HEWLETT **hp** PACKARD

2000B:

TIME-SHARED BASIC SYSTEM

OPERATOR'S GUIDE

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PREFACE

This OPERATOR'S GUIDE is the instructional text for operating the HP 2000B
Time Shared BASIC System. It is not a user's manual or a reference text for
the BASIC language. The *OPERATOR'S GUIDE* contains information necessary for
the management and control of the 2000B System.

Operator commands and important concepts are formatted in frames for easy
reading, quick reference, and maximum usefulness. The book is divided into
an introduction, eight chapters, and two appendices.

The Introduction presents the software and hardware elements of the 2000B.
Section I describes the responsibilities of the system operator. The com-
mands controlling user access to the system are covered in Section II, and
the commands that monitor and change user files are discussed in Section III.
Section IV defines the hardware configuration commands; and Section V de-
fines the ROSTER, SLEEP, and STATUS commands. Logging on and off is dis-
cussed in Section VI. Section VII demonstrates how a system library of
public programs can be established. Section VIII includes all phases of
loading and restarting the 2000B software. Appendix A summarizes the oper-
ator command formats, and Appendix B summarizes error messages. A glossary
and index follow the text.

A comment card is provided at the back of this book for your convenience.
Please use it to let us know of any errors or omissions in the *OPERATOR'S
GUIDE* or for general comments and suggestions.

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INTRODUCTION

OVERVIEW OF THE TIME SHARED BASIC SYSTEM

The 2000B Time shared BASIC System consists of an HP 2116B computer, a fixed-head mass storage device, an operator console, a photoreader, an HP 2114B computer with two multiplexors for up to 32 simultaneous users, and a software program to supervise the system. The TSB System can operate without attendance, but an operator console is provided for orderly start-up, shut-down, and response to special situations.

Figure I-1 diagrams the logical organization of the TSB System (figures are symbolic, not drawn to scale).
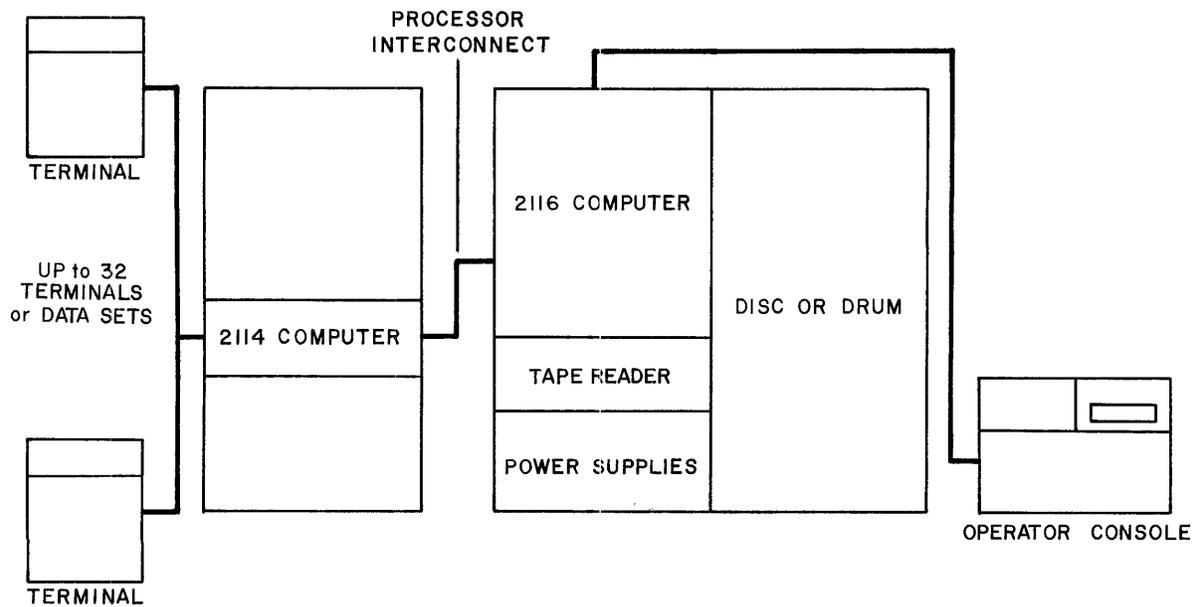
Figure I-1. Organization of HP 2000B Time Shared BASIC System

THE SYSTEM OPERATOR

The operator has commands to modify the hardware configuration on-line, to enter, monitor and remove users of the TSB System, to supervise the mass storage and hardware status, and indirectly, to establish the System Library. The TSB System, without attendance, logs users on and off the system, receives and maintains their active BASIC programs, keeps track of the time and mass storage used by each user, and maintains a personal library of BASIC programs for each user.

