iMDX 581
ISIS CLUSTER BOARD PACKAGE INSTALLATION, OPERATION, AND SERVICE MANUAL

Intel Corporation, 3065 Bowers Avenue, Santa Clara, California 95051

Order Number: 122293-001

iMDX 581
ISIS CLUSTER BOARD PACKAGE INSTALLATION, OPERATION, AND SERVICE MANUAL

Order Number: 122293-001

Intel Corporation, 3065 Bowers Avenue, Santa Clara, CA 95051

CAUTION

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A Computing Device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Additional copies of this manual or other Intel literature may be obtained from:

Literature Department
Intel Corporation
3065 Bowers Avenue
Santa Clara, CA 95051

Intel retains the right to make changes to these specifications at any time, without notice. Contact your local sales office to obtain the latest specifications before placing your order.

Intel Corporation makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Intel Corporation assumes no responsibility for any errors that may appear in this document. Intel Corporation makes no commitment to update nor to keep current the information contained in this document.

Intel Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in an Intel product. No other circuit patent licenses are implied.

Intel software products are copyrighted by and shall remain the property of Intel Corporation. Use, duplication or disclosure is subject to restrictions stated in Intel's software license, or as defined in ASPR 7-104.9(a)(9).

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of Intel Corporation.

The following are trademarks of Intel Corporation and its affiliates and may only be used to identify Intel products:

BITBUS	i_m	iSBC	Plug-A-Bubble
COMMputer	iMMX	iSBX	PROMPT
CREDIT	Insite	iSDM	Promware
Data Pipeline	$int_e l$	iSXM	QueX
Genius	int_eIBOS	KEPROM	QUEST
i	Intelevision	Library Manager	Ripplemode
i^a	int_eligent Identifier	MCS	RMX/80
I^2ICE	int_eligent Programming	Megachassis	RUPI
ICE	Intellec	MICROMAINFRAME	Seamless
iCS	Intellink	MULTIBUS	SOLO
iDBP	iOSP	MULTICHANNEL	SYSTEM 2000
iDIS	iPDS	MULTIMODULE	UPI
iLBX	iRMX		

REV.	REVISION HISTORY	DATE	APPD.
-001	Original issue. Represents combination of previous manuals documenting the iMDX 580 and iMDX 582.	12/84	C.W.

This manual is intended for the design engineer, programmer, or technician who will install and check out the iMDX 581 ISIS Cluster Network Workstation Upgrade Kit.

- Chapter 1, "General Information," includes a description of the ISIS Cluster Board Package and specifications.
- Chapter 2, "Installation," lists the Cluster Board Package contents and provides step-by-step instructions for installing a Cluster board in the Intellec workstation.
- Chapter 3, "Booting the System and Diagnostics," describes the logon procedure and how to use the firmware diagnostics.
- Chapter 4, "Field Service Information," describes the various firmware-based tests and provides step-by-step instructions for verifying the hardware.

Supporting documentation is available in the following manuals:

- *NDS-II Network Development System Overview*, order number 121761
- *NDS-II Network Development System Site Preparation Manual*, order number 121885
- *NDS-II ISIS-III(N) User's Guide*, order number 121765
- *NDS-II ISIS-III(C) User's Guide*, order number 122098
- *Intellec® Series II Model 22X/23X Installation Manual*, order number 9800559
- *iMDX 557 Resident Processor Card Installation Manual*, order number 122015
- *Intellec® Microcomputer Development System Reference Manual*, order number 9800132
- *iMDX 455 Network Workstation Upgrade Kit Installation and Checkout Manual*, order number 121882
- *NDS-II Network Resource Manager Field Service Manual*, order number 133711
- *NDS-II Network Resource Manager User's Guide*, order number 134300
- *Intellec® Series IV Installation and Checkout Manual*, order number 121757
- *Intellec® Series IV Field Service Manual*, order number 121889
- *Intellec® Diagnostic Confidence Test Operator's Manual*, order number 9800386

Notational Conventions

UPPERCASE	Characters shown in uppercase must be entered in the order shown. You may enter the characters in uppercase or lowercase.
italic	Italic indicates a meta symbol that may be replaced with an item that fulfills the rules for that symbol.
V*x.y*	Is a generic label placed on sample listings where the version number of the product that produced the listing would actually be printed.
punctuation	Punctuation other than ellipses, braces, and brackets must be entered as shown. For example, the punctuation shown in the following command must be entered: `SUBMIT PLM86(PROGA,SRC,'9 SEPT 81')`

Input lines	In interactive examples, user input lines are printed in white on black to differentiate them from system output.
‹cr›	Indicates a carriage return.

CONTENTS

CHAPTER 4 PAGE
FIELD SERVICE INFORMATION

FIGURES

TABLES

CHAPTER 1
GENERAL INFORMATION

1-1. Introduction

This chapter describes the iMDX 581 ISIS Cluster Board Package and lists specifications of the ISIS Cluster Processor Board.

1-2. General Description

The iMDX 581 ISIS Cluster Board Package includes an ISIS Cluster Processor Board, internal and external RS232C cables, mounting hardware, and a literature kit. The Cluster Board Package permits adding additional workstations to Intellec® Series II or IIE, Series III or IIIE, Series IV, or Model 800 Development Systems connected to the Network Resource Manager (NRM) in the NDS-II Network Development System. Each Cluster board supports one Cluster workstation.

As shown in Figure 1-1 and described in the *NDS-II Network Development System Site Preparation Manual*, either a 10-meter or 50-meter cable is required to interface each Intellec development system (workstation) to the centrally located NDS-II system Intellink chassis. A serial cable interfaces each ISIS Cluster terminal (workstation) to the Intellec workstation.

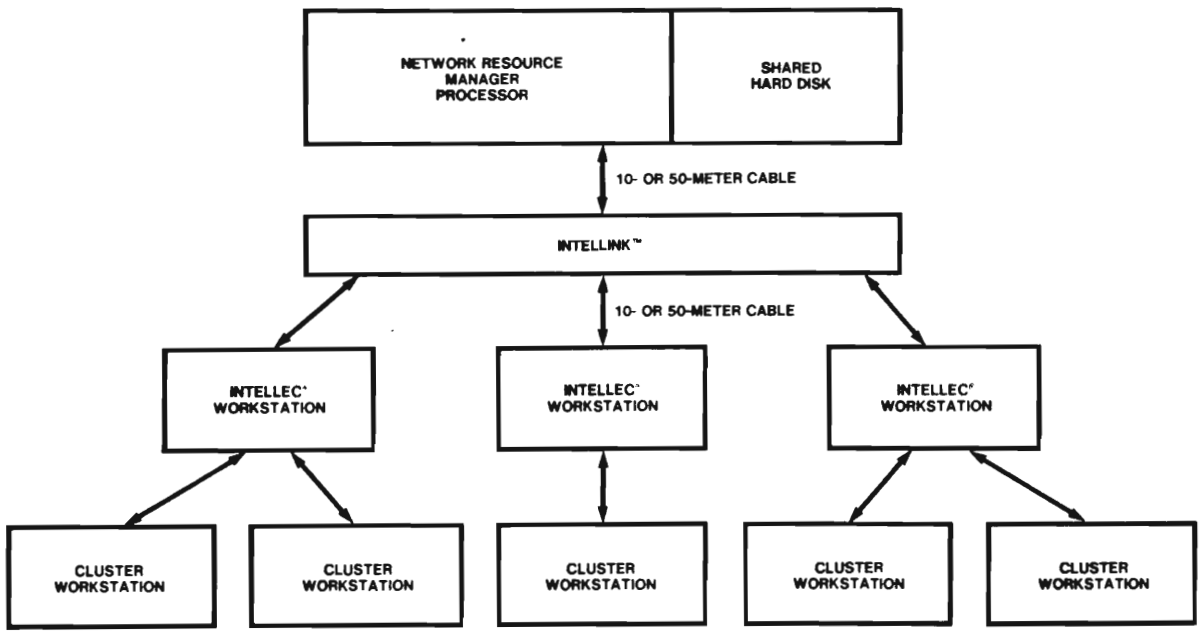


Figure 1-1. Example of an NDS-II Network Development System 122100-1

The Network Communications boards residing in the Intellec workstation and the NRM provide communications between the NRM system and the Intellec and Cluster workstations. One ISIS Cluster board is required for each Cluster workstation. A maximum of seven Cluster boards can be installed in a Series II or III workstation. A maximum of two Cluster boards can be installed in a Model 800 workstation. A maximum of four Cluster boards can be installed in a Series IV workstation. If the Series IV is equipped with other options, fewer Cluster boards will be supported due to card slot limitation.

1-3. Functional Description

The ISIS Cluster board is a single board computer based on an 8085A microprocessor. This board contains CPU, RAM/ROM memory, and I/O circuitry. Figure 1-2 is a block diagram of the ISIS Cluster board.

1-3-1. CPU

The CPU section of the ISIS Cluster board contains the MULTIBUS interface. The 8085AH-2 processor operates at 4.0 MHz.

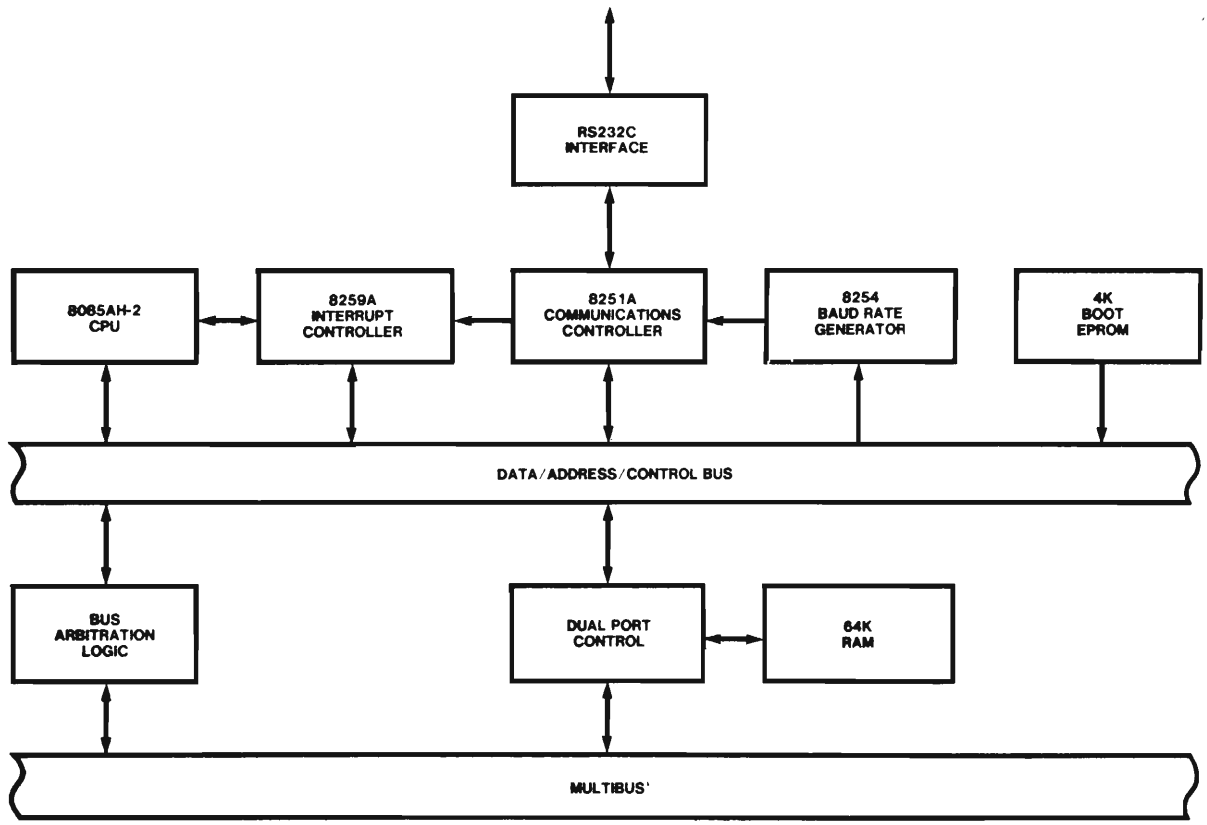


Figure 1-2. ISIS Cluster Board, Block Diagram 122100-2

1-3-2. Memory

The ISIS Cluster board contains 64K bytes of dual-ported dynamic RAM plus 4K bytes of EPROM memory. The EPROM memory contains the ISIS Cluster Boot and Diagnostic program and the Cluster Monitor.

1-3-3. I/O

The ISIS Cluster Processor on-board I/O consists of an RS232C serial data channel, an interval timer, and programmable interrupts.

1-4. Accessory Kit

The accessory kit includes two internal serial I/O cables, a 10-foot external RS232C cable, and attaching hardware. One internal cable is for Series II, III or Model 800 workstations, and the other is for Series IV workstations. The internal cable connects the ISIS Cluster board to the Intellec (development system) workstation rear panel. The external cable connects the Cluster workstation (RS232C terminal) to the Intellec workstation rear panel. See Section 2-1 for more details about the accessories.

1-5. Software

The Cluster operating system software is described in detail in the *NDS-II ISIS-III(C) User's Guide*. You should be using version 2.2 or greater of ISIS-III(C).

Both the Intellec workstations and the Network Resource Manager (NRM) must be equipped with release 2.8 or greater of NDS-II to support the ISIS Cluster boards.

All eight-bit ISIS-based Intellec software is supported, including text editors, macro assemblers, and high-level languages. However, the use of ICE or any other debugging tool is not supported in combination with an ISIS Cluster.

1-6. ISIS Cluster Processor Specifications

Table 1-1 lists the ISIS Cluster board specifications.

Table 1-1. ISIS Cluster Processor Specifications

Onboard Memory	
Dynamic RAM:	Dual-ported, 64K bytes used primarily for code downloaded from system memory.
EPROM:	4K bytes of firmware for bootstrap and diagnostic programs.
Memory Addressing	
Dynamic RAM:	*n*0000H to *n*FFFFH (memory page address)
EPROM:	0 to 1FFFH (access only to 8085AH-2)
System:	0 to FFFFH (local RAM address)
where *n* is the 64K page of the Cluster Board address (8 to EH).	

Table 1-1. ISIS Cluster Processor Specifications (Cont'd.)

System Clock	4.0 MHz
Interfaces:	MULTIBUS compatible, TTL level.
Environmental Requirements	
Operating Temperature:	0 to 55 degrees C (32 to 131 degrees F).
Relative Humidity:	To 90% without condensation.
Physical Characteristics	
Width:	30.48 cm (12.00 in)
Height:	17.15 cm (6.75 in)
Thickness:	1.78 cm (0.7 in)
Power Requirements	
	+5VDC @ 4.5 A Maximum +12VDC @ 25 mA Maximum −12VDC @ 23 mA Maximum

NOTE: iMDX 581 power requirement is +5VDC @ 4.5A maximum, but the typical power consumption is +5VDC @ 2.6A.

CHAPTER 2
INSTALLATION

2-1. iMDX 581 ISIS Cluster Board Package Contents

The iMDX 581 ISIS Cluster Board Package contains the items listed in Table 2-1. After verifying that the shipment is complete, check to see that the preinstallation requirements in the next section have been met.

2-2. Preinstallation Requirements

Before the iMDX 581 ISIS Cluster Board Package can be installed, the development system must already be upgraded with the iSBC 550 Communications Controller. If your system requires installation of the iMDX 455 Workstation Upgrade Kit (iSBC 550) for the Series II, III or Model 800, or the iMDX 456 Network Workstation Upgrade Kit for the Series IV, contact the nearest Intel Service Office for details.

The *NDS-II Network Development System Site Preparation Manual* also specifies that the customer is responsible for the distribution of workstations (Development Systems) at the NDS-II system site. After deciding where a particular workstation will be located, move the workstation to that location and install the ISIS Cluster Board Package as described in the following paragraphs.

