Bailey® infi 90®

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Instruction

Management Command System Hardware Manual Software Release M.2

A9194

Bailey

Seamless, Real-Time Process Management Solutions

WARNING notices as used in this manual apply to hazards or unsafe practices which could result in personal injury or death.
CAUTION notices apply to hazards or unsafe practices which could result in property damage.
NOTES highlight procedures and contain information which assist the operator in understanding the information contained in this manual.

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MAINTENANCE MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL AND ONLY AFTER SECURING EQUIPMENT CONTROLLED BY THIS PRODUCT. ADJUSTING OR REMOVING THIS PRODUCT WHILE IT IS IN THE SYSTEM MAY UPSET THE PROCESS BEING CONTROLLED. SOME PROCESS UPSETS MAY CAUSE INJURY OR DAMAGE.

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Preface

This manual serves as a reference manual for the Management Command System (MCS). It includes standard jumper configurations, switch settings and cable and wire connections for all internal components. This information is provided should existing setups be inadvertently changed or modules be replaced. The hardware configuration as stated in this manual is based on the requirements of MCS Software Revision M.2.

If you encounter problems in the installation, setup or servicing of the MCS not addressed by this manual, or you believe the material contains inaccuracies, notify your nearest Bailey Controls service center or sales office and request assistance.

We recommend that you read the entire manual before beginning installation and power up of your MCS.

This revision supersedes and replaces the product instruction I-E93-901-23B for the L.2 software release.

FOR Q.1
SOFTWARE

List of Effective Pages

Total number of pages in this manual is 198, consisting of the following:

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Safety Summary

GENERAL WARNINGS	**Equipment Environment** All components, whether in transportation, operation or storage must be in a noncorrosive environment. **Electrical Shock Hazard During Maintenance** Disconnect power or take precautions to ensure that contact with energized parts is avoided when servicing.
SPECIFIC WARNINGS	Do not operate the MCS with doors or covers opened or removed. Figure 1-2 is only for illustrative purposes. (p. 1-4) Switch the main circuit breaker to OFF before attempting repair or replacement. (p. 3-5) Disconnect from electrical supply before attempting repair or replacement. (p. 5-25)
GENERAL CAUTION	We strongly recommend that you turn off cabinet power before doing any termination module wiring. Failure to do so could result in equipment damage. Do not apply power until you verify all wire connections.
SPECIFIC CAUTION	Incorrectly setting the input power select may damage the disk drive unit. (p. 4-60)

Sommaire de Securite

AVERTISSEMENT D'ORDRE GENERAL	**Environment de l'equipement** Nes pas soumettre les composantes a une atmosphere corrosive lors du transport, de l'entreposage ou de l'utilisation. **Risques de chocs electriques lor de l'entretien** S'assurer de debrancher l'alimentation ou de prende les precautions necessaires a eviter tout contact avec des composants sours tension lors de l'entretien.
AVERTISSEMENT D'ORDRE SPECIFIQUE	Ne pas faire fonctionner le MCS lorsque les portes ou les panneaux d'acces sont ouverts ou enleves. Le MCS n'est represente a la Figure 1-2 qu'a titre d'illustration seulement. (p. 1-4) Placer le disjoncteur principal en position HORS CIRCUIT avant de procedure a l'enlevement de cartes. (p. 3-5) Debrancher de la source electrique avant de proceder a des travaux de reparation ou de remplacement. (p. 5-25)
ATTENTION D'ORDRE GENERAL	Il est fortement recommande de debracher l'alimentation electrique du cabinet avant d'effectuer tout connexion aux cartes de raccordment des modules. Des dommages aux equipments pourraient survenir dans le cas contraire. Ne pas rebrancher l'alimentation avant que toutes les connexions aient ete verifiees.
ATTENTION D'ORDRE SPECIFIQUE	Un mauvais reglage de la selection de l'alimentation d'entree pourait endommager l'unite de disque. (p. 4-60)

SECTION 1 - INTRODUCTION

OVERVIEW

The Management Command System (MCS) operator console provides integrated operations and data acquisition capabilities for plant wide control. It is a flexible, state-of-the-art system that features 10,000 tag capacity, distributed trending, high resolution CRT displays with optional touch screens and archival storage. Figure 1-1 shows the Management Command System-NMCS02.

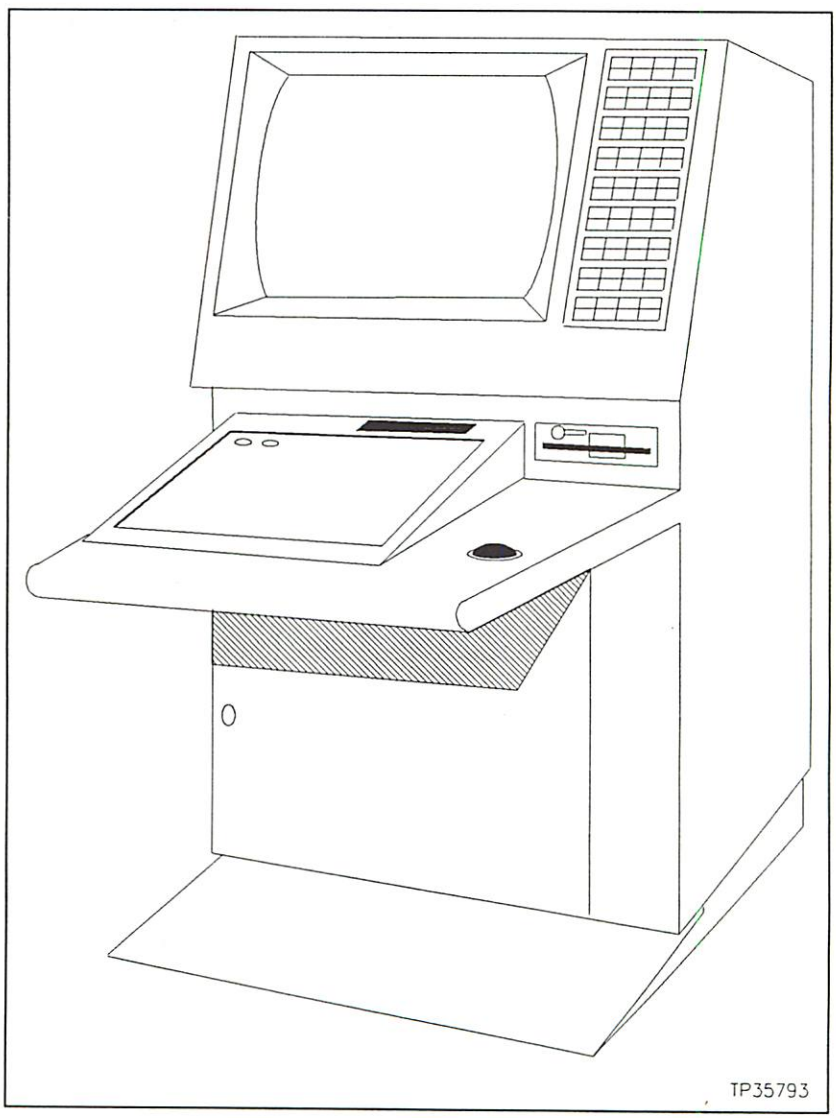

Figure 1-1. Management Command System - NMCS02

INTENDED USER

This manual is a guide for the systems engineer or technician of the Management Command System. It explains the start-up, maintenance and service. Follow the procedures in this manual carefully to properly maintain and use the MCS.

MCS DESCRIPTION

The NMCS02 dimensions are approximately 53 inches high by 28 inches wide by 46 inches deep. It has front and rear swing-out doors with individual locks. The rear door and the keyboard counter have slotted sections to accommodate the air intake and exhausts of the unit's internal cooling system. The unit is provided with a stabilizer which must be fastened to the front when the NMCS02 is not secured to the floor. One 2.5 inch diameter cable entry is provided at the bottom right rear of the unit.

The MCS is an operator console that provides integrated operations and data acquisition capabilities for plant wide control. It supports:

4 CRTs (including touch screens)

4 keyboards (membrane and full stroke)

2 printers (single or 8 color)

The optional Applications Processor package allows you to create FORTRAN and C programs to interface with system data and peripherals. Menu driven configuration screens are standard.

The MCS can be set up in one integrated cabinet or in a remote package without a keyboard or CRT. Remote consoles may be located 250 feet from the driver electronics, or 2000 feet with fiber optic communications.

FEATURES

The standard model of the Management Command System is the stand-up console, the NMCS02. The following lists contain the hardware included in the standard MCS and available options.

Standard Hardware

- AC distribution board
- Annunciator/display select panel - 64 key mini-annunciator panel
- Bus Transfer Module
- Color monitor
- Two pair of CPU/memory cards (with serial interface and clock calendar card)
- DIN connector
- Input/output (I/O) power supply
- I/O distribution panel
- Fan assembly
- Floppy disk drive
- Hard disk drive
- Keyboard electronics
- Loop Interface Module
- Plant loop to Computer Interface Module
- Two Megabytes RAM memory cards
- Module Mounting Unit
- MCS system power supply
- Multibus graphics controller
- Multibus Serial Interface Module
- Disk drive controller card
- Reset card
- Plant Loop Termination Unit
- 26 slot multibus card cage

Options

- Annunciator/display select panel - 64 key mini-annunciator panel
- Additional multibus graphics controllers, monitors and keyboards
- Applications Processor
- Color printer
- Color video copier
- High speed black white printer
- Nine-track magnetic tape for archival storage
- Optical disk archival storage
- QWERTY style auxiliary keyboard
- Redundancy transfer switch
- Satellite clock
- Standard black/white printer
- Streaming tape
- INFI-NET® to Computer Interface Module
- Network Interface Slave
- Touch screen
- Trackball

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NMCS02 - Component Location

Figure 1-2 illustrates the front and rear views of the NMCS02 with its doors removed. This figure shows the physical relationship between the subassemblies internal to this unit.

WARNING	**Do not operate the MCS with doors or covers opened or removed. Figure 1-2 is only for illustrative purposes.**
AVERTISSEMENT	**Ne pas faire fonctionner le MCS lorsque les portes ou les panneaux d'acces sont ouverts ou enleves. Le MCS n'est represente a la figure 1-2 qu'a titre d'illustration seulement.**

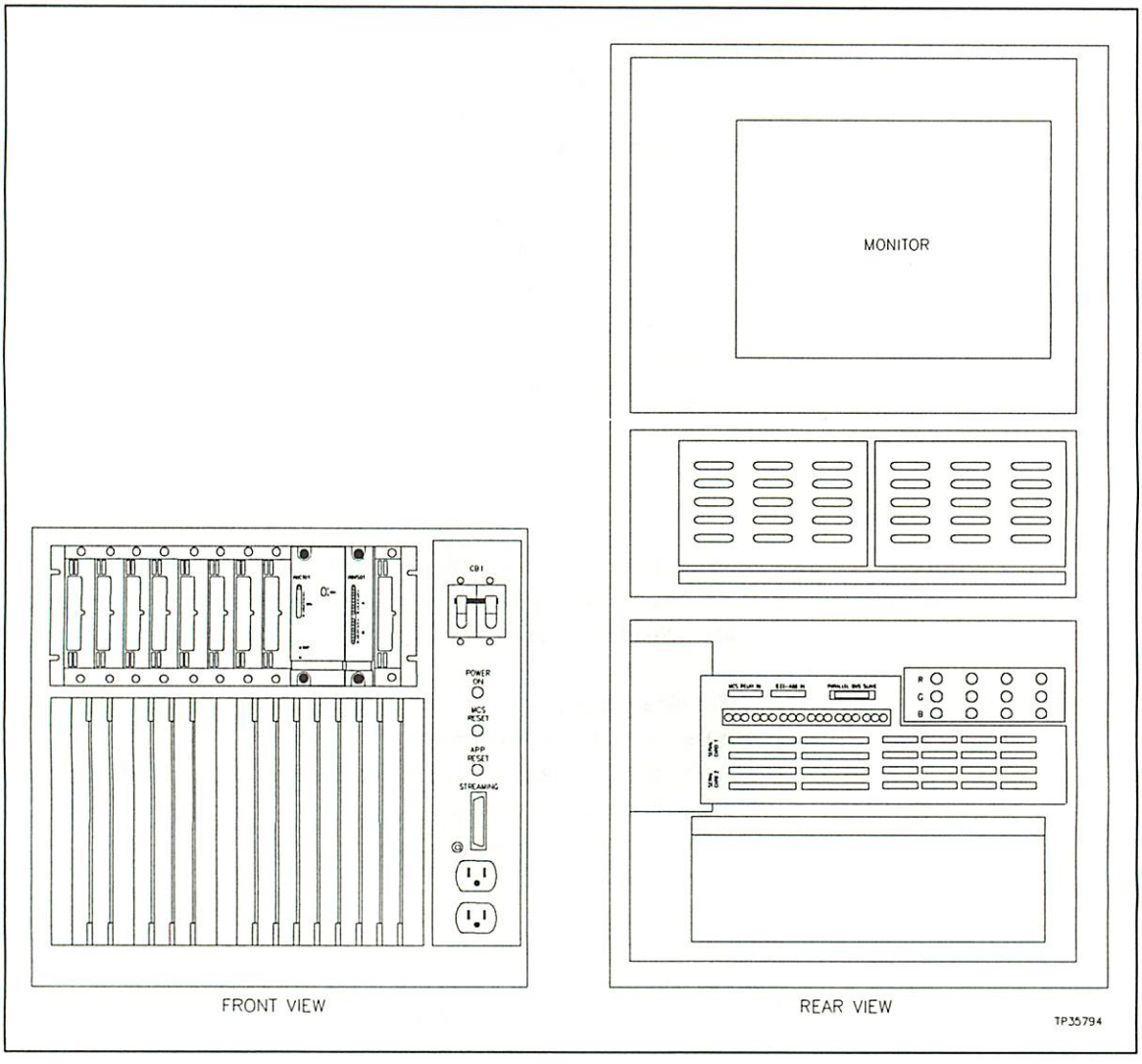

Figure 1-2. Front and Rear Views of NMCS02

INSTRUCTION CONTENT

This document is organized in the following manner:

Introduction Describes the physical attributes of the MCS, associated hardware, and provides a complete list of system specifications.

Installation and Start-up Gives complete instruction on installation procedures.

Standard Hardware Gives the standard hardware configurations for a base MCS.

MCS Options Describes the available MCS options and configuration and installation procedures for these options.

Maintenance Describes preventive maintenance necessary and includes troubleshooting information.

Support Sevices Includes a recommended spare parts list.

REFERENCE DOCUMENTS

References are made in this manual to the following Bailey publications:

Document Number	Document
I-E93-900-5	Network 90® Site Planning, Preparation and Equipment Installation Instructions
I-E93-901-21	MCS Operation and Configuration Manual

The information contained in these instructions accurately reflects the MCS hardware at the time of printing. However, Bailey Controls reserves the right to revise the design of the MCS hardware without prior notification.

® Network 90 is a registered trademark of the Bailey Controls Company.

GLOSSARY OF TERMS AND ABBREVIATIONS

Term	Definition
ADP	Alarm annunciator/display panel.
Controlway	A high speed version of the module bus, the redundant peer-to-peer communication link. It provides the communication path for point data transfer between intelligent modules.
CPU Card	Central Processing Unit Card; the board that interprets and executes instructions.
CWS	Work Stand; MCS cabinet bottom with a table top.
Dipswitch	A dual in-line package that contains single pole switches.
ESD	Electrostatic discharge.
INFI-NET	A communication loop for up to 250 individual control rings with up to 250 nodes per ring. INFI-NET is compatible with Network 90 and the INFI 90® hardware.
LED	Light Emitting Diode; the module front panel indicator that shows status and error messages.
MCS	Integrated Unit consisting of a console cabinet, CRT, keyboard and electronics.
MED	Remote electronics driver cabinet; same electronics as NMCS02 in standard full height NCAB06 cabinet.
MMU	Multibus Module Unit; the card rack for MCS standard and optional control and process modules (PC boards).
Module Bus	The bi-directional communication link on the back of the MMU. MMU modules communicate over the Module Bus.
NCPS	Printer Stand; an MCS cabinet bottom with a table top for a printer.
PEP	Power Entry Panel.
Plant Loop	A Network 90 communication loop can have up to 63 nodes per Plant Loop ring.
SASI	Shugart Associates System Interface (parallel interface module).
SCSI	Small Computer System Interface.
SSD	Static Susceptable Devices.

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NOMENCLATURE

Nomenclature	Description
IIMGC01	Multibus Graphics Controller
IIMSM01	Multibus Serial Interface Module
INBTM01	Bus Transfer Module
INICT01	INFI-NET Storage Module
INLIM03	Loop Interface Module
INNIS01	INFI-NET Interface Slave
INPCT01	Plant Loop to Computer Transfer Module
NCPS01	Printer stand; an MCS cabinet bottom with a table top for a printer
NCRT01[1]	Tabletop 19" CRT with keyboard
NCRT02[1]	19" CRT console with keyboard
NCRT03[1]	Stand up environmental unit; 19" CRT with keyboard
NCRT04[1]	Two 19" CRTs with one keyboard
NCRT05[1]	Tabletop 19" CRT without keyboard
NCRT06[1]	Panel mount 19" CRT (optional keyboard)
NCRT09[1]	19" CRT only in a NCRT02 style cabinet; no keyboard
NCWS01	Work stand; MCS cabinet bottom with a table top
NICL01	Termination Modules Communication Link
NMCS02	Integrated unit consisting of: Console cabinet: 19" color CRT (640 x 480 pixel resolution) Membrane operator keyboard; functional layout, 32 user-assignable keys Electronics: INFI-NET/Plant Loop Interface 85 Megabyte hard disk drive 1.2 Megabyte floppy disk drive; 5¼" format Annunciator relays and audible tones Multiple 68000 family microprocessor board sets RAM memory Battery-backed real time clock Serial I/O ports
NCAB06	Optional full height cabinet
NMED01	Remote electronics driver cabinet; same electronics as the MCS
NTCL01	Termination Unit Communication Link
NUCC01	Console cabinet; an empty MCS cabinet with a plate over the CRT opening.

NOTE: 1. All remote CRTs can be used with NMCS02 or NMED01. Up to three remote CRTs can be used with each NMCS02. Up to four remote CRTs can be used with each NMED01.

SPECIFICATIONS

Power Requirements

Line Voltage	103 to 132 VRMS
Line Frequency	47 to 63 Hz
Power Factor	0.65
Crest factor	2.19

Current

In-rush (half-cycle) 63.2 amps

Nominal	NCRT01/05	NCRT02/09	NCRT03	NCRT04	NCRT06	NMCS02	NMED01
120 VAC	1.5	1.75	8.0	2.75	1.5	10.75	9.0
240 VAC	+0.75	N/A	N/A	N/A	+0.75	N/A	4.5

Power Consumption

	NCRT01/05	NCRT02/09	NCRT03	NCRT04	NCRT06	NMCS02	NMED01
Watts	126	140	886	262	124	925	785

Cooling Requirements

	NCRT01/05	NCRT02/09	NCRT03	NCRT04	NCRT06	NMCS02	NMED01
BTU/hr.	430	477	3021	893	423	3154	2677

CRT Resolution	640 x 480 pixels
Touch Screen Resolution	4,096 x 4,096 points
Configuration	Nonvolatile ROM and hard disk memory
Display Screens	1,000; 200 dynamic items per screen
Control/Display Selects	200 selects from touch screen 200 selects from keyboard
Tags	10,000 standard
Trends	1,000
Logs	100 in any combination of Trend, Trip and Periodic Logs; Sequence of Events logs are additional.
Weight	453 lbs (305.5 kg)

Environmental Constraints

Temperature

Operating	4° to 40°C (40° to 104°F)
Storage	-22° to 60°C (-8° to 140°F)
Transportation	-30° to 60°C (-22° to 140°F)

SPECIFICATIONS *(continued)*

Environmental Constraints (continued)	
Relative Humidity	
Operating	20% to 80% noncondensing
Storage	10% to 90% noncondensing
Transportation	5% to 95% noncondensing
Altitude	-1,000 feet to +10,000 feet
Certification	CSA certification for use in an ordinary (nonhazardous) location.

Specifications Subject To Change Without Notice

SECTION 2 - INSTALLATION AND START-UP

INTRODUCTION

This section explains what to do before you put the MCS into operation. ***DO NOT*** proceed with operation until you read, understand and do the steps in the order in which they appear.

SPECIAL HANDLING

NOTE: Always use Bailey's Field Static Kit (P/N 1948385A2 - has a wrist strap, ground cord assembly, alligator clip) when working with MCS circuit boards. The kit connects a technician to the MCS ground point to prevent damage to the circuit boards by electrostatic discharge.

The MCS contains devices that use metal oxide semiconductor (MOS) devices. MOS devices require special precautions during shipping and handling. Static discharge, improper grounding and careless handling can damage these devices. To help reduce the chance of damage, follow these procedures:

1. Keep all spare circuit boards in the special antistatic bag until you are ready to install them. Save the antistatic bag for future use.

2. Ground the antistatic bag before opening it to remove the circuit board.

3. Check that the MCS is properly grounded before installing circuit boards.

4. Avoid touching the circuitry when handling circuit boards.

NOTE: Wear the grounding straps from the field static kit when removing or installing circuit boards to change switch settings.

UNPACKING AND INSPECTION

These are steps to follow for general handling:

1. Examine the MCS to make sure that no damage has occurred in transit.

2. Notify the nearest Bailey Controls sales/service office of any damage.

3. File a claim for any damage with the shipping company that handled the shipment.

4. Use the original packing material or container to store the MCS.

5. Store the MCS, additional spare parts and options in a place with clean air; free of extremes of temperature and humidity. If the storage period is over a week in duration, disconnect the clock battery by removing a jumper (refer to ***Clock Calendar Card*** in section three and ***SATELLITE CLOCK CARD*** in section four). Failure to do so will result in excessive battery drain, requiring replacement of the clock calendar card battery.

SETUP/INSTALLATION

This manual refers to MCS setup only. For other information, refer to the Bailey Controls manual, ***Site Planning, Preparation and Equipment Installation (I-E93-900-5)***.

The following information gives the steps required to install and power up the MCS.

1. Open the back door of the MCS or MED cabinet. This provides access to the terminals needed for wiring to your plant loop or INFI-NET System and AC power.

2. Connect the plant loop or INFI-NET Communication Link. (Refer to section three of this manual, ***TERMINATION UNIT - COMMUNICATION LOOP***, for further information).

NMCS02 Located at the rear of the NMCS02 to the lower left is a rack which accommodates a Communication Link Termination Unit (NTCL01) (Figure 2-1). Refer to the NTCL01 in the Bailey termination manual I-E93-911 for wire connections.

NMED01 Located at the rear of the NMED01 above the multibus card cage is a rack which accommodates a Communication Link Termination Module (NICL01) (Figure 2-2). Refer to the NICL01 in the Bailey termination manual I-E93-911 for wire connections.

3. The next step is to wire AC power to the MCS or MED. The recommended minimum size for power wiring to the MCS is 14 AWG copper wire with a 600 V, 75°C rating and thermoplastic insulation. Wire with a 300 V or 150 V rating may be used provided it is accepted by local wiring codes, protected by cable trays or conduit and suited for the service voltage.

The power wiring to the MCS must include a third-wire grounding conductor. This grounding conductor must not be of a smaller gauge than the power wiring and must be either bare or green colored, if insulated. The grounding conductor must be terminated at the system safety ground connection.

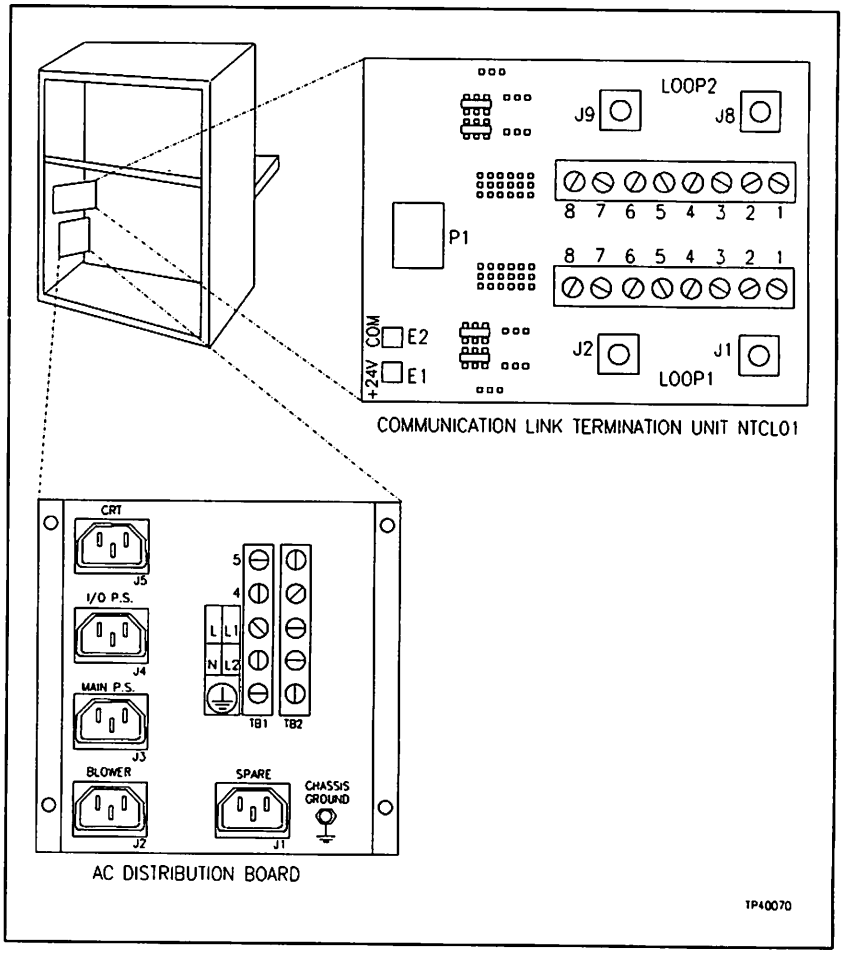


Figure 2-1. NTCL01 and AC Distribution Board Location

The over-current protection provided for your AC distribution must be sized to allow for the inrush current required by the MCS hardware. See section one for the peak inrush current and duration for the MCS.

For other power wiring and grounding considerations, such as line conditioning, and EMI (electromagnetic interference), refer to manual ***I-E93-900-5, Site Planning, Preparation and Equipment Installation.***

NMCS02 Located just below the Communication Link Termination Unit, the AC distribution board (Figure 2-1) accepts 120 VAC at 50/60 Hz. Connect one side of the 120 VAC line to TB2-L, and the other side to TB2-N. Connect the ground wire to TB2-G. (Refer to ***AC DISTRIBUTION BOARD*** in section three of this manual for further information.) If other

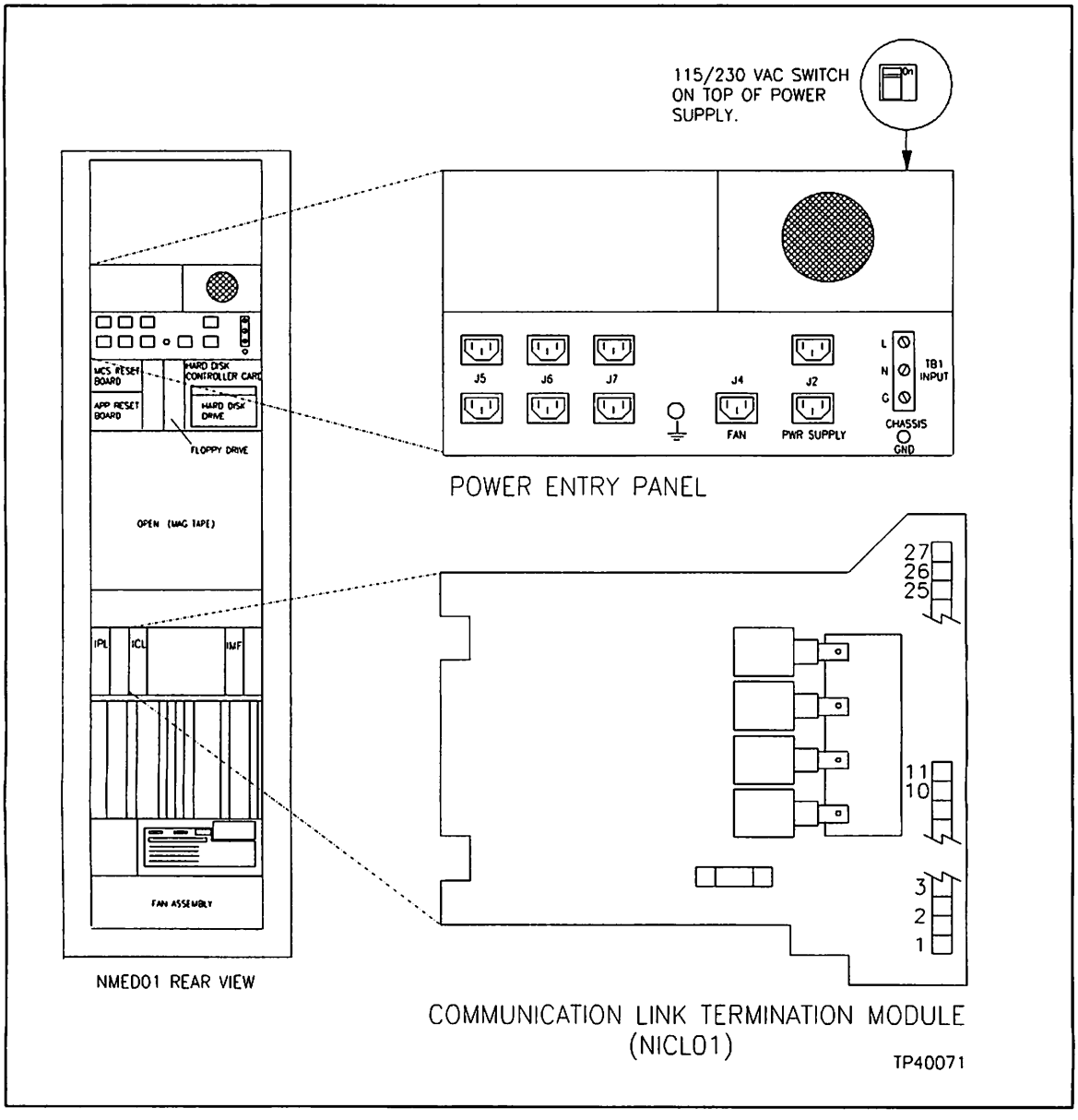


Figure 2-2. NMED01 PEP and NICL01 Location

power is present at your plant, a compensating transformer is required.

NOTE: If remote CRTs are being installed, ensure they are powered using the same polarized power and ground as the MCS to prevent ground loops. Failure to do so may cause display distortion. If ground loops are still suspected, use of optically isolated modems will eliminate the problem.

NMED01 Located just below the power supply near the top of the cabinet is the Power Entry Panel (PEP). The PEP accepts 120 VAC or 240 VAC at 50/60 Hz. A switch located on top of the power supply (Figure 2-2) is used to select the desired input voltage. Refer to MCS Remote Electronics Driver Cabinet,

POWER ENTRY PANEL in section four of this manual for wire connections. If other power is present at your plant, a compensating transformer is required.

> **NOTE:** If remote CRTs are being installed, ensure they are powered using the same polarized power and ground as the MCS to prevent ground loops. Failure to do so may cause display distortion. If ground loops are still suspected, use of optically isolated modems will eliminate the problem.

4. During shipping, some problems may occur. Before applying power to the MCS, perform the AC and DC power up tests in section five of this manual. Adjust the supplies as shown, if necessary.

5. Once the wiring is complete, and the DC voltage sources have been checked, you are ready to apply power to the MCS. If problems occur, refer to the ***Troubleshooting Chart*** in section five of this manual.

MCS peripherals (keyboards, monitors, printers, etc.) are connected to the I/O distribution board. Refer to ***I/O DISTRIBUTION BOARD*** in section three of this manual for wiring connections. If connecting an MCS touch screen, refer to ***TOUCH SCREEN*** in section four of this manual.

SECTION 3 - STANDARD HARDWARE

INTRODUCTION

This section is organized into three parts: multibus cards, INFI 90 and Network 90 modules and other hardware components. Each section contains jumper and switch configurations for a standard MCS. The components in the MCS are factory configured. The configuration process described in section three and section four is not required to operate the MCS. This information is given in case settings are inadvertently changed or hardware needs to be replaced. The general location of each component along with wire and cable connections are also given. This is a reference section of standard equipment. Information regarding other MCS options is given in section four of this manual.

Table 3-1 lists the multibus cards and their location in the multibus card rack. Figure 3-1 shows the cards in the multibus card rack.

Table 3-1. Multibus Card Cage Assignments

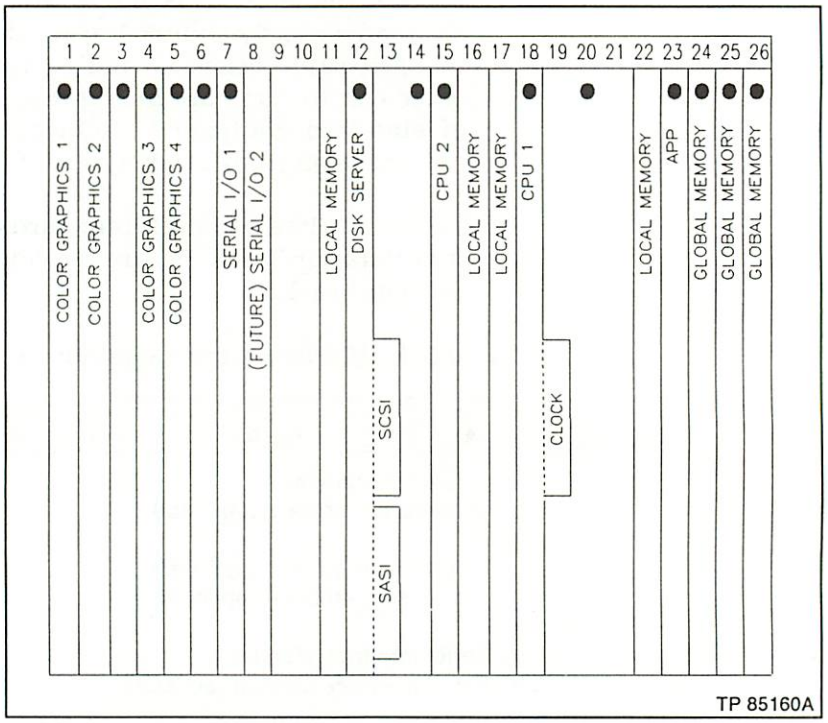
Slot Number	Card	Multibus Card Part No.
1	Multibus graphics controller 1	IIMGC01
2	Multibus graphics controller 2 (optional)	1948025_1
3	Unused	——
4	Multibus graphics controller 3 (optional)	1948025_1
5	Multibus graphics controller 4 (optional)	1948025_1
6	Unused	IIMSM01
7	Multibus Serial Interface Module 1	IIMSM01
8	Multibus Serial Interface Module (optional)	——
9	Unused	——
10	Unused	——
11	Local memory 3 (for disk server CPU)	6637447_1
12	Disk server CPU	6637033_4
13	Disk bus adapter interface (SASI) and optional magnetic storage interface (SCSI)	1948023_1
14	Unused	——
15	MCS CPU 2	6637033_3
16	Local memory 2 (for MCS CPU 2)	6637447_1
17	Local memory 1 (for MCS CPU 1)	6637447_1
18	MCS CPU 1	6637033_2
19	Clock calendar	1947999_1
20	Unused	——
21	Unused	——
22	Local memory 4 (optional) (for applications processor)	6637447_1
23	Applications Processor (NAPP02) (optional)	6637033_1
24	2 Megabytes of global RAM memory 1	6637446_7
25	2 Megabytes of global RAM memory 2	6637446_8
26	2 Megabytes of global RAM memory 3	6637446_9

MULTIBUS CARD CAGE

Bailey P/N - 1948017_1

The multibus card cage provides the communication paths and defines the priority level for the MCS multibus cards. The MCS cards in the card cage are slot dependent. Card placement is shown in Figure 3-1.

NOTE: Figure 3-1 reflects the maximum amount of hardware available with the MCS. This may be more than is contained in the current system.



NOTE: • Priority-wired slots
ISBX (SASI,SCSI,AND CLOCK) modules need screws and spacers; screws part number 10390, spacers part number 10222.

Figure 3-1. MCS Multibus Card Cage (Front View)

Each card in the MCS multibus card cage has a required priority level. The priority level is determined by wire jumper settings J1 through J4 (Table 3-2) on the back of the card cage. The card cage back view (Figure 3-2) shows the location of the jumper pins and power terminals. Card cage power connections are listed in Table 3-3.

Table 3-2. Card Priority Jumper Settings

Card Slot	J4	J3	J2	J1	Card Slot
(Lowest Priority)			(Highest Priority)		
14	1 - 14	14 - 1	1 - 14	14 - 1	1
15	2 - 15	15 - 2	2 - 15	15 - 2	2
16	3 - N/C	N/C - 3	3 - 16	16 - 3	3
17	4 - N/C	N/C - 4	4 - 17	17 - 4	4
18	5 - 16	16 - 5	5 - 18	18 - 5	5
19	6 - N/C	N/C - 6	6 - 19	19 - 6	6
20	7 - 17	17 - 7	7 - 20	20 - 7	7
21	8 - N/C	N/C - 8	8 - N/C	N/C - 8	8
22	9 - N/C	N/C - 9	9 - N/C	N/C - 9	9
23	10 - 18	18 - 10	10 - N/C	N/C - 10	10
24	11 - 19	19 - 11	11 - N/C	N/C - 11	11
25	12 - 20	20 - 12	12 - 21	21 - 12	12
26	13 - 21	21 - 13	13 - N/C	N/C - 13	13

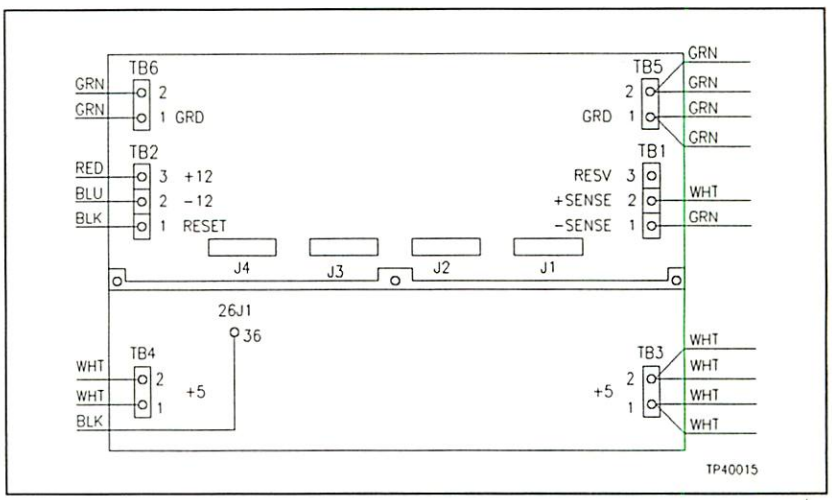


Figure 3-2. Multibus Card Cage (Back View)

Table 3-3. Multibus Wiring Connections

26J1	TB1	TB2	TB3	TB4	TB5	TB6
Use wire assembly number 6636493_2*		Connect:	Use wire assembly number 6636494_2		Connect:	
Black wire to position 36	Green wire to terminal one White wire to terminal two Make no connection to terminal three	Black wire to terminal one Blue wire to terminal two Red wire to terminal three	Two white wires from each tab position to CH1 POS on power supply	One white wire from each tab position to CH1 POS on power supply	Two green wires from each tab position to CH1 NEG on power supply	One green wire from each tab position to CH1 NEG on power supply One green wire from assembly number 6636493_2

* This wire assembly plugs into the multibus socket adjacent to the Power Supply.

MULTIBUS CARDS

Multibus Card Installation

The multibus cards insert into the card cage along two guide rails. Slide the card into the desired position, being careful to align it beneath the slot number. Press on the card removal tabs to fully insert the card into the multibus backplane.

Remove the cards by pulling the latches toward you and gently sliding the card out of the cage.

Multibus Card Removal

Figure 3-3 shows the card removal tabs. Remove the cards by pulling the latches toward you and gently sliding the card out of the cage.

WARNING	**Switch the main circuit breaker OFF, before attempting to remove any cards.**
AVERTISSEMENT	**Placer le disjoncteur principal en position HORS CIRCUIT avant de procedure a l'enlevement de cartes.**

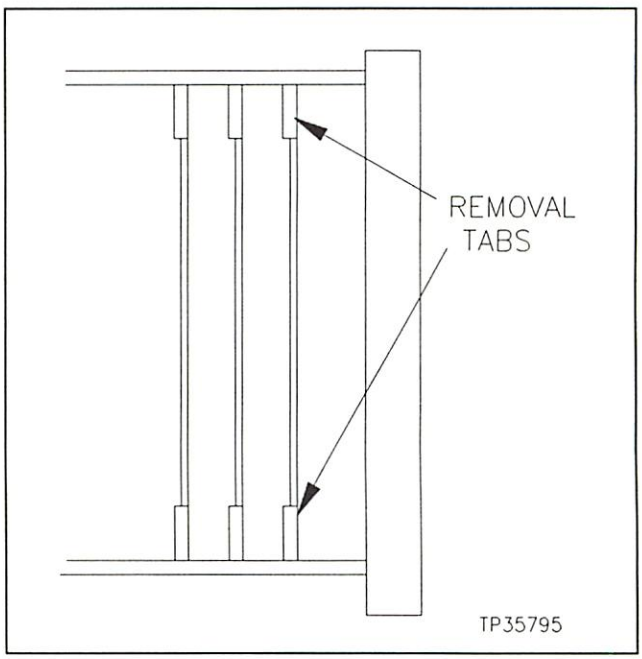


Figure 3-3. Inserting MCS Card into Multibus Card Cage

MULTIBUS CARD CONFIGURATIONS

This section describes the cabling and jumper settings for the standard cards used in the MCS. Refer to section four for the optional hardware available.

Multibus Graphics Controller (IIMGC01)
Bailey Nomenclature - IIMGC01

The MCS multibus graphics controller (IIMGC01) drives the MCS monitor. The card address is set by wire-wrapping jumpers to the appropriate pins. The location of the pins is shown in Figure 3-4.

NOTE: Refer to ***SECTION 4 - MCS OPTIONS***, for the jumper settings of any additional color graphics cards.

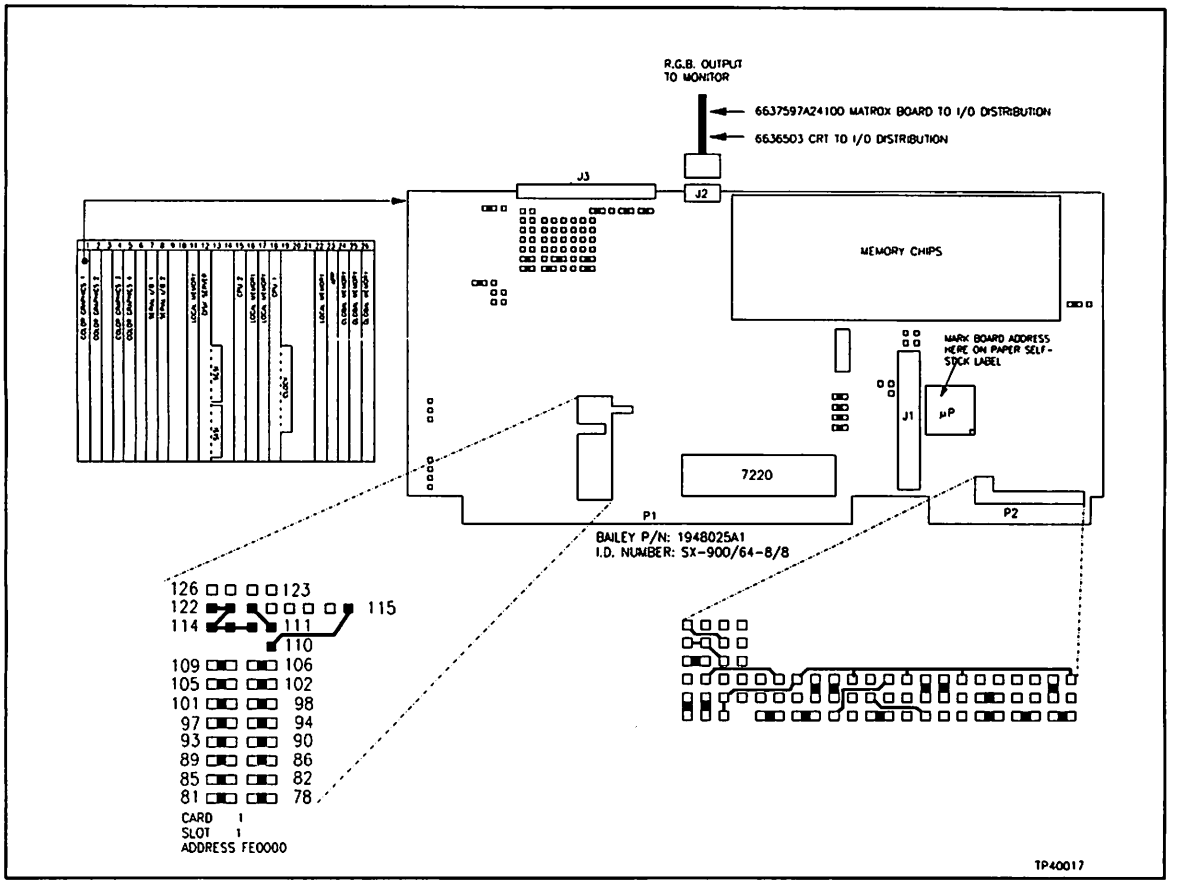
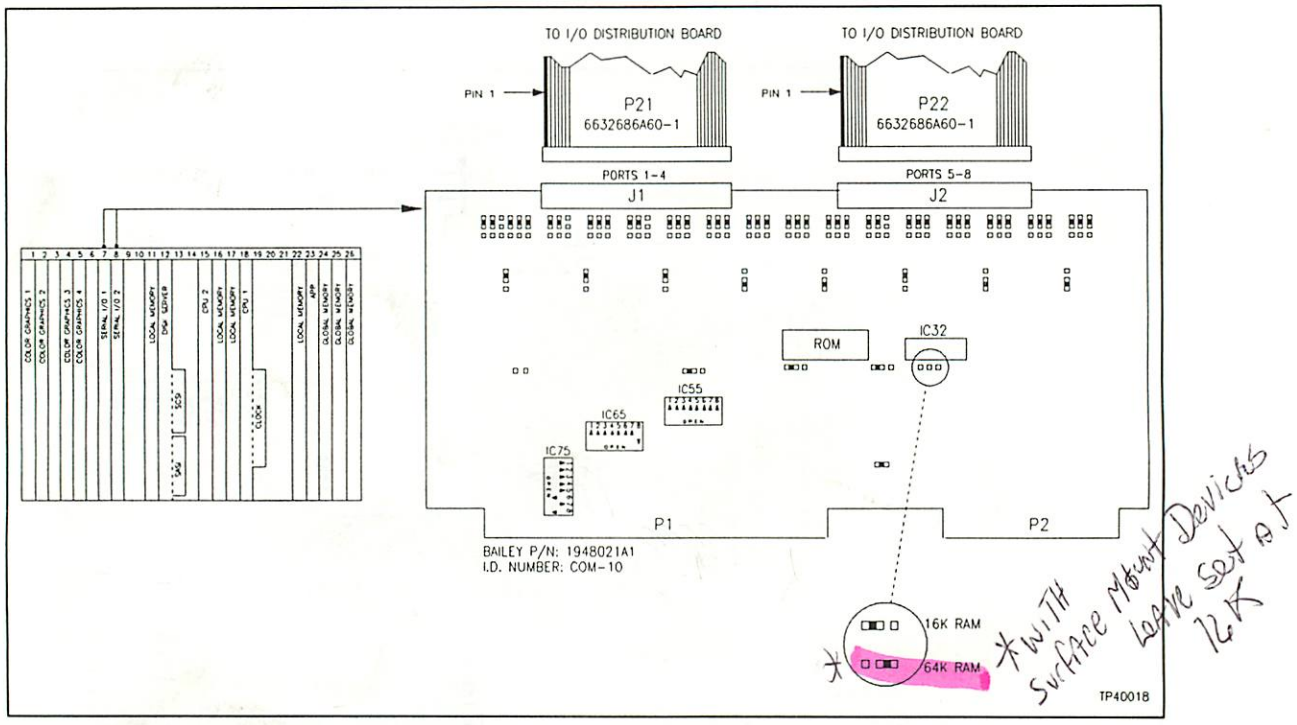


Figure 3-4. Multibus Graphics Controller (IIMGC01)

Multibus Serial Interface Module (IIMSM01)

The MCS interfaces with various peripherals through the Serial Interface Module (IIMSM01). The peripherals include keyboards, printers and terminals. This card is configured by setting jumpers and dipswitches (Figure 3-5). Refer to Table 3-4 for port assignments.



NOTES:
1. Jumpers located below IC32 must be set according to the size of RAM used for IC32, 16K or 64K. The number 16 or 64 (located within the chip number) is printed on IC32. Set the jumper according to this number.
2. Refer to section four for ***Serial Interface Card Number 2*** switch settings.

Figure 3-5. Serial Interface Module (IIMSM01)

Table 3-4. Serial Port Function

Port	Card 1
1	Keyboard 1
2	Keyboard 2
3	Keyboard 3
4	Aux/CIU
5	Printer 1
6	Keyboard 4
7	Printer 2
8	Diagnostic Terminal (DDT), I/O Port 0100 RAM Address FA0000 to FAFFFF 64K Block

Disk Server Card
Bailey P/N - 6637033_4

The disk server card has different firmware than a CPU card. This allows it to handle all system disk functions. It is connected to an adjacent local memory card with a ribbon cable. A small computer system interface (SCSI) adapter may be added for use with nine-track tape and optical disk units (refer to ***SECTION 4 - MCS OPTIONS***, for information concerning this adapter).

Configure the disk server card by setting the jumpers as shown in Figure 3-6.