REQUIRED MINIMUM HARDWARE

The Time Shared BASIC System operates on an HP 2116B computer with the following options:

- 16K Memory
- Power Supply Extender
- Direct Memory Access
- Extended Arithmetic Unit
- Power Fail/Auto Restart
- Memory Parity Check

and an HP 2114B computer with the following options:

- 8K Memory
- Memory Parity Check
- Power Fail/Auto Restart

In addition, the following peripheral equipment is required:

- Photoreader
- Processor Interconnect Kit
- Two Teleprinter Multiplexors (the system will operate with only one multiplexor and 16 users)
- Operator Console (ASR-35)

▯ One Fixed-Head Disc Storage Unit (see "Mass Storage Devices")

▯ Time Base Generator

▯ Up to 32 teleprinters with modifications for data-set compatability

The required hardware is assigned as follows:

	I/O Channel	Contents
2116B	$10\text{-}11_8$	Processor Interconnect
	12_8	System Console
	13_8	Photoreader
	$14\text{-}15_8$	First mass storage device
	16_8	Time Base Generator
2114B	10_8	First Multiplexor
	11_8	Second Multiplexor
	$12\text{-}13_8$	Processor Interconnect
	14_8	First Disconnect (see Phones)
	15_8	Second Disconnect (see Phones)

OPTIONAL EXPANDED CONFIGURATIONS

There are three classes of optional equipment that can be added to the Time Shared BASIC System. Each provides a specific useful capability. Each class has an operator command that gives the TSB System information about the option if it is included. (See Section IV.)

Phones

For each disconnect board in the 2114B, up to 16 data sets can be added to the system in the place of hardwired teleprinters. This allows users to phone into the TSB System over regular phone lines. Using the PHONES command, the operator specifies the number of seconds allowed a user to sign on before the system hangs up. The first disconnect board corresponds to the first multiplexor board.

Magnetic Tape Unit

An HP 3030 or 7970 magnetic tape unit can be connected to the TSB System through
two adjacent I/O channels in the 2116B. The TSB System uses the magnetic tape to
dump a copy of itself whenever the operator requests a SLEEP operation.

Mass Storage Devices

The TSB System requires a minimum of 750,000 words of mass storage and is
expandable to 256 tracks. Each track contains between 90 and 128 sectors
(64 sixteen-bit words per sector), depending on the device. The first
physical disc must be in locations 14-15, but subsequent discs may be in
any free pairs of I/O locations.

The TSB System treats each 64 tracks as a logical disc unit; a device of
128 tracks is treated logically as two discs of 64 tracks each. The first
64 tracks are called Disc-∅. Be sure to check Section IV dealing with the
DISC command; this command notifies the TSB System that a mass storage de-
vice is connected to the computer.

The TSB System will accept six different models of mass storage device --
three discs and three drums. Although a particular TSB System may mix
discs and drums, they will all be treated logically as disc units. Through-
out this book, any reference to discs also refers to drums. Table I-1
lists the mass storage devices available.

Table I-1.

Mass Storage Devices

Device	Type	Sectors/Track	No. of Tracks
2770A-01	disc	90	64*
2771A	disc	90	64*
2771A-01	disc	90	128
2773A	drum	128	48*
2774A	drum	128	96
2775A	drum	128	192

Since the drums are 48, 96 and 192 tracks each and the TSB System is designed for discs of 64-track multiples, the operator must lock the missing tracks after entering the drum. (See Section IV.)

---

*Not large enough to be used alone on 2000B.

SECTION I

SYSTEM OPERATOR'S CONSOLE

The operator communicates with the HP 2000B Time Shared BASIC System through an ASR-35 teleprinter. From this console the operator controls and monitors user access to the system, modifies or examines the directory of disc usage, changes the hardware configuration on-line, checks who is using each terminal, and systematically shuts down the system. The computers, disc, and photo-reader reside in a locked cabinet.

