

**System
Software
Installation
Guide**

**A Series
A 2/A 3 Systems**

*(Relative to the Mark 3.6 System Software Release)
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1 INTRODUCTION

The Burroughs A 2 and A 3 single-processor systems with Address Space Number (ASN) memory management are general-purpose data processing systems consisting of memory, processor, input/output (I/O) subsystem, datacomm subsystem, and software. The A 2 is the entry-level system to the Burroughs A Series product line. For information on other A 3 systems, refer to the A 3 Dual-Processor System Software Installation Guide or the A 3 Advanced System Software Installation Guide. Key features of the A 2 and A 3 systems are the following:

- Object code compatibility with A Series architecture.
- Ability to configure up to 9 million bytes of memory on the A 2 and up to 24 million bytes of memory on the A 3.
- Compatibility with Universal Input/Output (UIO).
- Ability to evolve with technology.
- Ability to upgrade processor performance in the field.
- Easy-to-use maintenance functions.
- A low-cost input/output (I/O) subsystem.

PURPOSE OF THE GUIDE

The purpose of this guide is to inform you about the following:

- The components of the A 2 and A 3 systems.
- The procedures necessary to install the system software.
- The Halt/Loading procedures.
- The procedure used to start up the datacomm subsystem.
- The procedure used to create a Halt/Load pack.
- The hardware and software features of the A 2 and A 3 systems and their compatibility with other Burroughs systems.

HOW TO USE THIS GUIDE

There are two ways this guide can be used: as an installation guide, or, as a reference manual.

To use this guide as an installation guide, read the "Understanding Your System" section to familiarize yourself with the A 2 or A 3 system that has been delivered to you. Then read the "A 2 and A 3 Screens" section for information on screens that are unique to the A 2 and A 3. Finally, read the "Initial Software Installation Procedures" section for information about the sequential procedures necessary to install your A 2 or A 3 system software. If the automatic initialization sequence is interrupted, go to the "Troubleshooting the Automatic Initialization Sequence" section.

After the initial installation, various circumstances may arise that require different types of Halt/Loads or a new Halt/Load pack. The "Simple Halt/Loading of Your System" section, the "Halt/Loading Using UTILoader and Loader" section, the "Defining I/O Paths and Loading Controlware" section, and the "Creating a Halt/Load Pack on an A 3" section present procedures for doing these activities.

Additionally, the hardware and software features are summarized in the "Hardware Features of the A 2 and A 3 Systems" section and the "Software Features of the A 2 and A 3 Systems" section. The A 2 or A 3's compatibility with other Burroughs systems is discussed in the "Compatibility" section.

RELATED DOCUMENTS

<u>Document</u> -----	<u>Form No.</u> -----
A 2/A 3 Remote Support Operating Instructions	5016868
A 2/A 3 System Reference Manual, Volume I	5013196
A 3 Advanced System Software Installation Guide	1170073
A 3 Dual-Processor System Software Installation Guide	1195096
A Series System Architecture Reference Manual, Volume II	5014954
ALGOL Reference Manual	1169844
Binder Reference Manual	5014582
Disk Subsystem Software Overview	1169992
Field Engineering Features/Modification Installation Manual	1034733
Interactive Datacomm Configurator (IDC) User's Guide	1169810
Memory Subsystem Overview	1169836
Menu-Assisted Resource Control (MARC) User's Guide	1169588
Network Definition Language II (NDLII) Reference Manual	1169604
Operator Display Terminal (ODT) Reference Manual	1169612
PTD/DOC/CONF/IVR	PTDTESTS Tape
PTD/DOC/USERS/GUIDE	PTDTESTS Tape
System Software Site Management Reference Manual	1170008
System Software Support Reference Manual	1170016
Work Flow Language (WFL) Reference Manual	1169802

2 UNDERSTANDING YOUR SYSTEM

The first three sections introduce the A 2 and A 3 systems and their components. The information includes descriptions of the components, descriptions of screens that are unique to these systems, and a description of the software installation procedures.

With the A 2 and A 3 systems, you receive a minimum configuration that includes these items, described on the following pages:

- An ET1100 System Control Terminal (SCT).
- A built-in Winchester disk drive Storage Module Device (SMD) and an SMD Data Link Processor (SMD-DLP).
- A Printer Tape Data Link Processor (PT-DLP).
- A Data Communications Data Link Processor (DC-DLP).
- A User Interface Processor (UIP).

Additionally, you may have purchased or already own a compatible streamer tape drive or a phase-encoded (PE) tape drive, additional disk drives, and a printer.

THE ET1100 SYSTEM CONTROL TERMINAL

The ET1100 System Control Terminal (SCT) consists of a video display unit and a keyboard used to enter information. As the System Control Terminal, the ET1100 presents you with three distinct terminal uses. The first use is to access the operating system as the Operator Display Terminal (ODT). The second use is to access the maintenance subsystem as the Maintenance Display Terminal (MDT). The third use is to access Remote Support as the Remote Display Terminal (RDT). These uses become available to you after the automatic initialization sequence has finished.

WINCHESTER DISK DRIVES

In the A 3 system cabinet, you can have up to four Model 226 SMD-type Winchester disk drives, depending on the configuration. In the A 2 system cabinet, you can have two Model 226 SMD-type Winchester disk drives. Additionally, you can have an MD4 cabinet with up to 4 Model 236 SMD-type Winchester disk drives on the A 2 and the A 3 systems. Each drive can store about 122 megabytes of information. The disk pack that is mounted on disk unit 44 is the Boot unit. A Boot unit has been selected as containing the operative BOOTCODE file. It is used by the System Control Processor (SCP) to initialize the system. Disk unit 44 is also the Halt/Load unit and is designated as the unit containing the pack having the operative Master Control Program (MCP) on it. That pack also contains all the necessary files to initialize your A 2 or A 3 system automatically.

In addition, the disks can store other system and user data programs and files.

PRINTER TAPE DATA LINK PROCESSOR (PT-DLP)

The Printer Tape Data Link Processor (PT-DLP) can control one buffered printer and up to four streamer tape drives. The following printers can be supported by this DLP:

- B9246-12 1250 LPM band printer
- B9246-6 650 LPM band printer

DATA COMMUNICATIONS DATA LINK PROCESSOR (DC-DLP)

The Data Communications Data Link Processor (DC-DLP) can drive four serial datacomm lines. The protocols supported are Poll/Select and teletype (TTY). All four lines have switched capability with one line providing the auto-dial feature. A default datacomm environment is defined by the file SYSTEM/DATACOMINFO, which is found on the preinitialized disk.

USER INTERFACE PROCESSOR (UIP)

The User Interface Processor (UIP) serves two functions. It is System Control Processor (SCP), which performs a maintenance subsystem self-test before loading and transferring control to the maintenance subsystem software. It is also the controller (ODT2-DLP) for the ODT when it is in operator display mode and is acting as a terminal to the processor.

The UIP is one card based on a 16-bit microprocessor. It has access to A 2 or A 3's main memory, the A 2 or A 3 processor, the input/output (I/O) processor, and the Data Link Interface (DLI) I/O base. It also contains code for ODT functions.

The UIP has a certain amount of resident Programmable Read-Only Memory (PROM) code. Nonresident code is stored on the Boot unit. The resident code can read and write data from an SMD disk, PE tape drives, and streamer tape drives attached to the A 2 or A 3's special DLI bus. It also manages the Power Control Card (PCC) and communicates with the ET1100 System Control Terminal (SCT). It is not capable of transferring data to or from peripheral devices in any other I/O base.

The SCP retrieves all required initialization and maintenance information from an SMD disk drive or a streamer tape drive that is visible to the MCP. The SMD disk drive must reside in the built-in DLI I/O base.

3 THE A 2 and A 3 SCREENS

Since the Maintenance Display Terminal (MDT) screens are unique to the A 2 and A 3 systems, the three screens most often used are described in this section. The examples show A 3 screens. The A 2 screens are the same except the A 3 label is replaced with A 2.

The status line for the MDT and Operator Display Terminal (ODT) screens is also described. The MDT screens (the Operator Menu, the Manual Menu, and the Configuration menu) control the system, display information about the system, and change the configuration of the system. Refer to the A 2/A 3 Remote Support Operating Instructions manual for information on the use of Remote Display Terminal (RDT) screens.

Four function keys on the ET 1100 System Control Terminal (SCT) keyboard allow you to go from one screen group to another. They are function key 1 [F1], function key 2 [F2], function key 3 [F3], and function key 10 [F10]. If a terminal has been powered down while the system is still running, all function keys become inoperative until they have been reinstated. To reinstate the function keys, do the following:

1. Power up the terminal.
2. Press the specify [SPCFY] key in response to the message that appears on the screen or enter ??> followed by <key name> in the upper left-hand corner, where <key name> can be ODT, RDT, or MDT. Then press the transmit [XMIT] key.

All four function keys are now reprogrammed.

By pressing [F1], the system returns you to the ODT window configured in datacomm mode, which does not require a visible ETX. It is recommended that you use [F1] for ODT operations. An ETX is an end-of-transmission character.

By pressing [F2], the system returns you to the MDT window. The screen that you were on when you last used the MDT window reappears.

By pressing [F3], the system returns you to the RDT window.

By pressing [F4], the system returns you to the ODT window configured in ODT mode, which requires a visible ETX.

THE OPERATOR MENU

The Operator Menu is the highest-level interface with the maintenance subsystem. It is used to change the state of a running A 2 or A 3, or as a path to move to the next level of menu.

OPERATOR MENU	A3/UIP
1) HALT 2) CONTINUE 3) BOOT_LOAD 4) FORCE MEMORY DUMP 5) GO MANUAL MENU 6) SOFT POWER UP 7) POWER DOWN	
ENTER NUMBER > <	
<error message line>	> < status >
<function line	FORM MDT 1

To make a selection, enter the number of the desired function between the inward-pointing arrows, > <, on the "ENTER NUMBER LINE". To refresh the screen and erase any error messages that are displayed, enter a blank and press [XMIT]. The following table describes each function found on the screen.

The A 2 and A 3 Screens

OPERATOR MENU SELECTIONS

Command	OPERATOR MENU Function
-----	-----
HALT	This selection halts the A 2 or A 3 processor. A halt can be specified at any time.
CONTINUE	This selection causes the A 2 or A 3 processor to resume processing. This selection is allowed only when the status of the machine is OPER-HALT or COND-HALT.
BOOT_LOAD	This selection reloads UTILoader and initiates the MCP. This selection is allowed only when the system is halted or cleared.
FORCE MEMORY DUMP	This selection can be made when the MCP is running. It causes the MCP to initiate a fatal memory dump, which is a record of the processor's memory at the given moment. A memory dump is termed "fatal" if it ends in a Halt/Load of the system.
GO MANUAL MENU	This selection transfers you to the Manual Menu. This can be done at any time.
SOFT POWER UP	This selection restarts the system from the SCP initialization as if the machine were just powered up. It allows the Boot unit to be changed without powering off the system. The system must be halted to use this selection.
POWER DOWN	This selection powers off the entire system. If the MCP is running, the UIP delays the power-down for approximately five minutes, so that the system can be halted. If the system is halted, power-off is immediate.

THE MANUAL MENU

The Manual Menu screen is intended to provide step-by-step initialization control of the system. This screen also provides maintenance options.

MANUAL MENU		A3/UIP
> <	CLEAR CPU	
> <	AUTO INITIALIZE	
> <	LOAD MICRO-CODE	
> <	LOAD UTILoader	
> <	START CPU	
> <	HALT CPU	
> <	CONTINUE CPU	
> <	FORCE MEMORY DUMP	
> <	SET CONDITIONAL HALT	
> <	RESET CONDITIONAL HALT	
	> <	GO MAINTENANCE MENU
	> <	GO TEST RUNNER MENU
	> <	GO CONFIGURATION MENU
	> <	LIST BOOT DIRECTORY
BOOT_UNIT	=	XXX
MCP HALT/LOAD UNIT	=	XXX
SYSTEM-SERIAL	=	XXXX
PCC VERSION	=	XX
	> <	CAPTURE STATES
	> <	VIEW STATES
	> <	SAVE STATES
	> <	SOFT POWER UP
	> <	POWER DOWN> <
<error message line>		
<function line		> < status >
		FORM MDT 1

The following table describes the different options presented on the Manual Menu. To select an option, enter an X between the inward-pointing arrows, > <, next to the desired option. If several options are desired, enter all the desired X's and press [XMIT]. The system executes the selections in the appropriate order.