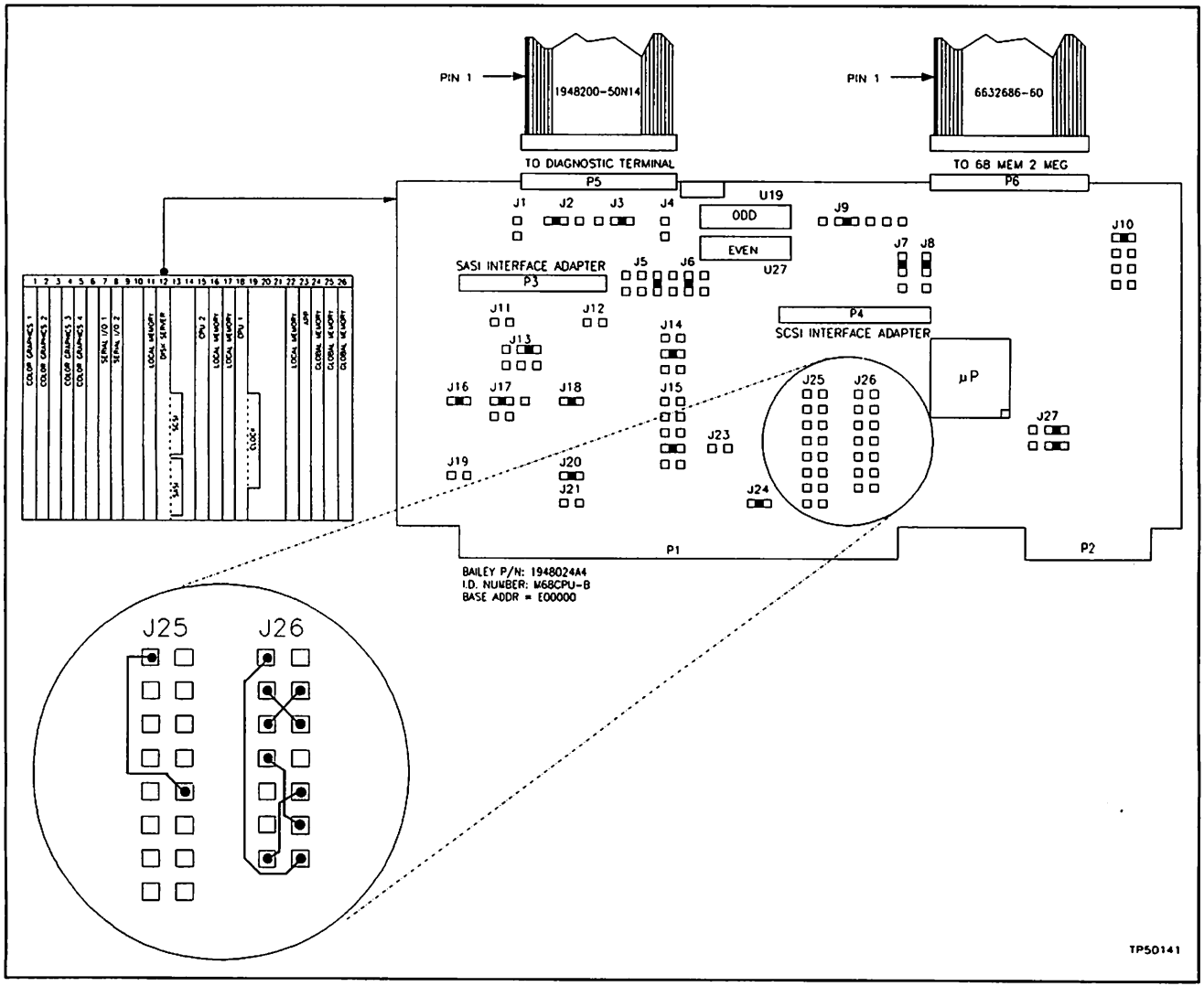


Figure 3-6. Disk Server Card

SASI Disk Bus Interface Adapter
Bailey P/N - 1948023_1

The disk bus interface adapter provides the Shugart Associates System Interface (SASI) between the disk drives and the disk server card. Shown in Figure 3-7, it attaches to the disk server card and occupies physical space allotted to slot 13.

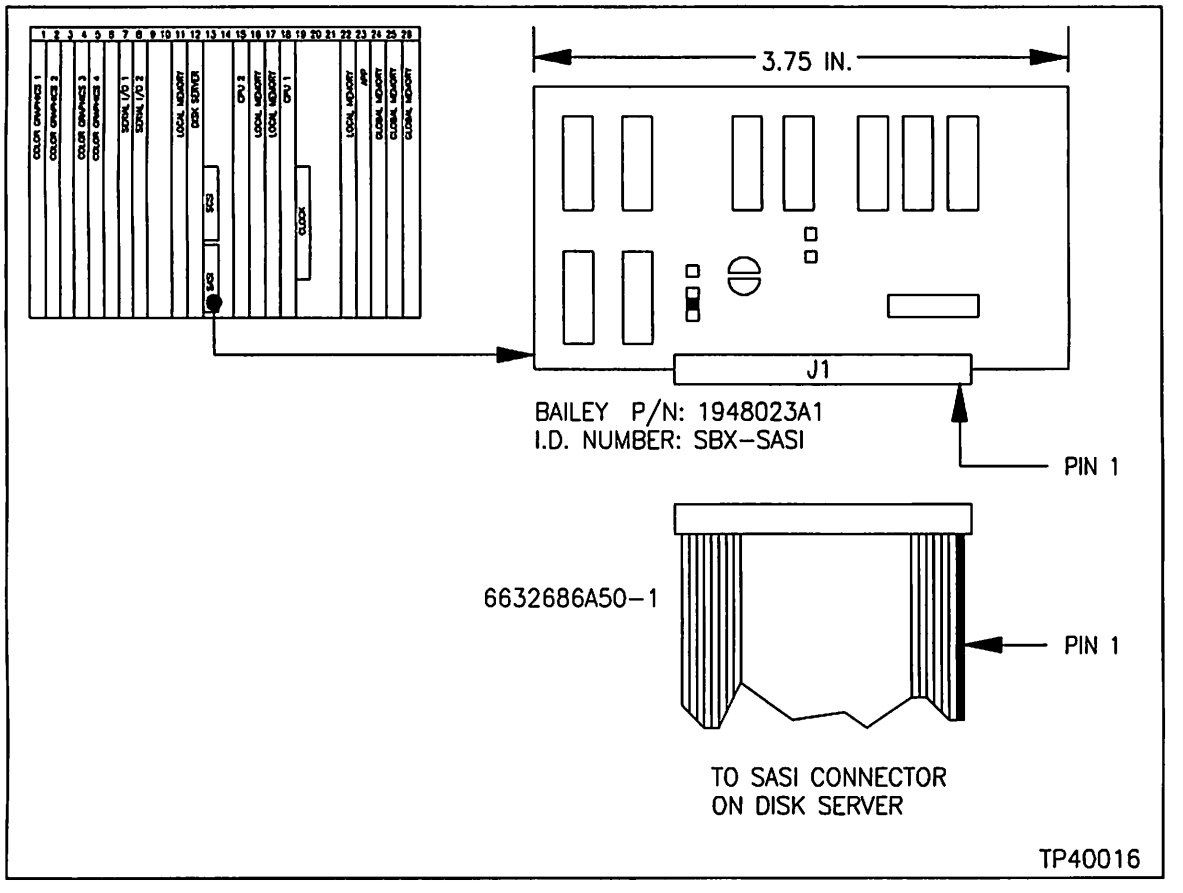


Figure 3-7. SASI Disk Bus Interface Adapter

Local Memory Card
Bailey P/N - 6637447_1

Each MCS CPU card (including the disk server card) requires two Megabytes of local memory. A local memory card is connected to each CPU card via a ribbon cable. This card contains two Megabytes of total on-board RAM. See Figure 3-8 when setting jumpers J1 through J9 on these cards. These jumper settings apply to the memory cards for all CPU cards.

NOTE: Some users may have memory cards containing four Megabytes of RAM. Jumper setting differ on these cards (Figure 3-8). This card is the same card used for the two Megabytes RAM card, but with all RAM chip sockets filled.

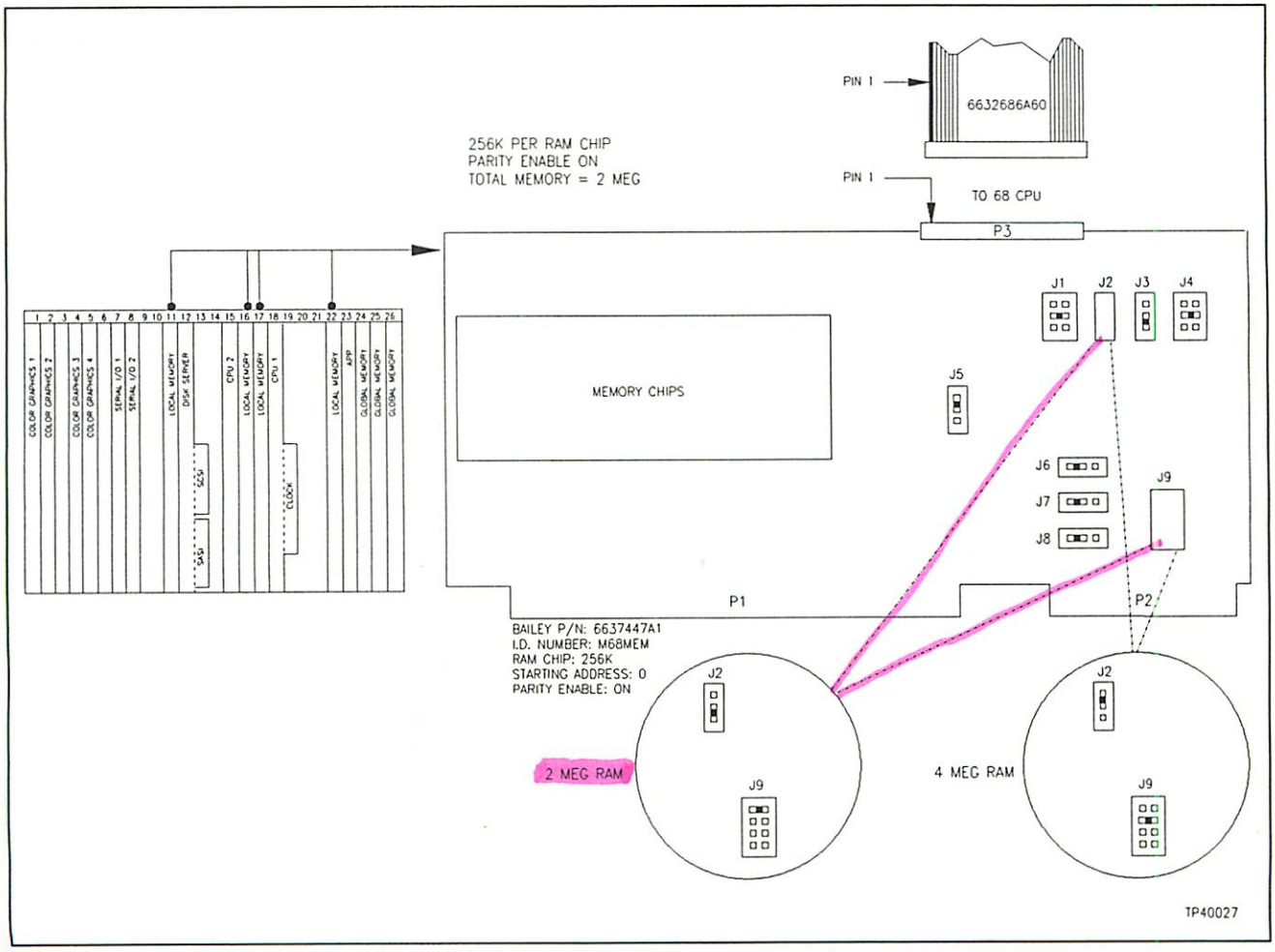


Figure 3-8. Local Memory Card

CPU Card

Bailey P/N - 6637033_2 (CPU Card 1 - Slot 18)
6637033_3 (CPU Card 2 - Slot 15)

The CPU card can access up to two Megabytes of RAM from the adjacent memory card connected by a ribbon cable. It contains electrically erasable programmable read only memory (EPROM) with a total storage capacity of 64 kbytes, and connection ports to a diagnostic terminal and the clock calendar card. See Figure 3-9 when setting the jumpers on CPU card 1 or 2.

NOTE: Figure 3-9 applies only to systems manufactured after February 1, 1986, which have a backplane connected electronic reset switch. Contact your nearest Bailey sales or service office for information on units manufactured before this date.

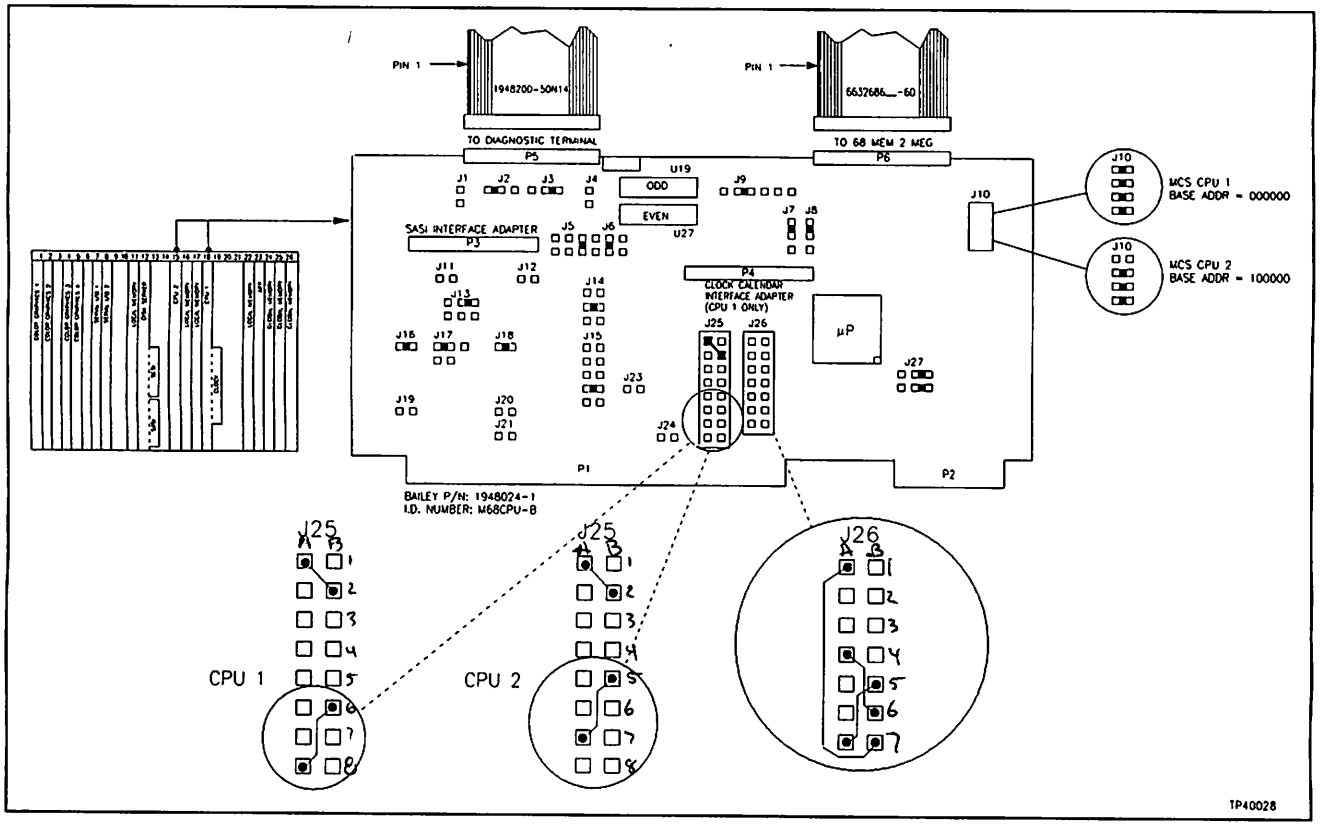


Figure 3-9. CPU Cards 1 and 2

Clock Calendar Card
Bailey P/N - 1947999_1

The clock calendar card gives the MCS *real time* capability. This card has an on-board battery if a power backup is ever needed. The clock calendar card, shown in Figure 3-10, resides on the CPU card and occupies physical space allotted to slot 19.

NOTE: If the MCS or replacement clock/calendar cards are stored for a duration of one week or more, remove the jumper located next to the battery (Figure 3-10). Failure to do so will result in excessive battery drain.

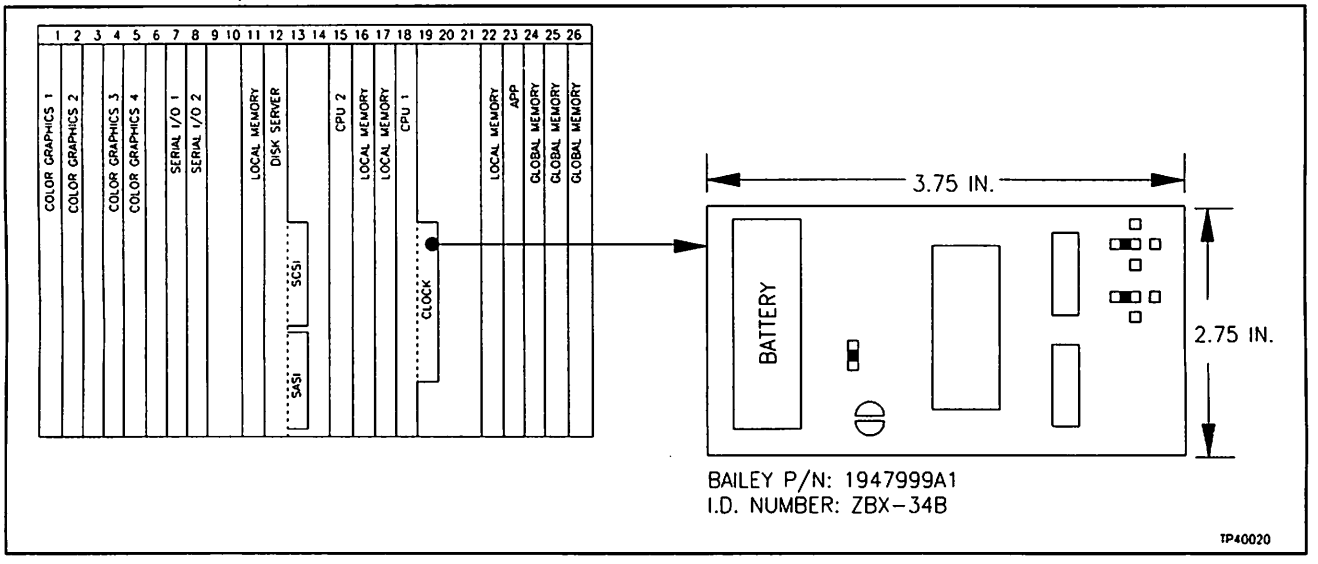


Figure 3-10. Clock Calendar Card

Global Memory Card - I.D. Number: PSM-2P

Bailey P/N - 6637446_7 - Global Memory Card 1
6637446_8 - Global Memory Card 2
6637446_9 - Global Memory Card 3

Global memory cards provide memory accessible by the entire MCS system. Two versions are currently in use: I.D. Number PSM-2P and INTEL SBC020EX (Figure 3-11 and 3-12). Three cards are required, and may consist of either version. Configure the cards by setting jumpers and dipswitches.

NOTE: Where both types of global memory cards are present, the same type must be grouped side-by-side, in contiguous memory locations. For the Intel SBC020EX, the E15 - E16 jumper (Figure 3-12) must be installed in the memory card in the highest address range. For example, if an Intel SBC020EX is installed in slot 24 and slot 25, and a PSM-2P is installed in slot 26, the Intel SBC020EX in slot 25 requires a jumper on E15 - E16.

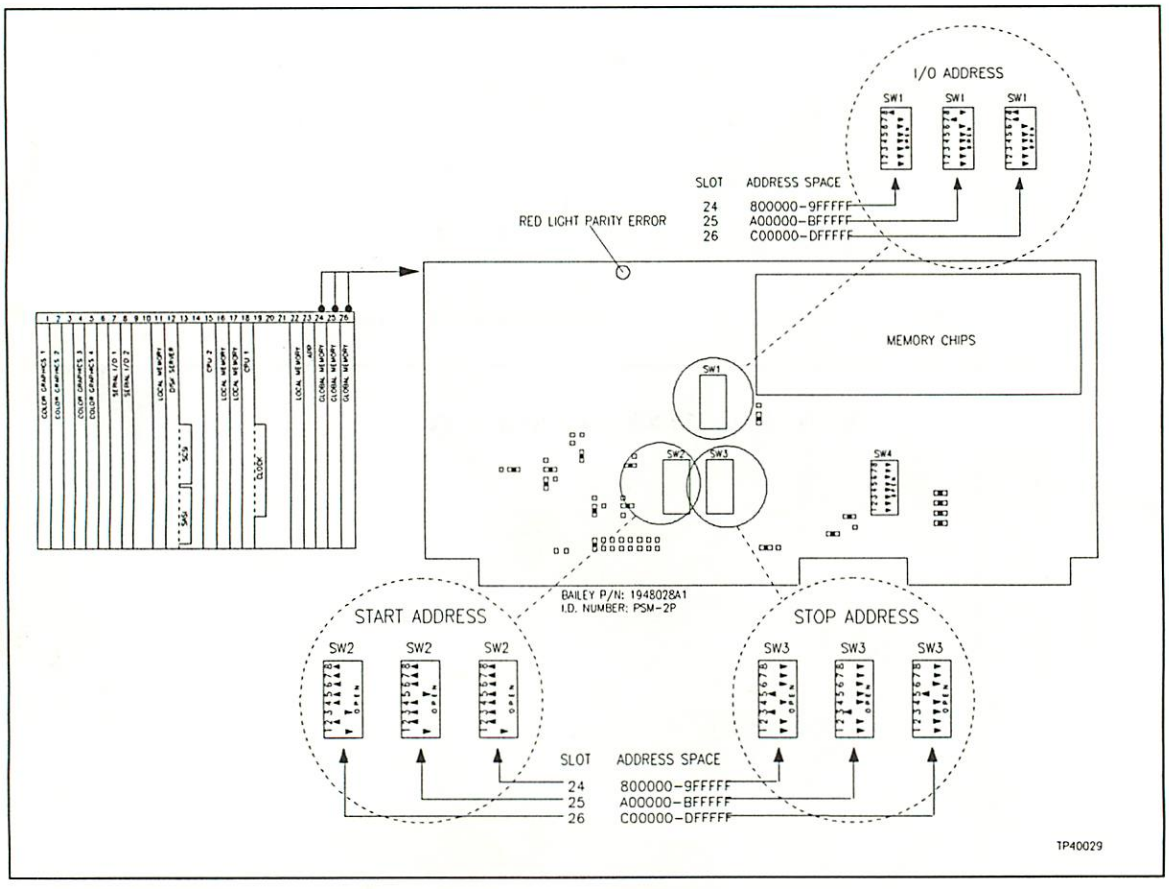


Figure 3-11. Two Megabyte RAM Memory Card (ID Number PSM-2P)

Global Memory Card I.D. Number: INTEL SBC020EX
Bailey P/N -6637446_7 - Global Memory Card 1
6637446_8 - Global Memory Card 2
6637446_9 - Global Memory Card 3

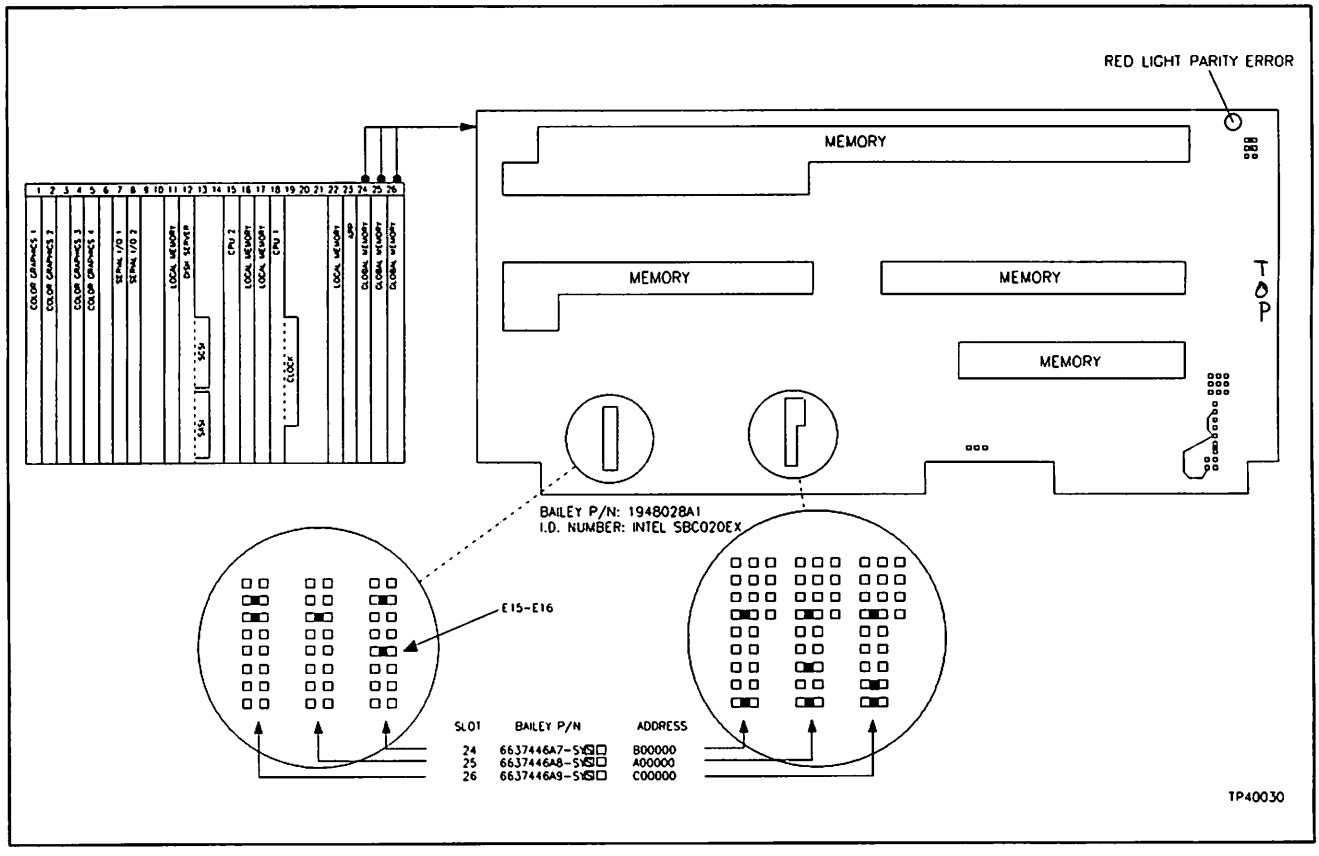


Figure 3-12. Two Megabytes RAM Memory Card (I.D. Number INTEL SBC020EX)

MODULE MOUNTING UNIT (NMMU02)

The Module Mounting Unit (NMMU02) provides power and communication paths for the INFI 90 and Network 90 modules used by the MCS. See Figure 3-13, Figure 3-14 and refer to Table 3-5 when connecting power to the MMU.

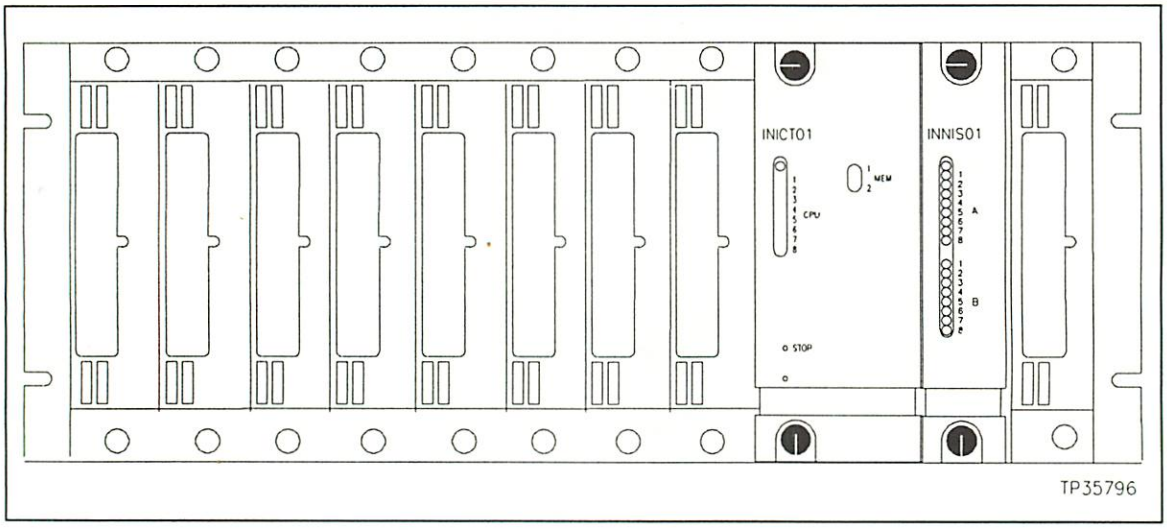


Figure 3-13. Module Mounting Unit (NMMU02) - Front View

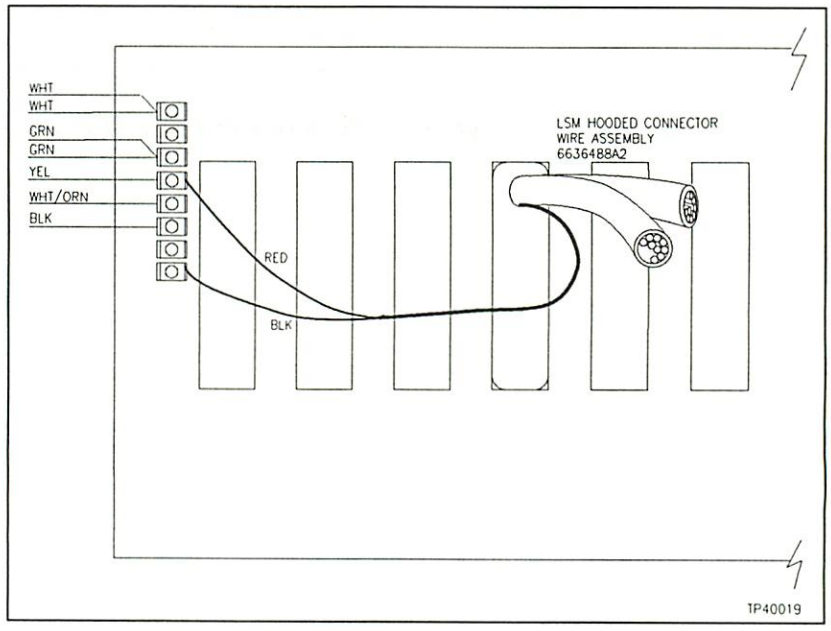


Figure 3-14. Module Mounting Unit - Back View Wiring Connections

Table 3-5. Wiring Connections to MMU Backplane Tabs

Tab Number	Assignment	Wire Type
1	+5 VDC to terminals 11 and 12 of TB1 at the top of the system power supply.	2 white wires[1]
2	No connection.	——
3	Common to terminals 9 and 10 of TB1 at the top of the system power supply.	2 green wires[1]
4	+ 15 VDC to J3 socket at the top of the system power supply. + 15 VDC to INPCT01 wire assembly.	1 yellow wire[2] 1 red wire[3]
5	–15 VDC to J3 socket at the top of the system power supply.	1 white/orange wire[2]
6	Power fail interrupt (PFI) to J3 socket at the top of the system power supply.	1 black wire[2]
7	No connection.	——
8	Signal common to INPCT01 wire assembly.	1 black wire[3]

NOTES:
1. Wire assembly 6636491_2 - Plugs into the TB1 socket at top of the system power supply.
2. Wire assembly 6636492_2 - Plugs into the J3 socket at top of the system power supply.
3. Wire assembly 6636488_2 - Hooded connector attaches to J3 (Center PCB connector) of the INPCT01. Red and black wires extend from the hood to tab 4 and 8 of the MMU.

COMPUTER INTERFACE UNIT (CIU)

The Computer Interface Unit (CIU) is made up of the Loop Interface Module, Bus Transfer Module and the Loop Storage Module. The CIU modules allow the MCS to communicate with Process Control Units (PCUs) and other operator consoles. Each module is configured using dipswitches and jumper settings.

NOTE: If your system interfaces with INFI-NET, refer to ***SECTION 4 - MCS OPTIONS***.

Installation The modules insert into the Module Mounting Unit along guide rails at the top and bottom of the interior frame. Each is secured in place by a lower latch. Slide the module into the desired position being careful to align the card edges into the guides. When the module is fully inserted, the latch snaps into the bottom of the rack.

Removal Remove a module by depressing the latch and gently pulling it out of the MMU.

Loop Interface Module (INLIM03)

The Loop Interface Module (INLIM03) allows communication between the MCS Bus Transfer Module and other Process Controls Units (PCUs) and operator consoles. See Figure 3-15 to configure this module by setting jumpers and dipswitches. For additional information on this module, refer to Bailey manual I-E96-621.

NOTE: Dipswitch S2 selects the loop address of this MCS and depends on your individual system.

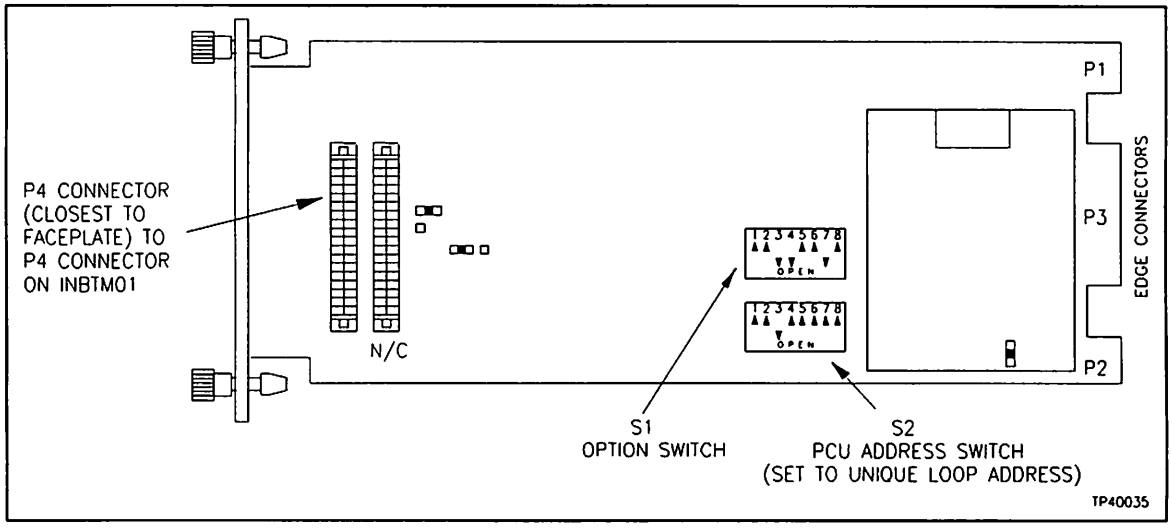


Figure 3-15. Loop Interface Module (INLIM03) Configuration

Bus Transfer Module (INBTM01)

The Bus Transfer Module (INBTM01) provides communication between the Loop Interface Module (INLIM03) and Plant Loop to Computer Module (INPCT01) across the MMU data bus. See Figure 3-16 to configure this module by setting jumpers and dipswitches. For additional information on this module, refer to Bailey product instruction I-E96-621.

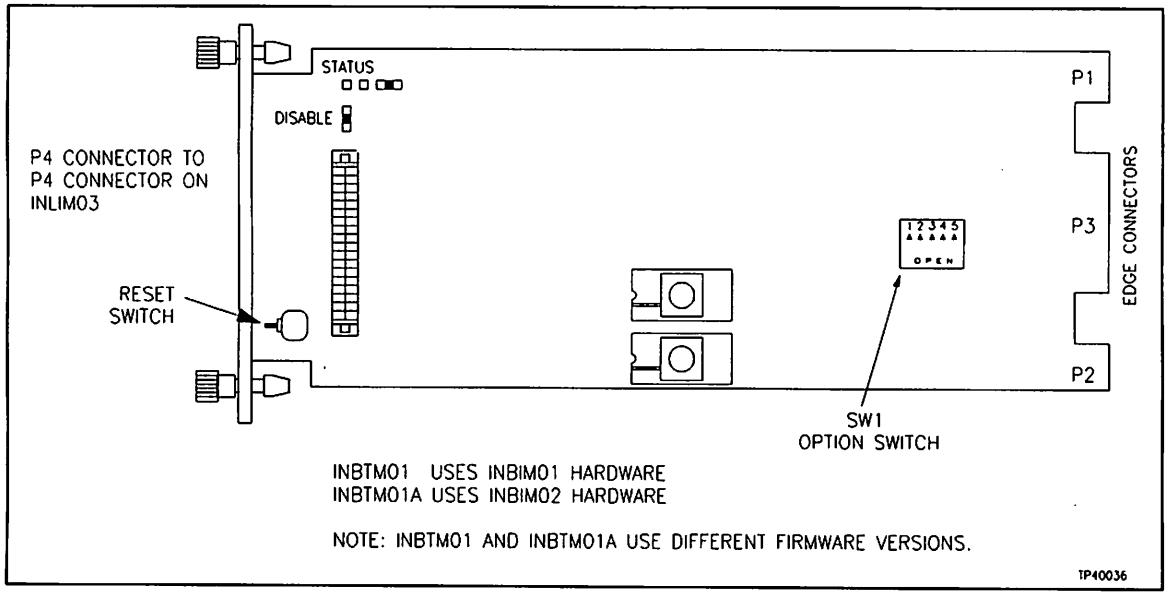


Figure 3-16. Bus Transfer Module (INBTM01) Configuration

Plantloop to Computer Transfer Module (INPCT01)

The Plant Loop to Computer Transfer Module (INPCT01) contains the circuits to direct the interface operation. It handles the communication with the host computer through an RS-232-C serial communication port and communicates directly with the Bus Transfer Module (INBTM01) over the module bus. When it communicates through the serial port, the PCT acts as data circuit-terminating equipment. The PCT can store up to 5,000 point definitions. The PCT maintains the point table and interprets commands coming from the host computer. It directs all communication between the computer and the plant loop. The MCS sends commands to the PCT requesting it to send or retrieve required data.

The PCT consists of two cards, a memory card and a CPU card. It is configured by setting dipswitches on the CPU card. See Figure 3-17 for the standard module dipswitch settings. For more information on this module, refer to Bailey product instruction I-E96-621.

NOTE: If performing CIU diagnostics, dipswitch U75-3 must be in the down position (open). Refer to the ***CIU Programmers Reference Manual I-E93-905-9.***

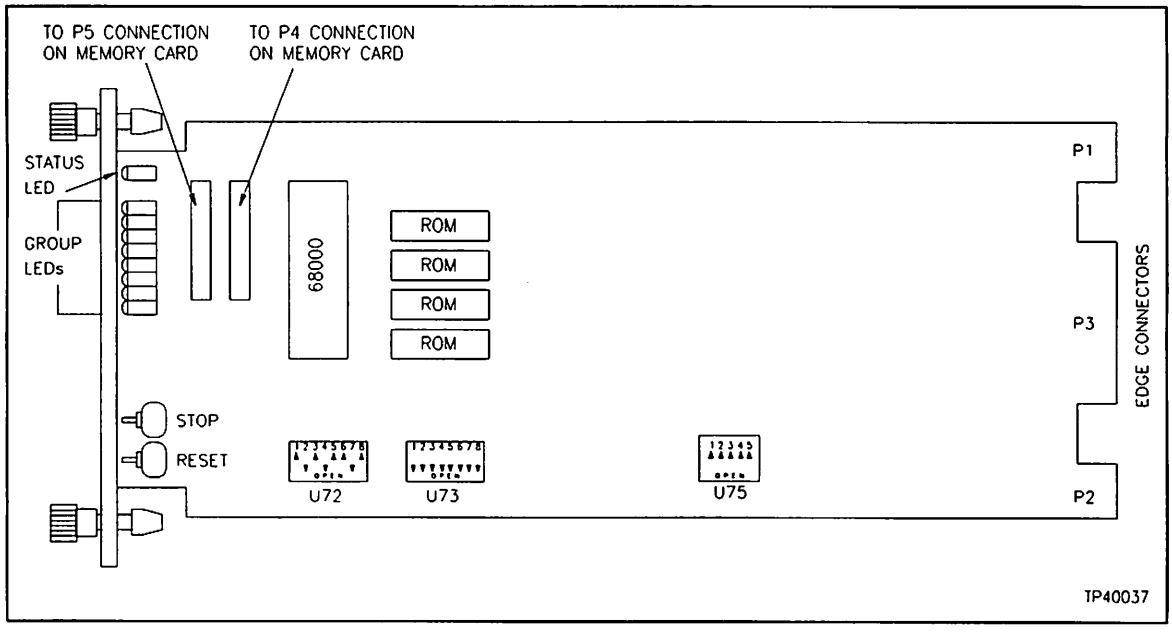


Figure 3-17. Plant Loop to Computer Transfer Module (INPCT01) Bottom Board

CABLE CONNECTION ASSEMBLY P/N 6636488_2

1. Attach the hooded connector at the back of the MMU, slot position 9 (CPU board).

2. Connect J1 to AUX 1 on the I/O distribution board.

3. Connect J3 to a terminal for diagnostics when running tests on the NLSM02 (refer to the ***CIU Product Instruction I-E93-905-2***).

WIRING

Connect wire pair: J4 connects to tab 4 (+15) on the MMU backplane. J5 connects to tab 8 (COM) on the MMU backplane.

AC DISTRIBUTION BOARD

Bailey P/N - 6636530_1

The AC distribution board (Figure 3-18) contains the main AC power terminals, and distributes the AC throughout the MCS. Wiring connections are shown in Table 3-6. Note that some of the connections are made behind the AC distribution board, and are not visible from the rear of the MCS.

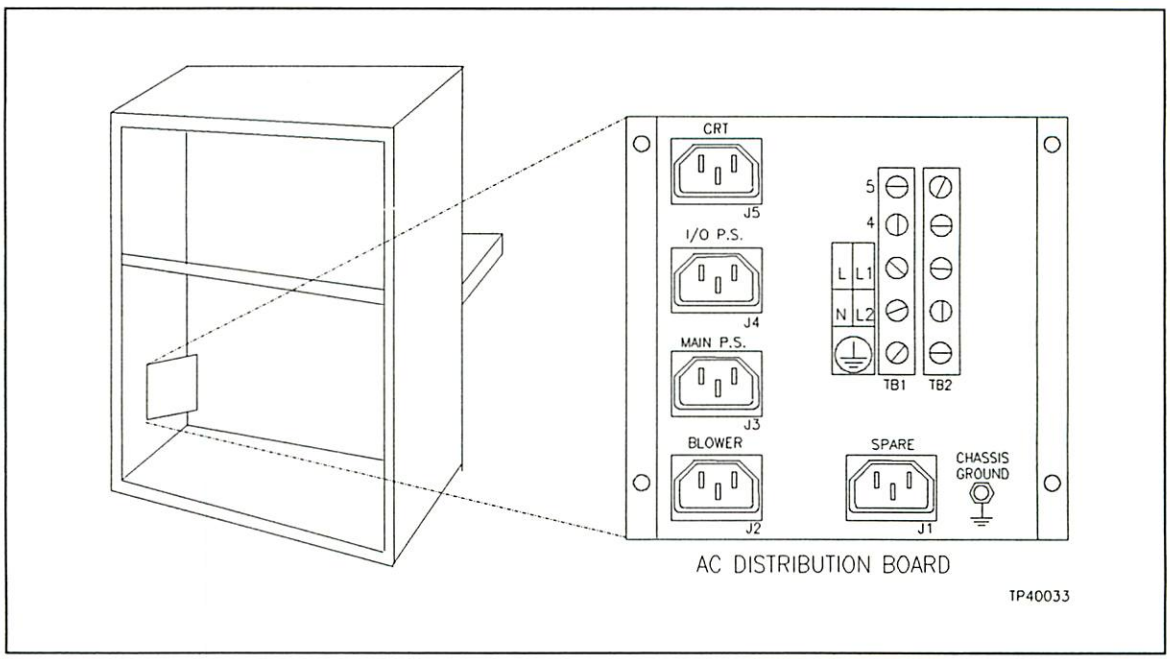


Figure 3-18. Location of AC Distribution Board

Table 3-6. Wiring Connections for AC Distribution Board

	1	2	3	4	
From TB1	12 AWG green wire to TB2, lug G 12 AWG green wire to J7 socket, lug 3	10 AWG black wire to TB2, lug L 10 AWG black wire to circuit breaker (CB1) lug 1	10 AWG white wire to TB2, lug N 10 AWG white wire to circuit breaker (CB1) lug 3	10 AWG white wire to filter 1, lug 2 10 AWG white wire to circuit breaker (CB1) lug 4	
	G	**N**	**L**	**4**	**5**
From TB2	12 AWG green wire to ground lug 3 10 AWG green wire to J5 socket, lug 3 12 AWG green wire to TB1, lug 1	10 AWG white wire to TB1, lug 2	10 AWG black wire to TB1, 1, lug 3	12 AWG black wire to filter socket, lug 2 12 AWG black wire to J8 socket, lug 1	12 AWG white wire to J5 12 AWG white wire to J8 socket, lug 2
From Chassis Ground	12 AWG green wire to TB2, lug G 12 AWG green wire to filter 1, lug 5				

CIRCUIT BREAKER (CB1) - 120 VAC

Bailey P/N - 1946949_7

The circuit breaker (CB1) provides over current protection and a means of removing power from the MCS. Table 3-7 provides wiring information. Note that the illustration in Figure 3-19 shows the rear view of the circuit breaker.

Table 3-7. Wiring Connections to 120 VAC Main Circuit Breaker

Lug Number			
1	2	3	4
10 AWG black wire to TB1, lug 2	To power status light, lug 1	10 AWG white wire to TB1, lug 3 10 AWG black wire to TB1, lug 4	To power status light, lug 2 10 AWG white wire to TB1, lug 5

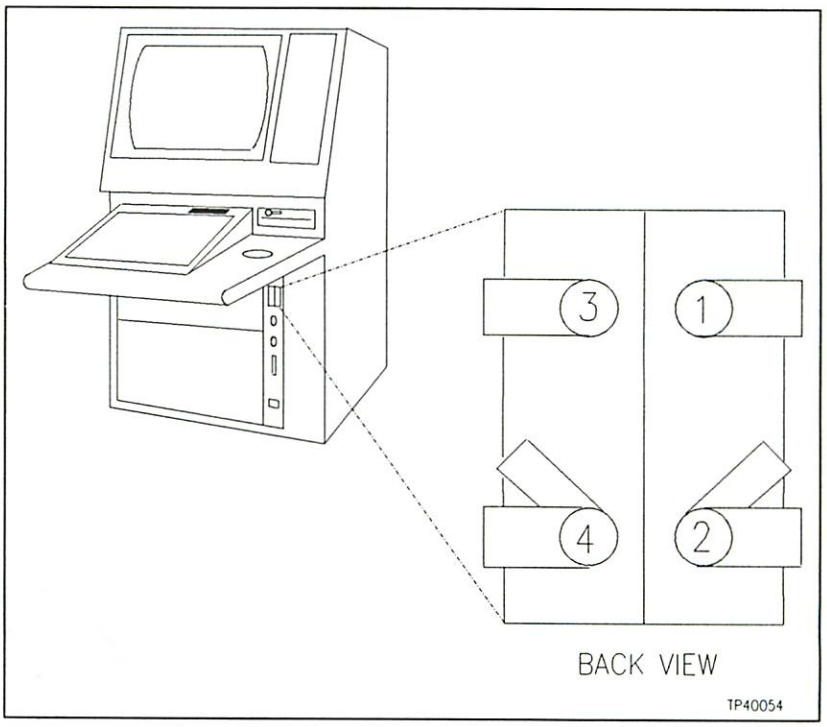


Figure 3-19. Location of 120 VAC Main Circuit Breaker (Rear View)

COLOR MONITOR

Bailey P/N - 6636994_1

The color monitor used in the MCS is an RGB monitor with a 640 x 480 pixel resolution CRT. Figure 3-20 shows the location of the color monitor. Table 3-8 shows wiring connections.

NOTES:

1. Cable number 6636503 connects the monitor to the I/O distribution board. Labels R, G and B represent red, green and blue, respectively.

2. Maximum length of RS-170 RGB cables is 100 feet. For distances over 100 feet, optical modems (NREM01) using up to 1000 feet of fiber optic cable (NKFM01-xx) are required.

3. If remote CRTs are being installed, ensure they are powered using the same polarized power and ground as the MCS to prevent ground loops. Failure to do so may cause display distortion. If ground loops are still suspected, use of optically isolated modems will eliminate the problem.

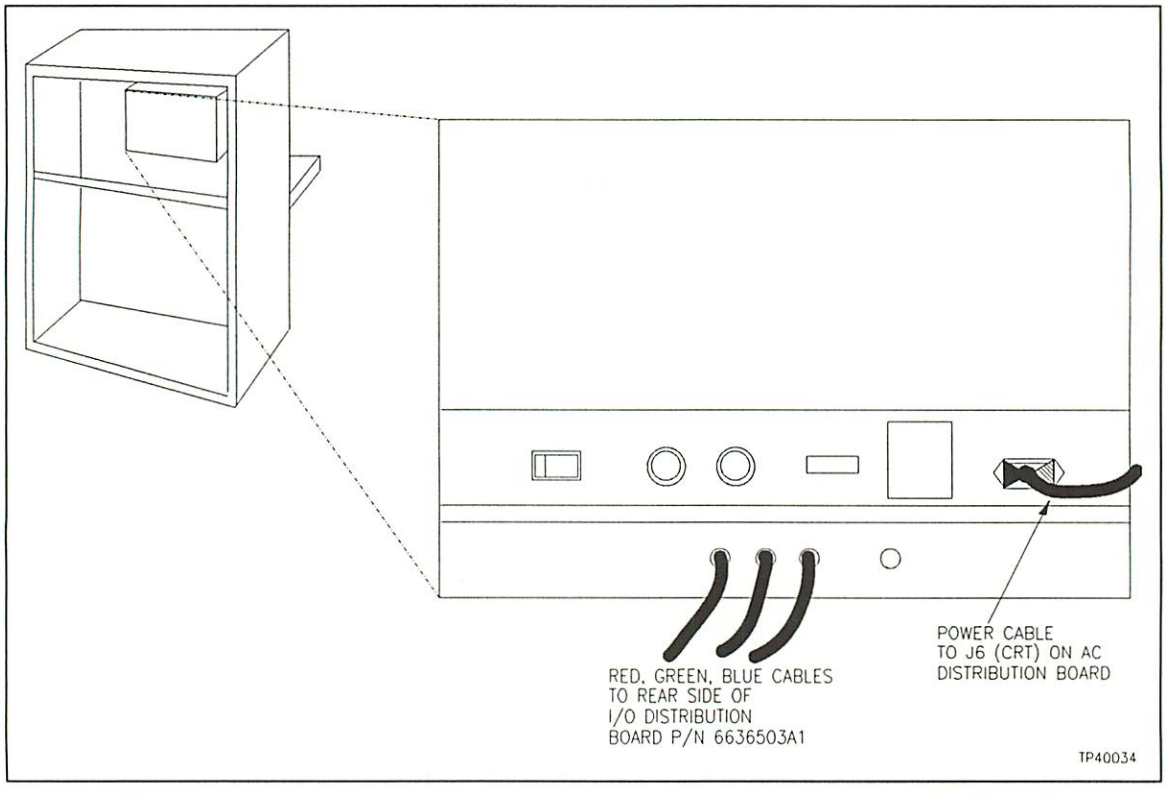


Figure 3-20. Location of Color Monitor

Table 3-8. Connections to Color Monitor

Video Inputs			
Red	**Green**	**Blue**	**Power**
Connect to red terminal (1 R) on front of I/O distribution board	Connect to green terminal (1 G) on front of I/O distribution board	Connect to blue terminal (1 B) on front of I/O distribution board	Plug into J6 socket on AC distribution board

DIN BOARD

Bailey P/N - 6636407

The DIN board (see Figure 3-21) attaches to the MCS keyboard and provides two auxiliary user ports. The DIN socket accepts an IBM PC/XT® or compatible style keyboard. A user RS232 serial port is available for foreign language keyboard.

NOTE: Some keyboards may have two underside switches. Set switch 1 to the ON position and switch 2 through 8 to the OFF position (fixed XT mode).

