select Rdr-Pch option and cycle at least once to condition 1402 clock.
- E. Select Rdr-Prt option and cycle at least once to condition 1403 clock.
- F. Return select switch to normal position.
- G. Press restore key on 1403 printer. Verify that 1403 clock does not run.
- H. Repeat steps E and F above. Adjust 6-8 line clutch on 1403 to alternate position. Verify that 1403 clock does not run.
- I. Repeat steps E and F above.
- J. Start CPU program. Verify that 1414, 1402 and 1403 clocks run.
- K. With program running, place Enable switch in disable position. Verify that 1414, 1402 and 1403 clocks continue to run.
- L. With program running, run out cards from reader and punch, and manually space printer. Verify that 1402 and 1403 meters do not run.
- M. Stop and restart program. Verify that 1414 clock does not run.
- N. With program running, place 1414 Sync Enable switch in enable position. Verify that 1414 clock does not run.
- O. Stop and restart program. Verify that 1414 clock runs.

14. 1. 3 On-Line, Off-Line Simultaneous Operation Check, 1414

- A. Enable 1414 Sync.
- B. Load a CPU diagnostic. Start program.
- C. Load and ready reader and punch.
- D. Place 1414 sync in off-line mode.
- E. Load punch buffer if necessary and then select punch option.
- F. Press 1414 CE start and cycle at least once to condition punch. Verify that 1402 meter does not run.
- G. Load reader buffer if necessary and then select reader option.
- H. Press 1414 CE start and cycle at least once to condition reader. Verify that 1402 meter does not run.

14. 1. 4 Off-Line Operation Check, 1414 and Card Equipment Clocks

- A. Assure "Process Time" signal is not active throughout this test.
- B. Enable 1414 synchronizer.
- C. Load and ready reader, punch and printer.
- D. Place 1414 in off-line mode and select Rdr-Pch option.
- E. Press 1414 CE start. Verify that 1414 and 1402 clocks run during extent of this operation.
- F. Select Rdr-Prt option.
- G. Press 1414 CE start. Verify that 1414, 1402 and 1403 clocks run during extent of this operation.
- H. Place Enable switch in disable position.
- I. Repeat steps C thru F. Verify that no operation can be performed and that the clocks do not run.

14. 1. 5 Service Aids

- A. The CE can scope the unused, unsealed outputs of logic cards to determine cause of trouble.
- B. "I/O Process Time" can be scoped in unsealed I/O units to help determine defective circuit.
- C. Isolate problem to card or cards and replace same by cutting card seals.
- D. If defect cannot be isolated by above methods, the pin seals can be removed and normal trouble-shooting methods applied.

14.2 1414 Tape Adapter Unit

14.2.1 Preparation

- A. Record 1414 TAU and tape drive clock readings to nearest 1/500 hour.
- B. Load typical CPU diagnostic. Note that "Meter Check Program" is unsatisfactory due to timed programmed halts.

14.2.2 On-Line Operation Check, TAU and Tape Unit Clocks

- A. Enable 1414 TAU unit.
- B. Load tape drives and move tape away from load point using TAU CE panel to condition tape drive clocks. Return TAU to on-line.
- C. Start program. Verify that TAU and tape drive clocks run.
- D. With program running, place Enable switch in disable position. Verify that TAU and tape drive clocks continue to run.
- E. With program running, rewind all drives to load point. Verify that tape drive clocks do not run at Load Point.
- F. Stop and then restart program. Verify that TAU clock does not run.
- G. With program running, place TAU Enable switch in enable position. Verify that TAU clock does not run.
- H. Stop and restart program. Verify that TAU clock runs.

14.2.3 Service Aids

- A. The CE can scope the unused, unsealed outputs of logic cards to determine cause of trouble.
- B. "I/O Process Time" can be scoped in unsealed I/O units to help determine circuit.
- C. Isolate problem to card or cards and replace same by cutting card seals.
- D. If defect cannot be isolated by above methods, the pin seals can be removed and normal trouble-shooting methods applied.