2-3. Preinstallation Tests

Before installing the Cluster board, verify that the Intellec workstation is operating correctly. The following manuals describe operation of several Intellec workstations.

a. For Series II workstations:
   Intellec® Series II Model 22X/23X Installation Manual, order number 9800559

Table 2-1. iMDX 581 ISIS Cluster Board Package Contents

ISIS Cluster Controller
1. Cluster Processor Board, PWA No. 113865 2. Accessory Kit containing: • Internal RS232C Cable, Part No. 4000677 • External RS232C Cable, 10 ft., Part No. 123312 • Internal RS232C Cable, Part No. 134586* • Adapter Plate, Part No. 125679 • Adapter Plate, Part No. 3002547 • Female Screw Lock Assy, Part No. 103452 • 2 ea. 4-40 × 3/8 Panhead Screws • 2 ea. 4-40 × 1/4 Panhead Screws • 4 ea. #4 Washers • 2 ea. 4-40 Kep Nut
Literature Kit
1. *iMDX 581 ISIS Cluster Board Package Installation, Operation, and Service Manual*, Order No. 122293 2. *NDS-II ISIS-III(C) User's Guide*, Order No. 122098

* Series IV workstations only.

b. For Series III workstations:

iMDX 557 Resident Processor Card Installation Manual, order number 122015

c. For Model 800 workstations:

Intellec® Diagnostic Confidence Test Operator's Manual, order number 9800386

d. For Series IV workstations:

Intellec® Series IV Installation and Checkout Manual, order number 121757

e. For Customer Confidence Test:

iMDX 455 Network Workstation Upgrade Kit Installation and Checkout Manual, order number 121882

2-4. Installation Procedure

The following sections include step-by-step instructions for installing the internal RS232C cable and the Cluster board. Certain parts of installation vary for the different development systems. Refer to the appropriate sections for instructions for the type of development system you are upgrading.

WARNING

Risk of electrical shock may be present on exposed metal parts unless this product is adequately grounded in accordance with the following guidelines:

a. An insulated grounding conductor, at least as suitable in size, insulation material, and thickness to the building AC line circuit conductors, must be installed as part of the building wiring.

b. The grounding conductor mentioned in item a is to be grounded to the earth at a suitable building earth ground such as the steel frame or water pipe of a building if they are suitably earth grounded.

c. The wall outlets in the vicinity of this product must be of the grounding type described in item a and must be connected as described in item b.

2-4-1. Series II/III Board Configuration

The internal cable and the Cluster board can be installed in either the Series II or III mainframe, or the Model 201 expansion chassis, depending on the configuration of the system. Figure 2-1 shows the four recommended configurations for the upgraded system. You can install fewer Cluster boards than the number shown in Figure 2-1 as long as each board is jumpered correctly.

Figure 2-1 shows systems that include the IPB-85. Use of systems with an IPB-80 card is not recommended. Also, note that the flexible disk controller must have the highest priority (low board slots) in Series II and III systems.

2-4-2. Model 800 Board Configuration

When upgrading a Model 800 workstation, the ISIS Cluster boards must have a priority below that of the flexible disk drive controllers. The Front Panel Controller and CPU boards occupy slots 1 and 2 (on the left, facing the front panel), while the Flexible Disk Controller boards usually occupy slots 16 and 17. ISIS Cluster boards must occupy only odd numbered (Master) slots (lower slot numbers than the Flexible Disk Controller boards).

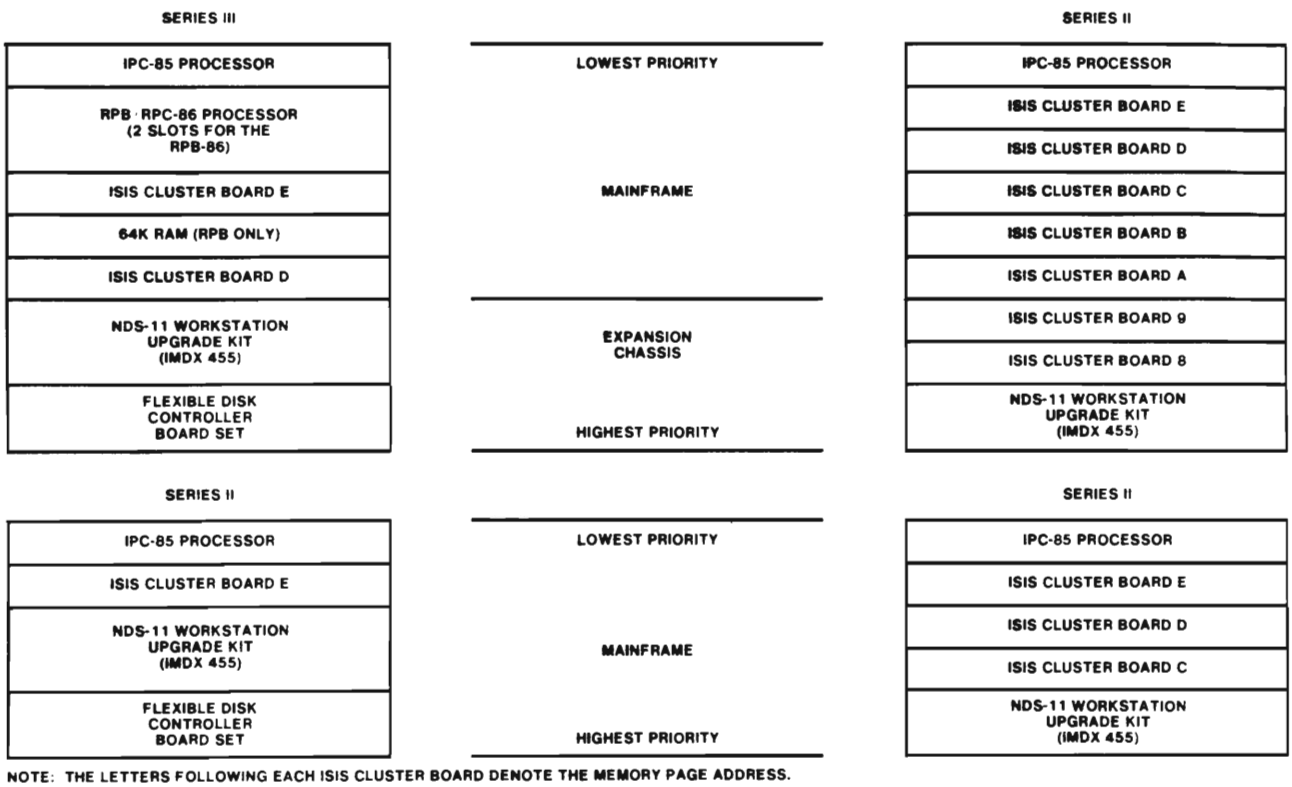


Figure 2-1. Recommended Series II/III Configurations 122100-3

2-4-3. Series IV Board Configuration

Table 2-2 shows the recommended configurations for a Series IV system.

If the Series IV is equipped with iMDX 740 or 720 controller boards, install the 740 or 720 boards into slots 9 and 10, the iSBC 550 Comunication board set into slots 7 and 8 (Processor board into slot 8, SerDes into slot 7), ISIS Cluster board E into slot 6, and ISIS Cluster board D into slot 5.

Table 2-2. Recommended Series IV Configurations

Slot	Board	Bus Priority*
1	CPIO	5
2	IEU	2
3	SPU (Optional)	4
4	iSBC-012B/iSBC-056	9
5	iSBC-215/Cluster Board B	1
6	Cluster Board D	6
7	Cluster Board C	3
8	Cluster Board E	7
9	iSBC-550 Processor Board	8
10	iSBC-550 SerDes 2 Board	0

*9=highest priority; 0=lowest priority

2-5. Board Addressing

The Series II and III development systems contain memory pages E, D, C, B, A, 9, and 8. The Series IV contains pages E, D, C, and B. The Model 800 contains pages E and D.

Addressing for the ISIS Cluster boards begins at memory page E, with each successive Cluster board at the next lowest memory page. If the Cluster board addresses are not in sequence they will not be identified as part of the system. In any ISIS Cluster board installation, there must always be one Cluster board at memory page E. Table 2-3 shows the jumper configurations for each page address. The Cluster board address is determined by on-board jumpers, not by its position in the Intellec workstation. For jumper locations, refer to Figure 2-2.

2-6. Baud Rate Selection

As shipped from Intel, the baud rate is set for 9600 baud. To select 19,200 baud install a jumper between jumpers 1 and 2 (see Figure 2-2).

2-7. Terminal Transmit/Receive Jumpers

As shipped from Intel, pin 2 of the rear panel RS232C connector is Transmit Data (from terminal), while pin 3 is Receive Data (to terminal). Some terminals can have these two pins reversed. To select the correct jumper configuration for your terminal, the jumpers should be as follows (see Figure 2-2):

- Standard Configuration: jumpers 80-81 and 82-83 jumpered.
- Reversed Configuration: jumpers 81-82 and 80-83 jumpered.

NOTE

When the reversed configuration is used, some terminals require that the following pins be crossed on the external cable:

- Pin 20 (Data Terminal Ready) and Pin 6 (Data Set Ready).
- Pin 4 (Request To Send) and 5 (Clear To Send).

Figure 2-2 shows the locations of user selectable jumpers: board addressing, baud rate selection, and RS232C terminal Transmit/Receive jumpers.

2-8. Power Requirements

Tables 2-4 and 2-5 list the power availability and usage for several Intellec systems and boards. The Current Available assumes a basic development system configuration (IPC-85 board, IOC board, but not flexible disk controllers or other options).

Table 2-3. ISIS Cluster Board Address Jumpers

W5: Jumper K to	Address Page
B	E0000 to EFFFFH
C	D0000 to DFFFFH
D	C0000 to CFFFFH
E	B0000 to BFFFFH
F	A0000 to AFFFFH
G	90000 to 9FFFFH
H	80000 to 8FFFFH

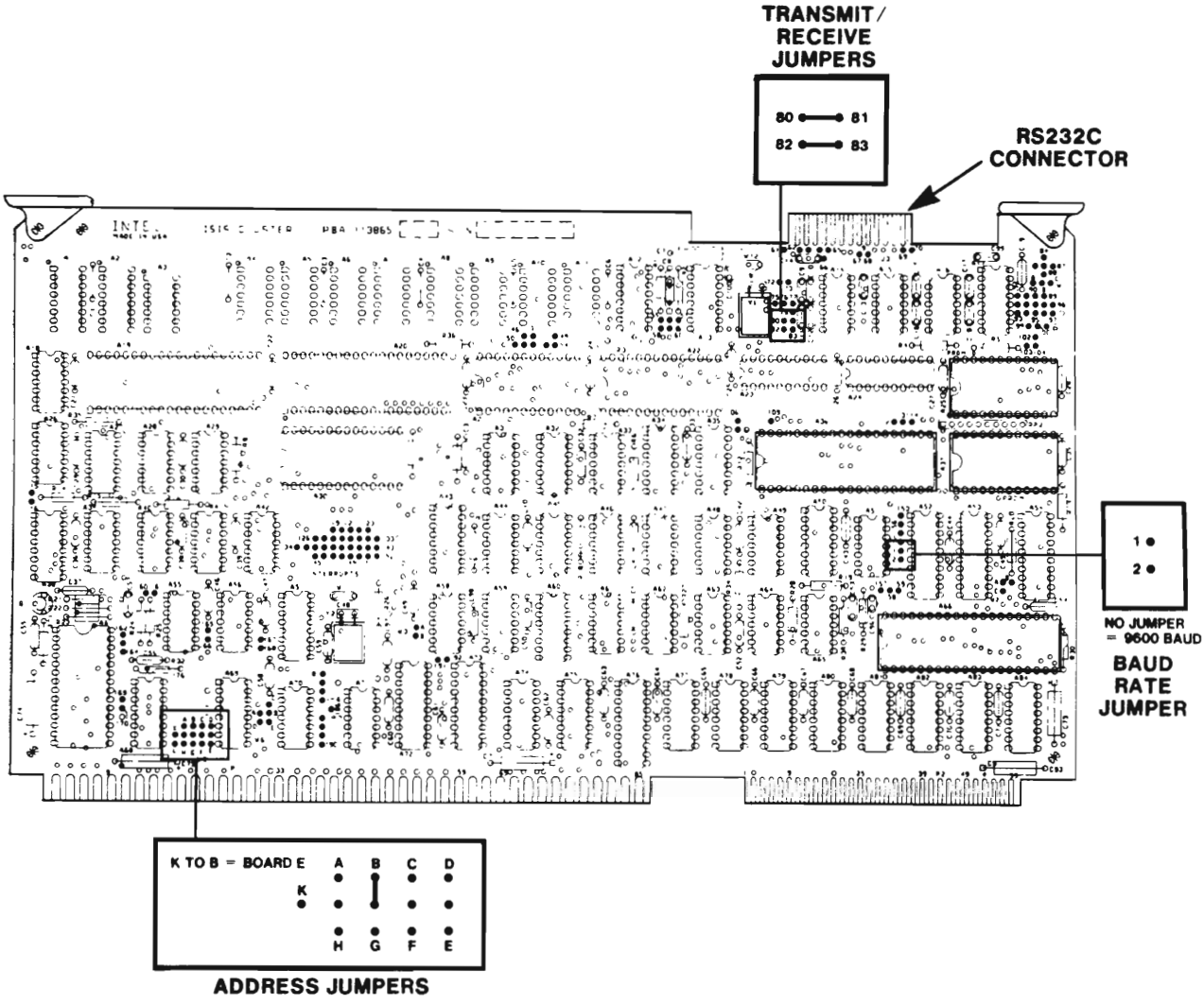


Figure 2-2. ISIS Cluster Board, Jumper Locations 122100-4

As an example, suppose that your Series II system has both the iMDX 455 kit (which includes the iSBC 550 boards) and the flexible disk controller board set installed. This requires an additional 16.5A from the +5 VDC supply, reducing the Current Available to 6.1A, permitting only one ISIS Cluster board installation.

With both the iMDX 455 and disk controller board sets installed in a Model 201 Expansion Chassis, there are slots and power available for a total of five Cluster boards.

In a fully configured Model 800, only two Cluster boards can be installed.

2-9. Internal RS232C Cable Installation

Step-by-step instructions for installing the internal serial I/O cable in the Series II/III mainframe, Model 201 Expansion Chassis, Model 800 mainframe, and Series IV mainframe are provided in the following sections.

Table 2-4. Series II/III and Model 800 Power Requirements

Current Available (Amperes)	+5V	+12V	−12V	−10V
Model 800	27.13	2.9	0.25	2.84
Series II/IIE	22.6	1.8	0.3	0.8
Model 201	24.0	2.0	0.3	0.8
Current Required (Amperes)				
iSBC 550 Boards	9.0	—	—	—
Flexible Disk Controller	7.5	—	0.2	—
RPB/RPC-86	5.6	0.025	0.023	—
iSBC 064	3.2	0.6	0.01	—
iSBC 056 256K RAM Board	4.6	—	—	—
iMDX 581 ISIS Cluster Board	4.5	0.025	0.023	—
Integral Disk Drive	1.0	—	—	—
ICE 22	13.0	0.1	0.03	—
ICE 51	10.0	0.08	0.02	—
ICE 85	12.0	0.08	0.001	—
ICE 86A	17.00	0.12	0.025	—

NOTE: iMDX 581 power requirement is +5VDC @ 4.5A maximum, but the typical power consumption is +5VDC @ 2.6A.