The A 2 and A 3 Screens

Manual Menu Option -----	Description -----
CLEAR CPU	This option clears the memory of the processor and can be selected only when the system is halted.
AUTO INITIALIZE	Enter an X to automatically load A 2 or A 3 microcode and UTILOADER, start the system running, and transfer control to the Operator Menu. Enter an A to initiate the system confidence tests, as well as the automatic sequence described above.
LOAD MICRO-CODE	This option loads A 2 or A 3 microcode and returns you to the Manual Menu.
LOAD UTILOADER	This option loads UTILOADER. To run UTILOADER so that a UTILOADER command can be selected, the CLEAR CPU and START CPU options must be selected also.
START CPU	This option starts the A 2 or A 3 processor.
HALT CPU	This option halts the A 2 or A 3 processor. A halt can be specified at any time.
CONTINUE CPU	This option causes the A 2 or A 3 processor to resume processing after being halted by the execution of a STOP machine instruction, or by a programmed event. This option is allowed only when the status of the machine is OPER-HALT, COND-HALT, or EVNT-STOP.
FORCE MEMORY DUMP	This option can be selected when the MCP is running. It causes the MCP to initiate a fatal memory dump, which is a record of the processor's memory at the given moment. A memory dump is termed "fatal" if it ends in a Halt/Load of the system.
SET CONDITIONAL HALT	This option turns the Conditional Halt flag on, thus causing a halt when the system encounters a STOP machine instruction.
RESET CONDITIONAL HALT	This option turns the Conditional Halt flag off, thus causing a STOP machine instruction to act as a NOOP instruction.

Manual Menu Option	Description
GO MAINTENANCE MENU	* This option transfers control to the Maintenance Menu. The system must be halted to make this selection.
GO TEST RUNNER MENU	* This option transfers control to the Test Runner diagnostics section of the maintenance subsystem. The system must be halted to make this selection.
GO CONFIGURATION MENU	This option transfers control to the Configuration Menu. This menu displays and allows for the setting of system options and various parameters used to control the power-up sequence. The system must be halted and cleared to make this selection.
LIST BOOT DIRECTORY	This option lists the names of all files in the BOOTCODE file directory on the current active Boot unit.

* These options normally are used only by your Customer Service Engineer for troubleshooting and maintenance.

The A 2 and A 3 Screens

Manual Menu Option	Description
CAPTURE STATES	* This option "takes a snapshot" of the various system states, including register information, interrupts, and stack information, and stores it on the Random Access Memory (RAM) of the User Interface Processor (UIP).
VIEW STATES	* This option displays the Statedump that was captured in the RAM.
SAVE STATES	* This option transfers the Statedump information from the RAM of the UIP to the currently active BOOTCODE file on the Storage Module Device (SMD) disk. The A 2 or A 3 must be cleared before this function is allowed. If the boot unit is not an SMD disk, the Statedump is not saved. The A 2 system does not allow non-SMD disks.
SOFT POWER UP	This option restarts the A 2 or A 3 from the System Control Processor (SCP) initialization as if the machine were just powered up. It allows the Boot unit to be changed without powering off the system. The system must be halted to make this selection.
POWER DOWN	This option powers down the entire system. If the MCP is running, the UIP delays power-down for approximately five minutes, so the system can be halted. If the system is halted, power-off is immediate.
BOOT_UNIT	This option displays the Boot unit number currently used by the UIP on this system.
MCP HALT/LOAD UNIT	This option displays the MCP Halt/Load unit number currently designated on this system.
SYSTEM-SERIAL	This option displays the system serial number assigned to this system.
PCC VERSION	* This option displays the version number of the Power Control Card (PCC) currently being used on this system.

* These options normally are used only by your Customer Service Engineer for troubleshooting and maintenance.

THE CONFIGURATION MENU

This menu displays and allows for the setting of system options and various parameters used to control the power-up sequence.

CONFIGURATION MENU		A3/UIF
POWER MODULE CONTROL OPTION(X)		
1) LOWER MODULE ONLY		
2) LOWER MODULE(CPU), UPPER MODULE(IO)		
> < SELECT OPTION		
AUTO POWER OPTION(XXX)		POWER FAIL RESTART(XXX)
0) OFF		0) OFF
1) ON		1) ON
> < SELECT OPTION		> < SELECT OPTION
	> < MONTH	
	> < DAY OF MONTH	
	> < YEAR	
	> < HOUR	
	> < MINUTE	
	> < SYSTEM SERIAL NUMBER (*)	
	> < MCP H/L UNIT	
> < PARENT		
<error message line>		
<function line		> CLEARED
		FORM MDT 1

* This entry appears only if the System Serial Number has not been set. Normally, it is set at the factory.

The following describes the information displayed and the data that can be entered.

The A 2 and A 3 Screens

POWER MODULE CONTROL OPTION

LOWER MODULE ONLY * When this selection is made, pressing the Power button initializes only the Central Processing Unit (CPU) power module. This option is used if you have one or two SMD disks.

LOWER MODULE(CPU), UPPER MODULE(IO)
When this selection is made, pressing the Power button initializes both the CPU power module and the I/O power module. This option is used if you have more than two SMD disks. Because the A 2 system has only two SMD disks, this option is not applicable for the A 2 user.

AUTO POWER OPTION

OFF If OFF (0) is selected, the system can only be powered on and off manually. Your A 2 or A 3 is delivered with this option turned off.

ON If ON (1) is selected, the system is powered on and off using the automatic schedule feature. (Refer to the "Initial Software Installation Procedures" section.)

POWER FAIL RESTART

OFF If OFF (0) is selected, the system does not power itself on and reinitialize automatically when electrical power has been restored after a power failure.

ON If ON (1) is selected, the system powers itself on and reinitializes automatically when electrical power has been restored after a power failure. Your system is delivered with this option turned on.

* This option normally is used only by your Customer Service Engineer for troubleshooting and maintenance.

MISCELLANEOUS OPTIONS

Month	To specify the month, enter a three-character abbreviation of the desired month. The following abbreviations are valid: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, and DEC.
Day of Month	To specify the day of the month, enter a two-digit number representing the desired day of the month. The number can be 01 through 31.
Year	To specify the year, enter a four-digit number representing the desired year.
Hour	To specify the hour, enter a two-digit number representing the current hour. The time should be represented by the 24-hour clock. Thus 2 p.m. is represented as 14. Midnight is represented as 00.
Minute	To specify the minute, enter a two-digit number representing the current minute. The number can be 00 through 59.
System Serial Number	If you are setting the system serial number, be sure to set it correctly because it cannot be altered. Do not set the system serial number to zero, because the SCP does not allow the processor to initialize when the system serial number is zero.
MCP H/L Unit	To specify a new Halt/Load unit, enter a three-digit number representing the Halt/Load unit that UTILOADER should attempt to load the MCP from.

The A 2 and A 3 Screens

THE STATUS LINE OF THE SCREENS

All MDT and ODT screens have a system status line. That line is found at the bottom of the screen and consists of a 48-character function segment and a 9-character status segment.

During initialization, the following information appears in the function segment.

- The date and time flashes at five-second intervals.
- The Master Control Program (MCP) writes information concerning actions taken by the A 2 or A 3 processor.

The information that appears in the status segment is written by the maintenance subsystem and indicates the current state of the system. The System Status Table, found on the next page, lists each status and its meaning.

A 2/A 3 SYSTEM SOFTWARE INSTALLATION GUIDE

System Status Table

Status	Meaning
CLEARED	This status is shown during the power-on initialization sequence and means that memory has been cleared of all information.
RUNNING	This status indicates that the A 2 or A 3 is properly initialized and is running.
OPER-HALT	This status indicates that the operator has halted the system via the Operator Menu or Manual Menu HALT selection.
COND-HALT	This status indicates that the system was halted by the execution of a STOP machine instruction.
EVNT-STOP	This status indicates that the system was stopped by a programmed event.
CPU S-HLT	This status indicates that the A 2 or A 3 processor was halted due to a hardware or software malfunction. This is referred to as a "Super-Halt."
HDP S-HLT I O ERR	This status indicates that the I/O processor has encountered an irrecoverable error. This is referred to as an "I/O Super-Halt."
GUARD-ERR	This status indicates that the A 2 or A 3 microcode has failed an internal data verification check.
M-STK-OVF	This status indicates that the A 2 or A 3 microcode has encountered a stack overflow.
CS-PARITY	This status indicates that a parity error has occurred in the A 2 or A 3 control store.
BOOT-ERR	This status indicates that the A 2 or A 3 resident bootstrap encountered a fault while trying to load the MCP.

4 INITIAL SOFTWARE INSTALLATION PROCEDURES

THE PERIPHERAL SUBSYSTEM REQUIREMENTS

To initialize your A 2 or A 3, a minimal portion of the peripheral subsystem must be in operational condition. This minimal portion consists of a preinitialized Model 226 Storage Module Device (SMD) disk, an ET1100 System Control Terminal (SCT), and a tape drive, along with their controlling hardware.

The preinitialized disk that was delivered with your system contains the following software object code and data files, making your A 2 or A 3 capable of push-button initialization.

- A 2 or A 3 BOOTCODE file, which contains the microcode, UTILoader code, and diagnostic tests for the A 2 or A 3 system
- Master Control Program (MCP) code file such as SYSTEM/AMLIPMCP36172
- A2/STATEDUMP/UTILITY or A3/STATEDUMP/UTILITY
- BOOK/MARC/ENGLISH
- BOOK/MARC/SHORTHELP/ENGLISH
- FIRMWARE/LSP
- FIRMWARE/NSP/009/"TD_LINE_CONTROL"
- FIRMWARE/NSP/009/EXECUTIVE
- FIRMWARE/NSP/010/"TD_LINE_CONTROL"
- FIRMWARE/NSP/010/EXECUTIVE
- FIRMWARE/NSP/015/"TD_LINE_CONTROL"
- FIRMWARE/NSP/015/EXECUTIVE
- SYMBOL/USERSTRUCTURE
- SYSTEM/ALGOL
- SYSTEM/COMS/KERNEL
- SYSTEM/DATACOMINFO
- SYSTEM/DATACOMSUPPORT

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- SYSTEM/DUMPALL
- SYSTEM/FILEDATA
- SYSTEM/GENERALSUPPORT
- SYSTEM/HELP
- SYSTEM/INTRINSICS
- SYSTEM/LOADER
- SYSTEM/LOGANALYZER
- SYSTEM/MAKEUSER
- SYSTEM/MARC/AGENDA/TDXXX
- SYSTEM/MARC/COMMANDER
- SYSTEM/MARC/MENUGRAPH/ENGLISH
- SYSTEM/NEWP
- SYSTEM/PRINT/ROUTER
- SYSTEM/PRINT/SUPPORT
- SYSTEM/TRAINABLES
- SYSTEM/USERDATAFILE (This file contains no entries.)
- SYSTEM/USERSTRUCTURE

This preinitialized disk is the disk unit that was selected as the Boot unit and the Halt/Load unit at the factory. The system expects to find the BOOTCODE file on the Boot unit and the operative MCP on the Halt/Load unit. To obtain more specific information on selecting a Boot unit, refer to the MB (Make Boot) ODT command in the Operator Display Terminal (ODT) Reference Manual. For information on the Halt/Load unit, refer to the "Simple Halt/Loading of Your System" section.

THE AUTOMATIC INITIALIZATION SEQUENCE

To begin the automatic initialization of your system for the first time, press the Power button found on the upper left-hand corner of your A 2 or A 3 cabinet.

After you have completed all the installation steps described in this section, other options are available to you to initialize your system. You can initialize the system in any of the four ways listed below depending on the situation.

1. Press the Power button found on the upper left-hand corner of your A 2 or A 3 cabinet.
2. Select the SOFT POWER UP selection on the Operator or Manual Menu to simulate a power-up without powering off the system.
3. Select the AUTO INITIALIZE selection on the Manual Menu to power up without going through all the initialization steps that occur in the above two selections.
4. Use the ODT "POWER" command to make the system power on and power off automatically.

Initialization takes approximately four minutes, during which distinct processes occur. The first process causes the User Interface Processor (UIP), acting as a System Control Processor (SCP), to perform a maintenance subsystem self-test. Then it searches the SMD disk subsystem looking for the Boot unit, which contains the BOOTCODE file. That file contains the maintenance subsystem software, A 2 or A 3 microcode, UTILOADER code, and diagnostic tests. Once the BOOTCODE file is found, the UIP loads the maintenance subsystem software into the UIP's memory and passes control to it.

The SCP now loads the A 2 or A 3 microcode into control store and UTILOADER into memory and transfers control to UTILOADER. At this point, the machine is an A Series Central Processing Unit (CPU) running a standalone program capable of loading the system software.