14.3 7106/07 Processing Unit

14.3.1 CPU in Automatic Mode (Not CE Mode)

- A. Clear storage. After storage is cleared, neither the CPU nor the CE meter should record.
- B. Start. CPU meter should record time. CE meter should not record time.
- C. Switch to CE mode, CE meter should record time. CPU meter should not record time.
- D. Clear storage, put CPU in Manual mode, not CE mode. Enter a typewriter select (076604001000) in location 00000. Enter HPR (042000000000) in location 00001. Put CPU in Automatic mode and start.

Master Stop TGR, should be on. Channel A should be in use, CPU meter should be recording and CE meter should not be recording.

14.3.2 Channel A Test

- A. CPU in Automatic mode, not CE mode. Using scope, note -C for a nominal 400 msec at the following pins when Clear button is depressed.

| | | |
|----------|----|---------|
| 01E3J09W | or | 01EL08B |
| 01E3J09Q | or | 01EL15R |
| 01E3J094 | or | 01EL29B |
| 01E3J097 | or | 01EL24B |

- B. Switch to CE mode. 01E3J097 or 01EL24B should remain at +C level when Clear button is depressed.
- C. Manual keys check. CPU in Pulse mode, not CE mode. A -C level should be observed at 01E3J097 or 01EL24B for a nominal 400 msec during the following conditions:

- Single Step depressed
- Multiple Step depressed (-C for at least 400 msec)
- Enter Storage depressed
- Display Storage depressed
- Enter Instruction depressed

14.3.3 Program Test

The following instructions are to be keyed in starting at location zero:

| <u>Location</u> | <u>Instruction</u> | | <u>Symbol</u> | |
|-----------------|--------------------|---------|---------------|-----------|
| 00000 | 077400 | 2XXXXXX | AXT | ** , 2 |
| 0001 | 077400 | 177777 | AXT | 77777, 1 |
| 0002 | 200001 | 100002 | TIX | *, 1, 1 |
| 0003 | 200001 | 200001 | TIX | *-2, 2, 1 |
| 0004 | 042000 | 000000 | HPR | |
| 0005 | 002000 | 000000 | TRA | 0 |

The constant that goes in (AXT **, 2) location zero is explained as follows:

- A. Use (AXT AA, 2) in location zero. Reset, CPU in Automatic mode, not CE mode. Note meter setting. Depress start. Do this five times with a delay of 10 to 30 seconds between starts. At the completion of Five starts the I/O position of the meter should be increased by 1.
- B. Use (AXT BB, 2) to test increment of 1/100 position by 1.
- C. Use (AXT CC, 2) to test increment of 1/10 position by 1.

| D. | | <u>7040</u> | <u>7044</u> |
|----|----|-------------|-------------|
| | AA | 422 | 666 |
| | BB | 211 | 333 |
| | CC | 2532 | 4216 |

14.4 7904 Data Channel

- A. Put channel use meter in Available mode and CPU use meter in Process mode and reset CPU. Use meters should not record.
- B. Clear storage and push Start. Use meters should record.
- C. Put CPU in CE mode. Use meters should not record.

14.4 7904 Data Channel (continued)

- D. Put CPU in Process mode and then channel in Not Available mode. Use meters should record.
- E. Push Automatic button twice. Channel use meter should stop when CPU goes into Manual mode and remain stopped when CPU return to Automatic mode.
- F. When channel use meter is recording the process time lines at 02A3F25C and M should be at +B. When channel use meter is not recording these lines should be at -B. These lines are to the TI and SI interfaces.
- G. Execute step A. Test channel for normal operation. (See following example for tapes on channel B1) Channel use meter should record.

| | | |
|-------|---------------|-------|
| 00100 | 076600 (WRS) | 02221 |
| 00101 | -05400 (RCHB) | 00103 |
| 00102 | 002000 (TRA) | 00100 |
| 00103 | 000100 (IORD) | 01000 |

- H. Put channel use meter in Not Available mode and reset CPU. Channel use meter should not record. The example in step G. should hang the CPU in L-time with the channel not selected.
- I. With channel still not available, test for Not Ready condition. (See following example for tapes on channel B1).

| | | |
|-------|---------------|-------|
| 00100 | 076210 (SEN) | 02221 |
| 00101 | -05400 (RCHB) | 00105 |
| 00102 | 006100 (TCOB) | 00102 |
| 00103 | 050000 (CLA) | 01000 |
| 00104 | 042000 (HPR) | 00000 |
| 00105 | 000001 (IORD) | 01000 |

There should be a "1" in the sign bit only of the accumulator. The CPU should not hang on a Sense instruction.