Table 2-5. Series IV Standard System Power Supply Loading

Assembly	Power Supply Outputs				
Power Supply Capacity (Maximum Amps)	**+5.1Vdc**	**+12Vdc**	**+12Vdc**	**−10Vdc**	**−12Vdc**
Multiple-Output Power Supply	45A	5.00A	3.00A	0.50A	2.00A
Auxiliary Power Supply	25A	—	—	—	—
Total Available Current	70A	5.00A	3.00A	0.50A	2.00A
Maximum Current Demand iMDX430 (Amps)					
CRT Display	—	—	1.50A	—	—
Keyboard	0.50A	—	—	—	—
Floppy Disk Drives (2)	1.40A	1.10A	—	—	—
CPIO Board	12.06A	—	0.25A	—	0.10A
IEU Board	6.82A	—	0.50A	—	0.50A
iSBC-056 256K RAM Board*	4.80A	—	0.015A	—	—
Total Current Drain	25.58A	1.10A	2.265A	—	0.60A
Available for Options	44.42A	#	0.735A	0.5A	1.40A
Maximum Current Demand iMDX431 (Amps)					
CRT Display	—	—	1.50A	—	—
Keyboard	0.50A	—	—	—	—
5¼" Winchester, iSBC-213A Board and Floppy Drive	3.50A	2.80A	—	—	—
iSBC-215B/D	5.05A	—	—	—	—
CPIO Board	12.06A	—	0.25A	—	0.10A
IEU Board	6.82A	—	0.50A	—	0.50A
iSBC-056 256K RAM Board*	4.80A	—	0.015A	—	—
Total Current Drain	27.68A	2.80A	2.265A	0.0A	0.60A
Available for Options	42.32A	#	0.75A	0.5A	1.40A

Table 2-5. Series IV Standard System Power Supply Loading (Cont'd.)

Assembly	Power Supply Outputs				
Optional Boards Current Demand					
SPU Board	13.2A	—	0.025A	—	0.023A
iSBC-550 Boards	9.55A	—	0.50A	—	—
iSBC-206 Hard Disk Controller	8.14A	—	—	—	—
iMDX 581 ISIS Cluster Board	4.5	—	0.025	0.023	—

Not Available
* Or iSBC 012B Board

2-9-1. Series II/III Mainframe

Turn off the system and peripheral device power. Install the internal cable as follows:

a. Disconnect mainframe, expansion chassis, and peripheral device power cords.

b. Disconnect the keyboard cable and all peripheral device cables attached to the mainframe rear panel connectors (see Figure 2-3).

c. If dual floppy disk drives are installed on top of the mainframe, remove ground strips between rear panels of drives and mainframe. Remove the drives from the top of the mainframe.

d. Loosen top cover of mainframe by removing the two screws on the rear cover and two screws on top (see Figure 2-4).

e. Remove the mainframe top cover, and disconnect the cables from connectors J14 and J15 at the top edge of the IOC board (see Figure 2-5). Connectors J16, J17, and J18 need not be disconnected.

f. Remove the four rear panel retaining screws. To access the rear panel cutouts, gently pull the rear panel assembly away from the mainframe.

NOTE

The accessory kit includes two adapter plates to permit attaching the internal RS232C cable (P/N #4000677) DB-25 connector to the larger rear panel cutouts. For the smaller rear panel cutouts, an adapter plate is not required.

g. If required, attach the DB-25 connector to an adapter plate as shown in detail A of Figure 2-6. Using the female screw lock assembly supplied, attach the cable DB-25 connector to the adapter plate. If an adapter plate is not used, use the female screw lock assembly to mount the DB-25 connector on the inside of the rear panel.

h. If an adapter plate is required, mount the connector/adapter assembly to the inside of the rear panel. Use the 4-40 × 3/8 pan head screws and kep nuts to attach the adapter plate/connector assembly.

i. Remove the front panel and route the cable (P/N #4000677) along the inside left of the mainframe as shown in Figure 2-6. Connect the PC edge connector to the Cluster board so that the cable leaves the connector toward the solder side of the Cluster board.

j. Reattach the rear panel to the mainframe using the four screws removed in step f. Reconnect the connectors removed in step e to J14 and J15 (see Figure 2-5).

k. Replace the top cover and tighten the four retaining screws. Reinstall the floppy disk drives on top of the mainframe. Reinstall the ground strips removed in step c.

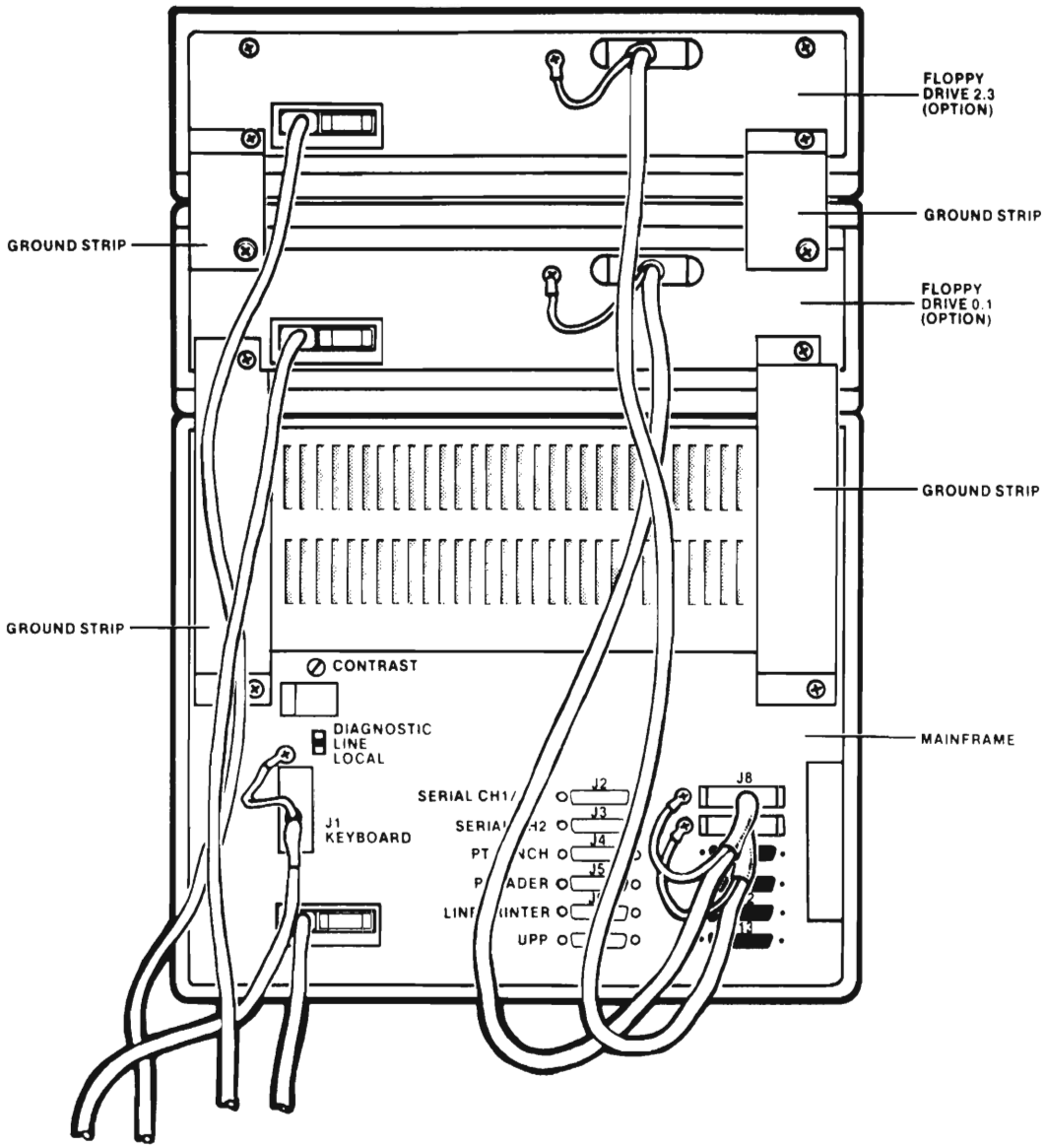


Figure 2-3. Series II/III Mainframe Rear Panel 121612-15

1. Reconnect the keyboard cable and all peripheral cables to the proper rear panel connectors. Reconnect mainframe, expansion chassis, and peripheral device power cords.

2-9-2. Model 201 Expansion Chassis

Turn off the system and all peripheral device power. Install the internal RS232C cable (P/N #4000677) in the expansion chassis as follows:

NOTE

If both a Flexible Disk (FD) controller and Network Communication Board Set are to reside in the expansion chassis, there will be no slots for ISIS Cluster boards. If only the Network Communication Board Set is installed,

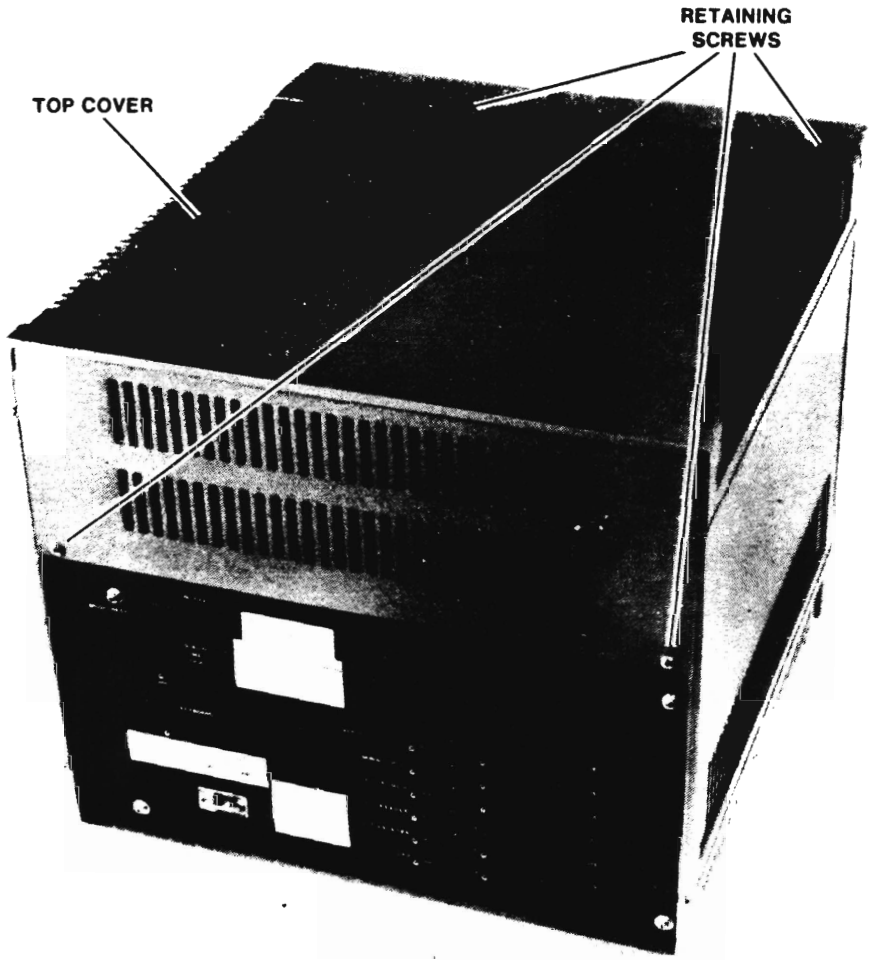


Figure 2-4. Series II/III Mainframe Top Cover Removal 559-46

two ISIS Cluster boards can be installed in the Model 201. The rear panel must have at least three rear panel cutouts. If your expansion chassis has only two cutouts, contact the Intel Field Service Office at the telephone numbers listed in Section 2-15. The part number for a rear panel with four cutouts is 125681.

a. Disconnect the mainframe, expansion chassis, and peripheral device power cords.

b. Disconnect the keyboard cable and all peripheral device cables attached to the mainframe rear panel connectors (see Figure 2-7).

c. Remove the ground strips between the rear panels of the mainframe and expansion chassis.

WARNING

The mainframe weighs 86 pounds (39 kg.). To prevent personal injury or equipment damage, have someone assist you in performing steps e and f.

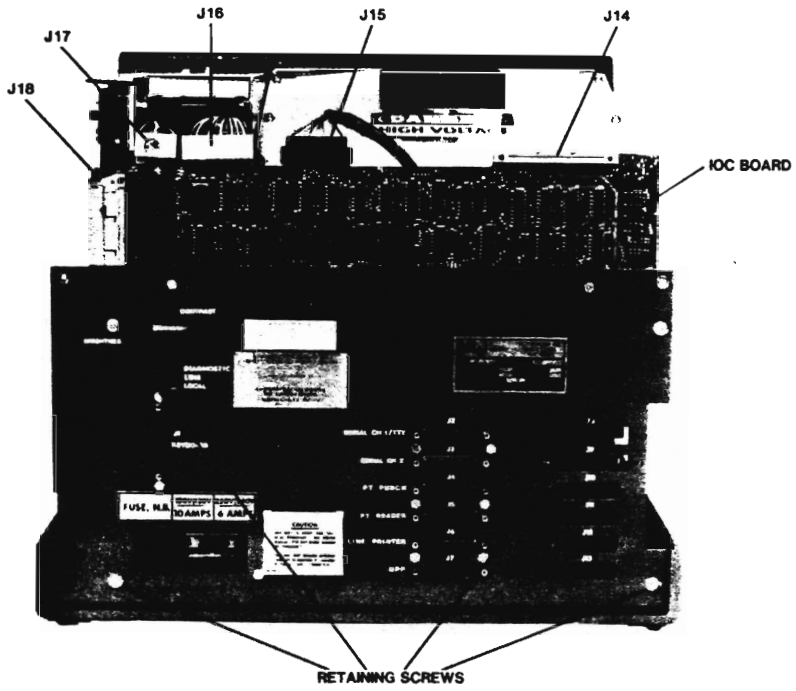


Figure 2-5. Series II/III IOC Board/Rear Panel Details 878-27

d. Tilt the mainframe forward (or backward) and disconnect the braided ground strap and flat bus extension cables from inside the mainframe cable port (see Figure 2-8).

e. Remove the mainframe from the top of the expansion chassis.

f. On the expansion chassis, loosen the two top cover retaining screws and remove the top cover (see Figure 2-9). Remove the four rear panel retaining screws.

NOTE

If you are installing a new rear panel with four cutouts, proceed with step g. If the existing rear panel already has three or four cutouts, omit step g.

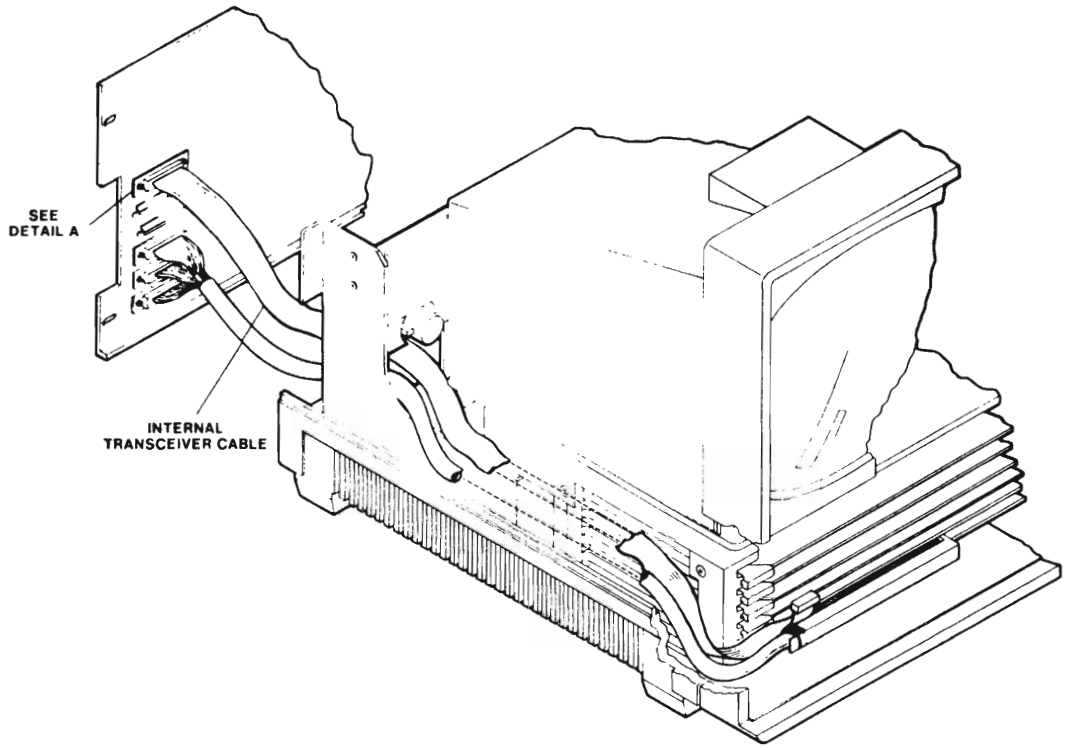
g. Remove the replacement rear panel, which includes four oblong connector cutouts, from the shipping carton. Remove existing Communication Controller cable connector from the old rear panel. Using existing hardware, reinstall the Communication Controller connector in the bottom cutout of the replacement panel.