During the next process, UTILOADER builds a bootstrap in memory. This bootstrap has pointers to the Halt/Load unit, as well as machine instructions capable of reading in the MCP from the Halt/Load pack. UTILOADER now passes control to the resident bootstrap, which in turn finds and loads the MCP and transfers control to it.

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The MCP initialization procedure sets up a run-time environment and loads the rest of the MCP code file, then brings the machine to an MCP idle. The MCP idle condition means that all resources have been identified and initialized and the MCP is prepared to execute jobs submitted by you. The system notifies you of the MCP idle condition by displaying this message:

SYSTEM INITIALIZATION HAS BEEN COMPLETED

The following screens appear as the initialization process is in progress. The examples show A 3 screens. The A 2 screens are the same except the system label is A 2.

```

      BURROUGHS A3 SYSTEM

      Starting System Initialization (approximate time: 4 minutes)

      Press <xt> to manually input boot unit > <

STATUS (Auto Mode): Disk initialization in progress .....(xx seconds)

FORM MDT 1
```

This screen appears after the maintenance subsystem self-test is done.

Initial Software Installation Procedures

```

          B U R R O U G H S   A 3   S Y S T E M

          Starting System Initialization (approximate time: 4 minutes)

          Boot-dlp xx      Boot-unit xxx      Sector-address xxxxxx

          dlp=0 dlpadr=1 dlpsta=B42C
          dlp=1 dlpadr=2 dlpsta=B42E
          dlp=2 dlpadr=4 dlpsta=0000
          dlp=3 dlpadr=8 dlpsta=0000 unit=15 unitsta=B403
          dlp=4 dlpadr=16 dlpsta=0000
          dlp=5 dlpadr=32 dlpsta=0000 unit=15 unitsta=B407 dirptr=B21F prio=60 entry=0000

          STATUS (Auto Mode): Building I/O configuration table .....

          FORM MDT 1

```

This screen appears when the BOOTCODE file is found.

```

          AUTO INITIALIZE                                A3/UTP
          XMIT TO ABORT > <

          AUTO INITIALIZE                                RUNNING
          MICRO CODE                                    <LOADING/LOADED>
          UTILoader                                    <LOADING/LOADED>

          <error message line>
          <function line                                > CLEARED
          RECEIVING                                     FORM MDT 1

```

This screen appears after the maintenance subsystem software receives control.

Now that the automatic initialization sequence is complete, you can proceed with the following steps to complete your software installation. You are now on the ODT screen. All ODT commands are entered from the upper left-hand corner of the screen followed by a visible ETX and transmitted by pressing [XMIT]. To put the ODT in datacomm mode, do the following:

Enter the TERM DCSTATION=TRUE command and press [XMIT].

This setting is saved over Halt/Loads.

LISTING YOUR SYSTEM'S CONFIGURATION

Now take the time to write down some important information about your system. Enter the GC (Group Configuration) ODT command from the upper left-hand corner of the screen. A display of your system's current configuration appears. Scan for the label ODT2 and write down the number to the left in the UIP ODT/ET1100 (ODT2) space below. Now do the same thing for all the other entries listed below that appear on your screen.

UIP ODT/ET1100 (ODT2) unit is _____.

NSP/DC-DLP (NSP5) unit is _____.

Buffered printer (TP5) unit is _____.

SMD (disk) (SMD1) units start at _____.

Streamer Tape (MT6) unit is _____.

Sequential HT(Pack) (HTS1) units start at _____ and _____.

PE Mag Tape (MT1) units start at _____ and _____.

You have just listed the configuration of your system. This configuration can change due to reconfiguration, but you now know what unit numbers are assigned to what units. In some cases, you have the starting unit number. For each additional unit of the same type, add one to the last unit number to determine the next unit number. Thus, if there are four SMD disk drives on the system and the first unit number is 44, the next three units are 45, 46, and 47.

You should also write down the System Serial Number of your A 2 or A 3. To do this, enter the WM (What MCP) ODT command and write down the system serial number displayed.

System Serial Number is _____.

SETTING THE POWER-UP SCHEDULE

The A 2 and A 3 have a Scheduled Power Up feature that can be set at any time the MCP is running. This feature automatically powers on the system at a preset time without any user intervention. If you want to set the schedule now, follow these instructions. Be aware that you will Halt/Load the system during this process.

First, you must enable the AUTO POWER OPTION using the Configuration Menu as follows:

1. Press Function key 2 [F2] to display the Maintenance Display Terminal (MDT) screens.
2. When the Operator Menu appears, select the GO MANUAL MENU selection and press [XMIT].
3. When the Manual Menu appears, select the HALT CPU selection and press [XMIT].
4. Select the CLEAR CPU selection and press [XMIT].
5. Select the GO CONFIGURATION MENU selection and press [XMIT].
6. Set the AUTO POWER OPTION by placing a 1 in the selection field.
7. Now place an X in the PARENT selection and press [XMIT]. On the Manual Menu, select the AUTO INITIALIZE selection and press [XMIT].

Now using the ODT "POWER" command, set the schedule, for example

1. To set the power-on time for 9:00 a.m. Monday, enter

```
POWER SCHEDULE MONDAY ON AT 9:00 AM
```

2. To set the power-off time for 5:00 p.m. Tuesday, enter

```
POWER SCHEDULE TUESDAY OFF AT 5:00 PM
```

3. To set the automatic power-on time to 8:30 a.m. Monday through Friday, enter

```
POWER SCHEDULE MONDAY THRU FRIDAY ON AT 8:30 AM
```

For more information about the POWER command, refer to the Operator Display Terminal (ODT) Reference Manual.

INITIALIZATION OF MENU-ASSISTED RESOURCE CONTROL (MARC)

Menu-Assisted Resource Control (MARC) allows you to access the operating system via a menu format rather than the ODT format. MARC also has help text. This text is reached by pressing [SPCFY] while in MARC.

To initialize MARC, enter the ODT primitive command ??MARC.

Refer to the Menu-Assisted Resource Control (MARC) User's Guide to learn about MARC's capabilities.

INITIALIZATION OF DATACOMM

To initialize the datacomm subsystem based on the description contained in the SYSTEM/DATACOMINFO file, you must start the datacomm controller software (DCCONTROL). This is done by entering the ID (Initialize Datacomm) ODT command, as follows. In the example, the DC-DLP unit number is 112.

ID 112

If you wish to modify the SYSTEM/DATACOMINFO file, refer to the "Datacomm Modification" section.

MODIFYING THE USERDATAFILE

The preinitialized disk contains a default USERDATAFILE. This USERDATAFILE allows the MU (Make User) ODT command with the privileged node to be used. Use this command to define a privileged usercode. Refer to the Operator Display Terminal (ODT) Reference Manual for information on this command.

Once you have defined a privileged usercode, you must customize the USERDATAFILE to your needs using the MAKEUSER utility described in the System Software Site Management Reference Manual. Three methods of customizing the USERDATAFILE are available to you.

The first allows you to create a new USERDATAFILE using the CREATE control statement and a number of user segments. Be sure you assign at least one usercode the privileged usercode status by using the PU locator ID. This privileged usercode must be used for any subsequent use of MAKEUSER utility. If you want the ODT "MU" command to be enabled, enter an MU segment. If you also want that command to be able to assign privileged usercodes, enter a PU in the MU segment.

The second method allows you to add a few usercodes to the already existing USERDATAFILE using the default form of the MAKEUSER utility. If you do not want the ODT "MU" command to allow the assigning of privileged usercodes, you must enter the "MU-PU" form of the MU user segment. If you want to disable the ODT "MU" command, enter the minus "-" form of the MU user segment.

The third method is to use a previously built USERDATAFILE instead of the default USERDATAFILE. To accomplish this, copy the previously built USERDATAFILE, using some name other than SYSTEM/USERDATAFILE, to the DL USERDATA disk family. Then use the RECALL statement of the MAKEUSER utility to change to the other USERDATAFILE.

PROTECTING YOUR SYSTEM

To recover from a system failure, it is wise to back up and save the following files and tapes.

1. Copy the BOOTCODE file to an additional disk, so that the disk can be used as a Boot unit if the need arises. Then use the MB (Make Boot) Operator Display Terminal (ODT) command to make the backup BOOTCODE file operative, but assign it a lower priority number than the designated BOOTCODE file. For the specific procedure, refer to the instructions in the "Troubleshooting the Automatic Initialization Sequence" on how to recover if the BOOTCODE file is not present on a disk unit.
2. Keep the BOOTFILE tapes in case you need to boot from a tape unit.
3. If you have customized the USERDATAFILE to your specifications, copy it to tape.
4. If you have modified your DATACOMINFO file, copy it to tape.

Refer to the Work Flow Language (WFL) Reference Manual for information on the COPY command and to the Disk Subsystem Software Overview manual for more information on file protection methods.

See also

Troubleshooting the Automatic Initialization Sequence 33

5 TROUBLESHOOTING THE AUTOMATIC INITIALIZATION SEQUENCE

Problems can occur during any automatic sequence. This section has been created to help diagnose possible problems and give suggestions about solving those problems.

MAINTENANCE SUBSYSTEM SELF-TEST NOT SUCCESSFUL

Failure of the maintenance subsystem self-test becomes apparent if the first screen of the automatic initialization sequence does not appear. Do the following to check for the cause of failure:

1. The REMOTE/SYSTEM switch, located near the POWER button, must be in the SYSTEM position.
2. If the Power button is not illuminated, verify that any external circuit breaker is in the ON position and the system AC plug is securely positioned.

If the Power button is still not illuminated, contact your Customer Service Engineer.

3. Problems can exist in the connection between the maintenance subsystem and the ET1100.
 - a. Make sure that the ET1100 System Control Terminal (SCT) is powered on.
 - b. Make sure that the cable from the A 2 or A 3 cabinet is securely plugged into the ET1100 System Control Terminal (SCT).
 - c. Now power the system off and on.

If none of the above conditions exist, and the maintenance subsystem is still inoperative, then contact your Customer Service Engineer.

BOOTCODE FILE NOT FOUND

The system status line at the bottom of the screen indicates the failure cause. The display in the center of the screen is of the current input/output (I/O) configuration. This display shows the set of available units that the system found during the last attempt to access the BOOTCODE file.

```

          B U R R O U G H S   A 3   S Y S T E M

          Starting System Initialization (approximate time: 4 minutes)

          Press (Xmit) for auto-search or enter boot unit (000 to 255) > <

          Maintenance I/O Configuration Table

          Proc  DLP  DLP  Unit
          No   No   type status ..... (units) indicates write-lock .....
          -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
          1    0
          1    1
          1    2   TP5
          1    3
          1    4
          1    5   MT1
          1    6   SMD   44 45
          1    7   MT6

          STATUS (Auto Mode): No boot unit found

          RECEIVING
          FORM MDT 1
  
```

Troubleshooting the Automatic Initialization Sequence

Listed below are three possible causes of failure. Follow the accompanying instructions for diagnosis and repair.

1. The Boot unit is not found or is not ready.

The Boot unit number should appear in the I/O configuration table. If it does not appear, make sure the device is powered on and ready.

Retry the power-on sequence by typing in the Boot unit number in the field provided or by pushing the Power button on the A 2 or A 3 cabinet.

If the Boot unit is still not found, indicate another disk drive as the Boot unit and push the Power button on the A 2 or A 3 cabinet. If no Boot units are displayed in the I/O configuration, the I/O subsystem is inoperative. Contact your Customer Service Engineer.

2. The BOOTCODE file is not present on a disk unit.

This occurs if none of the built-in disks have been initialized with the BOOTCODE file software or if the BOOTCODE file is corrupted.

If the BOOTCODE file on the Boot unit is corrupted, use a backup Boot unit if one is available. Retry the power-on sequence by typing in the new Boot unit number in the field provided on the current screen and pressing [XMIT].

If no disk unit has the BOOTCODE file on it, you need to load the BOOTCODE file from the BOOTFILE tapes. Two BOOTFILE tapes are delivered with your system. One is a data tape, the other is a library-maintenance-compatible formatted tape.

The names of the A 2 or A 3 BOOTFILE tapes are constructed in the following manner:

- a. The first two characters, A2 or A3, refer to the machine name.
- b. The next two characters, such as T1, refer to the type of BOOTCODE file. T1 stands for a Memory Control Unit (MCU)-compatible BOOTCODE file.
- c. The next three characters refer to a hardware level, for example HW1.
- d. The next five characters stand for the software release level, for example SW362.
- e. The last two characters refer to the tape type, such as BF, which stands for the library-maintenance-compatible BOOTFILE tape. If the tape is the data tape, the last two characters are BT.

