

WORLD WIDE MILITARY COMMAND AND CONTROL SYSTEM

WWMCCS

511X0

TRAINING HANDBOOK

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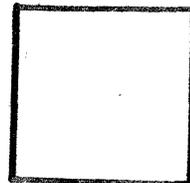


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TRAINING HANDBOOK

GENERAL HONEYWELL SERIES 6000 HARDWARE/SOFTWARE OVERVIEW

VOLUME 1

PREPARED BY: TESTING & TRAINING BRANCH
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1. Honeywell Information System(HIS) 6000 Introduction

a. The HIS 6000 is a large family of large scale, multidimensional information systems.

(1) Features high throughput, optimum use of system resources and a wide spectrum of user oriented capabilities.

(2) The HIS 6030, 6050, and 6070 models are well suited to mixed scientific, engineering, and business workloads.

(3) The HIS 6040, 6060, and 6080 models are well suited for heavy COBOL users. The only major difference between the even and odd numbered systems is the addition of the extended instruction set (EIS) on the even numbered models to greatly enhance the COBOL language.

b. The HIS 6000 Systems offer a great deal of functional modularity. By functional modularity we mean the ability to buy only the necessary equipment, then at a later date, add on and enlarge systems as a result of growth, without changing of software or extensive reconfiguration.

c. The HIS 6000 Systems also offer multidimensional processing. Multidimensional processing is the ability to concurrently process jobs from several different sources. The 6000 can process the following job sources:

(1) Remote Processing

(a) Inquires

(b) Transactions (real time)

(c) Direct access to programs in execution

(d) Data collection

(e) Output files

1) Return to sending terminal

2) Enter into file system

3) Output at central terminal

4) Hold

5) Send to another terminal

(2) Time Sharing

(a) Multiple users

(b) Privileged Slave

(3) Total On Line Testing System (TOLTS). TOLTS allows concurrent testing and diagnostics programs to be run with user programs. This allows for on-line maintenance therefore reducing downtime.

(4) Multiple Local and Remote Batch Users. This dimension allows jobs to be read in at the central site and jobs to be initiated at remote sites.

2. TYPES OF MULTIDIMENSIONAL PROCESSING

a. Remote Batch

(1) Job entered via remote terminal

(2) Under control of GCOS when in the system

(3) Interfaced with system through the use of communication processor such as the 355.

b. Remote Access

(You are on-line with the data base)

(1) On-line applications:

(a) Data Base Inquire

(b) Data Base Management

(c) Data Collection

(2) Direct terminal access to a program in execution

c. Transaction Processing

(1) On-line Real Time Applications- (Altering the environment of a program via messages input on remote device)

(2) Under the control of the Transaction Processing Executive.

d. Time Sharing

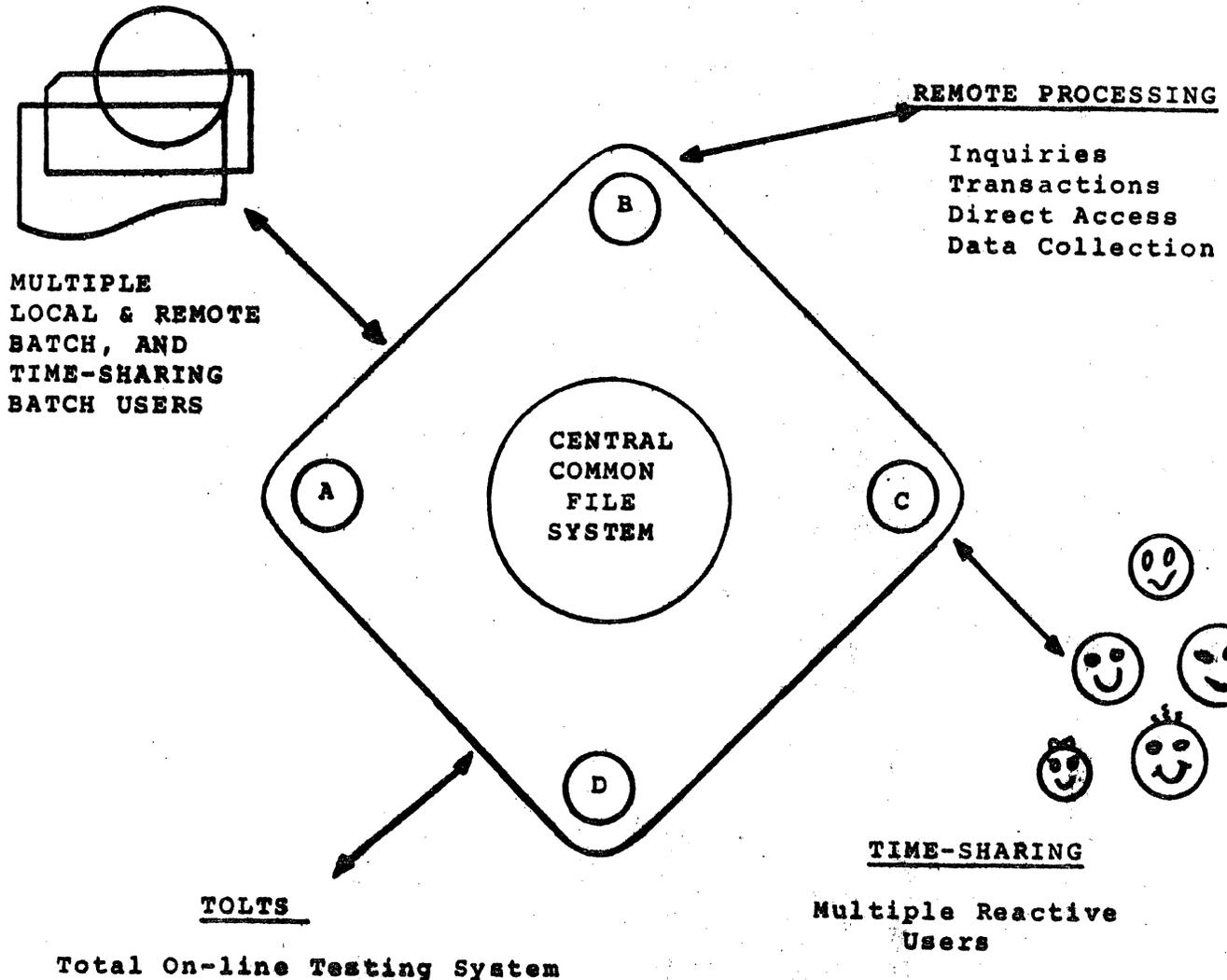
(1) Dedicated memory to users; core size is set by console message at central site.

(2) All features of GCOS are available to users

(3) Allocation, dispatching, selection, is under control of the Time Sharing Executive.

SERIES 6000

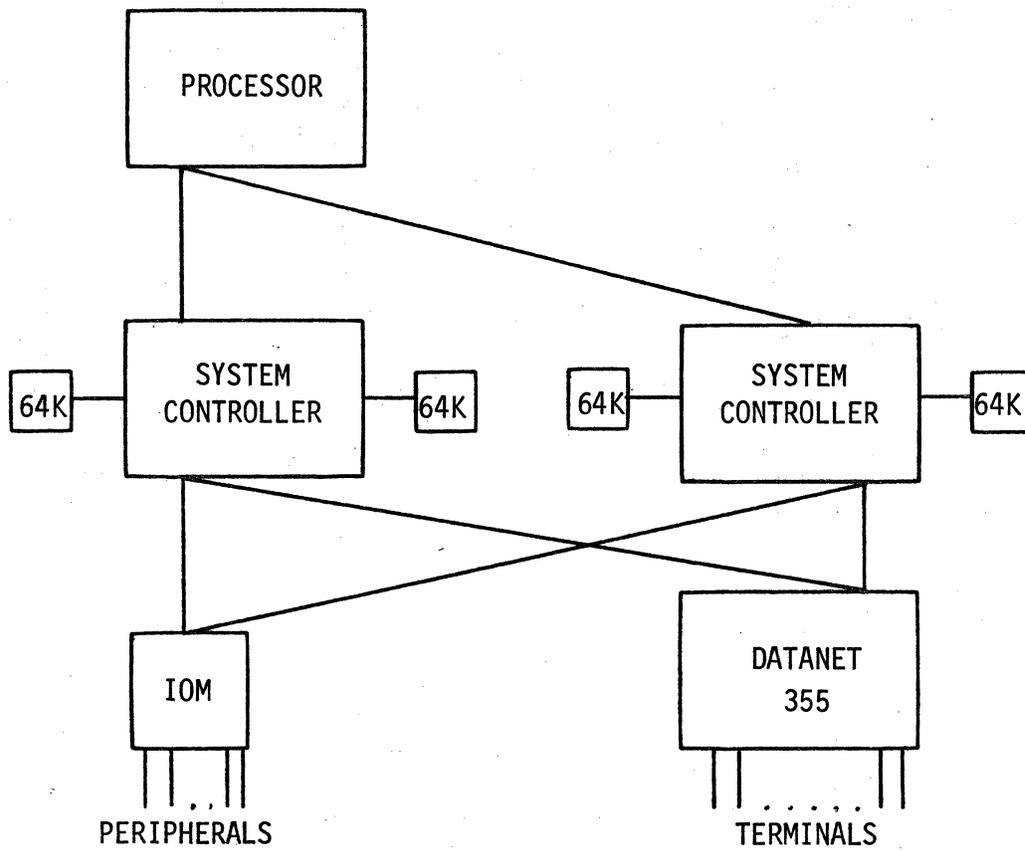
MULTIDIMENSIONAL CONCEPTS



- POLTS - Peripheral On-line Testing
- MOLTS - Main Frame On-line Testing
- COLTS - Communications On-line Testing (355 Datanet)
- OPS600 - (Old testing Program) Series 600

Figure 1-1
1-3

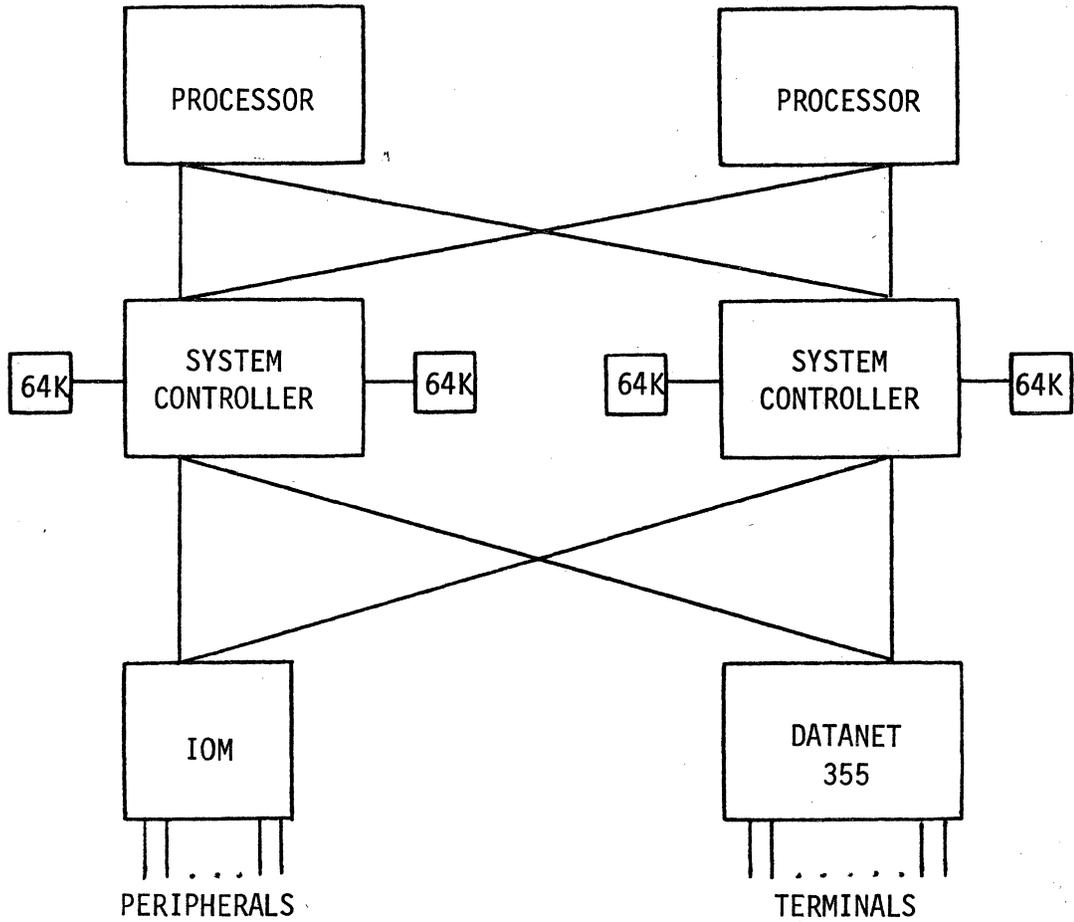
FUNCTIONAL MODULARITY



MULTI-DIMENSIONAL SYSTEM

Figure 1-2

FUNCTIONAL MODULARITY



MULTI-PROCESSOR SYSTEM

Figure 1-3

(4) Time Sharing appears as a single program to GCOS

(5) Capabilities:

(a) Use of BASIC language to interact with data base

(b) TEXT EDITOR options for updating of programs

(c) TSS FORTRAN language

(d) Ability to initiate Time Sharing batch jobs

3. REMOTE OPERATION NOTES:

a. The DATANET 355 Communications Processor is the interface between the central system and the time sharing users. The 355 takes care of many translating chores which the processor would need to do normally.

b. The DATANET 355 is a stored program mini computer.