14.5 729 Magnetic Tape Unit

14.5.1 Model 2, 4, 5 and 6 Relay Unit

- A. Insure the meter runs under the following three conditions:
1. -N process (M) line active
 2. Not at load point
 3. Not unloaded

NOTE: Off Line - to simulate -N process line, use $910\ \Omega$ 1/2w resistor P/N 528486, from pin A04E to -6 volts.

- B. Meter should not run when any one of these three conditions is missing.
- C. With meter operating properly, install in the power pac the tamper-proof plug supplied with power pac.

14.5.2 Model A2, A4, 5, 6 NOR Unit

- A. Insure the meter runs under the following three conditions:
1. -N process (M) line active
 2. Not at load point
 3. Not unloaded

NOTE: Off Line - to simulate -N process line, use $100\ \Omega$ 1/2w resistor P/N 213536 from pin J18C to -6 volts.

- B. Meter should not run when any one of these three conditions is missing.
- C. With meter operating properly, install in the power pac the tamper-proof plug supplied with power pac.

14.6 7330 Magnetic Tape Unit

The meter should run whenever the tape unit is not unloaded status and not at load point and the process line is active. Check this by initiating a low speed rewind to load point, forward motion, then a high speed rewind to load point. To simulate process line active, tie 6E01R to ground.

APPENDIX A
TAMPER-PROOFING DEVICES

1. GENERAL INFORMATION

This section explains the use and installation of devices for tamper-proofing use meters and accompanying circuits. Tamper-proofing may be required at the time of installation on any of the following:

- A. Paddle cards
- B. Panel pins
- C. Terminal blocks

2. APPLICATION

The following tamper-proofing devices are used for the components indicated:

| <u>P/N</u> | <u>Device</u> | <u>Application</u> |
|------------|---------------|--------------------|
| 362522 | Cap | Panel pins |
| 362610 | Lock | Paddle card |
| 262915 | Paper stamp | Terminal blocks |

3. INSTALLATION

3.1 Paddle Cards

Refer to figure A and proceed as follows:

- A. Remove card to be locked, and insert card lock into two center positions of card socket. Work from right to left when locking cards.
- B. Insert card. Some paddle cards are shorter than standard; they should not be inserted completely to the bottom of socket until step "D".

APPENDIX A
TAMPER-PROOFING DEVICES

3.1 Paddle Cards (continued)

- C. Pull strap to test locking action.
- D. Place pin portion of locking strap into card hole and use soldering iron to form locking bead.

Cards can be removed by cutting off pin portion of locking straps with cutting pliers. To lock card again, use a new lock.

3.2 Panel Wiring Pins

To cover pins, use P/N 362522 (figure A-2) as follows:

- A. Prepare area around pin by **pushing** wires away from pin to be covered.
- B. If pin contains a wire wrap connection, no special preparation is required; proceed to step "D".
- C. If pin contains slip-on terminal, check that wire from this terminal exits from end closest to the panel. If slip-on terminal is on pin without any wire wraps, add wire wrap to pin above slip-on terminal and cut off excess wire.
- D. Slip cap over pin, completely covering pin and all connections to the pin.
- E. Prepare Ungar soldering iron by installing 23 1/2 watt heating element, P/N 461393 and special soldering iron tip P/N 461394.

3.2 Panel Wiring Pins (continued)

CAUTION

Do not use pliers, or the equivalent, on hollow portion of tip when tightening tip on the heating element.