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In this example, the complete BOOTFILE tape name is A3T1HW1SW362BT.

Use the appropriate tape for the release level you want to use. For example, if you have a problem with the BOOTFILE tape for the current release, use the BOOTFILE tapes from the previous release to bring up your system. If the MCP is operative, you need to load only the library-maintenance-compatible tape. How to load one or both of the BOOTFILE tapes is described below.

Mount the data tape without a write ring and make the unit ready. Then retry the power-on sequence by typing in the tape drive unit number in the field provided on the current screen and pressing [XMIT]. If the system finds the BOOTCODE file on the tape, then automatic initialization continues.

It is important to understand that the BOOTCODE file still does not reside on a disk at this point. When the automatic initialization is complete, you must load the bootcode file to a disk using the BOOTFILE/A2 file for an A 2 or the BOOTFILE/A3 file for an A 3 found on the library-maintenance-compatible BOOTFILE tape. Mount this tape on a tape drive unit and enter a command on the Operator Display Terminal (ODT) in a form similar to the one shown below. (In the example, the bootfile name is BOOTFILEA3, the library-maintenance-compatible BOOTFILE tape is A3TIHW5SW362BF, and the family name is DISK.)

```
COPY & COMPARE BOOTFILE/A3 FROM A3T1HW5SW362BF TO DISK
```

Now select the disk pack DISK as the Boot unit by entering a command similar to the one shown in the following example:

```
MB + BOOTFILE/A3 ON DISK PRIORITY=50
```

Refer to the Work Flow Language (WFL) Reference Manual for the COPY command and to the Operator Display Terminal (ODT) Reference Manual for the MB (Make Boot) command.

Now restart the system, initializing from disk rather than tape. All subsequent power-ups use the BOOTCODE file that is now on disk. The restart can be accomplished by specifying the SOFT POWER UP option on the Operator or Manual Menu or by pushing the Power button on the A 2 or A 3 cabinet.

Troubleshooting the Automatic Initialization Sequence

3. Loading Errors

Loading errors, such as parity errors, can occur while loading the BOOTCODE file. If so, the status line displays the following message:

```
LOADING ERROR      MAINTENANCE SOFTWARE NOT LOADED
```

In this case, you should specify a backup Boot unit. The backup Boot unit can be another built-in disk or a tape unit. If no backup Boot unit is available on disk, you must use the tape BOOTCODE file. See the instructions that accompany "BOOTCODE file is not present on a disk unit" discussed earlier.

If the system repeatedly encounters loading errors, the maintenance subsystem memory is probably not functioning properly. Contact your Customer Service Engineer.

MICROCODE OR UTILOADER NOT LOADED

Listed below are the possible reasons why microcode or UTILOADER did not load. Follow the accompanying instructions for diagnosis and repair.

1. I/O failure on the Boot unit

An I/O failure can happen when the microcode or UTILOADER load procedure fails. The retry process is the same for both situations. Press [XMIT] to cause the Manual Menu to be displayed. Now select the SOFT POWER UP option to select a backup Boot unit. If no backup Boot unit is available on disk, you must use the tape BOOTCODE file. See the instructions that accompany "BOOTCODE file is not present on a disk unit" discussed earlier.

2. A 2 or A 3 Control Store Memory Failure

During the microcode load, the control store memory can fail. Contact your Customer Service Engineer.

3. A 2 or A 3 System Failure

If a system failure occurs while the UIP is loading microcode or UTILOADER, restart the automatic initialization sequence by pushing the Power button on the A 2 or A 3 cabinet. If the failure occurs again, contact your Customer Service Engineer.

Troubleshooting the Automatic Initialization Sequence

PROBLEMS WITH THE HALT/LOAD UNIT

Listed below are three possible reasons why a Halt/Load problem occurred.

1. If the specified Halt/Load unit does not contain an MCP bootstrap, the following message is sent to the ODT:

```
HALTLOAD FAILURE (UNIT PK NN DOES NOT
CONTAIN AN MCP BOOTSTRAP)
```

To recover, you can build a new bootstrap by using LOADER as described in the "Halt/Loading Using UTILOADER and LOADER" section or designate another Halt/Load unit that has a valid MCP bootstrap on it.

NOTE

The following two problems are not applicable to the A 2 system.

2. If the specified Halt/Load unit is an HT-Sequential disk pack, UTILOADER attempts to load controlware into the disk pack controller. If the load operation fails, the following messages are sent to the ODT:

```
HALTLOAD FAILURE (LOADHOST UNSUCCESSFUL)
MENU WILL FOLLOW (RECOMMENDED ACTION - LOADHOST)
```

Automatic Mode is terminated and Manual Mode should be adopted. Refer to the "Halt/Loading Using UTILOADER and LOADER" section.

3. If the specified Halt/Load unit is an HT-Sequential disk pack, has valid firmware loaded and is powered up, the reason may be one of the following:
 - a. The path selected to the disk pack is not valid.
 - b. The disk pack is not write enabled.

Either of the above reasons causes the following messages to be sent to the ODT:

```
HALT/LOAD FAILURE (UNIT PK NN VIA N N N N IS NOT READY)
MENU WILL FOLLOW (RECOMMENDED ACTION - HALTLOAD)
```

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Automatic Mode is terminated and Manual Mode should be adopted.
Refer to the "Halt/Loading Using UTILoader and Loader" section.

6 SIMPLE HALT/LOADING OF YOUR SYSTEM

A Halt/Load is the process of bringing all processing in the system to a halt, loading an MCP into memory, and executing that program, thus bringing the system to an MCP idle.

In order to successfully Halt/Load a system, a particular disk drive must be designated as the Halt/Load unit and the pack mounted on that unit must have an operative MCP code file on it. Several disk packs may have several copies of MCP code files on them, but the system uses only the copy that is on the Halt/Load unit and is designated as an operative MCP.

The Halt/Load unit designation can be made in one of four ways:

1. By using the Configuration Menu.
2. By using the HALTLOAD command of UTILoader.
3. By using the HALTLOADUNIT command of LOADER.
4. By using the Operator Display Terminal (ODT) HLUNIT command.

The designation of an operative MCP is made by using the Change MCP (CM) ODT command, or it is made when LOADER loads the MCP code file from tape.

A usable Halt/Load unit needs to have an MCP on disk that has been designated as the operative MCP. It also must be designated as the Halt/Load unit.

CAUSING A SIMPLE HALT/LOAD USING THE ??PHL COMMAND

During normal daily activities, certain circumstances require your system to be Halt/Loaded while the MCP is running. These circumstances include hardware or software problems that leave your system in the "hung" condition. The "hung" condition is defined as the condition occurring when system that does not respond to normal ODT commands. To Halt/Load your system under these circumstances, enter the primitive ODT command ??PHL (Programmatic Halt/Load). This command, if accepted by the MCP, causes an immediate Halt/Load and can be used whenever a Halt/Load is needed. This command returns the system to the same configuration it had when you issued the "??PHL" command. If "??PHL" does not work, control can be returned to the MCP by Halt/Loading the system through the maintenance subsystem as described in the next section.

Simple Halt/Loading of Your System

CAUSING A SIMPLE HALT/LOAD USING THE MAINTENANCE SUBSYSTEM

If the "??PHL" command fails to Halt/Load the system, then perform the following steps:

1. Press Function key 2 [F2] to display the Operator Menu.
2. Select the GO MANUAL MENU selection on the Operator Menu and press [XMIT].
3. When the Manual Menu appears, enter an X next to the CLEAR CPU selection and press [XMIT].
4. Enter an X next to AUTO INITIALIZE and press [XMIT].

CAUSING A HALT/LOAD DURING A MEMORY DUMP

Another circumstance that can require a Halt/Load is when a memory dump is to be taken or is being taken. Memory dumps are initiated by the MCP or by ODT commands and can be fatal or nonfatal. A fatal dump results in a Halt/Load, while a nonfatal dump does not.

If a Halt/Load is desired while the system is under the control of the memory dump routine, enter the HL memory dump command. Occasions do arise when normal execution cannot be resumed following a nonfatal dump. In this instance, use the primitive ODT command, ??PHL (Programmatic Halt/Load) to perform a simple Halt/Load.

To cause an immediate Halt/Load and cancel the memory dump routine, enter the HL memory dump command when the routine asks for a tape to be mounted.

Additionally, you can stop a memory dump while it is in progress by entering the CL memory dump command. Then the HL memory dump command can be entered.

Refer to the Operator Display Terminal (ODT) Reference Manual "Memory Dump Commands" section for information on the HL and CL commands.

CAUSING A HALT/LOAD TO CHANGE THE MCP

Under certain conditions, you will want to load a new MCP code file onto the Halt/Load pack and designate it as the new MCP code file. The CM (Change MCP) ODT command allows you to do this. This designation can be temporary if the pound sign character (#) is used following the "CM". It is permanent if the pound sign is not used. An MCP code file on a pack other than the Halt/Load pack can be designated as the operative MCP by using the "ON <family name>" form of the command. When a CM command is preceded by "??", the system views it as a primitive command and executes it immediately. Refer to the Operator Display Terminal (ODT) Reference Manual for details. Two examples of changing the MCP follow.

Example One

The system is running on SYSTEM/AMLIPMCPxxxxx and a new version of the MCP, called SYSTEM/AMLIPMCPyyyyy, has been loaded on the current Halt/Load pack. The following steps illustrate a safe way to change to SYSTEM/AMLIPMCPyyyyy for testing purposes before permanently designating it as the production MCP.

1. To temporarily designate SYSTEM/AMLIPMCPyyyyy as the current operative MCP and cause a Halt/Load when all active jobs have finished running, enter

```
CM # SYSTEM/AMLIPMCPyyyyy
```

The temporary form of the CM command is used so that the next Halt/Load brings the system up on the previous copy of the MCP, SYSTEM/AMLIPMCPxxxxx.

If the primitive form "??CM # SYSTEM/AMLIPMCPyyyyy" is used, it causes all active jobs to be interrupted immediately.

2. Test your system using the new MCP. When you feel confident that your system runs correctly using the new MCP, permanently designate the new MCP as the current operative MCP by entering

```
CM SYSTEM/AMLIPMCPyyyyy
```

If the primitive form "??CM SYSTEM/AMLIPMCPyyyyy" is used, it causes all active jobs to be interrupted immediately.

Example Two

The current operative MCP is SYSTEM/AMLIPMCPxxxxxx. It is loaded on Halt/Load unit 44 and that pack has a family name of DISK. A new version of the MCP, called SYSTEM/AMLIPMCPyyyyy, has been copied to the pack on disk unit 45 that has a family name of DISK1. The following example illustrates a safe way to change both the Halt/Load unit and the MCP.

1. To designate the copy of SYSTEM/AMLIPMCPyyyyy as the current operative MCP on DISK1, enter

```
CM SYSTEM/AMLIPMCPyyyyy ON DISK1
```

2. To designate disk unit 45 as the new Halt/Load unit, enter

```
HLUNIT PK45
```

3. To cause a Halt/Load that brings the system up on the new operative MCP found on the new Halt/Load unit, enter

```
??PHL
```

It is important to understand that SYSTEM/AMLIPMCPxxxxxx is still designated as the current MCP on disk unit 44. However, because disk unit 44 is not designated as the Halt/Load unit, SYSTEM/AMLIPMCPxxxxxx is not functioning as the current MCP. If a problem arises on SYSTEM/AMLIPMCPyyyyy, the command HLUNIT PK44 followed by ??PHL returns the system to SYSTEM/AMLIPMCPxxxxxx on DISK. If this does not work, refer to the "Halt/Loading Using UTILOADER and LOADER" section for additional ways to Halt/Load the system.

7 HALT/LOADING USING UTILOADER AND LOADER

When a simple Halt/Load does not work, there are several procedures that can solve your problem. These procedures are dependent on your knowing how to make UTILOADER visible and knowing what LOADER does for you. These concepts are introduced first. Then specific problems and how to solve them are discussed.

During the automatic initialization sequence, UTILOADER's commands are not visible to you; they are handled by the maintenance processor. When you are loading the MCP onto the Halt/Load pack for the first time, reloading the MCP, or loading the MCP into memory after the system has been halted because of power failure or maintenance, you need to have access to UTILOADER's commands. To do this, your A 2 or A 3 must be initialized in the Manual Mode.

To initialize Manual Mode when the system is powered off, perform the following steps:

1. Push the Power button on the upper left-hand corner of the A 2 or A 3 cabinet. When the AUTO INITIALIZE screen appears, press [XMIT]. This brings you to the Manual Menu.
2. Now enter an X next to the LOAD MICRO-CODE, LOAD UTILOADER, and START CPU options and press [XMIT]. This starts the initialization in the Manual Mode.