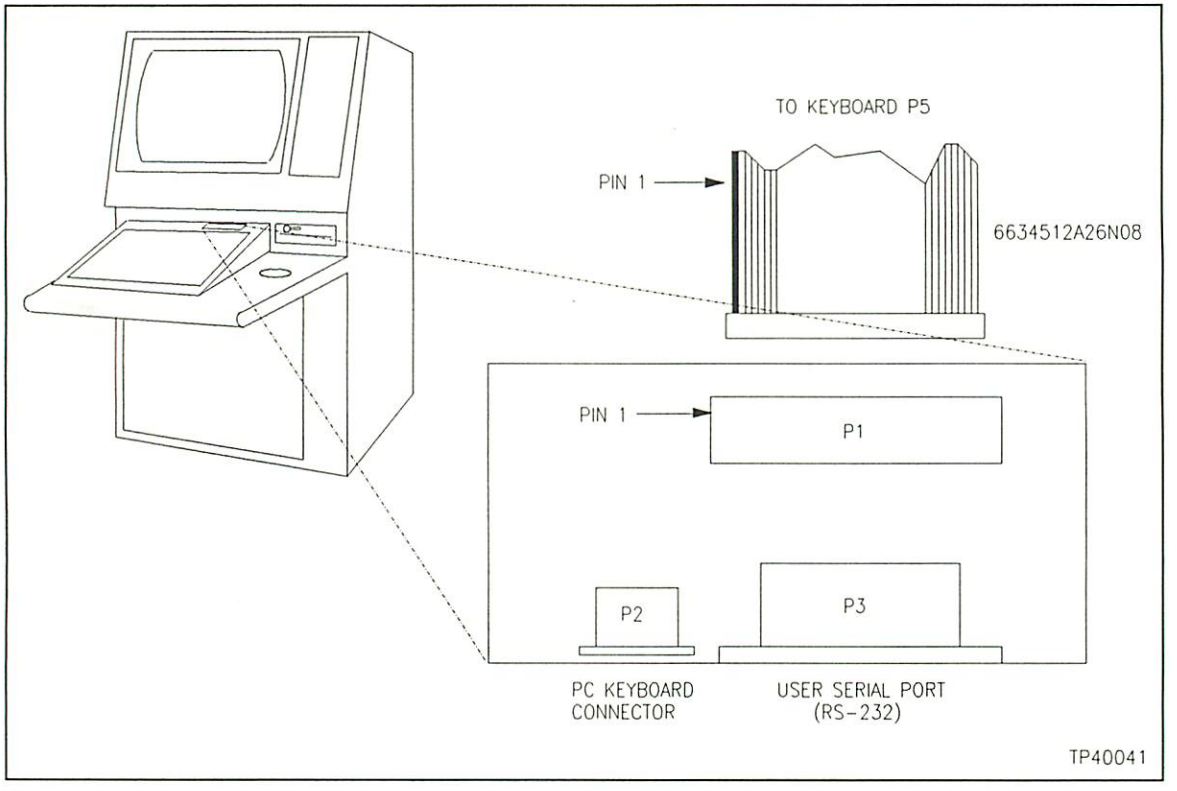


Figure 3-21. Location of DIN Board

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I/O DISTRIBUTION BOARD

Bailey P/N - 6636361_1

The I/O distribution board, shown in Figure 3-22, provides the interface for all input and output devices associated with the MCS. Each port on the I/O distribution board is assigned an input or output device. Refer to Table 3-9 for the port assignments.

Jumpers JMPR1 through JMPR16 are normally installed. When these jumpers are removed, serial card ports P21R through P24R become electrically equivalent to ports P21 through P24 respectively.

NOTE: Due to software enhancements, the assigned functionality of some RS-232 ports have changed. Figure 3-22 shows the correct port assignments. These may not agree with the actual labeling on the MCS.

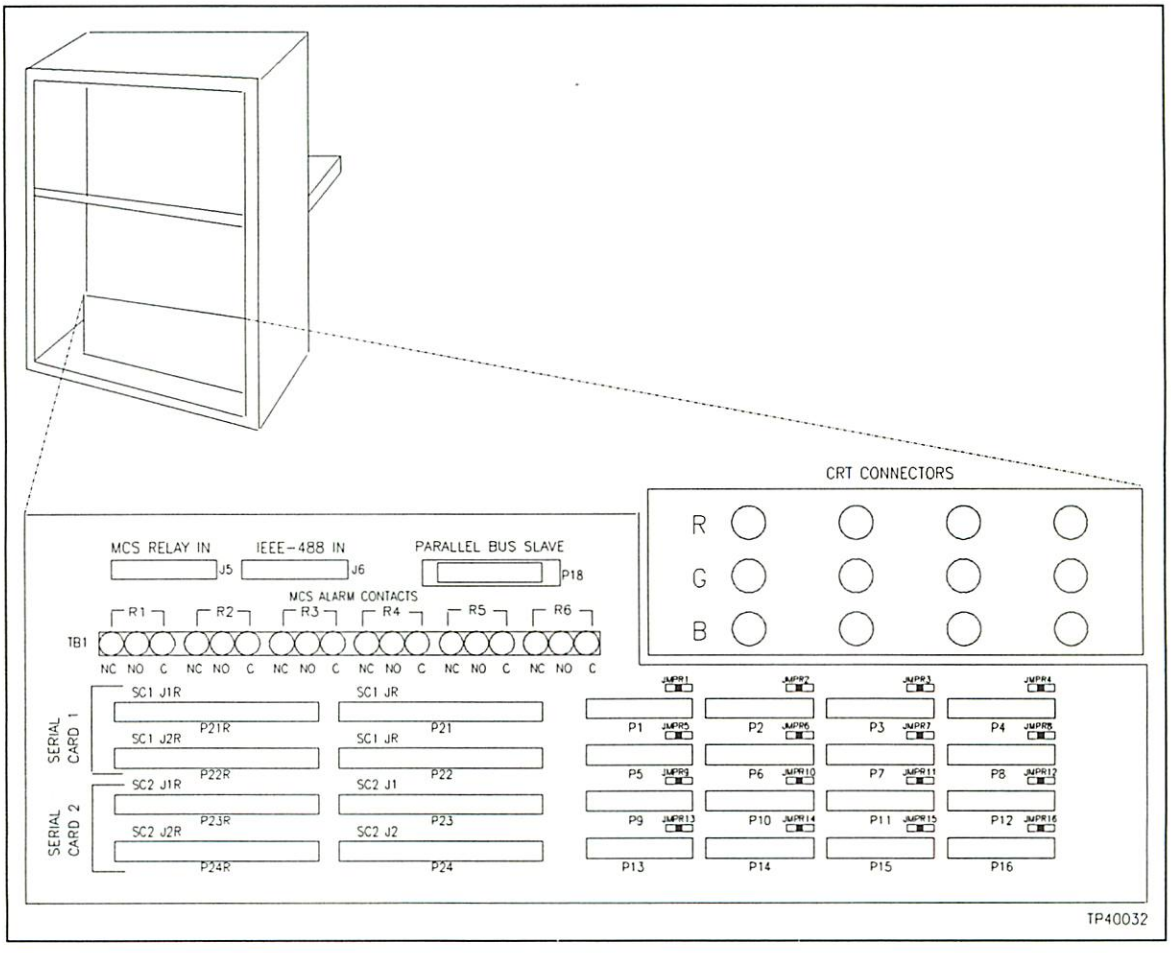

Figure 3-22. Location of I/O Distribution Board

Table 3-9. I/O Distribution Board Assignments

Connector	Function
MKI Relay	Connects to P9 connector on main keyboard controller card
IEEE-488 IN	Not used at this time
Parallel Bus Slave	Not used at this time
R1 - R6	Connects to field relays: NC = normally closed NO = normally open C = closed
P21R - P22R	Used for IIVRT01 option
P21 - P22	Connects to intelligent serial interface card 1
P23R, P24R	Used for IIVRT01 option
P23, P24	Connects intelligent serial interface card 2 (optional)
P1, P2, P3, P6	Connection ports for keyboard 1, 2, 3 and 4 respectively
P4	Connection port for CIU
P5, P7	Connection ports for printer 1 and 2 respectively
P8	Diagnostic test port for the DDT
P9, P12, P14, P16	Not used at this time
P13, P15	Connection ports for printer 3 and 4 respectively **NOTE:** Needs optional second serial card.

DISK DRIVE CONTROLLER CARD

Bailey P/N - 1948013_1

The disk drive controller card interfaces the floppy disk drive and the hard disk drive to the MCS. This card is configured with jumper settings. See Figure 3-23 for card configuration. Refer to Table 3-10 for wiring connections.

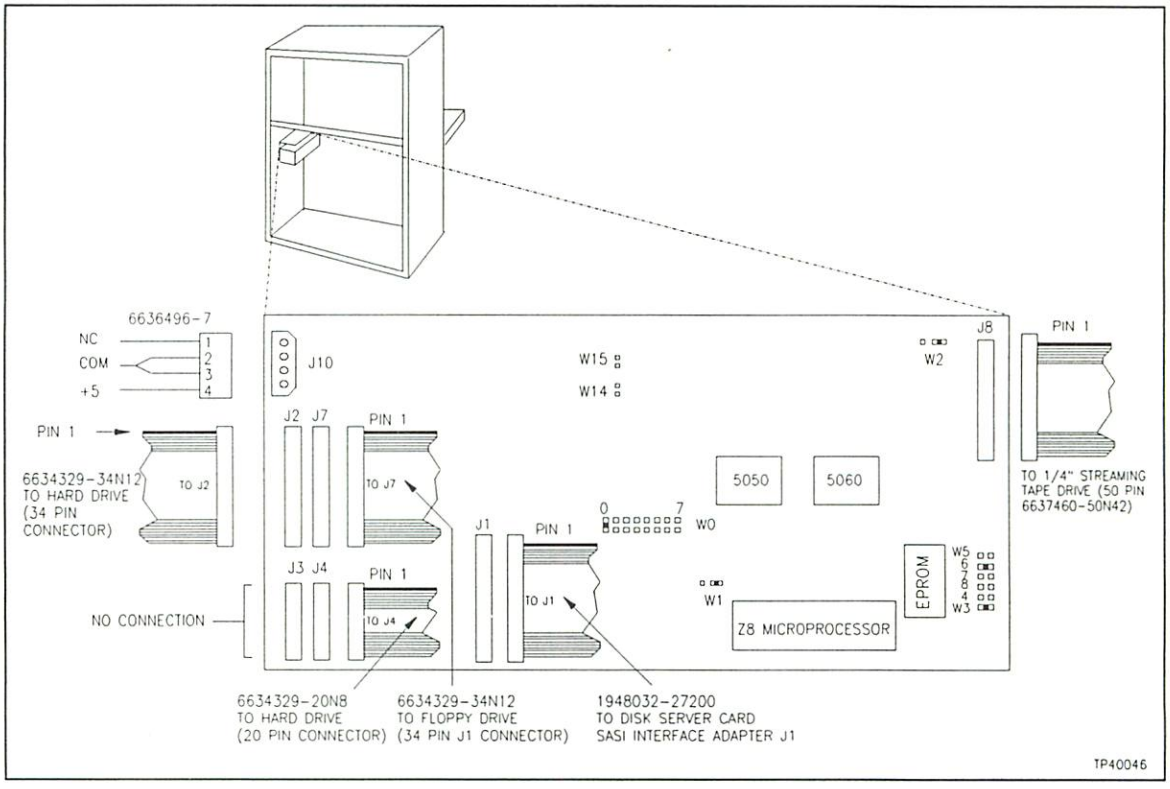

Figure 3-23. Disk Drive Controller Card

Table 3-10. Connections to Disk Drive Controller Card

From J1	From J2	From J3	From J4	From J7	From J10
To J1 connector on SASI card (mounted on CPU card pos 13) use wire assembly no. 1948032_27200	To J1 connector on hard disk drive; use wire assembly no. 6634329_34N12	Not used at this time	To J2 connector on hard disk drive; use wire assembly no. 6634329_20N8	To J1 connector on floppy disk drive; use wire assembly no. 6634329_34N12	To hard disk controller socket on top of main power supply; use wire assembly no. 6636496_7

FLOPPY DISK DRIVES

Floppy Disk Drive - Teac

Bailey P/N - 1946016_1

The MCS uses a high density 1.2 Megabyte floppy disk drive. Six drive styles are used, and each requires configuration by setting jumpers. The Teac FD-55GF and FD-55GF-60-U and their jumper configurations are shown in Figure 3-24.

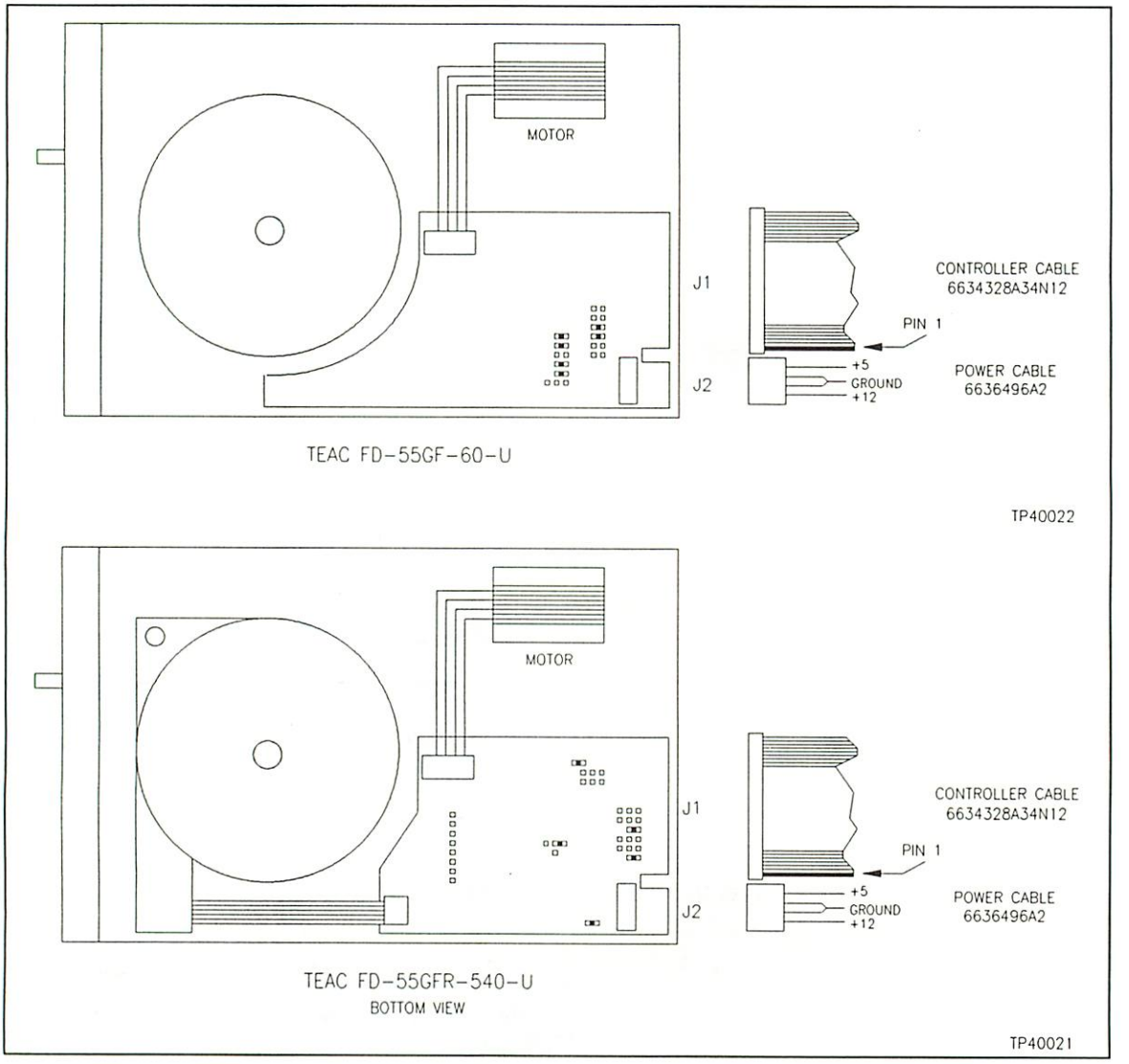

Figure 3-24. Teac Floppy Disk Drives

Floppy Disk Drive - Teac
Bailey P/N - 1948018_1

The Teac FD-55GFR-541-U and the Teac FD-55GFR-141-U with jumper configurations are shown in Figure 3-25.

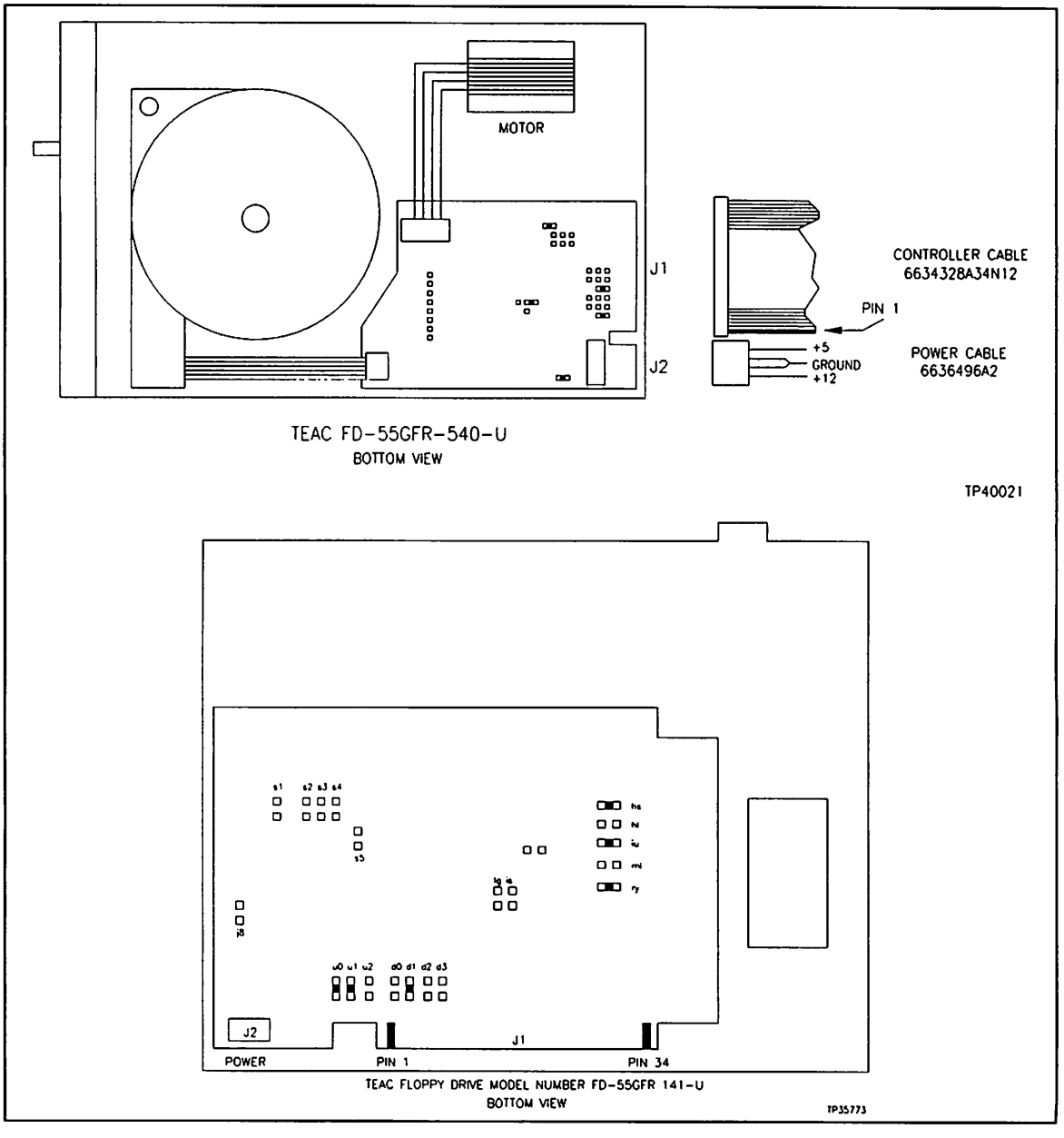

Figure 3-25. Teac Floppy Disk Drive

Floppy Disk Drive NEC
Bailey P/N - 1948018_1

The NEC FD 1155C and NEC FD 1157C and their jumper configurations are shown in Figure 3-26.

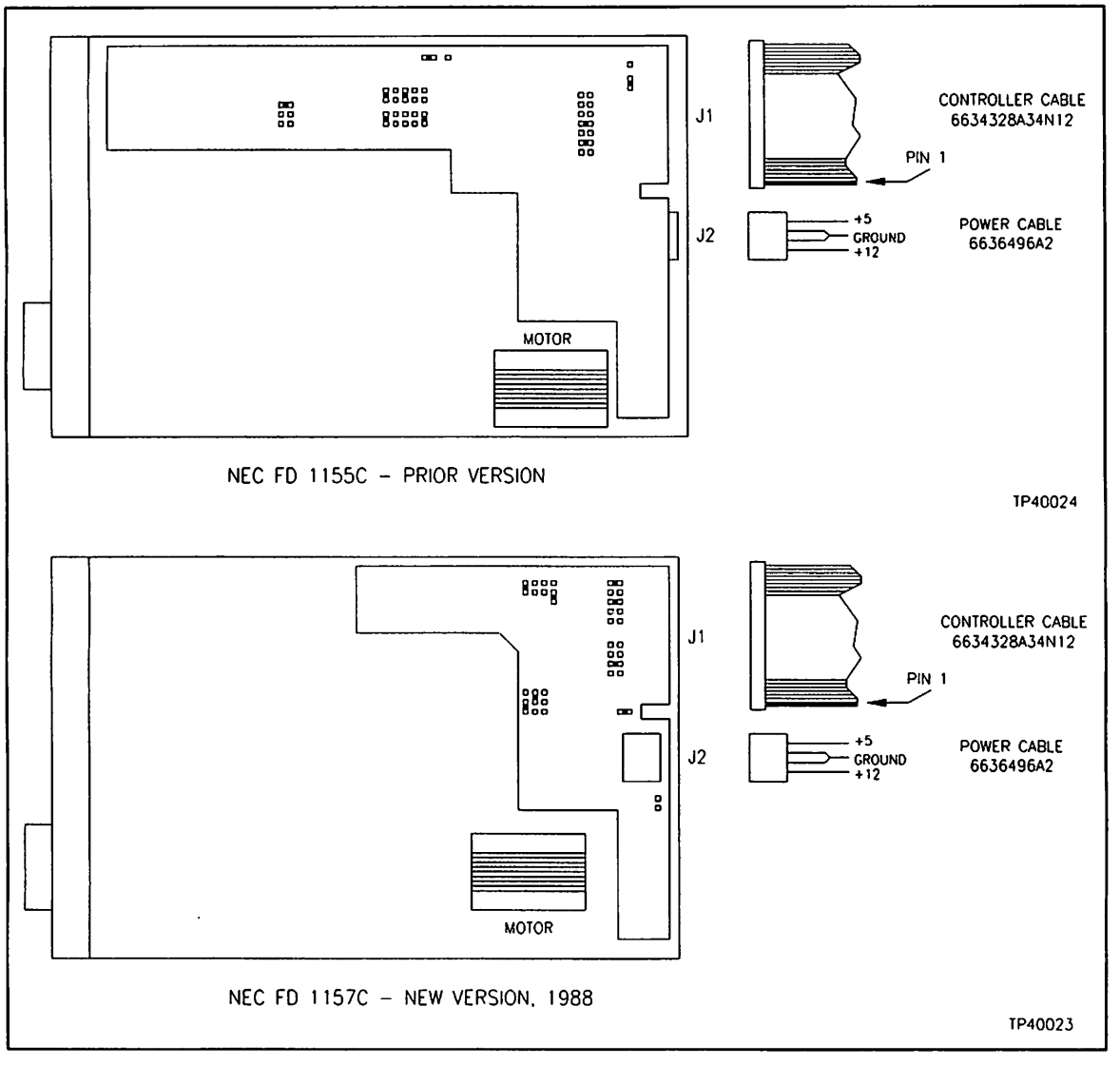

Figure 3-26. NEC Floppy Disk Drives

HARD DISK DRIVES

The MCS uses either the CYNTHIA® (BULL) hard disk, the VERTEX® PRIAM V150/V185 hard disk, the PRIAM® V185A hard disk, the SEAGATE hard disk or the MAXTOR hard disk. The SEAGATE and MAXTOR hard disks replace the CYNTHIA® (BULL), VERTEX® PRIAM V150/V185 and PRIAM® V185A hard disk drives. All require jumpers to be set to configure the drive for use with the MCS.

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® VERTEX is a registered trademark of Vertex Electronics, Inc.
® PRIAM is a registered trademark of Priam Corporation.
® SEAGATE is a registered trademark of Seagate Technology II, Inc.
® MAXTOR is a registered trademark of Maxtor Corporation.

CYNTHIA (BULL) 55 MBYTE

Bailey P/N - 1948002_1

Figure 3-27 shows the required jumper configuration for the CYNTHIA (BULL) hard disk drive.

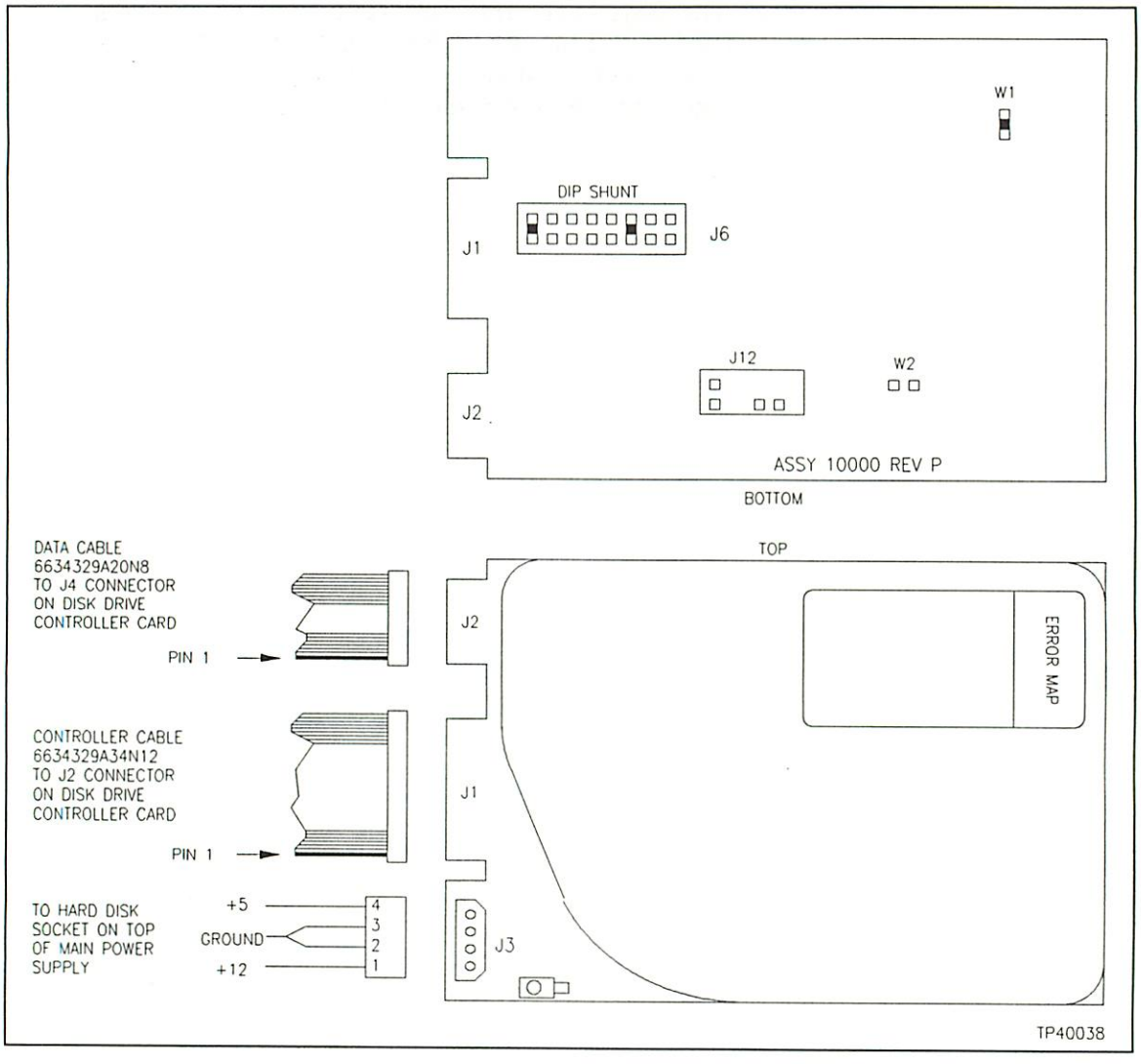


Figure 3-27. CYNTHIA (BULL) 55 Megabytes Hard Disk

Figure 3-28 shows the required jumper configuration for the VERTEX hard disk drive.

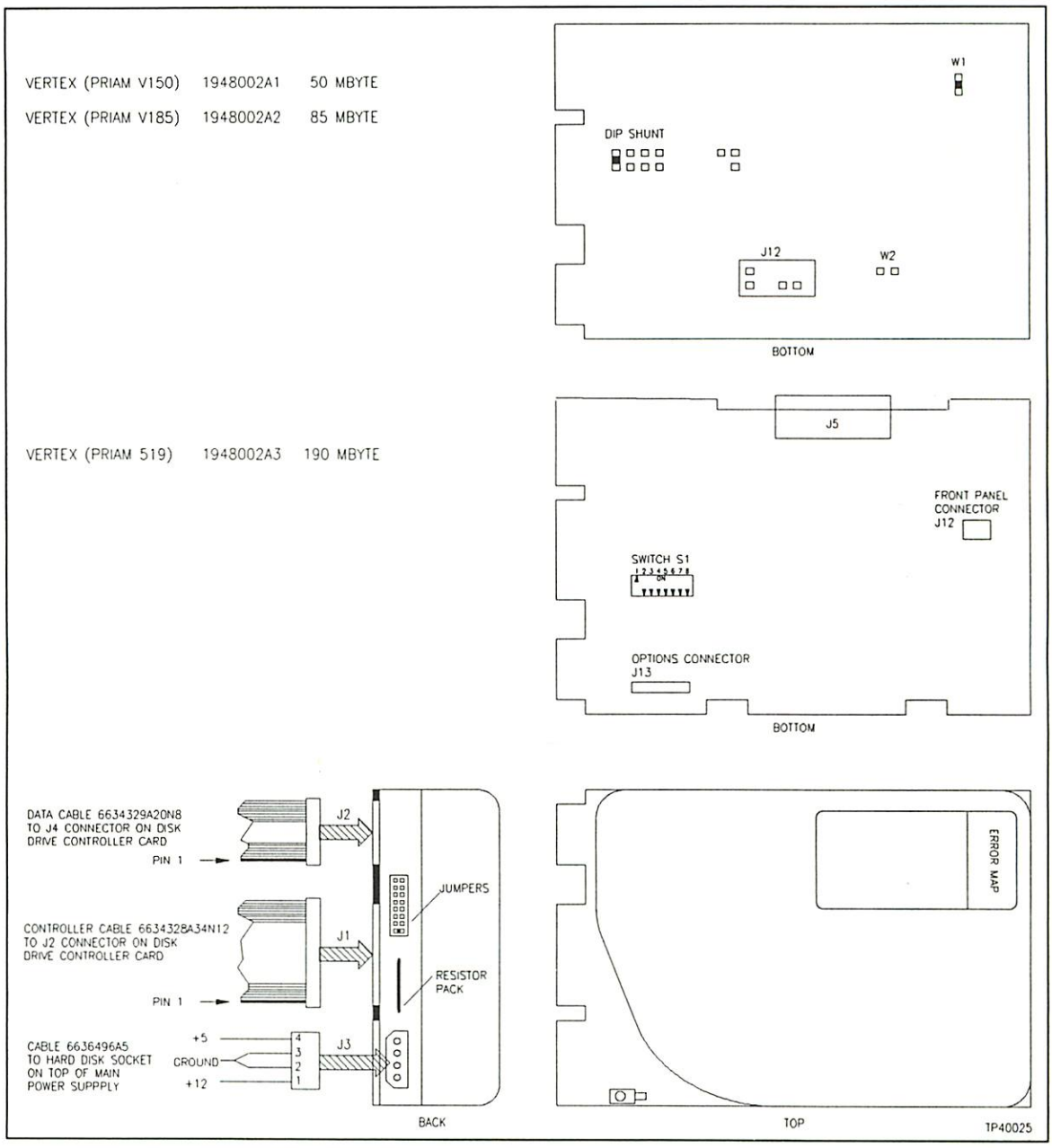


Figure 3-28. VERTEX (PRIAM) Hard Disk Drive

PRIAM V185A 85 MBYTE

Bailey P/N - 1948002_1

Figure 3-29 shows the required jumper configuration for the PRIAM V185A hard disk drive.

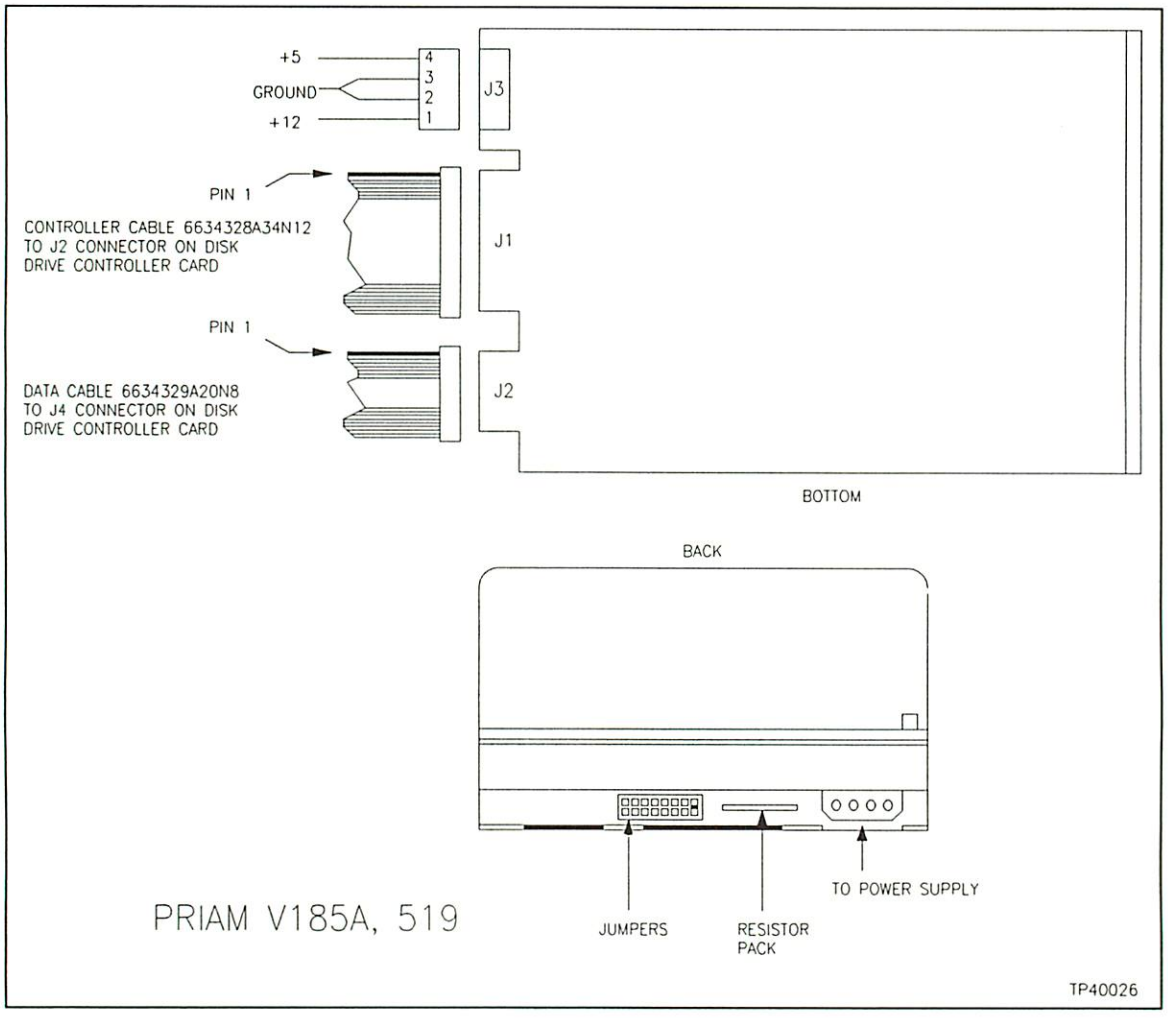


Figure 3-29. PRIAM V185A Hard Disk Drive

SEAGATE 94155-86/ST4086 85 MBYTE

Bailey P/N - 1948002B2

Figure 3-30 shows the required jumper configuration for the SEAGATE 94155-86/ST4086 hard disk drive.

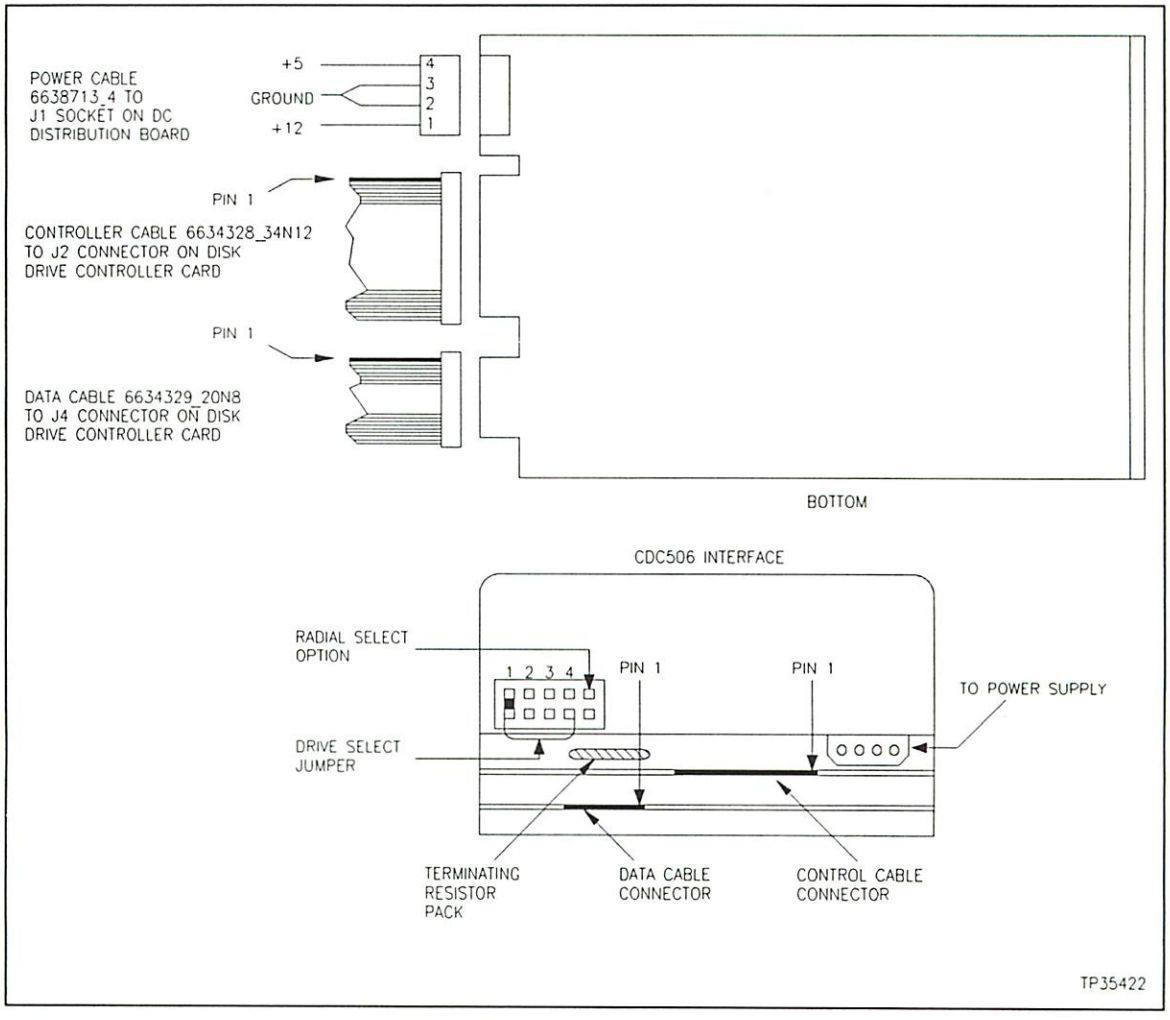


Figure 3-30. SEAGATE 94155-86/ST4086 Hard Disk Drive

MAXTOR XT-1085 85 MBYTE

Bailey P/N - 1948002B2

Figure 3-31 shows the required jumper configuration for the MAXTOR XT-1085 hard disk drive.

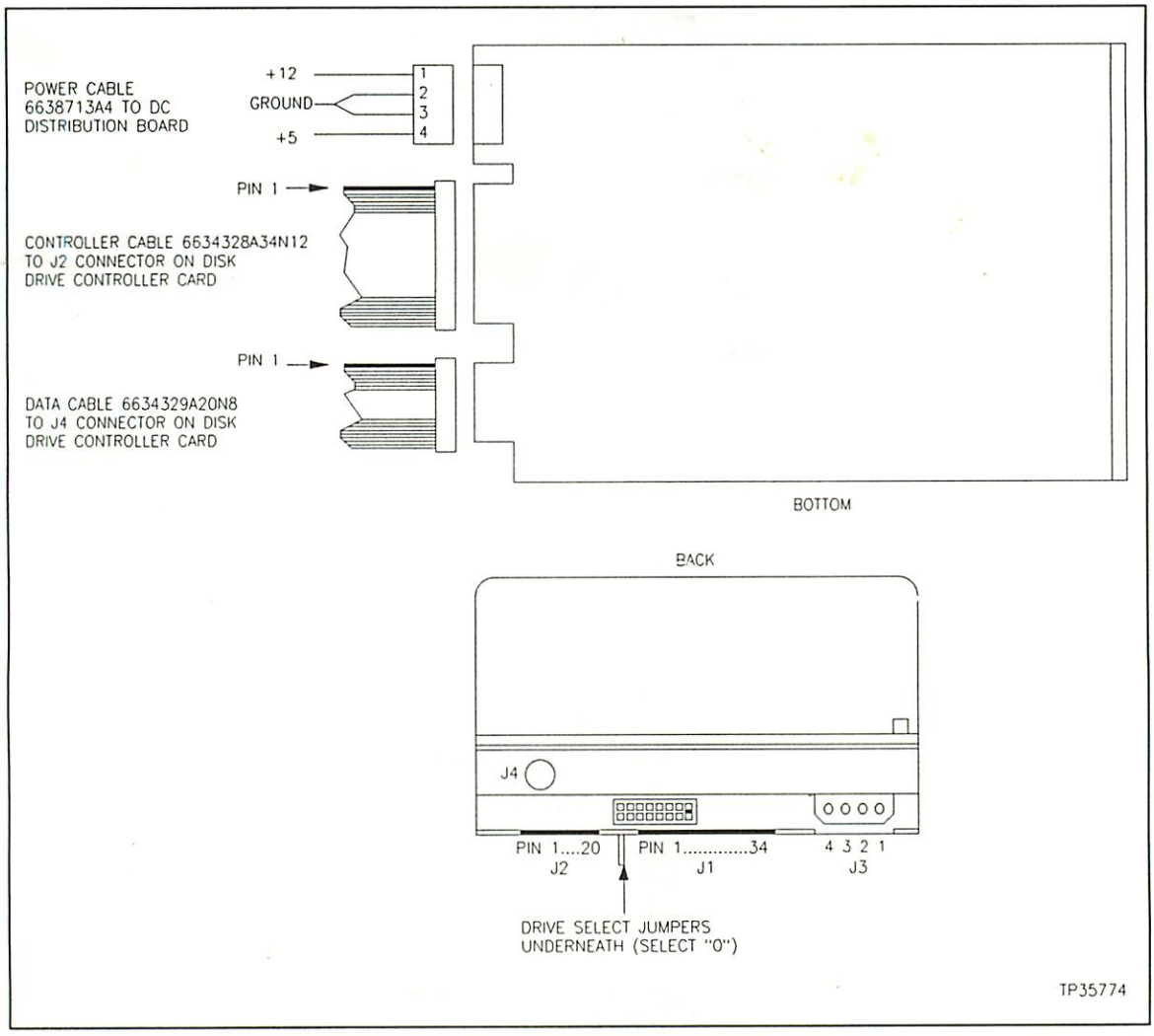


Figure 3-31. MAXTOR XT-1085 Hard Disk Drive

MCS KEYBOARD INTERFACE CARD (MKI)

Bailey P/N - 6636278_1

The MCS keyboard interface card (MKI) interfaces the keyboard and other operator input devices to the MCS. See Figure 3-32 and refer to Table 3-11 for wiring connections.

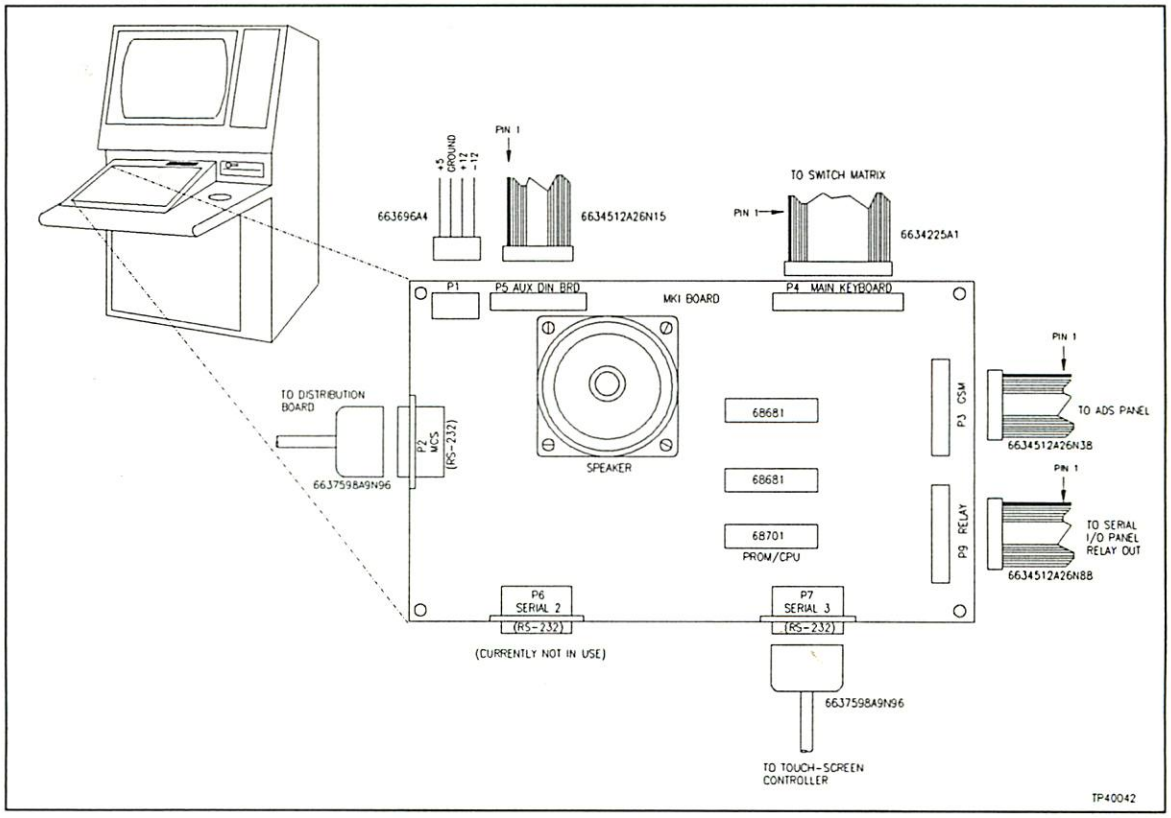


Figure 3-32. Location of Keyboard Controller Card - Main Console

Table 3-11. Connections for Main Keyboard Controller Card

From P1	From P2	From P3	From P4	From P5	From P6	From P7	From P9
To keyboard socket on top of main power supply, use wire assembly no. 6634696_4	To I/O distribution board; use wire assembly no. 1948055_ 22008	To P2 connector on annunciator display/ select board	To switch matrix (located beneath key pad)	To P1 connector auxiliary DIN Board; use wire assembly no. 6634512_ 26N15	Not used at this time	To RS-232 connector on touch screen controller	To MKI RELAY IN on I/O distribution board

MCS ENHANCED KEYBOARD INTERFACE CARD (EMKI)

Bailey P/N - 6637517_1

The MCS enhanced keyboard interface card (EMKI) interfaces the keyboard and other operator input devices to the MCS as does the MKI, and also interfaces an optional trackball. (See ***TRACKBALL*** in section four of this manual.) See Figure 3-33 and refer to Table 3-12 for wiring connections.

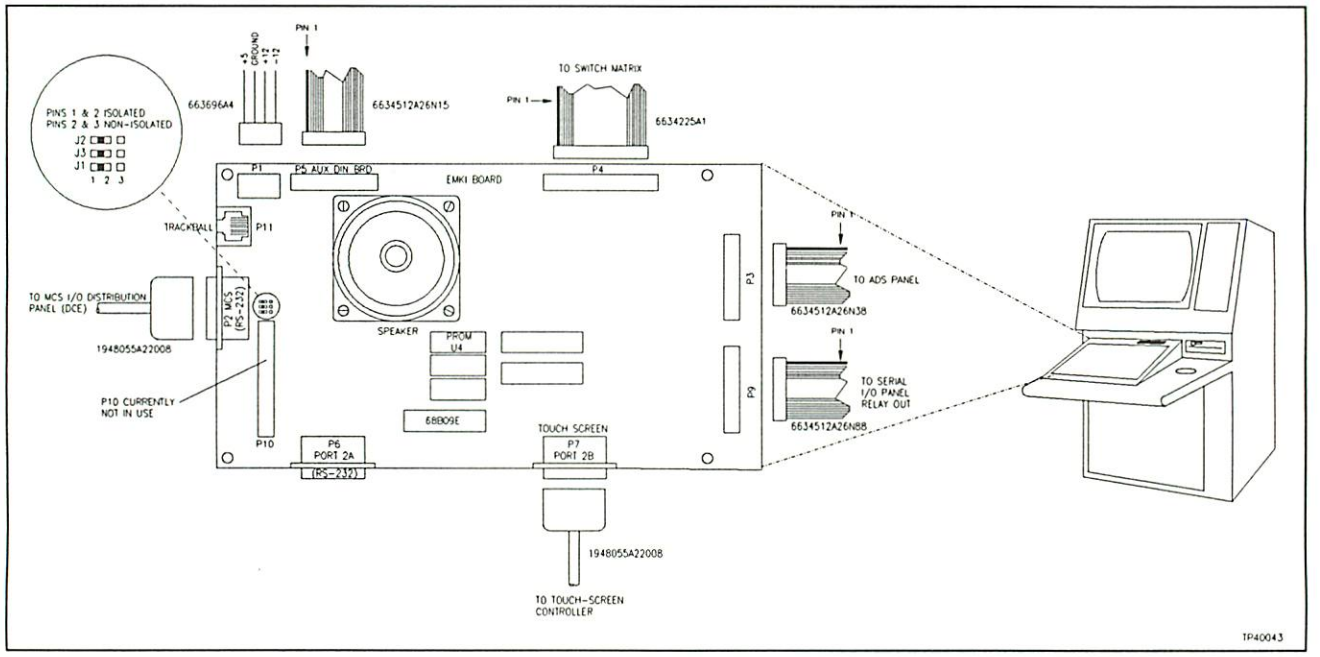


Figure 3-33. EMKI Keyboard Electronics Controller Card

Table 3-12. Connections for EMKI Controller Card

From P1	From P2	From P3	From P4	From P5	From P6	From P7	From P9	From P11
To keyboard socket on top of main power supply, use wire assembly no. 6634696_4	To I/O distribution board; use wire assembly no. 1948055_ 22008	To P2 connector on annunciator display/ select board	To switch matrix (located beneath key pad)	To P1 connector auxiliary DIN board; use wire assembly no. 6634512_ 26N15	Not used at this time	To RS-232 connector on touch screen controller	To MKI RELAY IN on I/O distribution board	To trackball socket

CONVENIENCE OUTLET

Bailey P/N - 1941268_3

Convenience outlets (Figure 3-34) are provided for use with 120 VAC 60 Hz user equipment. Refer to Table 3-13 for wiring connections.