4. MULTIPROGRAMMING

a. MULTIPROGRAMMING - The concurrent processing of many programs in memory to maintain the highest possible overlap of simultaneous I/O; and to maximize processor utilization. Concurrent is not simultaneous.

b. MULTIPROCESSING - The use of two or more processors to execute multiple programs simultaneously to gain greater throughput.

5. DUAL MODES OF OPERATION

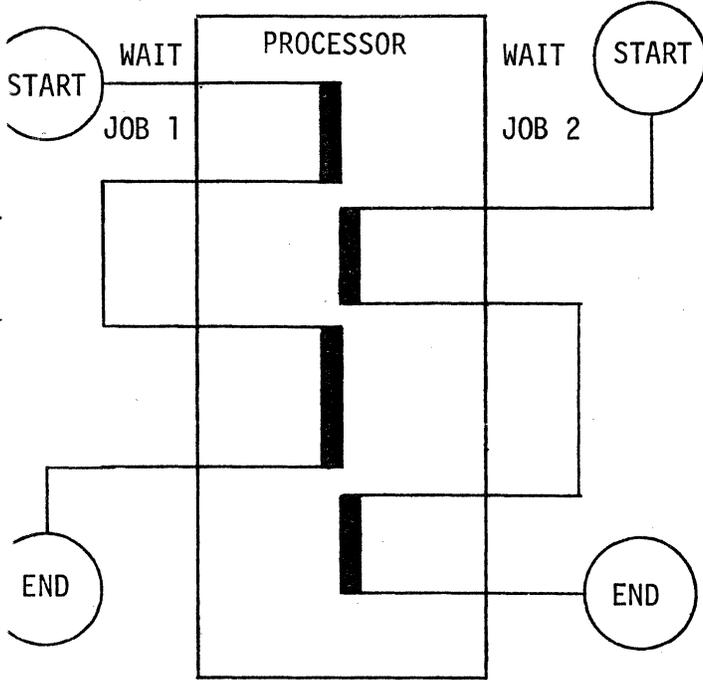
a. The HIS 6000 has two modes of operation: Slave and Master.

(1) Master Mode: Reserved for the operating system (GCOS) and has unrestricted access to memory, initiates I/O through I/O controllers, and sets the control registers including the Base Address Register (BAR). The BAR contains the beginning address of the program (absolute) in memory and the number of 1024-word or 4096-byte blocks assigned to the program.

(2) Slave Mode: Slave mode is used by job programs. It has restricted access to memory. All its references to memory are relative to the BAR.

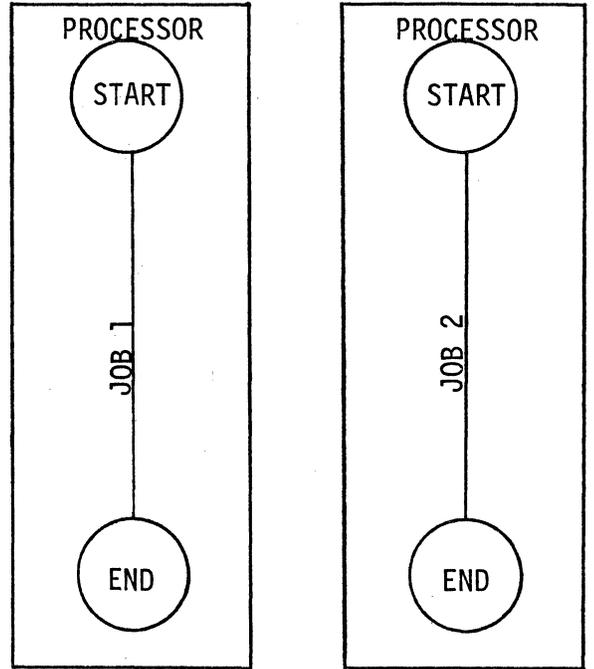
MULTIPROGRAMMING

Concurrent Job Execution

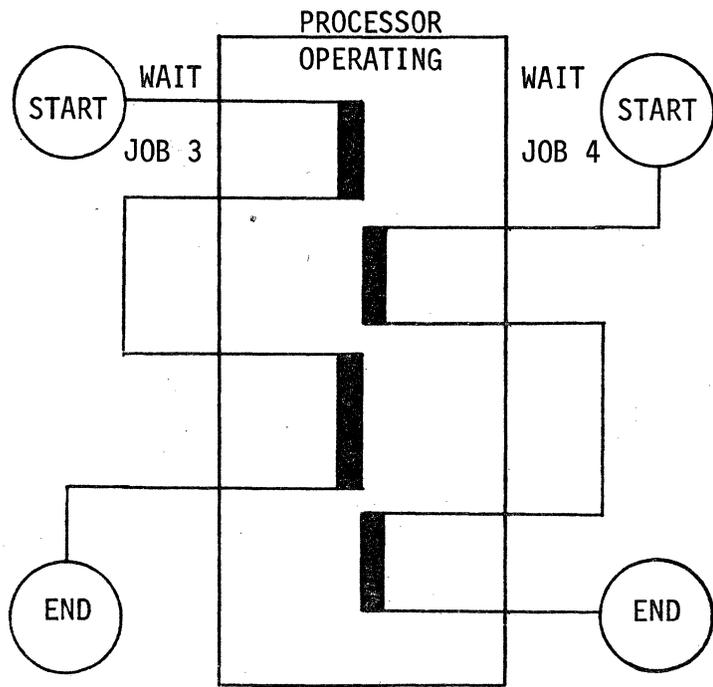
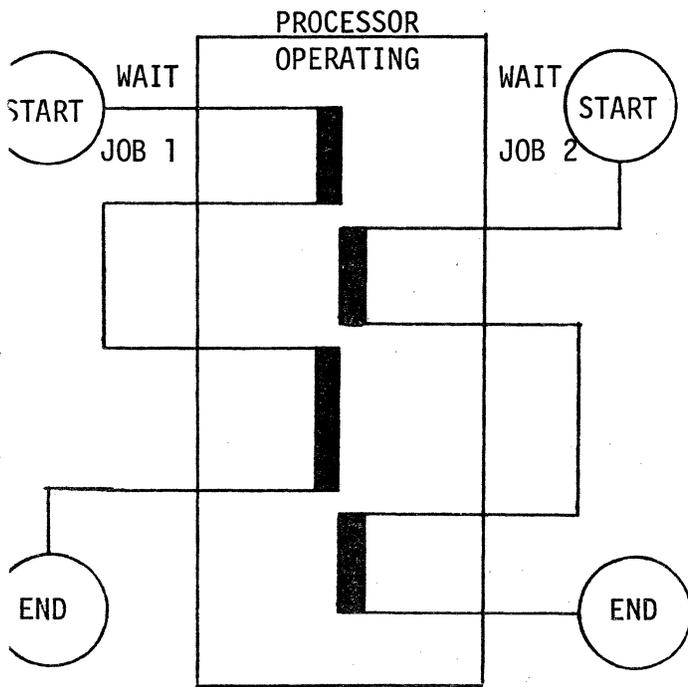


MULTIPROCESSING

Simultaneous Job Execution



COMBINED MULTIPROGRAMMING and MULTIPROCESSING



DUAL MODE OF OPERATION

MASTER. . .

- * RESERVED FOR OPERATING SYSTEM INTEGRITY
- * UNRESTRICTED ACCESS TO MEMORY
- * I/O INITIATION THROUGH I/O CONTROLLERS
- * SETTING OF CONTROL REGISTERS INCLUDING THE BASE ADDRESS REGISTER (BAR)

SLAVE. . .

- * USED BY JOB PROGRAMS
- * RESTRICTED ACCESS TO MEMORY
- * ALL MEMORY REFERENCES TO BASE ADDRESS REGISTER (BAR)

GCOS operates in both modes.

PRIVILEGED SLAVE - Accessing certain portions of restricted memory. (A slave program is allowed Privileged Slave by using the PRIVITY option. Operators must give a PRIVITY job a RUN by SNUMB before it enters allocation. This prevents unauthorized users access to the Privileged Slave Option.)

b. GCOS can operate in both modes of operation. Some users are allowed to access restricted memory from the slave mode by use of the privilege slave mode. A priority job must be run at the console by the SNUMB # and not the program number.

6. GCOS - GENERAL COMPREHENSIVE OPERATING SUPERVISOR

a. Intergrates processing dimensions

- (1) Common file structure - reduces duplication
- (2) Tailored for installation requirements

b. Resource Management

(1) Maintains current status of all system resources for optimum utilization

(2) Job Scheduling (System Scheduler)

(a) Unlimited number of jobs from multiple local and remote devices

(b) Up to 63 jobs in execution

1) Concurrently (1 processor)

2) Simultaneously (2 processors)

(c) Priority allocation

(d) Ease of use

(e) Data Base Management

(f) Security Control

(g) On-line system development

c. The General Comprehensive Operating Supervisor (GCOS) allows for functional modularity by having major functions programmed into separate modules. This allows the need for only a small portion of GCOS to be resident in memory at any one time. Some modules are collectively referred to as the (HCM Hard Core Modules. GCOS is stored on the mass storage devices (disc packs) by individual modules. The modules are interspersed throughout the permanent disc packs allowing updates and restarts if necessary.

7. JOBS AND ACTIVITIES

a. **ACTIVITY:** A complete task such as compilation or execution.

b. **JOB:** A job is a group of related activities assigned to a single ID. There can be several activities in a job. A user program is stored in an area called the Slave Service Area (SSA). This area holds the necessary software needed to complete an activity such as compilers or system subroutines.

c. **Six Phases of Job Flow:**

(1) Input Media Conversion

(a) Jobs can be input into system from these sources.

1) On-line card reader using GEIN module

2) Magnetic tape using IMCV module

3) Remote devices using RGIN module

(b) Jobs are then divided into two files:

1) Control Cards

2) Associated data

(c) These files are preserved until termination to allow restart if necessary.

(2) **System Scheduler:** Schedules jobs according to classes and limits and established priority.

(3) **Allocation Phase:** Two steps to allocation.

(a) Peripheral allocation

(b) Core allocation: All peripheral requirements must be satisfied before core is allocated. Memory is allocated in 1024 word blocks (1K). All allocation is for contiguous blocks.

(4) **Execution:** Logical processor handles all dispatching and interrupt processing.

(5) **Termination:** All jobs go through termination whether normal or abnormal. All files are closed and instructions for sysout are setup.

(6) **Output Media Conversion:** Sysout is a pool of multiple files which can be restarted after a system failure. It is stored on random disc and can be overflowed to tape by operators using the purge option. Output can be sent to remote devices. The SYSOUT module is not core resident and allows space to be reused upon completion of output.

8. GCOS JOB FLOW

a. Basic Definitions:

(1) Activity - A single program or an object program execution.

(a) COBOL or FORTRAN compilation is an activity

(b) Execution of a COBOL or FORTRAN object deck is an activity.

(c) Activities are defined to GCOS by Activity defining Control Cards.

| | | |
|----------|----|---------|
| EXAMPLE: | \$ | COBOL |
| | \$ | FORTRAN |
| | \$ | UTILITY |
| | \$ | CONVER |

(2) Job - A set of related activities which constitute a logical computer application.

b. Six Phases of Job Flow:

(1) Input Media Conversion (IMC) - Utilization of the GIN module of GCOS. Provides for multiple input streams.

(a) On-line devices (local card readers)

(b) Magnetic tape (IMCV tape)

(c) Remote devices (Teletypes, VIPS, and remote card readers. Utilize the RGIN module of GCOS)

(d) Jobs are separated into two files:

1) Control Card File - JCL Language cards. These cards eventually become the first part of the execution report.

2) Data File - This file contains the data associated with a job.

3) These two files are preserved until termination of the job. This allows for a restart after a system failure.

(2) Scheduling -

(a) Instrument that allows the installation manager to schedule all dimensions of job input.

(b) Affect only the order in which jobs are fed to the next phase of job flow.

(c) Is activated when a job in execution is terminated as well as when a new job enters the system.

(d) Performs the following functions:

1) Logically subdivides jobs into classes. The number of classes is defined at system startup via the \$ SSFILE card. A minimum of three classes must be defined. The first of which is an express class (.EXPRS). "EXPRESS" jobs are those jobs that require a limited number of system resources. The second is a HOLD class (.HOLD). "HOLD" jobs can have a hold until date and time associated with it. This is the date and time the job will be entered into actual scheduling. The remaining class or classes (1-50) is referred to as a NORMAL class (here the user site reflects its own name).

2) Selects jobs from mass storage for dispensation to the GCOS job stack. Criteria for selection are: EXPRESS class is always scheduled first, then NORMAL classes are scheduled on a rotational basis by class, priority within class and first in basis on jobs with equal priorities.

3) Insures that each job class contains a maximum number of jobs.

4) Removes much operator and installation bias from the turn around of programs.

(e) Virtually no limit to the number of jobs in the system; limited only by amount of job dispenser storage made available.

(f) Priority scheme within scheduler versus urgency scheme in allocation phase.

1) Priority used to define the scheduling sequence of jobs within a given class.