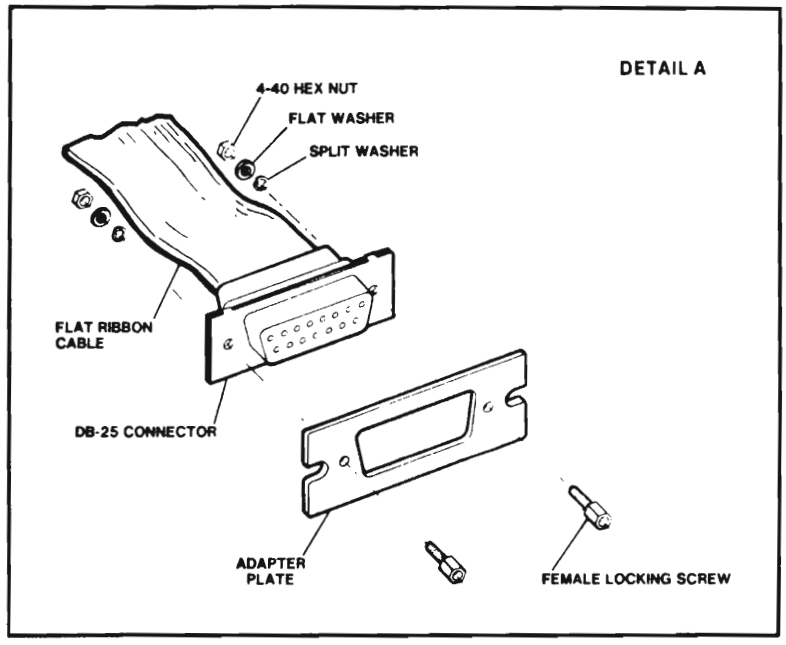
h. Using the female screw lock assembly supplied, attach the DB-25 connector of the internal RS232C cable (P/N #4000677) to the adapter plate as shown in Figure 2-10.

i. Using the 4-40 × 3/8 pan head screws and 4-40 kep nuts, attach the adapter plate to the rear panel.

j. Remove the front panel and route the RS232C cable inside the left side of the expansion chassis (see Figure 2-10).

k. Reattach the rear panel to the expansion chassis using the four screws removed in step f. Replace the top cover, and tighten the two retaining screws.





NOTE:
IF THE ADAPTER PLATE IS USED, FASTEN ADAPTER PLATE CONNECTOR TO BACK OF REAR PANEL. WITH NO ADAPTER PLATE, MOUNT THE CONNECTOR ON BACK OF REAR PANEL.

Figure 2-6. Internal Cable Installation (Series II/III Mainframe) 122100-5

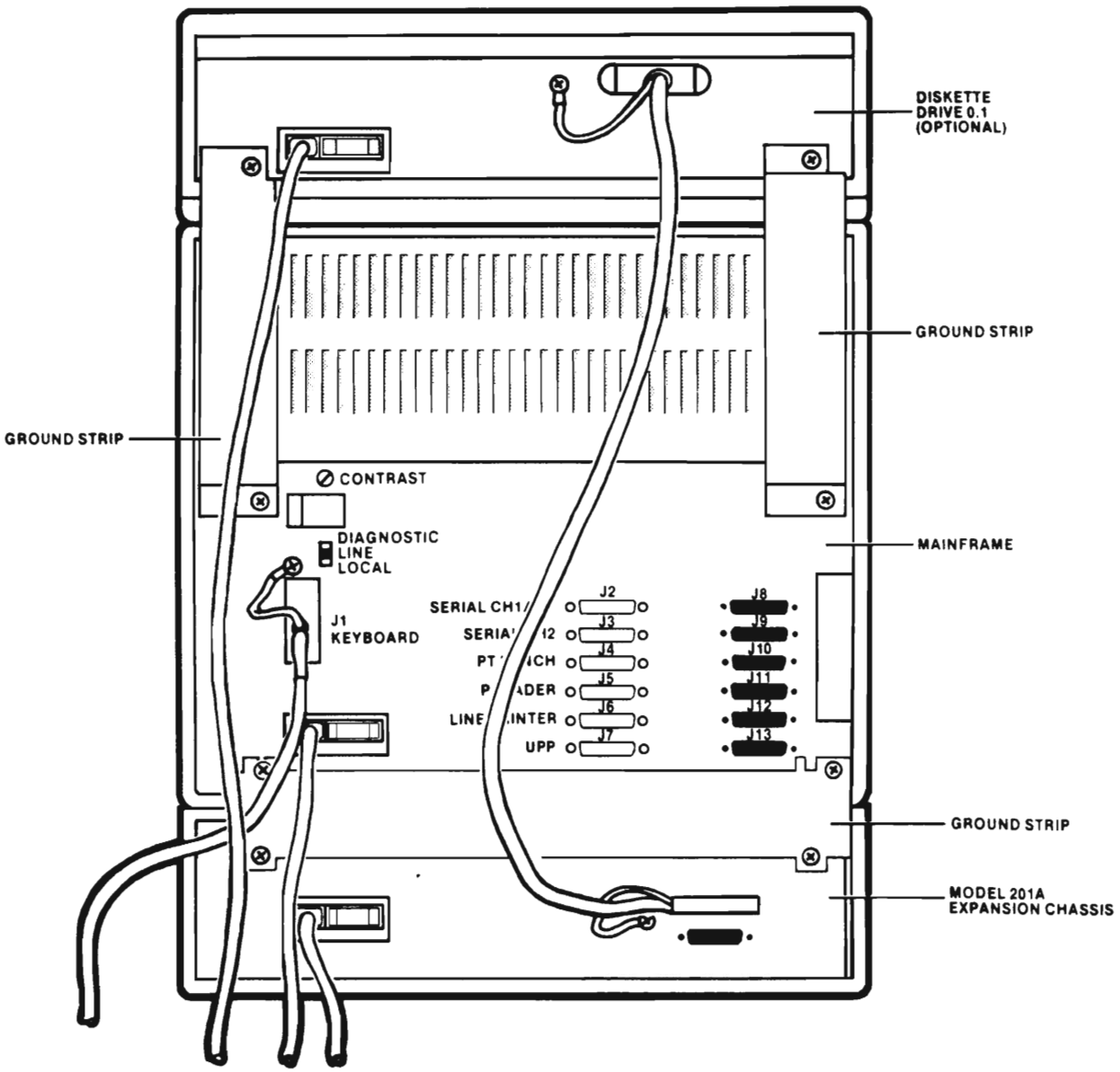


Figure 2-7. Series II/III Mainframe and Expansion Chassis Rear View 122100-6

WARNING

The mainframe weighs 86 pounds (39 kg). To prevent personal injury or equipment damage, have someone assist in performing step l.

l. Place the mainframe on top of the expansion chassis. Tilting the mainframe backward to access the interior of the cable port, connect the two bus extension cables to the connectors inside the cable port (see Figure 2-8). Attach the quick disconnects on the ground strip to the two ground lugs located between the two bus connectors inside the mainframe cable port.

m. Gently lower the mainframe into place on top of the expansion chassis. Using existing hardware, attach ground strips between rear panels of the mainframe and expansion chassis (see Figure 2-7).

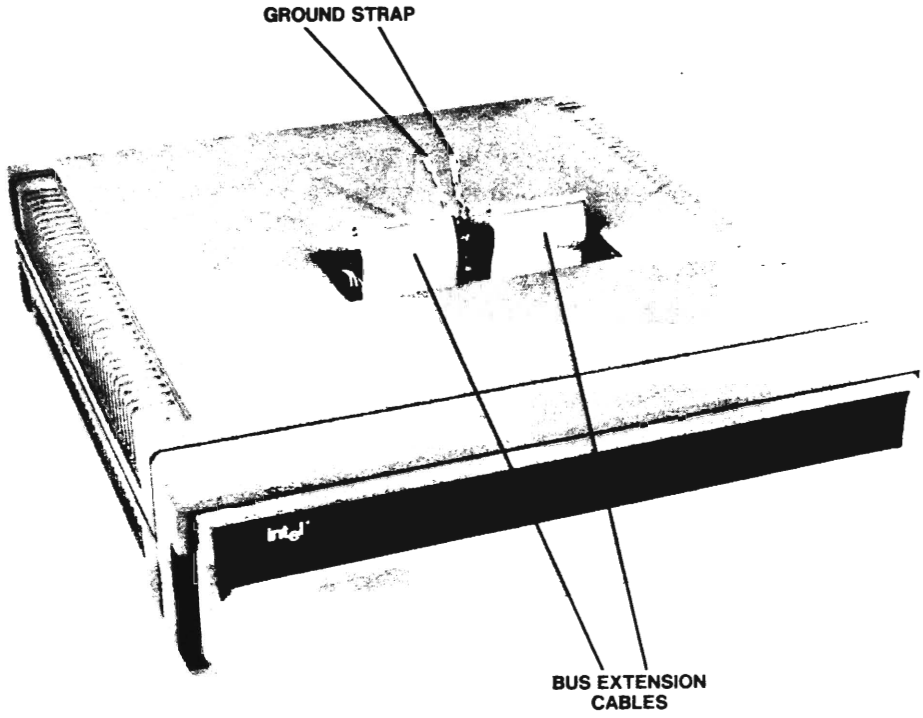


Figure 2-8. Expansion Chassis Cable Port Details 559-74

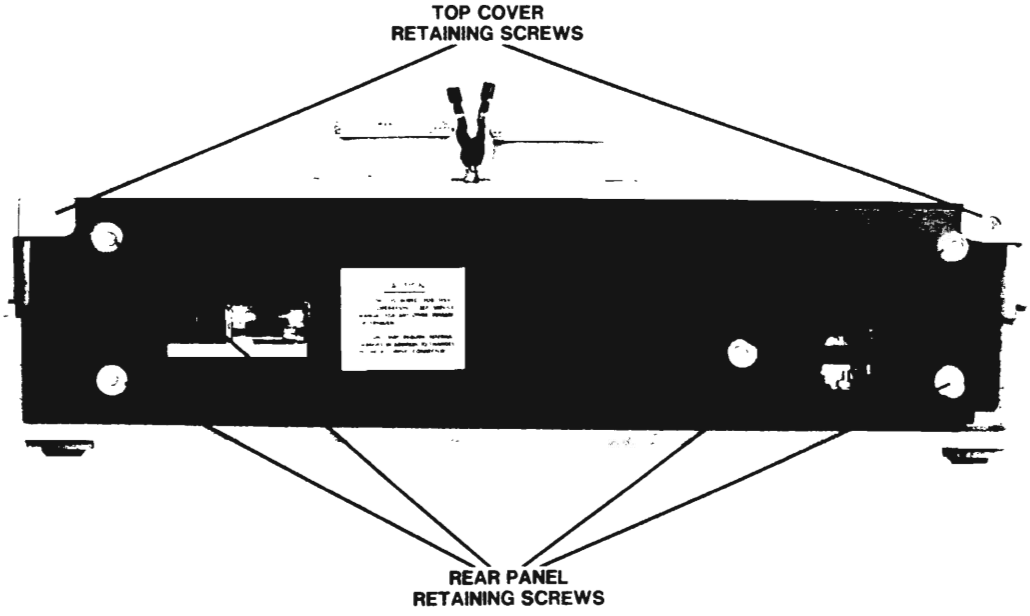
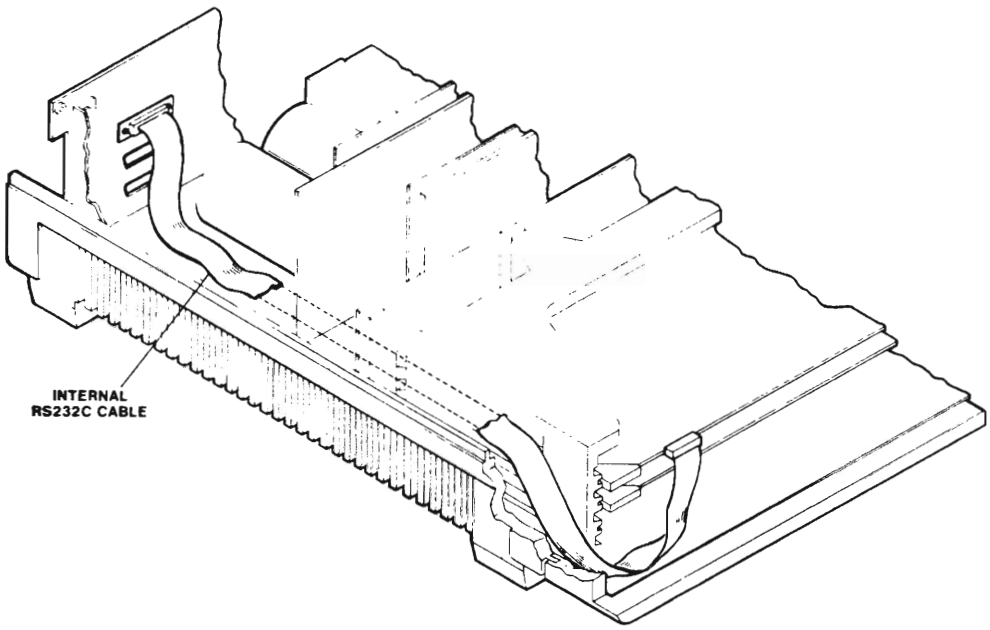
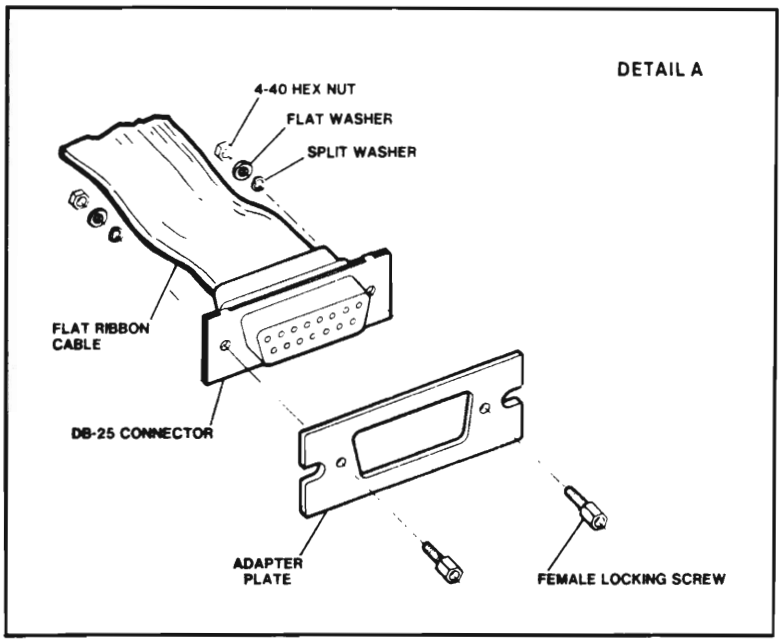


Figure 2-9. Expansion Chassis Rear Panel Details 121612-11





NOTE:
IF THE ADAPTER PLATE IS USED, FASTEN ADAPTER PLATE/CONNECTOR TO BACK OF REAR PANEL. WITH NO ADAPTER PLATE, MOUNT THE CONNECTOR ON BACK OF REAR PANEL.