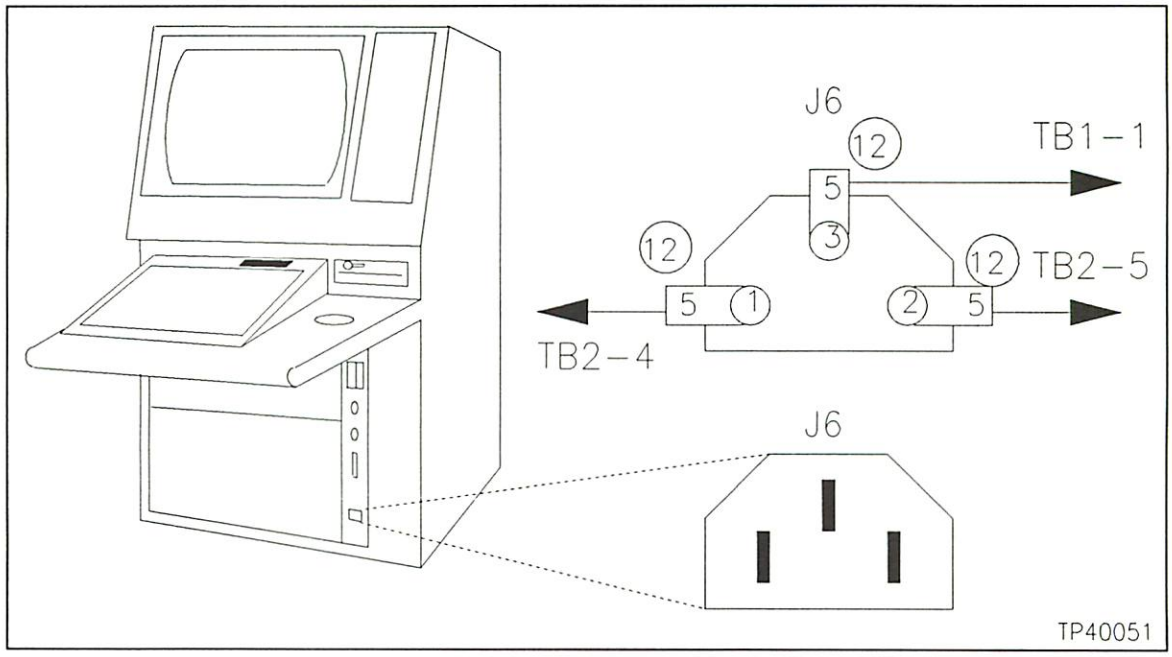


Figure 3-34. Location of Convenience Outlets J7 and J8

Table 3-13. Connections to Convenience Outlets J7 and J8

From J7 Socket	From J8 Socket	
Lug 3	Lug 1	Lug 2
12 AWG green wire to TB1, lug G	12 AWG black wire to TB2, lug 4	12 AWG white wire to TB2, lug 5

POWER STATUS LIGHT AND ESD GROUND CONNECTION

Bailey P/N - 1947508_1

Power Status Light

When power is applied to the MCS, the power status light (Figure 3-35) turns on. Refer to Table 3-14 for wiring connections.

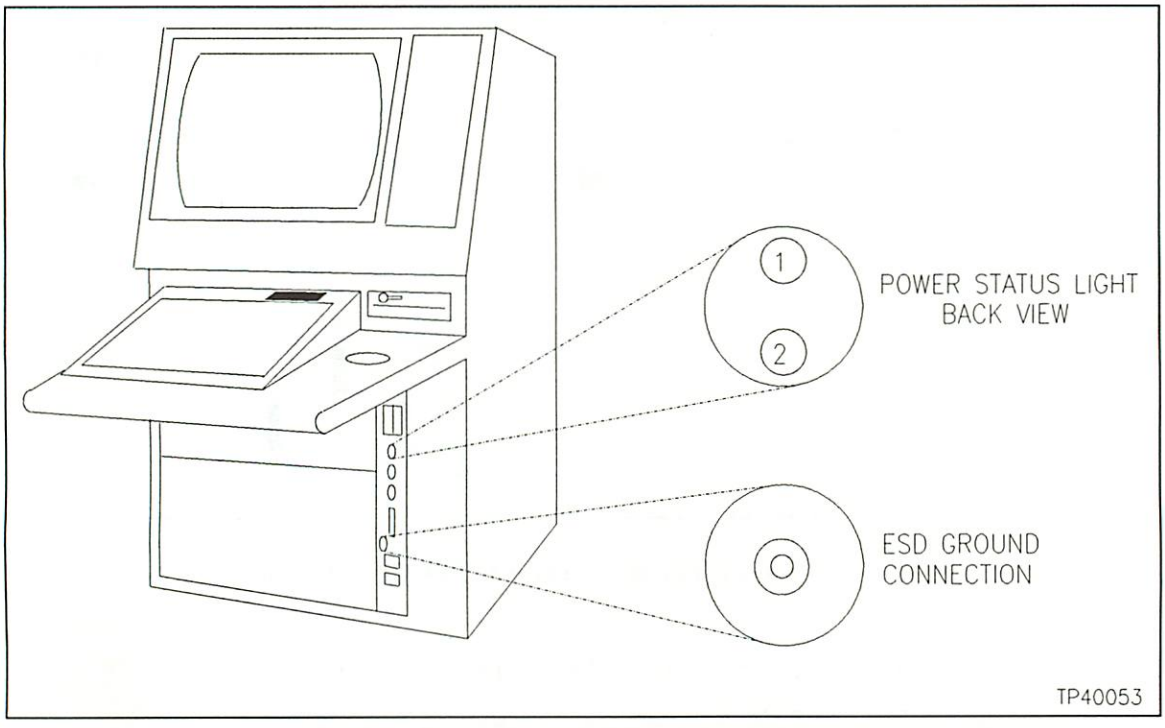


Figure 3-35. Location of Power Status Light and ESD Ground Connection

Table 3-14. Connections to Power Status Light

Lug Number	
1	2
To circuit breaker (CB1), lug 2	To circuit breaker (CB1), lug 4

ESD Ground Connection

The ESD (Electrostatic Discharge) ground connection is a grounded jack used to connect ESD protective devices such as wrist straps and mats. ESD protective devices should always be used when handling MCS hardware.

POWER SUPPLY - I/O

Bailey P/N - 1948005A

The I/O power supply (Figure 3-36) is a 40 watt power supply which provides power to the MCS input and output devices. Table 3-15 gives the necessary wiring connections from the two terminal blocks of the I/O power supply (internally and externally mounted). The AC power cord plugs into socket J4 on the AC distribution board.

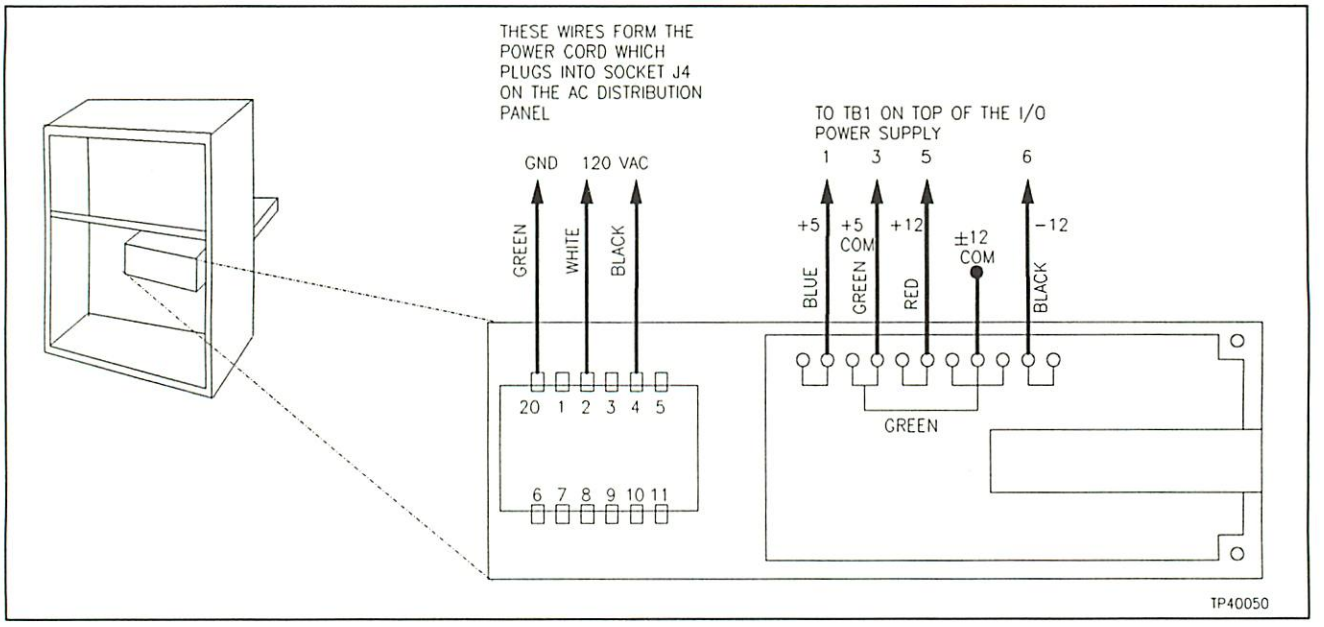


Figure 3-36. Location of I/O Power Supply

Table 3-15. Connections to I/O Power Supply

From TB1 Terminal Number (at top of I/O Power supply)[1]			
7	**8**	**10**	**12**
To -12 V terminal on I/O power supply with 12 AWG black wire	To +12 V terminal on I/O power supply with 12 AWG red wire	To +5 V COM terminal on I/O power supply with 12 AWG green wire	To +5 V terminal on I/O power supply with 12 AWG blue wire

NOTE: 1. You must also connect a length of 12 AWG green wire between the +5 V COM and 12 V COM terminals on the I/O power supply.

Sockets (Figure 3-37) are provided on top of the I/O power supply. Note that not all of the voltages shown are from the power supply, but also those of system signals.

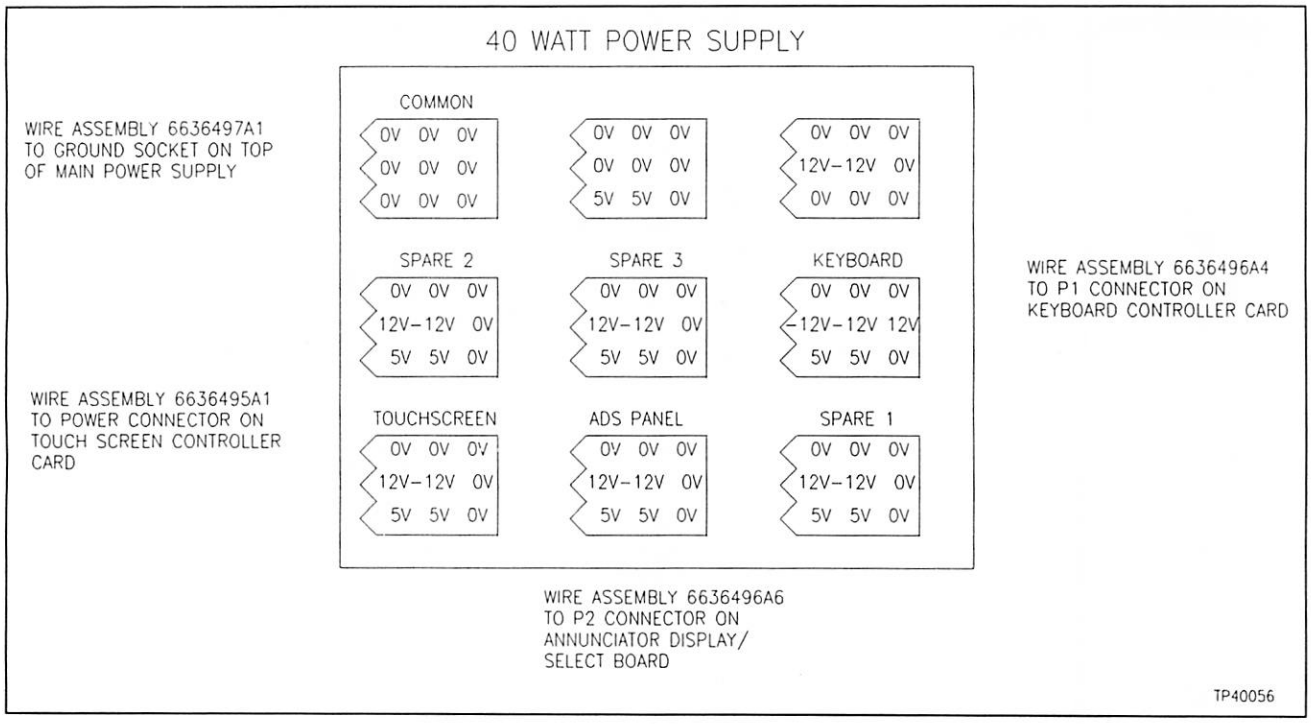


Figure 3-37. I/O Power Supply (Top View)

POWER SUPPLY - MAIN

Bailey P/N - 1948003A

The main power supply (Figure 3-38) is a 750 watt power supply which provides power to all MCS multibus cards and disk drives. Table 3-16 gives the necessary wiring connections for TB1, found at the top-rear of the supply.

NOTE: Monitor the voltages at the MMU backplane when adjusting the main power supply voltages. The difference between the power supply voltage and the backplane voltage may be as much as 0.3 VDC.

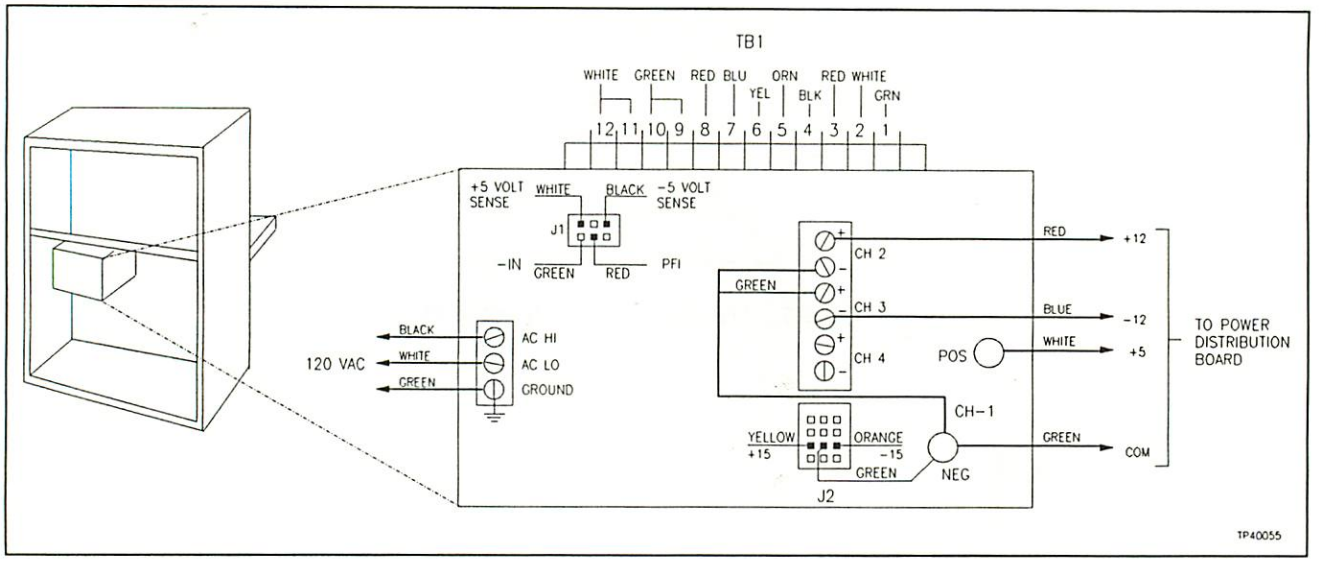


Figure 3-38. Location of Main Power Supply

Table 3-16. Connections on TB1 of Main Power Supply

1	2	3	4	5	6
To J1 plug with green wire from assembly number 6636537_1	To J1 plug with white wire from assembly number 6636537_1	To J1 plug with red wire from assembly number 6636537_1	To J1 plug with black wire from assembly number 6636537_1	To J2 plug with orange wire from assembly number 6636538_1	To J2 plug with yellow wire from assembly number 6636538_1

Table 3-16. Connections on TB1 of Main Power Supply (continued)

7	8	9	10	11	12
Use wire assembly 6636491_1					
To CH3- terminal with 12 AWG blue wire To E2 tab (COM) on NTCL01 with 14 AWG blue wire	To E1 tab (+24) on NTCL01 with 14 AWG red wire To CH2+ terminal with 12 AWG red wire	To tab 3 on MMU backplane (COM) with green 12 AWG wire To TB1 terminal number 10 with 12 AWG green wire	To tab 3 on MMU backplane (COM) with green 12 AWG wire To TB1 terminal number 9 with 12 AWG green wire To CH1 NEG post terminal with 12 AWG green wire	To tab 1 on MMU backplane (+5) with white 12 AWG wire To TB1 terminal number 12 with 12 AWG white wire	To tab 1 on MMU backplane (+5) with white 12 AWG wire To TB1 terminal number 11 with 12 AWG white wire To CH1 POS post terminal with 12 AWG white wire

Sockets (Figure 3-39) are provided on top of the main power supply. Voltages shown are from the power supply and system signals.

Table 3-17 gives the necessary wiring connections for all terminals at the rear of the supply.

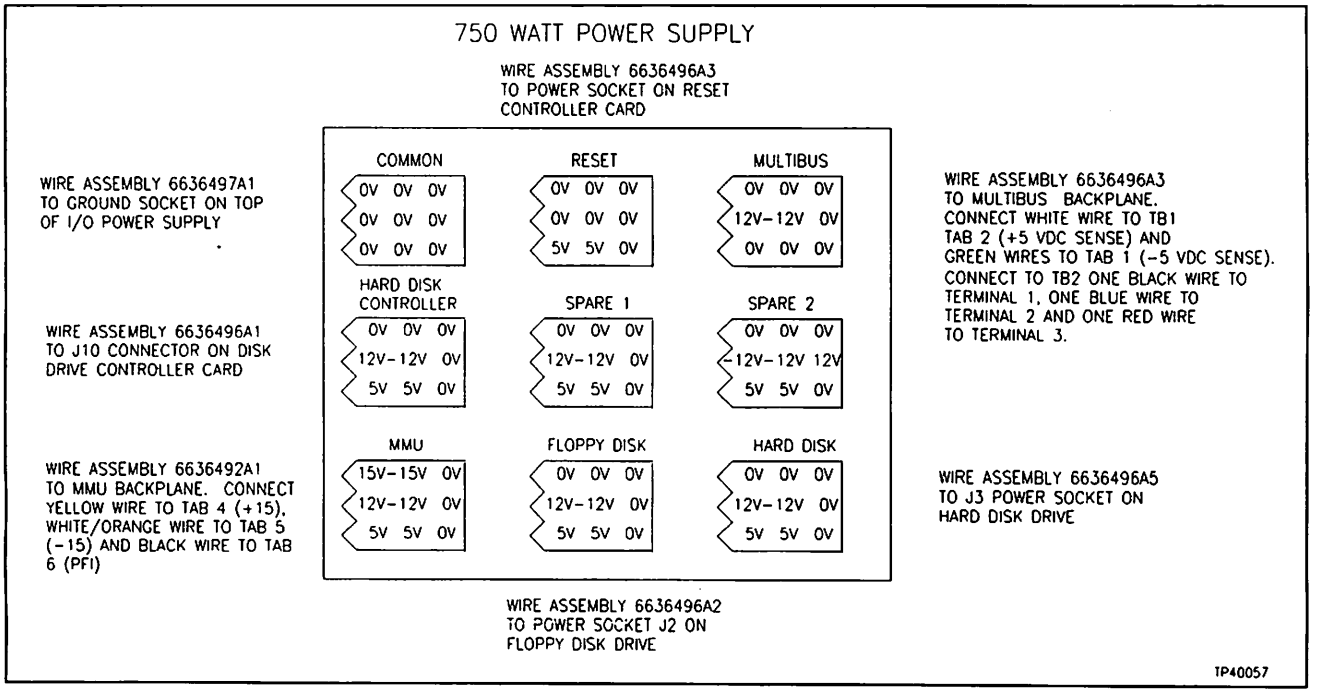


Figure 3-39. Main Power Supply (Top View)

Table 3-17. Connections on Rear of Main Power Supply

From J1	From J2	From CH1 POS	From CH1 NEG	From CH2 POS	From CH2 NEG	From CH3 POS	From CH3 NEG	From CH4
Use wire assembly 6636537_1, connect: Green wire to TB1 terminal number 1 White wire to TB1 terminal number 2 Red wire to TB1 terminal number 3 Black wire to TB1 terminal number 4	Use wire assembly 6636538_1 connect: Orange wire to TB1 terminal number 5 Yellow wire to TB1 terminal number 6 Green wire to CH1 NEG post terminal	Use wire assembly 6636494_1, connect: Two white wires to TB3, tab position 1 on multibus Two white wires to TB3, tab position 2 on multibus One white wire to TB4, tab position 1 on multibus One white wire to TB4, tab position 2 on multibus One white wire to TB1 terminal number 12; on main power supply dist. board **NOTE:** all above wiring is 12 AWG	Use wire assembly 6636494_1, connect: One green wire to TB6, tab position 1 on multibus One green wire to TB6, tab position 2 on multibus Two green wires to TB5, tab position 1 on multibus Two green wires to TB5, tab position 2 on multibus To J2 connector; use green wire from assembly 6636538_1 To CH2 NEG terminal; use 12 AWG green wire To TB1 terminal 10; use 12 AWG green wire To chassis ground on AC distribution board; use green wire from assembly 6636501_1	To TB1 terminal number 8; use 12 AWG red wire on main power I/O dist. board	To CH3 POS terminal on main power supply; use 12 AWG green wire To CH1 NEG post terminal on main power supply; use 12 AWG green wire	To CH2 NEG terminal on main power supply; use 12 AWG green wire	To TB1 terminal number 7 on main power I/O dist. board use 12 AWG blue wire	POS/NEG Not used

RESET BUTTON AND CONTROLLER BOARD

Bailey P/N - 6636410

The MCS is reset to initial power up conditions by pressing the reset button. The reset controller board ensures a correctly timed reset pulse. See Figure 3-40 for wiring connections.

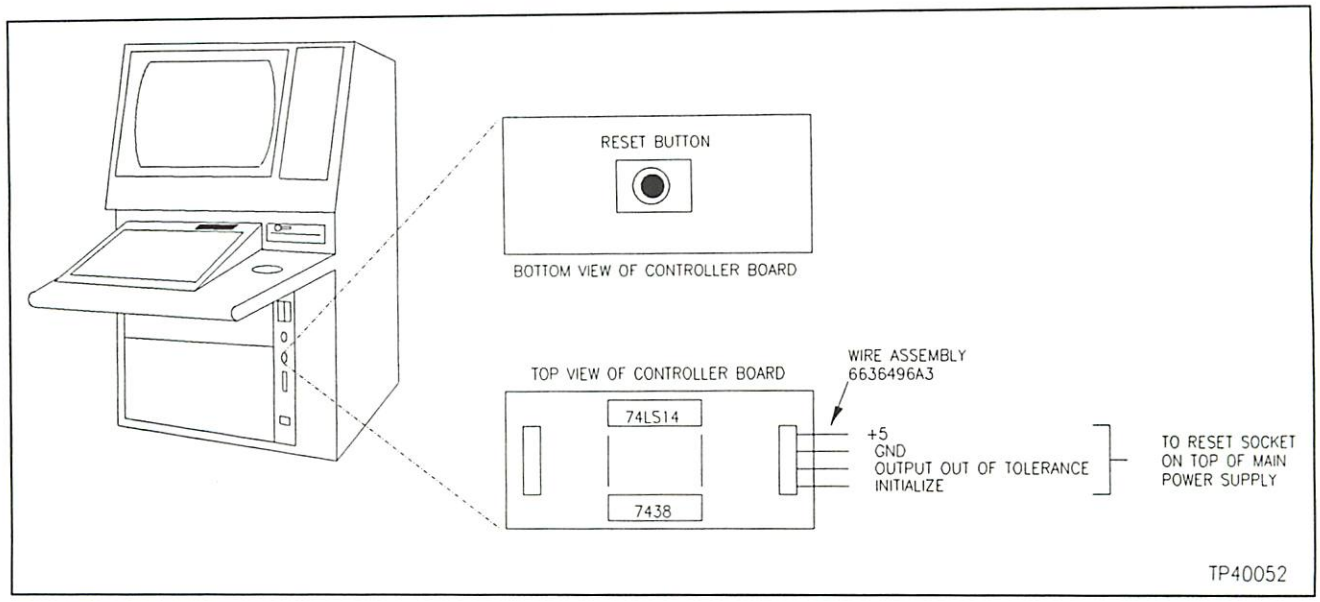


Figure 3-40. Location of Reset Button and Controller Board

TERMINATION UNIT - COMMUNICATION LOOP (NTCL01)

The termination unit (TU) as shown in Figure 3-41 interfaces the MCS to the communication loop. A cable (NKLM01/02/03/04) connects the TU and the Loop Interface Module (NLIM03). One end of the cable plugs into the P1 socket on the TU; the other ends snaps into place at the back of the MMU (standard position is slot 11).

NOTE: The jumpers on the NTCL01 are user defined. Refer to Bailey Product Instruction E93-911 for more information.

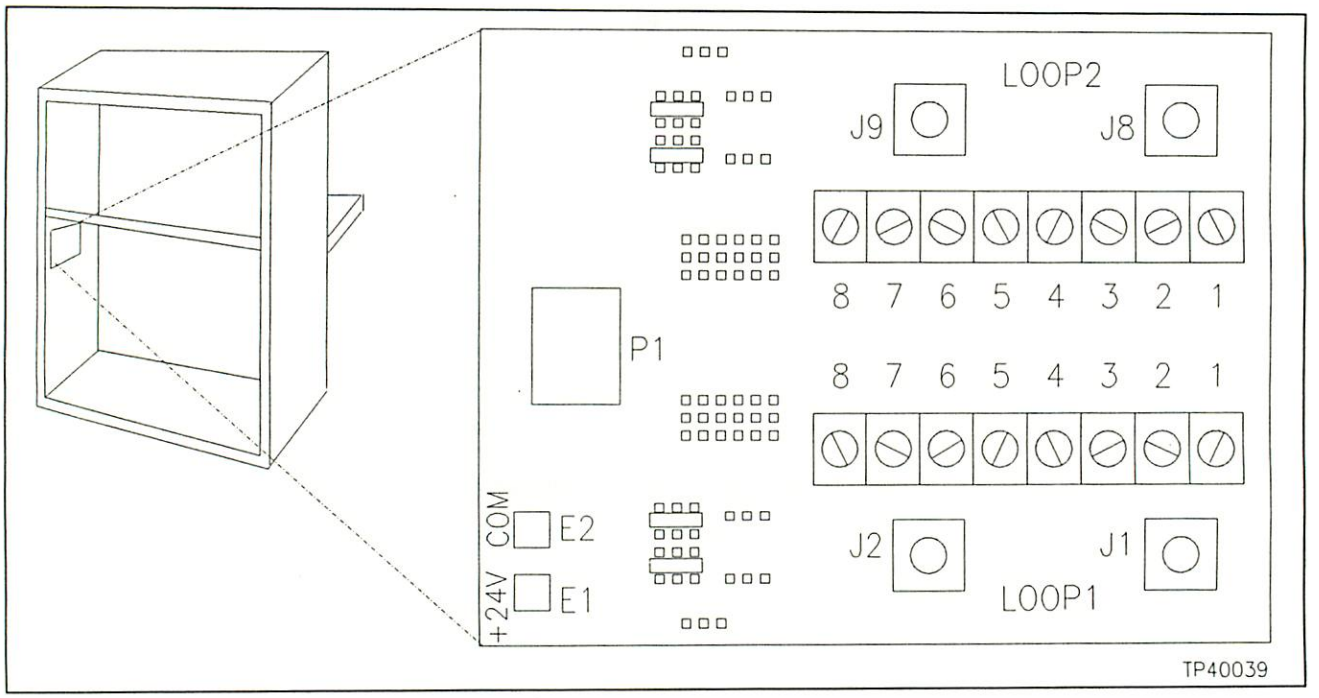


Figure 3-41. Communication Loop Termination Unit (NTCL01)

ANNUNCIATOR/DISPLAY SELECT BOARD (ADS)

Bailey P/N - 6636448_1

The annunciator/display select board (ADS) provides a panel of 64 lamps and pushbuttons. Each lamp and pushbutton can be assigned to an MCS display. When a tag on a display goes into an alarm condition, the assigned ADS lamp turns on. Pressing the assigned pushbutton causes the assigned display to be printed to the screen.

An MCS can drive a total of four monitor/keyboard optional terminals (refer to ***COLOR MONITORS*** in this section of this manual). Four ADS panels may be installed per each monitor/keyboard combination, for a total of 16. See Figure 3-42 for dipswitch configuration. Refer to Table 3-18 for wiring connections to the ADS Panel.

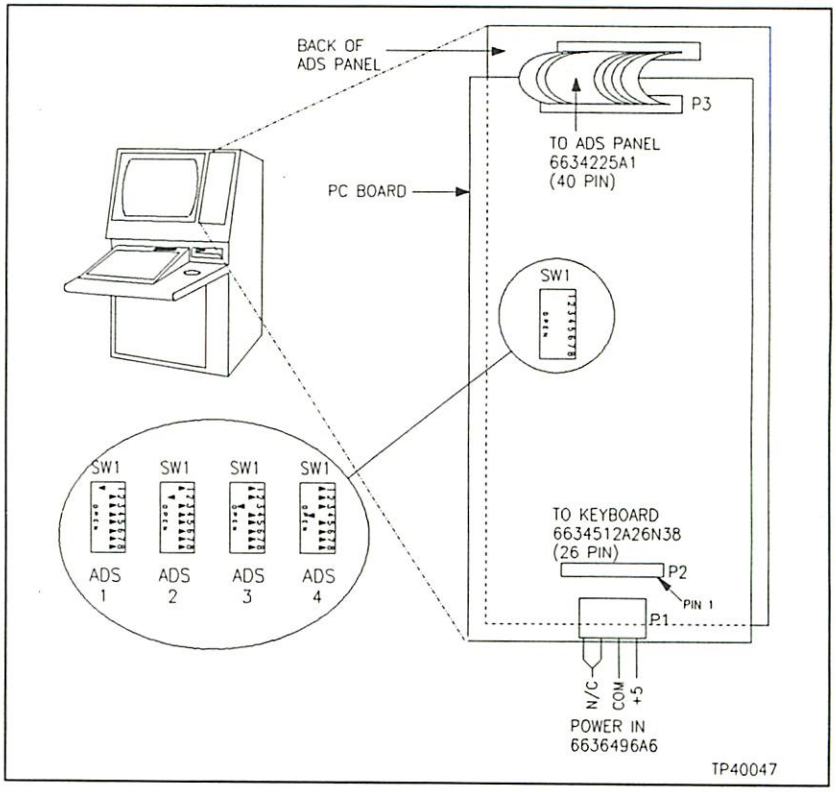


Figure 3-42. Location of Annunciator/Display Select Board

Table 3-18. Connections to Annunciator/Display Select Board

From P1	From P2	From P3
To group select socket on top of I/O power supply; use wire assembly number 6636496_6	To P3 connector on keyboard controller card; use cable number 6634512_26N38[1]	To P3 connector on annunciator display/select panel; use cable number 6634225_1[1]

NOTE: 1. 26 Pin Ribbon Cables, maximum length - 15 feet (4.5 m)

SECTION 4 - MCS OPTIONS

INTRODUCTION

This section details optional hardware your MCS may contain, and the installation procedures necessary to upgrade your current system. Section three provides detailed information on the hardware within the standard base MCS. Available hardware options are:

- Annunciator display/select panel (up to four panels per keyboard)
- Application processor
- Multibus graphics controllers (three may be added, giving a total of four)
- Color monitors (one per multibus graphics controller)
- Color video copier system (NPRT04)
- Engineering keyboards (a maximum of 4)
- Nine track reel-to-reel tape backup (NMTP01/02)
- Printers (a maximum of four; one per main console)
- Redundancy transfer switch (IIVRT01)
- Remote electronics driver cabinet (NMED01)
- SCSI nine track reel-to-reel tape backup adapter
- Streaming tape drive (NSTP01)
- INFI-NET Computer Interface Unit (NCIU04)
- Touch screen (one per color monitor and keyboard electronics card)
- Trackball

The I/O distribution board contains connection points for additional MCS options. The connector locations are clearly labeled. Adding new hardware requires making the proper cable connection to this distribution board and making any required jumper and/or dipswitch settings. Also of importance are the two power supplies. The covers on these supplies contain clearly labeled sockets which receive cables from system hardware. Specific installation procedures for individual components are given separately.

ANNUNCIATOR/DISPLAY SELECT BOARD (ADS)

Bailey P/N - 6636448_1

The annunciator/display select board (ADS) provides a panel of 64 lamps and pushbuttons. Each lamp and pushbutton can be assigned to an MCS display. When a tag on a display goes into an alarm condition, the assigned ADS lamp turns on. Pressing the assigned pushbutton causes the assigned display to be printed to the screen.

An MCS can drive a total of four monitor/keyboard optional terminals (refer to ***COLOR MONITORS*** in this section of the manual). Four ADS panels may be installed per each monitor/keyboard combination for a total of 16. See Figure 4-1 for dipswitch configuration. Refer to Table 4-1 for wiring connections to the ADS Panel.

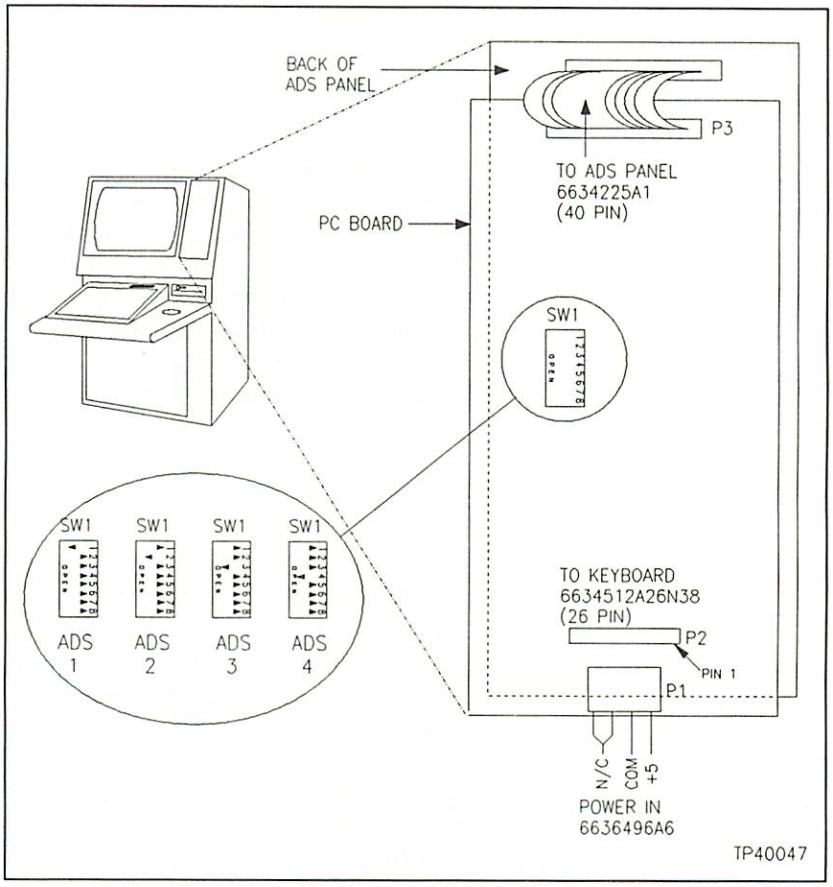


Figure 4-1. Location of Annunciator/Display Select Board

Table 4-1. Connections to Annunciator/Display Select Board

From P1	From P2	From P3
To group select socket on top of I/O power supply; use wire assembly number 6636496_6	To P3 connector on keyboard controller card; use cable number 6634512_26N38[1]	To P3 connector on annunciator display/select panel; use cable number 6634225_1[1]

NOTE: 1. 26 Pin Ribbon Cables, maximum length - 15 feet (4.5 m)

APPLICATION PROCESSOR (AP)

Bailey P/N - 6637033_1- CPU Card - Slot 23
6637447_1- Memory Card - Slot 22

The application processor provides custom programming. Supported languages are C, FORTRAN and 68000 Assembly. Refer to Bailey product instruction I-E93-901-25 for further information. A maximum of two application processors can be added. The jumper settings and locations of these processor cards are shown in Figure 4-2.

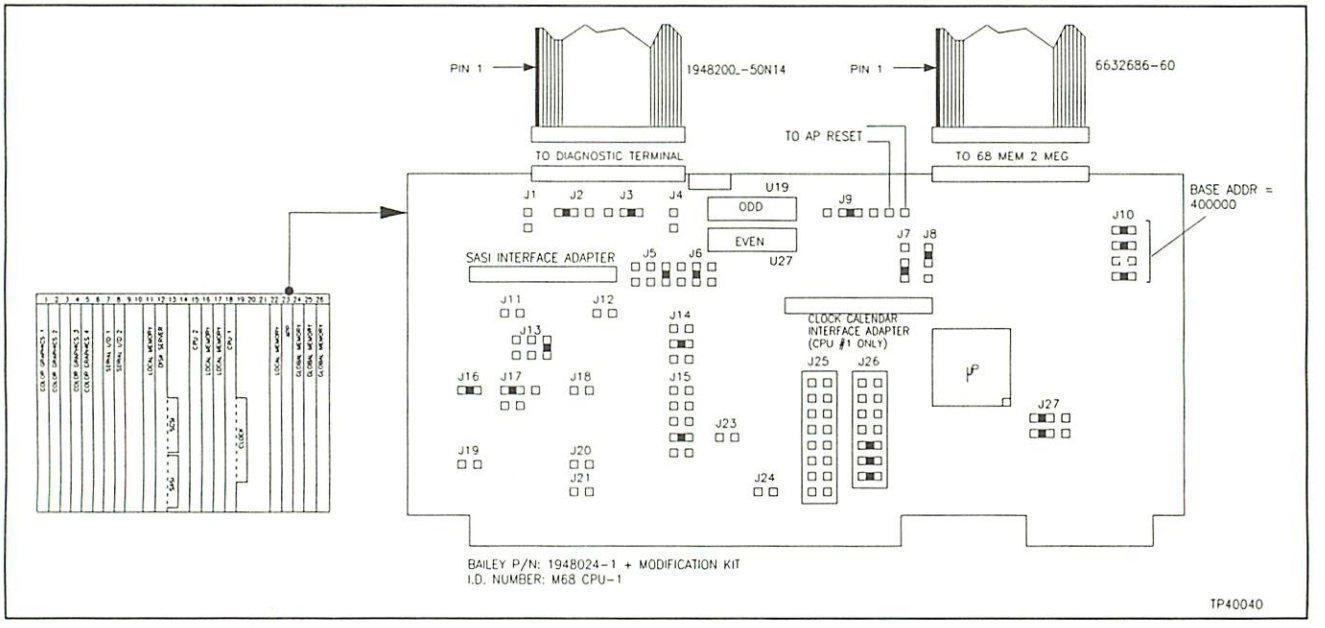


Figure 4-2. Application Processor

The application processor has a separate reset button located in the front left panel just below the MCS reset on the NMCS02, and to the left of the floppy disk drive just below the MCS reset button on the NMED01.

The standard MCS CPU card is transformed into an application processor with the Bailey upgrade kit (P/N 1948203_1) (Table 4-2). The kit contains seven jumpers, five PALs and a set of conversion instructions.

Conversion Procedure:

1. Cut wire wrap jumper leads and unwrap using needle nose pliers.

2. Install jumpers from kit on locations (as specified in Figure 4-2).

3. Remove the five PALs listed for a standard CPU card.

4. Install the five PALs from the kit in the specified sockets for an application processor.

5. Remove EPROMs in locations U27 and U19. Replace with P/N 1900108____ as listed.

6. Cross out silk-screened card designation and label as M68 CPU-1 with an indelible marker.

Table 4-2. Transforming MCS CPU Card into an AP Card

	Socket	PAL Part Number	Socket	Bailey Part Number	J27
Application Processor	U44 U20 U57 U63 U74	66411 66408 66414 66415 66421	U27 U19	1900108_1_ 1900108_2_	o–o o o–o o
Standard CPU Card Bailey P/N 1948024_1	U44 U20 U57 U63 U74	66448 66447 66490 66450 66452	U27 U19	1900105_1_ 1900105_2_	o o–o o o–o

INTELLIGENT SERIAL INTERFACE CARD

Bailey P/N 1948021_2

The MCS interfaces with various peripherals through the intelligent serial interface card. The peripherals include keyboards, printers and terminals. This card is configured by setting jumpers and dipswitches (Figure 4-3). Refer to Table 4-3 for port assignments.

NOTES:

1. Jumpers located below IC32 must be set according to the size of RAM used for IC32, 16K or 64K. The number 16 or 64 (located within the chip number) is printed on IC32. Set the jumper according to this number.
2. Refer to section three for serial interface card number one switch settings.

Table 4-3. Serial Port Function

Port	Card 2	Port	Card 2
1	Spare	5	Printer 3
2	Spare	6	Spare
3	Spare	7	Printer 4
4	Spare	8	Spare
I/O Port 0102 RAM Address FB0000 to FBFFFF 64K Block			

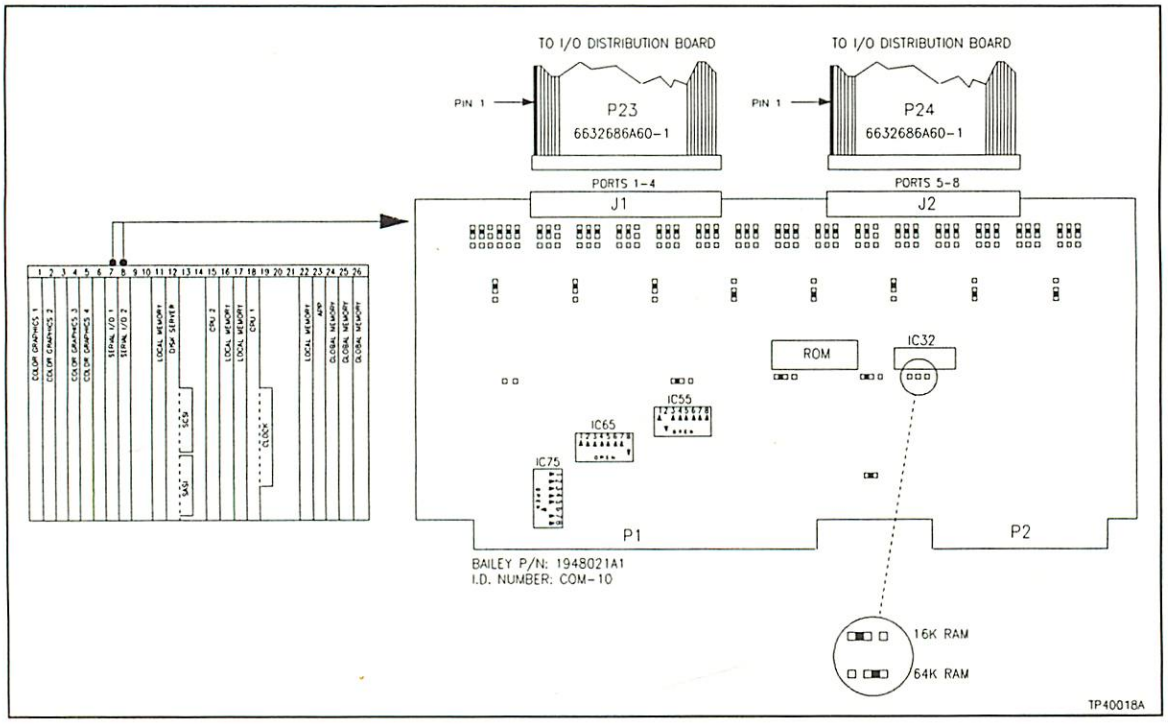


Figure 4-3. Intelligent Serial Interface Card 2

MULTIBUS GRAPHICS CONTROLLERS

Bailey Nomenclature - IIMGC01

Multibus graphics controllers drive MCS monitors. Each additional MCS monitor requires a multibus graphics controller. Each card must be configured by setting jumpers. See Figure 4-4 for card locations and jumper settings. Refer to ***COLOR MONITORS*** of this section for monitor wiring connections.

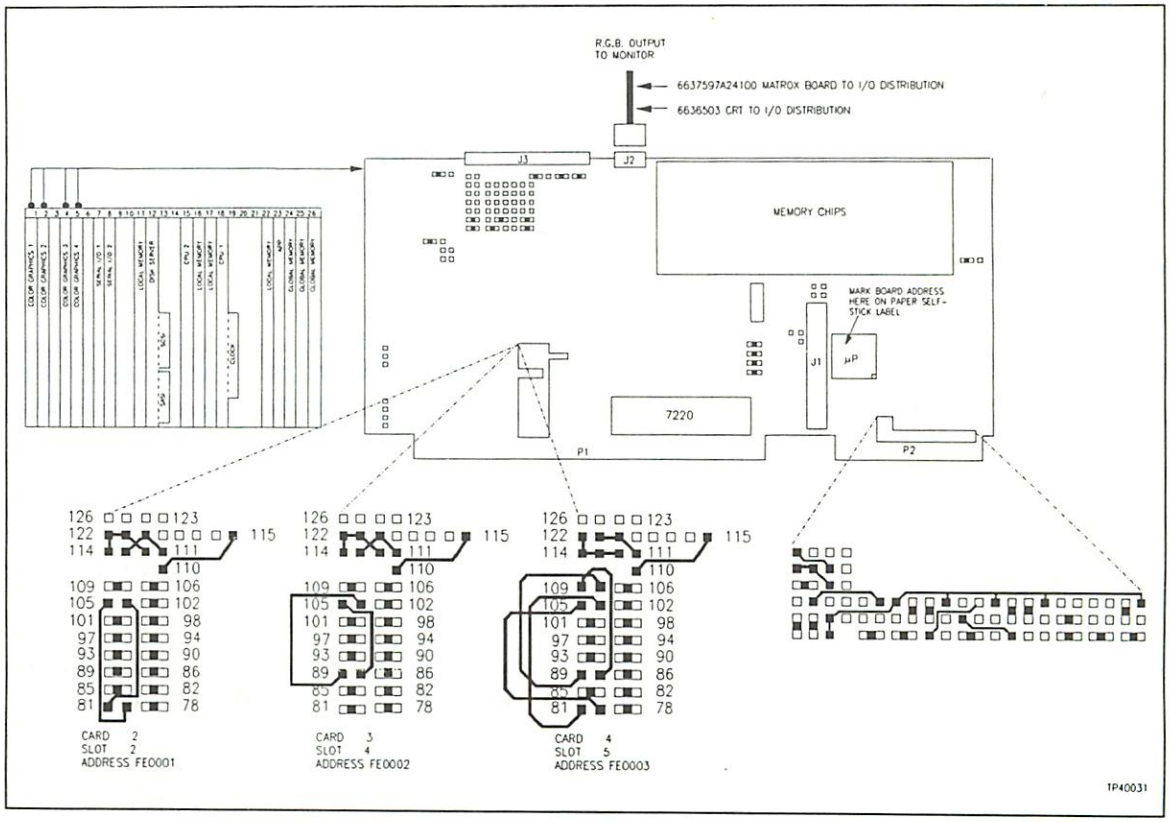


Figure 4-4. Location and Configuration of Multibus Graphics Controllers (IIMGC01)

COLOR MONITORS

Adding additional color monitors is model dependent. Refer to Table 4-4 for a list of available color monitor options.

Table 4-4. Color Monitor Options

Bailey P/N	Description
NCRT01	19 inch CRT table top with keyboard
NCRT02	19 inch CRT console with keyboard
NCRT03	Stand-up (environmental) unit with 19" CRT and keyboard
NCRT04	Two 19 inch CRTs with one keyboard
NCRT05	19 inch CRT table top - no keyboard
NCRT06	19 inch CRT panel mountable - no keyboard
NCRT09	19 inch CRT in NUCC01 - no keyboard (NCRT02 w/o keyboard)

A second color monitor requires adding a second color graphics card. Refer to ***MULTIBUS GRAPHICS CONTROLLERS*** in this section for card cage location and configuration information. Follow these steps to add a second graphics card.

1. Slide the card into place and secure the two front latches.

2. Plug the RGB inputs line into the socket on the front of the card.

3. Connect the separate red, green and blue lines to the appropriate points on the back of the I/O distribution board.

4. Connect the cable assembly from the front of the I/O distribution board, to the corresponding receptacles on the back of the color monitor.

5. Plug the monitor power line into the proper socket on the AC distribution board.

The procedure for additional monitors is similar to that for adding a second one. Each monitor requires a separate multibus graphics controller.

NOTE: If remote CRTs are being installed, insure they are powered using the same polarized power and ground as the MCS to prevent ground loops. Failure to do so may cause display distortion. If ground loops are still suspected, use of optically isolated modems will eliminate the problem.

COLOR VIDEO COPIER SYSTEM (NPRT04)

The NPRT04 is used to make a color hard copy of an MCS screen. This is done by pressing Copy on the MCS keyboard. Related products for the NPRT04 are:

Color copier	1948439_1
Video processor	1948440_1
Centronics cable	6634330N10
MCS cable	6637356_1-25
Spare ink roll	1948465_1
Spare paper roll	1948464_1
RGB cable assembly	NKMC01-25
BNC tee adapter	1945080_4

Operation Summary

There are two main parts to the color video copier system. These are the video processor and the color copier.

The function of the video processor is to capture all needed information from an MCS screen in a matter of seconds. The video processor then sends this information as it is needed to the color copier. This frees up the MCS screen to enable an operator to continue with his work while the color copy is actually being produced. The video processor has internal memory to store multiple screens. When multiple screens are stored by the video processor, they are printed out one after another in the order in which they were stored.

The color copier is the device that makes the actual color copy. It takes approximately 45 to 60 seconds to make a color copy of an MCS screen. The copier makes three passes over the paper, placing the yellow, red, and blue colors on the paper separately. When the copy is done, the copier aligns itself to make the next copy, at which time the color copy just produced may be torn off at the perforation.