2) Priorities range from 0-63

3) Priorities may be increased or decreased to alter the scheduling flow.

(3) Allocation Phase

(a) Peripheral Allocation

1) Three key checks

a) Syntax check on control cards

b) Gross configuration check (Checks to insure that a job doesn't ask for more resources than would ever be available e.g. # tapes, size of core etc.)

c) Sieve limits test - A screen of incoming jobs.

/1/ Types of checks

/a/ Amount of memory

/b/ Processor time

/c/ Amount of SYSOUT

/d/ I/O time

/e/ Disc space

/2/ The sieve test prevents hogging of the system by "large jobs". Makes it possible for an operator to run a large job at a convenient time.

2) Allocation - Done on an urgency basis with jobs of higher urgencies being allocated first; first in basis for jobs with equal urgencies. An urgency of 41 or higher will stop all further allocation of other jobs until that job's requirements are met.

a) Urgency may be defined on the \$ SNUMB card. If not each activity which is a candidate for allocation is given an initial urgency of 5.

b) Each time an activity is by passed for lack of sufficient peripherals its urgency is increased.

c) A threshold value of 40 may be input via the console for hot jobs. This blocks allocation of all other jobs with lower urgencies. Care must be taken when giving threshold values.

(b) Core Allocation

1) Allocates memory in multiples of 1024 work blocks (1K).

2) When required compacts or swaps programs to make room for another activity.

3) Core allocation rules and procedures:

a) Core allocation queue is kept sorted in descending urgency sequence.

b) Three levels of allocation functions:

/1/ Allocate if enough contiguous core space exists for the contending activity.

/2/ If not enough contiguous space, compact core to allocate the contending activity. Contending activity must have an urgency of at least 5.

/3/ If not enough space at all, swap out all lower urgency activities. Swap done only if urgency is 33.

(4) Execution Phase

(a) Under supervision of a formalized queue call a dispatcher.

- 1) Only jobs ready for execution are in queue
- 2) Queue is generally ordered on basis of ratio of I/O time to processor time. I/O programs get preference
- 3) Top of queue dispatched first
- 4) Dispatch queue is I/O interrupt driven. Interrupt processing modifies queue. Control is returned to the dispatcher at completion of the interrupt processing.
- 5) Dispatch queue objective is to maximize I/O effectiveness by keeping as many system components as possible in simultaneous use.
- 6) One dispatcher queue in a multiprocessor system
- 7) Fault processing and I/O exceptions occur during execution.
- 8) Control processor (logical processor 0) handles all faults and peripheral interrupts.

(5) Termination Phase (normal and abnormal) Every job goes through termination phase.

(a) Abnormal - usually set because of a problem, optional memory and file dump is allowed.

- 1) Internal coding problem
- 2) Improper request for a GCOS function
- 3) External abort request. Usually by operator.
- 4) Hardware malfunction
- 5) Error record sent to accounting file
- 6) Successive compilations executed: Object program execution by programmer's option.

(b) Normal - Indicated by program itself.

1) Look ahead for similar activities: GCOS runs successful compilation activities of the same type as one activity - thus avoids duplication de-allocation and allocation.

2) De-allocation of system resources: Notification of files that require dismounting. Release back to system of non-saved resources. Capability of saving files between activities.

3) Execution report created: Report includes a detailed breakdown of memory used, processor time, peripheral used, channel use time, and number of sysout lines, etc.

4) Notifies SYSOUT of work to be done at completion of last activity of job.

(6) Output Media Conversion (SYSOUT)

(a) Features:

- 1) Pool of multiple files
- 2) Restart after system failure of operator action
- 3) Stored on random storage
- 4) Overflow by operator intervention (purge option)

(b) Output is a separate entity - Jobs may be printing while others are executing.

(c) Capability to send output to remote devices:

- 1) To remote printer
- 2) CRT/TTY (Cathode ray tube/Teletype)
- 3) Scan mode

(d) Sysout module not core resident (can be swapped)

(e) Space in the SYSOUT file becomes available for reuse as soon as the output of a job is completed.

SECTION 2

GCOS FILE SYSTEM

1. The file system is basic to the organization of GCOS. It provides a permanent on-line data base, with standardized security protection and access control.

a. Disk Pack Types

Four types of disk packs are used in the disk storage subsystems. The pack type is not based on physical characteristics, but on the information on the pack, and how the pack is configured at startup. The types are defined as follows:

1. Permanent Label on pack indicates STRUCT at startup, and pack contains available space tables and permanent file catalog structure. Thus a permanent file is a structured pack.
2. Structured Removable Label indicates STRUCT but pack is mounted on a spindle (unit) that is designated removable at startup.
3. Nonstructured Removable Label does not indicate STRUCT, and pack is mounted on a spindle (unit) that is removable at startup. Nonstructured removable packs are allocated only as temporary files.
4. Stranger System knows nothing about pack. The pack may or may not contain a label and/or a permanent file catalog structure. Stranger packs are allocated in their entirety as temporary files.

b. Basic structure

(1) System master catalog

Identifies each user which has access to the file system.

Within this catalog are pointers to catalogs for every user.

(2) User master catalog

May define files or may point to still lower catalog levels.

c. Timesharing accounting is done at system master catalog.

Master catalog defines the total amount of resource dollars per user.

d. Catalog/file string

To identify a file in the system, a string of names is given, beginning at the user master catalog.

There can be passwords/permissions at any level.

e. Controls all user file space

For each user in the master catalog, there are entries defining the maximum space he may use in the file system, cannot create file greater than that space.

f. Complete access by batch, remote batch and timesharing.

g. Manager of all random device space.

User does not define track and cylinder, only size of the desired file.

2. Organization

a. Tree structured

Up to 9 levels of user catalogs and subcatalogs for a total of 10 levels.

b. Catalogs and files

(1) Catalog

A catalog consists of a catalog name and password and/or permission and pointer to any files or subcatalogs.

(2) File

Consists of a file definition containing the file name, file size, and passwork and/or permissions, and a description of the physical file space occupied. Note: The file definition is distinct from the actual data.

c. Standardized user validation and access control on 4 possible levels.

(1) First level - user identification

System master catalog entry

(2) Second level - log on password

Must have a password coinciding with user identification.

(3) Third level - passwords

Optionally every user catalog and/or file may include a password.

(4) Fourth level - permissions

Optionally every catalog and/or file may be assigned use permissions.

Permissions define who may or may not use the catalog/file and how he may use it.

d. Passwords

At each level, passwords must be given for each level in a string. Knowing the password just for the end file will not allow access.

e. Permissions

General or specific. Specific takes precedence, permissions are accumulative unless specific.

Originator of file string has all permissions.

(1) General

(2) Specific - Access control for specific user IDs

f. Concurrent access of same file by multiple programs in core

(1) Normal

Either one program writes or multiple programs read.

(2) Read-while-write

Multiple readers and one writer

(3) Multiple readers/writers

Updating problems are a users responsibility

3. Languages used

a. FILSYS - batch language

b. ACCESS - timesharing subsystem

4. GCOS Basic Structure - Distributed GCOS Concept

1. Components of distributed GCOS

a. Hard Core Monitor (HCM)

Permanently resident portion of GCOS

b. User Service Subroutines (USS)

Used to answer slave program service requests of GCOS by slave programs.

c. System Programs

Transient, freestanding programs performing housekeeping chores, GCOS job phases and system diagnostics.

d. Slave Service Areas (SSA)

Attached to slave program. 1K in size.

e. Slave Prefix Areas (SFA)

Part of a slave program used for various purposes by GCOS. The Loader, and the slave program itself.

2. Hard Core Monitor

a. Size

Depends upon the configuration, operations, and modes to be performed, including remote communications. Size is approximately 20K.

b. Components of HCM

(1) System configuration tables

Identifies current configuration.
Built at Startup Time.

(2) Dispatcher

Used in execution phase of each slave program. Dispatches time-bursts on processor to slave programs when their turns arise.

(3) I/O Supervisor

(a) Handles all physical I/O control and error recovery.

(b) Provides device independence in conjunction with GFRC (General File and Record Control).

- (c) Provides device interchange in conjunction with GFREC.
- (d) Handles all I/O channel request queues.
- (e) The precise composition of I/O Supervisor is determined at Startup Time since the number of IOMs and types of devices determines size.

(4) Fault Processor

Services all processor faults initially. Actual service can occur in any area of GCOS.

(5) Abort processor

Services all slave termination requests. A portion exists in HCM. The remainder is brought into SSA of pertinent slave program.

(6) Most heavily used user service subroutines

3. User Service Subroutines (USS)

- a. About 37 different requests possible from a slave program.
- b. Execute in SSA or HCM. If SSA, there can be exact copies of USS in several places in memory concurrently.
- c. Are effectively subroutines of the requesting slave.
- d. Concurrent and/or simultaneous execution of requests. This is due to multiprogramming and multiprocessing.

4. GCOS System Programs

- a. Concern themselves with the functions of introduction, preparation for execution and dispersal of results of slave programs.
- b. They are completely transient. They have no committed memory space except for 3K for core allocation.
- c. They are executed in the slave mode.
- d. Treated just like user slave. i. e. , allocated, deallocated, swapped, dispatched.
- e. Perform for all users, not any specific user.
- f. Have Master Mode privileges. This is necessary because these programs need to look at tables in the HCM.

g. Constituents of GCOS System Programs

- (1) Job Input (GIN)
- (2) Peripheral Allocation (PALC)
- (3) Operator interface/Core Allocator
- (4) Job Output Dispenser (GOT)
- (5) Timesharing Executive (TSE)
- (6) Remote Job input (Remote GIN)
- (7) TOLIS
- (8) User Program Assignment

5. Slave Service Area (SSA)

a. General

- (1) SSA contains all program status information, register storage areas, I/O queue entries requested by the program. Also any User Service Subroutines requested by the user program are executed in the programs SSA.
- (2) Each slave program automatically assigned an SSA.
- (3) Each user program has its own copy of whatever GCOS user service subroutine it needs and its own set of common tables. This reduces processor interferences in multiprocessor configurations.
- (4) Size

1K is normal. Additional is provided after 1K if print lines exceed 2500. This additional is used by SYSOUT for buffer space.

b. SSA memory map

c. Benefits of SSA

(1) Effective memory discipline

All memory above GCOS HCM is available for program execution. There is no partitioning of memory or dividing memory into regions.

All service functions are limited to SSA size so no memory syndrome can occur.

(2) More effective memory compaction

The SSA concept allows all system and user programs to be moved in total.

(3) Dynamic allocation of tables and buffers

When a slave program is not in memory, the table space, etc. for that program is not sitting idle.

(4) Easy program swapping

All of the data for the program is in one place - all the criteria necessary for moving or swapping can easily be checked.

(5) Distributed memory references

Reduces interference with simultaneous access to same memory blocks

(6) High fault tolerance

In general a failure in one of the SSA routines will cause the abortion of that particular slave and not the total system.

1. Basic System Components

MEMORY MODULE (MCT) or (SCU)

a. The memory module consists of two parts, the system controller and the memory units. Referred to as the passive component it has no program execution or arithmetic capabilities. The controller is the hub of all information interchanges between the processor and the input/output multiplexor. More than one controller can be connected to a processor and IOM. Each controller is independent of one another and can operate simultaneously, thus allowing for overlapped memory access. The controller coordinates communications between the processor and the IOM. It has eight ports available. Lowest port must always be an IOM and the highest port number must always be a processor. Each controller can have a maximum of 256K and must have a minimum of 32K.

PROCESSOR (PRO)

b. The processor conducts all program execution and data processing within the system. It consists of two units, the operations unit and the control unit. The operations unit executes all arithmetic and logical operations. The control unit communicates with the system controllers and performs housekeeping chores such as instruction fetch, address preparation, etc. A maximum of four system controllers can be interfaced with each processor.

INPUT/OUTPUT MULTIPLEXER (IOM)

c. The Input/Output Multiplexer coordinates all input and output activities between memory and the peripheral subsystems. Each IOM can have up to 32 interfaced data channels. The first eight channels are reserved for GCOS leaving 24 channels for peripheral devices. Each channel may function independently with its own memory assigned or it may be interfaced with other channels for faster access. The channels used by hardware peripherals are referred to as Peripheral Unit Buffers (PUB). More than 1 IOM can be connected to the controller.

DATANET 355 COMMUNICATIONS SUBSYSTEM

d. The Datanet 355 is a stored program processor for communications with the remote devices. Each 355 can control a maximum of 200 remote terminals. More than 1 355 can be connected to a single system.

2. Component Operation (operator) panel

The Processor, System Controller and Input/Output Multiplexer (IOM) are equipped with identical sets of indicators and pushbutton indicators for starting and stopping the device. These operator controls are described below.

| | | | | | | |
|---------------------|-------------|--------------|--------|---------|--------------|----------------|
| AC BREAKER ON | POWER ON | POWER OFF | NORMAL | READY | OVER TEMP | ALARM RESET |
| | | | TEST | TROUBLE | | |

- AC BREAKER ON - This indicator is lighted when the main AC circuit breaker is closed for the device.
- POWER ON - This pushbutton switch initiates the power-on sequence for the device. The indicator light is on when power is on.
- NORMAL/TEST - This two-part indicator indicates the setting of the TEST/NORMAL switch on the device's configuration panel.
- READY/TROUBLE - This two-part indicator indicates normal operation (READY) or malfunction (TROUBLE).
- OVERTEMP - This indicator lights when the temperature in the device exceeds the maximum operating limits. This indicator stays ON until the overtemperature condition is corrected.
- ALARM RESET - This pushbutton/indicator lights when the audible alarm sounds. It is pressed to reset the alarm and turn off the indicator.
- POWER OFF - This pushbutton/indicator initiates the power-off cycle. The indicator remains on as long as the AC circuit breaker is closed with AC power off.