Figure 2-10. Internal Cable Installation (Model 201 Expansion Chassis) 122100-7

n. Reconnect the keyboard cable and all peripheral cables to the proper rear panel connectors. Reconnect mainframe, expansion chassis, and peripheral device power cords.

2-9-3. Model 800 Mainframe

Turn off the system and peripheral device power, and install the internal cable as follows:

a. Disconnect the mainframe and all peripheral device power cords.

b. Loosen the four retaining screws and remove the top cover.

c. On the mainframe cable panel, disconnect the console cable and all other peripheral cables.

d. Referring to Figure 2-11, remove the four cable panel retaining screws. Pull the cable panel far enough away to access the interior side of the unused connector cutouts.

e. If an adapter plate is required, attach the DB-25 connector using the female screw lock assembly supplied as shown in detail A of Figure 2-11. If an adapter plate is not required, use the female screw lock assembly to attach the DB-25 connector to the inside of the rear panel.

f. Using the 4-40 × 3/8 panhead screws and 4-40 kep nut, attach the connector/adapter plate to the inside of the rear panel.

g. Connect the PC edge connector to the Cluster board so that the cable will leave the connector toward the solder side of the Cluster board.

h. Reconnect the console cable and all other cables to the proper rear panel connectors. Reconnect mainframe and all peripheral device power cords.

2-9-4. Series IV Mainframe

Install the ISIS Cluster board and internal serial I/O cable into the Series IV as follows:

a. Turn off the Series IV circuit breaker and disconnect the ac power plug from the wall outlet.

WARNING

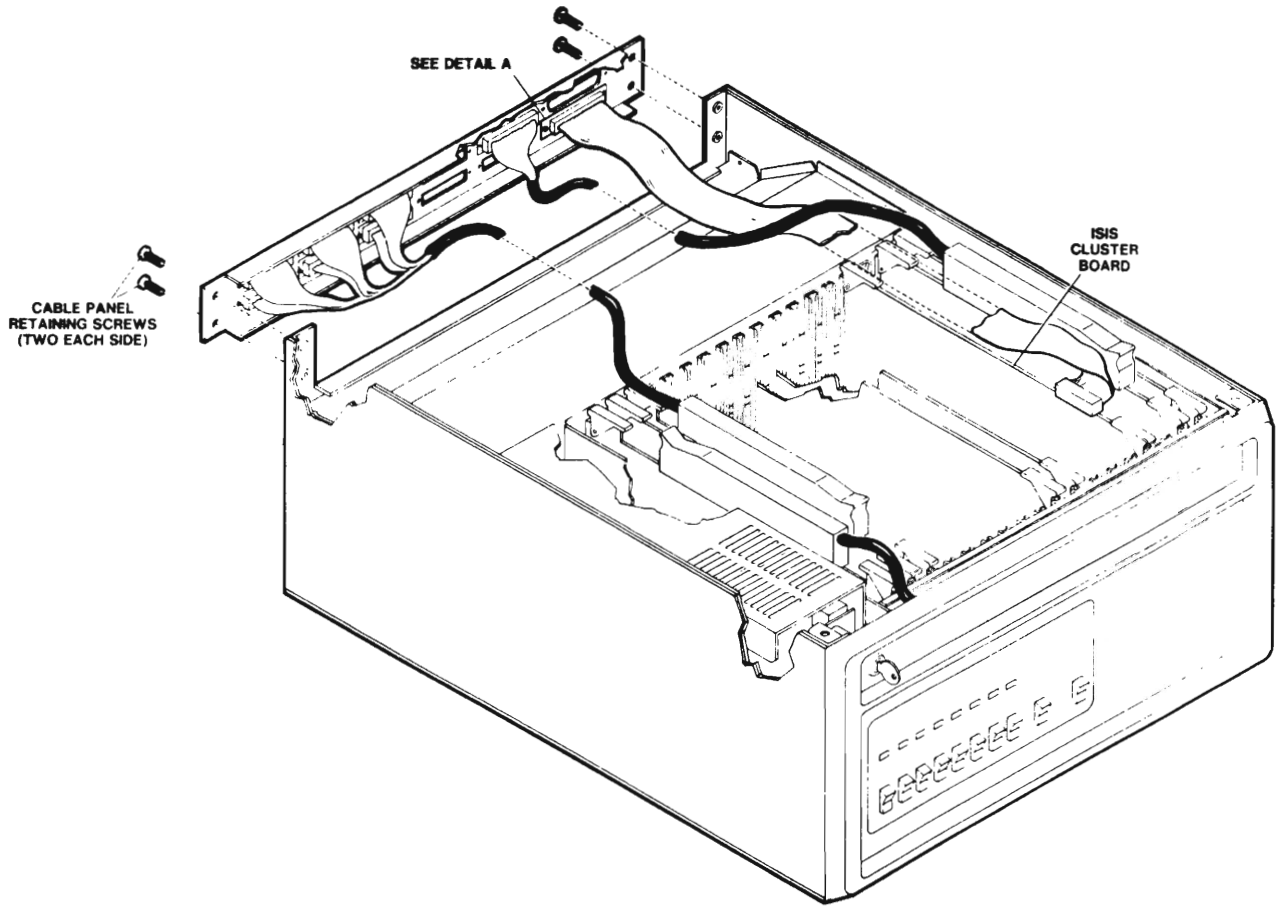
High voltage is present in the mainframe chassis. DO NOT attempt to connect power or operate the system with the cover removed. DO NOT attempt to override the safety interlock switch. DO NOT come in contact with the CRT anode connection. Failure to observe these precautions may result in serious injury.

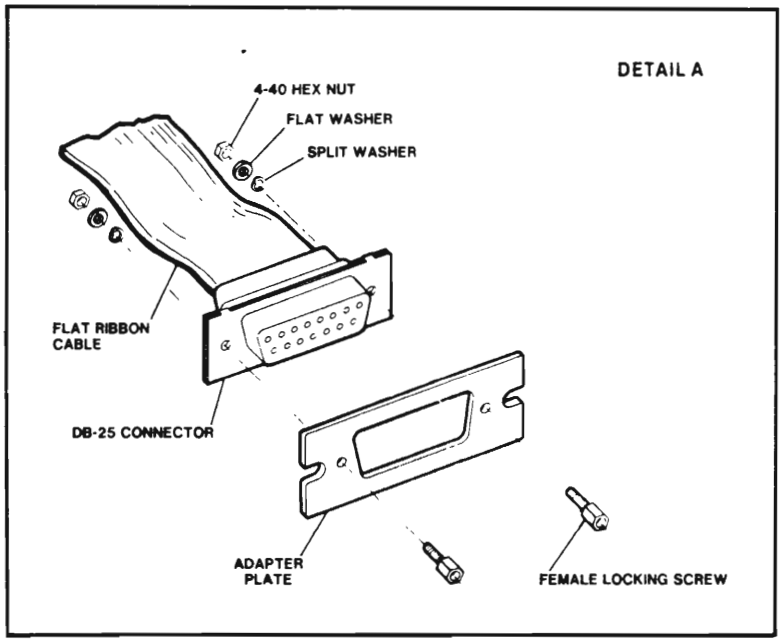
b. To remove the top cover from the system, loosen the cover-retaining thumbscrews until it is completely free from the top cover (see Figure 2-12). The thumbscrew remains captive in the base.

c. Lift the board-access door and loosen the two cover-retaining screws until the screws are completely free from the base (see Figure 2-12). The cover-retaining screws remain captive in the cover.

WARNING

Use extreme care when working near the neck or base of the CRT. Striking either of them could cause the CRT to implode and may result in serious injury or damage.





NOTE:
IF THE ADAPTER PLATE IS USED, FASTEN ADAPTER PLATE /CONNECTOR TO BACK OF REAR PANEL. WITH NO ADAPTER PLATE, MOUNT THE CONNECTOR ON BACK OF REAR PANEL.

Figure 2-11. Internal Cable Installation (Model 800 Mainframe) 122100-8

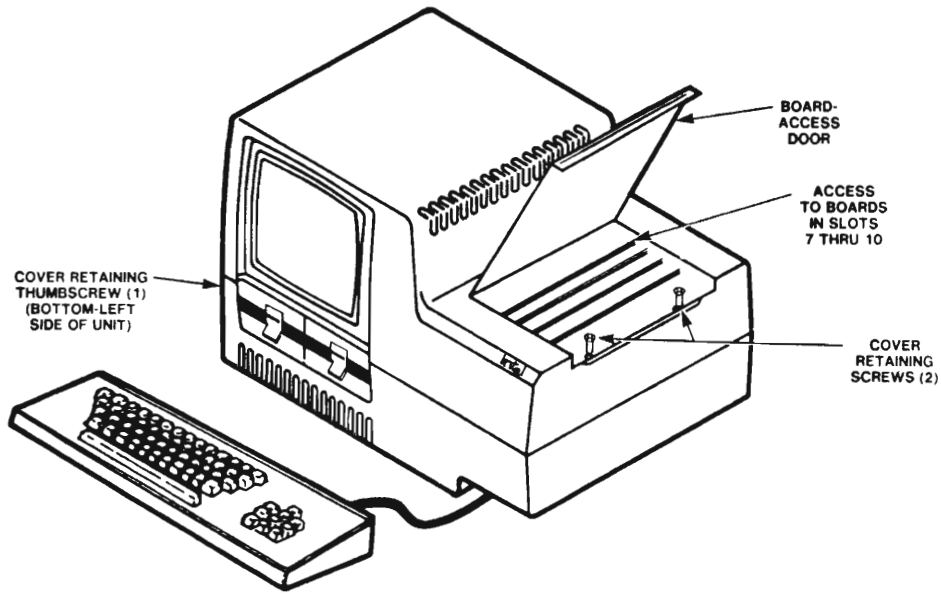


Figure 2-12. Series IV Mainframe with Board-Access Door Opened 122293-1

d. Close the board-access door, then lift straight up on the top cover until it completely clears the card cage and CRT. Set the cover aside so the work area is kept clean.

e. If the system is equipped with an iSBC 012B RAM board, proceed to step f. If the system is not equipped with an iSBC 012B RAM board, proceed to step k.

f. Some system configurations require that the memory strapping on the iSBC 012B RAM board be changed before adding the Cluster boards since its ending memory address would overlap with the MULTIBUS address of a Cluster board. When this is the case, the addition of each Cluster board costs 64K (one page) of memory onboard the iSBC 012B RAM board.

   Refer to Tables 2-6 and 2-7 and, if necessary, reconfigure the iSBC 012B RAM board as indicated. The jumper locations are illustrated in Figure 2-13. If it is not necessary to reconfigure the iSBC 012B RAM board, proceed to step k.

g. When it is necessary to reconfigure the iSBC 012B RAM board, the memory address strapping on the IEU board has to be reconfigured to the next contiguous page of memory above the ending iSBC 012B memory page. Refer to Table 2-6 for jumper reconfiguration information and Figure 2-14 for jumper locations. To access the IEU board, proceed to step h.

h. Some systems are equipped with an RFI shield over the first three card slots. If an RFI shield is installed in the system, perform the following steps:

   1. Loosen the screws on top of the RFI shield (see item 1 of Figure 2-15). Do not remove the screws.
   2. Loosen the four screws on the side of the RFI shield (see items 2 and 3 of Figure 2-15). The screws (two in front and two in back) remain captive in the RFI shield.
   3. Slide the RFI shield out from under the top screws and set it aside to keep the work area clear.

i. Later model systems are equipped with a Board Hold-Down Bracket instead of an RFI shield. If a Board Hold-Down Bracket is installed in the system, remove the single screw securing it in place. See Figure 2-16.

j. When the RFI or Board Hold-Down Bracket is removed, proceed to step k.

k. To connect the internal RS232C cable (P/N #134586) to a utility connector slot on the back panel of the Series IV, perform one of the following steps. Refer to Figures 2-17 and 2-18 for assistance.

1. If a small utility connector slot is used, mount the DB-25 connector directly to the inside rear panel using the female screw lock assembly.

2. If a large utility connector slot is used, the DB-25 connector must first be mounted on the adapter plate using the female screw lock assembly. Then mount the connector/adapter assembly to the inside rear panel using the 4-40 × 3/8 panhead screws, flat washers, and kep nuts.

Table 2-6. Series IV Optional Jumper Configurations

System	Cluster Board Memory Page Addr Installed				IEU Memory Jumper Table				IEU Page Addr	iSBC-012B RAM Jumper Table (Upper Addr. Boundary)				iSBC-012B Page Addr
	E	D	C	B	E55-E56	E59-E60	E57-E58	E53-E54		W22	W21	W20	W19	
iMDX-430						X			B		X		X	3-A
	X					X			B		X		X	3-A
	X	X				X			B		X		X	3-A
	X	X	X			X			B		X		X	3-A
	X	X	X	X		X		X	A		X	X		3-9**
iMDX-430 W/434								X	E			X		6-D
	X						X		D			X	X	6-C**
	X	X					X	X	C		X			6-B***
	X	X	X			X			B		X		X	6-A****
	X	X	X	X		X		X	A		X	X		6-9*****
iMDX-431						X			B		X		X	3-A
	X					X			B		X		X	3-A
	X	X				X			B		X		X	3-A
	X	X	X	N/A*		X			B		X		X	3-A
iMDX-431 W/434								X	E			X		6-D
	X						X		D			X	X	6-C**
	X	X					X	X	C		X			6-B***
	X	X	X	N/A*		X			B		X		X	6-A****

NOTE: X = Jumper/Bd installed

* An iMDX-431 system (Series IV equipped with a Winchester disk) has three unused card slots. Therefore, it can support a maximum of three ISIS Cluster boards.

** One page of memory lost

*** Two pages of memory lost

**** Three pages of memory lost

***** Four pages of memory lost

Table 2-7. Series IV System Memory Configurations with Maximum Number of Cluster Boards Installed

Memory Page	iMDX-430	iMDX-430 with 434	iMDX-430 with iSBC-012B	iMDX-430 with 434 and iSBC-012B	iMDX-431*	iMDX-431* with 434	iMDX-431* with iSBC-012B	iMDX-431* with 434 and iSBC-012B
F				Bootstrap Proms				
E	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.
D	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.
C	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.
B	Cluster Bd.	Cluster Bd.	Cluster Bd.	Cluster Bd.			IEU	IEU
A		IEU	IEU	IEU		IEU	iSBC-012B	iSBC-012B
9		iSBC-056	iSBC-012B	iSBC-012B		iSBC-056		
8								
7	IEU				IEU			
6	iSBC-056				iSBC-056			
5		SPU		SPU		SPU		SPU
4								
3								
2				CPIO				
1				Reserved				
0				IEU				

* An iMDX-431 system (Series IV equipped with a Winchester disk) has three unused card slots. Therefore, it can only support a maximum of three ISIS Cluster boards.