To initialize Manual Mode when the system is running, perform the following steps:

1. Press [F2] to make the Manual Menu appear.
2. Enter an X next to the HALT CPU option and press [XMIT].
3. Enter an X next to the CLEAR CPU option and press [XMIT].
4. Enter an X next to the LOAD MICRO-CODE, LOAD UTILOADER, and START CPU options and press [XMIT]. These options are executed in the correct sequence by the maintenance subsystem, thus starting the initialization in the Manual Mode.

VISIBLE UTILOADER

In the Manual Mode, UTILOADER displays its start-up progress in the lower left corner of the screen. When it is successfully initialized, it displays a command list in the upper left corner and idles.

The following are the listed commands.

```
HALTLOAD  
TAPELOAD  
CONFIGURATION  
PACKLOAD  
LOADHOST  
POWERON
```

The HALTLOAD command loads the MCP code file into memory from a Halt/Load unit that you can designate. Then it transfers control to the resident MCP bootstrap.

The TAPELOAD command loads the standalone NEWP program that you specify, in this case the LOADER program, from tape and transfers control to this program.

The CONFIGURATION command displays configuration information about the I/O subsystem.

The remaining commands are not used by procedures in this manual, but their use is documented in the appendix "UTILOADER Commands".

Halt/Loading Using UTILOADER and LOADER

LOADER DIALOG

The following gives you an example of the dialog that you will have with UTILOADER and LOADER whenever LOADER is used.

If you choose the TAPELOAD command, UTILOADER asks where the tape containing LOADER is found. Your answer is described in each procedure using LOADER in this manual. Now UTILOADER loads LOADER into memory and transfers control to it. The following message appears as control is transferred.

UTILOADER NOW TRANSFERRING CONTROL

Now LOADER spends a short period of time initializing itself and displays a beginning-of-job (BOJ) message. Then it asks for input with the following message:

ODT INPUT REQUIRED

You can now enter LOADER commands that are appropriate to your current situation. In the situations described later in this section, the appropriate commands are included. If you need to obtain additional syntax and semantics information for any LOADER command, enter HELP at the upper left-hand corner of the screen and press [XMIT].

When all the appropriate commands have been entered, you can terminate LOADER by entering STOP on the upper left-hand corner of the screen. LOADER terminates execution and displays the following message:

>>>> LOADER TRANSFERRING CONTROL TO SCP <<<<

Now the User Interface Processor (UIP), acting as the System Control Processor (SCP), reloads UTILOADER, which loads the current operative MCP into memory from the current Halt/Load pack and transfers control to it.

HALT/LOADING A HALTED SYSTEM

If your system has been halted due to a power failure, a program problem, or a maintenance halt, you can Halt/Load from another Halt/Load unit or the current Halt/Load unit using the Manual Mode initialization described earlier. When the UTILOADER command list is displayed, do the following.

1. Type in HALTLOAD at the upper left-hand corner of the screen and press [XMIT].

UTILOADER requests the Halt/Load unit.

2. To specify the Halt/Load unit, such as disk unit 45, enter

PK45

UTILOADER builds the resident MCP bootstrap in memory and transfers control to it. The MCP then brings the system to an MCP idle condition.

Halt/Loading Using UTILOADER and LOADER

LOADING MCP ON HALT/LOAD PACK WITHOUT PURGING FILES

If an MCP cannot be run and there is no backup Halt/Load pack, the MCP must be loaded on the Halt/Load pack again. The following procedure loads the MCP without purging the files. This procedure is referred to as the "Cool Start" in the LOADER instructions. To begin the procedure, use the Manual Mode initialization described earlier. When the UTILOADER command list is displayed, do the following.

1. Type in TAPELOAD at the upper left-hand corner of the screen and press [XMIT].

UTILOADER asks where LOADER is found.

2. Answer the request with the following command. In the example, the name of the tape file is SYSTEMAS and the location is tape drive 128.

SYSTEM/LOADER FROM SYSTEMAS ON MT128

Now LOADER is loaded. It receives control of the system from UTILOADER and requests input as described in "LOADER Dialog" in this section.

3. Now designate the Halt/Load unit to LOADER by entering the following command. In the example, the Halt/Load unit is disk unit 44.

HALTLOADUNIT 44

4. Now specify where the MCP code file that is to be copied is found. In the example, the MCP title is SYSTEM/AMLIPMCPnnnnn, the source medium is TAPE, and the tape volume name is SYSTEMAS. The nnnnn portion of the file name stands for the Mark release number.

LOAD MCP SYSTEM/AMLIPMCPnnnnn FROM TAPE SYSTEMAS

5. Terminate LOADER by entering

STOP

See also

LOADER Dialog 49

LOADING MCP ON HALT/LOAD PACK AND PURGING FILES

If the procedure to load the MCP without purging files did not work, use the following procedure. Also use it when you want to change the management of the system's memory. It is important to understand that this procedure will purge all files on the disk. It is referred to in the LOADER instructions as a "Cold Start". To begin this procedure, use the Manual Mode initialization described earlier. When the UTILoader command list is displayed, do the following.

1. Type in TAPELOAD at the upper left-hand corner of the screen and press [XMIT].

UTILoader asks where LOADER is found.

2. Answer the request with the following command. In the example, the name of the tape file is SYSTEMAS and the location is tape drive 128.

```
SYSTEM/LOADER FROM SYSTEMAS ON MT128
```

Now LOADER is loaded. It receives control from UTILoader and requests input as described in "LOADER Dialog" in this section.

3. Now designate the Halt/Load unit to LOADER by entering the following command. In the example, the Halt/Load unit is disk unit 44.

```
HALTLOADUNIT 44
```

4. Specify the overlay row size by entering

```
OLAYROW 1200
```

where the row size specification can range from 400 to 4096. The selection of an optimal overlay row size requires a decision on your part. That decision is a tradeoff between the need for large overlayable arrays and the need to optimize your disk usage. Every job, while it is running, is allocated at least one area of disk space equal to the overlay row size. Thus an overlay row size much larger than necessary causes the allocation of unnecessarily large amounts of disk space. On the other hand, too small a value for the overlay row size can cause programs using large unsegmented arrays to fail.

The overlay row is made up of sectors, and its size is the number of contiguous sectors in an overlay area. A sector holds 22.5 tagged 6-byte words. For example, an overlay row size of 1200 can yield a maximum array size of 27000 words (1200 X 22.5 = 27000 words). A

Halt/Loading Using UTILoader and Loader

value of 1200 is the smallest advisable value. A value of 2000 would be sensible in an A 3 disk configuration if disk resources are not constrained. The locations of the overlay files can be specified by the Disk Location (DL) ODT command. The preinitialized disk's overlay row size is 1200 sectors.

NOTE

The Loader "OLAYROW" command causes Loader to interpret the LOAD MCP command as a request to load the MCP and purge the files on the disk.

5. Load the MCP code file to disk. The following example of a LOAD command causes Loader to label the pack mounted on disk unit 44 with the family name of DISK and the serial number of 190373. Then a new directory is created on that pack, thus purging all files that existed on the pack. Finally, the MCP named SYSTEM/AMLIPMCPnnnnn is copied to the pack.

Note that the disk unit number must match the disk unit number in the HALTLOADUNIT command above.

```
LOAD MCP SYSTEM/AMLIPMCPnnnnn FROM TAPE SYSTEMAS TO DISKPACK 44
NAME=DISK SERIAL=190373
```

Before the MCP is loaded from the SYSTEMAS tape, the following message is displayed.

```
COLD START IS REQUESTED TO PK44 DISK
ENTER OK TO CONTINUE
```

6. If the information displayed is correct, enter

OK

Loader loads the MCP code file from the SYSTEMAS tape to the Halt/Load pack. Progress is displayed until the load process is completed. Then Loader displays

```
SYSTEM/AMLIPMCPnnnnn LOADED
ODT INPUT REQUIRED
```

7. Terminate Loader by entering

STOP

Because all of the files were purged from your disk, you must copy them back onto the disk. This allows the automatic initialization sequence to be operative.

1. You will need to use the IL (Ignore Label) ODT command when the first automatic initialization process is used after purging all your files. This command is used in response to waiting entries, such as STARTSYSTEM and LOGHANDLER. The IL command should point to the Halt/Load pack.
2. STARTSYSTEM asks for a USERDATAFILE after any cold start. If your USERDATA family is on the Halt/Load pack, use the DS (DiScontinue) ODT command to discontinue STARTSYSTEM. Then copy your USERDATAFILE to the Halt/Load pack. If your USERDATA family is on another family, you only need to use the DL (Disk Location) ODT command to indicate the location of the USERDATAFILE.
3. Copy your system files and the DATACOMINFO file if it is customized.
4. Use the MB (Make Boot) ODT command to make your backup BOOTCODE file selectable as the Boot unit.
5. You will also need to use the SL (System Library) ODT command to initialize the functions listed below. In these examples, the family name is DISK.

SL COMSSUPPORT = SYSTEM/COMS/KERNEL ON DISK

SL DATACOMSUPPORT = SYSTEM/DATACOMSUPPORT ON DISK

SL HELPSUPPORT = SYSTEM/HELP ON DISK

SL PRINTSUPPORT = SYSTEM/PRINT/SUPPORT ON DISK

SL GENERALSUPPORT = SYSTEM/GENERALSUPPORT ON DISK

The above SL commands are required to run Menu-Assisted Resource Control (MARC), Communications Management System (COMS), and Interactive Datacomm Configurator (IDC). You will also want to use the SL command to initialize other functions for your unique system. Refer to the Disk Subsystem Software Overview manual for recommendations on where to place various files.

6. You must tell the system to use the SYSTEM/INTRINSICS file by entering the SI (System Intrinsic) ODT command in its "SI+" form.
7. It will be necessary to initialize datacomm, using the ID (Initialize Datacomm) ODT command, and to restore any other parameters that you selected to customize your system.

Halt/Loading Using UTILoader and Loader

See also

Loader Dialog 49

8 DEFINING I/O PATHS AND LOADING CONTROLWARE

NOTE

If you are an A 2 user, use the "Defining I/O Paths and Loading Controlware" section only for defining multiple paths to the tape subsystem, if applicable; the A 2 system does not allow disk units that are not Storage Module Device (SMD) Winchester disk drives.

If your system contains multiple paths to the tape subsystem or is an A 3 system that contains disk units with multiple paths, then more flexibility is available to the operator when using UTILoader or Loader.

DEFINING THE I/O PATH ADDRESS

Before you can specify a unique I/O path to Loader, you must know the configuration of your system. It should be noted that A 2 and A 3 system displays show the Message-Level Interface Processor (MLIP) number, but commands requiring path information do not require the MLIP number in their syntax. The following steps describe how to obtain this information and what commands can be used:

1. Make UTILoader visible by using the Manual Mode initialization instructions found in the "Halt/Loading Using UTILoader and Loader" section. Then return to the next instruction.
2. Type in CONFIGURATION at the upper left-hand corner of the screen and press [XMIT].

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UTILOADER displays a table of I/O subsystem information such as the following display of an A 3 configuration:

```

BASE 0/0/0
  MLIP 1, MLIP PORT 0, LEMPORT 0
    ADDRESS 1 DLPID 001 UIP ODT
    ADDRESS 3 DLPID 010 NSP5
    ADDRESS 4 DLPID 006 BUFFERED PRINTER
    ADDRESS 5 DLPID 048 SEQUENTIAL HT(PACK)
    ADDRESS 7 DLPID 200 STREAMER TAPE

BASE 1/0/0
  MLIP 1, MLIP PORT 1, LEMPORT 0
    ADDRESS 1 DLPID 048 SEQUENTIAL HT(PACK)
    ADDRESS 2 DLPID 064 SEQUENTIAL HT(PACK)
    ADDRESS 3 DLPID 128 PE MAG TAPE
    ADDRESS 4 DLPID 128 PE MAG TAPE

```

In the A 3 example display, there are two I/O paths to the pack string PK48 through PK63, one path to the packs PK64 through PK79, and two paths to the tapes MT128 through MT143. The Operator Display Terminals (ODTs), the streamer tape drive, the SMDs, and the printer are by definition single-path devices.

If the I/O configuration is sufficiently large, the display is divided into pages. Press [SPCFY] to advance to each page.

3. Write down the I/O path numbers in the order given, so they can be used later in commands.

If the designated Halt/Load unit is an SMD pack, you are not required to bring the non-SMD disk controllers on-line to bring up the system. However, to use packs other than SMD packs, you must load their controlware.