Installation

After unpacking both the copier and video processor, place them side by side. First, configure the DIP switches on the rear of the video processor (Figure 4-5). The following information may be useful when configuring the DIP switches:

- Termination for the red, green and blue video signals should be 75 ohm (S1-1 through S1-6 all down).
- The signal levels for the video inputs are one volt nominal (S2-1 and S2-2 down).
- Switch positions S2-3 and S2-4 are related to the sync. These switch positions should be set to reflect that the sync is on the green video input (S2-3 and S2-4 both down).
- Switch three is related to the attenuation of the video signals. The signal levels for the video inputs are one volt nominal, therefore these switch positions are at high gain settings (S3-1 through S3-6 all down).
- Connections of the red, green and blue video signals from the MCS monitor to the video processor is done with the NKMC01 RGB cable assembly.

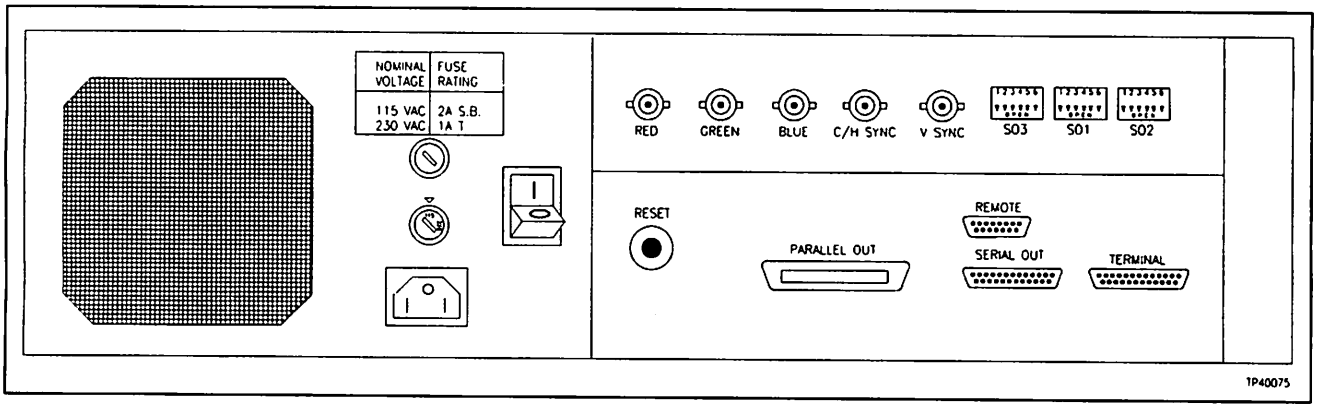


Figure 4-5. Back View of the Color Video Processor

If a Hitachi intecolor or other color monitor is used, it is necessary to use BNC tee adapters to make the connections from the graphics board to the monitor and from the monitor to the video processor. To do this, connect the BNC tee adapters (P/N 1945080_1) to the red, green and blue connectors on the back of the monitor. Make sure the termination beside each of these connectors is set to the high impedance setting (down).

Connect the RGB output from the graphics board to one side of the BNC tee adapters. Connect one end of the NKMC01

RGB cable assembly to the other side of the BNC tee adapters. Connect the other end of the NKMC01 cable assembly to the red, green and blue inputs on the back of the video processor (Figure 4-5).

If a Mitsubishi monitor is being used, connect one end of the NKMC01 RGB cable assembly to the red, green and blue loop-through connector on the back of the monitor. Make sure the termination switch beside each of these connectors is set to the high impedance setting (down). Connect the other end of the NKMC01 cable assembly to the red, green and blue inputs on the back of the video processor.

Next, connect the video processor to the copier with the Centronics parallel cable (P/N 6634330_30N25). Connect one end of the Centronics cable to the signal input on the back of the copier. Connect the other end of the Centronics cable to the parallel port connector on the back of the video processor.

Connect the MCS video processor cable from the remote port of the video processor to the MCS I/O distribution board relay contact that will be dedicated to handle the capture initiation process. Which relay contact will handle this function is user configurable. This relay contact will be controlled by Copy on the MCS keyboard. When Copy is depressed, the MCS screen is frozen for approximately five seconds. As soon as the screen has been frozen, the relay contact controlling the capture initiation is closed for a minimum of 10 microseconds. This pulls the capture line on the video processor low. A low on this line tells the video processor to initiate a screen capture. The video processor then obtains all needed information off the red, green and blue lines of the MCS screen to make a color copy. This takes approximately three seconds. After all needed information is obtained from the MCS screen, it is no longer necessary to keep the screen frozen. Thus, the screen is freed and the operator may continue with his work while the color copy is actually being produced.

Connect the DB9 side of the MCS video processor cable to the remote connector on the back of the video processor. Connect the two lugs on the other end of the cable to the relay contact to perform this function.

Connect the black wire to the terminal labeled C for the relay contact. Connect the white wire to the terminal labeled NO for the relay contact.

ENGINEERING KEYBOARDS NAKB01

Each MCS console supports an additional engineering QWERTY keyboard. The keyboard plugs into a five pin DIN located above the membrane keyboard on the main MCS console (Figure 4-6).

NOTE: The recommended procedure requires removing power from the MCS before plugging in the engineering keyboard. Failure to do so may result in faulty operation due to an improper initial state.

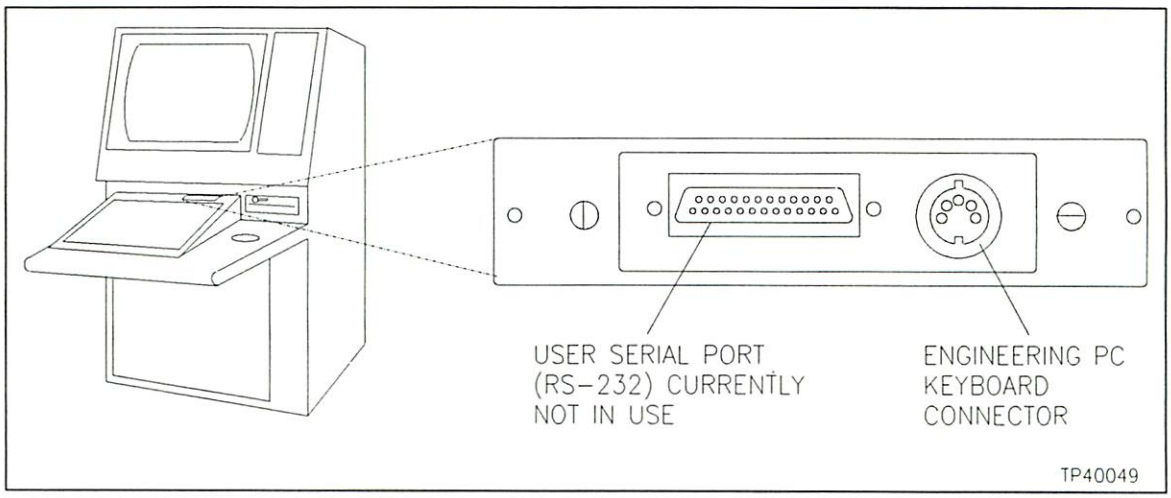


Figure 4-6. Engineering Keyboard Connector

NINE TRACK REEL-TO-REEL TAPE TRANSPORT

Bailey Nomenclature - NMTP01 - Mounts in NMED01 Systems.
NMTP02 - Mounts in NCWS01, NCPS01 or NCRT02 for NMCS02 Systems.

The nine track reel-to-reel tape transport (MTP) is a nine track ½ inch reel-to-reel tape drive. Parts contained in the base MTP drive are:

Qty.	Part
1	Print of DWG _6637805
1	194776_23001 - Three amp slow blow fuse
1	1947950_5 - Power cord
1	1948468_1 - SCSI interface
1	1948032_31200 - ribbon cable assy.
1	1948380_1 - Magnetic tape drive

The NMTP01 mounts in the NMED01. It contains the components of the base MTP drive and the parts:

Qty.	Part
12	NTLAC19000 - Lockwasher
12	NMPCC16002 - Nut
12	NANAU16008 - Screw
4	6637702_1 - Mounting plate
1	6637701_1 - Support rod
1	6637698_1 - Vent panel
2	6637703_1 - Support panel
1	6637805M_1 - Base magnetic tape drive

The NMTP02 mounts in the NCRT02. It allows mounting in the NCWS01, NCPS01, NUCC01 and the NCRT02. It contains the components of the base MTP drive and the parts:

Qty.	Part
1	Print of DWG C258449, this kit
1	Print of DWG C6637727, base
1	Print of DWG C6637726, shelf
1	Print of DWG B6637724, support rod
8	NDPAC16006 - Tap screw
1	6637730_1 - Mounting rack
2	6637728_1 - Mounting tab
1	6637723_2 - Mounting rail, rear
1	6637723_1 - Mounting rail, rear
1	6637725_1 - Rack mounting rail, front
1	6637725_2 - Rack mounting rail, front
1	6637805_1 - Base magnetic tape drive

Unpacking

On tape transport, open the hinged tape guide lid; remove the packing material (Figure 4-7). Unscrew retainers at left and right front edges and lift the hinged transport mechanism, exposing circuit boards (Figure 4-8). Separate card frames and remove packing material from the boards. Unpack CSC-100 SCSI adapter kit.

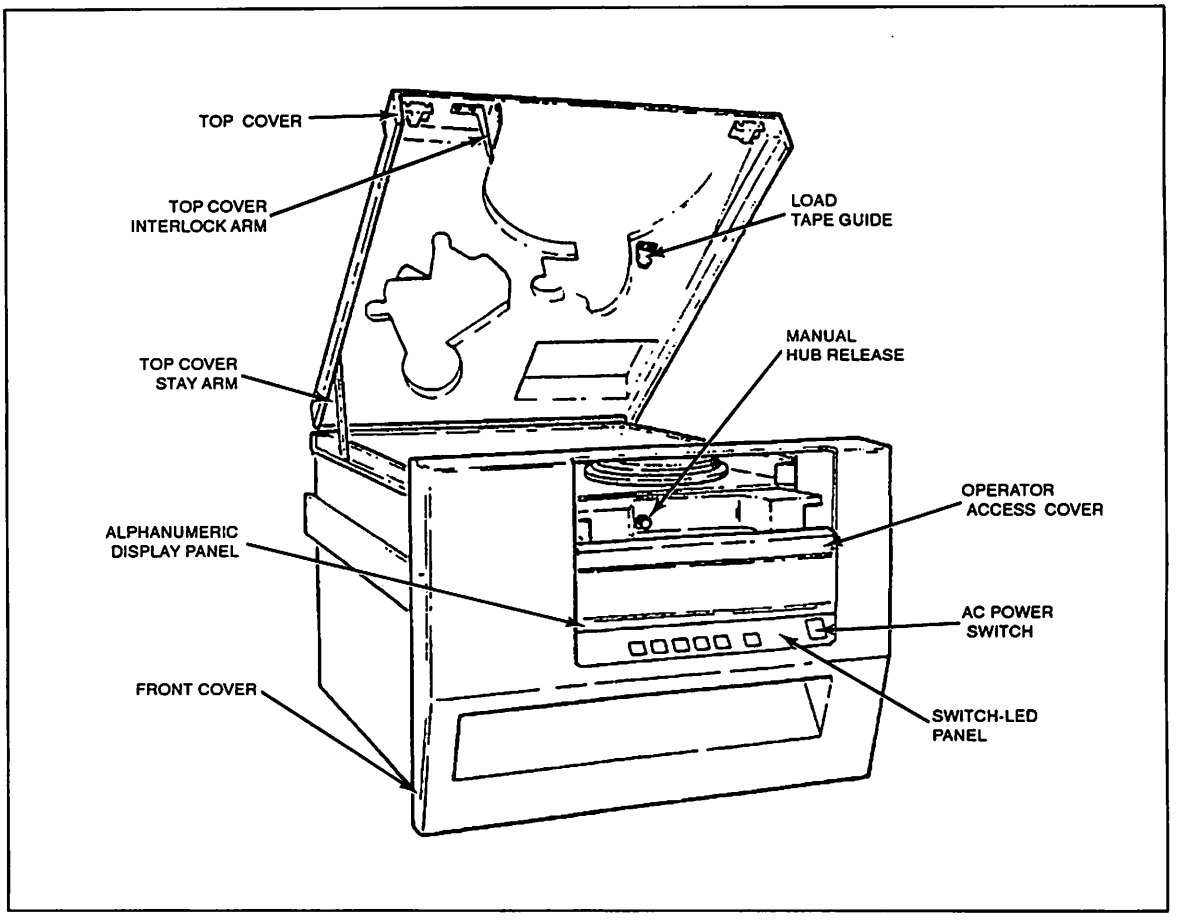


Figure 4-7. Reel-to-Reel Tape Drive Unit

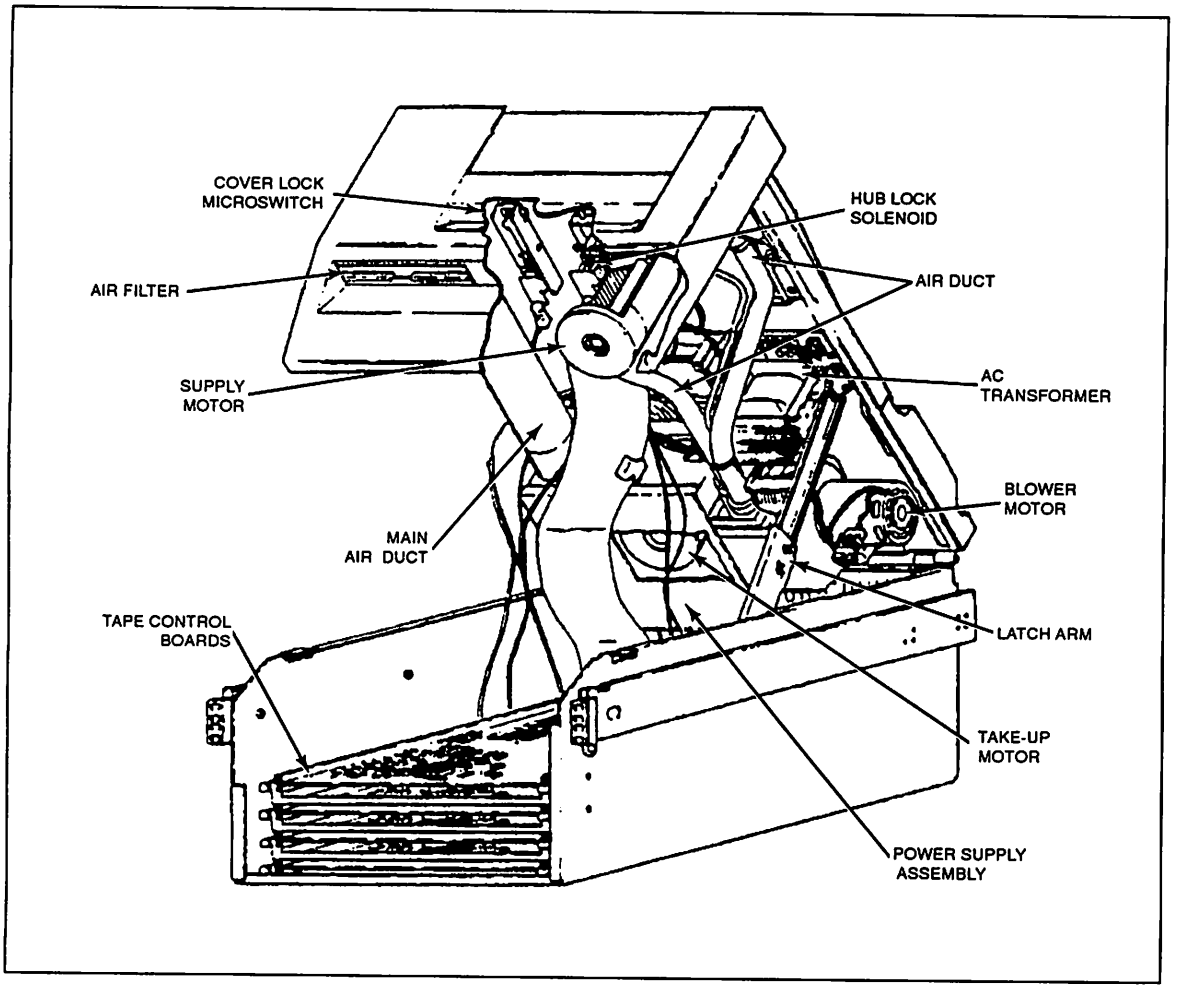


Figure 4-8. Transport Tape Mechanism

1. At right rear of transport, locate two pin white nylon cable jack marked J9, and pass it out the opening in the back of the case.

2. In the event that J9 connector is not in the wiring harness, locate the provisioned J9 jack with one foot white and black leads terminating in fasten lugs. Clip lugs, strip and splice white and black leads to similarly colored wires in the harness. Insulate with electrical tape. (Feed connector through rear of transport.)

3. Turn power on.

4. Check for +48 V at white lead with respect to black (-). Correct as required.

5a. NMCS02 applications: Locate two rack slides and position inner slide on each side with mounting ears facing outward at front. Extend slides and mount using three furnished machine screws, heads inserted through slides then through corresponding three holes in each side. Retain using six locknuts inside case.

5b. NMED01 applications: To install the nine track transport in NMED01 driver cabinet, the hardware provided with the NMTP01 is used to mount rails underneath the transport, rather than on the sides, as with the NMTP02. Locate the two support panels and orient with tabs pointing inward on each side. Open transport, unbolt rack slide hinges and transfer them to corresponding locations on the left and right support panels. Mount support panels to transport sides, through the holes where hinges are mounted.

6. Detach and mount rack ear section of each slide to front and rear cabinet rack rails. Mount above shelf of NMED01 cabinet or using bottom rail pattern of NCRT02 work surface enclosure.

NOTE: When manual tape mounting or service is required, the transport must be hinged up in operation.

7. Lift transport into rail engagement in cabinet (requires a minimum of two people).

Preparation, SCSI Interface Unit, CSC-100

1. Place unit upright, and remove two screws near tapered edge. Lift open hinged lid.

2. Locate +48 V power cable labeled 962031 and insert connector P1 in circuit board location J4, engaging cable plug kerf in chassis jack clip. Reseat ROMs in sockets.

3. Route loose P2 connector through large cutout. Close the box.

4. Locate two six inch braided straps. Slip a box retaining screw through the lug on each strap, and refasten box.

1. Locate two 50 pin ribbon jumpers marked 961991. Orient the pin header P2 connector of each so striped edge is at location silk-screened ½, then insert one each into board locations J1 and J2.

2. Orient tapered edge of CSC-100 to view LEDs at left and DIP switches to their right (Figure 4-9). Set ID switches one through four open (up), and switch five of right most switch open.

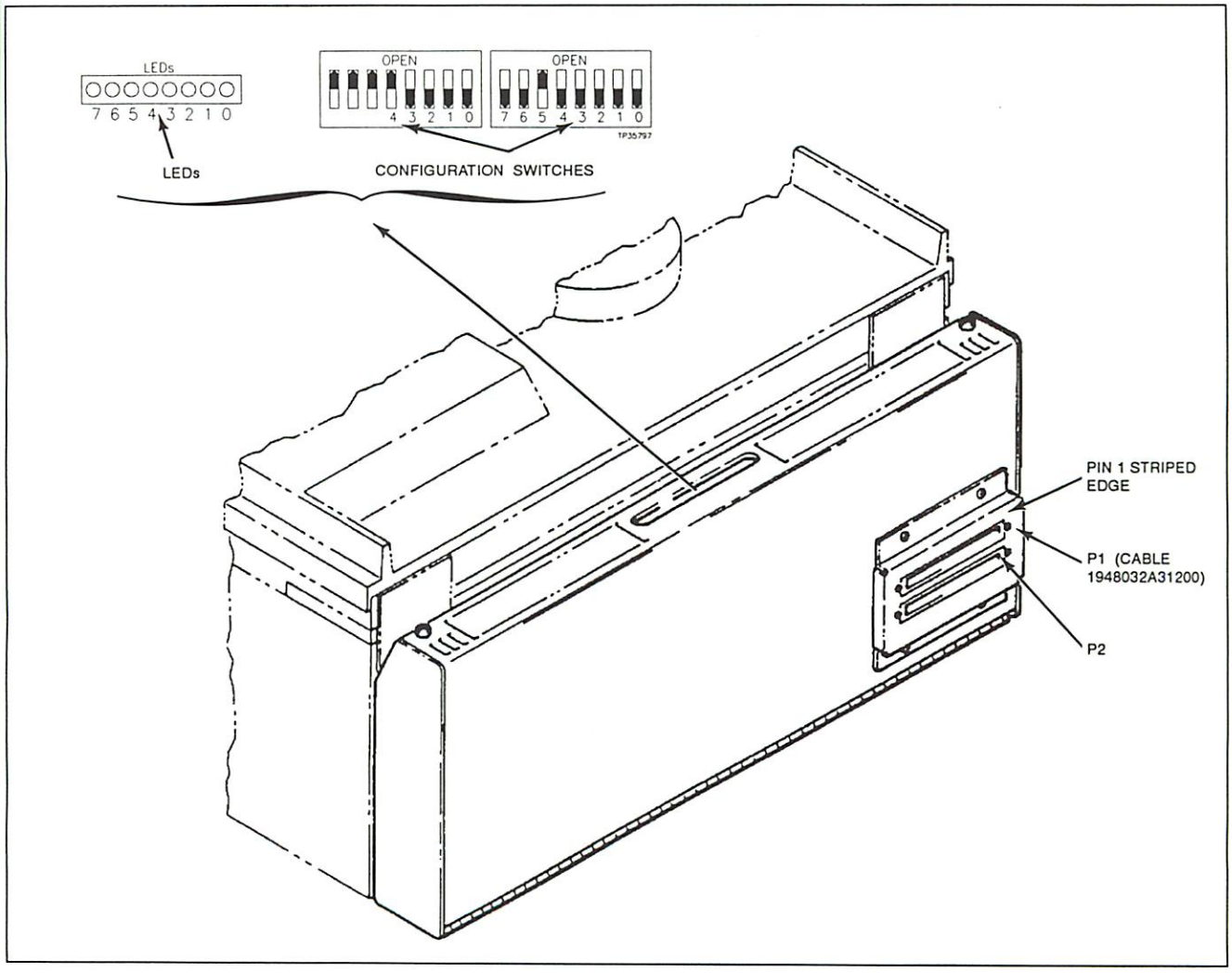


Figure 4-9. LED and Switch Location

System Interconnections

1. Rotate power rotary selector at rear of tape transport. Set it to the required voltage and frequency. If voltage is 200 to 240 VAC, pop out (screwdriver 1/4 turn CCW) adjacent fuse holder and replace fuse with 3 A slow blow fuse provided.

2. Use the parallel blade cord from transport's IEC-320 receptacle to MCS NCRT02's J4 power or J5 spare receptacle as available. If installed in MED driver cabinet, use IEC320 male to female cable P/N 19447950_5 and connect to power entry panel utility receptacle.

3. With front panel power switch rocked and left permanently on, (system running) measure voltage at transport rear J9 connector, white wire, and confirm that it is +50 VDC with respect to the black wire. Correct as necessary.

4. Turn off each MCS cabinet breaker and attach the CSC-100 units P/N 962031 P2 connector to transport connector J9.

5. Attach left and right ribbon cable P1 connectors to transport connectors P1 and P2 respectively. Cables have stripe to right at transport rear. Cables do not cross.

6. Dress cable tagged 962031 and transport power cable down through trough, then hook CSC-100 on rear of transport.

7. Attach grounding/hanger straps to screws at left and right of transport. Arrangement needs to look like a swing, as installed.

8. Dress the end of cable P/N 1948032_31200 having the strain relief connector down left and front sides of NMED01 or NCRT02 card cage, striped edge down.

9. Attach the other end to either connector on the rear box of CSC-100, strips to right. Fully seat the connector.

1. Observe antistatic procedures. Remove disk server card 11 and 12 pair, noting cable attachments for installation.

2. Install C2 or later EROMs in locations U19 and U27.

3. Locate, plug-in, and screw down SCSI ISBX adapter P/N 6637337_1 at location P4.

4. Install boards and cables. Attach cable P/N 1948032_31200 to visible connector of SCSI board. Position striped edge down at all ribbon connectors.

5. Remove fastener from squared-off end of ½ inch tape 1200 or 2400 feet reel, and insert with tape uncoiling clockwise through hinge-up doorway (Figure 4-10).

6. Fully seat tape on hub, then close door.

7. Turn on power to each MCS cabinet, and immediately press transport's Load , then On-Line . Press the MCS Reset a couple of seconds after turning the breaker ON. Whenever

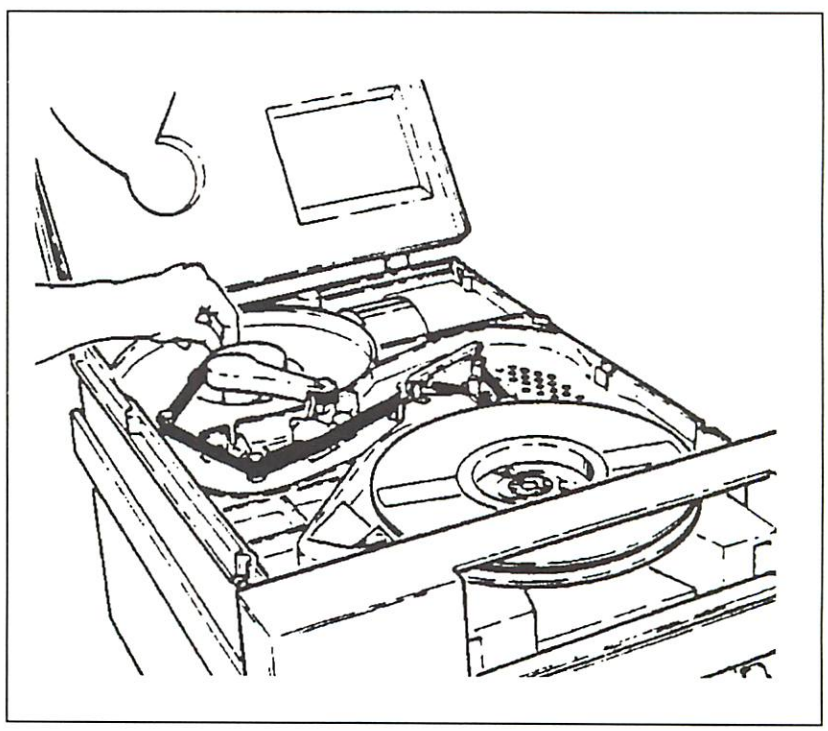


Figure 4-10. Loading Tape

the display does not confirm a successful load, load manually by:

a. Grasp lower left hand door release behind faceplate, squeeze and glide-out transport.

b. Lift hood (chock drops into position).

c. Thread tape through maze then (holding tachometer arm away) wrap six winds clockwise around take-up hub.

d. Lift chock, close hood and retract transport.

e. While pressing Density , press Load , then press On-Line .

PRINTER

Bailey Nomenclature - NPRT02 - Black and White Printer Serial Interface
NPRT03 - Four Color Ribbon
NPRT05 - Black and White High-Speed Draft Printer

A maximum of four printers may be added to the MCS. Refer to ***I/O DISTRIBUTION BOARD*** in section three for socket allocation. Plug the printer into the appropriate I/O distribution board socket. Printers supported are:

GENICOM 3410 with firmware 506111, 507256
GENICOM 3404 with firmware 00403293
GENICOM 4440 model B with firmware 44A512090

NOTES:

1. For distances over 100 feet, optical modems (using up to 1000 feet of fiber optic cable) are required.

2. Emulation mode may be either IBM or GENICOM: ANSI x3.64.

3. The line cord must have isolated safety ground referenced to the same point as the main MCS electronics safety ground, without connection to conduit/structural ground. Receptacles must be isolated ground duplex (e.g., Pass and Seymour IG6200 or equivalent).

Attaching Cables

1. Attach one end of cable NKMR01 to the printer's DB25 serial connector.

2. Attach the remaining end to the MCS/MED terminal panel. Tighten hood screws.

3. Turn printer power on.

4. Press On-Line to obtain LOCAL mode.

5. Press and hold Program to obtain the current setup.

6. If the setup does not agree with the listed setups, change the appropriate function by setting numbers accordingly.

Setup Configuration for Genicom 3410, Firmware 00506111

The Present Configuration is:

1. Font:
   Style - (44_506153) draft
   CPI - 12.0
   Country - USA
   Mode - Normal
2. LPI- 6
3. Forms Control:
   Form Length - 11.0"
   Top Margin - 0.0"
   Bottom Margin - 0.0"
4. Interface Control:
   Interface Type - Serial
   Input buffer length 0512
   Interface Straps A:

```
          1         2         3
12345678901234567890123456789012
00001000000010000000100000001000
```

   Interface Straps B:

```
          1         2         3
12345678901234567890123456789012
00000000000000000000000000000000
```

   Speed - 9600
   Parity - Space
5. Margin Settings
   Left Margin - 0.0"
   Right Margin - 13.6"
6. Horizontal Tab Stops:
   None
7. Vertical Tab Stops:
   None
8. Printer Control Straps:
   Printer Straps A:

```
          1         2         3
12345678901234567890123456789012
10001000101100000000000000000000
```

   Printer Straps B:

```
          1         2         3
12345678901234567890123456789012
00000000000000000000000000000000
```

9. Emulation Mode - IBM

Press the number 0 to return to normal operation.
To continue modification select (1- 8).

Setup Configuration for Genicom 3410, Firmware 507256

Resolution: MED PRINTHEAD: 18P

1. Font:
   Style - (507339 Draft) 400 CPS 2/144
   CPI - 12.0
   Country - USA
   Mode - Normal
2. LPI - 6
3. Forms Control:
   Form Length - 11.0"
   Top Margin - 0.0"
   Bottom Margin - 0.0"
4. Interface Control:
   Interface Type - Serial
   Input buffer length 0512
   Interface Straps A:

```
          1         2         3
12345678901234567890123456789012
00001000000010000000100000001000
```

   Interface Straps B:

```
          1         2         3
12345678901234567890123456789012
00000000000000000000000000000000
```

   Speed - 9600
   Parity - Space
5. Margin Settings
   Left Margin - 0.0"
   Right Margin - 13.6"
6. Horizontal Tab Stops:
   None
7. Vertical Tab Stops:
   None
8. Printer Control Straps:
   Printer Straps A:

```
          1         2         3
12345678901234567890123456789012
10001000101100000000000000000000
```

   Printer Straps B:

```
          1         2         3
12345678901234567890123456789012
00000000100000000000000000000000
```

9. Emulation Mode - IBM

Press the number 0 to return to normal operation.
To continue modification select (1-9).

printer setup

Setup Configuration for Genicom 3410, Firmware 507256
511320

Resolution: MED PRINTHEAD: 18P

1. Font:
   Style - (507339 DP) 400 CPS 2/144
   CPI - 12.0 10.0
   Country - USA
   Mode - Normal
2. LPI - 6
3. Forms Control:
   Form Length - 11.0"
   Top Margin - 0.0"
   Bottom Margin - 0.0"
4. Interface Control:
   Interface Type - Serial
   Input buffer length 0512
   Interface Straps A:

```
          1         2         3
12345678901234567890123456789012
00001000000010000000100000001000
```

   Interface Straps B:

```
          1         2         3
12345678901234567890123456789012
00000000000000000000000000000000
```

   Speed - 9600
   Parity - Space
5. Margin Settings
   Left Margin - 0.0"
   Right Margin - 13.6"
6. Horizontal Tab Stops:
   None
7. Vertical Tab Stops:
   None
8. Printer Control Straps:
   Printer Straps A:

```
          1         2         3
12345678901234567890123456789012
10001000101100000000000000000000
```

   Printer Straps B:

```
          1         2         3
12345678901234567890123456789012
00000000100000000000000000000001
```

9. Emulation Mode - GENICOM: ANSI X3.64

Press the number 0 to return to normal operation.
To continue modification select (1-9).

Setup Configuration for Genicom 3310, Firmware 506895

Resolution: HI PRINTHEAD: 9

1. Font:
   Style - (44A506864) DP
   CPI - 12.0
   Country - USA
   Mode - Normal
2. LPI - 6
3. Forms Control:
   Form Length - 11.0"
   Top Margin - 0.0"
   Bottom Margin - 0.0"
4. Interface Control:
   Interface Type - Serial
   Input buffer length 0512
   Interface Straps A:

```
          1         2         3
12345678901234567890123456789012
00011000000010000000100000001000
```

   Interface Straps B:

```
          1         2         3
12345678901234567890123456789012
11100000000000000000000000000000
```

   Speed - 9600
   Parity - None
5. Margin Settings
   Left Margin - 0.0"
   Right Margin - 13.6"
6. Horizontal Tab Stops:
   None
7. Vertical Tab Stops:
   None
8. Printer Control Straps:
   Printer Straps A:

```
          1         2         3
12345678901234567890123456789012
10001000111100000000000000000000
```

   Printer Straps B:

```
          1         2         3
12345678901234567890123456789012
00000100110010000011000000000000
```

9. Emulation Mode - IBM

Press the number 0 to return to normal operation.
To continue modification select (1-9).

Setup Configuration for Genicom 3310, Firmware 506895

Resolution: HI PRINTHEAD: 9

1. Font:
   Style - (44A506864) DP
   CPI - 12.0
   Country - USA
   Mode - Normal
2. LPI - 6
3. Forms Control:
   Form Length - 11.0"
   Top Margin - 0.0"
   Bottom Margin - 0.0"
4. Interface Control:
   Interface Type - Serial
   Input buffer length 0512
   Interface Straps A:

```
          1         2         3
12345678901234567890123456789012
00011000000010000000100000001000
```

   Interface Straps B:

```
          1         2         3
12345678901234567890123456789012
11100000000000000000000000000000
```

   Speed - 9600
   Parity - None
5. Margin Settings
   Left Margin - 0.0"
   Right Margin - 13.6"
6. Horizontal Tab Stops:
   None
7. Vertical Tab Stops:
   None
8. Printer Control Straps:
   Printer Straps A:

```
          1         2         3
12345678901234567890123456789012
10001000111100000000000000000000
```

   Printer Straps B:

```
          1         2         3
12345678901234567890123456789012
00000100010010000011000000000000
```

9. Emulation Mode - GENICOM: ANSI X3.64

Press the number 0 to return to normal operation.
To continue modification select (1-9).

Setup Configuration for Genicom 3404, Firmware 00403293

1. Font:
   Style - Draft
   CPI - 12.0
   Country - USA
   Mode - Normal
   Ribbon Type - Process
2. LPI - 6
3. Forms Control:
   Form Length - 11.0"
   Top Margin - 0.0"
   Bottom Margin - 0.0"
4. Interface Control:
   Interface Type - Serial
   Speed - 9600
   Parity - None
   Interface Straps:

```
                1         2         3
1234567890123456789012345678901 2
0000100000001000000010000000 1000
```

5. Margin Settings
   Left Margin - 0.0"
   Right Margin - 13.6"
6. Horizontal Tab Stops:
   None
7. Vertical Tab Stops:
   None
8. Printer Control Straps:

```
          1
1234567890123456
1000100011110000
```

Press the number 0 to return to normal operation.
To continue modification select (1-8).

NOTE: Will print color only if ribbon type is Process.

Setup Configuration for Genicom 4440, Firmware 44A512090 SY - 44A512091 IM

1. Font:
   Style - 44A512091 Data Processing
   CPI - 12.0
   Country - USA
   Mode - Normal
   Horizontal Expansion - X1
   Vertical Expansion - X1
2. LPI - 6 LPI
3. Forms Control (inches):
   Form Length - 11.0
   Top Margin - 0.0
   Bottom Margin - 0.0
4. Interface Control:
   Interface Type - Serial
   Input buffer length 2816
   Interface Straps A:

```
          1         2         3
12345678901234567890123456789012
00011011000010100000101000001000
```

   Interface Straps B:

```
          1         2         3
12345678901234567890123456789012
11000000000000000000000000000000
```

   Speed - 9600
   Parity - Odd
5. Margin Settings (columns):
   Left Margin - None
   Right Margin - 132
6. Horizontal Tabs (columns):
   None
7. Vertical Tab Stops (inches):
   Default
8. Printer Control Straps:
   Printer Straps A:

```
          1         2         3
12345678901234567890123456789012
10011000000000010000000000000000
```

   Printer Straps B:

```
          1         2         3
12345678901234567890123456789012
00000100000000000000000000000000
```

9. Emulation Mode - ANSI X3.64

Options: None
Press the number 0 to return to normal operation.
To continue modification select (1-9).

Setup Configuration for Genicom 4440, Firmware 44A507470 SY - 44A507471 IM

1. Font:
   Style - 44A507471 Data Processing
   CPI - 12.0
   Country - USA
   Mode - Normal
   Horizontal Expansion - X1
   Vertical Expansion - X1
2. LPI - 6 LPI
3. Forms Control (inches):
   Form Length - 11.0
   Top Margin - 0.0
   Bottom Margin - 0.0
4. Interface Control:
   Interface Type - Serial
   Input Buffer Length 2997
   Interface Straps A:

```
          1         2         3
12345678901234567890123456789012
00011011000010100000101000001000
```

   Interface Straps B:

```
          1         2         3
12345678901234567890123456789012
11000000000000000000000000000000
```

   Speed - 9600
   Parity - Even
5. Margin Settings (columns):
   Left Margin - None
   Right Margin - 132
6. Horizontal Tabs (columns):
   None
7. Vertical Tab Stops (inches):
   Default
8. Printer Control Straps:
   Printer Straps A:

```
          1         2         3
12345678901234567890123456789012
00000000000000000011000001001010
```

   Printer Straps B:

```
          1         2         3
12345678901234567890123456789012
00000000000000000000000000000000
```

9. Emulation Mode - ANSI X3.64

Options: None
Press the number 0 to return to normal operation.
To continue modification select (1-9).

REDUNDANCY TRANSFER SWITCH (IIVRT01)

Description

The MCS redundancy transfer switch (IIVRT01) is used to switch control of four keyboards, four monitors and two line printers between one of two management command system driver electronics (Figure 4-11).

The switch is a 5 inch, by 19 inch, by 9 inch, open box with two circuit boards and a power supply. It is designed to mount on a standard 19 inch EIA rack. The IIVRT01 replaces the I/O distribution board and is mounted in the same location. It mounts inside the NMED01 driver cabinet, or in the NMCS01 with rack adapters.

The VRT provides a fail safe configuration mode which transfers all peripherals to the secondary MCS driver cabinet should the primary fail.

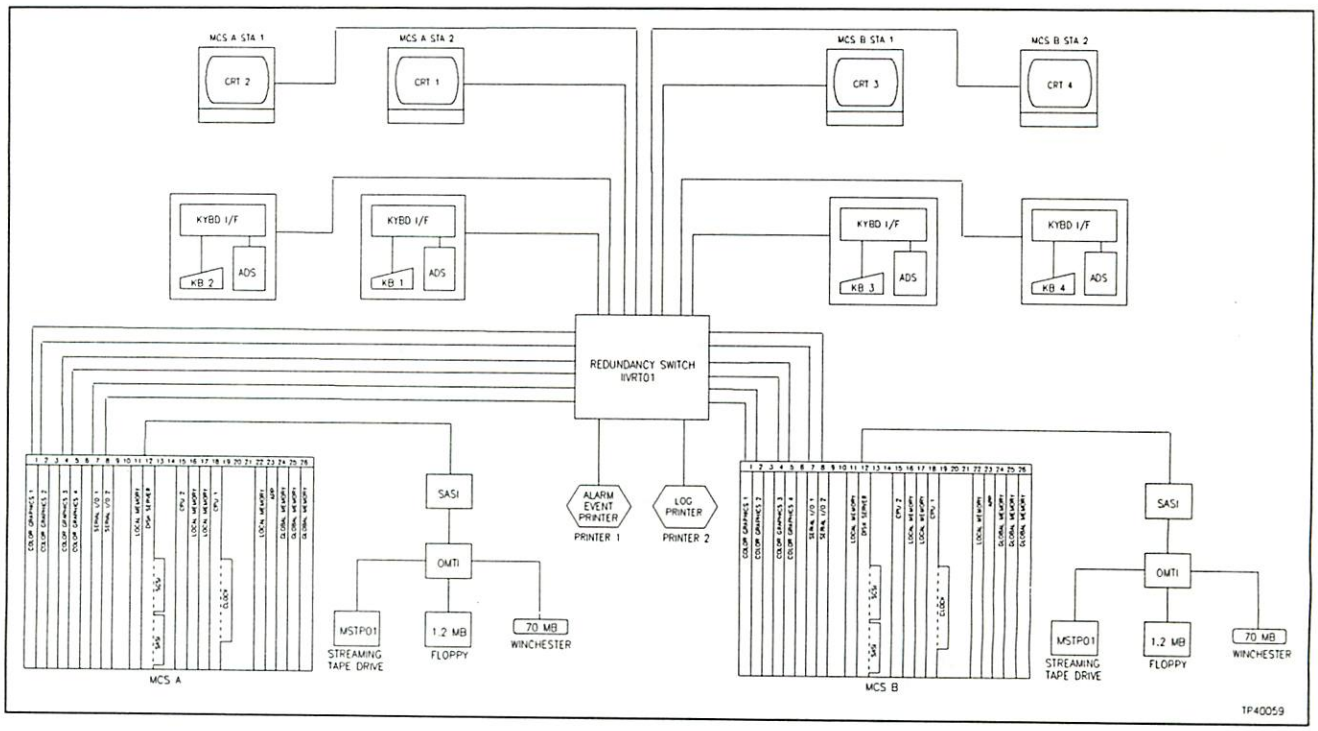


Figure 4-11. MCS Hardware Configuration Using the IIVRT01

Top Circuit Board

The four keyboards and line printers are connected to the top circuit board via RS232 cables and 25 pin DB connectors:

Peripheral	RS232 Connector
Keyboard 1	P1
Keyboard 2	P3
Keyboard 3	P5
Keyboard 4	P11
Printer 1	P9
Printer 2	P13
CIU (MCS A)	P8

NOTE: Even numbered connectors are not switchable. Connect the CIU to the even numbered connectors. The diagnostic port is connector P15.

60 pin ribbon connectors are connected from the I/O boards in the MCSs:

I/O Panel Connector	IIVRT01 Connector
MCS A, P21R (SCI J1R)	P18
MCS B, P21R (SCI J1R)	P19
MCS A, P22R (SCI J2R)	P20
MCS B, P22R (SCI J2R)	P21

Ribbon Cable	P/N
74 inches	6632686_60-1
10 feet	1948524_10
15 feet	1948524_15
20 feet	1948524_20

The rocker switches across the top of the board are used to select assignment of peripherals when the external switch is in the USER SELECT position. The position of the external switch along with POWER ON are indicated by four red LEDs on the circuit board (Figure 4-12).

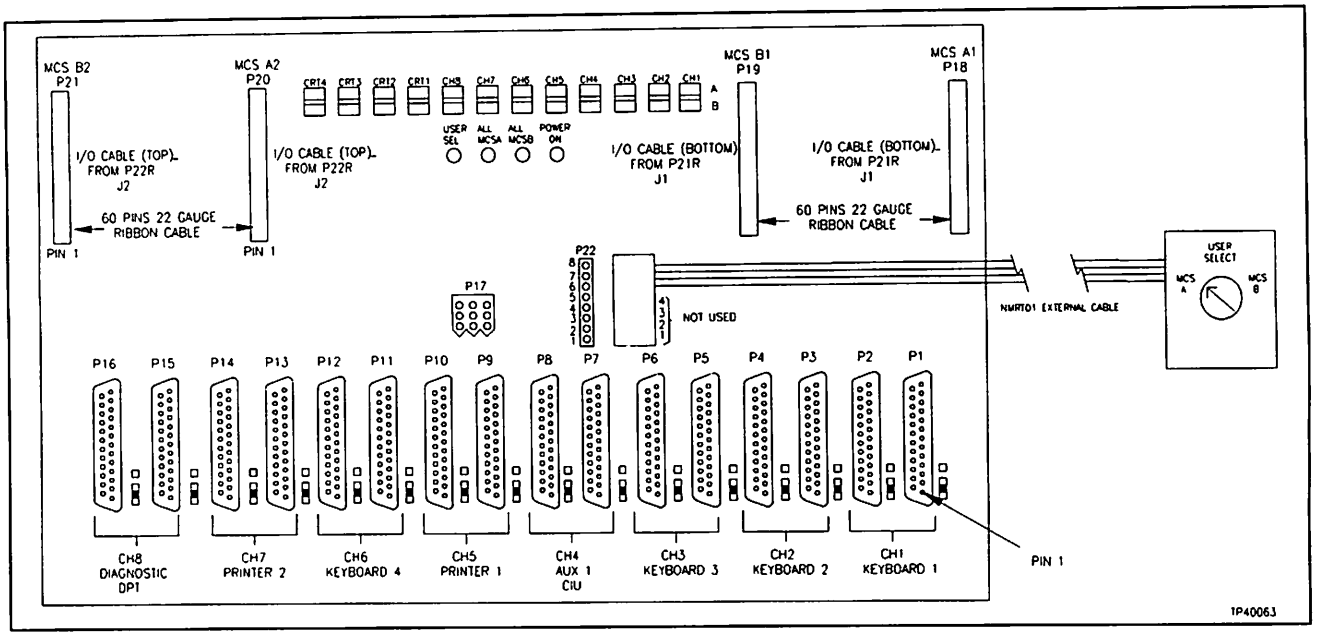


Figure 4-12. IIVRT01 Top Circuit Board

Operation

When the external switch is in the MCS A position, all four keyboards, the four monitors and both line printers are driven by the MCS A driver electronics. Conversely, when the switch is in the MCS B position, the assigned peripherals are driven by the MCS B driver electronics.

When the external switch is in the USER SELECT position, the user may select which MCS driver electronics is assigned to the peripherals by activation of the rocker switches.

External Switch

The external switch connector (Figure 4-13) is polarized. Pins 1, 2, 3 and 4 of P22 (Figure 4-12) are wired to the switch. The maximum distance from the IIVRT01 to the switch is 90 feet.

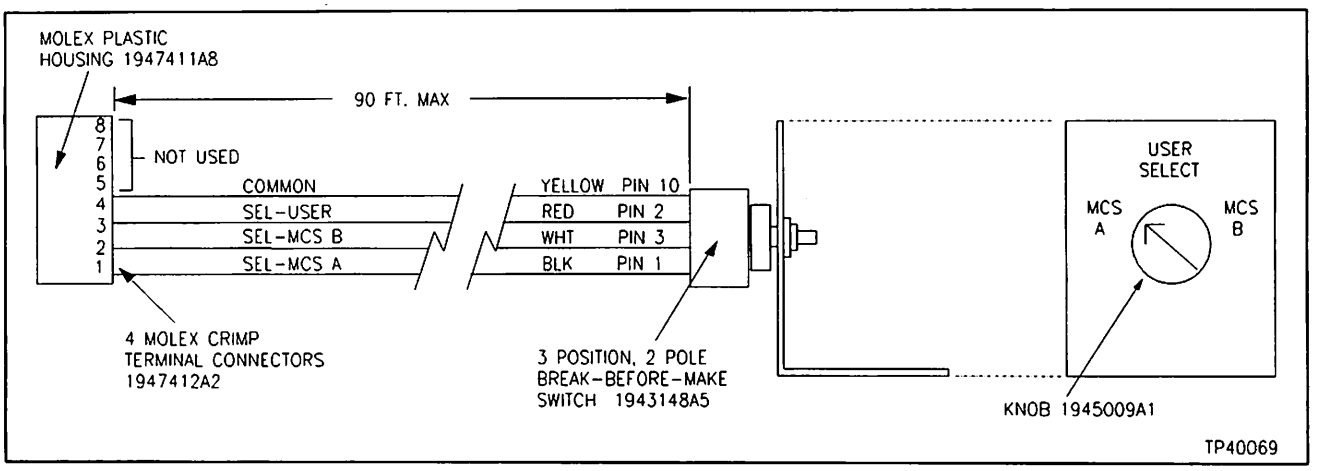


Figure 4-13. IIVRT01 External Switch

Bottom Circuit Board

The red, green and blue coaxial cables from the driver display (MATROX) boards in the MCS are connected to the respective BNC connectors on this board (Figure 4-14).

The power supply is connected to a 120 VAC outlet on an MCS, or the 120/240 VAC outlet on the NMED01 power entry panel. Set the jumpers on the power supply (shown in Table 4-5) for the appropriate input voltage level.

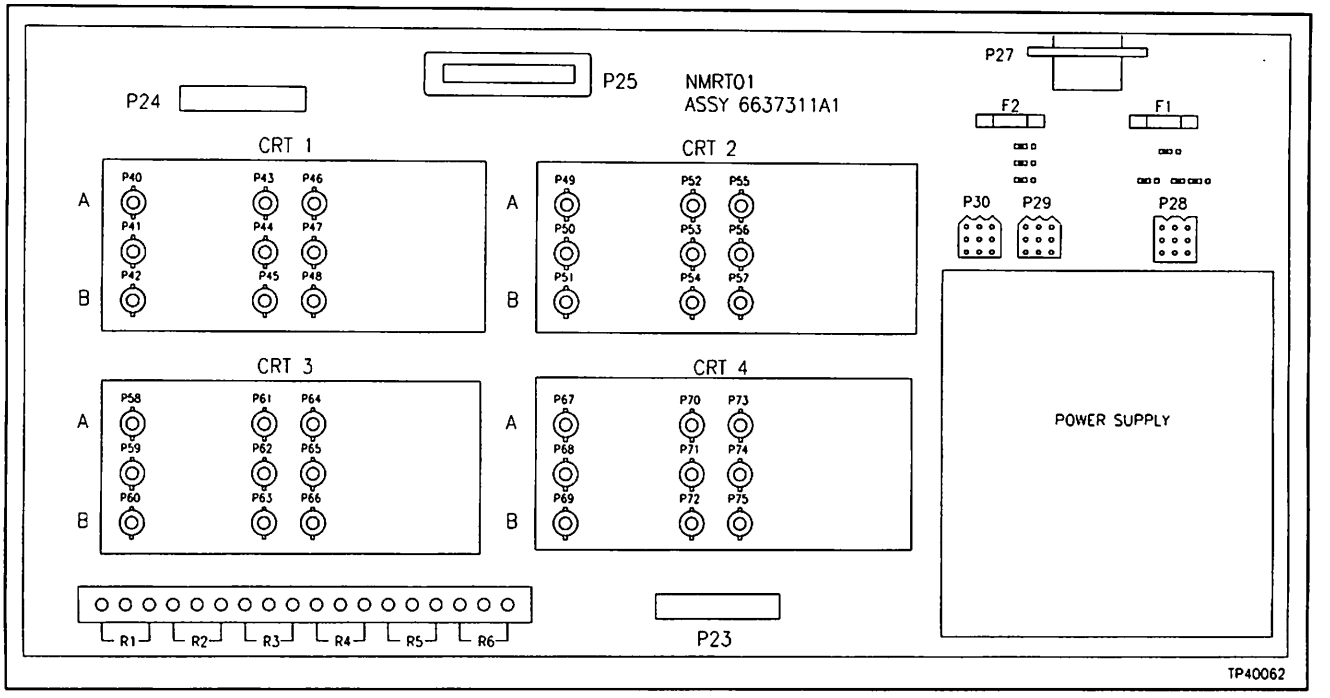


Figure 4-14. IIVRT01 Bottom Circuit Board

Table 4-5. IIVRT01 Power Supply Jumper Settings

Voltage (VAC)	J18	J19	J20	J21	J22	J23
100	o–o o	o–o o	o–o o	o o–o	o o–o	o–o o–o o
120	o–o o	o–o o	o–o o	o–o o	o–o o	o–o o–o o
220	o o–o	o o–o	o o–o	o o–o	o o–o	o o–o o–o
230/240	o o–o	o o–o	o o–o	o–o o	o–o o	o o–o o–o

Mounting

The VRT mounts in the same way that the I/O distribution board mounts in a standard NMCS02 or NMED01. For the NMCS02, special brackets are included with the assembly to mount it behind the multibus card cage. For the MED01 the brackets may be discarded since the weldment is designed for use with an EIA standard 19 inch rack, as found in the NMED01.