2-10. ISIS Cluster Processor Board Installation

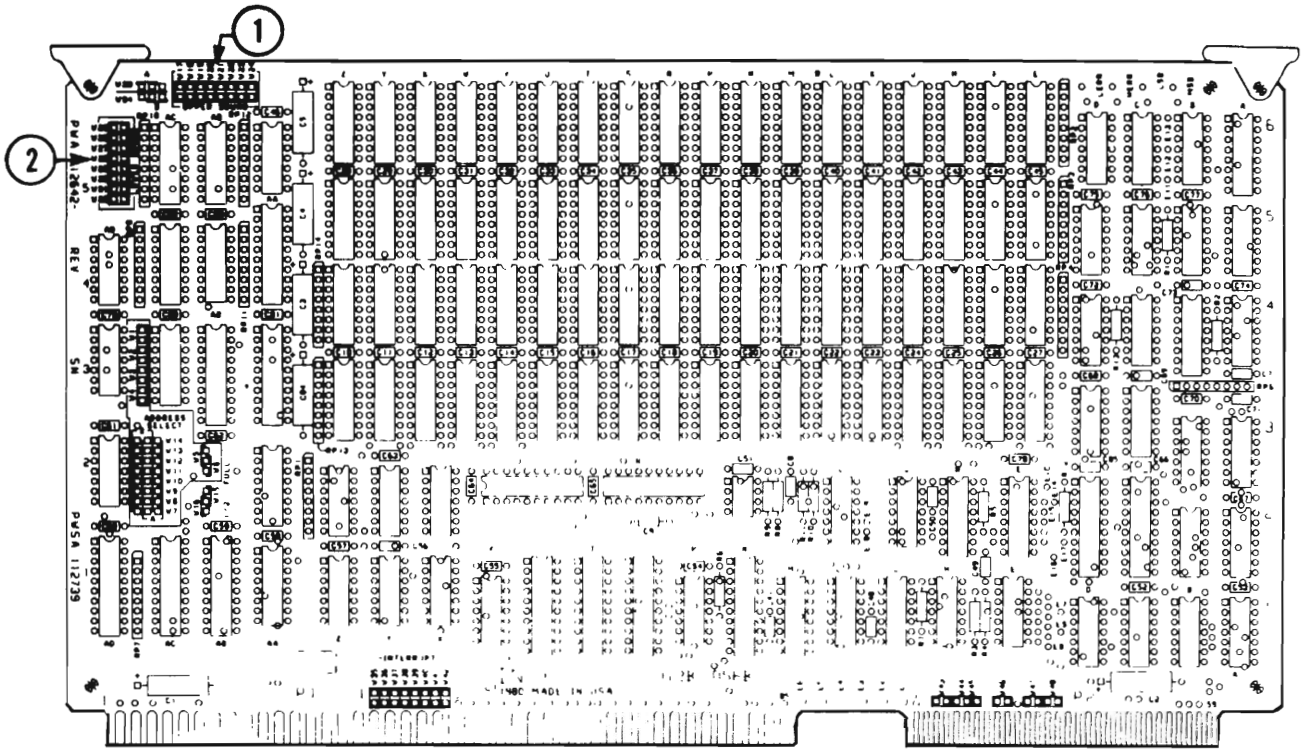
Unpack and configure the Cluster Processor board address jumpers as shown in Table 2-3. The first board is configured for memory Page E, the next is Page D, and so on.

CAUTION

To prevent possible equipment damage, do not install or remove a board while power is still applied to the chassis.

2-10-1. Series II/III and Model 800 Mainframes

Install the ISIS Cluster board component side up in the Series II/III and Model 201 expansion chassis; component side to the left for a Model 800. Connect the PC edge connector to the Cluster board so that the cable leaves the connector toward the solder side of the Cluster board.



Starting Address	W27	28	29
PAGE 0	X	X	X
1		X	X
2	X		X
3			X
4	X	X	
5		X	
6	X		

Refer to Location 2

Ending Address	19	20	21	22
PAGE 7				X
8	X	X	X	
9		X	X	
A	X		X	
B			X	
C	X	X		
D		X		

Refer to Location 1

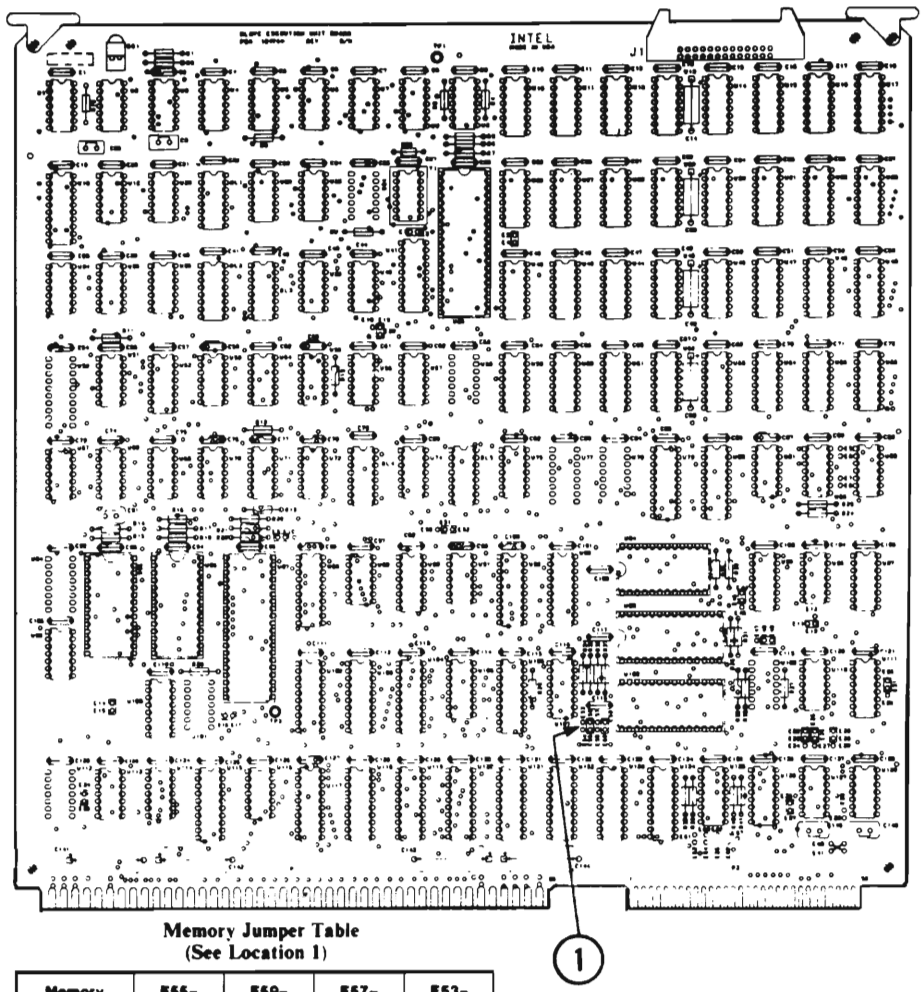
Figure 2-13. iSBC® 012B RAM Board Address Boundary Jumper Locations 122293-2

2-10-2. Series IV Mainframe

Unpack the Cluster board and configure the address jumpers as shown in Table 2-3. The first board installed in the system must be configured to memory Page E, with each additional board configured to the next lower page number (i.e., D, C, B).

NOTE

Any Series IV system configuration that contains optional MULTIBUS boards will not support four Cluster boards due to limitations in available card slots. For example, the iMDX-431 (Series IV equipped with a Winchester disk) has three unused card slots. See Tables 2-6 and 2-7.



Memory Jumper Table
(See Location 1)

Memory Address	E55–E56	E59–E60	E57–E58	E53–E54
0	X	X	X	X
1	X	X	X	
2	X	X		X
3	X	X		
4	X		X	X
5	X		X	
6	X			X
7	X			
8		X	X	X
9		X	X	
A		X		X
B		X		
C			X	X
D			X	
E				X
F				

X = Jumper Installed

Figure 2-14. IEU-II Board Memory Jumper Locations 122293-3

Refer to Table 2-2 and install the Cluster board in the designated slot. Connect the internal RS232C cable (P/N # 134586) to the Cluster board RS232C connector (see Figure 2-2). Verify that pin 1 on the cable aligns with pin 1 on the Cluster board connector.

If you removed the RFI shield or the Board Hold-Down Bracket when installing the internal cable, re-install them now. Re-install the top cover by reversing the procedure in step b of Section 2-9-4. Then reconnect the ac power plug.

2-11. Connecting an RS232C Terminal

To connect an RS232C terminal to the ISIS Cluster Processor, use the shielded 10-foot cable (P/N #123312) included with the ISIS Cluster Installation Kit. This cable is a one-to-one cable (i.e., pin 1 at one end is connected to pin 1 at the opposite end); each connector pin is connected to the same number pin at the opposite end. The RS232C cable provided by Intel has two male connectors. If the target Cluster terminal also has a male connector, an adapter plug is required. Intel does not provide this adapter.

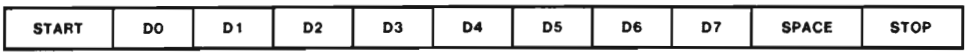
The terminal must be set to operate at 9600 baud, which is the factory setting. For 19,200 baud operation, place a jumper between pins 1 and 2 (see Figure 2-2). The use of a short cable (less than 50 feet or 15 meters) is recommended. Longer cables can be used if they conform to the RS232C specification. Table 2-8 is a list of the rear panel DB-25 connector pinouts. For I/O jumper configuration, see Sections 2-6 and 2-7 and Figure 2-2.

NOTE

Some terminals may have problems operating at 19,200 baud (dropping characters or lines). If so, use the 9600 baud configuration (remove jumper between pins 1 and 2).

2-12. Serial Data Format

In order for the Cluster terminal to work properly with the system, the serial data format set at the terminal is one start bit, eight data bits, parity bit set for spacing with no parity checked, and one stop bit.



2-13. Software Preparation

Each ISIS Cluster user must be sysgened into the NDS-II system as outlined in the NDS-II Network Resource Manager User's Guide (P/N #134300).

Figure 2-19 shows a sample system user's table. When an Intellec host workstation is added to the system user's table during sysgen, the user is asked to enter the comm id code, the location, the station type, and the number of Cluster boards contained in that Intellec workstation. The comm id code must be the same as the Intellec workstation ID code. A Cluster workstation table entry must be adjacent to its Intellec host workstation. You may have to rearrange the table if you add a Cluster board to an Intellec workstation whose table entry is not followed by enough blank spaces in which to list its Cluster workstations.

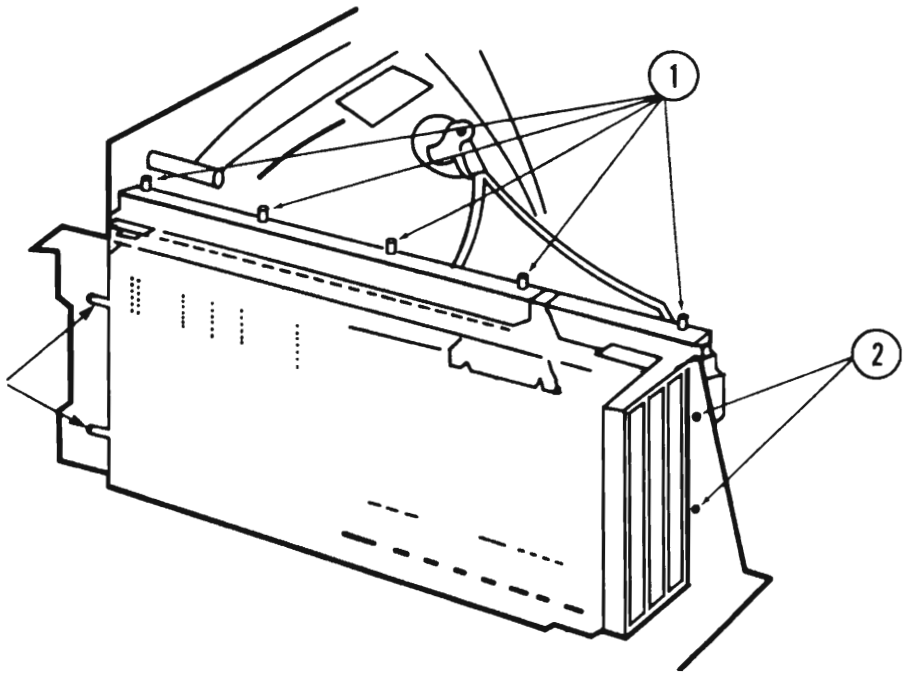


Figure 2-15. Series IV with RFI Shield Removed 122293-4

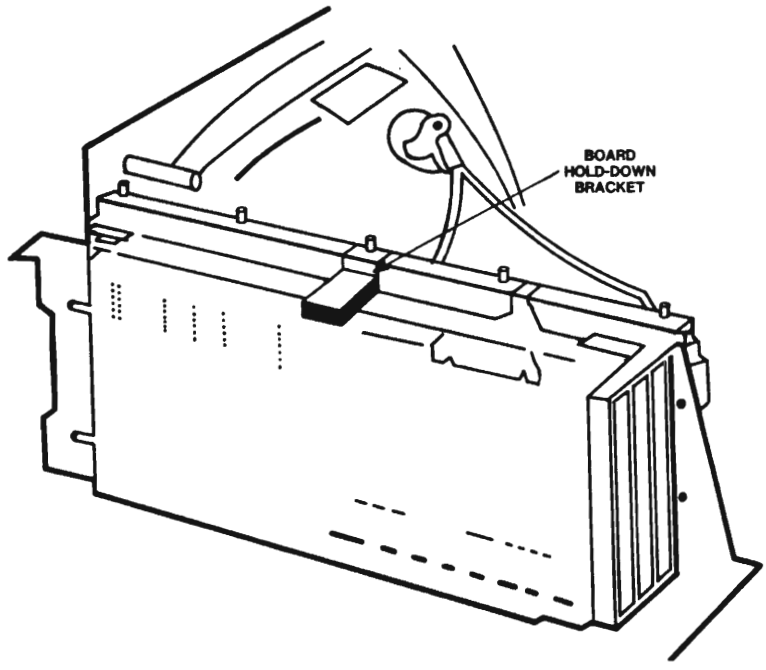
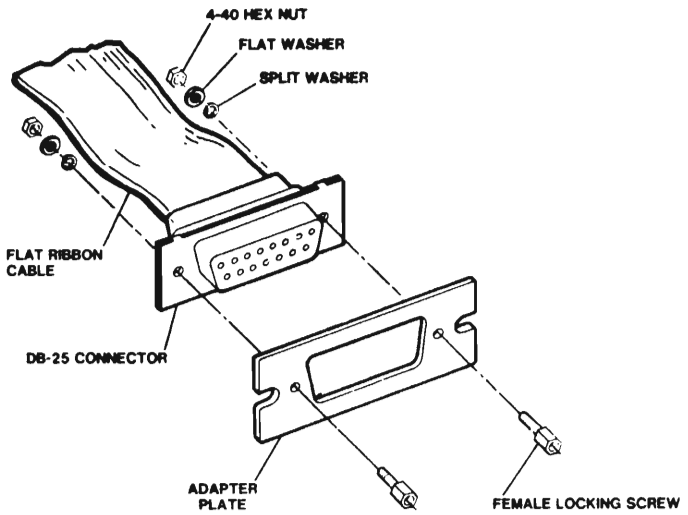


Figure 2-16. Series IV Board Hold-Down Bracket 122293-5



NOTE:
IF THE ADAPTER PLATE IS USED, FASTEN ADAPTER PLATE/CONNECTOR TO BACK OF REAR PANEL. WITH NO ADAPTER PLATE, MOUNT THE CONNECTOR ON BACK OF REAR PANEL.