- F. When the soldering tip has reached full heat, slip tip over cap as far as possible but do not force against wires under end of tip. Keep tip over the cap approximately 15 to 20 seconds. Remove tip and let the cap cool.
- G. When cap is cool, pull it with the tip of fingers to check security. If cap is not secure and you can push cap back into position do so, and reapply heat until cap is secure.
- H. To remove a cap, reheat with same soldering tools. While cap is in heated, soft state pull it off with pliers. Use a new cap to reseal pin.

3.3 Terminal Blocks

The paper stamp (P/N 362915) is used to seal terminal block safety shield, screws and clips. Refer to figure A-3 for the use of this device.

1 / 1 / 64

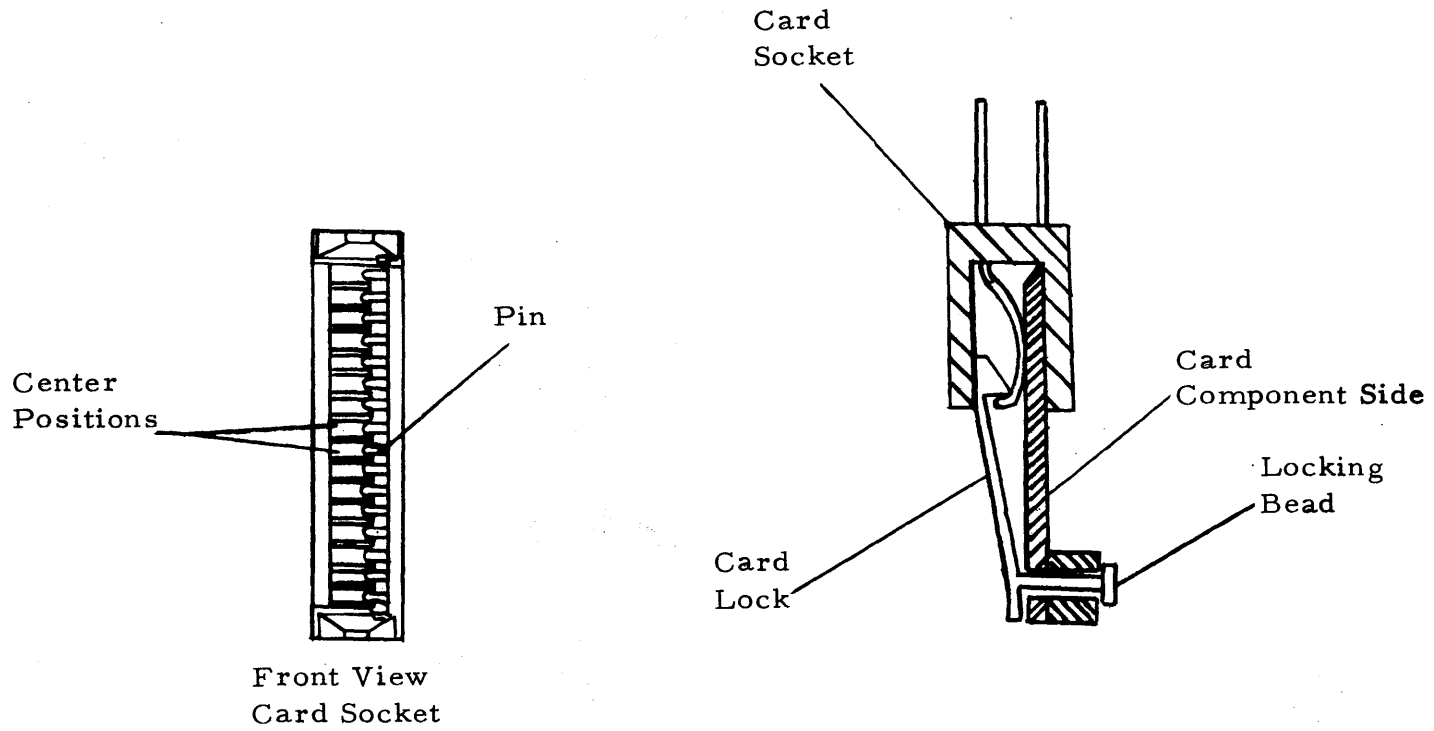


FIGURE 1 TAMPER-PROOFING PADDLE CARDS

APPENDIX A
TAMPER-PROOFING DEVICES

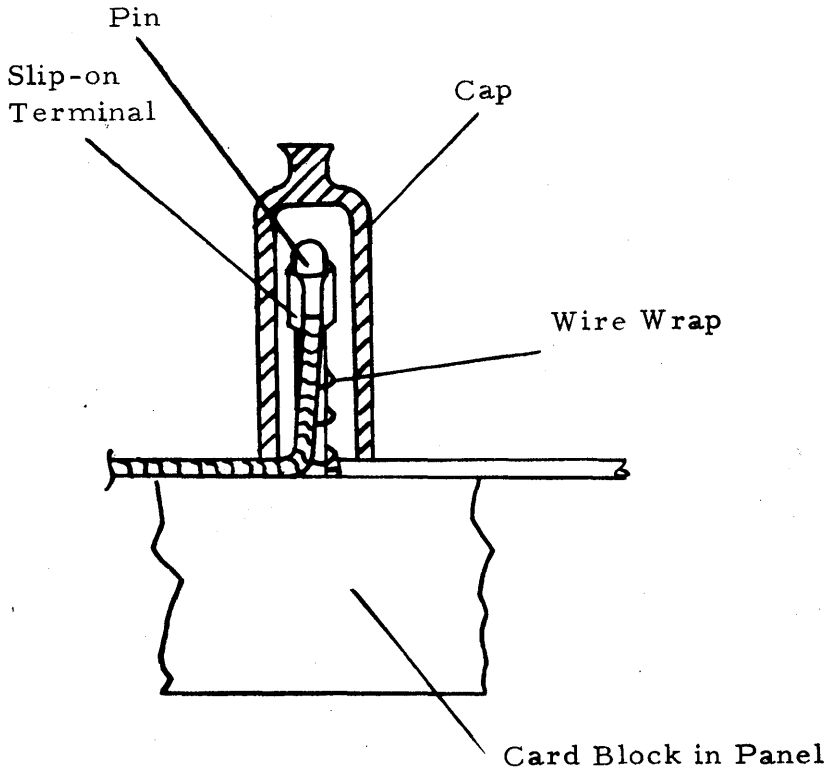
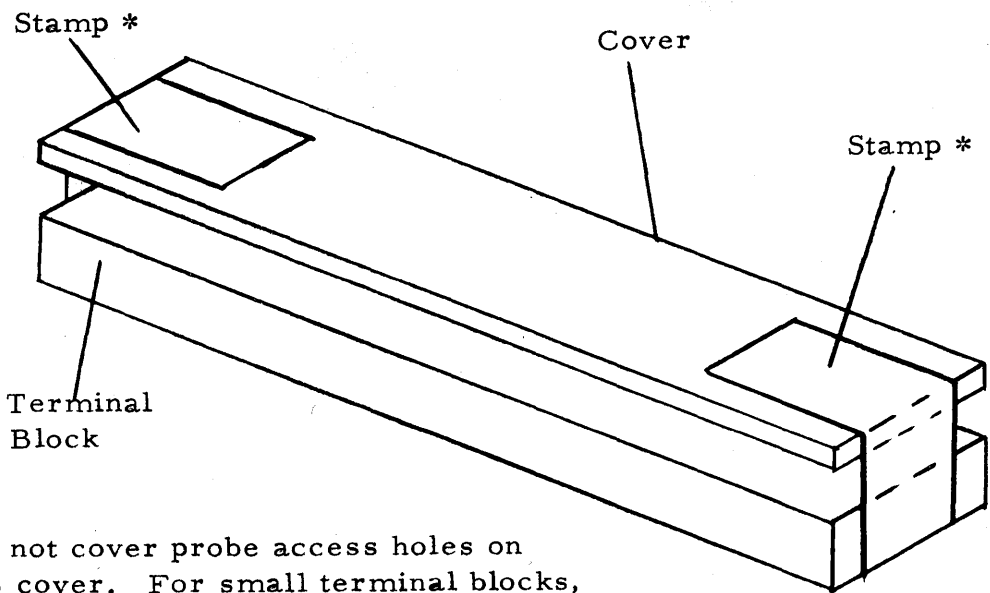


FIGURE A-2 TAMPER-PROOFING PANEL WIRING PINS



* Do not cover probe access holes on TB cover. For small terminal blocks, cut stamp to fit.