PCI is located on the VRT on a hinged frame that allows it to swing down for access to PCII and the power supply section (Figure 4-15).

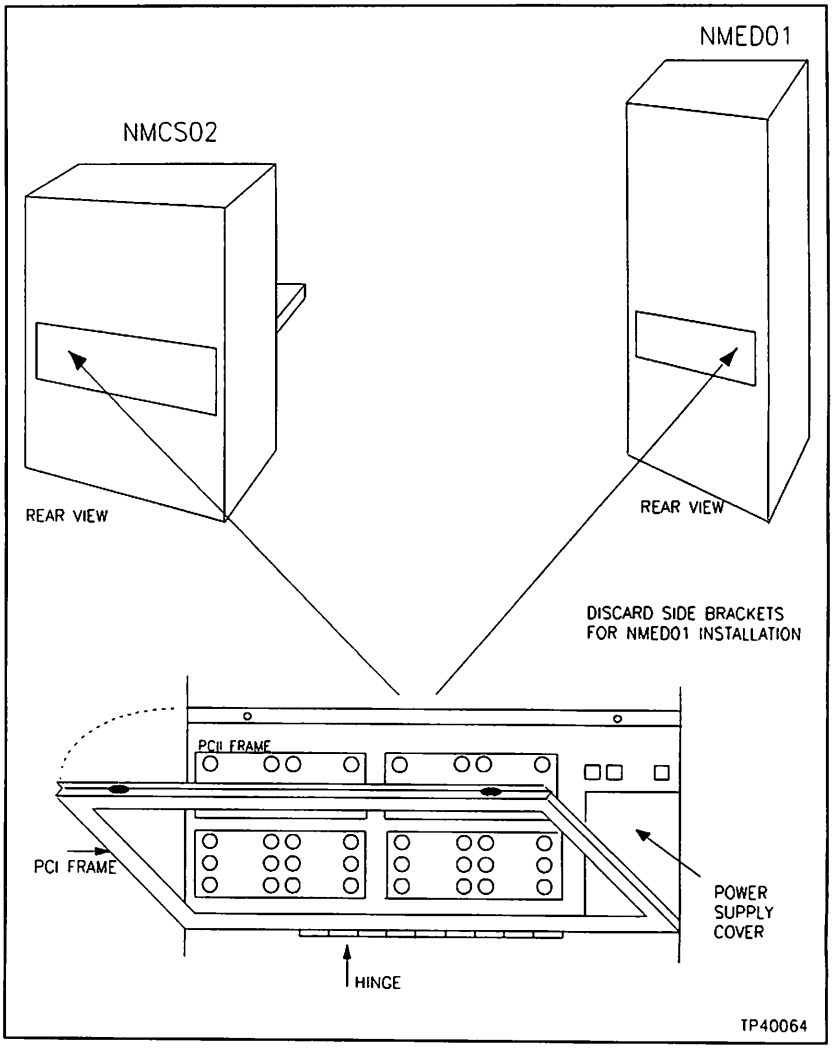


Figure 4-15. VRT Mounting

System Configuration

All the monitors, keyboards and line printers must be configured the same in both driver electronics. To accomplish this, position the external selector to the MCS A and configure all the peripherals which are to be assigned to the MCS A driver electronics. After MCS A is configured, repeat the procedure for MCS B. Note that the monitor, keyboard and printer assignments must be the same for both driver electronics.

Figure 4-16 shows the IIVRT01 connections for MCS A and MCS B.

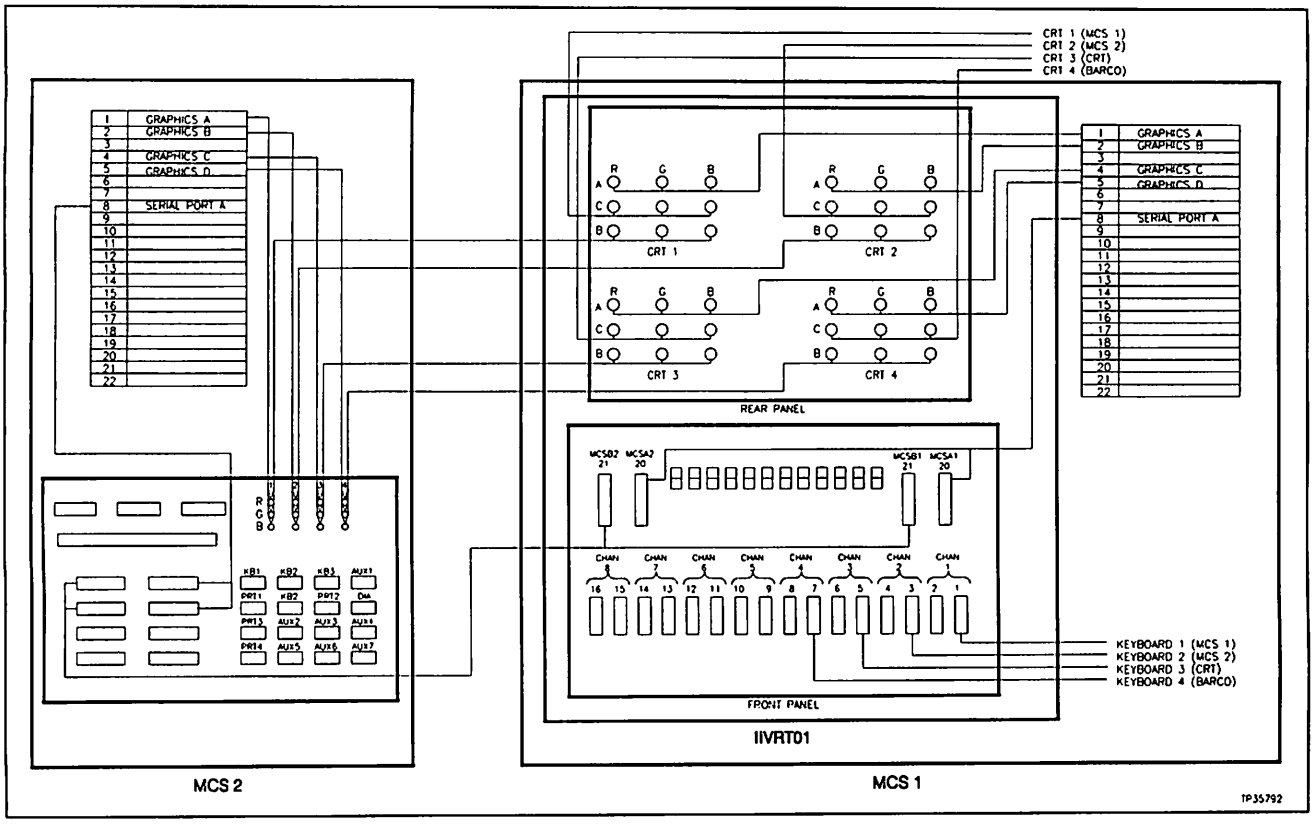


Figure 4-16. VRT Connections

REMOTE ELECTRONICS DRIVER CABINET (NMED01)

The MCS remote electronics driver cabinet (NMED01) provides protection from industrial environments for INFI 90 and Network 90 hardware, while allowing monitors and central processing units to be cabled away in a cleaner environment.

The MED cabinet measures 87 inches by 24 inches by 30 inches. It contains the same driver electronics as the NMCS02, and is configured in the same manner. The front and rear views of the MED is shown in Figure 4-17.

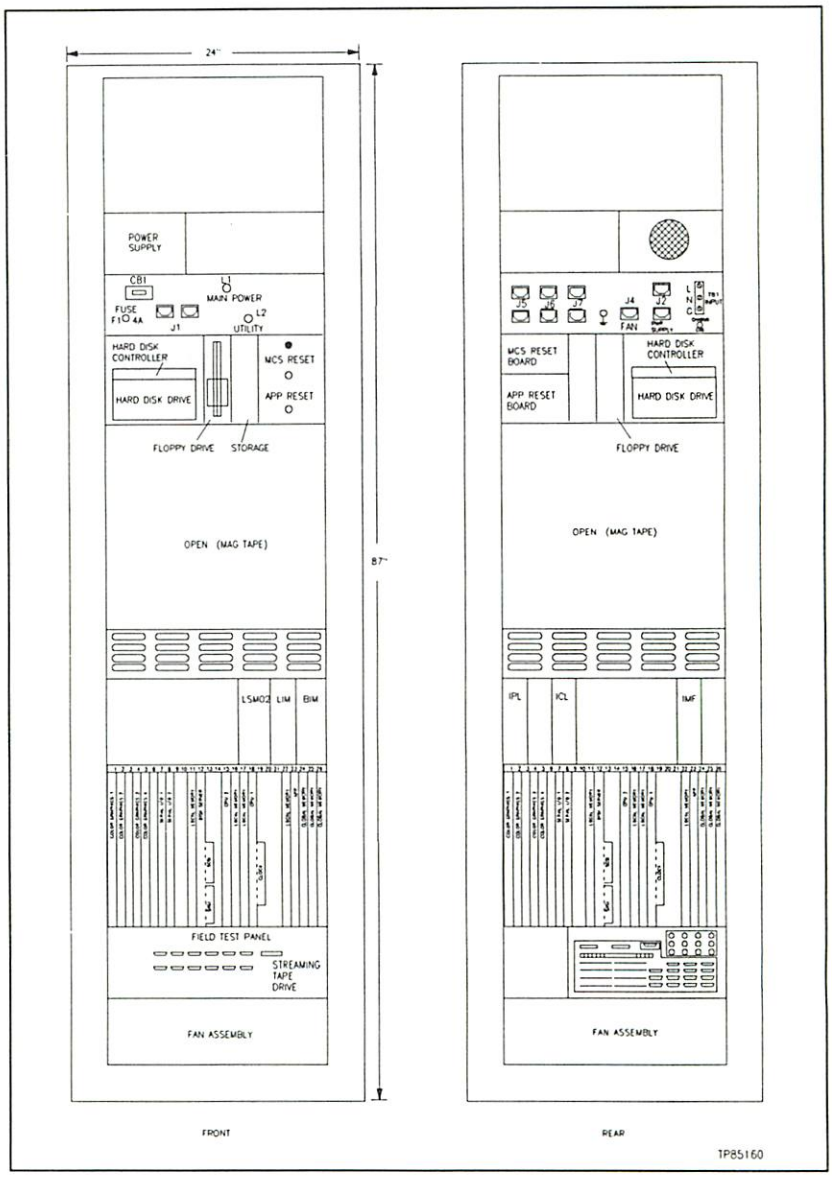


Figure 4-17. Front and Rear Views of the NMED01

Field Test Panel
Bailey P/N - 6637229_1

Figure 4-18 shows the field test panel for the NMED01. Table 4-6 lists the wiring connection to the field test panel.

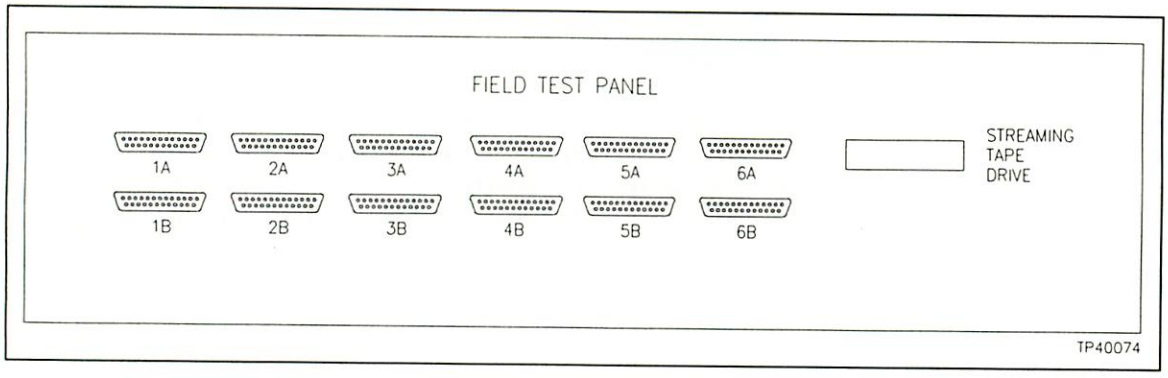


Figure 4-18. Field Test Panel

Table 4-6. Wiring Connection to Field Test Panel

1A/1B	2A/2B	3A/3B	4A/4B5A/5B	6A/6B	Streaming Drive
To P5 connector on disk server card	To P5 connector on CPU card 2	To P5 connector on CPU card 1	Unused	To J3 connector of assembly number 6636488_1 to NLSM02	Unused to J8 connector on disk drive controller card
Use cable number 1948200_50N14					Use cable number 6637460_ 50N93

POWER ENTRY PANEL (PEP)

Bailey P/N - 6637587_1

Power is supplied to the MED through the Power Entry Panel (PEP). Refer to ***SECTION 2 - INSTALLATION AND START-UP***, for connecting AC power. Table 4-7 contains the wiring connections to the PEP. Figure 4-19 shows the power entry panel for the MCS.

Table 4-7. Wiring Connections to the PEP

J2	Socket Number J4 (Fan)	J5 - J6	J7	From TB1 Input	From PEP Chassis GND
Use wire assembly 6637599_1; Connect to terminal block on power supply Brown wire to terminal L blue wire to terminal N Green/yellow wire to terminal G	Power to fan assembly	Modems (optional)	Mag Tape (optional)	To AC power source	To chassis ground with green wire 6637448_1 To power supply use wire assembly Connect: one green wire to CH1 NEG, One green wire terminal block, G terminal

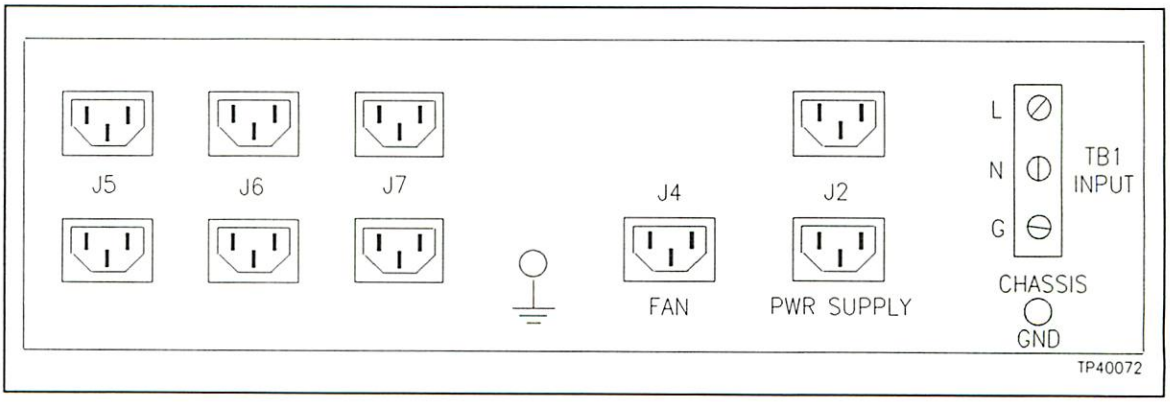


Figure 4-19. Power Entry Panel (PEP)

SCSI NINE TRACK REEL-TO-REEL TAPE TRANSPORT ADAPTER

Bailey P/N - 6637337_1

The small computer system interface (SCSI) adapter (Figure 4-20) interfaces a nine track reel-to-reel tape transport to the MCS. For more information on this tape transport, refer to ***NINE TRACK REEL-TO-REEL TAPE TRANSPORT*** in this section. The SCSI adapter plugs into the disk server card (refer to ***Disk Server Card*** in section three of this manual). Configure the adapter by setting the jumpers as shown in Figure 4-20.

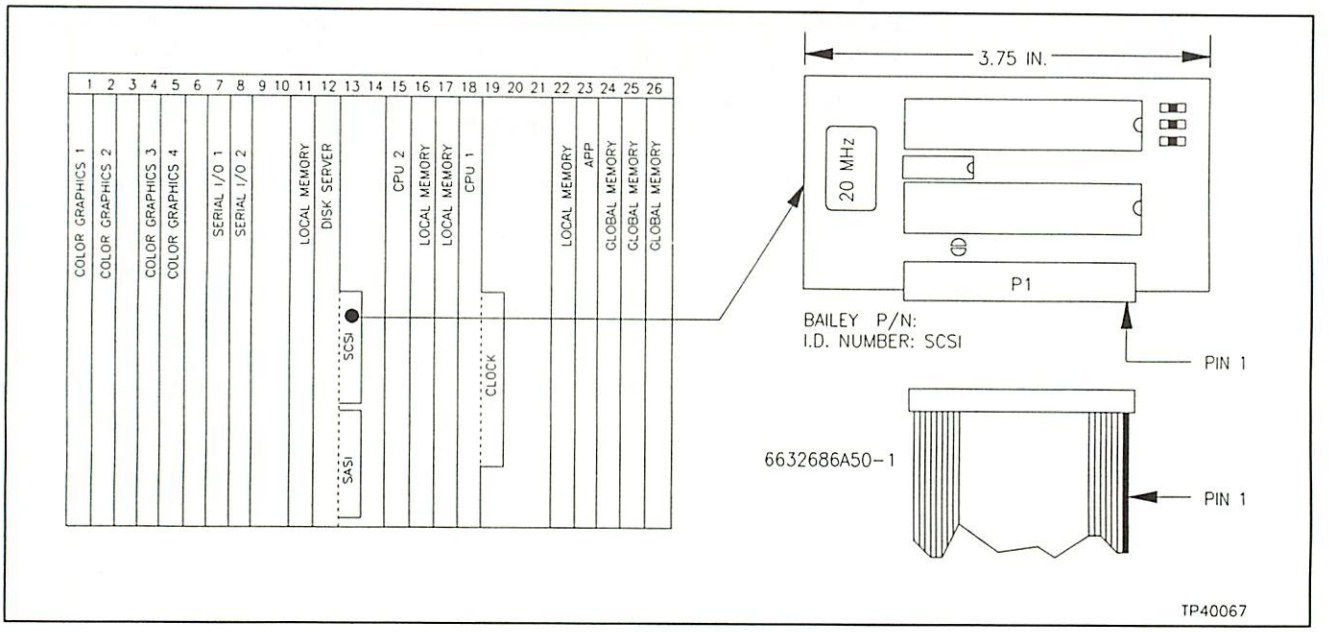


Figure 4-20. SCSI Adapter Card

STREAMING TAPE DRIVE (NSTP01)

The NSTP01 streaming tape drive peripheral is a 60 Mbyte cartridge tape drive with a QIC02 interface and power supply housed in an APC half-case enclosure. It is used to perform backups of the MCS hard disk with the command BU and restores with the command RU. The backup/load process may be completed in about 40 minutes, depending on the interleave factor. For 85 Megabyte drives, attendance is required midway to completion of each command to remove the first tape and insert the second. The disk controller used by the MCS also controls the tape drive.

A kit (P/N 258433_1) is available to adapt to the rugged 50 pin blue ribbon receptacle (Figure 4-21) supplied on the front panel of those MCS systems shipped since the fall of 1987. The streaming tape unit is supplied with a blue ribbon D plug. See Figure 4-21 to attach the cable (P/N 1948325_50) between the controller board J8 connector to the front panel D receptacle.

The tape drive unit contains a controller board which requires configuration by setting jumpers. The jumper settings are factory set and should require no further configuration. To verify the settings, see Figure 4-22.

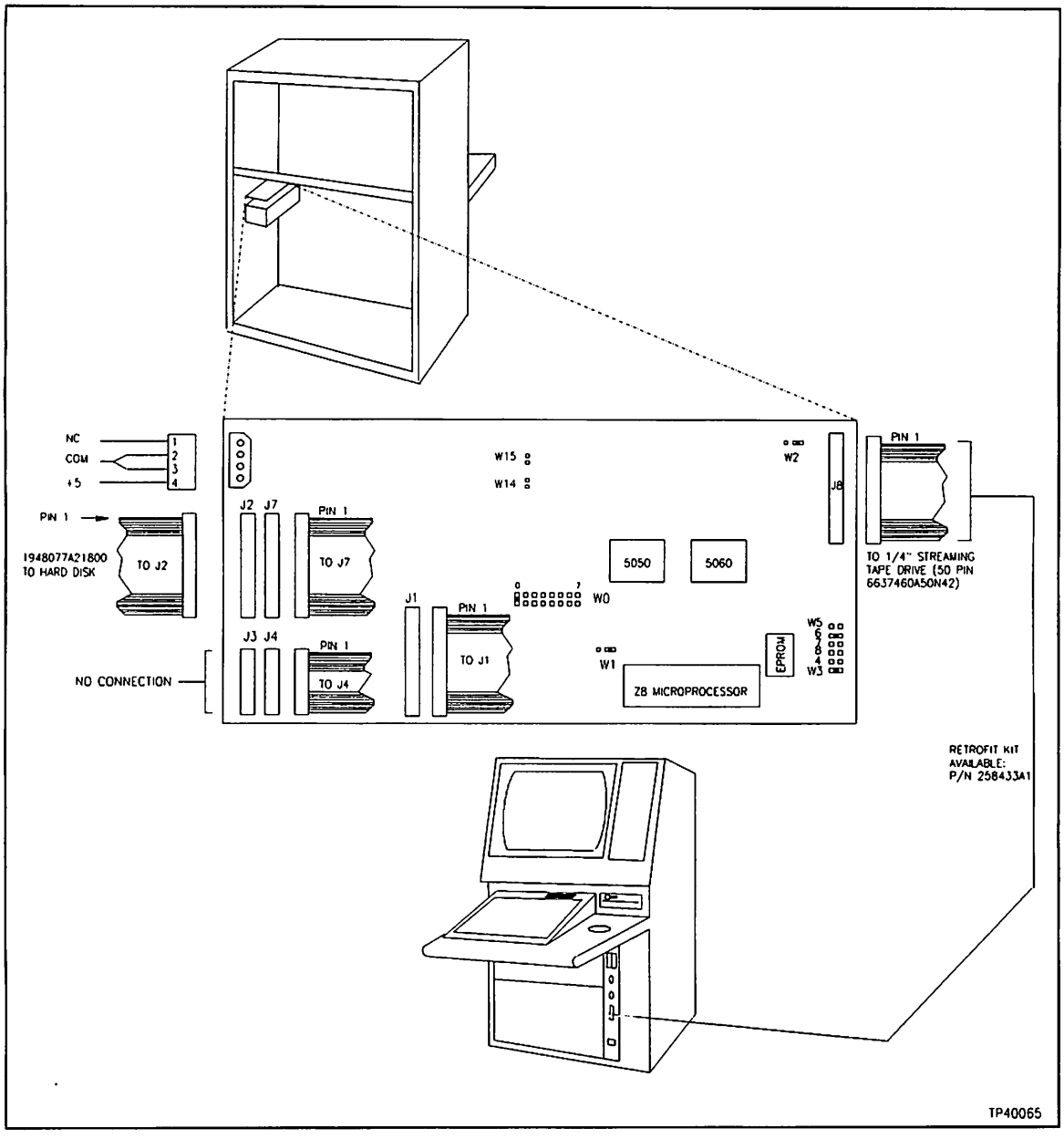


Figure 4-21. NSTP01 Cable Connections

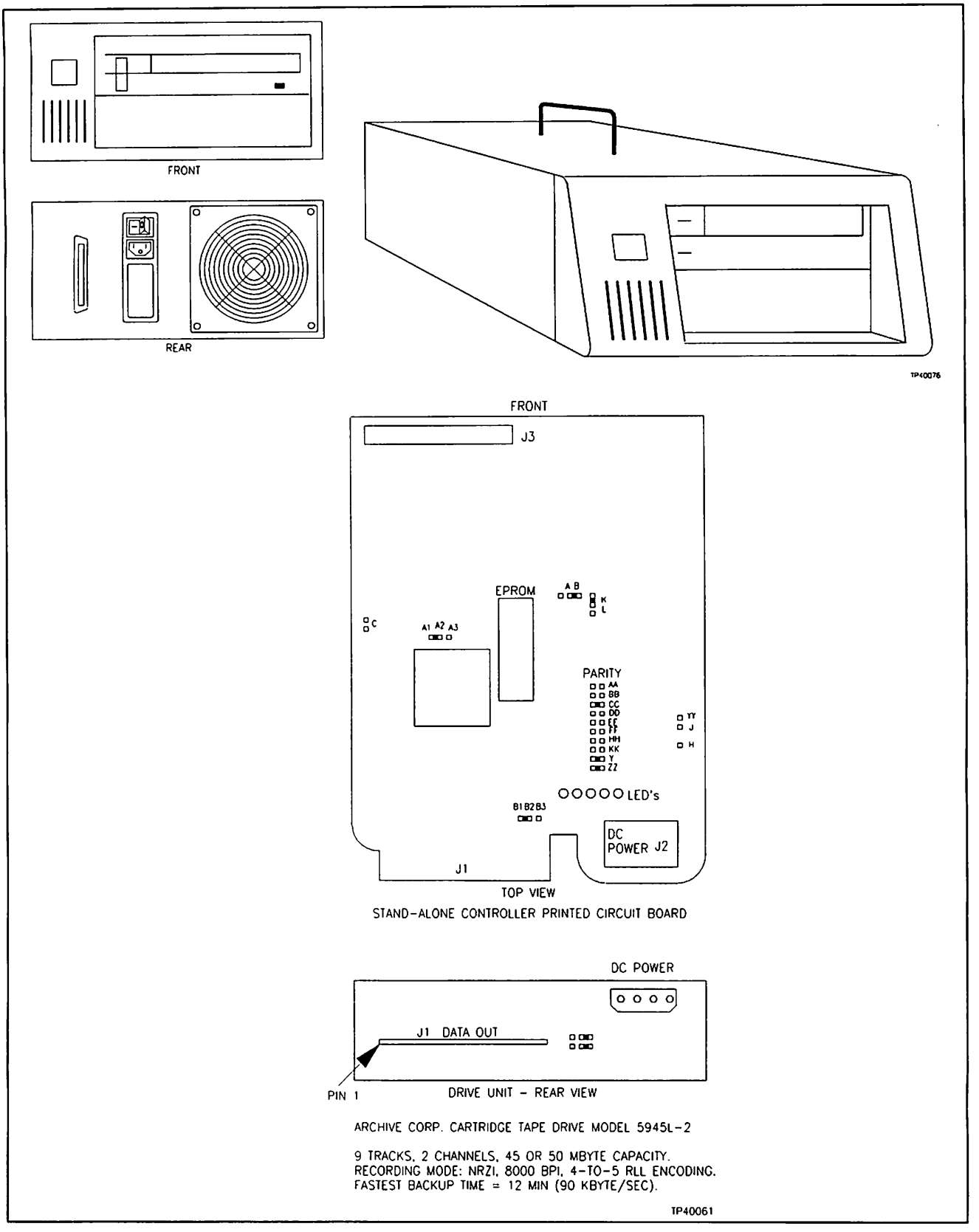


Figure 4-22. Tape Drive and Internal Controller Card Jumper Settings

Backup and Restore Operation

Connect the terminal to the Monitor 68K diagnostic port on the disk server card. Reset the MCS, and press Enter on the terminal within seven seconds. Enter the command **BU** to backup the MCS hard disk to tape, or the command **RU** to restore the hard disk from tape.

A 55 Mbyte hard disk backup must be restored to a 55 Mbyte hard disk, with one tape required. An 85 Mbyte hard disk backup must be restored to an 85 Mbyte hard disk, with two tapes required. A 190 Mbyte hard disk backup must be restored to a 190 Mbyte hard disk, three tapes required.

INFI-NET COMPUTER INTERFACE UNIT (INICI04)

The computer interface unit (INICI04) enables the MCS to interact with the INFI 90 and Network 90 system through INFI-NET. This interface consists of the INFI-NET interface slave and the INFI-NET storage module. If your MCS contains an LIS and SSM modules, they may continue to be used with their current settings.

OPTICAL DISK STORAGE

Bailey Nomenclature - NODS01

The NODS01 is a Cherokee™ optical disk drive data system with rack mount hardware. (Cherokee P/N 8831-2). This list is the contents of the NODS01.

Qty.	Part Number	Description
1	6637858	Print of drawing
1	1948497A1	Optical disk drive
1	1948497A3	Optical disk media
1	1947950A5	Line cord AC
1	1948032A31200	Ribbon cable assembly
1	6638124A1	Support angle
1	6638124A2	Support angle
2	6638125A1	Mounting clips
12	NMPCC16002	Nut
12	NBJAU16010	Screw
1	6637337B1	ISBX SCSI interface

These instructions are IMPORTANT. To avoid damage to the optical disk drive unit, please read them thoroughly before attempting installation or applying power.

NOTE: In this instruction, NODS01 refers to the disk drive and hardware package. When we refer to the disk drive as a separate unit, we call the Cherokee P/N 8831-2 a disk drive unit (single drive).

TM Cherokee is a registered trademark of Cherokee Data Systems Inc.

INFI-NET To Computer Transfer Module (INICT01)

The INNIS01 receives frames from the INFI-NET and passes them on to the INFI-NET to Computer Transfer Module (ICT) for processing (if an LIS is installed it may continue to be used). The ICT then sorts this incoming data, storing exception reports and incoming requests until the MCS is ready for the data. (Refer to Bailey manual I-E96-608 for more information on this module) See Figure 4-24 for dipswitch configuration. Cable assembly number 6636488_2 provides the necessary connections to the INICT01.

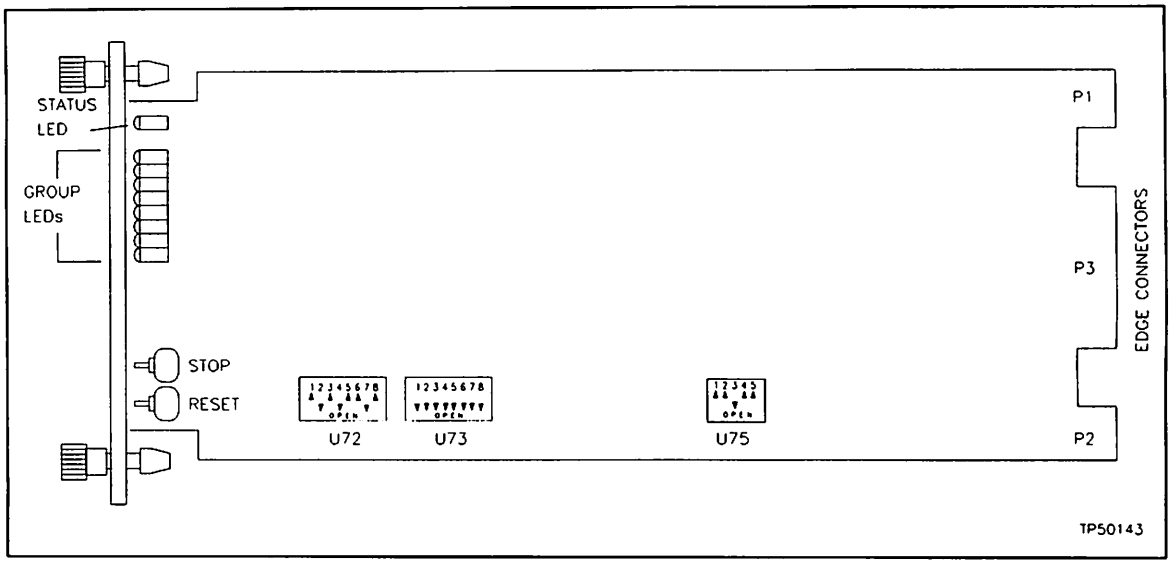


Figure 4-24. INFI-NET To Computer Transfer Module (INICT01)

OPTICAL DISK STORAGE

Bailey Nomenclature - NODS01

The NODS01 is a Cherokee™ optical disk drive data system with rack mount hardware. (Cherokee P/N 8831-2). This list is the contents of the NODS01.

Qty.	Part Number	Description
1	6637858	Print of drawing
1	1948497A1	Optical disk drive
1	1948497A3	Optical disk media
1	1947950A5	Line cord AC
1	1948032A31200	Ribbon cable assembly
1	6638124A1	Support angle
1	6638124A2	Support angle
2	6638125A1	Mounting clips
12	NMPCC16002	Nut
12	NBJAU16010	Screw
1	6637337B1	ISBX SCSI interface

These instructions are IMPORTANT. To avoid damage to the optical disk drive unit, please read them thoroughly before attempting installation or applying power.

NOTE: In this instruction, NODS01 refers to the disk drive and hardware package. When we refer to the disk drive as a separate unit, we call the Cherokee P/N 8831-2 a disk drive unit (single drive).

TM Cherokee is a registered trademark of Cherokee Data Systems Inc.

Unpacking

Carefully remove the disk drive unit drive from its shipping carton and verify its contents which are:

- **M8831-2 Optical Disk Drive.** This self contained unit contains the disk drive, SCSI controller and power supply in a 19 inch rack mount configuration. The optical disk drive requires a Cherokee Data Systems update before it can be used with the MCS. Check for the update label on the back of the unit.

- **Tracker Operators Manual.** This manual contains detailed operating and maintenance instructions for the disk drive unit.

- **Power Cable.** This cable connects the disk drive unit to a local power source.

Save the shipping carton and packing material that accompanied the disk drive unit. It can be used during moving and shipping to protect the unit against damage. Table 4-8 lists the tools required for installation.

Table 4-8. Tools Required for Installation

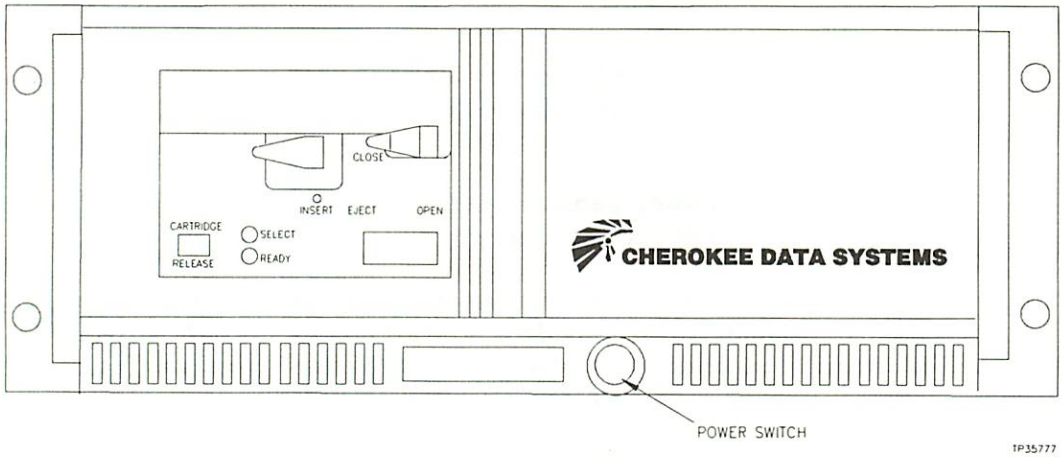
Qty.	Description
1	Flat blade screwdriver
1	Phillips screwdriver
1	Socket flat head number 4-40 wrench

Features

There are setup, operator and maintenance controls on the front and on the back of the optical disk drive.

FRONT PANEL CONTROLS

Figure 4-25 shows the front panel of the disk drive unit.



FRONT PANEL CONTROLS	
SWITCHES	POWER ON/OFF SWITCH CARTRIDGE RELEASE SWITCH
STATUS INDICATORS ON A SINGLE DRIVE	READY STATUS SELECT STATUS
MEDIA ACCESS DOOR ON A SINGLE DRIVE	CLOSE SWITCH OPEN SWITCH

Figure 4-25. Optical Disk Unit Front View

Power On/Off Switch

This pushbutton switch is located on the lower center of the disk drive unit. Pressing the switch applies power. Pressing the switch again will remove power. When power is being supplied to the disk drive unit the switch is illuminated.

Cartridge Release Switch

This pushbutton switch is located just below the cartridge access door on the drive. Depressing the switch allows you to rotate the lock/insert switch. In the unlock (insert) condition, the SELECT and READY lights flash alternately. Refer to ***Select/Status Light***.

Ready/Status Light

If the green READY STATUS indicator stays on, the optical drive in the disk drive unit has optical media loaded and is awaiting access from the host computer.

Select/Status Light

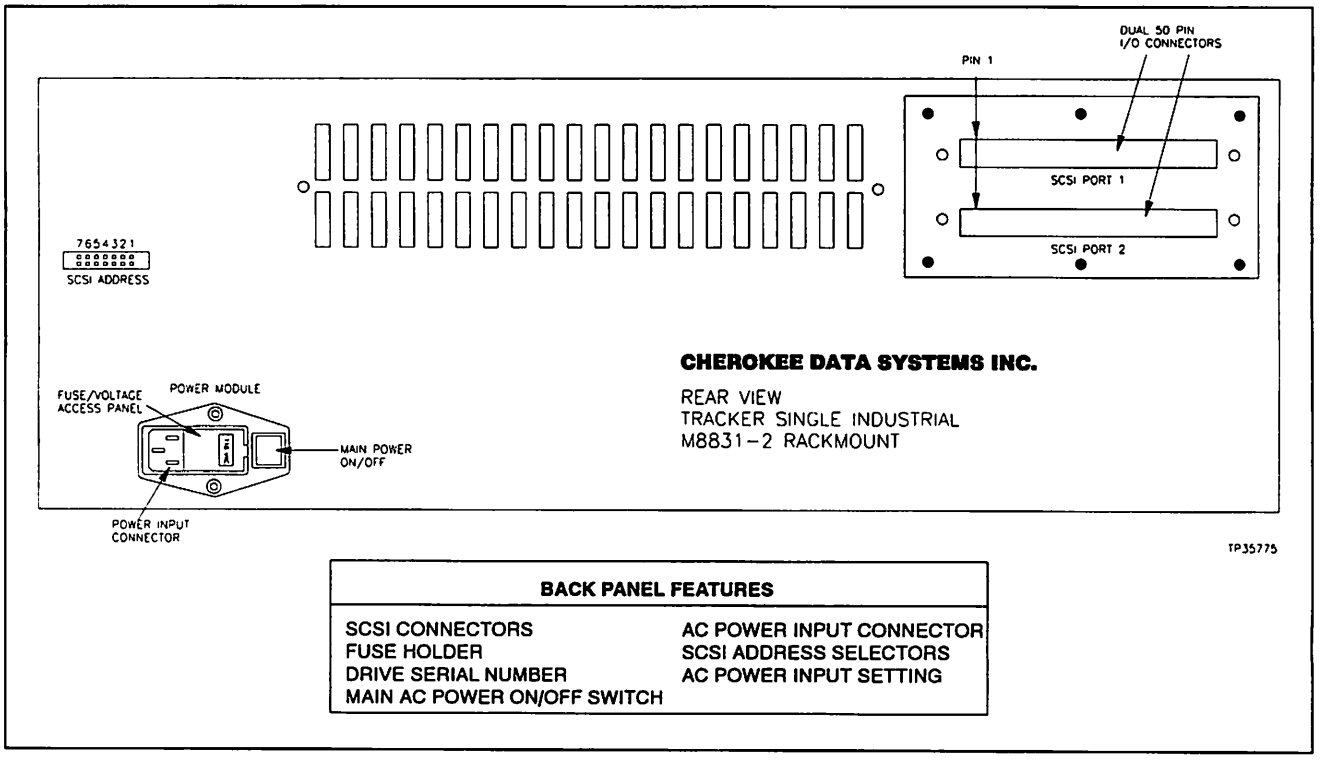
The red SELECT STATUS light indicates that the optical drive in the disk drive unit has been selected by the host computer which may be transferring data or status information.

Media Access Door

Insert or remove storage media by opening the cartridge access door in the front of the disk drive unit. Open the door by rotating the door release knob from the CLOSE position to the OPEN position. Prior to operation, the door release knob should be in the CLOSE position for reliable drive operation. Opening or closing the door release knob does not require power to the drive.

BACK PANEL FEATURES

Figure 4-26 shows the back panel of the disk drive unit.



BACK PANEL FEATURES	
SCSI CONNECTORS	AC POWER INPUT CONNECTOR
FUSE HOLDER	SCSI ADDRESS SELECTORS
DRIVE SERIAL NUMBER	AC POWER INPUT SETTING
MAIN AC POWER ON/OFF SWITCH	

Figure 4-26. Optical Disk Unit Back View

SCSI Connector

The SCSI connector connects the host computer and the SCSI controller in the disk drive unit. The SCSI connectors are located in the right rear corner of the rear panel.

Power Input Connector

The power input connector provides power connection to the disk drive unit. This connector is located next to the fuse holder at the lower left side on the rear of the disk drive unit.

Fuse Holder

The fuse holder is located inside the fuse/voltage access panel on the rear panel of the disk drive unit.

Power Input Setting

The power input setting is located inside the fuse/voltage access panel.

SCSI Address Selectors

The address selector is located on the upper left corner.

Drive Serial Number

The disk drive unit serial number is located at the center of the back panel.

SCSI Address

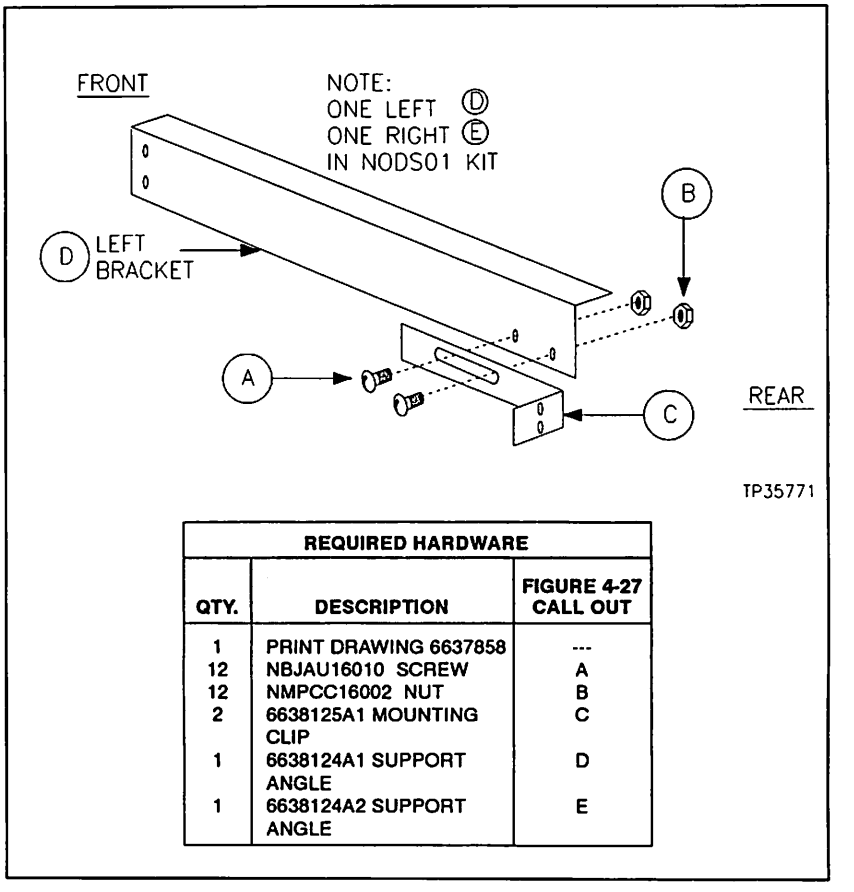
The SCSI address for the optical drive is assumed to be one by the system.

Drive LUN Number

The factory set disk drive Logical Unit Number (LUN) is 0.

Installation

To install the NODS01, first install and align the mounting bracket assembly. See Figure 4-27 and refer to this list when assembling the bracket. The following materials are needed:



REQUIRED HARDWARE		
QTY.	DESCRIPTION	FIGURE 4-27 CALL OUT
1	PRINT DRAWING 6637858	---
12	NBJAU16010 SCREW	A
12	NMPCC16002 NUT	B
2	6638125A1 MOUNTING CLIP	C
1	6638124A1 SUPPORT ANGLE	D
1	6638124A2 SUPPORT ANGLE	E

Figure 4-27. Bracket Assembly

RAIL ASSEMBLY

See Figure 4-27 to assemble the rack mount side rails.

NOTE: Do not over tighten the mounting clip screws until the rails are adjusted to fit their desired cabinet.

RAIL ALIGNMENT AND INSTALLATION

Figures 4-28 and 4-29 show the two cabinet types where the NODS01 is used. Place the rails one at a time in the cabinet and adjust the length. Do this by lining up the front and rear screw holes on the bracket to the front and rear screw holes on the cabinet. Figures 4-28 and 4-29 show the screw hole location for bracket adjusting. Mark the mounting clip position on the support angle.

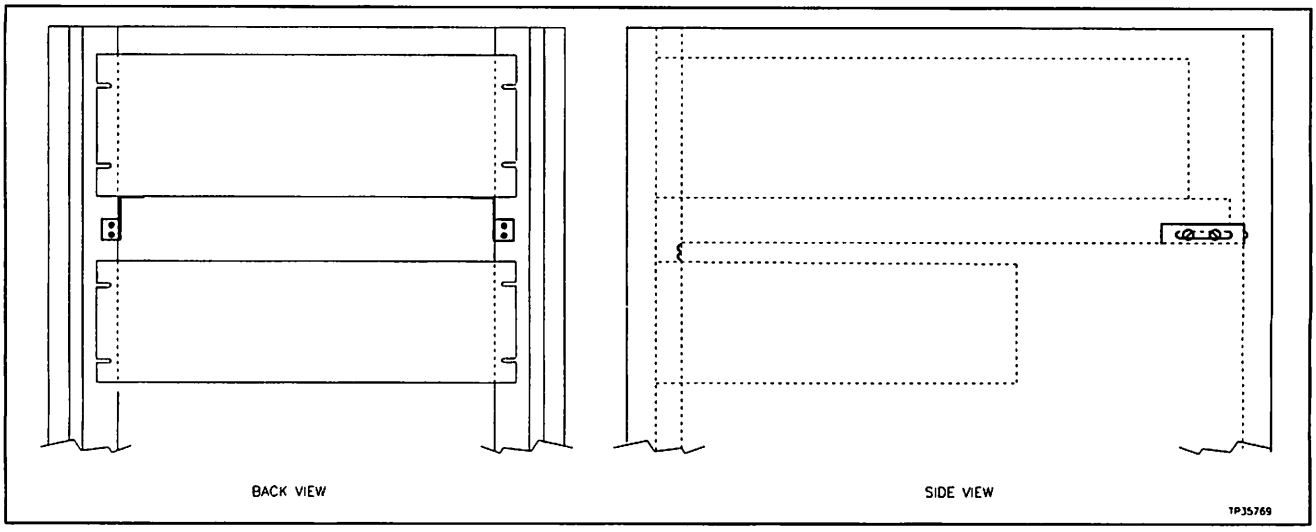


Figure 4-28. MED Cabinet Mounting

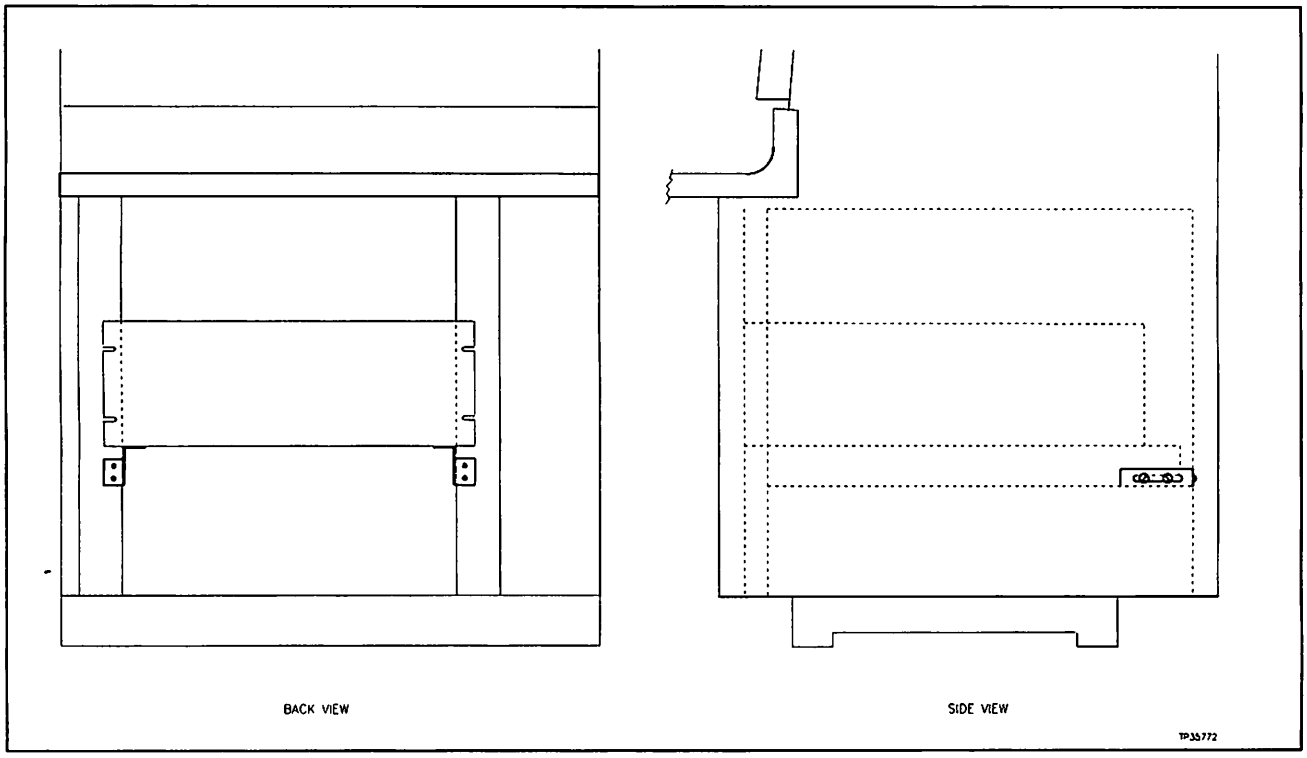


Figure 4-29. MCS Cabinet Mounting

Remove the rail assembly from the cabinet and tighten the mounting clip screws at desired length.

After tightening the mounting clip screws, reinstall the rails and mount it to the cabinet using screws and nuts provided.

NOTE: Make sure rails are at equal heights on both sides of the cabinet.

With rails firmly in place slide the disk drive unit in the cabinet on top of the rails and fasten the rack mount handle screws to the holes in the cabinet rack. See Figure 4-30.