If you choose a non-SMD pack to be the designated Halt/Load unit, then select an I/O path to the Halt/Load unit where the Master Control Program (MCP) is to be loaded. This path is referred to as the Halt/Load path. If you want PK48 to be the Halt/Load unit, and the Halt/Load path of this unit has a Message-Level Interface Processor (MLIP) number of 1, an MLIP port of 0, a Line Expansion Module (LEM) port of 0, and a Data Link Processor (DLP) address of 5, then write down the following information:

```
HL Unit/Path: PK48 VIA 1 0 0 5
```

Defining I/O Paths and Loading Controlware

If you want to define a second path to the controller of the PK48 through PK63 string and the controller of PK64 through PK79 string, then write down this information:

PK Paths: PK48 VIA 1 1 0 1, PK64 VIA 1 1 0 2

Finally, write down the MLIP number, MLIP port, LEM port, and DLP address numbers of the paths that lead to the tape drive that has the SYSTEMAS tape mounted on it. This information is useful if one of the paths to a multipath drive is defective.

Suppose that you mounted the SYSTEMAS tape on tape drive 128. The information you should write down is as follows:

MT Paths: MT128 VIA 1 1 0 3, 1 1 0 4

Now press [SPCFY] to return the display to the original command list.

4. If you want to specify the Halt/Load path address as well as the Halt/Load unit when using the HALTLOAD command of UTILOADER, use the following command. In the example, the Halt/Load unit is disk unit 48 and the Halt/Load path address has an MLIP number of 1, an MLIP port of 0, an LEM port of 0, and a DLP address of 5.

PK48 VIA 1 0 0 5

5. If you want to specify the tape I/O path that UTILOADER uses, enter the following command. In this example, the tape is mounted on MT128 and the path has an MLIP number of 1, an MLIP port of 1, a LEM port of 0, and a DLP address of 3.

SYSTEM/LOADER FROM SYSTEMAS ON MT128 VIA 1 1 0 3

LOADING THE CONTROLWARE FILE

NOTE

The "Loading the Controlware File" section does not apply to the A 2 system.

You can load controlware using UTILOADER or LOADER. UTILOADER automatically loads controlware to non-Storage Module Device (SMD) packs, if the controlware file exists on those packs, in the following two situations:

1. When you are in UTILOADER Automatic Mode and the Halt/Load path UTILOADER chooses does not have any controlware.
2. When you are in UTILOADER Manual Mode, you enter HALTLOAD, and the Halt/Load path UTILOADER or you choose does not have any controlware.

If UTILOADER cannot automatically load the controlware, you can use UTILOADER in Manual Mode or LOADER to load the controlware files.

In Manual Mode, the UTILOADER "LOADHOST" menu option leads you through the steps to define the paths and load the controlware. You can use this method in the following two situations:

1. If you have packs other than SMD packs without loaded controlware.
2. If your controlware has been corrupted or you have powered-off the controller to the non-SMD packs.

You must load controlware to the controllers of non-SMD disk packs using LOADER if you have to purge all the files on the disk.

The following is the controlware title you need to know to load the controlware:

Subsystem Type -----	Controlware Title -----
HTS1 DLP	CONTROLWARE/B9387S

Defining I/O Paths and Loading Controlware

If the disk drive to which you are loading controlware is going to be designated as the Halt/Load unit, the LH (Load Host) LOADER command described below must precede the HALTLOADUNIT command in the procedure for loading an MCP and purging all the files on the disk. You can also load all the controlware at this point if you want.

The following example of the LH (Load Host) LOADER command loads controlware from a tape named SYSTEMAS to a controller using an HTS1 DLP with an I/O path address of 1 0 0 5. The disk unit is 48.

```
LH PK48 VIA 1 0 0 5 CONTROLWARE/B9387S FROM SYSTEMAS
```

If you want to designate an I/O path to the tape unit also, add the I/O path address of the tape, 1 0 0 4, to the command.

```
LH PK48 VIA 1 0 0 5 CONTROLWARE/B9387S FROM SYSTEMAS VIA 1 0 0 4
```


2 DATACOMM MODIFICATION

Your preinitialized disk has a SYSTEM/DATACOMINFO file on it. This file specifies the configuration of lines and stations needed to initialize the datacomm network, as well as all the standard protocols supported by Burroughs.

The file SYSTEM/DATACOMINFO on the preinitialized disk contains the following configuration:

The Data Communications Data Link Processor (DC-DLP) has a unit number of 112.

The line on adaptor 0 connects to four poll/select terminals running at 9600 baud with addresses of "00", "01", "02", and "03".

The line on adaptor 1 connects to four poll/select terminals running at 9600 baud with addresses of "10", "11", "12", and "13".

The line on adaptor 2 connects to four poll/select terminals running at 9600 baud with addresses of "20", "21", "22", and "23".

The line on adaptor 3 connects to a screen teletype (TTY) terminal running at 9600 baud.

You can modify a copy of the SYSTEM/DATACOMINFO file to reflect your unique configuration by using the Interactive Datacomm Configurator (IDC). Refer to the Interactive Datacomm Configurator (IDC) User's Guide for instructions.

NOTE

Use of Network Definition Language II (NDLII) described below is not supported on the A 2 system.

On an A 3 system, if a Network Information File II (NIFII) describing the network was already created by the Network Definition Language II (NDLII) compiler, remove the SYSTEM/DATACOMINFO file. When you initialize datacomm the MCP automatically creates a DATACOMINFO file with the datacomm prefix from the NIFII and initializes datacomm using this DATACOMINFO file.

The standard protocols supported by Burroughs are a result of a compilation of the file SYMBOL/SOURCENDLII, found on the system tape. The datacomm prefix of this file is SYSTEM. A customized NIFII can be generated by patching the file SYMBOL/SOURCENDLII to specify the

datacomm configuration and then compiling the resultant symbolic with the NDII compiler. Refer to the Network Definition Language II (NDII) Reference Manual for information.

INITIALIZING DATACOMM USING THE MODIFIED FILE

After creating your customized NIFII or modifying the SYSTEM/DATACOMINFO file, do the following.

1. If you want to point to a DATACOMINFO file other than the SYSTEM/DATACOMINFO file, enter the ID (Initialize Datacomm) ODT command, as follows. In the example, the CAA3/DATACOMINFO file would be used to initialize datacomm.

ID CAA3

2. To start the datacomm controller software (DCCONTROL) that initializes the datacomm subsystem based on the description contained in the DATACOMINFO file, enter the ODT "ID" command, as follows. In this example, the DC-DLP unit number is 112.

ID 112

10 CREATING A HALT/LOAD PACK ON AN A 3**NOTE**

The "Creating a Halt/Load Pack on an A 3" section does not apply to the A 2 system.

If your A 3 system is equipped with a removable media pack drive 206 or 677, it is advisable to have a backup Halt/Load pack. The following procedure will create such a backup pack and should be used after the first power-on initialization. If no backup pack exists and the SMD Halt/Load pack is inoperative, you can create a Halt/Load pack on an already running B 5000/B 6000 Series system or on an already running A Series system and carry it to the inoperative A 3. It is recommended that the following procedure be used only after the important considerations listed below have been read and understood.

IMPORTANT CONSIDERATIONS

If the running system is using a configuration file, the image of that system's hardware configuration is included in the system information on the Halt/Load pack. If the configuration is different from the one on your A 3, this could lead to serious complications or failure when using the pack to Halt/Load your A 3. To avoid this, the running system should be reconfigured to a default configuration prior to the creation of the Halt/Load pack. An alternative method is to create a Halt/Load pack by running LOADER and using its TARGETMACHINE command.

When a disk pack is transported from another system to an A 3, the system serial number recorded on the pack is updated to the system serial number of the A 3 to which the pack is transferred. But if the disk pack is transported to a B 5000 or B 6000 Series system, that system inherits the system serial number from the system that last updated the system serial number on the pack. This could have adverse effects on the B 5000 or B 6000 Series system. The file cataloging system, for example, relies extensively on the validity of the system serial number.

PROCEDURE FOR CREATING A HALT/LOAD PACK

A problem occurs when trying to create a Halt/Load pack on a running system if the family name of the new pack is identical to one that exists on the running system. If, for example, the name of the Halt/Load pack to be created is to be DISK and a pack named DISK exists on the system, all the steps below should be performed. If the Halt/Load pack names are not identical, do not perform the steps marked with asterisks.

Before starting, mount the SYSTEMAS tape on a tape drive.

1. Create a suitably labeled pack as necessary, using either the RC (Reconfigure) or the LB (Label) command. Both are described in the Operator Display Terminal (ODT) Reference Manual. An example of an RC command that labels a disk pack on unit number 67 with the name NEWDISK and a serial number of 092084 follows.

```
RC PK67 NAME=NEWDISK SERIAL=092084
```

2. If the RC or LB routines notify you that an Initialize, Verify, and Relocate (IVR) procedure is required, you should use the Peripheral Test Driver (PTD) to initialize, verify, and relocate any defective sectors of the pack. For IVR instructions, refer to the "PTD" section of the System Software Support Reference Manual and the tapes containing PTD/DOC/USERS/GUIDE and PTD/DOC/CONF/IVR. At this stage, family name must be unique on the running system.
3. Now copy the MCP to the new pack. In the following example, the MCP title is SYSTEM/AMLIPMCPnnnnn and the pack name is NEWDISK. The nnnnn portion of the file name stands for the Mark release number.

```
COPY & COMPARE SYSTEM/AMLIPMCPnnnnn FROM SYSTEMAS TO  
NEWDISK(PACK)
```

4. If the system you are running on has a different hardware configuration than the system you will use the Halt/Load pack on, reconfigure the running system to the default configuration by entering

```
RECONFIGURE GROUP AS DEFAULT
```

This command causes a Halt/Load to make the reconfiguration effective.

Creating a Halt/Load Pack

5. Now mark the MCP on the new pack as the current MCP. This action will not affect the running MCP. In the following command, the MCP title is SYSTEM/AMLIPMCPnnnnn and the Halt/Load pack name is NEWDISK.

```
CM SYSTEM/AMLIPMCPnnnnn ON NEWDISK
```

- *6. Close the disk pack mounted on unit 67 by entering

```
CLOSE PK67
```

- *7. Make the pack on unit 67 unavailable to the running system by entering

```
SV PK67
```

- *8. Change the family name of the pack mounted on unit 67 to DISK by entering

```
LB PK67 NAME=DISK
```

Because the pack is saved, a duplicate family name conflict will not arise on the running system having an in-use pack with that name.

9. Power off disk unit 67 by entering

```
PO PK67
```

The Halt/Load pack is ready to start up your A 3.

11 **HARDWARE FEATURES OF THE A 2 AND A 3 SYSTEMS**

THE A 2 AND A 3 PROCESSORS

The A 2 and A 3 processors are microprogrammed processors that make extensive use of Transistor Transistor Logic (TTL) Gate Arrays, storage devices, and drivers. The A 2 and A 3 implement A Series architecture by executing microcoded instructions.

For more detailed information on all processor functions and cards, refer to the A 2/A 3 System Reference Manual, Volume I. For a detailed description of the A 2 or A 3 operator set, consult the A Series System Architecture Reference Manual, Volume II.

THE INPUT/OUTPUT (I/O) SUBSYSTEM

The primary component in the A 2 or A 3 I/O subsystem is the Message-Level Interface Processor (MLIP), whose primary function is to transfer data between the processor and various peripheral devices. The A 2 and A 3 MLIPs support two ports: an internal Data Link Interface (DLI) on the system backplane and an external Message-Level Interface (MLI).

The DLI I/O base is the built-in I/O base unique to the A 2 and A 3 systems. The DLI base is always attached to port 0 of the MLIP and supports a maximum of eight Data Link Processors (DLPs). The MLI port provides a connection to an external I/O base, allowing the full network capabilities of Universal Input/Output (UIO).

THE MEMORY SUBSYSTEM

The memory subsystem consists of the Memory Control Unit (MCU) and memory storage boards. The MCU can control up to eight memory storage boards of three million bytes of memory each.

On the A 2 system, the minimum amount of physical memory that can be configured is six million bytes of memory. More memory can be added in a three million byte increment to a maximum amount of nine million bytes of memory.

The minimum amount of physical memory that can be configured on an A 3 Model D or Model F system is three million bytes. The maximum amount of memory that can be configured on an A 3 system is 24 million bytes.