3. Processor Configuration Switches

The switches on the Processor configuration panel (Figure 3-1) perform the following functions:

STORE SIZE - PORT A/B/C/D - These four rotary switches (one per system controller port) define the core storage size on each port. Each switch has four size positions: 32K, 64K, 128K, 256K.

PORT ASSIGNMENT - These 12 switches (three per port), in conjunction with the STORE SIZE switches, assign Store addresses which are recognized by each port as in the following example:

| Port Assignment Switches | Store Size Switches | | | | | | | | | | | |
|--------------------------------|---------------------|---|---|---------|---|---|-------------------|---|---|--------------------|---|---|
| | ALL 32K | | | ALL 64K | | | A-128K B,C-64K | | | A,B-64K C,D-32K | | |
| | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 |
| PORT A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PORT B | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| PORT C | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| PORT D | 0 | 1 | 1 | 0 | 1 | 1 | | | | 1 | 0 | 1 |

INTERLACE - These switches (one per port) enable the interlace mode between adjacent pairs of ports. Interlaced ports must be connected to System Controllers with equal storage capacity. In interlace operation, core storage accesses are alternated between interlaced System Controllers.

PORT ENABLE - These switches (one per port) enable or disable the Processor ports.

SYSTEM INITIALIZE ENABLE - These switches (one per port) are set ON to allow a port to receive an initialization signal. In the OFF position, the initialize signal is inhibited.

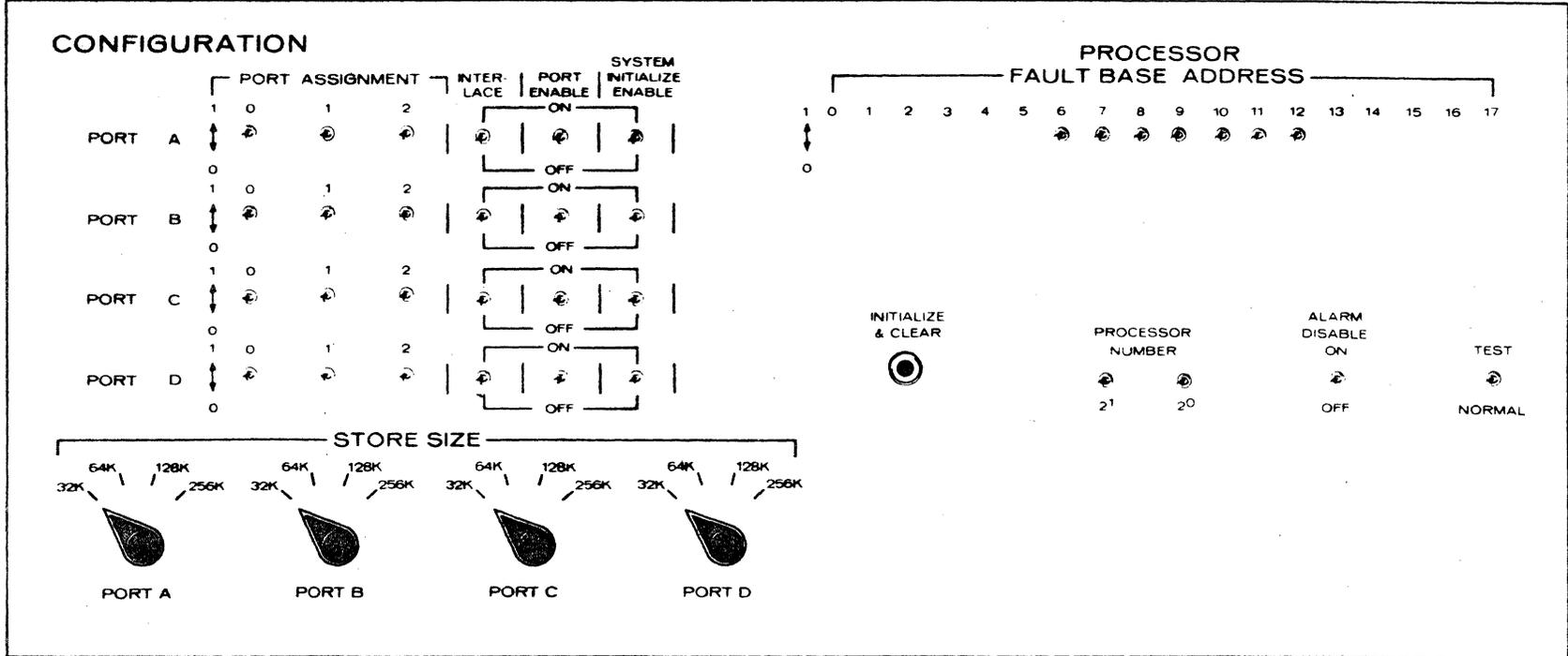
PROCESSOR FAULT BASE ADDRESS - These switches are used to establish the address of the Processor fault vectors.

INITIALIZE AND CLEAR - This pushbutton is used to set the Processor logic to an initialized state for startup.

PROCESSOR NUMBER - This pair of switches is used in a multiprocessor system to identify each Processor within the system configuration. In a uniprocessor system, the Processor number must be 00.

ALARM DISABLE - This switch is used to disable the audible alarm on the Processor.

TEST/NORMAL - This switch is used to put the Processor in either the normal mode of operation with the maintenance panel disabled or in the test mode in which the maintenance panel is enabled.



3-5
Figure 3-1

Processor Configuration Panel

4. IOM Configuration Switches

The switches on the IOM configuration panel (Figure 3-2) function as follows:

PORT ASSIGNMENT (A,B,C,D) - These switches (three for each port) are used to direct interrupts to the proper port, based on address, interlace and store size.

INTERLACE (A,B,C,D) - These switches (one per port) are used to place adjacent pairs of ports in the interlace mode of operation. PORT ASSIGNMENT switch 2 for the interlaced ports must be set opposite one another and switches 0 and 1 must be set the same for both ports. The interlaced ports must be connected to System Controllers with equal storage capacities.

PORT ENABLE - These switches (one per port) are used to logically connect the port to a System Controller.

SYSTEM INITIALIZE ENABLE - These switches (one per port) are used to enable a system initialize signal from a System Controller on the port.

STORE SIZE - These rotary switches (one per port) are used to define the size of the core storage connected to the port.

IOM BASE ADDRESS - This set of 12 switches (six of which are shared with Program Interrupt Base) are used to establish the base address for the IOM.

PROGRAM INTERRUPT BASE - These 13 switches (six shared) are used to set the Program Interrupt base address.

IOM NUMBER - This pair of switches define the number of this IOM in the system configuration (number 00 is the first IOM; number 01 is the second, etc.).

BOOTLOAD SOURCE TAPE/CARD - This two-position switch is used to select either card deck or tape as the source of the bootload program.

TAPE CHANNEL NUMBER - When the bootload program source is tape, these six switches are used to define the channel number of the tape unit containing the bootload program tape.(Octal)

CARD CHANNEL NUMBER - When the bootload program source is cards, these six switches are used to define the channel number of the card reader from which the bootload program deck is to be read.(Octal)

SYSTEM INITIALIZE - This pushbutton is used to send a system initialize signal to the System Controller(s).

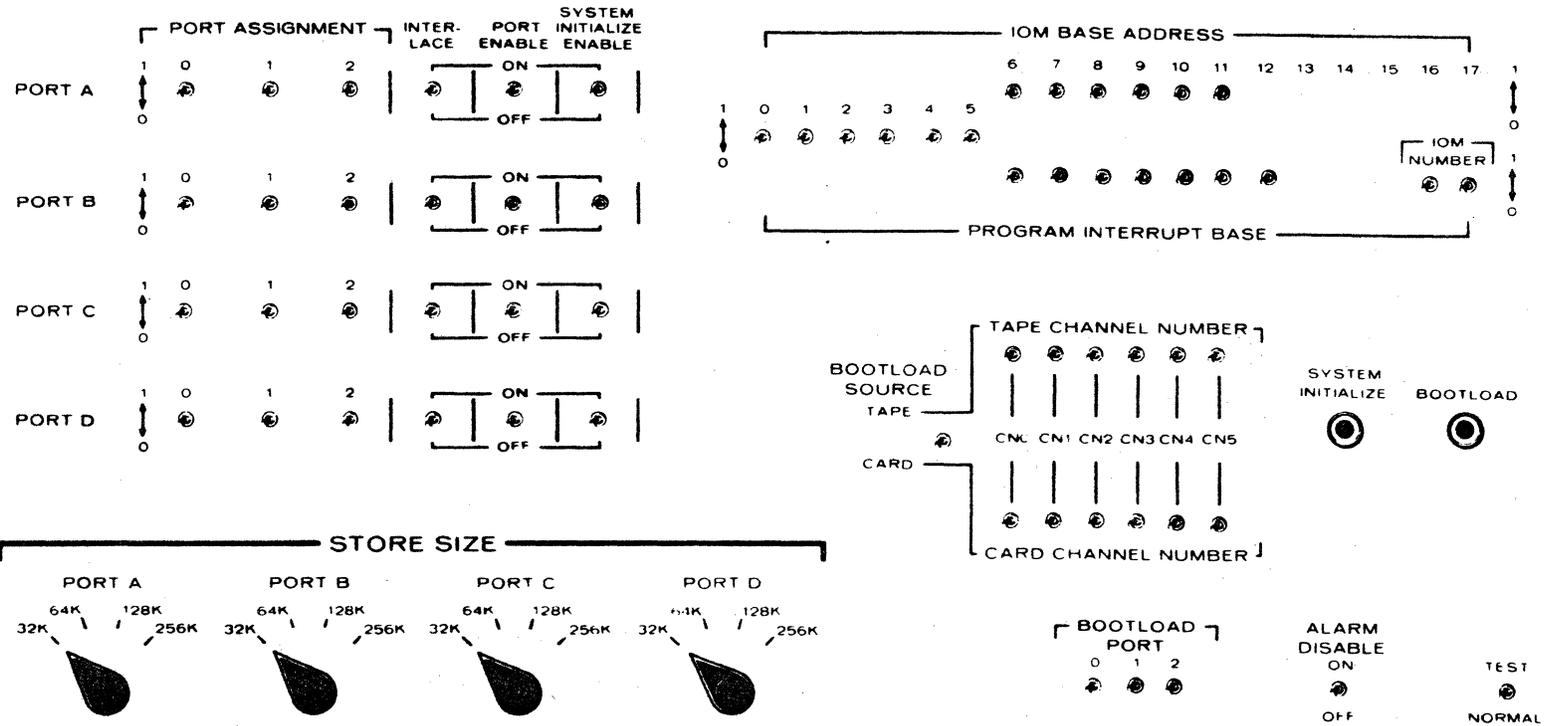
BOOTLOAD - This pushbutton is used to initiate the bootload function.

BOOTLOAD PORT - These three switches are used to define the port number of the System Controller through which connects are to be sent to the IOM.

ALARM DISABLE - This switch is used to turn off the audible alarm bell.

TEST/NORMAL - This switch is used to put the IOM in either the TEST or NORMAL operating mode.

CONFIGURATION



3-8
Figure 3-2

IOM Configuration Panel

5. System Controller Configuration Switches

The switches on the System Controller Configuration panel (Figure 3-3) perform the following functions:

LOWER STORE A/B - This switch is used to establish core address 0 in store unit A or B. This switch setting is valid only if the INTERLACE switch is OFF.

ADDRESS OFFSET - This rotary switch relocates the specified blocks of core storage within each Store Unit on the System Controller. The blocks are not relocated between the Store Units.

INTERLACE - This switch establishes an interlace mode of operation between the Store Units on a System Controller. The two units must be the same size for interlaced operation.

ALARM DISABLE - In the ON position, this switch disables the audible alarm.

TEST/NORMAL - This switch puts the System Controller in TEST or NORMAL mode of operation. In the TEST mode, the MAINT PNL ENABLED indicator will be ON to indicate test mode.

CYCLE PORT PRIORITY - These switches enable the priority functions for the ports. These switches may be set to link ports so that they will share the same priority in a cyclic or round-robin fashion. Linked ports must be in sequence.

PORT ENABLE - These eight 3-position switches (one switch-light pair per channel) are used to enable or disable the designated port or to place the port in a mode in which the port is enabled or disabled by the program. Indicators show when a port is enabled.

STORE A/B - MODE - A rotary switch for each Store Unit on the System Controller establishes the mode of operation for that unit, as follows:

ON-LINE - The Store Unit is logically configured in the system.

MAINT - The Store Unit is in the maintenance mode and can be accessed from the System Controller maintenance panel.

OFF-LINE - The Store Unit is not logically configured in the system.

STORE A/B - SIZE - These rotary switches are used to set the size of the Store Unit: 32k, 64k, 128k or 256k.