FIGURE A-3 TAMPER-PROOFING TERMINAL BLOCKS

DIRECT COUPLE FEATURE

1. SYSTEM CONFIGURATIONS

Four system configurations are possible:

| | | |
|------|-----------------|------|
| | 7040 --- 7090 | |
| 704X | 7040 --- 7094 | 709X |
| | 7044 --- 7094 | |
| | 7044 --- 7094-2 | |

A copy of the 709X installation manual should be available for additional cabling information.

2. CABLE INSTALLATION

2.1 Multiplexor Cable 5215679

This cable is stored in the 7106/07 C frame. Route the cable and the attached 20 position connectors to the D frame tailgate connector panel and install the connector blocks. Install per labeling in positions L29, 33, 37, 41, 45, 49 and U33, 37, 41, 45, 49.

2.2 Cable 52115680

The cable is stored in the D frame with "bullet" terminals attached. Route the twisted pair to the 20 position connectors installed with cable 5215679 and connect per the labeling.

2.3 External Cables

The external cables are 709X system cables. Plug the cables using table B-1, selecting only the key numbers that apply to your particular installation. Table B-1 is a duplicate on systems page 00.00.13.0 (7090, 7094, 7094 Mod. 2).

2.4 Cable Terminators

If the system configuration is "stand-alone" with no channels, or if the 7106/07 is on the end of a 7607 Data Channels, terminating resistor assemblies must be plugged into the 7106/07 tailgate connector panel. Terminators are of the type used on 709X channels. One terminator (01DL29) is shipped with the 704X system. The remaining terminators should be available at the existing 709X installation or shipped with the 709X. Plug the terminators into the 7106/07 connector panel as follows:

DIRECT COUPLE FEATURE

| 7607 EQUIVALENT 7040/44 CONNECTIONS | | | | 7040/44 TERMINATORS REQUIRED P/N |
|--|----------------------------|-------------------|-----------------------------|--|
| CHAN IN CONN | EQV. 7040/44 IN CONN. * | CHAN OUT CONN. | EQV. 7040/44 OUT CONN. * | |
| E 05D | C U09 | E 05C | D U33 | NOT AVAILABLE |
| E 17D | C U13 | E 13D | D U37 | 532131 |
| E 21D | C U17 | E 09D | D U41 | 532131 |
| E 13F | C U21 | E 13E | D U45 | NOT AVAILABLE |
| E 17F | C U25 | E 17E | D U49 | NOT AVAILABLE |
| E 21C | C U29 | E 09C | D L33 | 532133* |
| E 17C | C L21 | E 13C | D L49 | 532132 |
| F 41F | C U33 | F 41C | D L37 | 532134 |
| F 33C | C U37 | F 33E | D L41 | 533700 |
| F 37F | C U41 | F 37C | D L45 | 532135 |
| 7040/44 ONLY NO 709X EQUIVALENT | | | D L29 | 532133 |
| * 7040/44 ONLY REMOVE PIN #6 | | | D L33 | NOT AVAILABLE |
| * For further signal routing in 7040/44 see 7040/44 ref. page 02.00.90.0 | | | | |

The above information is also on systems page 00.00.06.0
(7090, 7094, 7094 mod. 2).

DIRECT COUPLE FEATURE

3. DIAGNOSTIC TESTING

Run the following programs as indicated:

4MP1

Purpose: To check the operation of the Direct Connection feature.

Reliability Run: Run, using all routines, for 10 minutes.

Marginal Check: 7040 - 1 minute at each voltage limit

Vary voltages on 7106 C and 7106 D

-12M -15V Low -9V High

7090/94 - 1 minute at each voltage limit

Vary voltages on 7109, 7108 or

7110, 7302 and 7606 simultaneously

+6M 5V Low 7V High

-12M -13 Low -11V High

4SY2

Purpose: To system test the 7040/44 with D.C. feature.