ASN Memory

The descriptor-based addressing mechanism used in the architecture is capable of referencing up to 1024K words. A partitioning scheme referred to as "Address Space Number" (ASN) is used to increase the maximum physical memory available to the total of all processes running on an A 2 or A 3 system beyond 1024K words. The A 2 or A 3 ASN implementation is the same as the A 9 ASN implementation.

For additional information about ASN memory, refer to the EC (Environment Component) and MS (Make Subsystem) commands in the Operator Display Terminal (ODT) Reference Manual.

Memory Error Detection and Reporting

The memory subsystem employs a Hamming code and parity error detection logic that provides single-bit error correction. These single-bit failures result in memory locations being rewritten with the corrected information. All memory errors are logged in a hardware log (ELOG), which is used by the microcode to report memory errors to system software. The software logs these errors in the SYSTEM/SUMLOG file.

THE MAINTENANCE SUBSYSTEM

The A 2 and A 3 systems have multifunction maintenance subsystems. The major hardware components in the A 2 and A 3 maintenance subsystems are the User Interface Processor (UIP), the Power Control Card (PCC), and the Processor Interface Card (PIC). The PIC connects the UIP to the A 2 or A 3 processor.

The maintenance subsystem provides the following system functions:

- System initialization at power-up
- Remote maintenance support
- Interface with the processor backplane
- A system event analyzer
- A history trace capability
- ODT/MDT functions
- A continuously running clock with a battery backup
- Initiation and reading of self-testing DLPs on the DLI
- A DLI I/O clock
- The Scheduled Power On/Off capability

12 SOFTWARE FEATURES OF THE A 2 AND A 3 SYSTEMS

A Series system software is an integral part of the A 2 and A 3 systems. All standard A Series system software is supported on the A 2 and A 3.

SYSTEM SERIAL NUMBER

The A 2 or A 3 system serial number is stored on the PCC EEPROM. This number is set at the factory and should not require change. If the System Serial Number must be reentered due to a new PCC card, it is suggested that you enter the System Serial Number originally entered at the factory.

MACHINE IDENTITY CONSIDERATIONS

On A 2 systems, the TIME(23) intrinsic (machine identity) returns 1 in the field [7:8]; on A 3 systems, the TIME(23) intrinsic returns 0 in the field [7:8]. The TIME(24) intrinsic returns the EBCDIC string of "A3 " on the A 3 system and "A2 " on the A 2 system. Refer to the ALGOL Reference Manual for information about the TIME intrinsic.

MEMORY ERROR REPORTING

As mentioned in "Memory Subsystem" in the "Hardware Features of the A 2 and A 3 Systems" section, the memory subsystem corrects single-bit errors. These error activities are detected by the MCP through a sampling technique. During the sampling, the errors are detected and logged in the system SYSTEM/SUMLOG file and LOGANALYZER can analyze the results of these error logs. For information on the log format, the method of logging the memory errors, and the analyzed format of these errors, refer to the System Software Site Management Reference Manual and the System Software Support Reference Manual.

DATE AND TIME HANDLING

The MCP obtains the system date and time values from the maintenance subsystem's continuously running calendar clock and writes this value into the processor clock. This information is obtained at the following times:

- When the system is initialized
- When the DR (Date Reset) ODT command is used
- When the TR (Time Reset) ODT command is used

If a machine is run continuously, excessive drift between the two clocks is prevented by the MCP synchronizing the maintenance clock to the processor clock at midnight.

The date and time are retrieved from the continuously running calendar clock on the A 2 and A 3 systems. The LOADER "DATE" command and the TARGETMACHINE command do not need to be specified for this function on these systems.

13 COMPATIBILITY

The A 2 and A 3 are designed for object-code compatibility with the entire A Series product line.

LIMITATIONS AND RESTRICTIONS

For B 5000/B 6000/B 7000 Series product-line-generated object code to be made compatible with the A 2 or A 3, the following limitations and restrictions must be observed.

The compatibility does not extend to detailed instruction implementation or timing within the product line.

Limitations

The IORESULT and IOMASK buffer attributes of direct I/O operations are compatible with the other Message-Level Interface Processor (MLIP) based systems (the B 5900, B 6900, A 9, and A 10.)

Burroughs Common Language (BCL) encoding and vector mode are not implemented.

Arithmetic precision is at least equal to the B 5900.

The FORTRAN Optimized Compiler is not supported.

Restrictions

Source programs must be compiled at or above the Mark 3.4.1 release level.

The MCP code file must be a Mark 3.5.0 release level or above on the A 3. The MCP code file must be a Mark 36.170 release level or above on the A 2.

The A 2 system must be at Engineering Release Level (ERL) 1. The A 3 system must be at ERL 5.

MACHINE-DEPENDENT CODE FILES

On A Series systems, the compiler target to generate optimized code for A 2 and A 3 systems is "LEVEL1". "LEVEL1" is the default compiler target on A 2 or A 3 systems.

The A 2 and A 3 systems are in the same processor operator family as the A 9 and A 10 systems. Therefore, code generated for an A 9 or A 10 using compiler target "A9", "A10", or "LEVEL1", or code generated for an A 2 or A 3 system using compiler target "LEVEL1" is executable on any of the above systems, plus the A 15.

The compiler target to generate code executable on non-A Series systems is "LEVEL0". Code files from B 5000/B 6000/B 7000 (LEVEL0) Series systems execute on A Series systems. A code file compiled for an A 2 or A 3 (LEVEL1) system cannot be run on a predecessor (LEVEL0) system. Descriptions of the restrictions and usage of machine-dependent code files are given in the COMPILERTARGET command found in the Operator Display Terminal (ODT) Reference Manual, the Binder Reference Manual, and the System Software Support Reference Manual. Also refer to the TARGET compiler option in an appropriate language reference manual.

All code files on the preinitialized disk, including the MCP, are compiled with a TARGET of LEVEL1. The MCP code file is also compiled with the compile-time option ASERIESMLIPONLY, which reduces the code file size. Note that whether or not a compiler code file is optimized for an A 2 or A 3 system, it can generate either optimized (LEVEL 1) or nonspecific (LEVEL 0) code files.

A UTILoader COMMANDS

When control is transferred to the UTILoader, it responds by displaying a menu of commands. To select a command, type in the desired command in the upper left-hand corner of the screen and press [XMIT]. The list of commands displayed and their uses follows:

HALTLOAD

This command starts the MCP. UTILoader next asks for the Halt/Load unit and then writes the resident bootstrap to memory and transfers control to it.

TAPELOAD

This command loads a standalone NEWP program, typically LOADER, from tape and transfers control to that program.

CONFIGURATION

This command displays configuration information pertaining to the I/O subsystem. The displayed information is often used in UTILoader or LOADER commands that include I/O path addresses.

PACKLOAD

This command loads a standalone NEWP program, typically LOADER, from a disk pack to memory and then transfers control of the system to the loaded program.

After PACKLOAD has been transmitted, UTILOADER requests the location of the file in the following form

ENTER INPUT REQUEST IN THE FOLLOWING FORMS:

<FILENAME> FROM <VOLNAME> ON PK/DK <UUUU>

<FILENAME> FROM <VOLNAME> ON PK/DK <UUUU> VIA <PATH>

A <PATH> HAS THE FORM:

<PORT #> <LEMPORT #> <DLP #>

or

<MLIP #> <PORT#> <LEMPORT#> <DLP #>

<UUUU> is the unit number of the pack. The optional <PATH> can be obtained from UTILOADER's CONFIGURATION display. An example of a response is

SYSTEM/LOADER FROM DISK ON PK62 VIA 1 0 2

This command initiates the following sequence of events:

1. The disk pack drive controller of the specified unit is tested to see if operational controlware is loaded or if it is in Read-Only Memory (ROM) Execute Mode.
2. The drive is tested for readiness.
3. The pack label is matched against VOLUMENAME.
4. The pack is searched for a directory.
5. The directory is searched for the specified file.
6. If the file is a standalone NEWP code file and resides entirely on that pack, the file is read into memory and control is transferred to the program after the following message is displayed:

UTILOADER NOW TRANSFERRING CONTROL

UTILoader Commands

Note that any error encountered during this process causes an appropriate message to be displayed. UTILoader returns to its initial menu. At this time, the problem should be corrected and the input request retransmitted.

LOADHOST

NOTE

The LOADHOST command is not applicable for an A 2 system.

This command loads a B9387 disk pack drive controller using a controlware file from a disk pack. This function can be performed on an A 3 system with an HT-Sequential DLP and disk pack controllers B9387-51/52.

After LOADHOST has been transmitted, UTILoader requests the location of the file in the following manner:

ENTER INPUT REQUEST IN THE FOLLOWING FORMS:

<FILENAME> FROM <VOLNAME> ON PK/DK <UUUU>

<FILENAME> FROM <VOLNAME> ON PK/DK <UUUU> VIA <PATH>

A <PATH> HAS THE FORM:

<PORT #> <LEMPORT #> <DLP #>

or

<MLIP #> <PORT #> <LEMPORT #> <DLP #>

<UUUU> is the unit number of the pack. The optional <PATH> information can be obtained from UTILoader's CONFIGURATION display. An example of a response is

0 0 6 CONTROLWARE/B9387S FROM DISK ON PK 62

If the VIA option is used, the entry would be

0 0 5 CONTROLWARE/B9387S FROM DISK ON PK 62 VIA 0 0 6

This command initiates the following sequence of events:

1. The disk pack controller that is to be loaded is put in Read-Only Memory (ROM) Execute Mode.
2. The source disk pack controller, if different from the one to be loaded, is also tested to ensure that it is ready.

A 2/A 3 SYSTEM SOFTWARE INSTALLATION GUIDE

3. The source pack label is checked and the directory searched for the specified controlware file, which must reside entirely on that pack.
4. Each controlware segment is then read from the file, the header is validated, and the segment is loaded.
5. If the source disk pack controller is the one being loaded, it is put back into Read-Only Memory (ROM) Execute Mode after each segment, until the last segment is loaded.
6. If no error occurs, the following message is displayed on the ODT:

OPERATIONAL FIRMWARE LOADED

Any error encountered during this process causes an appropriate error message to be displayed. UTILoader returns to its initial menu. At this time, the error should be corrected and the input request retransmitted.

POWERON

NOTE

The POWERON command is not applicable to the A 2 system.

The POWERON command is valid only for drives that are capable of being powered on by software and that have previously been powered down by software. This command powers on disk pack drives, if an HT-Sequential DLP is in use. If the system does not have the proper DLP, the ODT displays the following message:

DLP DOES NOT SUPPORT POWER ON

To use the POWERON command also requires the following Engineering Change Notices (ECNs) for disk packs:

For type 207 disk packs, ECN 3666 has been released by Winnipeg Product Assurance and Support as a documentation change to the Field Engineering Features/Modification Installation Manual, Section B. The kit consists of a schematic and rework instructions. The kit, #2787 5186, can be ordered through Product Distribution.

UTILOADER Commands

For type 206 disk packs, ECN 63832 has been released by Westlake Product Assurance and Support as a documentation change to the Field Engineering Features/Modification Installation Manual, Section B. The kit consists of a schematic and rework instructions. The kit, #2164 2046, can be ordered through Product Distribution.

After POWERON has been transmitted, UTILOADER requests the location of the file in the following manner:

ENTER INPUT REQUEST IN THE FOLLOWING FORMS:

PK <UUUU>

PK <UUUU> VIA <PATH>

A <PATH> HAS THE FORM:

<PORT #> <LEMPORT #> <DLP #>

or

<MLIP #> <PORT #> <LEMPORT #> <DLP #>

<UUUU> is the unit number of the pack. The optional <PATH> information can be obtained from UTILOADER's CONFIGURATION display. An example of a response is

PK 62

If the VIA option is used, the following is an example of the response:

PK 62 VIA 0 0 6

This command initiates the following sequence of events:

1. The DLP of the specified pack is tested to ensure that it is capable of issuing a power on operation.
2. The pack is tested to ensure that it is in the correct state to be powered on.
3. The drive is then powered on and, after a 30-second wait, a read is issued to determine the success of the operation.
4. When the operation is successful, the ODT displays

**** PACK POWERED UP ****
5. UTILOADER returns to its initial menu.

GLOSSARY

Address Space Number (ASN)

A partitioning scheme that increases the maximum physical memory available on an A Series system.

ALGOL

A structured, high-level programming language that provides the basis for much of the systems programming of Burroughs machines.

ASN

See "Address Space Number."

base

A hardware unit in the input/output (I/O) subsystem that contains the components necessary for handling the routing of messages between the Data Link Processors (DLPs) and the host processor through the Message-Level Interface Processor (MLIP). The base itself contains at least one DLP.