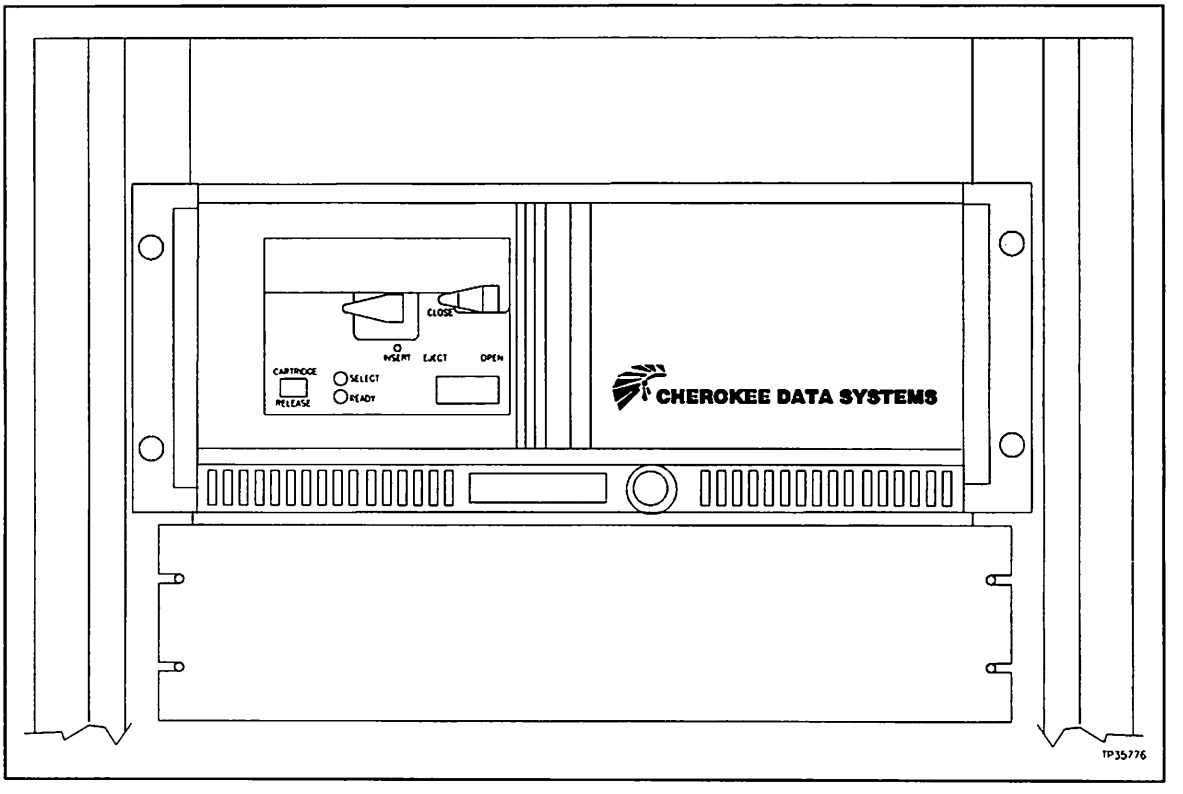


Figure 4-30. Optical Disk Unit Installed

Disk Drive Set Up

POWER SETTINGS

The disk drive unit has been set at the factory for US power, 115 VAC 47-440 Hz. The disk drive unit may be operated using either of the following voltages by changing the input power setting:

115 VAC, 47 to 440 Hz
230 VAC, 47 to 440 Hz

CAUTION	**Incorrectly setting the input power select may damage the disk drive unit.**
ATTENTION	**Un mauvais reglage de la selection de l'alimentation d'entree pourait endommager l'unite de disque.**

Change the input power setting by following these steps:

1. Disconnect the AC power cord at the rear of the disk drive.

2. Locate the input power module at the rear left corner of the disk drive unit.

3. The input power access panel is to the right of the power ON/ OFF switch. Using a flat blade screw driver, pry open the access panel. Remove the voltage select wheel, turn to the proper voltage and replace. The selected input voltage should be displayed.

FUSE REPLACEMENT

The disk drive unit is protected with two fuses located at the rear of the disk drive unit. The fuse rating is 250 Volts at three Amps. To replace a fuse, follow these steps:

1. Disconnect the power cord at the rear of the disk drive.

2. Locate the input power module at the rear left corner of the disk drive.

3. Locate the fuse/voltage access panel located to the right of the power ON/OFF switch. Using a flat blade screwdriver, pry open the access panel.

4. Locate fuses to the right of the power select wheel. Remove the defective fuse. The arrow on the fuse holder should point up.

5. Close access panel.

Wiring and Cabling

The materials required for step three are:

Qty.	Part Number	Description
1	1948497A1	Optical disk drive
1	1947950A5	AC line cord
1	1948032A31200	Ribbon cord assembly
1	6637337B1	ISBX SCSI interface
1	Grounding wrist strap	

NOTE: The disk drive unit should still be unplugged.

STANDARD CONFIGURATION

1. Using your grounding strap, ground yourself to the computer chassis ground.

2. Turn off the computer main power using power down procedures.

> **NOTE:** Modify the layout of the card cage to make room for the SCSI board on the CPU 2 card. Do this by moving the LOCAL MEMORY card at slot 16 to slot 14 in the card cage.

3. Mount the SCSI interface board to the CPU 2 card. Figure 4-31 shows the CPU 2 card and its card cage location. Slide the CPU about halfway out of the card cage. Connect jumpers J-25 and J-26 as shown in Figure 4-31.

Note on Figure 4-32 the SCSI interface is mounted on the center of the CPU 2 card. Apply the SCSI interface board to the CPU 2 as shown in Figure 4-33 making sure that the connector pins line up. Snap the retaining clip on the front of the interface to the hole in the CPU 2 card and install the CPU 2 card to the card cage.

4. Connect one end of the ribbon cable assembly to the SCSI interface board pin out and the other end to the I/O connector 1 or 2 of the disk drive unit.

> **NOTE:** Observe pin one location when connecting the ribbon cable to SCSI interface board and optical disk drive.

5. Select the ID for the SCSI card. Do this by installing jumpers on pins 3,2,1. Pins 4 through 7 are not used for SCSI ID selection. Refer to Table 4-9 for an example.

> **NOTE:** The SCSI ID selection for the disk drive unit has to be one for all applications. All prior and some replacement units require removing the case to set a similar jumper pattern on the rear most circuit board.

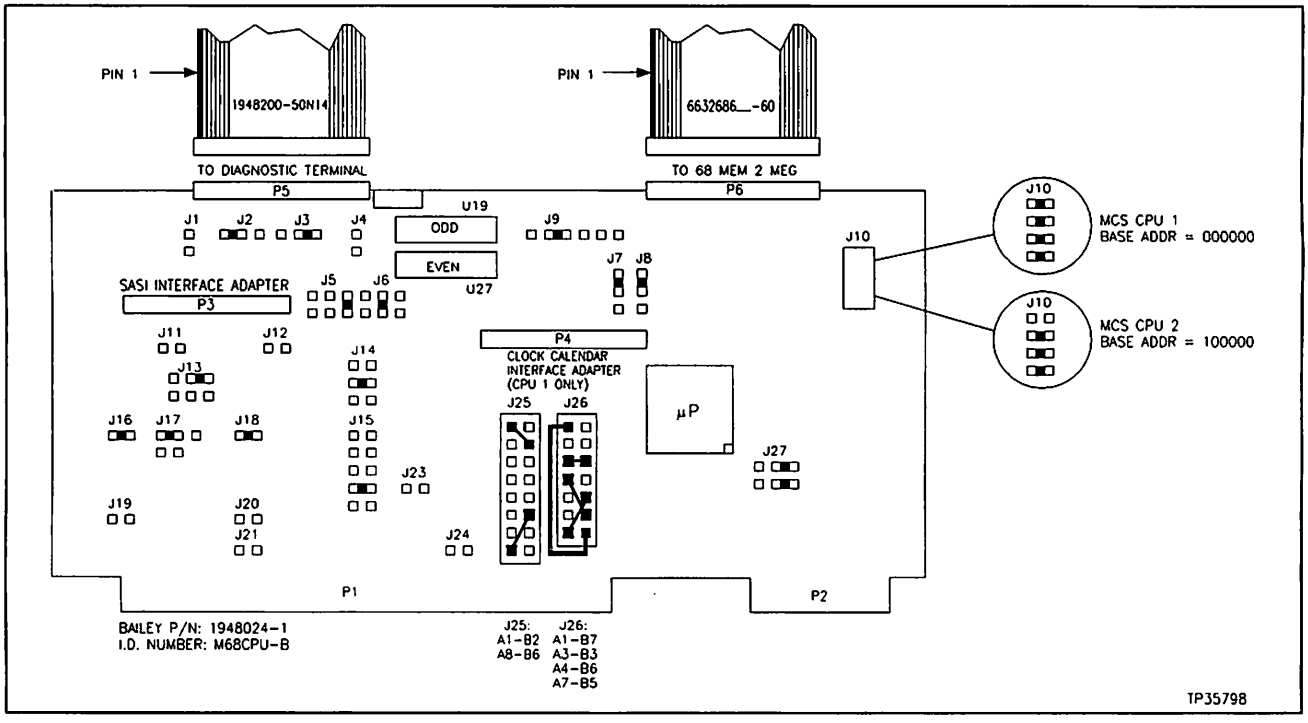


Figure 4-31. CPU 2 Card

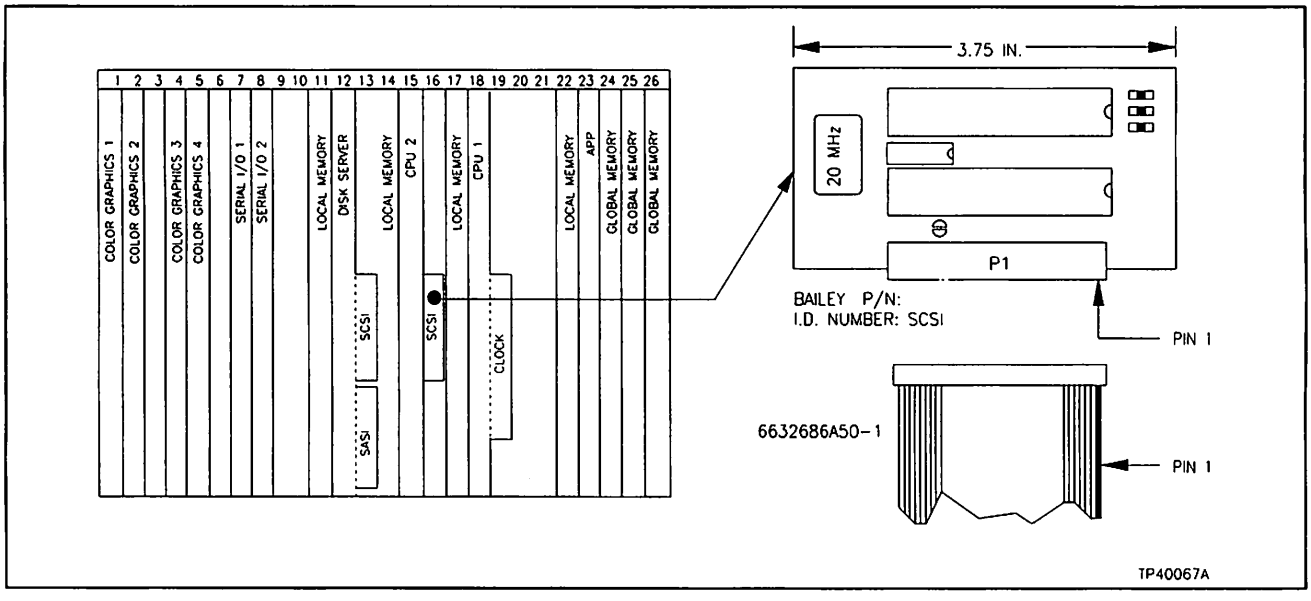


Figure 4-32. CPU 2 Card Location

6. Plug the AC line cord into the power entry panel of the computer. Termination of power is provided by the disk drive unit in all configurations.

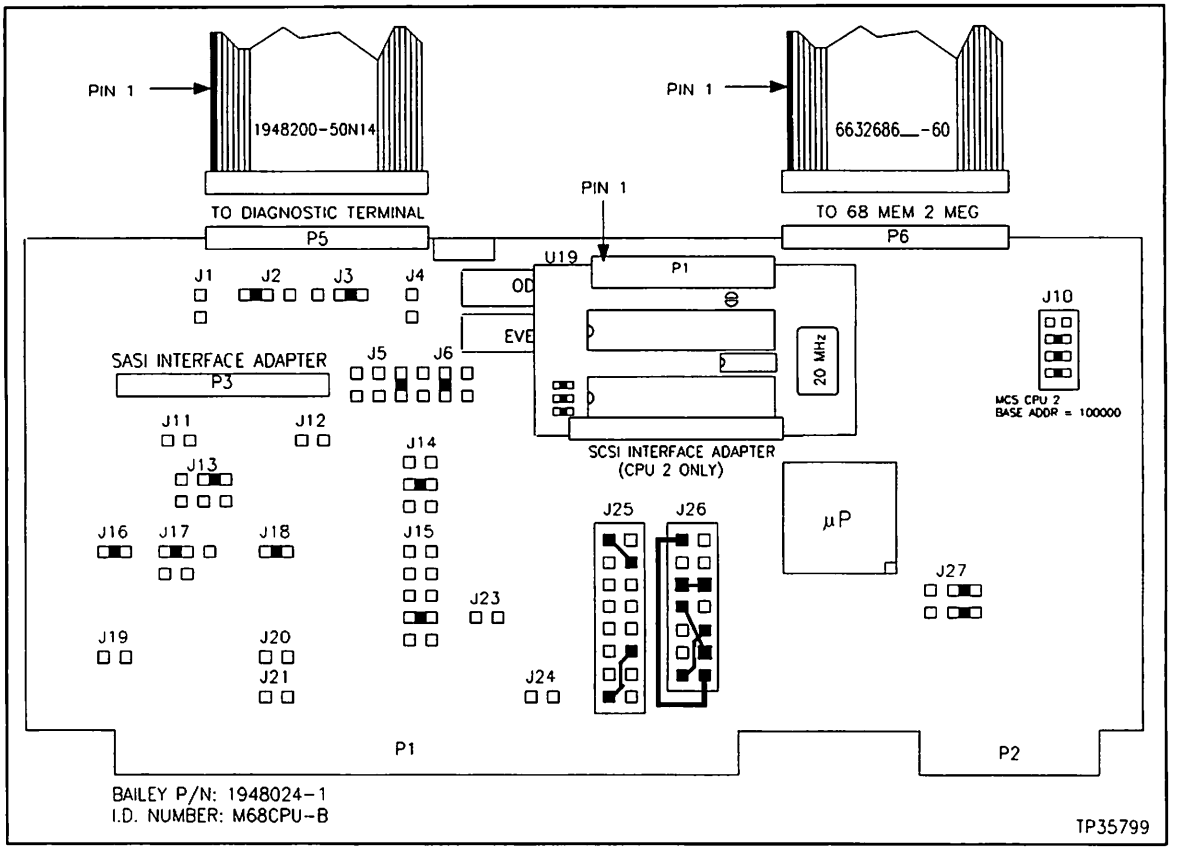


Figure 4-33. SCSI Interface Card Mounted on CPU 2 Card

Table 4-9. SCSI ID Selections

SCSI ID[1]	Pin 3	Pin 2	Pin 1
0	OFF	OFF	OFF
1[2]	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON

NOTE:
1. The SCSI pin ID is located at the rear of the M8831-2.
2. The required SCSI number is 1.

Disk Drive Unit Operation

Operation consists of using the disk drive unit and the storage media. The types of storage media and how to use them in the disk drive unit are explained in this section.

POWER UP THE DISK DRIVE UNIT

After you install the hardware with the procedure in this manual, turn power on by pressing the red button located on the lower right front panel. Verify that the AC power switch located on the rear panel is in the on position. It will be illuminated red.

OPTICAL MEDIA

The disk drive unit can be used with either single sided or double sided media. The optical media is enclosed in a cartridge with spring loaded slides which open when the cartridge is inserted in the disk drive unit. The banded end of the media cartridge is always inserted first into the optical drive. In addition, there are arrows located on the cartridge indicating the proper orientation. The disk drive uses only write only disks. Disks do not need formatting, the MCS formats the disks when it writes to them.

Single Sided Media

Single sided media permits recording on only one side of the media. The user capacity of this media is in excess of 260 megabytes. This does not include spare data tracks which are automatically allocated for use by the SCSI controller defect management microcode. Single sided media must be inserted A side up for proper orientation of the recorder surface to the optical recording head.

Double Sided Media

Double sided media permits recording on both sides of the media. Each side is capable of storing in excess of 260 megabytes of user information. After filling the first side of the disk turn it over to store data on the second side. The disk drive only writes to one side.

Media Storage

The optical media cartridge provides protection for the media. We recommend:

1. When powering down the optical drive for extended periods of time. Remove the optical media to protect it from damage.

2. The optical media cartridge should be stored in a dust free environment.

3. The optical media will withstand storage temperature of 40° to + 75° C. However, do not store storage media in extreme heat and sunlight for extended periods.

4. Optical media stored in excessively cold temperature should be given several minutes to reach temperature stability before inserting it into the optical drive. This also helps eliminate condensation which may occur on an extremely cold surface.

MEDIA LOADING WITH POWER APPLIED

The media has two sides A and B. Choose which side will be used first (usually A).

If the LOCK/INSERT switch on the front panel is in the INSERT position, insert the optical disk cartridge (metal banded end first) into the disk drive unit until encountering a firm stop. A fully inserted cartridge will be totally contained within the drive. Rotate the LOCK/INSERT switch to the LOCK position. The optical disk will recalibrate and indicate a READY status (green light on front of panel).

Should the LOCK/INSERT switch be in the lock position, press Cartridge Release . The SELECT and READY lights will alternately flash. This indicates that the LOCK/INSERT switch has been unlocked and may be rotated counter clockwise to the INSERT position.

The LOCK/INSERT switch can only be rotated to the INSERT position while the SELECT and READY lamps are flashing. If the lamps stop flashing before turning the switch to INSERT, the LOCK switch will again be locked in the LOCK position. Press Cartridge Release again and rotate the LOCK/INSERT switch to INSERT position while the lights are flashing. (This may be repeated without damage to the disk drive unit). A cartridge can now be inserted using the above procedure.

UNLOADING WITH POWER APPLIED

To unload a cartridge from the disk drive unit with power applied, press Cartridge Release . The SELECT and READY lights will alternately flash indicating that the LOCK/INSERT switch has been unlocked. The switch may now be rotated counter clockwise to the eject position. Rotate the switch until the cartridge is released and ejected from the disk drive unit. The LOCK/INSERT switch is locked when it is rotated in the LOCK position to prevent an accidental ejection of the cartridge. The LOCK/INSERT switch may only be rotated

from LOCK to INSERT when Cartridge Release has been depressed and the SELECT and READY lamps are flashing. If the lamps stop flashing and the LOCK/INSERT switch has not been rotated, the cartridge remains loaded and the LOCK/INSERT switch is again locked. Pressing Cartridge Release again will unlock the LOCK/INSERT switch (SELECT and READY flashing) and the LOCK switch may be rotated to the EJECT position ejecting the cartridge.

NOTE: If Cartridge Release is pressed and the LOCK/INSERT switch has not been rotated, the cartridge remains loaded but the disk drive unit is in a NOT READY condition.

To bring the disk drive unit to a READY state (green light), press Cartridge Release , wait until the SELECT and READY lights flash, then press Cartridge Release again. The disk drive unit will recalibrate and become ready.

UNLOAD MEDIA WITH NO POWER APPLIED

You can remove an optical cartridge when unit power is turned off. Do this by inserting a small, round rod (paper clip will be adequate), approximately one inch through the small opening above the insert label. This releases the LOCK/INSERT switch and the switch may be rotated to the EJECT position. This method should only be used when power cannot be applied to the unit and removal of the cartridge is desired. The optical disk cartridge should be removed from the unit before the unit is powered down. Leaving the cartridge inserted, leaves the media exposed with the cartridge access door open.

Troubleshooting

These troubleshooting suggestions will help answer your questions. In addition, Cherokee provides assistance at (303) 776-0721 to answer additional questions on the disk drive unit. When calling indicate that technical assistance is required and give the serial number of your disk drive unit.

Unit will not power up	1. Check for blown fuse, refer to the ***Installation*** section. 2. Check for power at the power entry panel. 3. Check AC input power setting, refer to the ***Installation*** section.
Cartridge is loaded and the unit does not indicate a ready status (green light)	1. Depress the Cartridge Release, wait until SELECT and READY lights flash and press Cartridge Release again the unit should return to READY status. 2. Turn power off to unit then turn power back on, wait several seconds for unit to return to ready status.
Ready and select lights are both on with a cartridge loaded	Depress the Cartridge Release switch, wait until unit indicates ready.
Constant units elect indication (red light)	This may occur when the unit is accessed but does not have a cartridge loaded. Insert a cartridge, rotate LOCK/INSERT switch to the lock position. Wait until unit is ready and depress the Cartridge Release switch again.
Disk drive unit cannot be accessed (drive not ready) from host computer	1. Check the seating of the SCSI interface and the disk server card. 2. Check the cable connections. 3. Check the drive power, and READ status.
Cannot unload cartridge when select and ready flashing	1. With SELECT and READY lights flashing, rotate LOCK/INSERT switch slightly clockwise from the LOCK position then counter clockwise to the INSERT position. 2. Turn unit power off, insert rod approximately one inch into the left of the eject label. White holding rod in place, rotate the LOCK/INSERT switch to the INSERT position.
Application diagnostics will not run	1. Check SCSI interface adapter seating. 2. Check SCSI interface to disk drive unit SCSI cable seating. 3. Check ready status of disk drive unit.
Drive has media loaded with constant select (red light) and will not go into a ready condition (green light).	1. Shut off power and manually eject the optical cartridge as described in ***Disk Drive Unit Operation*** for the error message, *CANNOT UNLOAD CARTRIDGE WHEN SELECT & READY FLASHING*. 2. Inspect the media to insure it is double sided. Single sided media inserted as to expose the nondata surface to READ/WRITE will cause the device to be continually busy as it attempts to locate the initial data track which is nonexistent. Turn the media to the correct side up and reinsert. This condition may occur when track zero has been overwritten and cannot be read, or the surface of the media in disk drive unit is unreadable.

Maintenance

The disk drive unit is designed for maintenance free operation. There is only one maintenance procedure recommended for the disk drive unit and that is to clean the input filters. These filters are located at the lower left and right of the front panel. Remove, clean and replace the filters by following these steps.

FILTER MAINTENANCE

1. Locate the air intake on the lower left and right sides of the front panel.

2. Remove the two socket flat head screws (4x40) on each front filter.

3. Grasp the filter assembly from behind and pull up and away from the unit.

4. Clean the filter element with a solution of water and liquid detergent and allow to dry or use high pressure air.

5. Slide the filter assembly into the disk drive unit in reverse order (3, 2, 1).

ADDITIONAL MAINTENANCE

The disk drive unit requires operator action for:

1. Fuse replacement.

2. Primary power setting.

3. Air filter replacement.

For other maintenance actions the disk drive unit should be returned to the factory.

TOUCH SCREEN

Bailey Nomenclature - NSCT01, NMTS01 and NMTS02 includes:
19 inch Touch Screen 1948026_1
25 inch Touch Screen 1948026_2
Touch Screen Controller Card 1948027_2
Associated Cables and Hardware

A touch screen provides a means of moving the screen cursor and selecting display options by touching the desired area on the monitor screen. One touch screen per color monitor and keyboard electronics card can be added. This option requires the addition of a touch screen and touch screen controller card. Two versions of the touch screen (1948026_1) are in use, one using a three wire lead and one using a five wire lead. Two versions of the controller card are in use, 1948027_2 (I.D. number E217-60MKII, single pot version) and 1948027_1 (I.D. number E271-60, five pot version).

Touch Screen Installation

Remove the top cover of the MCS and position the touch screen in front of the color monitor. The NSCT01 is used with the NMCS02, NCRT01 and NCRT02.

Touch Screen Controller Card Installation

See Figure 4-34 for connecting the touch screen controller board. See Figure 4-35 for dipswitch settings and wiring connections of controller I.D. number E217-60MKII, and Figure 4-36 for controller I.D. number E271-60.

Prior to attaching the touch screen ribbon cable to the controller board, the capacitive charge on the touch screen must be bled to the monitor case ground.

1. Insert one end of a straight pin or 24 AWG wire into either outside touch screen connector contact (of either the three or five wire lead).

2. Press the other end of the pin or wire to the monitor case ground.

Failure to perform this may result in loss of MOS-FETS on the controller by stored charge coupled from the pulsating 25 kV anode potential during picture tube operation.

If connecting a three wire touch screen to a five contact touch screen controller board, plug the touch screen connector onto the center three pins. If the controller card is the Bailey P/N 1948027_2 (I.D. Number E271-60MKII), a jumper is required on two pins located at the center of the board (Figure 4-36).

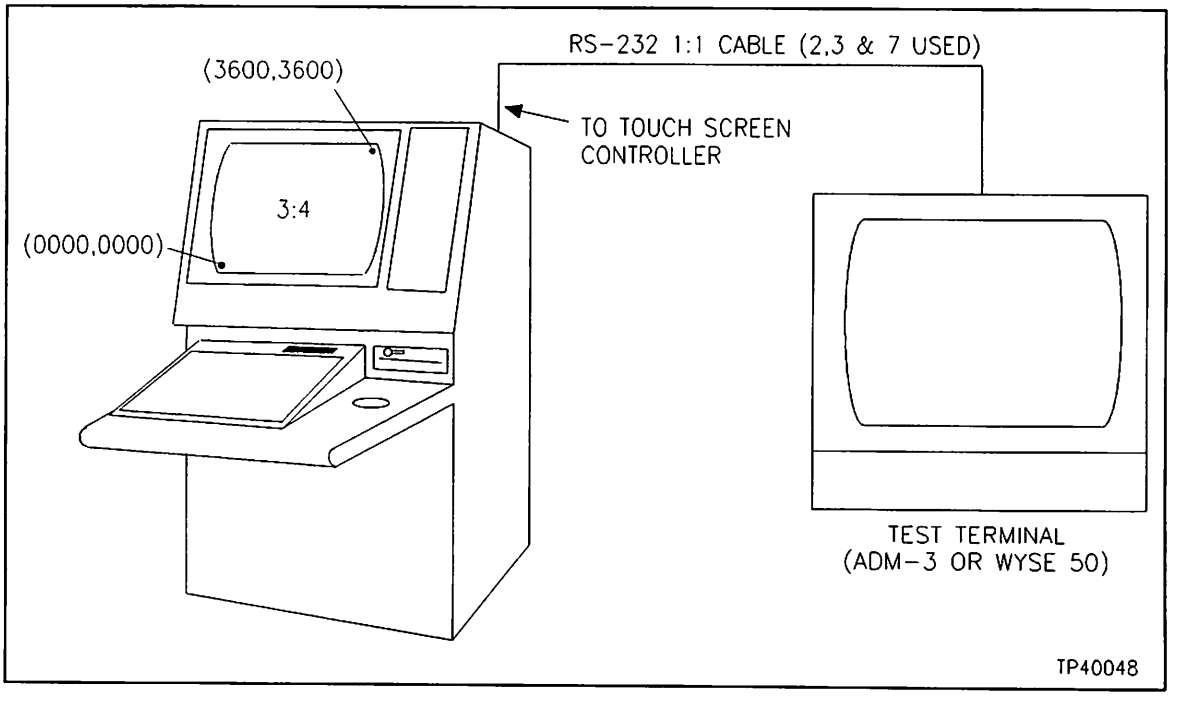


Figure 4-34. Manual Touch Screen Calibration

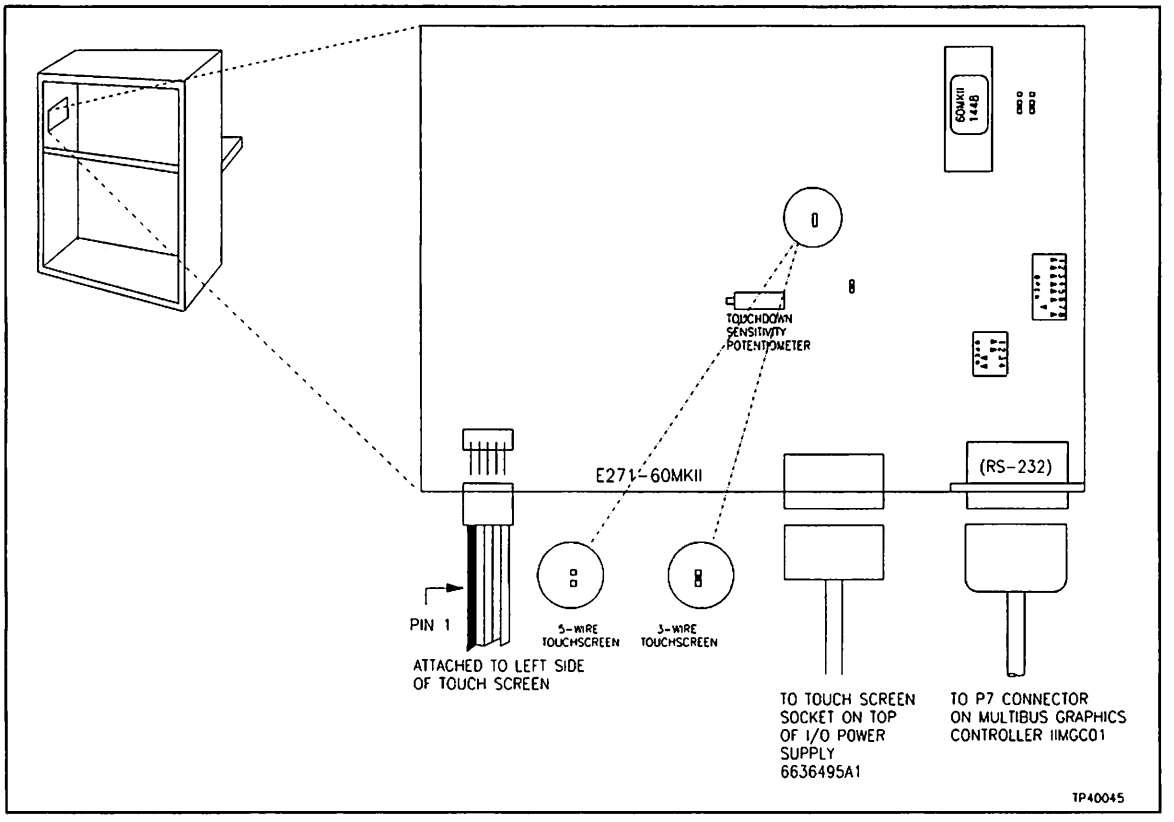


Figure 4-35. Touch Screen Controller Card - I.D. Number E271-60MKII

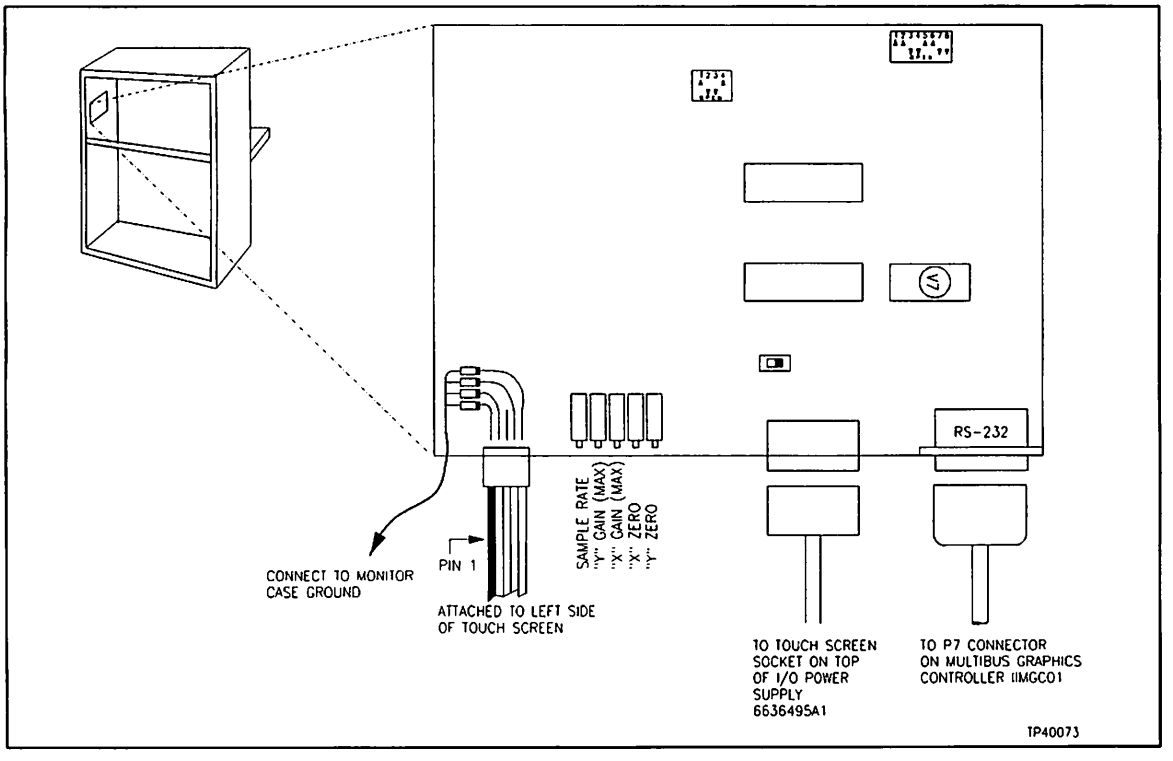


Figure 4-36. Touch Screen Controller Card - I.D. Number E271-60

Touch Screen Calibration

To calibrate, a terminal must be attached as shown in Figure 4-34. Set a serial communications terminal to 600 baud, eight data bits, one stop bit for the E271-60MKII or 9600 baud, eight data bits, one stop bit for the E271-60. The terminal must be set for full duplex (not block mode). Connect the terminal to the RS232-C connection on the touch screen controller board (Figure 4-35). Follow the instructions on the following pages for the touch screen controller board in use.

When testing, use a display that utilizes the full screen (10,000 by 7,500). Graphics card test number four (refer to test command GT given in the advanced EPROM diagnostics, section five) is good for this purpose. The touch screen (and the MCS color monitor) extend beyond the edges of the console screen casing. Thus it is necessary to calibrate the touch screen only for the useful area (visible to the user) of the screen.

Calibration

Touch Screen Controller I.D. Number E271-60MKII (1947027_2)

If MCS software revision K.0 (or later) and the EMKI keyboard controller is installed, an on-line calibration utility is provided. Refer to the ***MCS Operation and Configuration*** manual I-E93-901-21 for information on the use of this utility.

> **NOTE:** The ROM label on the touch screen controller board must have the checksum 1448. If this checksum number is not on the ROM label, contact your nearest Bailey service representative to obtain an update.

1. When the controller is sent the proper command, two 4-digit values representing the X and Y coordinates where the screen was touched will be displayed on the terminal. If the controller was retrofit to a three wire touch screen, these values may either not display or may display twice for each touch of the screen. If this is the case, the touchdown sensitivity potentiometer should be adjusted. The touchdown sensitivity potentiometer is on the touch screen controller board, and is shown in Figure 4-35.

To adjust, turn counterclockwise until the count will not display on the terminal, then clockwise until displayed, and two turns further to assure proper operation.

2. To calibrate, type **%C** (upper case C) on the terminal. Call up a grid showing display active area edges, then touch in succession the lower left (0000,0000), then upper right (3600,3600) edges of the active area. Type **%C** and recalibrate as required. New calibration constraints will be generated and stored in the controller board's nonvolatile memory.

Calibration

Touch Screen Controller I.D. Number E271-60 (1947027_1)

1. Adjust X-ZERO (R3) and Y-ZERO (R4) controls to get the XXXX,YYYY value as close to 0000,0000 as possible. Do not use the general functions menu to adjust your touch screen.

2. Touch the lower left corner of the screen. The test terminal should start displaying a stream of XXXX,YYYY coordinate pairs.

3. Touch the upper, right-hand corner of the screen. Adjust the X-GAIN (R2) and Y-GAIN (R1) controls to get a count of 3600,3600.

4. Repeat steps one through three at least two times, to dial-in the screen as close as possible.

5. After setting the zero and max points for the screen, try touching the screen at points 25 percent, 50 percent and 75 percent along the X and Y directions. Verify that for each of these points, the reading is approximately what is expected (900, 1800 and 2700 respectively). The required accuracy for this calibration is:

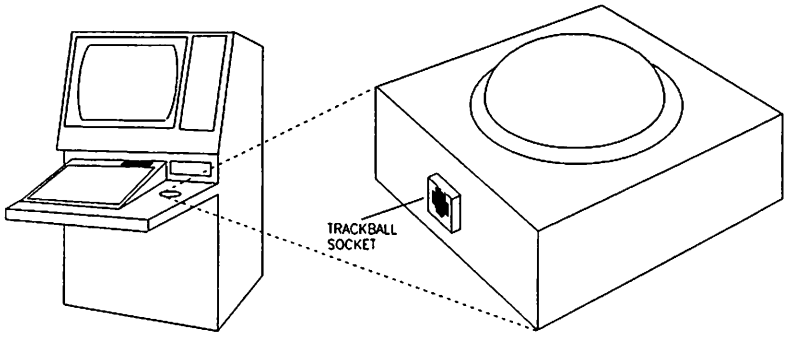
X zero -0%, +2%	0 = 0 to 72 (min)
Y zero -0%, +2%	0 = 0 to 72 (min)
X max -2%, +2%	3600 = 3528 to (full) 3672
Y max -2%, +2%	3600 = 3528 to (full) 3672

TRACKBALL (NMTB01)

The MCS trackball (NMTB01) option permits faster cursor positioning during normal operator control or configuration. This option requires the enhanced MCS keyboard (EMKI01) P/N 6637517_1. Refer to ***MCS ENHANCED KEYBOARD INTERFACE CARD (EMKI)*** in section three of this manual for cable connections.

Trackball Installation

The trackball is mounted from the bottom of the console counter, using a sheet metal cover and four thread forming metal mounting screws. A quick disconnect style (telephone) cable connects the trackball to the keyboard electronics board EMKI (Figure 4-37).



PARTS LIST

QUANTITY	PART NUMBER	DESCRIPTION
1	1948313_1	TRACKBALL
1	6634945_1	CONSOLE COUNTER
1	4843357_1	COVER
6 INCHES	484692_2	SEALING STRIP
1	1948318_818	CABLE ASSEMBLY
4	NKDAC14008	1/2 INCH LONG, NO. 8 PAN HEAD THREAD FORMING SCREW

Figure 4-37. Trackball Location

The following steps cover the installation of the trackball assembly.

1. Assemble trackball to the console counter. Insert trackball into counter slot, with cable socket pointing towards the keyboard.

NOTE: The ball and surrounding seal should fit snugly into the hole in the counter.

2. Place the trackball cover, with sealing strips, over the bottom of the trackball and attach to the cover with the four number eight pan head thread forming screws. Attach cable to trackball.

3. Assemble console counter to MCS. Turn off power to the MCS.

4. Remove the keyboard assembly from the sloped structural foam housing. Disconnect all cables to the console counter top (keyboard electronics, brightness control, etc.). Use a socket wrench and extension to remove the six 3/8 inch diameter bolts holding the counter top to the console (1/2 inch socket) and remove the counter.

5. Detach the perforated sheet metal keyboard electronics bottom cover and structural foam housing from the counter top. Remove the four housing copper colored wire brads from the structural foam housing by carefully pulling them out of the housing. The housing lifts off the console top. Unscrew the four sheet metal screws holding the perforated steel bottom cover to the counter top. Save all keyboard parts and mounting hardware.

6. Attach the console top with the mounted ball to the console weldment with the six, 3/8 inch diameter bolts which held the original counter top.

NOTE: Make sure that the floppy disk housing (if present) is in place before tightening the two bolts which hold it to the weldment.

7. Set the EMKI jumper settings as shown in ***MCS ENHANCED KEYBOARD INTERFACE CARD (EMKI)*** in section three of this manual.

8. Install the keyboard in the counter top. Mount the perforated shell cover first and then the structural foam housing. Ensure that the trackball connecting cable is inside the perforated cover before tightening the cover screws. Mount the structural foam housing with the brads. Mount the keyboard assembly to the structural foam housing. Connect the power, RS-232, ADS, relay and trackball cables before the electronics are installed.

SATELLITE CLOCK (NMSC01)

The MCS satellite clock (NMSC01) option synchronizes the Network 90 system time more accurately than the standard clock card. This option allows all MCSs on the loop to receive the Omega satellite time/date signal. This signal is available worldwide and accurate to within five milliseconds. The satellite clock receiver outputs this signal in the IRIG-B format via BNC connectors on the rear panel. Two separate IRIG-B outputs are provided. Each one can drive six MCSs with a maximum cable length of 300 feet.

The NMSC01 consists of these parts:

Parts List		
Quantity	**Description**	**Part Number**
1	Satellite clock receiver	1948485_1
1	Satellite clock card	1948487_1
1	Power cord	1947950_5
4	Clip-on nuts	NMPCC16002
4	Screws	NIDAC16000

The clock receiver also includes an 8 foot roof-mount whip antenna, a 50 foot antenna cable, 19 inch rack mount brackets and operation manuals.

Satellite Clock Installation

NOTE: Each MCS on the loop must use the satellite clock card and be wired to the satellite receiver. Replace existing clock calendar cards with satellite clock cards (P/N 1948487_1). Each clock card in the system must be connected to the IRIG-B signal through a 50 Ohm coaxial cable. Each clock card has two BNC connectors to allow daisy chaining up to six MCSs from one source, with a maximum total cable length of 300 feet. The system configuration is application specific. Exact cabling details will vary from system to system.

1. Mount the satellite clock receiver in either an NMED01, NCRT02, or NUCC01 cabinet using the mounting brackets in the kit. Fasten the clip-on nuts to the mounting rails in the console or cabinet and attach the receiver using the screws provided.

2. Set the AC Voltage selector on the rear of the receiver to the system voltage (120-240 VAC). Connect the power cord and plug in the receiver.

3. Mount the antenna and preamp according to the supplied operation manual. Connect the antenna cable from the preamp to the rear of the receiver. If the supplied cable is not long enough (50 feet), use an NKCL01-xx (communication loop cable) with a NKTL01-3 (a three foot cable with N type to a BNC type connectors) on the receiver end. Maximum cable length is 1000 feet.

4. Power down the MCS and remove the CPU 1 board from slot 18 of the card cage.

5. The satellite clock card mounts in the same place on CPU 1 as the clock calendar card. If a standard clock card is already on the CPU board, remove it (see Figure 4-38).

6. Add a wire wrap jumper to J26 of the CPU 1 board as shown in Figure 4-39.

7. Attach the satellite clock card (part number 1947487_1) to the upper (blue) ISBX connector on CPU 1. Tighten down both boards (be sure the nylon spacer is installed on the clock board).

8. Set the dipswitch on the clock card. Normally all switches are set to the OFF position. Set jumper W1 to position 1-2 to enable battery backup operation.

9. Put CPU 1 board back into the card cage.

10. Connect the clock cards. The clock card has two connectors on it (see Figure 4-40). The top connector is the IRIG-B

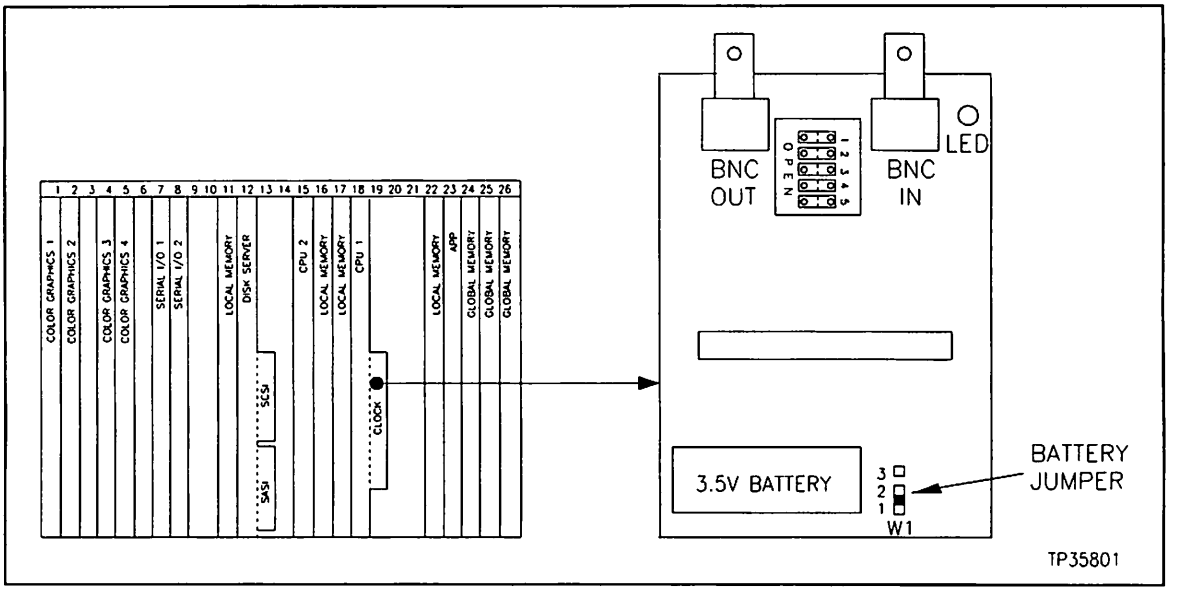


Figure 4-38. Satellite Clock Card

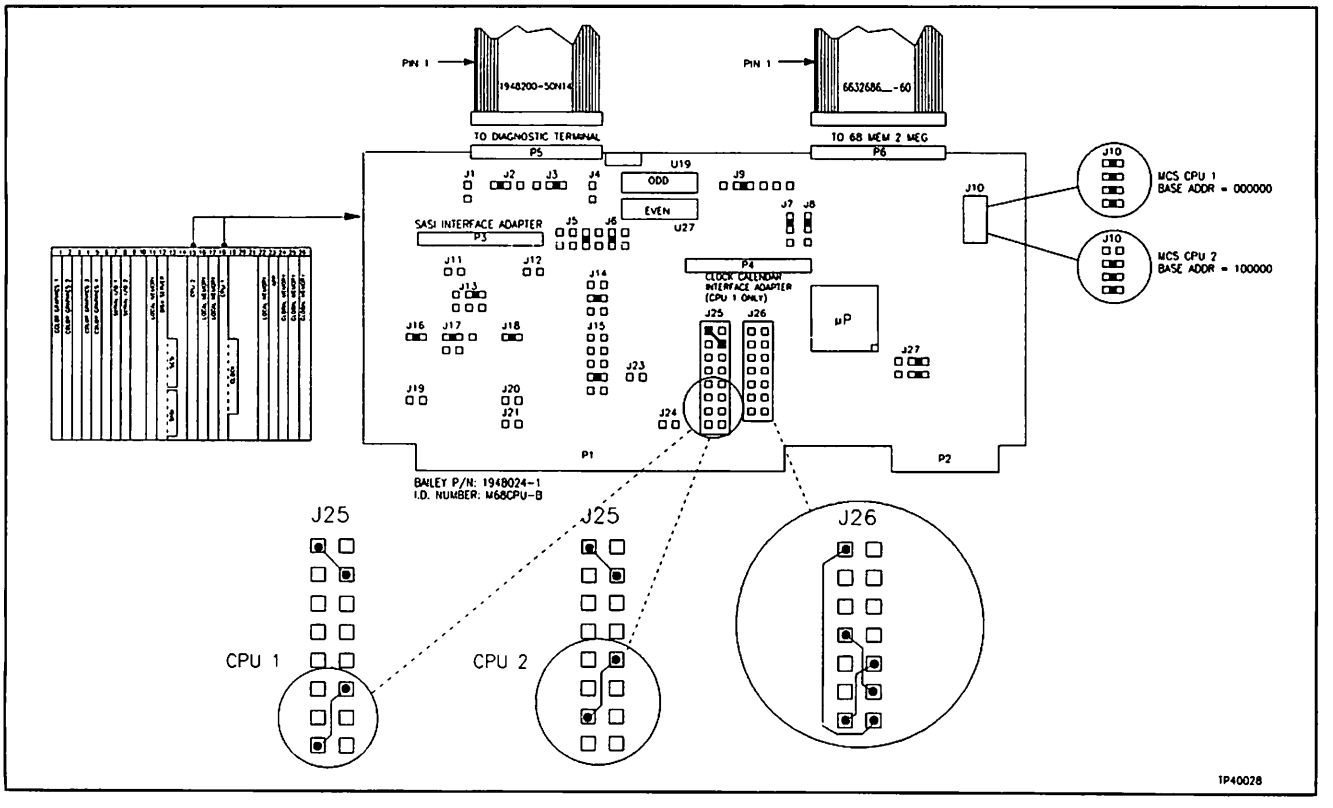


Figure 4-39. CPU 1 Card

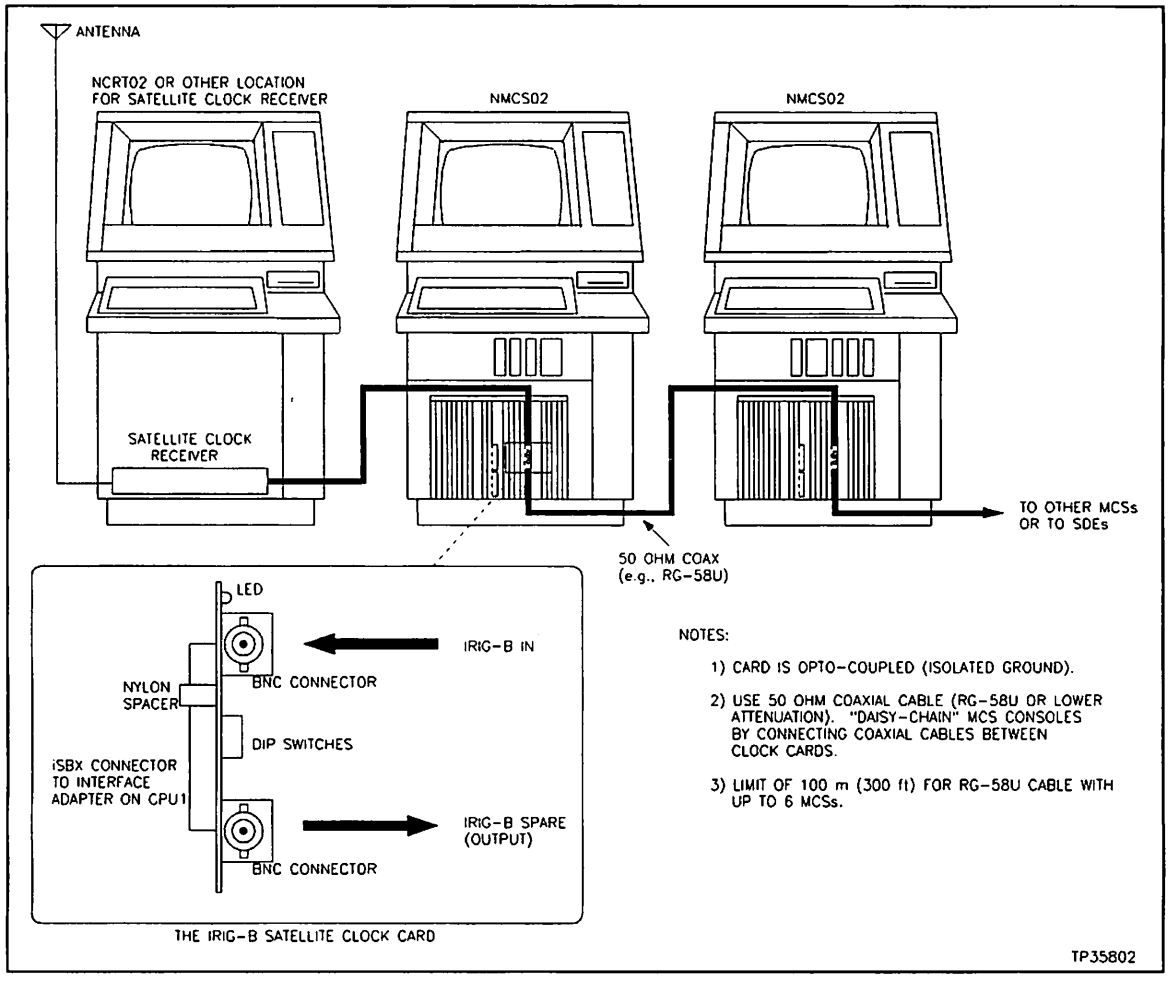


Figure 4-40. Daisy Chained IRIG-B Signal

input. The bottom connector is used to daisy chain the signal to the next MCS on the loop. You can use standard MCS cables to connect the clock system.