EXECUTE INTERRUPT MASK ASSIGNMENT - A/B/C/D - These four rotary switches designate the port to which the Control Processor(s) are connected. Each switch represents a mask register for a Control Processor. Each switch has 10 positions

OFF - To turn off that mask register.

0-7 - Port numbers.

M - Maintenance mode.

Store Unit Configuration Switches

Four switches on the Store unit maintenance panel are used in system configuration. The functions of these switches are as follows:

32k/64k - This switch defines the size of core storage to be used.

MOST SIGNIF/LEAST SIGNIF - If the 32k/64k switch is in the 32k position (32k of storage), this switch specifies whether the most significant (upper) or the least significant (lower) half of core storage is to be used.

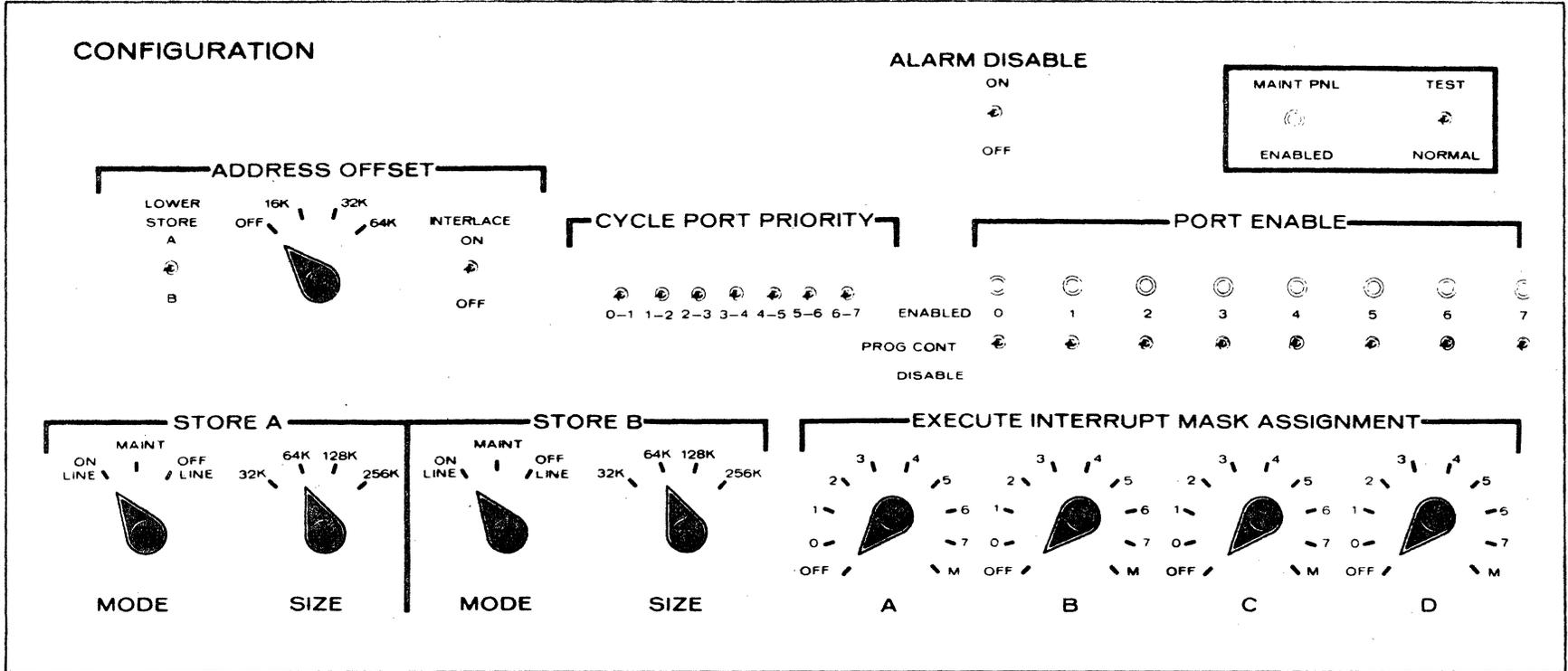
DATA DISPLAY/TEST/PORT DISPLAY - This switch is only used in the off-line operation of the Store Unit.

OFF LINE/TEST/ON LINE - This three-position switch places the Store Unit in an operating mode as follows:

OFF LINE - Store Unit is off-line and can be operated from the maintenance panel.

TEST - If the DATA DISPLAY/TEST/PORT DISPLAY switch is also in TEST, the programmable margins (maintenance register) are enabled and the Store Unit is on-line.

ON LINE - Store Unit is on-line with the programmable margins disabled.



System Controller Configuration Panel

3-11
Figure 3-3

6. DATANET 355 PROCESSOR

With power applied, set the switches on the DATANET 355 processor maintenance panel as follows:

1. LOWER PROTECTED ADDRESS and UPPER PROTECTED ADDRESS switches should be set to 0.
2. MEMORY PROTECT, DISABLE POWER FAULTS, 8K OFFSET, DISABLE ELAPSED TIMER, DISABLE ALARM and TEST switches should be set to NORMAL.
3. All other switches on the DATANET 355 maintenance panel except ICA or DIA configuration switches are disabled when the TEST switch (see 2. above) is set to NORMAL.

Inter-Computer Adapter (ICA) (Switches not used with DIA option)

The maintenance panel switches for the Inter-Computer Adapter (or Inter-Computer Channel) are set as follows:

1. **Set Mem.Size** switches to the store size of the system controller connected to a port. The system controller with the greater storage capacity must be connected to the lower-order port (port A is the low-order port and port D is the high-order port).
2. Set the PORT ASSIGNMENT switches to establish the core address blocks (non-interlaced system controllers) as defined in the following table. The PORT ASSIGNMENT switches for the port connected to the system controller with the largest core capacity will be set to 000.

| MEMORY SIZE | PORT ASSIGNMENT | ADDRESS RANGE (OCTAL) |
|-------------|-----------------|-----------------------|
| 32K | 000 | 000000 - 077777 |
| | 001 | 100000 - 177777 |
| | 010 | 200000 - 277777 |
| | 011 | 300000 - 377777 |
| | 100 | 400000 - 477777 |
| | 101 | 500000 - 577777 |
| | 110 | 600000 - 677777 |
| | 111 | 700000 - 777777 |
| 64K | 000 | 000000 - 177777 |
| | 001 | 200000 - 377777 |
| | 010 | 400000 - 577777 |
| | 011 | 600000 - 777777 |
| 128K | 000 | 000000 - 377777 |
| | 001 | 400000 - 777777 |
| 256K | 000 | 000000 - 777777 |

Figure 3-4 ICA Port Assignment

For example:

With 128K of core storage connected to port A and 32K of core storage connected to port B, PORT ASSIGNMENT switches for port A are set to 000 and for port B are set to 100.

3. For two interlaced system controllers, PORT ASSIGNMENT switches 0 and 1 must be set the same (0 if only two controllers are configured) for both ports and switch 2 must be set opposite. The storage capacity of the controllers must be equal, and they must be on consecutive ports.
4. Set the INTERLACE switches as follows, for ports to be interlaced:

| | |
|------------------|--------------------|
| Series 600 | OFF |
| Series 6030/6040 | OFF |
| Series 6050/6060 | Optional ON or OFF |
| Series 6070/6080 | ON |

5. Set PORT ENABLE switch ON for ports in use.
6. Set all SYSTEM INITIALIZE ENABLE switches to the OFF position.
7. For DATANET 355 processors in a Series 6000 system with IOM, MAILBOX ADDRESS switches should be set for the appropriate system configuration. Use the following equation to calculate the mailbox address for DATANET 355 number 0:

$$355\#0 \text{ Mailbox Address} = 600_8 * A + 1400_8$$

Where: A= Number of IOM's in Series 6000 system

8. LOWER BOUND and UPPER BOUND switches should be set to 0.

9. INTERRUPT CELL switches set to the number for the interrupt cell in the central processor. This number depends on the DATANET 355 number.

| <u>DATANET 355 Number</u> | <u>IOC</u> | <u>IOM</u> |
|---------------------------|------------|------------|
| 0 | 3 | 3 |
| 1 | 1 | 7 |
| 2 | 13 | 13 |
| 3 | 11 | 17 |

10. DISABLE MEMORY TIMER, DISABLE MEMORY WRITE and RESTRICTED ADDRESSING switches should be set to NORMAL.

Direct Interface Adapter (DIA)

The maintenance panel switches for the Direct Interface Adapter (figure 3-5) are set as follows:

CENTRAL SYSTEM CONFIGURATION

1. The ADDRESS BOUNDS switches should be set as follows:
All UPPER switches should be set to the value 7.
All LOWER switches should be set to the value 0.
2. The PCW MAILBOX ADDRESS switches should be set for the appropriate system configuration. Use the following equation to calculate the mailbox address for DATANET 355 number 0:

355#0 Central System Mailbox Address =

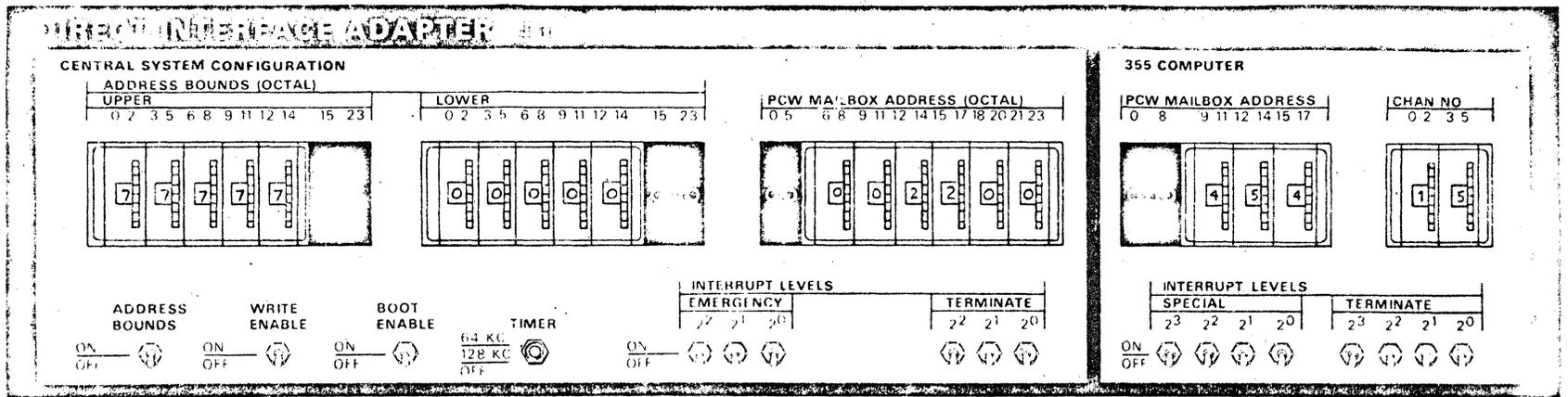
$$600_8 * A + 1400_8$$

Where: A = Number of IOM's in Series 6000 System.

For each additional DATANET 355 processor add 100₈ to the above calculation to determine the mailbox address.

3. The switches labeled ADDRESS BOUNDS, WRITE ENABLE, and TIMER should be set to the OFF position.
4. The switch labeled BOOT ENABLE should be set to the ON position.
5. The TERMINATE and EMERGENCY INTERRUPT LEVEL switches should be set to the value 7. Unlike the ICA, these numbers are independent of the DATANET 355 number.

Figure 3-5
3-16



Direct Interface Adapter (DIA) Configuration Panel

7. System Console Configuration Switches

The following switches and indicators on the System Console are used in system startup and operation:

SYSTEM READY - This indicator lights when the Processor, System Controller and IOM are in the Ready state.

CONSOLE READY - This indicator lights when console power is ON and the RUN/MAINTENANCE switch (console maintenance panel) is in the RUN position.

RESET CONSOLE - This switch is used to clear the console before rebooting.

BOOTLOAD - This pushbutton is used to initiate the system bootload operation. When this pushbutton is pressed, the first card is read to begin the startup sequence.

INIT - This pushbutton is used to initialize the system.

MAINT/RUN - This switch establishes the operating mode.

8. SYSTEM INITIALIZATION

Power-On Sequence

Each central system module has a set of pushbutton/indicators that are used in the power-on sequence. As the first step in putting each module on-line, apply power as follows:

1. Turn on AC BREAKER (located on AC distribution panel). The indicator should light to show that the breaker is closed.
2. Press POWER ON. The indicator should light to indicate that power is ON. Assure that blowers in module are operating.
3. Check NORMAL/TEST. If TEST is ON, set the TEST/NORMAL switch (CONFIGURATION panel switch) to the NORMAL position.
4. Check READY/TROUBLE indicator. If TROUBLE indicator is ON, correct malfunction before continuing.
5. Check OVERTEMP indicator. If this indicator is ON, correct the overtemperature condition before continuing.