Reliability Run: Run all applicable routines and devices for 15 minutes with sense switch 6 on. Do not exceed the allowable tape errors.

Marginal Check: 7040 - 1 minute at each voltage limit

Vary voltages on 7106 C and 7106 D

-12M -15V Low -9V High

7090/94 - 1 minute at each voltage limit

Vary voltages on 7109, 7108, or 7110

7302 and 7606 simultaneously

+6M 5V Low 7V High

-12M -13 Low -11V High

49C4

Purpose: Diagnostic Control Program used when running 7090/94/94-2 diagnostic programs, and 7040/44 is required for maintenance control.

APPENDIX B
DIRECT COUPLE FEATURE

TABLE B-1 EXTERNAL CABLE ROUTING- DIRECT COUPLE

| CABLE GROUP | KEY NO. | NAME & FRAME NO. | | FROM | | TO | | Y | Z | CABLE PART NO. |
|-------------|---------|------------------|--------|-------|------|-------|------|----|--------|----------------|
| | | FROM | TO | %GATE | CONN | %GATE | CONN | | | |
| | | | | | | | | | | |
| A62 | 62 | 7606 | 7106N' | 03E | 29F | | U09 | 60 | 24 | 587314 |
| | | ↑ | 7106N | 03E | 29G | O1C | | | | ↑ |
| | 62a | | 7106N' | 03E | 33F | | U13 | 62 | 24 | |
| | | | 7106N | 03E | 33G | O1C | | | | |
| | 62b | | 7106N' | 03E | 37F | | U17 | 64 | 24 | |
| | | | 7106N | 03E | 37G | O1C | | | | |
| | 62c | | 7106N' | 03F | 21D | | U21 | 22 | 24 | |
| | | | 7106N | 03F | 21E | O1C | | | | |
| | 62d | | 7106N' | 03F | 25D | | U25 | 24 | 24 | |
| | | | 7106N | 03F | 25E | O1C | | | | |
| | 62e | | 7106N' | 03F | 29D | | U29 | 26 | 24 | |
| | | | 7106N | 03F | 21F | O1C | | | | |
| 62f | | 7106N' | 03F | 33D | | L21 | 28 | 24 | | |
| | | 7106N | 03F | 33E | O1C | | | | | |
| 62g | | 7106N' | 03F | 37D | | U33 | 30 | 24 | | |
| | | 7106N | 03F | 37F | O1C | | | | | |
| 62h | | 7106N' | 03F | 45D | | U41 | 32 | 24 | ↓ | |
| | | 7106N | 03F | 41F | O1C | | | | 587314 | |
| A63 | 63 | ↓ | 7106N' | 03F | 41D | | U37 | 32 | 24 | 531641 |
| | | 7606 | 7106N | 03F | 41E | O1C | | | | |
| A66 | 66 | 7606A | 7106 | 03F | 53D | O1C | L17 | 38 | 24 | 587314 |
| | 66a | ↑ | B | ↑ | 53E | ↑ | ↑ | ↑ | ↑ | ↑ |
| | 66b | NOTE XIV | C | | 53F | | | | | |
| | 66c | | D | | 53G | | | | | |
| | 66d | | E | | 49D | | | | | |
| | 66e | | F | | 49E | | | | | |
| | 66f | | G | ↓ | 49F | ↓ | ↓ | ↓ | ↓ | ↓ |
| | 66g | 7606H | 7106 | 03F | 49G | O1C | L17 | 38 | 24 | 587314 |
| A67 | 67 | 7607 | 7106 | 06E | 05C | O1C | U09 | 48 | 24 | ↑ |
| | 67a | ↑ | ↑ | 06E | 09C | O1C | U29 | 50 | ↑ | |
| | 67b | | | 06E | 09D | O1C | U17 | 50 | | |
| | 67c | | | 06E | 13C | O1C | L21 | 52 | | |
| | 67d | | | 06E | 13D | O1C | U13 | 52 | | |
| | 67e | | | 06E | 13E | O1C | U21 | 52 | | |
| | 67f | | | 06E | 17E | O1C | U25 | 54 | | |
| | 67g | | | 06F | 37C | O1C | U41 | 30 | | ↓ |
| 67h | ↓ | ↓ | 06F | 41C | O1C | U33 | 32 | ↓ | 587314 | |
| A68 | 68 | 7607 | 7106 | 06F | 33E | O1C | U37 | 28 | 24 | 531641 |