CONSOLE OPERATION

When the Time Shared BASIC System is loaded into the computer, the operator checks that the ASR-35 teleprinter is set to ON LINE. See Figure 1-1.

OFF

ON
LINE   LOC.
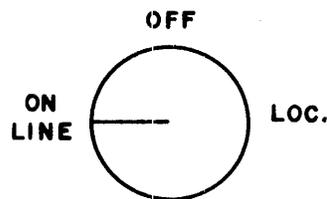
Figure 1-1. On-Off Switch

Three Mode Switch settings on the teleprinter are used with the Time Shared BASIC System. These are the K, T and KT positions. When set to the K position the teleprinter will print only, not punch. When set to T, the teleprinter will both print and punch everything that goes through it. The KT

position is the normal setting; in this position only the LOG ON* and LOG OFF
messages are punched. See Figure 1-2.
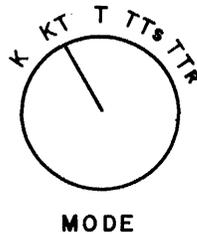
MODE

Figure 1-2. Teleprinter Mode Switch Settings

If Switch Register bit 0 on the front panel of the computer is in the up
position, all input from the console will be ignored by the system. With
this feature, if the cabinet door is kept locked, unauthorized persons can
be prevented from tampering with the operation of the Time Shared Basic
System.

OPERATOR COMMANDS

The operator controls the system by operator commands. The format of all
these commands is identical. Only the first three letters of each command
are significant; the remainder are superfluous and need not be included. If
the command requires parameters, a dash ("-") must separate the command and
the parameters. Parameters are separated by commas (",") and blanks are
ignored, except in the SLEEP command. Each command is terminated by a car-
riage return. If the system does not understand a command, it will print ???.

---

* See Section VI LOGGING

The character ← acts as a backspace key. Typing this key causes the computer to delete the previous character. For example, the sequence:

ABC←←DE←F

is equivalent to the sequence:

ADF

Either of the characters ALT-MODE or ESCAPE deletes the entire line being typed. When the system senses such a character, it automatically responds with the character"\", followed by a CARRIAGE-RETURN and LINEFEED.

All numerical communication with the Time Shared BASIC System is in decimal, except for the I/O select codes necessary for the hardware configuration commands. These are always in octal. Disc track numbers are in decimal.

Printed output produced by commands can be terminated by pressing any key. Printing then terminates at the end of the line.

Table 1-1 lists the operator commands alphabetically, their functions and where they are documented in this manual.

Table 1-1

Operator Commands

Command	Function	Reference
CHANGE	Modifies password, time or disc limit of a user.	Section II
DIRECTORY	Lists library programs and files by user.	Section III
DISC	Informs system that a new disc has been added or an old one removed.	Section IV
FAST	Sets specified ports "fast."	Section IV
KILLID	Removes a user from the system.	Section II
LOCK	Prevents the system from using specified tracks of the disc.	Section IV
MAGTAPE	Informs system of the addition or removal of a magnetic tape unit.	Section IV
NEWID	Enters a new user into the system.	Section II
PHONES	Sets number of seconds allowed user to sign on.	Section IV
PURGE	Removes library programs and files which have not been used since a specified date.	Section III
REPORT	Prints a list of all users with time and disc used to date.	Section II
RESET	Resets terminal time clock of any user.	Section II
ROSTER	Lists all active users.	Section V
SLEEP	System shut down command. Prints a specified message on each active terminal.	Section V
SLOW	Resets specified ports to normal speed.	Section IV
STATUS	Returns information about system status.	Section V
UNLOCK	Makes specified tracks of a disc available for use.	Section IV

SECTION II

ID COMMANDS

The Time Shared BASIC System provides five commands for the operator to use to modify or examine the system ID table. The ID table contains one entry for each user recognized by the system, consisting of the following information:

> User's IDcode
>
> Password
>
> Total terminal time used to date (in minutes)
>
> Maximum terminal time allowed the user
>
> Amount of disc used for library storage (in sectors)
>
> Maximum amount of disc storage allowed

The IDcode A000 is reserved for the system operator. The programs saved by user-A000 become the publicly accessible library. User-A000 also has access to special library commands, PROTECT and UNPROTECT. (See Section VII for complete details.)