9. Processor Configuration

With power applied to the Processor, set the switches on the CONFIGURATION panel as follows:

1. Set STORE SIZE switches to the store size of the System Controller connected to a port. The System Controller with the greater storage capacity must be connected to the lower order port.
2. Set the PORT ASSIGNMENT switches to establish the core address blocks (noninterlaced System Controllers) as defined in the following table. The PORT ASSIGNMENT switches for the port connected to the System Controller with the largest core capacity must be set to 000.

| <u>PORT ASSIGNMENT</u> | | | <u>STORE SIZE</u> | <u>Core Block Addressed</u> |
|------------------------|----------|----------|-------------------|-----------------------------|
| <u>0</u> | <u>1</u> | <u>2</u> | | |
| 0 | 0 | 0 | 32 | 0-32 |
| | | | 64 | 0-64 |
| | | | 128 | 0-128 |
| | | | 256 | 0-256 |
| ----- | | | | |
| 0 | 0 | 1 | 32 | 32-64 |
| | | | 64 | 64-128 |
| | | | 128 | 128-256 |
| ----- | | | | |
| 0 | 1 | 0 | 32 | 64-96 |
| | | | 64 | 128-192 |
| ----- | | | | |
| 0 | 1 | 1 | 32 | 96-128 |
| | | | 64 | 192-256 |
| ----- | | | | |
| 1 | 0 | 0 | 32 | 128-160 |
| ----- | | | | |
| 1 | 0 | 1 | 32 | 160-192 |
| ----- | | | | |
| 1 | 1 | 0 | 32 | 192-224 |
| ----- | | | | |
| 1 | 1 | 1 | 32 | 224-256 |

For example:

With 128k of core storage connected to Port A and 32k of core storage connected to Port B, PORT ASSIGNMENT switches for Port A are set to 000 (address block 0-128) and for Port B are set to 100 (address block 128-160).

For two interlaced System Controllers, PORT ASSIGNMENT switches 0 and 1 must be set the same (0 if only two controllers are configured) for both ports and switch 2 must be set opposite. The storage capacity of the controllers must be equal, and they must be on consecutive ports.

3. Set the INTERLACE switches as follows for ports to be interlaced:

| | |
|------------------|--------------------|
| Series 6030/6040 | OFF |
| Series 6050/6060 | Optional ON or OFF |
| Series 6070/6080 | ON |

4. Set PORT ENABLE switch ON for ports in use.
5. Set SYSTEM INITIALIZE ENABLE switch ON for the port connected to the low order core storage.
6. Set PROCESSOR NUMBER switches to 00.
7. Set ALARM DISABLE switch to OFF.
8. Assure that TEST/NORMAL switch is in NORMAL.
9. Set PROCESSOR FAULT BASE ADDRESS switches to define fault vector address (octal numbers) as follows:

| |
|--|
| System without DATANET 355 - 2200 (switches 7 and 10 set) |
| System with DATANET 355 - 2300 (switches 7, 10 and 11 set) |
10. Assure that the STEP CONTROL switch (lower right side of Processor maintenance panel) is set to OFF.

10. System Controller Configuration

With power applied to the System Controller, set the switches on the CONFIGURATION panel as follows:

1. Set LOWER STORE to the storage unit (A or B) which is to have the lower store address for this controller.
2. Set ADDRESS OFFSET switch to OFF.
3. If storage units are to be interlaced, set INTERLACE switch to ON; for noninterlaced operation set to OFF. Interlaced storage units must be the same size.

4. Set STORE A and STORE B switches as follows:
 - MODE - to ON LINE
 - SIZE - to core store size
5. Set PORT ENABLE switches to ENABLED for the ports in use.
6. Set TEST/NORMAL to NORMAL.
7. For single Processor/IOM system, CYCLE PORT PRIORITY switches should be OFF.
8. Set EXECUTE INTERRUPT MASK ASSIGNMENT switch A to the port number for the Processor.
9. Set ALARM DISABLE to OFF.

Store Unit Configuration

Set the configuration switches on the Store Unit maintenance panel as follows:

1. Set 32k/64k switch to size of core.
2. If 32k/64k switch is set to 32k, set MOST SIGNIF/LEAST SIGNIF switch to indicate whether the 32k of core configured is the most significant (upper) or least significant (lower) half of the core.
3. Set OFF LINE/TEST/ON LINE to ON LINE.

11. IOM Configuration

With power applied to the IOM, set the switches on the CONFIGURATION panel as follows:

1. Set the following switches the same as the corresponding switches on the Processor CONFIGURATION panel:

PORT ASSIGNMENT
 INTERLACE
 PORT ENABLE
 SYSTEM INITIALIZE ENABLE
 STORE SIZE

2. Set IOM BASE ADDRESS switches to 1400 octal (switches 8 and 9 set).

3. Set PROGRAM INTERRUPT BASE switches to 1340 octal (switches 8,10, 11, and 12 set).
4. Set Bootload Source switch to CARD or TAPE depending on the bootload media. Normal bootload is from cards.
5. Set TAPE CHANNEL NUMBER to the number of the channel connected to the tape handler if bootload source is set to tape.(Octal)
6. Set CARD CHANNEL NUMBER to the number of the channel connected to the card reader if bootload source is set to card.(Octal)
7. Set BOOTLOAD PORT switches to the number (0-7) of the port on the System Controller to which the IOM is connected.
8. Set IOM NUMBER to the number of the IOM in the configuration (number 00 for the first IOM, 01 for the second etc.).
9. Set Alarm Disable to OFF.
10. Set TEST/NORMAL to NORMAL.

12. Peripheral Equipment Initialization

Prior to initialization or restart of the system, each peripheral subsystem must be initialized and put on-line. Perform the peripheral initialization as specified in the operators manual for each device or subsystem.

6000 SYSTEM CONFIGURATION
SWITCH SETTINGS

| IOM#1 | IOM#2 | 355#1 | 355#2 | 355#3 | 355#4 | GPU#1 | GPU#2 | GPU#3 | GPU#4 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1400 | | | | | | 2200 | | | |
| 1400 | | | | | | 2200 | 2240 | | |
| 1400 | | | | | | 2200 | 2240 | 2300 | |
| 1400 | | | | | | 2200 | 2240 | 2300 | 2340 |
| 1400 | | 2200 | | | | 2300 | | | |
| 1400 | | 2200 | | | | 2300 | 2340 | | |
| 1400 | | 2200 | | | | 2300 | 2340 | 2400 | |
| 1400 | | 2200 | | | | 2300 | 2340 | 2400 | 2440 |
| 1400 | | 2200 | 2300 | | | 2400 | | | |
| 1400 | | 2200 | 2300 | | | 2400 | 2440 | | |
| 1400 | | 2200 | 2300 | | | 2400 | 2440 | 2500 | |
| 1400 | | 2200 | 2300 | | | 2400 | 2440 | 2500 | 2540 |
| 1400 | | 2200 | 2300 | 2400 | | 2500 | | | |
| 1400 | | 2200 | 2300 | 2400 | | 2500 | 2540 | | |
| 1400 | | 2200 | 2300 | 2400 | | 2500 | 2540 | 2600 | |
| 1400 | | 2200 | 2300 | 2400 | | 2500 | 2540 | 2600 | 2640 |
| 1400 | | 2200 | 2300 | 2400 | 2500 | 2600 | | | |
| 1400 | | 2200 | 2300 | 2400 | 2500 | 2600 | 2640 | | |
| 1400 | | 2200 | 2300 | 2400 | 2500 | 2600 | 2640 | 2700 | |
| 1400 | | 2200 | 2300 | 2400 | 2500 | 2600 | 2640 | 2700 | 2740 |

| | | | | | | | | | |
|------|------|------|------|------|--|------|------|------|------|
| 1400 | 2200 | | | | | 3000 | | | |
| 1400 | 2200 | | | | | 3000 | 3040 | | |
| 1400 | 2200 | | | | | 3000 | 3040 | 3100 | |
| 1400 | 2200 | | | | | 3000 | 3040 | 3100 | 3140 |
| 1400 | 2200 | 3000 | | | | 3100 | | | |
| 1400 | 2200 | 3000 | | | | 3100 | 3140 | 3200 | |
| 1400 | 2200 | 3000 | | | | 3100 | 3140 | 3200 | 3240 |
| 1400 | 2200 | 3000 | 3100 | | | 3200 | | | |
| 1400 | 2200 | 3000 | 3100 | | | 3200 | 3240 | | |
| 1400 | 2200 | 3000 | 3100 | | | 3200 | 3240 | 3300 | |
| 1400 | 2200 | 3000 | 3100 | | | 3200 | 3240 | 3300 | 3340 |
| 1400 | 2200 | 3000 | 3100 | 3200 | | 3300 | | | |
| 1400 | 2200 | 3000 | 3100 | 3200 | | 3300 | 3340 | | |
| 1400 | 2200 | 3000 | 3100 | 3200 | | 3300 | 3340 | 3400 | |
| 1400 | 2200 | 3000 | 3100 | 3200 | | 3300 | 3340 | 3400 | 3440 |

NOTE: 1400 base is an octal number

Add 600₈ locations to the 1st IOM base for the next piece of hardware regardless of its type (ie. 355, IOM, CPU)

Add 100₈ locations to the 1st 355 base for the next piece of hardware regardless of its type (ie. CPU, 355)

Add 40₈ locations to the 1st PROC base for the next piece of hardware.

SECTION 4

INTRODUCTION

1. Startup of a Honeywell Series 6000 Information System is a complex procedure for establishing the correct relationship between hardware and software components. This manual describes the procedures for configuring the Series 6000 system hardware, initializing the system for operation in a GCOS environment, and initializing the mass storage devices for the system.

Because the types, numbers and configuration of peripheral devices may vary from system to system, the initialization of these devices is not covered in this book. The system operator should refer to the reference manual for each device for the appropriate initialization procedures.

This manual also contains some of the basic operating procedures for the Series 6000 system. These procedures are of primary concern to the system operations people, but they may also be of interest to systems analysts and programmers.

This manual contains the following types of information:

- System Startup - Hardware configuration and GCOS/software loading.
- Startup Program - Description of the sections of the Series 6000 Startup deck.
- Disk Pack Initialization - Procedures for initializing the disk pack storage devices used for mass storage.
- Dump Functions - Procedures for taking and analyzing a master mode dump.
- GCOS Utility Operations - Procedures for some of the utility functions which may be performed from the System Console; i.e., spawning a job, HOLD functions, system output control, etc.

SYSTEM STARTUP

2. System startup is basically two procedures: configuration of the hardware modules and initialization of the startup program. In the first procedure, the hardware modules are started and configured by setting switches on the configuration portion of the maintenance panel of each module. In the second procedure, the startup program is loaded into core storage (bootloaded) and initialized.

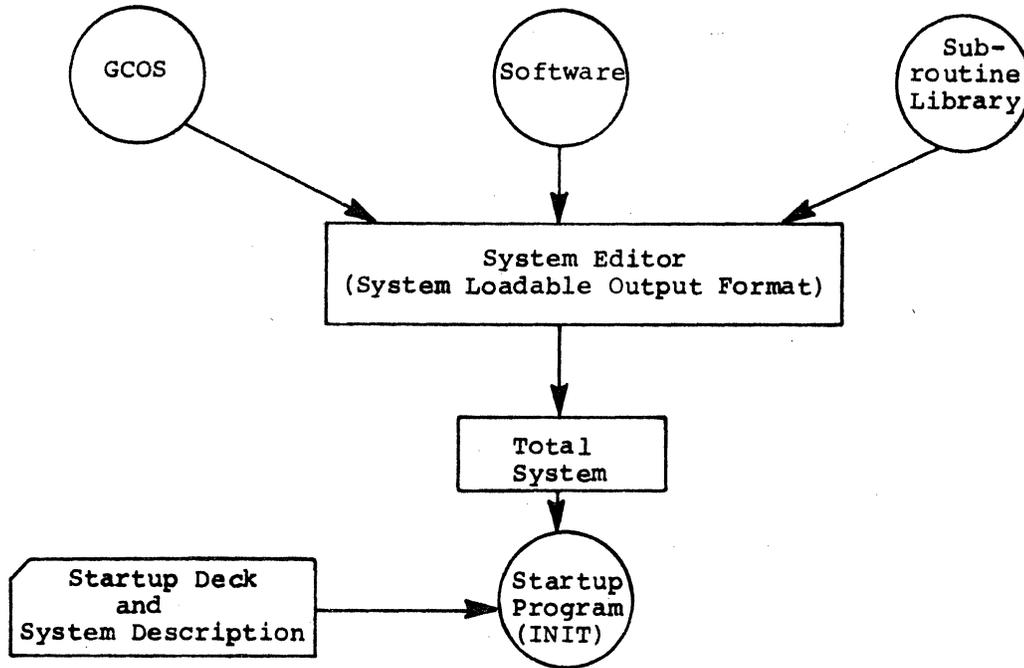
The startup program operates much like a miniature operating system, calling in program modules to perform the various startup functions. The program initializes the software system files, loads GCOS hard core modules into core storage, and defines the environment in which GCOS is to operate.

The following configuration procedures cover only the configuring of the hardware modules which make up the central computer system (Processor, Input/Output Multiplexer, System Controller, and Console). For startup procedures for the peripheral devices refer to the appropriate hardware reference manuals. For start of the DATANET 355 Front-End Network Processor, refer to GRTS/355 Startup Procedures.