Figure 2-17. Series IV Internal RS232C Cable Connection to Adapter Plate 122100-5

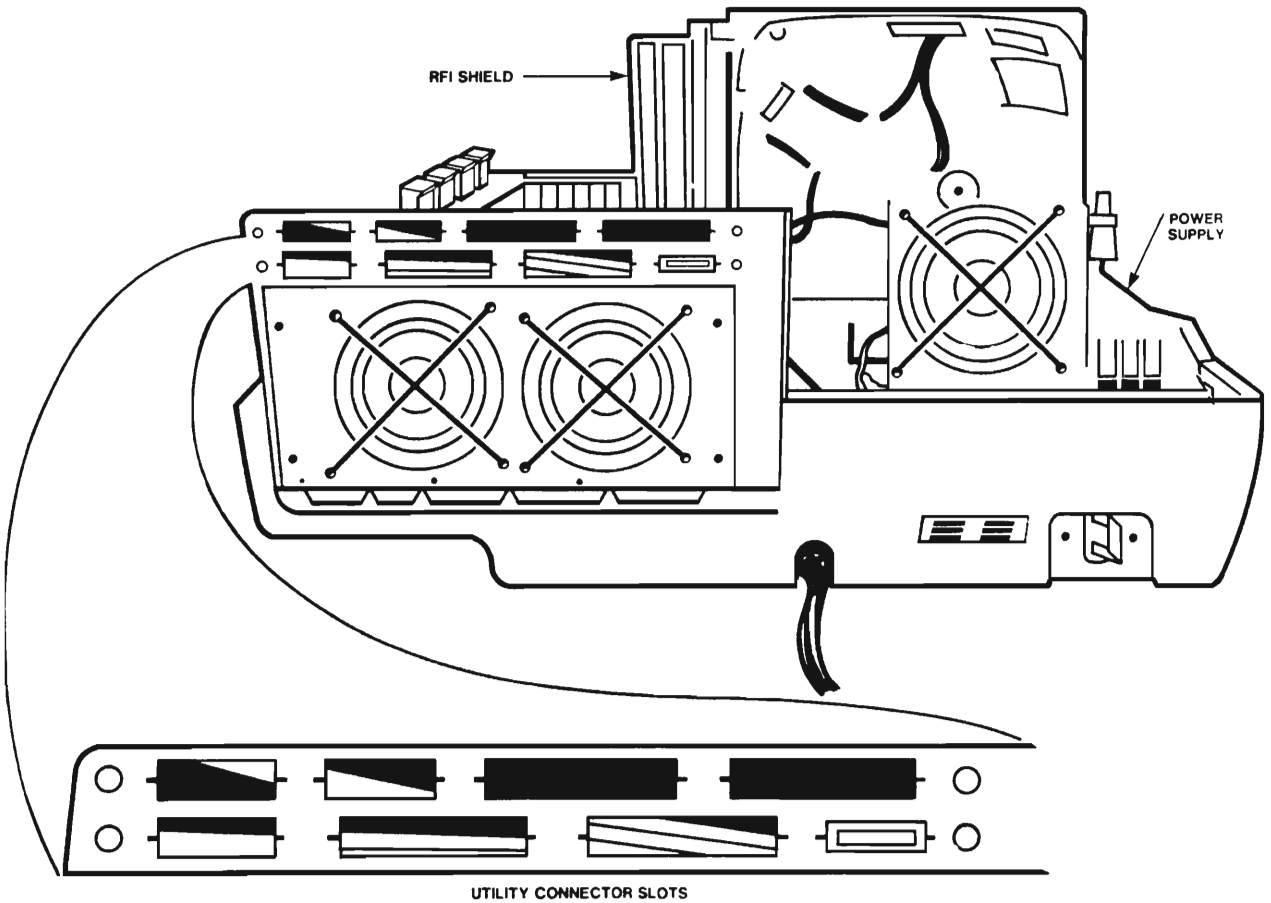


Figure 2-18. Series IV Mainframe with Cover Removed (Rear View) 122293-6

Table 2-8. DB-25 Connector Pinouts

Pin	Direction	Function	Definition
1		Protective Ground	
2	From Terminal	Transmit Data	Data signal from user terminal to the Cluster board.
3	To Terminal	Receive Data	Data signal from the Cluster board to the user terminal.
4	From Terminal	Request to Send	Handshake signal from the user terminal. Enables the transmission of data from the Cluster board to user terminal.
5	To Terminal	Clear to Send	Handshake signal from Cluster board. Enables the transmission of data from the user terminal.
6	To Terminal	Data Set Ready	Handshake signal from the Cluster board. Informs the user terminal that the Cluster board is ready.
7		Signal Ground	
20	From Terminal	Data Term. Ready	Handshake signal from the user terminal. Informs the Cluster board that the terminal is ready.

NOTE: Pins not used are omitted.

NOTE

The configuration information is not modified to include the sysgened Cluster workstation until the NRM is rebooted.

The ISIS Cluster default user directory (:F0:) is a directory file called ISIS.SYS that resides on the NRM system drive. If this does not exist, it must be created by the superuser and world access rights set to add-entry and display access rights. All files on ISIS-III(N) must then be copied to this directory from the host workstation. The ISIS.SYS file contains

ISIS.BIN
ISISC.BIN
ISIS.CLI
ISIS.OV0
ISIS.OV1
ISIS.OV2
ISIS commands such as COPY, DELETE, ...

with world access set to World Read access.

For users that do not have a HOME directory assigned, you may want to have the superuser at the NDS-II console create a HOME directory with the USERDEF command. The user's HOME directory is assigned to directory identifier :F9: at LOGON time.

2-14. Firmware Diagnostic

The firmware-resident diagnostic test, which verifies a fundamental level of Cluster Processor board integrity, is invoked each time at power-up. Pressing the RESET button on the Intellec workstation will also invoke the firmware diagnostic. If the diagnostic executes successfully and the system program is loaded, a LOGON message

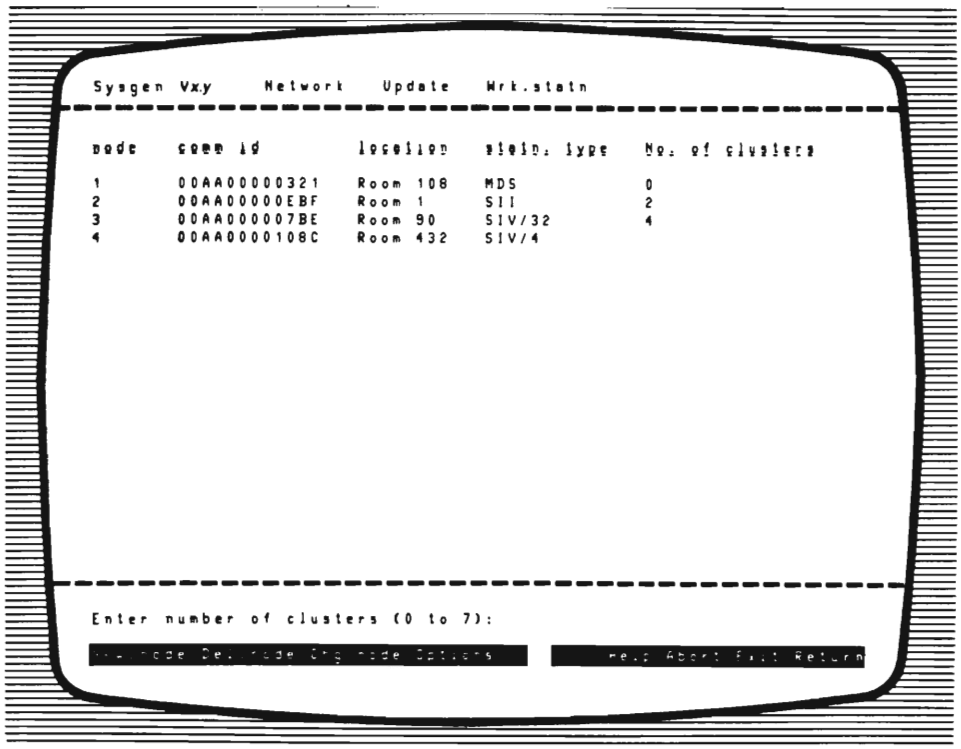


Figure 2-19. Sample System User's Table 122293-7

will be displayed. The firmware diagnostics will identify a non-functional board by displaying a message on the terminal.

2-15. Service and Repair Assistance

The best service for your Intel product will be provided by an Intel Customer Engineer. Intel Customer Engineers are trained professionals who will provide prompt, efficient, on-site installation, preventive maintenance, and corrective maintenance services.

Your Intel Customer Engineer can provide the service you need through a prepaid service contract or on an hourly basis. For further information, contact your local Intel office.

When it is impossible for you to use the service of an Intel Customer Engineer or when Intel service is not available in your local area, you may contact the Intel Service Center directly at one of the following numbers:

Telephone

From Alaska, Arizona, or Hawaii call—
(602) 869-4600

From the following U.S. areas call—

East: (602) 869-4951
Midwest: (602) 869-4392
West: (602) 869-4045

TWX

910-951-1330

Never return equipment to Intel for service or repair before you contact an Intel Customer Engineer or the Intel Service Center.

If return of your equipment is necessary, you will be given a Repair Authorization Number, shipping instructions, and other important information that will help Intel provide you with fast, efficient service. If the product is being returned because of damage sustained during shipment, or if the product is out of warranty, a purchase order is necessary in order for the Intel Service Center to make the repair.

When preparing the product for shipment to the Service Center, use the original factory packaging material if available. If the original packaging is not available, wrap the product in a cushioning material such as Air Cap 5D-240, manufactured by the Sealed Air Corporation, Hawthorne, N.J., and enclose in a heavy-duty corrugated shipping carton. Seal the carton securely, mark it FRAGILE to ensure careful handling, and ship it to the address specified by the Intel Service Center.

NOTE

Customers outside of the United States should contact their sales source (Intel Sales Office or Authorized Intel Distributor) for directions on obtaining service or repair assistance.

CHAPTER 3
BOOTING THE SYSTEM AND DIAGNOSTICS

3-1. Introduction

Operation of the ISIS Cluster workstation is provided by firmware in on-board EPROM memory, and the ISIS Cluster operating system software, ISIS-III(C). The on-board firmware contains Boot, Monitor, and Diagnostic programs. This chapter assumes that all network hardware and software are functioning correctly. Refer to Chapter 2 for information on hardware and software. For the Series II, III or Model 800 workstations, power-up or RESET assumes that the ISIS-III(N)/III(C) (Version 2.2 or later) diskette is in the system's drive 0 (single or double density). The diskette is not required for power-up or RESET of the Series IV workstation.

3-2. ISIS Cluster Board Initialization

When power is applied to an Intellec workstation, all installed ISIS Cluster boards are initialized. The following sign-on message is displayed at the Cluster workstation terminal:

```
ISIS CLUSTER BOOT Vx.y
Copyright year(s) Intel Corporation
```

and the firmware diagnostics are executed. If a test fails, a message will be displayed at the Cluster terminal. Properly functioning Cluster boards and terminals will not be affected. The host workstation will also display the results of the diagnostic execution for each Cluster board (see Section 3-3). If you do not see the sign-on message, check that power is on at the Cluster terminal, and that the correct baud rate and serial data format (one start bit, eight data bits, parity off, and one stop bit) are in effect.

3-3. Intellec® Workstation Initialization

When power is applied to an Intellec workstation, or when the RESET button is pressed, the sign-on message is displayed at the workstation terminal. The display indicates whether a particular user terminal is on, and gives the results of the firmware diagnostic tests.

Figure 3-1 contains a sample display for a Series II, III or Model 800 workstation. In this example, four ISIS Cluster boards are installed. The first Cluster board (memory page E) has its terminal on, and all diagnostics pass. The second Cluster board (memory page D) passed the diagnostics, but the terminal is off. In the third case (page C board), the terminal is off, and the ISIS Cluster board failed the TIMER TEST. In the fourth case (page B board), the ISIS Cluster board has been programmatically removed from the system for diagnostic purposes. Other than being present and addressable, the page B board is not a part of the NDS-II system.

Figure 3-2 contains a sample display for a Series IV workstation. In this example, four Cluster boards are installed. The first Cluster board (memory page E) has its terminal on, and all diagnostics pass. The second and third Cluster boards (memory

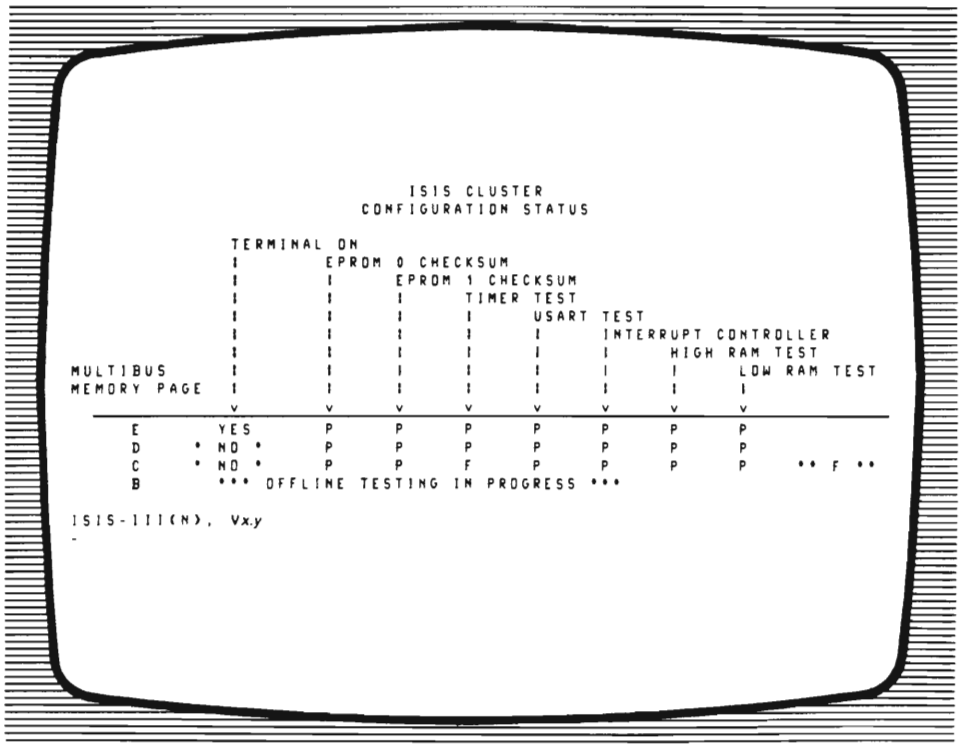


Figure 3-1. Series II/III and Model 800 Workstation Power-Up or RESET Display 122293-8

pages D and C) passed the diagnostics, but the terminals are off. In the fourth case (memory page B), the Cluster board has been programmatically removed from the system for diagnostic purposes. Other than being present and addressable, the page B board is not a part of the NDS-II network.

3-4. Log-On

At power-up or RESET, the operating system will request the following:

```
PLEASE LOGON

USER NAME-<user name><cr>
PASSWORD-<user password><cr>
```

NOTE

For security reasons, the screen does not display the typed password.

Terminals that are turned off can be turned on to gain access to the NDS-II system; resetting the Intellec workstation is not necessary. Simply apply power and enter RETURN. The log-on message will be displayed.

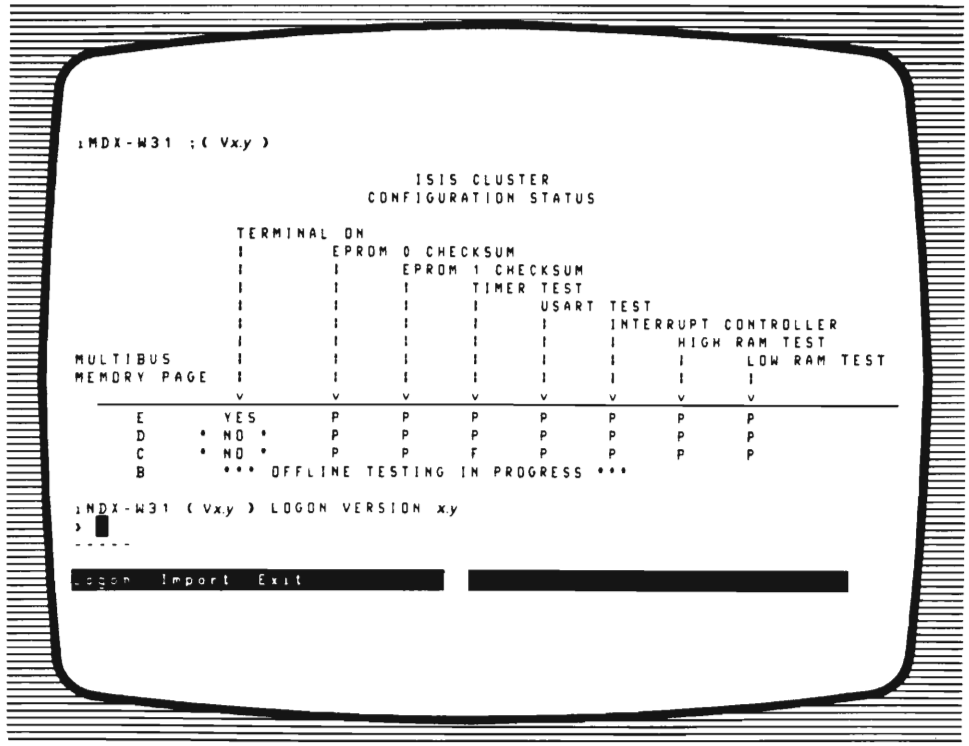


Figure 3-2. Series IV Workstation Power-Up or RESET Display 122293-9

In order to log on through a Cluster workstation, the following things must be done:

1. The Cluster workstation must be sysgened into the NDS-II network.
2. The directory ISIS.SYS must exist with Display and Add access rights.
3. System and command files must also be in the ISIS.SYS directory with World read access rights.
4. A HOME directory must be created for the user.