(CONTINUED)

APPENDIX B
DIRECT COUPLE FEATURE

TABLE B-1 EXTERNAL CABLE ROUTING- DIRECT COUPLE (COUNTINUED)

| CABLE GROUP | KEY NO. | NAME & FRAME NO. | | FROM | | TO | | Y | Z | CABLE PART NO. |
|-------------|---------|------------------|------|---------------------|-------|--------|-------|----|----|----------------|
| | | | | FRAME | CABLE | FRAME | CABLE | | | |
| | | FROM | TO | ¢ GATE | CONN | ¢ GATE | CONN | | | |
| A69 | 69 | 7106 | 7607 | OID | U33 | 06E | 05D | 24 | 48 | 587314 |
| | 69a | ↑ | ↑ | OID | L33 | 06E | 21C | ↑ | 56 | ↑ |
| | 69b | | | OID | U41 | 06E | 21D | | 56 | |
| | 69c | | | OID | L49 | 06E | 17C | | 54 | |
| | 69d | | | OID | U37 | 06E | 17D | | 54 | |
| | 69e | | | OID | U45 | 06E | 13F | | 52 | |
| | 69f | | | OID | U49 | 06E | 17F | | 54 | |
| | 69g | | | OID | L45 | 06F | 37F | | 30 | ↓ |
| | 69h | ↓ | ↓ | OID | L37 | 06F | 41F | ↓ | 32 | 587314 |
| A70 | 70 | 7106 | 7607 | OID | L41 | 06F | 33C | 24 | 28 | 531641 |
| A71 | 71 | 7106 | 7909 | OID | L37 | 05A | L09 | 24 | 24 | 587314 |
| | 71a | ↑ | ↑ | OID | L45 | ↑ | L21 | ↑ | ↑ | ↑ |
| | 71b | | | OID | L33 | | L25 | | | |
| | 71c | | | OID | U45 | | L29 | | | |
| | 71d | | | OID | U49 | | L33 | | | |
| | 71e | | | OID | U41 | | L37 | | | |
| | 71f | | | OID | U37 | | L41 | | | |
| | 71g | | | OID | L49 | | L45 | | | ↓ |
| | 71h | ↓ | ↓ | OID | U33 | ↓ | L49 | ↓ | ↓ | 587314 |
| A72 | 72 | 7106 | 7909 | OID | U41 | 05A | L13 | 24 | 24 | 531641 |
| A73 | 73 | 7909 | 7106 | 05A | L09 | 01C | U33 | 24 | 24 | 587314 |
| | 73a | ↑ | ↑ | ↑ | U21 | 01C | U41 | ↑ | ↑ | ↑ |
| | 73b | | | | U25 | 01C | U29 | | | |
| | 73c | | | | U29 | 01C | U21 | | | |
| | 73d | | | | U33 | 01C | U25 | | | |
| | 73e | | | | U37 | 01C | U17 | | | |
| | 73f | | | | U41 | 01C | U13 | | | |
| | 73g | | | | U45 | 01C | L21 | | | ↓ |
| | 73h | ↓ | ↓ | ↓ | U49 | 01C | U09 | ↓ | ↓ | 587314 |
| A75 | 75 | 7909 | 7106 | 05A | U13 | 01C | U37 | 24 | 24 | 531641 |
| A74 | 74 | 7109 | 7106 | 02E | 29D | 01C | L25 | 60 | 24 | 587314 |
| A76 | 76 | 7618 | 7106 | EMERGENCY OFF INTLK | | | | 24 | 24 | 381492 |