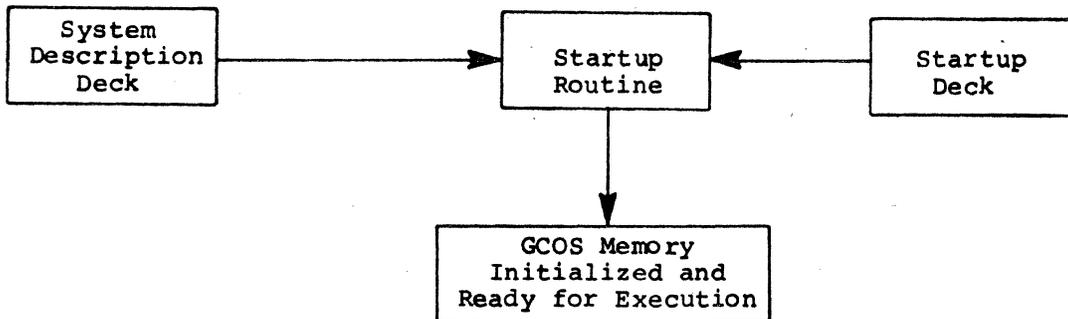
3. GCOS SYSTEM TAPES

The GCOS system tapes are in system-loadable format, which is used by the System Loader. As shown on page 4-3, GCOS hard core modules and Slave Service Area (SSA) modules are placed in primary system storage. The startup and reboot operation is also illustrated on page 4-3.

4. STARTUP INITIALIZATION



STARTUP REBOOT



Startup deck may be rebooted from the device indicated on the \$ AUTOLD card or directly from the card reader.

System Startup

5. SYSTEM DESCRIPTION PACKET

\$CONFIG Defines hardware attached to system
\$ SYID Identifies system by name and GCOS version
\$ DATE (optional) to set date in system for accounting purposes
\$ ANSWER Allows some startup questions to be preanswered.
\$ TRACE To identify trace entries to be included in system dump
\$ MCT To describe port cabling between mainframe components
\$ INFO Contains optional parameters that may be used by the GCOS
\$ IOM Defines IOM number and equipment attached to it
\$ TRAINS Lists the standard BCD trains for the site
\$ GCOSFIL Defines devices that contain files used by the Startup pro.
\$ AUTOLD Defines mass storage device for autoboot.
\$ XBAR Specifies IOM channels which are crossbarred
\$ MPC Describes grouping of PSIA channels for each MPC
\$ MPCFIG Defines primary IOM channel and firmware version for MPC
\$ ETC Continuation card

\$INITIALIZE Contains control cards that describe device initialization
\$ INIT Describes mass storage devices which are to be initialized
\$ OBJECT Firmware deck for MPC
\$ DKEND
\$ Direct Describe defective space on mass storage devices
\$ DECKSAV Permits saving of a MPC firmware deck on mass storage

\$EDIT Defines where each GCOS module is to be stored and its size
\$ FILDEF Specifies the device on which the file is to be defined,
file identification, file size and format

\$FILES Describes the files of software programs which are to be
loaded from the TOTAL SYSTEM TAPE (S)
\$ SYSTEM Defines names of up to 16 files which constitute GCOS and
software systems
\$ SAVE Specifies name of file to be used for dump control and
restart
\$ SYSOUT Defines up to 12 files to be used for system output
\$ LIBRARY Specifies files to be used for system library
\$ ACCOUNT Specifies name of file to be used for storing statistical
information
\$ PFILES (optional) Identifies system files that may be accessed
while system is running

\$PATCH Builds correction table for GCOS and Software modules.

\$LOAD Loads Hard Core Modules to replace system program files

DATE 05-28-76

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\$CONFIG

```

$ SYID 2SICP,W6.2
$ ANSWER INITIALIZE/PARTIAL,BCOTLOAD/YES,INIT/NO,SCF/YES,EDIT/NO
$ ANSWER EOCT/AUTO,CCNTROL/LOAD
$ TRACE 0,0
$ MCT-0 256,FORT-0,IOM-1,PORT-1,IOM-1,
$ ETC FORT-5,PEO-1,FORT-7,FRO-0
$ MCT-1 128,FORT-0,IOM-0,PORT-1,IOM-1,
$ ETC FORT-5,PEO-1,FORT-7,FRO-0
$ IOM-0 FUE-8,DISC*191,UNITS-8,UNIT-1,101,UNIT-2,102,
$ ETC UNIT-3,103,RMVBL,UNIT-4,104,RMVBL,UNIT-5,105,RMVBL,
$ ETC UNIT-6,106,RMVBL,UNIT-7,107,RMVBL,UNIT-8,108,RMVBL
$ ICM-0 FUE-12,DISC*191,UNITS-8,UNIT-1,ST1,201,UNIT-2,202,
$ ETC UNIT-3,203,UNIT-4,204,RMVBL,UNIT-5,205,RMVBL,
$ ETC UNIT-6,206,RMVBL,
$ ETC UNIT-7,207,RMVBL,UNIT-8,208,RMVBL
$ IOM-0 FUE-16,TAPE*ASA9,UNITS-6,UNIT-0,1T0,ASA7,UNIT-1,1T1,
$ ETC UNIT-2,1T2,UNIT-3,1T3,UNIT-4,1T4,UNIT-5,1T5
$ IOM-0 FUE-20,PRINTER*300,PR2,TRAIN-2
$ IOM-0 FUE-21,PRINTER*300,PR1,TRAIN-2
$ IOM-0 FUE-22,PRINTER*300,,,,,TRAIN-2
$ IOM-0 FUE-23,READER*200
$ IOM-0 FUE-24,READER*200,CR1
$ IOM-0 FUE-25,PUNCH*200,PU2
$ ICM-0 FUE-26,PUNCH*200
$ IOM-0 FUE-27,365-0,LINES-40
$ ICM-0 FUE-29,CONSOLE
$ IOM-0 FUE-31,CONSOLE,TY1,TY2,TY3,TY4
$ IOM-1 FUE-16,TAPE*ASA9,UNITS-8,UNIT-0,ASA7
$ IOM-1 FUE-19,TAPE*ASA9,UNITS-6,UNIT-0,2T0,ASA7,UNIT-1,2T1,
$ ETC UNIT-2,2T2,UNIT-3,2T3,UNIT-4,2T4,UNIT-5,2T5
$ IOM-1 FUE-20,PRINTER*300,,,,,TRAIN-2
$ IOM-1 FUE-21,PRINTER*300,PR3,TRAIN-2
$ IOM-1 FUE-22,PRINTER*300,PR4,TRAIN-2
$ ICM-1 FUE-23,READER*200,CR2
$ IOM-1 FUE-24,READER*200
$ IOM-1 FUE-25,PRINTER*300,PR5,TRAIN-2
$ ICM-1 FUE-26,PUNCH*200,PU1
$ ICM-1 FUE-29,CONSOLE
$ XBAR IOM-0,FUE-8,ICM-1,FUE-12,ICM-0,FUE-9,ICM-1,PUB-13,
$ ETC IOM-0,FUE-10,ICM-1,PUB-14,ICM-0,FUE-11,ICM-1,PUB-15
$ XBAR IOM-0,FUE-12,ICM-1,FUE-8,ICM-0,FUE-13,ICM-1,PUB-9,
$ ETC IOM-0,FUE-14,ICM-1,PUB-10,ICM-0,FUE-15,ICM-1,PUB-11
$ XBAR IOM-0,FUE-16,PUB-17
$ MPC-0 SIZE-4,PSI-0,IOM-0,FUE-8,PUB-9,FUE-10,FUE-11,
$ ETC PSI-2,ICM-1,PUB-8,PUB-9,PUB-10,PUB-11
$ MPC-1 SIZE-4,PSI-0,IOM-0,FUE-12,FUE-13,PUB-14,PUB-15,
$ ETC PSI-2,ICM-1,FUE-12,FUE-13,FUE-14,PUB-15
$ GCOSFIL ST1,201,202,203,101,102
$ INFO SLTAPE/3,SYSCUT/25000,MEMORY/65,SLTIME/0050
$ INFO EXTM/YES
$ INFO ASCII,TRAIN/2
$ INFO LINES/57
$ INFO RLP
$ AUTOLD 201,200 LLINKS

```

Figure 4-1

DATE 05-28-76

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LSTOK 01 05-28-76 15.365 *CAPC* LISTING OF BCD CARDS.

\$EQUIT

| | | |
|----|--------|---|
| \$ | FILDEF | ST1,TND-INSEPT,720/0,SYS,1T1 |
| \$ | FILDEF | 204,SOFTW-SYSLIB,800/0,ROM,* |
| \$ | FILDEF | 204,LIBB,800/0,ROM,*,LABEL/SCFTW-SYSLIB |
| \$ | FILDEF | ST1,GECOS-HI-USE,800/0,SYS,* |
| \$ | FILDEF | 203,GECOS-LO-USE,2000/0,SYS,* |
| \$ | FILDEF | 202,T-AND-0,900/0,SYS,* |
| \$ | FILDEF | 205,TSS-SUB-SYS,900/0,SYS,* |
| \$ | FILDEF | 205,SCFTW-PRIME,1500/0,SYS,* |
| \$ | FILDEF | 202,SCFTW-SECND,3200/0,SYS,* |
| \$ | FILDEF | 203,DMS-SOFTW,2200/0,SYS,* |
| \$ | FILDEF | ST1,LUMP,12/0 |
| \$ | FILDEF | ST1,BACKDOOR,12/0 |
| \$ | FILDEF | 202,SYOU1,4500/0 |
| \$ | FILDEF | 203,SYOU2,4500/0 |
| \$ | FILDEF | 205,SYOU4,4500/0 |
| \$ | FILDEF | 204,SYOU3,4500/0 |
| \$ | FILDEF | 204,PRINTIMAGE,24/0 |
| \$ | FILDEF | ST1,S1,2000/0 |
| \$ | FILDEF | 202,T1,2000/0 |
| \$ | FILDEF | 203,U1,2000/0 |
| \$ | FILDEF | 204,V1,2000/0 |
| \$ | SSFILE | 202,MAX/32,MIN/08,.TASK/1,.TRANS/1, |
| \$ | ETC | .EXPRS/10/8,.HOLD/10, |
| \$ | ETC | .NCRM/40/12 |

DATE 05-28-76

THIS LIST IS UNCLASSIFIED

LSTOK 01 05-28-76 15.487 *CAPC* LISTING OF BCD CARDS.

\$FILES

| | | |
|----|---------|-------------------------------|
| \$ | SYSTEM | GECOS-WMIXJSE, |
| \$ | ETC | TND-INSEPT, |
| \$ | ETC | GECOS-HI-USE,GECOS-LO-USE, |
| \$ | ETC | T-AND-0, |
| \$ | ETC | TSS-SUB-SYS, |
| \$ | ETC | SOFTW-PRIME, |
| \$ | ETC | SOFTW-SECND,DMS-SOFTW |
| \$ | PFILES | BACKDOOR,LUMP,SSFILE |
| \$ | PFILES | S1,T1,U1,V1 |
| \$ | PFILES | DMS-SOFTW |
| \$ | SYSOUL | SYOU1,SYOU2,SYOU3,SYOU4 |
| \$ | LIBRARY | ROM,SOFTW-SYSLIB,ROM,LIBB |
| \$ | SAVE | LUMP |
| \$ | ACCOUNT | RMV.1TE,IDS,RUFSIZ/450,CONCUR |
| \$ | ACCRUF | 0000000000,7777777777,36 |
| \$ | SGCMM | 12,HCM |

Figure 4-2

6. SYSTEM STARTUP

With the central system modules and the specified complement of peripheral devices configured, start the system as follows:

1. At the Processor maintenance panel, assure that the STEP CONTROL switch is OFF.
2. Mount the GCOS system tape on the tape unit specified on the \$ FILDEF cards in the \$EDIT section of the Startup deck.
3. Assure that the MAINT/RUN switch on the System Console maintenance panel is in the RUN position.
4. Load the Startup deck into the card reader and press the OPERATE/RESET pushbutton to the operate position (OPERATE indicator on).
5. At the console, press the SYSTEM INITIALIZE pushbutton (INIT pushbutton on the typewriter console) to initialize the system.
6. Press the SYSTEM BOOT pushbutton (BOOTLOAD pushbutton on the typewriter console) to initiate the bootload.

The bootload initiation causes the first card of the Startup deck to be read. This card causes the Startup program to be read into core storage and to be given control. Startup then reads the remainder of the Startup deck into core storage. This portion of the deck contains the system configuration definition, the file edit functions needed to read GCOS from the system tape into core storage, the software file definitions, the octal corrections for various GCOS modules, and a card describing the device to be used for automatic reboot of the system.

The \$CONFIG section defines the system configuration. Within this section the following six device names must be defined: ST1, PR1, TY1, TY2, TY3, TY4. If these names are not defined, startup will abort. If the \$CONFIG section contains the \$ ANSWER card, a YES response to the *CHANGE? question will cause all the information on the \$ ANSWER card to be ignored. A YES response should be given to *CHANGE? whenever any answers on the \$ ANSWER card need to be changed such as during a cold boot. A NO response specifies those answers on the \$ ANSWER card are to be used during Startup.

The \$INITIALIZE section of startup defines those devices which must be initialized during startup. These devices include mass storage devices and any Micro-programmed Peripheral Controllers configured. When doing a COLD BOOT, the *INITIALIZE? question should be answered with YES. This will specify that all devices are to be initialized automatically and the INIT questions will not be asked. A NO response to the *INITIALIZE? question will force startup to the \$EDIT section. It should be noted that a NO response does not allow the firmware to be loaded into the MPC. An answer of PARTIAL to *INITIALIZE and YES to the BOOTLOAD question will allow the MPC firmware to be loaded without initializing the perm packs. This procedure is normally taken care of in the \$ ANSWER card.