Use of ID Commands

The ID commands control who has access to a particular Time Shared BASIC System and how much of the system's facilities each user is allowed. Each user's history with the system can be traced logically in the ID commands referencing his ID code. The user is entered into the system and assigned a password with the NEWID command. That password can be changed with a CHANGE command if the user finds that unauthorized persons have learned his password and are using his IDcode. The user also uses a CHANGE command to request more disc storage space or terminal time.

At some point an accounting process takes place and the user is charged for his total time and disc space used (REPORT command). At that time the user's terminal time clock is probably turned back to reflect his payment for time used to date (RESET command). If the user no longer desires the services of the system, his IDcode is removed using a KILLID command.

NEWID

The NEWID command is used to enter a new user into the system. The command establishes a unique IDcode and password for each user, plus maximum limits on terminal time and disc storage.

NEWID -*IDcode,password,time,disc*

IDcode - Consists of a letter followed by three decimal digits.

password - Consists of 0 to 6 characters other than NULL ($@^C$), RUBOUT, ALT-MODE, ESCAPE, COMMA, "←", space, RETURN (M^C), LINEFEED (J^C) or XOFF (S^C). Non-printing characters other than these are allowed. Some characters can be made into non-printing characters by depressing the CONTROL KEY while striking the character. This allows the user to define a secret password which is never printed out on the teleprinter. Such a combination is symbolized by superscript "c" following the character, for example Z^C.

time - Specifies the maximum number of minutes of terminal time the user is allowed. This number may not exceed 65535.

disc - Specifies the maximum number of disc sectors that the user is allowed for storage of his library programs and files. This number may not exceed 65535.

Examples of NEWID Commands

NEWID-AØØØ, MASTER,1ØØØ,5ØØ

establishes user-AØØØ with the password MASTER, 1000 minutes of terminal time and 500 sectors (i.e., 32000 words) of disc storage.

$$NEWID-Q123,BA^CSI^CC^C,1\emptyset\emptyset,2\emptyset\emptyset$$

establishes user-Q123 with the actual password $BA^CSI^CC^C$ where the A, I, and C are non-printing characters. (Remember that A, I, and C are actually typed after the B and the S, but with the control key depressed.) User-Q123 is allowed 100 minutes of time and 200 sectors (i.e., 12800 words) of disc storage.

The following diagnostic messages may be printed in response to a NEWID command.

Message	Meaning
ILLEGAL FORMAT	Indicates that one of the parameters was illegal or missing.
DUPLICATE ENTRY	Indicates that the specified IDcode already exists within the system.
ID TABLE FULL	Indicates that the ID-table cannot accommodate any more entries.

CHANGE

The operator may use the CHANGE command to modify any or all of
the parameters of a particular ID code.

CHANGE-*IDcode, [password], [time], [disc]*

The parameters have the same meaning as in the NEWID Command.
Those in brackets may be missing, in which case they are not
changed. However, the commas must be present if they are neces-
sary to keep the place of missing items (i.e., trailing commas
are not required).

Examples of CHANGE Commands

CHANGE-Q123,BASIC

changes the password of user-Q123 from BA^{C}SI^{C}C^C to BASIC. The time remains
at 100 minutes and the disc storage at 100 sectors.

CHANGE-Q123,,1000

changes the terminal time allotment of user-Q123 from 100 minutes to 1000
minutes. The other parameters remain unchanged.

CHANGE-Q123,,,500

changes the disc storage allotment of user-Q123 from 100 sectors to 500 sec-
tors. The other parameters remain unchanged.

The following diagnostics may be printed in response to a CHANGE Command:

Message	Meaning
ILLEGAL FORMAT	Indicates that one of the parameters of the CHANGE command was illegal or missing.
NO SUCH ID	Indicates that the specified IDcode could not be changed because it had not been previously entered into the system via a NEWID command.