The *NDS-II Network Resource Manager User's Guide* contains instructions for sysgening the Cluster workstation and setting up the necessary directories and files.

To verify that the Cluster workstation can communicate with the NRM, perform the following:

1. Log on to the system.
2. Type ASSIGN ‹ cr ›, and verify that directory 0 is assigned to ISIS.SYS and directory 9 to your HOME directory.
3. Enter DIR E ‹ cr › and examine the display for the ISIS system files and commands.
4. If the DIR display in step 3 shows World read access rights for the ISIS commands, the Cluster workstation is ready for use.

3-5. Firmware Diagnostics

To execute the firmware diagnostics from a Cluster terminal, press the workstation RESET button. After approximately four seconds, the reset diagnostic execution will complete and wait for booting the operating system or for pressing the M key at the Cluster terminal. Pressing the M key will place the Cluster workstation in Monitor mode. In Monitor mode, typing

```
Z$<cr>
```

will execute the diagnostic tests one time. The following will be displayed:

```
ISIS CLUSTER DIAGNOSTIC Vx.y
Copyright year(s) Intel Corporation
  ROM0 CHECKSUM TEST -- PASS
  TIMER TEST -- PASS
  USART TEST -- PASS
  INTERRUPT CONTROLLER TEST -- PASS
  HI RAM TEST (32K TO 64K) -- PASS
  LOW RAM TEST (0 TO 32K) -- PASS
END TEST
```

To repetitively execute the diagnostics, type

```
ZL$<cr>
```

The diagnostics will continue to execute repeatedly until CONTROL-C is pressed (CNTL and C simultaneously). To exit from Monitor mode to Network mode, the workstation must be Reset. The diagnostics can be run with other Cluster users logged on the system. However, any time the Intellec workstation RESET button is pressed, all users will be reinitialized.

NOTE

On some terminals, the CONTROL key is labeled CTRL or CNTL.

CHAPTER 4
FIELD SERVICE INFORMATION

4-1. Introduction

This chapter is intended for use by Intel Customer Engineers only. It includes a procedure to locate trouble in the ISIS Cluster Network, explanation of the use of the firmware Monitor and diagnostics, and software descriptions.

4-2. Hardware Configurations

The basic Intellec workstation configurations that support ISIS Cluster workstations are shown in Figure 2-1 and Table 2-2. Figure 1-2 is a block diagram of the ISIS Cluster board.

4-2-1. Model 800 Hardware Configuration

In a Model 800 Workstation, the ISIS Cluster boards must have a priority below that of the flexible disk drive controllers. The Front Panel Controller and CPU boards occupy slots 1 and 2 (on the left, facing the front panel), while the Flexible Disk Controller boards usually occupy slots 16 and 17. The Monitor board is usually in slot 18, (the last slot on the right, facing the front panel). ISIS Cluster boards must occupy only odd numbered (Master) slots.

4-2-2. User-Selectable Jumpers

Figure 2-2 shows the locations of following the user-selectable jumpers:

- Page Address Jumpers: See Section 2-6 and Table 2-2.
- Baud Rate Jumpers: See Section 2-7.
- Transmit/Receive Jumpers: See Section 2-8.

4-3. Software

The network software must be configured to include the ISIS Cluster boards. Refer to Chapter 2 for sysgen and configuration information.

In addition to the standard ISIS-III boot file, ISISC.BIN is needed to boot the cluster. (All files are on the standard ISIS.III(N)/III(C) V*x.y* diskette.)

4-4. Troubleshooting

Before attempting to locate problems in ISIS Cluster systems, be certain that all the network software and the Intellec workstations are working correctly. If the workstation has problems, or the iSBC 550 boards are malfunctioning, the ISIS Cluster boards cannot be properly tested.

4-4-1. Troubleshooting Sequence

Figure 4-1 illustrates a Troubleshooting Sequence. Note the following:

- Be certain that all ISIS Cluster terminals are turned on, are properly connected, and set to the correct baud rate.
- Make sure the software is correct for the particular system configuration.

To test the ISIS Cluster boards, use the following procedure. If the Diagnostics fail, the faulty ISIS Cluster board must be returned for repair.

1. If the workstation is a Series II, III or a Model 800, place the ISIS-III(N)/III(C) diskette in drive 0 (single or double density).
2. Press the RESET button.

If the development system is a Series II, III or Model 800, a display similar to Figure 4-2 should appear on the screen. If it is a Series IV, a display similar to Figure 4-3 should appear.

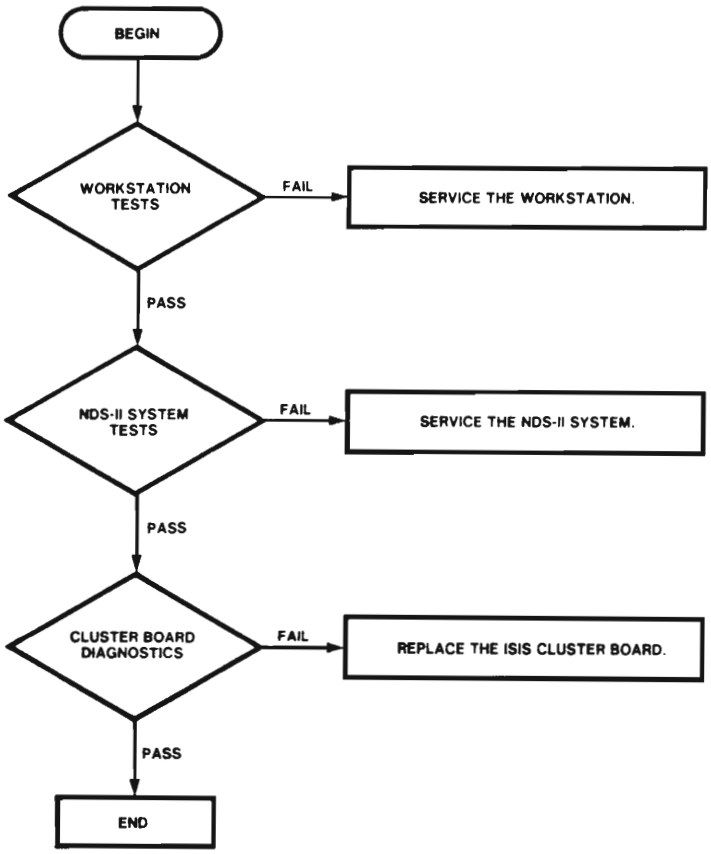


Figure 4-1. Troubleshooting Sequence 122100-9

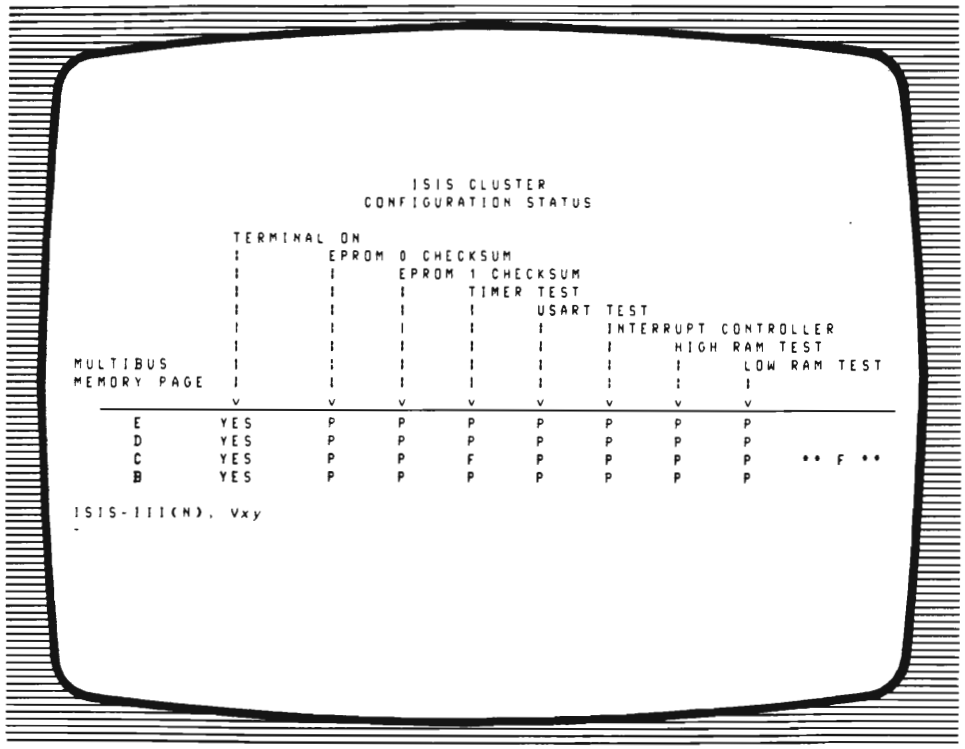


Figure 4-2. Series II/III and Model 800 Workstation Initial Display

122100-11

In Figure 4-2, all ISIS Cluster boards passed except the one addressed at memory page C. There is an indication that the TIMER TEST failed on ISIS Cluster board C. If a problem shows up at this point, execute the ISIS Cluster firmware diagnostics from the Monitor mode of the failed board.

In Figure 4-3, all Cluster boards passed except the one addressed at memory page C. There is an indication that the TIMER TEST failed on Cluster board C. If a problem shows up at this point, execute the ISIS Cluster firmware diagnostics from the Monitor mode of the failed board.

If an ISIS Cluster board is installed, but does not show up in the display, check the address jumpers. Also look for missing letters in the sequence (e.g., E, D, B, A has C missing). The sequence should be contiguous. If the sequence is not contiguous, it indicates a Cluster board that cannot be addressed, or an address jumper is missing or in the wrong place.

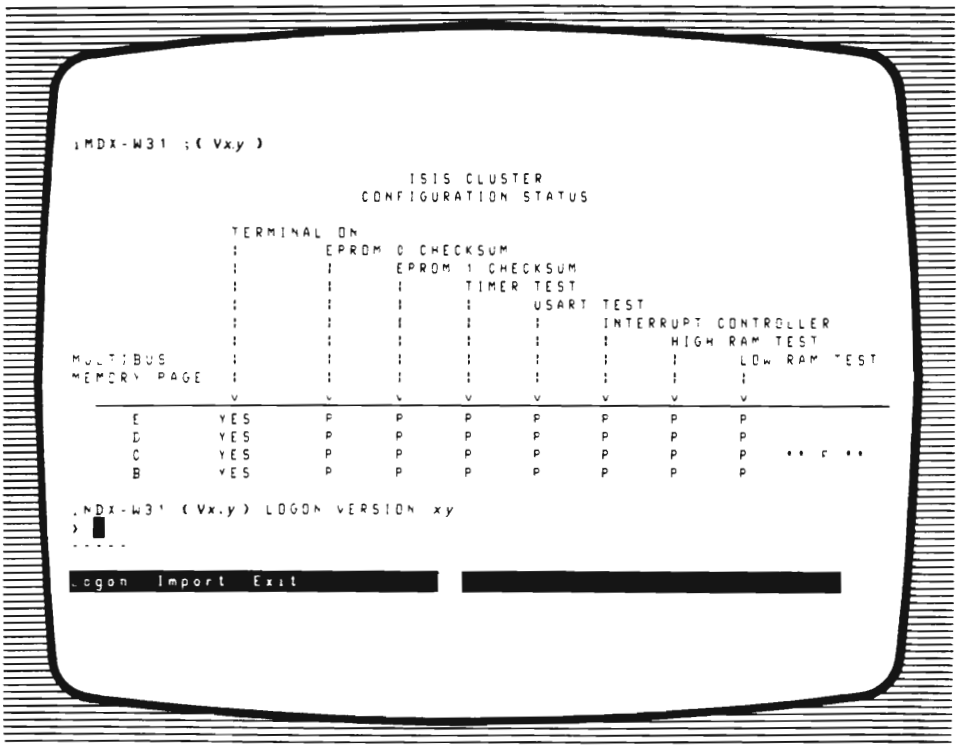


Figure 4-3. Series IV Workstation Initial Display 122293-12

4-5. Monitor Mode

To execute the firmware diagnostics from an ISIS Cluster terminal, press the RESET button at the host workstation. (If the host workstation is a Series II, III or Model 800, you must first remove the ISIS-III(N)/III(C) diskette.) After approximately four seconds, press the M key at any Cluster terminal or at the Intellec workstation. The message

```
CLUSTER MONITOR Vx.y
Copyright year(s) Intel Corporation
```

indicates that a particular Cluster board is in Monitor mode. Entering

```
Z$<cr>
```

executes the diagnostic tests one time. The following will be displayed:

```
ISIS CLUSTER DIAGNOSTIC Vx.y
Copyright year(s) Intel Corporation
  ROM0 CHECKSUM TEST -- PASS
  TIMER TEST -- PASS
  USART TEST -- PASS
  INTERRUPT CONTROLLER TEST -- PASS
  HI RAM TEST (32K TO 64K) -- PASS
  LOW RAM TEST (0 TO 32K) -- PASS
END TEST
```

To repetitively execute the diagnostics, enter

```
>L $<cr>
```

The diagnostics will continue to execute until CONTROL-C is pressed (CNTL and C simultaneously). To exit from Monitor mode, the entire system must be reset. The diagnostics can be run with other Cluster users logged onto the system. To do this, the M key should be held down at RESET until the Monitor signs on. However, each time the host workstation RESET button is pressed, all users will be reinitialized. Each time the diagnostics execute, the diagnostic display shown above will be displayed.

NOTE

On some terminals, the CONTROL key is labeled CTRL or CNTL.

4-6. Test Results

The results of executing the diagnostics are displayed at the end of execution. If a test fails, FAIL will be displayed instead of PASS. Several memory locations contain codes describing what the error was:

Memory Location	Function
F6D0H	Communications Handshake Byte
F6D1H	Soft Error Byte
F6D2H	EPROM 0 (A25) Checksum Failure Flag
F6D3H	EPROM 1 (A37) Checksum Failure Flag
F6D4H	Timer Failure Flag
F6D5H	USART Failure Flag
F6D6H	Interrupt Controller Failure Flag
F6D7H	HI RAM Test Failure Flag
F6D8H	LO RAM Test Failure Flag
F6D9H	EPROM0 Checksum Value
F6DAH	EPROM1 Checksum Value
F6DBH	Test Loop Condition Byte
F6DCH	System Diagnostic Failure Byte

The following codes are used in the Communications Handshake Byte:

00H	Diagnostics in progress
55H	Diagnostics passed, ready to load system
AAH	System loaded
F5H	Customer Engineer Control
FAH	Diagnostics failed

The following codes are used in the Soft Error Byte:

01H	CRT not connected or turned off

Failure flags with any value other than 00H indicate failure of a diagnostic test. In addition, each time a test fails, the particular diagnostic register will be incremented by one. When 256 errors occur, the error flag byte will return to zero.

To look at the memory contents, enter

```
>F6D0,F6DA<cr>
```

A display similar to the one below will occur when no errors have been detected:

```
F6D0   F5   00   00   00   00   00   00   00   00   xx   xx
```

where the first byte indicates that the board is in Monitor mode. The remaining bytes indicate that no errors occurred. If an error occurred with the Timer, the following would be displayed:

```
F6D0   FA   00   00   00   01   00   00   00   00   xx   xx
```

where 01 at F6D4 indicates a Timer failure. In this case, repeatedly executing the diagnostics could locate an intermittent failure.

INTEL CORPORATION, 3065 Bowers Avenue, Santa Clara, California 95051 (408) **987-8080**

Printed in U.S.A.