When doing an EDIT, the files specified in the \$FILES section are loaded to the mass storage devices as defined in the \$EDIT section. At times during an EDIT, the following message may appear: FILES IS XXXXXXXX SHOULD BE XXXXX SCFR? (S)TOP, (C)ONTINUE, (F)IND, (R)EWIND. When this message appears, the proper response is F unless otherwise directed.

When Startup has been initialized, the entire system is in the control of GCOS. *SYSOUT FOUND: A BACKDOOR FILE TOO will be printed on the console when startup is complete. If a warmboot has been accomplished, the system is now ready for use. If a coldboot has been accomplished, the following additional steps must be taken:

1. The first job read in must be MAGIC. If MAGIC is deleted for any reason. Startup must be reaccomplished from the beginning.
2. After a successful EOJ to MAGIC the next job read in must be RESTO. The most current SAVE tapes with the OPNSUTIL file on it will be input to this job.
3. When RESTO reaches EOJ, all the user files may be restored.

If a warmboot with EDIT is desired, Answer NO to CHANGE and YES to EDIT. If a warmboot with a partial edit is desired, answer NO to CHANGE and PARTIAL to EDIT. Answer YES to only those files which are to be edited. An EOM should be given to all files which are not to be edited.

7. REBOOTING FROM MASS STORAGE

In the case of a system fault, an automatic bootload procedure permits the system to be rebooted from mass storage. If the \$AUTOLD control card is in the \$CONFIG section of the Startup deck, this card specifies the device from which the reboot is to be made. Otherwise the first device specified on the \$GCOSFIL card is used.

To reboot after a system fault, the operator performs the following operations.

1. At the conclusion of a master mode dump or BOOT message, the following message is sent to the console:

BOOT SOURCE,CARDS OR AUTO?

If reboot is from card reader, the operator responds - CARDS

If reboot is via the AUTO LOAD procedure, the operator responds - AUTO

2. If the operator's response is AUTO, the following message asks which sections of the Startup deck, are to be input from the card reader: CONTROL CHG AT CONFIG,INITIALIZE,FILES,EDIT,PATCH OR LOAD?

The operator must define which section of the Startup program will be the first to be read in from cards. Sections following the specified section will also be read. For example, if FILES is specified, all sections of the Startup program from the \$FILES section to the end of the deck will be read.

Modules in the LOAD section are not saved for the next automatic bootload operation, and these are omitted from an automatic bootload. If modules are to be included and the remainder of the bootload is identical to the previous one, the response to the CONTROL CHG message should be LOAD.

The \$CONFIG through \$PATCH sections used in an automatic bootload are identical to those used in a previous bootload (AUTO or CARDS). Sections updated from the card reader are used until changed.

NOTE: The difference between a warm boot and a cold boot is as follows:

WARM BOOT - BOOTLOAD WITHOUT INITIALIZING ST1 FILE

COLD BOOT - INITIALIZATION OF MASS STORAGE DEVICES PLUS
EDITING GCOS

The following page is a sample output from a reboot sequence of operations. The underlined messages are the responses typed in at the system console. NOTE: In these messages, the symbol ø stands for END-OF-MESSAGE (EOM).

END, RESTART TABLES SAVED

BOOT SOURCE, CARDS OR AUTO? AUTO
CONTROL CHG AT CONFIG, INITIALIZE, EDIT, FILES, PATCH OR LOAD? LOAD
*CHANGE? YES
*RESTART ? YES
*SCF CONTINUATION? YES
*DATE 000000 ? 110871
*TIME 00.000? time
*INITIALIZE? Y
*EDIT ? Y
*SYSTEM SCHEDULER CLEAR? NO

* TAPE 00 ON 0 02 RELEASED

* UNIT 07 DSPK 0 04 RELEASED.

* UNIT 08 DSPK 0 04 RELEASED.

*SYSTEM SCHDLR JOBS TO RE-INPUT

2537T-A 2457T-B

*CANNOT READ ALL OF SYS SCHEDLR FILE

JOBS THAT CANNOT BE RESTARTED, RE-INPUT

NONE

JOBS THAT ARE FINISHED, ARE IN SYSOUT

NONE

JOBS THAT ARE BEING RESTARTED

PFILE PPRMF PPRNT PPNCH PTAPE

* DATE 110871 TIME 11.367

* SYSOUT FOUND: 0079 BLINKS, 2 PRINTERS, 1 PUNCH, 1 REMOTE

*SYSOUT FOUND: A BACKDOOR FILE, TOO

* S#PFILE IS IN REST 11.370

* S#PPRMF IS IN REST 11.377

* S#PPRNT IS IN REST 11.378

* S#PPNCH IS IN REST 11.379

* S#PTAPE IS IN REST 11.380

???JRUN REST

???LSTAL

IN EXECUTION

PPRNT-02 U50

PPNCH-02 U50

PFILE-02 U05

PPRMF-02 U05

PTAPE-02 U05

NOTE: Most of the Dump and Startup Messages can be pre-answered by entering options on the \$ ANSWER card in the \$ CONFIG section of the Startup deck.

Attachment 4-1 is a sample console list for a bootload with a partial Initialization and a partial Edit. Notice that a YES* response was given to only the 191 MPC BOOTLOAD question in the INITIALIZE section. If the response to *CHANGE? had been NO or EQM, the INITIALIZE questions would not have been asked.

The PARTIAL response to *EDIT? causes each file defined in the EDIT section to be listed on the console. A YES response should only be given to the file(s) that need to be **edited**.

Attachment 4-2 is a sample console list for a COLD BOOT. The YES response to *CHANGE? causes the answers on the \$ANSWER card to be ignored. The YES response to the *INITIALIZE? question causes the Directory on ST1 to be initialized and the directories in all the perm packs to be initialized. The YES responses to the MPC BOOTLOAD questions cause the Firmware to be loaded into the MPC's. The YES response to the *EDIT? question caused the files to be loaded from the TOTAL SYSTEM TAPE to the mass storage devices as defined in the \$EDIT section.

The **first** job in the system after SYSOUT is found is MAGIC. MAGIC builds a dummy user master catalog to allow subsequent jobs to be run with the dummy userid until all user master catalogs have been restored.

When MAGIC goes to EQJ, the next job run is RESTO. RESTO loads the **OPNSUTIL** user master catalog so user **restore** programs can be spawned to load user files. When RESTO goes to EQJ the system is ready for operation.

???ROOTE
*RECOVERY DATA SAVED OK
* SCF FILE AT 0 17 05
END,PESTART TABLES SAVED

ROOT SOURCE, CARDS OR AUTO? AUTO
CONTROL CHANGE AT CONFIG, INITIALIZE, EDIT, FILES, PATCH OR LOAD? LOAD
*** OPERATOR ERPOP - PE ENTER LOAD
* EXTENDED MEMORY NOT CONFIGURED.

*CHANGE? YES
*RESTART? YES
*SCF CONTINUATION? YES
*DATE 120274 ?
*TIME 23.551 ?

*INITIALIZE ? PARTIAL

*INIT?
\$ INIT ST1,CAT PA 5
*INIT?
\$ INIT 3D3,CAT 5
*INIT?
\$ INIT 3D4,CAT 5
*INIT?
\$ INIT 3D5,CAT 5
*INIT?
\$ INIT 1D1,CAT 5
*INIT?
\$ INIT 1D2,CAT

5
*INIT?
\$ INIT 1D3,CAT 5
*INIT?
\$ INIT 1D4,CAT 5
*INIT?
\$ INIT 1D5,CAT 5

*191 MPC ON 0 08 BOOTLOAD? SYS ID NAME "DSC101" YES
*PRINTER ERROR, 0 20 00: POF I DEVICE RELEASED
*PRINTER ERROR, 0 22 00: POF I DEVICE RELEASED
*EDIT ? PARTIAL
*EDIT GCOS-WMIXUSE ? 5
*EDIT SOFTW-SYSLIB ? YES

REEL NO. W0473
*FILE IS GCOS-WMIXUSE SHOULD BE SOFTW-SYSLIB SCFP?
*(S)TOP, (C)ONTINUE, (F)IND, (R)EWIND

*EDIT GCOS-HI-USE ? 5
*EDIT GCOS-LO-USE ? 5
*EDIT T-AND-D ? 5
*EDIT TSS-SUB-SYS ? 5
*EDIT SOFTW-PRIME ? 5
*EDIT SOFTW-SECOND ? 5
*EDIT DMS-SOFTW ? 5
*EDIT FORTLIB ? 5
*EDIT LUMP ? 5
*EDIT S. CKDOOP ? 5
*EDIT SYOU? ? 5
*EDIT SYOU1 ? 5
*EDIT SYOU3 ? 5
*EDIT SYOU4 ? 5
*EDIT SYOU5 ? 5

* PROCESS SSFILE CARD ? 5
*SYSTEM SCHEDULER CLEAR? 5
*BOOTLOAD DEVICE ERROR, 0 23 00: 600102000134
*FIX TYPE GO, OP TYPE STOP G05

* UNIT 01 DSPK 0 08 RELEASED.
* UNIT 02 DSPK 0 08 RELEASED.
* UNIT 06 DSPK 0 12 RELEASED.
* TAPE 00 ON 0 18 RELEASED
* TAPE 01 ON 0 18 RELEASED
* TAPE 02 ON 0 18 RELEASED
* TAPE 03 ON 0 18 RELEASED
* TAPE 04 ON 0 18 RELEASED
* TAPE 05 ON 0 18 RELEASED
* PRINTER ON 0 20 RELEASED
* PRINTER ON 0 22 RELEASED
* CARD READER 0 23 RELEASED
* CARD READER 0 24 RELEASED

* JOBS THAT CANNOT BE RESTARTED, REINPUT
* NONE
* JOBS THAT ARE FINISHED, ARE IN SYSOUT
VIDEO 899T
* JOBS THAT ARE BEING RESTARTED
HEALS DATE 0369T

* DATE 120274 TIME 23.551
* SYSOUT FOUND: 0300 BLINKS, 3 PRINTERS, 1 PUNCH, REMOTES

* SYSOUT FOUND: A BACKDOOR FILE, TOO

4-12

ATTACHMENT 4-1

*CHANGE? YES
*RESTART? N
*SCF CONTINUATION? N
*DATE 000000? 013176
*TIME 00.000? 12:36
*INITIALIZE? YES
 *191 MPC ON 0 08 BOOTLOAD? SYS ID NAME "DSC191" YES
 *191 MPC ON 0 12 BOOTLOAD? SYS ID NAME "DSC191" YES
*FORMAT/LABEL QUESTIONS? N
*EDIT? YES
TYPE IN EDIT DRIVE NAME 1T1
REEL NO. W7540
TYPE IN EDIT DRIVE NAME 1T2
REEL NO. W7580

* UNIT 03DSPK 0 08 RELEASED.
* UNIT 04DSPK 0 08 RELEASED.
* UNIT 05DSPK 0 08 RELEASED.
* UNIT 06DSPK 0 08 RELEASED.
* UNIT 07DSPK 0 08 RELEASED.
* UNIT 08DSPK 0 08 RELEASED.
* UNIT 04DSPK 0 12 RELEASED.
* UNIT 05DSPK 0 12 RELEASED.
* UNIT 06DSPK 0 12 RELEASED.
* UNIT 07DSPK 0 12 RELEASED.
* UNIT 08DSPK 0 12 RELEASED.
* CARD READER 0 23 RELEASED.
* CARD READER 0 24 RELEASED.
* PUNCH 0 25 RELEASED.
* TAPE 00 ON 1 16 RELEASED.
* TAPE 01 ON 1 16 RELEASED.
* TAPE 02 ON 1 16 RELEASED.
* TAPE 03 ON 1 16 RELEASED.
* TAPE 04 ON 1 16 RELEASED.
* TAPE 05 ON 1 16 RELEASED.
* PRINTER ON 1 20 RELEASED.
* PRINTER ON 1 21 RELEASED.
* PRINTER ON 1 22 RELEASED.
* CARD READER 1 24 RELEASED.
* PRINTER ON 1 25 RELEASED.
* PUNCH ON 1 26 RELEASED.

* DATE 013176 TIME 13:155
* OHLR MT 0 16 05 \$CALC-00 NA#W1348
 *SYSOUT FOUND: 0399 BLINKS, 7 PRINTERS, 3 PUNCHES, REMOTES

 *SYSOUT FOUND: A BACKDOOR FILE TOO

*S#MAGIC ASKS PRIVITY, ID= DUMMYNAME ..RUN?

???RUN MAGIC

*SRT MAGIC-01 @13.178 FILSYS (990)
*EOJ MAGIC-01 @13.179

*QUE EMPTY @13.179
*EXEUNT GEOT

*S#RESTO ASKS PRIVITY, ID= ADOSVEXEC ..RUN?

???RUN RESTO

*MEDIA--S#RESTO-01 DMT 0-16-01 PR #99999 SAVE-TAPE @13.586

*SRT RESTO-01 @13.588

*RDY MT 0-16-01 RESTO-01 (PR) 0002 IN CEC

*RDY MT 0-16-01 RESTO-01 (PR) 0003 IN CEC

*EOJ RESTO-01 @14.876

*QUE EMPTY @14.878
*EXEUNT GEOT