BCL

See "Burroughs Common Language."

Boot unit

A disk pack that has been selected as the pack containing the operative BOOTCODE file. The BOOTCODE file is made operative using the MB (Make Boot) Operator Display Terminal (ODT) command.

BOOTCODE file

A file that contains the maintenance subsystem software, A 2 or A 3 microcode, UTILoader code, and diagnostic tests.

Burroughs Common Language (BCL)

A code using 6-bit character representation. BCL is not available on some A Series and B 5000/B 6000/B 7000 Series systems.

bootstrap

A collection of data and machine instructions capable of loading another program into memory.

Change MCP (CM)

An Operator Display Terminal (ODT) command that specifies a particular Master Control Program (MCP) code file on an optionally specified disk pack family as the MCP code file to be used at the next Halt/Load.

CM

See "Change MCP."

Communications Management System (COMS)

A Burroughs Message Control System (MCS) that controls on-line environments on the A Series and B 5000/B 6000/B 7000 Series systems.

COMS

See "Communications Management System."

controlware

A code file used to control a disk pack controller. Controllers using 206, 207, 659, and 677 pack types require the loading of operational controlware before they can be brought on-line.

Data Communications Data Link Processor (DC-DLP)

A data communications processor that combines the functions of the Network Support Processor (NSP) and Line Support Processor (LSP) into one physical Data Link Processor (DLP) and supports up to four lines of communication.

Data Link Interface (DLI)

An internal port on the system backplane. The DLI input/output (I/O) base is unique to the A 2 and A 3 systems, is always attached to port 0 of the Message-Level Interface Processor (MLIP), and supports a maximum of eight Data Link Processors (DLPs).

Data Link Processor (DLP)

A controller of one or more peripheral devices or datacomm lines. It provides the interface between the system and the peripherals or lines.

DATAKOMINFO file

A file that contains a complete description of the datacomm configuration, including algorithms, editors, and translate tables. This is the file that the Interactive Datacomm Configurator (IDC) modifies and from which the Master Control Program (MCP) initializes the data communications subsystem.

DC-DLP

See "Data Communications Data Link Processor."

disk

A flat circular plate with magnetic surfaces on which data can be written by selective magnetization of portions of its surfaces.

DLI

See "Data Link Interface."

DLP

See "Data Link Processor."

EEPROM

See "Electrically Erasable Programmable Read-Only Memory."

Electrically Erasable Programmable Read-Only Memory (EEPROM)

A chip that retains information until it is erased electronically.

ELOG

A hardware error log.

End-of-transmission character (ETX)

A keyboard character used to signal the end of input prior to pressing [XMIT].

ETX

See "End-of-transmission character."

Halt/Load

A process that starts or restarts the Master Control Program (MCP).

Halt/Load pack

A pack that contains a Master Control Program (MCP) that is designated as the current operative MCP. This pack is mounted on a drive that has been or will be designated as the Halt/Load unit.

Halt/Load path

The input/output (I/O) path to the Halt/Load unit. On Message-Level Interface Processor (MLIP) systems, the Halt/Load path is described by its MLIP port, Line Expansion Module (LEM) port, and Data Link Processor (DLP) address numbers and implicitly includes the disk pack controller attached to the DLP.

Halt/Load unit

The drive on which the Halt/Load pack is mounted. The LOADER "HALTLOADUNIT" command, the Operator Display Terminal (ODT) "HLUNIT" command, and the UTILOADER "HALTLOAD" command designate the disk drive unit as the Halt/Load unit.

HDP

See "Host Dependent Port."

Host Dependent Port (HDP)

A hardware module capable of interfacing a processor to the Message-Level Interface (MLI). It is referred to on A 2 and A 3 systems as the "Message-Level Interface Processor (MLIP)."

I/O

See "input/output."

IDC

See "Interactive Datacomm Configurator."

initialization

A procedure that makes a system or subsystem available for its intended use. Important phases of initialization are the recognition of the physical environment, the identification of the available resources, and establishment of the interface with the user.

Initialize, Verify, and Relocate (IVR)

A maintenance procedure that makes a new disk pack usable by the system or attempts to make a damaged pack reusable. The end product of an IVR is a Master Available Table (MAT) of available disk segments.

input/output (I/O)

An operation in which the system reads data from or writes data to a file on a peripheral device such as a disk.

Input/Output Control Block (IOCB)

A data structure used for communication between the host system and the Message-Level Interface Processor (MLIP).

Interactive Datacomm Configurator (IDC)

A Burroughs interactive, menu-driven utility that allows you to create, interrogate, and modify datacomm network configurations.

IOCB

See "Input/Output Control Block."

IVR

See "Initialize, Verify, and Relocate."

LEM

See "Line Expansion Module."

Line Expansion Module (LEM)

A hardware module that allows the attachment of several bases to a single Message-Level Interface Processor (MLIP) port.

Maintenance Display Terminal (MDT)

The name given to the System Control Terminal (SCT) when it is in Maintenance Mode. The MDT allows the operator to access the maintenance subsystem.

maintenance firmware

The user interface that allows access to the state of the machine via the System Control Processor (SCP).

maintenance subsystem

The software and hardware that serve as the interface between the user and the Master Control Program (MCP) when the hardware is to be initialized, configured, or halted, or when system software is to be initialized for the first time. The subsystem is also used in diagnosing hardware and software problems.

Make Boot (MB)

An Operator Display Terminal (ODT) command. It causes the BOOTCODE file on the pack to be selectable as a possible operative Boot unit if its selected priority is the highest on the system.

MARC

See "Menu-Assisted Resource Control."

Master Control Program (MCP)

An operating system on Burroughs A Series and B 5000/B 6000/B 7000 Series systems. The MCP controls the operational environment of the system by performing job selection, memory management, peripheral management, program segmentation, subroutine linkage, and system utilization and error logging.

MB

See "Make Boot."

MCP

See "Master Control Program."

MCP idle

In the context of system initialization, Master Control Program (MCP) idle is achieved when all available resources have been identified and initialized and the MCP is prepared to execute submitted jobs. After a Halt/Load, MCP idle is signaled by the following message:

SYSTEM INITIALIZATION HAS BEEN COMPLETED

MCU

See "Memory Control Unit."

MDT

See "Maintenance Display Terminal."

Memory Control Unit (MCU)

A hardware module controlling the memory subsystem and up to eight memory storage boards.

Menu-Assisted Resource Control (MARC)

A Burroughs product that allows access to the operating system by way of a menu format. MARC also provides help text for the user.

Message-Level Interface (MLI)

An internal port, supported by the Message-Level Interface Processor (MLIP), that provides a connection to an external input/output (I/O) base, allowing the full network capabilities of Universal Input/Output (UIO).

Message-Level Interface Processor (MLIP)

The input/output (I/O) processor associated with a Central Processing Unit (CPU).

MLI

See "Message-Level Interface."

MLIP

See "Message-Level Interface Processor."

NDLII

See "Network Definition Language II."

Network Definition Language II (NDLII)

A Burroughs language used to physically, logically, and functionally describe the datacomm subsystem on Message-Level Interface Processor (MLIP) systems.

Network Information File II (NIFII)

A file that contains the object code generated by the Network Definition Language II (NDLII) compiler from NDLII statements.

Network Support Processor (NSP)

A module that controls the interface between the host system and the datacomm peripherals. It executes the code generated by the Network Definition Language II (NDLII) compiler for line control and editor procedures.

NEWP

A structured, high-level programming language used in developing some of Burroughs system software.

NIFII

See "Network Information File II."

NSP

See "Network Support Processor."

ODT

See "Operator Display Terminal."

Operator Display Terminal (ODT)

The name given to the System Control Terminal (SCT) when it is in Operator Display Mode. The ODT allows the operator to enter commands directly to the operating system and receive output responses.

pack

A disk that consists of multiple platters on a central spindle. Data on a pack is accessed by movable read/write heads. Some packs are removable. Packs are also referred to as "disk packs."

PCC

See "Power Control Card."

Peripheral Test Driver (PTD)

A module of the Master Control Program (MCP) that executes maintenance tests for peripheral devices.

PIC

See "Processor Interface Card."

Power Control Card (PCC)

A part of the A 2 or A 3 maintenance subsystem managed by the User Interface Processor (UIP).

preinitialized disk

A Storage Module Device (SMD) disk that the factory prepares for use on this system. The factory's preparation includes the initialization, verification, and relocation of any defective sectors, as well as the labeling of the pack. The required files are then copied onto the disk, including the BOOTCODE and Master Control Program (MCP) files. The disk is then designated as the Halt/Load unit and selected as the Boot unit.

The selection of a Boot unit is accomplished by using the MB (Make Boot) Operator Display Terminal (ODT) command.

Printer Tape Data Link Processor (PT-DLP)

A processor that can control one buffer printer and a streamer tape drive.

Processor Interface Card (PIC)

A part of the A 2 or A 3 maintenance subsystem that connects the User Interface Processor (UIP) to the system.

Programmable Read-Only Memory (PROM)

A type of memory that can be modified once for specific purposes, then can only be read.

Glossary

PROM

See "Programmable Read-Only Memory."

PT-DLP

See "Printer Tape Data Link Processor."

PTD

See "Peripheral Test Driver."

RAM

See "Random Access Memory."

Random Access Memory (RAM)

A type of memory that allows the reading and writing of memory.

RDT

See "Remote Display Terminal."

Read-Only Memory (ROM)

A type of memory that can be read but cannot be written to or altered.

Remote Display Terminal (RDT)

The name given to the System Control Terminal (SCT) when it is in Remote Display Mode. The RDT allows the operator to access remote support.

ROM

See "Read-Only Memory."

SCP

See "System Control Processor."

SCT

See "System Control Terminal."

SMD

See "Storage Module Device."

Storage Module Device (SMD)

The communications protocol between an input/output (I/O) processor and disk drives. The Model 226 disk utilizes the SMD protocol, and the disks themselves are referred to as "SMD drives" or "SMD disks."

System Control Processor (SCP)

An independent processor. The User Interface Processor (UIP) has Programmable Read-Only Memory (PROM) code that allows it to act as the SCP on the A 2 and A 3 systems. As the SCP, it performs a maintenance subsystem self-test and loads the maintenance subsystem software.

System Control Terminal (SCT)

An ET 1100 terminal used to enter information. It can be used three ways: as an Operator Display Terminal (ODT) to access the operating system, as a Maintenance Display Terminal (MDT) to access the maintenance subsystem, or, as a Remote Display Terminal (RDT) to access remote support. These uses are available once the automatic initialization sequence has finished.

SYSTEM/LOADER

A standalone program that can be loaded into main memory by UTILoader for execution. Its primary use is creating a Halt/Load pack on a system whose Master Control Program (MCP) cannot run. This condition usually occurs when the last available Halt/Load pack has been destroyed. SYSTEM/LOADER is referred to as "LOADER" in this guide.

Glossary

SYSTEM/UTILoader

A standalone program that is loaded into main memory by the System Control Processor (SCP) and executed by the A 2 or A 3 processor. It is primarily responsible for the loading and execution of other standalone programs such as SYSTEM/LOADER and for Halt/Loading the Master Control Program (MCP). SYSTEM/UTILoader is referred to as "UTILoader" in this guide.

teletype (TTY)

A protocol supported by the Data Communications Data Link Processor (DC-DLP). The DC-DLP can drive four serial datacomm lines.

Transistor-Transistor Logic (TTL)

A circuit type used in integrated circuits characterized by multiple-emitter transistors at the inputs. TTL circuits perform at high speed.

Transistor-Transistor Logic (TTL) gate array

A chip made up of an array of simple gates programmed to indicate the the internal circuit characteristics of the logic device.

TTL

See "Transistor-Transistor Logic."

TTY

See "teletype."

UIO

See "Universal Input/Output."

UIP

See "User Interface Processor."

Universal Input/Output (UIO)

The input/output (I/O) subsystem that manages all transfers of information between the operating system and peripheral devices.

User Interface Processor (UIP)

A processor that can serve two functions. It can be a System Control Processor (SCP) that performs a maintenance subsystem self-test before loading and transferring control to the maintenance subsystem software, or a controller for the Operator Display Terminal (ODT) when the ODT is in Operator Display Mode and is acting as a terminal to the processor.

WFL

See "Work Flow Language."

Winchester disk drive

A direct-access storage device in which not only the disks but also the vertical shaft, access mechanism, and read/write heads are enclosed in a sealed cartridge to achieve high recording density and reliability.

Work Flow Language (WFL)

A Burroughs language that provides users with the means of constructing a job that allows tasks or programs to be run.

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