11. Power up the MCSs and the clock receiver. Refer to the operation manual shipped with the clock to make sure you are operating the receiver correctly.

The yellow LED on the clock card on each MCS should light to indicate the presence of the IRIG-B signal. If the LED fails to light, check the cabling. If the LED still fails to light and the receiver is operating properly, do the following:

1. Power down the MCS.

2. Set dipswitch one on the clock card to the ON position. This increases the input gain to overcome a weak signal caused by long cable distances.

3. Put CPU 1 back into the MCS and apply power.

SECTION 5 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

The MCS arrives ready for operation. After completing the instructions given in section two, the unit should be prepared for service. Should you encounter trouble, the troubleshooting guide in Table 5-1 may help you identify the problem and fix it.

NOTE: Printed circuit boards should not be repaired in the field. Those containing MOS devices should be placed in antistatic bags when stored or shipped back to the factory. All repair and adjustment should be performed by qualified personnel.

Table 5-1. Troubleshooting Guide

Symptom	Possible Problem or Solution
No power indicator on circuit	No AC power at MCS Blown fuse on AC input module Check AC wiring on input module Check breaker wiring Check AC input module Check breaker light
Breaker off but indicator on	Check breaker contacts Check breaker wiring Check AC input wiring
No green indicator (LED) on CPU cards	Check power at supply Check ripple at supply Check fuses Check power at backplane Check CPU card LED Check all CPU card jumpers Check reset line and PFI Check reset switch (faulty?) Check remaining card jumpers Check ROMs Check CPU to memory card cable Pull out cards one by one - start with MATROX, then serial, third RAM memory card, etc.
Green LED comes on but goes off quickly for all cards on CPU cards	Check all power points as before Check all switch and jumper settings Check SASI - OMTI - hard disk drive - floppy disk drive combination including all cables Check CPU to memory card cables Check ROMs
No prompt or disk I/O or time out	Check SASI - OMTI etc. as above Check clock calendar module Check terminal settings Check CPU/terminal cable - RS-232 drivers (1488, 1489)

Table 5-1. Troubleshooting Guide (continued)

Symptom	Possible Problem or Solution
Improper/incomplete start-up	See diagnostic message at start-up for possible problems If parity light on global memory cards stays on, check card jumper settings; if persists, replace global memory card; if persists, check CPU1 jumper settings; if persists, replace CPU1
Start-up OK but no CIU response	Check CIU settings (checksum on port A at 19.2 Kbyte) Check CIU cables Check serial I/O card jumpers Try using CIU diagnostic port to test CIU/LSM/BTM modules
Start-up OK but no keyboard response	Check serial I/O card and jumpers Check all cables Check keyboard power (including ripple) Check caps lock position Check MCS configuration (number of keyboards?) Check keyboard assignment May have defined the keyboard controller card to be an EMKI when it is actually an MKI or vice versa. Run the keyboard conversion program EXTCON.OB. Refer to the appropriate EN for the MCS software revision in use
Start-up OK no CRT picture	Check CRT AC power Check CRT fuses Check RGB cables Check MATROX cards Check MCS conf. (number of CRTs ?) - in file SYSTSIZE.CF and MCS sector 0
No printer response	Check AC power Check serial I/O cards Check cables Check printer set-up Check MCS configuration (number of ?) Check printer directories (logging) for corruption
No cursor response with trackball	Check the trackball cable by substitution.

Power Up Tests

If the troubleshooting guide fails to identify a problem, proceed with the following step-by-step procedure.

AC POWER

1. Disconnect AC power to all equipment inside the MCS console by unplugging all line cords from the AC distribution board.

2. Apply power to the MCS by switching on the line circuit breaker located at the front of the MCS (Figure 5-1).

NOTE: For the remainder of this manual, when the instructions state to apply power to the MCS, that will mean switching the main circuit breaker to the ***ON*** position. Likewise, when told to turn off the power to the MCS, that will mean switching the main circuit breaker to the ***OFF*** position.

3. Using a digital voltmeter, measure the AC power at each of the outlets (J1 through J8). The line voltage should be 102-132 VAC RMS.

4. Using the digital voltmeter, check each outlet to insure that neutral, live and ground are wired correctly, and there are no ground faults.

5. Turn off the power to the MCS. Verify that it removes power from all outlets.

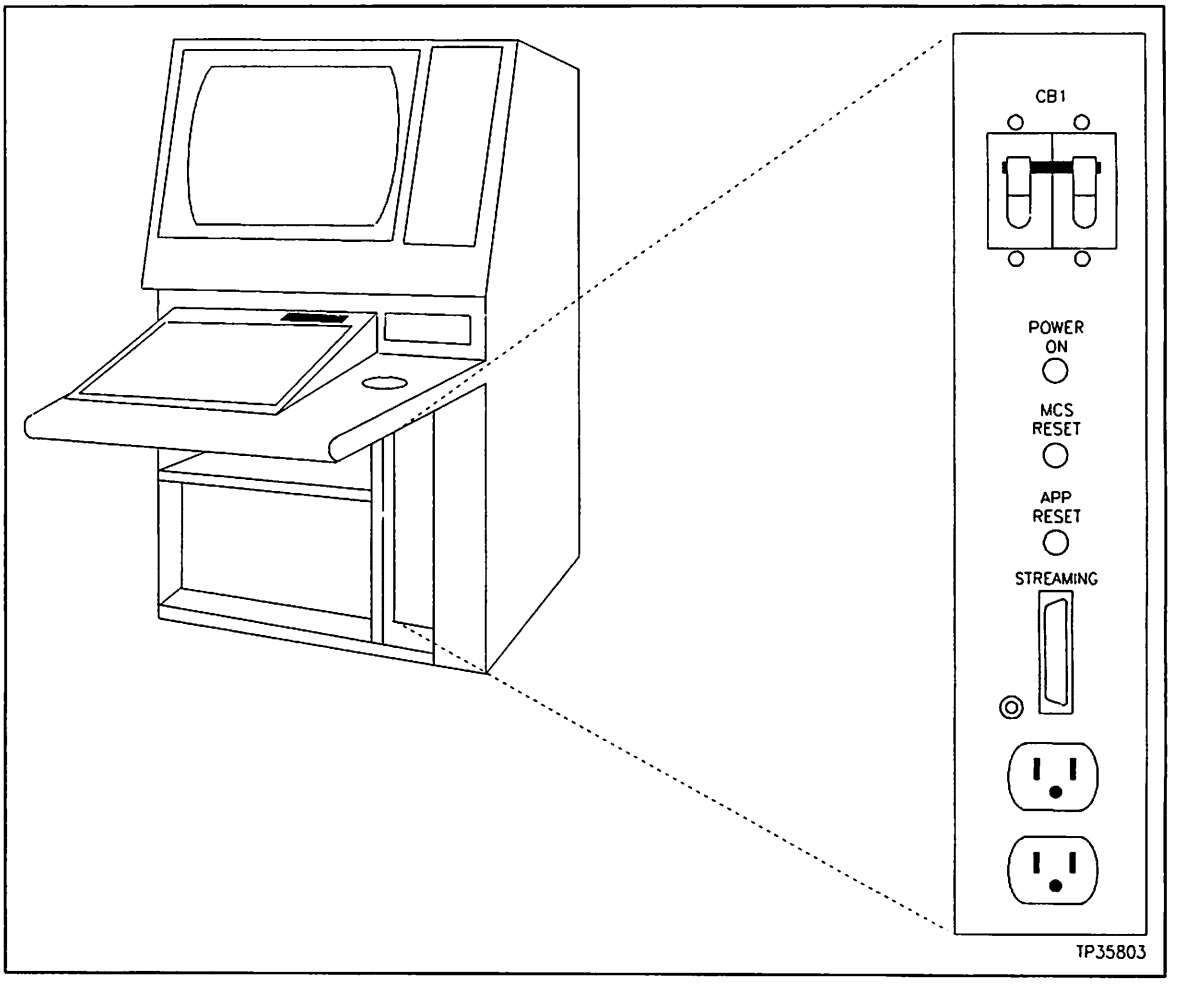


Figure 5-1. MCS Main Circuit Breaker

6. Plug the blower and the color monitor power cords into the appropriate AC distribution board sockets. DO NOT plug in the DC power supplies yet. Apply power to the MCS. Verify that the blower is operational. Nothing will be displayed on the color monitor until the system software is loaded.

DC POWER

1. Turn off power to the MCS. Unplug all modules from the module mounting unit (MMU).

Necessary test equipment:

1 - Digital voltmeter

1 or 2 - Wyse® 50 terminals, ADM-3 (or equivalent) terminals

2 - RS-232 cables (25 pin male to male, wired one-to-one)

1 - SBE serial port cable (1948200_50N14)

The following equipment is optional depending upon the terminal used and tests run:

1 - RS-232 cable set up as a null modem

1 - RS-232 loop-back plug

1 - Oscilloscope - Tektronix® 475 or equivalent

2. Unplug DC power distribution cables from all peripheral devices (disk drives, disk drive controller card, keyboard, reset board and touch screen controller, if present). On MCS consoles having two DC power distribution panels, disconnect the power cables at the distribution side of the cables. For MCS consoles with one DC power distribution power panel, cables must be disconnected at the peripheral device end of the cable.

NOTE: DO NOT disconnect the power wiring from the MMU and the multibus card cage.

3. Unplug all multibus cards from the card cage.

NOTE: The modules and cards do not have to be pulled all the way out. They just need to be disconnected and pulled a few inches away from the card edge connectors.

4. Plug the power line cord for the 750 Watt power supply into the AC distribution panel.

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® Tektronix is a registered trademark of Tecktronix, Inc.

5. Ensure that ALL power supply wiring is correct.

6. Apply power to the MCS.

7. Measure the DC voltages at the multibus card cage.

8. Verify the DC voltages at the power supply (Figure 5-2). DO NOT attempt to adjust the OL and OVP settings. These are factory set.

Adjust the voltages to within a tolerance of approximately 0.25 VDC of the following values, if necessary. A final adjustment will be made later with the power supply under load. Refer to Figure 5-2.

- +5.00 VDC at the CH1 POS terminal
- +12.00 VDC at the CH2 + terminal
- –12.00 VDC at the CH3 – terminal
- +15 VDC at pin 7 of J2 (to within ± 0.5 VDC)
- –15 VDC at pin 9 of J2 (to within ± 0.5 VDC)

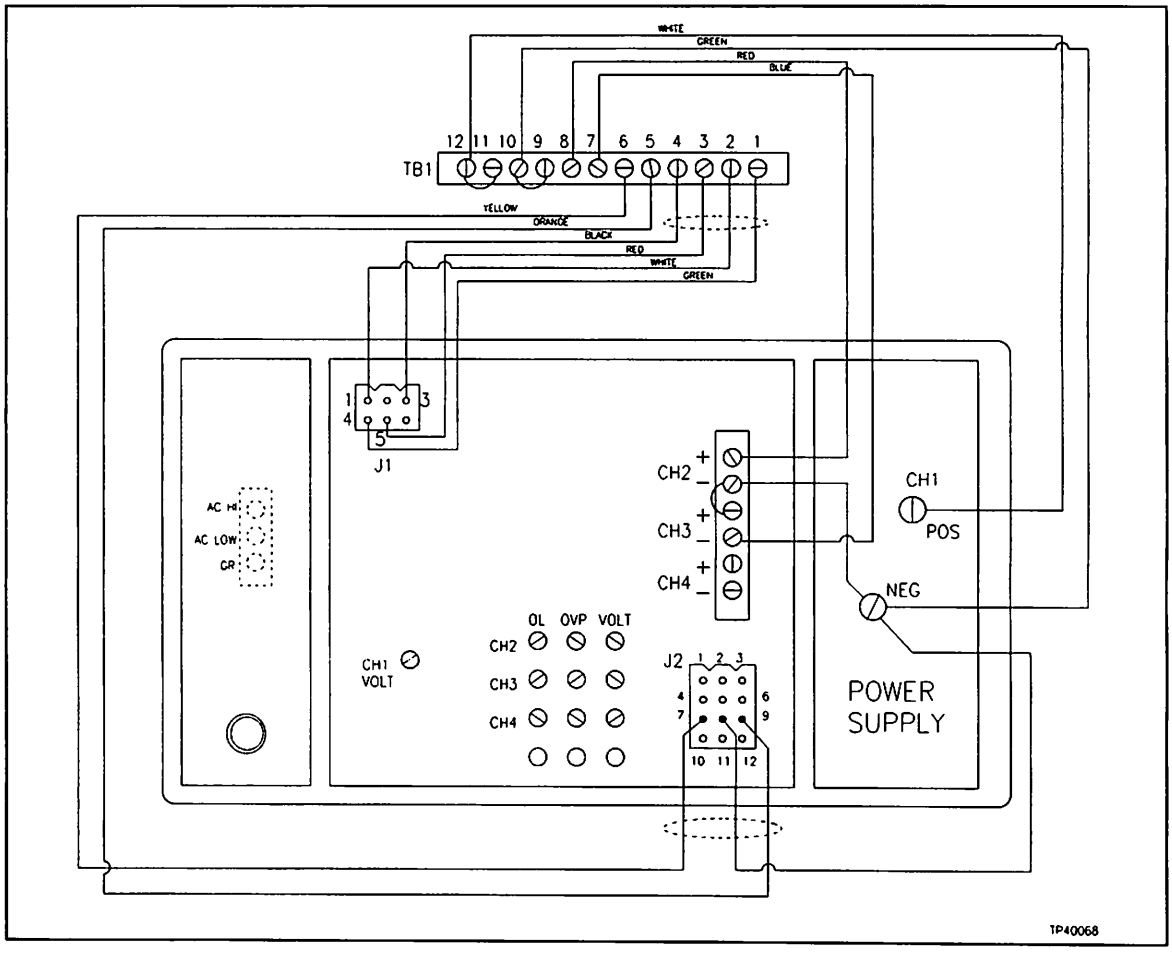

Figure 5-2. Wiring Schematic for Main Power Supply

9. Turn off the power to the MCS. Plug in all multibus cards and MMU modules.

10. Reconnect all DC power distribution cables.

11. Apply power to the MCS and check the DC voltage levels again. Adjust the power supply as necessary to obtain the voltage within a tolerance of ± 0.05 VDC.

12. With the MCS power still on, check the level of the ± 15 VDC source at the MMU. Adjust the power supply as necessary to within ± 0.5 VDC.

NOTE: Verify that ±5 VDC is also connected to the MMU, but DO NOT readjust. Only verify that it is present.

Multibus Card and Subassembly Tests

This section consists of running a set of software-driven tests to confirm that each card or subassembly within an MCS works by itself. The sequence of testing is structured to first prove that lower level parts work, then use these parts to test the rest of the system. The tests assume that the technician has verified power wiring, DC power levels and the routing and connection of all cables.

EQUIPMENT

The equipment necessary for these tests is:

- A dumb terminal (Wyse 50 or ADM-3) P/N: NTER01
- A nine pin RS-232-C cable (25 pin D male to male) P/N: NKMR01-25
- A null RS-232-C cable (nine pins with pins 2 and 3 crossed over) P/N: HCBL02
- A 50-pin SBE-CPU port cable P/N: 1948200_50N14

EQUIPMENT SETUP

Equipment setup for the testing of the multibus cards:

NOTE: When a dumb terminal is connected to a CPU, it will be referred to as a ***Monitor-68K*** terminal.

1. Connect a Monitor-68K terminal to the MCS processor (M68CPU/MEM) card set (slots 15/16 and 18/17) and to the disk server (slots 12/11). These cards are located in the multibus card cage. At the present time only the first card set is of concern. The remaining cards will be tested later.

2. Using a standard nine conductor RS-232-C cable with 25 pin D male connectors on each end, connect one end to the modem port of the terminal.

3. Connect the other end to the channel A port on the CPU diagnostic connector cable (a 50-pin ribbon cable). This cable, in turn, should be plugged into a connector at the bottom of the M68 CPU card. For this test, start by plugging the cable into the M68 CPU card located in slot number 18.

NOTE: Test sections must be repeated for each additional CPU card or card set. The Monitor-68K terminal must be connected to the CPU card set being tested.

TESTS

1. Test MCS CPU/MEM 1. Connect the Monitor-68K terminal to the lower connector on the MCS CPU card (slot 18). Apply power to the MCS.

2. Enter the monitor mode by pressing Enter on the terminal within seven seconds after applying power to the MCS, otherwise the operating system will load. If this time frame is passed, reset the MCS and retry.

After entering the monitor mode, the screen shows a new line and a prompt *1:>*.

3. Type: **PT** Enter

This runs the processor self test. This is not a conclusive test of all features of the Memory/CPU card pair.

If this test is successful, the monitor shows a new line and a prompt (in about one second).

If the test fails, the monitor may become unresponsive, display a memory register dump (a string of alphanumeric characters appearing on the screen), or display the message, *CPU ERROR*. If the test fails, try checking all switch and jumper settings on the CPU/MEM pair set or try a new CPU/MEM set. Repeat this test until the test passes.

4. This step performs a memory block test on the MEM card of the CPU/MEM pair.

Type: **BT 1500 1FFFFE** Enter

Wait for a prompt or an error message. If you get an error message, replace the MEM board and repeat steps three and four.

If successful, this test returns a prompt (in about 18 seconds).

5. Test MCS CPU/MEM 2. Connect the Monitor-68K terminal to the lower connector on the MCS CPU card (slot 15).

6. Perform steps three and four of this procedure.

7. Test MCS disk server/MEM. Connect the Monitor-68K terminal to the lower connector on the MCS disk server card (slot 12).

8. Perform steps three and four of this procedure.

9. Test global memory card 1. Connect the Monitor-68K terminal to the lower connector on the MCS CPU 1 (slot 18). Press Enter on the terminal. A prompt will appear on the screen.

NOTE: Since the switch settings differ on these cards, they are NOT interchangeable.

Type: **BT 800000 9FFFFE** Enter

10. Wait for a prompt or an error message. With an error, check all switch and jumper settings on the global RAM cards and/or try new global RAM cards.

If the test is successful, the monitor will show a new line and/or a prompt (in about 20 seconds). When a prompt or new line returns, you are ready continue.

11. Test global memory card 2. Connect the Monitor-68K terminal to the lower connector on the MCS CPU 1 (slot 18). Press Enter on the terminal. You will get a prompt on the screen.

Type: **BT A00000 BFFFFE** Enter

12. Test global memory card 3. Connect the Monitor-68k terminal to the lower connector on the MCS CPU 1 (slot 18). Press Enter on the terminal. You will get a prompt on the screen.

Type: **BT C00000 DFFFFE** Enter

13. Test color graphics controller one. Connect the Monitor-68K terminal to the lower connector on the MCS CPU 1 (slot 18). Press Enter on the terminal. You will get a prompt on the screen.

NOTE: Since the switch settings differ on these cards, they are NOT interchangeable.

Type: **SM.B FE0000 0B** Enter
or
Type: **VT 0**

The monitor should display a *VERIFY ERROR AT* message if you use the **SM.B FE00000 0B** test method. This is not a problem at this time. Within about six to seven seconds, the MCS monitor will display a series of blue, then green stripes.

14. Self test status - color graphics controller 1.

First Method

Second card	Type: **SM.B FE0001 0B** Enter
Third card	Type: **SM.B FE0002 0B** Enter
Fourth card	Type: **SM.B FE0003 0B** Enter

Second Method

Second card	Type: **VT 1**
Third card	Type: **VT 2**
Fourth card	Type: **VT 3**

During and/or after completion of the self-test, the status of the graphics controller card may be checked.

NOTE: If you used **VT** in step 13, the status is automatically checked.

Check the status of the graphics controller card.

Type: **DM FE0000** Enter

The monitor shows one of the two character codes listed in Table 5-2. If the code *1B*, appears a second time, repeat steps 9 and 10 after checking jumpers and wire wraps of each graphics controller card.

15. Test Color Graphics Controller 2, 3 and 4

Self-Test Status - Color Graphics Controller 2, 3 and 4

Second card	Type: **DM FE0001** Enter
Third card	Type: **DM FE0002** Enter
Fourth card	Type: **DM FE0003** Enter

Table 5-2. Graphics Controller Card Self-Test Status

Code	Meaning	Action
10 11	Illegal command Stack overflow	Reset MCS and retry test
12 13	Stack underflow Self-test OK	Test complete, continue with step 15
14 15	Program error Circular buffer full	Reset MCS and retry test
16 17	Reset completed Illegal tracking command	Retry test
18 19	Illegal inking command Illegal rubberband command	Reset MCS and retry test
1A 1B	Doing self-test Self-test fail	Test in progress Retry test
1C	CPU time-out	Reset MCS and retry test

16. Test serial I/O interface cards one and two. Connect the Monitor-68K terminal to the lower connector on the MCS CPU 1 (slot 18). Press Enter on the terminal. You will get a prompt on the screen.

17. Check for the presence of a serial interface card by looking at memory locations in the area of each port (approximately 256 bytes of memory is sufficient). Ability to access all ports shows that the serial interface card is properly addressed. The test procedure for the serial interface card is given in the following two steps.

18. For first card, press Enter (monitor displays a prompt)

Type:	For:
DM FA0000 Enter	Port 0
DM FA2000 Enter	Port 1
DM FA4000 Enter	Port 2
DM FA6000 Enter	Port 3
DM FA8000 Enter	Port 4
DM FAA000 Enter	Port 5
DM FAC000 Enter	Port 6
DM FAE000 Enter	Port 7

19. For second card, press Enter (monitor displays a prompt)

Type:	For:
DM FB0000 Enter	Port 0
DM FB2000 Enter	Port 1

DM FB4000 Enter	Port 2
DM FB6000 Enter	Port 3
DM FB8000 Enter	Port 4
DM FBA000 Enter	Port 5
DM FBC000 Enter	Port 6
DM FBE000 Enter	Port 7

20. Test disk system functions. This nondestructive test returns a prompt if successful. If the test fails, one of the two character codes listed in Table 5-3 displays on the monitor screen.

Table 5-3. Disk Read Test Error Codes

Code	Meaning
02	Read error on the hard disk
22	Read error on floppy disk
FF	Data error on disk Time out error on disk I/O
1F	System (bus controller, disk controller, or either disk drive) volume not directory volume not established yet initialized (This is not a problem at this time.)

21. Disk sector tests.

Press Enter
(the monitor displays a prompt)

Type: **DT [0]** Enter
[hard disk sector 0 test]

22. Insert a floppy disk into the floppy disk drive.

Type: **DT [1]** Enter
[floppy disk sector 0 test]

On the success of the tests in steps 21 and 22, the monitor displays a prompt. An error displays: *DISK I/O ERROR*. Note the error message that is shown and reset the MCS. Press Enter ; repeat Steps 21 and 22.

23. ***Directory Reads***. Further verify disk system operation by listing the directory for each disk device.

Press Enter
(the monitor displays a prompt)

Type: **DI [0]** Enter
[hard disk drive directory]

Insert *SYS1* disk into the floppy disk drive.

Type: **DI [1]** Enter
[floppy disk drive directory]

On success of this test, the monitor displays a directory listing, one screen at a time. If this test fails, the monitor displays the same error messages as in step 20. Note the error, reset the MCS, press Enter , and repeat the directory read tests.

DIAGNOSTICS IN EPROM

The MCS supports diagnostic system tests run with a terminal. The tests are located in the EPROM on the MCS CPU 1, MCS CPU 2 and disk server CPU cards. The key functions listed in Table 5-4 are control commands which may be used during these tests.

Commands can also be chained together. For example:

Entering: **CT;RC;CT**

Causes the following to be printed:

05/15/87 10:38:24	current date and time
$\frac{u\ 19\ u\ 27}{116\ E\ 3\ DCA}$	ROM checksum
05/15/87 10:38:25	current date and time

Chaining the clock test command with other tests provides a timer. You can also chain single tests together.

Table 5-4. Control Commands for Advanced Diagnostics

Function	Purpose
Esc	Exits advanced diagnostics and returns to monitor level program
Ctrl -A	Aborts current test
Ctrl -C	Copies successive characters of previous input line
Ctrl -R	Reprints previous command input line
Ctrl -S	Suspends current test, hit any key to continue
/R	Repeats the test until error or you abort the test (Ctrl -A)
;	Separates a sequence of tests
\	Continues command inputs onto next line
[...]	Indicates optional parameters

To run the ROM based diagnostics, connect a terminal to the diagnostic port of the desired CPU card, then press the MCS reset button. The message:

SYSTEM RESTARTED
ENTER MONITOR BY PRESSING
OTHERWISE MTOS WILL AUTOLOAD IN 7 SECONDS.

will be displayed on the terminal screen. Press Enter within seven seconds to load the ROM based diagnostics. After approximately 20 seconds, a prompt will appear on the terminal:

1: if connected to the MCS CPU 1. slot 18

2: if connected to the MCS CPU 2. slot 15

> if connected to the MCS disk server. slot 12

Command Syntax

All commands consists of a two character command and a series of operands. The operands may be optional. If an operand is enclosed < >, it is required, and if enclosed in [..], it is optional.

Mode

The mode states where the command can be executed. The terminal begins in the monitor mode. Commands which may be executed in this mode have monitor written in the mode column.

Advanced diagnostic commands may be executed in DG mode. This mode is entered by typing **DG** in monitor mode and pressing Enter . Pressing Esc will exit the DG mode and return to monitor mode.

CPU1, CPU2, DSV

The diagnostics reside in three CPU boards in the MCS (refer to Table 5-5).

CPU1 = MCS CPU 1

CPU2 = MCS CPU 2

DSV = MCS Disk Server

The terminal must be connected to the diagnostic port of the proper CPU card. Each command states which CPU card it is available on. Some commands are available on more than one CPU card.

Table 5-5. Diagnostic Commands

Command Syntax	Mode	CPU1	CPU2	DSV	Description
BT <start addr> <end addr>	Monitor	X	X	X	Read/write test of continuous segment of memory.
BU				X	Load streaming tape from hard disk.
CF	Monitor	X		X	Configure hardware parameters of MCS, AP host interface to DSV, (disk partition for MCS host and AP host). The MCS will give you the following options: **A** - MCS host only **B** - MCS and AP hosts with 20 MB for AP **1** - edit/review MCS host configuration **2** - edit/review AP host configuration **E** - exit On systems without an application processor, the option selected should always be **A**. If anything else was entered by mistake, the CF command should be run again. The DSV is the recommended CPU to run this command from.
CI	DG	X			CIU test.
CL	DG	X	X	X	Clear configuration and restart diagnostics.
CM <addr1> <length> <addr2>	Monitor	X		X	Compare two blocks of memory.
CT <[month/day/year] hour:minute>	DG	X			Clock test.

Table 5-5. Diagnostic Commands (continued)

Command Syntax	Mode	CPU1	CPU2	DSV	Description
CV <decimal num> or CV 0<hex num>	Monitor	X	X	X	Convert decimal and hexadecimal integers.
D!	Monitor			X	Starts disk server processing with debug messages enabled. When debug messages are enabled, output and performance is slowed.
D$	Monitor			X	Starts disk server processing with debug messages disabled; equivalent to normal auto-start.
DF	Monitor	X			Duplicate floppy. User is prompted for input.
DG	Monitor	X	X	X	Start Bailey MCS EPROM-based advanced diagnostic utilities.
DI <drive num> [USN]	Monitor	X		X	Directory listing of files for specified device and USN. The hard disk is drive number zero, and the floppy disk is drive number one.
DM [<addr> [num of bytes]]	Monitor	X	X	X	Display memory starting at specified location. DM Display next 16 bytes. DM <address> Display next 16 bytes at starting address. DM <address> <num of bytes> Display next <num of bytes> at starting address.
DP <device>	DG			X	Disk parameters.
DS	Monitor	X			Dismount disk; flush disk buffers.
DT <drive num>	Monitor	X			Easy disk read test for sector 00.
EL	DG			X	Error log for hard disk.
FO <device> [type]	Monitor	X	X	X	Format specified file system device. This command formats either floppy disks or the hard disk. The optional type parameter is used to format the hard disk and is either a one (Priam V150), two (Priam V185), three (Priam V519/Maxtor XT-2190), four (Seagate 4086), five (Microscience 4090) or six (Maxtor XT-1085). If the type parameter is needed but not present on the command line, the user is prompted for it.

Table 5-5. Diagnostic Commands (continued)

Command Syntax	Mode	CPU1	CPU2	DSV	Description
FO <device> [type] (continued)	Monitor	X	X	X	When the system is done formatting the hard disk, it enters RT (replace track mode, and asks for the cylinder address and the head address (in decimal). It then assigns an alternate track table and informs when it is complete. To exit, press Enter with no input to the head or cylinder field. The system then returns to the CFG mode. Upon completion of the CF command, the system returns to the command line prompt.
GO [addr] or GO [/till <addr>]	Monitor	X	X	X	Starts execution of a program.
GT <board [test]>	DG	X	X		Graphics test <board> = 0 to 3, [test] = 1 to 5.
HE [command name]	ALL	X	X	X	Help displays information, parameters, etc. for a selected command or all commands.
HT	Monitor	X	X	X	Causes monitor to enter host transparent mode.
IT	DG	X	X	X	Interrupt test.
KK <keyboard num>	DG	X			Keyboard key test.
KL <keyboard num>	DG	X			Keyboard LED test.
KR <keyboard num [relay mask]>	DG	X			Keyboard relays test.
KS <keyboard num>	DG	X			Keyboard sound test.
LF <addr> <filename.ex> <drive> [USN]	Monitor	X		X	Loads file under specified drive/USN into memory.
LO <addr> <num sectors> <start sector> <drive>	Monitor	X		X	Load contiguous memory image to disk.
LT <pcu num> <module num>	DG	X			Loop test.
MB <source addr> <destination addr> <num sectors>	Monitor	X	X	X	Move sectors memory (256 bytes each).
MT	Monitor	X	X		Invokes start-up or restart of MTOS operating system.
MV <source addr> <length> <destination addr>	Monitor	X	X	X	Move blocks of memory.
PT	Monitor	X	X	X	Motorola processor test.
PU <start addr> <length>	Monitor	X	X	X	Download (punch) Motorola's records to host computer.
RC	DG	X	X	X	ROM checksum.
RE	Monitor	X	X	X	Upload (read) Motorola's records from host computer.
RM <start addr> <end addr>	DG	X	X	X	Long memory test.

Table 5-5. Diagnostic Commands (continued)

Command Syntax	Mode	CPU1	CPU2	DSV	Description
RS <device>	Monitor			X	Request sence error message from disk controller for given file system device. This command returns four bytes of sense information, in hex format, for either the floppy or hard disk.
RT <drive> <bad track addr> <alt track addr>	Monitor			X	Performs alternative mapping (replacement of tracks) around known bad tracks on hard disk. This command prompts the user for bad cylinder and head address (must be entered in decimal format). It then automatically assigns an alternate track, prompts the user for the next bad cylinder address. If Enter is entered alone for either prompt, RT exits back to the command line.
RU				X	Restore hard disk from streaming tape.
SA <addr> <num sectors> <start sector> <drive>	Monitor	X		X	Save contiguous image to disk.
SB <board num> <port num> [C]	DG	X			Serial Board Test. [C] = use loopback connector.
SC	DG			X	SASI/OMTI disk controller test.
SF <addr> <filename.ex> <device> [USN]	Monitor	X	X	X	Saves memory data to file under specified device/USN.
SM [size] <addr> <data>	Monitor	X	X	X	Store values at memory locations. Mode can be changed to one of the following: .B bytewise storage (8 bits) default .W word size storage (16 bits) .L long word storage (32 bits)
ST	DG		X		SASI interface adapter test.
SX <long word> or SY <long word> or DSZ <long word>	All	X	X	X	Three base registers that can be used in expressions or commands. Example: SX 1000 SY X+2 SZ 'ABCD'
TD	Monitor	X	X	X	Trace display prints the current values of all processor user registers: PC, SR, USP, SSP, D0 to D7, A0 to A7.

Table 5-5. Diagnostic Commands (continued)

Command Syntax	Mode	CPU1	CPU2	DSV	Description
UT	Monitor	X	X	X	Utility that automates verification of operation for interprocessor communication hardware. Prompts user for actions. Must reset MCS at end of test. 1. Connect ~~terminal~~ CABLE to disk server. 2. Press **Enter** to reset and abort restart. 3. Enter **UT** **Enter** at the prompt (>). 4. Select 1-MMU TEST and press **Enter** . 5. Move ~~terminal~~ CABLE to target CPU (CPU1 or CPU2). 6. Press **Enter** . 7. Enter **UT** and press **Enter** at the monitor prompt. 8. Select 1-MMU TEST and press **Enter** . 9. Enter **T** to start the test. 10. Move ~~terminal~~ CABLE back to the disk server. 11. Press **Enter** . 12. Enter the number (**1** or **2**) of the CPU being tested.
VT <device num>	Monitor	X	X	X	Call graphics controller self-test. The device number is either 0, 1, 2 or 3, for the graphics controller 1, 2, 3 or 4, respectively.

Table 5-5. Diagnostic Commands (continued)

Command Syntax	Mode	CPU1	CPU2	DSV	Description
WT <device> <disk type> <num test> <test type> [A]	DG			X	Winchester test. Tests the hard disk. <device> = 0 (hard disk) <disk type> = 1 (Priam V150), 2 (Priam V185), 3 (Priam V519/Maxtor XT-2190), 4 (Seagate 4086), 5 (Microscience 4090), 6 (Maxtor XT-1085) <num tests> = number of times to perform the test <test type> = D - destructive; N - non destructive [A] = replace with alternate. **NOTE:** The destructive test type deletes the data on the hard disk. The user should backup data on floppies before performing this test. Upon completion of this test, perform the CF (configure) command, initialize the MCS, then reload from backups.

ERROR CODES

Tables 5-6 through 5-10 list the system error codes. Refer to Bailey product instruction ***I-E93-905-9, Enhanced Computer Interface Unit Programmer's Reference Manual***, for further information.

Table 5-6. File System Error Codes

Hexadecimal Error Code	Error Description
$00	No error
$01	Logical/physical end of file violation
$02	Time-out occurred before initiating service
$03	Device reported hard error in data block
$04	Device reported hard error in file allocation block (FAB)
$05	Device reported error in directory, bit-map, or volume I.D. sectors
$06	Device type not compatible with this command
$07	Device reported time-out error

Table 5-6. File System Error Codes (continued)

Hexadecimal Error Code	Error Description
$08	Invalid command
$09	Invalid logical unit
$0A	No file channels available
$0B	No units are available
$0C	Logical unit not assigned
$0D	File has been reserved against request
$0E	Device has been reserved against request
$0F	Invalid option
$10	Incompatible option
$11	Invalid file description
$12	Attempt to create a file that already exists
$13	File not found
$14	Device not found in DIT table
$15	Attempt to write to a file opened for read or vice versa
$16	Error in logical record format
$17	Invalid record format
$18	Invalid key
$19	Key length error
$1A	Insufficient medium space (device full)
$1B	Insufficient buffer space
$1C	End of directory
$1D	Key not found
$1E	Key already exists
$1F	Buffer overflow
$20	Mount violation
$21	Invalid volume dismount
$22	Attempt to open or dismount while a file is open
$23	Open files on volume
$24	Attempt to free a channel with pending requests
$25	Unit has been reserved so open files can can be aborted
$26	Internal error
$27	File must be reserved
$28	Unit must be reserved
$29	Invalid time unit for PAUFIN coordination
$2A	Illegal coordination mode given
$2B	Size conflict during write
$2C	Variable length record length of 0
$2D	Inconsistent lock option
$2E	Attempt to close while no file is open
$2F	No internal queue block available
$30	Mismatch of label or sequence number
$41	Device error (hard error)
$42	Disk controller error
$43	Seek error
$44	Write error
$45	Exclusive device access denied
$46	Can not open device
$47	Illegal operation code
$48	Illegal request

Table 5-6. File System Error Codes (continued)

Hexadecimal Error Code	Error Description
$49	Time out error - for MCS time out of request I/O routine
$4A	Bad lun number
$4B	Illegal disk address
$4C	Illegal memory address
$4D	No lun for host
$4F	Reset command successfully completed
$50	Hash overflow buffer is full
$51	Write protection error
$5F	Disk controller time out
$60	Check condition (sense bytes returned in sense data buffer)
$61	Signal that host issuing a close never had exclusive access
$62	Unit is off-line
$63	Interface device (SCSI board) not present or functioning
$64	A track on a device was not formatted completely
$65	An unexpected SASI PIO status was returned
$101	The maximum number of files is open
$102	The requested record length is too big for UNIX buffers
$103	Invalid pathname format
$104	Invalid type supplied
$105	Asked for sequential file, file is contiguous
$106	Requested sequential record size is different from existing file
$107	Attempt to append at end of contiguous file

Table 5-7. Disk Controller Error Codes

Hexadecimal Error Code	Error Description
$0000	No error
$0100	No index signal
$0200	No seek complete
$0300	Write fault
$0400	Drive not ready
$0500	Drive not selected
$0600	No track zero found
$0700	Multiple drives selected
$0900	Cartridge changed
$0D00	Operation in progress
$1000	Tape exception
$1100	Uncorrectable error in data field
$1300	No address mark in data field
$1400	No record found
$1500	Seek error
$1700	Write protected

Table 5-7. Disk Controller Error Codes (continued)

Hexadecimal Error Code	Error Description
$1800	Correctable ECC error
$1900	Bad track flag set
$1A00	Incorrect interleave factor
$1C00	Unable to read alternate track data
$1E00	Illegal direct access to alternate track
$1F00	Tape drive failure
$2000	Invalid command
$2100	Illegal parameters
$2200	Illegal function for drive type
$2300	Volume overflow
$3000	Power up diagnostic error
$3100	FDC 765 error
$9100	Uncorrectable error in data field
$9300	No address mark in data field
$9400	No record found
$9500	Seek error
$9700	Write protected
$9800	Correctable ECC error
$9900	Bad track flag set
$9A00	Incorrect interleave factor
$9C00	Unable to read alternate track data
$9E00	Illegal direct access to alternate track

Table 5-8. UNIX I/O Error Codes

Hexadecimal Error Code	Error Description
$01	Modified buffer could not be written
$02	Could not close file
$04	Could not dismount file
$08	Could not close file because end of tape was encountered
$101	The maximum number of files are open
$102	The requested length is too big for UNIX
$103	Invalid pathname format
$104	Invalid type supplied
$105	Asked for sequential, file is contiguous
$106	Requested sequential record size is different from existing file
$107	Attempt to append to a contiguous file at end of file

Table 5-9. Tape File Error Codes

Hexadecimal Error Code	Error Description
$201	Attempt to mount or init while volume is mounted
$202	Attempt to dismount or open while no volume is mounted
$203	Attempt to init volume with invalid bpi density
$204	Attempt to dismount when task hadn't mounted
$205	End Of Tape (EOT) encountered before operation was completed
$206	Tape file system internal error
$207	Device busy - can not perform mount or open
$208	Volume is write protected
$209	Size of file created does not match the original create file parameter, file will be deleted on close.
$20A	(for internal use)
$20B	(for internal use)
$20C	EOV mark exists, no recovery action taken
$20D	Directory full, reached maximum number of files
$280	Unexpected sense data format
$281	Target managed to recover an error condition
$282	Unit not ready
$283	Command terminated due to flaw in medium or error in recorded data
$284	Target detected nonrecoverable hardware error
$285	Illegal request
$286	Unit attention, medium may have been changed
$287	Data protect
$288	Blank check, reading blank block
$289	Incorrect block length

Table 5-10 lists the CIU error codes in decimal format. Refer to Bailey product instruction ***I-E93-905-9, Enhanced Computer Interface Unit Programmer's Reference Manual***, for further information.

Table 5-10. CIU Error Codes

Decimal Error Code	Error Description
0	No error
1	Waiting for loop
2	Improper format
3	Illegal command
4	Index already established
5	Block already established at another index (Loop, PCU, MOD and Block are all the same as another tag)
6	Command too long
7	Bad reply from LIS/BTM
8	Export used as import
9	Repeat CIU restart command
10	Undefined index
11	Memory full
12	Host communication error

Table 5-10. CIU Error Codes (continued)

Decimal Error Code	Error Description
13	LIS/BTM not responding
14	Import used as export
15	Time-out of loop response
16	Number out of range
17	Illegal key
18	Need a restart command
19	Module status used as import
20	Message active on loop
21	Import or export used as module status
22	Exception report specifications lost
23	No message queued, dequeue received
24	Reply too large
25	Illegal station mode command
26	Illegal module number in command
27	Time out between bytes in command
28	Index already established by another node
29	Point type incompatible with command
30	Watchdog time-out
31	Checksum compare error
32	Destination node off-line
33	Callup command required
34	CIU error
35	CIU busy
36	LIS/BTM off-line
37	Conflict with monitor mode
38	Point type incorrect
39	Destination ring off line
40	Destination node busy
41	Destination ring busy
100	Undefined message type for target module
101	Busy - cannot respond at this time
102	Mode for command does not agree with current module mode
103	Message data out of range
104	Invalid block number
105	Undefined block number - block is valid but not configured
106	Block not readable - block number is valid but has no readable parameters
107	Invalid function code for target module
108	Function code and block number not compatible in target module
109	Insufficient memory to write block in EEROM and/or RAM
110	Module not responding

PART REPLACEMENT PROCEDURES

WARNING	**Disconnect from electrical supply before attempting repair or replacement.**
AVERTISSEMENT	**Debrancher de la source electrique avant de proceder a des travaux de reparation ou de remplacement.**

Hardware Setup Electrostatic Discharge (ESD) Control

Static susceptible devices (SSD) may be damaged by contact with potential static charges during handling. Static charges in excess of the device's maximum rating (6.25 volts or greater), when placed across the leads of SSD can damage the oxide layers within the package. Latent or immediate damage may result. Latent damage may not be detectable under normal circuit check-out, but may result in a severe degradation of equipment or system reliability. Methods for preventing damage involve equalizing the potentials across all SSD terminals and across the SSD working area, tooling and operator. The most common method is to electrically connect tools, assembly equipment and the operator to earth ground. Follow this procedure at all stages of handling.

These special handling procedures should be followed to avoid damage to the printed circuit boards:

1. Personnel working with or handling printed circuit boards should be properly grounded by wearing conductive wrist ground straps.

2. Personnel wearing silk, wool or synthetic clothing need to wear a conductive material smock. Keep all plastic and textiles which are not antistatic away from SSD and work stations.

3. Use antistatic containers and bags. Store ESD-sensitive equipment in these containers/bags when not in the system.

4. Ground containers and bags before opening.

5. Ground test and assembly equipment.

6. Construct or cover work stations with conductive materials.

7. Keep the work area free of plastic, styrofoam, cellophane and vinyl materials (e.g., coffee cups, cup holders, cigarette packages, combs, books, folders).

8. Use only tools constructed of conductive materials and provide a means for connection to ground.

9. Use only grounded tip soldering irons approved for use on SSD.

Card Cage

Bailey P/N 1948017_1

1. Disconnect all cables and wiring from the back of cage.

2. Remove the four screws at the front of the card cage (two on each side).

3. Slide the cage out of the cabinet.

Color Monitor

Bailey P/N - 6636994_1

1. Shut off power to the MCS.

2. Remove the two screws at the side of the door which retain the top cover. Remove the top cover by lifting the rear edge and pushing toward the front of the MCS.

3. Remove the cable from the J1 connector.

4. Remove the cable to the front panel mounted brightness control.

5. Remove the power cord.

6. Remove the two screws holding the CRT to the rails.

7. Slide the CRT out the rear of the MCS.

Disk Drive Controller Card

Bailey P/N - 1948013_1

1. Shut off power to the MCS.

2. Disconnect the ribbon cables from the controller card.

3. Loosen the controller card attaching screws. Carefully lift off the controller card.

Fan Assembly

Bailey P/N - 6634988_1
Air Filter - 199914_22

1. Shut off power to the MCS.

2. Cut and remove cable ties securing the fan assembly power cord.

3. Remove the air filter.

4. Remove the two screws at the bottom of the fan assembly which secure the unit to the MCS.

5. Remove the two screws securing the I/O distribution board to the top of the fan assembly.

6. Lift the unit out of the MCS cabinet.

Floppy Disk Drive

Bailey P/N - 1948018_1

1. Shut off power to the MCS.

2. Remove all power and ribbon cable connectors to the floppy disk drive.

3. Remove the bolt at the the bottom of the disk drive.

4. Remove the bolt at the top of the disk drive.

5. Slide the disk drive out through the front of the MCS.

Hard Disk Drive

Bailey P/N - 1948002_1

1. First, remove the disk drive controller card. Use the procedure given in the description of the hard disk drive in the ***Standard Hardware*** section.

2. Disconnect plugs to the main power supply.

3. Loosen the far right screw (as viewed from the rear) but leave in place. Remove the four remaining screws retaining the disk power supply.

4. Swing the power supply to the right and out of the way, to gain access to the hard disk drive. Cut and remove cable ties securing AC and DC wires.

5. Disconnect all power and ribbon cables to the hard disk drive.

6. Remove the screws securing the hard disk drive to the cabinet. Lift the drive out of the cabinet.

MCS Keyboard

Bailey P/N - 6636278_1

1. Shut off power to the MCS.

2. Slide the logo plate from the face of the keyboard.

3. Remove the two screws holding the keyboard assembly to the keyboard housing.

4. Lift the keyboard assembly and remove the connections at the CPU card's connectors and the keyswitch connectors.

I/O Power Supply

Bailey P/N - 1948005_1

1. Shut off power to the MCS.

2. Cut and remove cable ties retaining the AC and DC wires to/from the disk power supply.

3. Release the plunger latches on the supply and slide it out of the cabinet.

Main Power Supply

Bailey P/N - 1948003_1

1. Shut off power to the MCS.

2. Remove the power supply plug from the socket on the AC distribution board.

3. Mark and disconnect the wires between the power supply and the TB1 terminal block and the NTPL01 or NTCL01 termination unit.

4. Release the plunger latches on the power supply assembly; slide the unit out of the cabinet.

Reset Assembly

Bailey P/N - 6636410_1

Remove the card cage to access the reset assembly.

1. Follow the directions for removing the card cage.
2. Remove wiring connections from the reset assembly.
3. Remove the retaining screws securing the assembly to the cabinet.

Termination Unit

Bailey Nomenclature - NTPL01 or NTCL01

1. Shut off power to the MCS.
2. Disconnect all attached cables and wiring.
3. Remove the two retaining screws.

SECTION 6 - MAINTENANCE

INTRODUCTION

This section covers preventive maintenance, diagnostic tests and replacement part procedures. Information in sections two through four may also help in replacing parts. The ***INSTALLATION AND START-UP*** section should be carefully reviewed for specific adjustments associated with certain replaceable parts, before the system is returned to normal operation.

Table 6-1. Preventive Maintenance

MCS Component	Frequency	
	Monthly	Annually
Floppy disk drive	—	Clean and check alignment.
Printer	Inspect, clean and lubricate.	Adjust.
Keyboard electronics	—	Check key functions.
Power supply	—	Adjust power supply if necessary.
Blower assembly	Clean filter.	Rinse filter with water, blow dry and reinstall. Remove squirrel cage and oil bell at motor axis.
CRT power supply	—	Check and adjust power supply if necessary.
Touch screen and CRT	—	Check alignment.

SECTION 7 - SUPPORT SERVICES

INTRODUCTION

Bailey Controls is always ready to assist its customers in the operation and repair of its products. Requests for sales or application services along with installation, repair, overhaul and maintenance contract services should be directed to your nearest Bailey Controls sales/service office.

Replacement Parts and Ordering Instructions

If the user wants to make repairs at his facility, replacement parts should be ordered through a Bailey Controls sales/service office. We request that the following information be provided when ordering parts:

1. Part description, part number and quantity.

2. Model and serial (if applicable) numbers and ratings of the assembly for which the part has been ordered.

3. Bailey publication number and reference used in identifying the part.

When ordering parts from Bailey Controls, we request that part numbers and part descriptions from respective renewal parts sections of pertinent equipment manuals be used. Parts which do not have a commercial description provided must be ordered from your nearest Bailey Controls sales/service office. Recommended spare parts lists, including prices, on standard assemblies are also available through your nearest Bailey Controls sales/service office.

Training

Bailey Controls has a modern training center, equipped to provide service and repair instruction, which is available for in-plant training of customer personnel. Specific information regarding course content and scheduling can be obtained from your nearest Bailey Controls sales/service representative.

Technical Documentation

Price and delivery of additional copies of this publication can be obtained through your nearest Bailey Controls sales/service office.

Recommended Spare Parts

Table 7-1 is a list of the recommended spare parts for the MCS. Bailey Controls suggests a stock supply of one item each to minimize the duration and cost of down-time in case of component failure.

Table 7-1. MCS Recommended Spare Parts List

Description	Part No.
Air filter	199914_22
Card cage	1948017_1
Clock calendar card	1947999_1
Color monitor	1948014_5
Multibus graphics controller	IIMGC01
CPU card 1	6637033_2
CPU card 2	6637033_3
Disk server card	6637033_4
Fan assembly	6634988_1
Floppy disk drive	1948018_1
Fuse, 3.0 amp utility AC	194776_13001
Hard disk drive: 55 Megabytes/or 85 Megabytes/or 190 Megabytes	 1948002_1 1948002_4 1948002_3
High speed IC assembly	1947692_148
Interface PCB assembly	6637273_1
Keyboard controller: MKI/or EMKI	 6636278_1 6637517_1
Keyboard assembly	6636166_2
Global 2 Megabyte RAM	1948028_1
Private 2 Megabyte RAM	1948022_1
OMTI disk controller	1948013_1
Power supply assebly I/O	6636374_1
Power supply assembly main	6636444_1
Local memory card	6637447_1
Multibus Serial Interface Module	IIMSM01
Reset assembly	6636410

Table 7-1. MCS Recommended Spare Parts List (continued)

Description	Part No.
SASI Interface Module	1948023_1
Termination unit communication link	NTCL01
Varistor: 150 VAC 240 VAC	 6634333_1 6634333_2
Optional NMED01 remote electronics cabinet: Power entry panel[1] Termination modules communication link[1]	 6637587_1 NICL01
Optional touch screen: Touch screen Touch screen controller card	 1948026_1 1948027_2
INFI-NET: INFI-NET interface slave INFI-NET storage module -OR- Plant loop: Bus transfer module Loop Interface Module Plant loop to Computer Transfer Module	 INNIS01 INICT01 INBTM01 INLIM03 INPCT01

NOTE: 1. Bailey suggests one item each be maintained in your stock supply.

INTECOLOR
model NO: E01942-20F
OPTIONS: E91A
SERIAL NO: 633229
DATE: 06/06/90

INTECOLOR Duluth, GA
404-623-9145 DAVE BASS

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