Allotment of disc storage via the CHANGE or NEWID commands does not actually reserve a particular area of disc for the user at that time, nor does it guarantee that he will be able to obtain that much when he wants it. The amount assigned is merely a limit which he is not permitted to exceed. When the user requests storage beyond his allotment, the following message is printed on the user teleprinter:

FILE SPACE FULL

When the user goes over his allotted terminal time, the system makes a note of the fact but does not abort the user. However, the next time that this user attempts to log onto the system, he will get the following message:

NO TIME LEFT

KILLID

KILLID-*IDcode*

The KILLID command gives the operator power to remove a user from the system completely. User-AØØØ may not be killed. Any disc files or library programs assigned to the user are removed and the space is returned to the system. If the specified user is currently logged in at a terminal and executing, he will be forcibly disconnected from the system. If the user is connected via data phone, the system hangs him up. If the user attempts to log in with his old IDcode, the following message will be printed:

ILLEGAL ACCESS

Examples of KILLID Commands

KILLID-Q123
KILLID-S356

RESET

> RESET-*IDcode,time*
>
> The system maintains a clock of total terminal time used for each user. The operator may change the value recorded in the clock with the RESET command. If no time is specified, it is assumed to be zero. If IDcode equals "ALL", all users are reset.

Examples of RESET Commands

If user Q123 had accumulated 100 minutes of terminal time, the command

<div align="center">

RESET-Q123,2Ø

</div>

would reset his clock to 20 minutes of terminal time used.

If user S356 had used 157 minutes of terminal time, the command

<div align="center">

RESET-S356,Ø

</div>

would reset his clock to zero. Or,

<div align="center">

RESET-S356

</div>

would accomplish the same thing.

<div align="center">

RESET-ALL,2Ø

</div>

would reset all IDcodes to 2Ø minutes of terminal time used.

REPORT

The format for a REPORT command is simply the word REPORT. The
REPORT command causes a list of users to be printed out giving
the total terminal time and disc storage used by each. The out-
put is in the following form:

IDcode time disc

where *time* is in minutes and *disc* is the number of sectors.
IDcodes are printed in alphabetic order and in ascending numer-
ical order when more than one *IDcode* begins with the same letter.

Example of a REPORT Command

REPORT

ID	TIME	DISC	ID	TIME	DISC	ID	TIME	DISC
AØØØ	Ø7851	ØØ112	K456	ØØØ23	ØØ232	S356	ØØØØ1	ØØØØØ

SECTION III
DISC DIRECTORY COMMANDS

The Disc Directory is a table of all library programs and files, giving the name, disc location and last date referenced for each. The Disc Directory resides on the disc. One track of directory space is reserved per disc defined logically in the system. (These tracks might all reside on the same disc.) The location and length of the disc directory tracks are given by the STATUS command. (See Section V.)

DIRECTORY

The Directory command is initiated by the word

DIRECTORY [-IDcode]

This causes the system to print a list of library programs and files according to user IDcode. If the optional IDcode appears, listing starts at that point in the directory. The following information is listed for every program or file.

NAME	the program name (1 to 6 characters)
DATE	last date this item was referenced (day of year/last two digits of year)
DISC ADR.	location of program on disc (disc number/track/sector) in decimal
LENGTH	length of program in decimal words
"C" or "F" (optional)	If "C" appears in the last column of the entry, the entry is a program in semi-compiled form. If "F" appears, the entry is a file. If neither, the entry is a program in uncompiled form.

EXAMPLES OF DIRECTORY

Example 1

```
        DIR
         ID    NAME    DATE     DISC ADR    LENGTH
        AØØØ   B       114/7Ø   Ø/53/Ø81    2688 F
               B1      114/7Ø   Ø/54/ØØØ    8192 F
               B2      114/7Ø   Ø/55/ØØØ    8192 F
               CHANGE  1Ø4/7Ø   Ø/47/ØØØ    3238
               CLASS   1Ø4/7Ø   Ø/53/Ø48    2Ø55
               CURRIC  111/7Ø   Ø/4Ø/Ø24    1Ø55
               DAILY   1Ø4/7Ø   Ø/53/ØØØ    3Ø18 C
               DATE    Ø69/7Ø   Ø/39/1Ø4    Ø455 C
               DEBUG   111/7Ø   Ø/39/Ø61    Ø188
               DUMP 1  111/7Ø   Ø/41/ØØ2    Ø791
               FDUMP   111/7Ø   Ø/43/Ø17    Ø393
               FLOAD   111/7Ø   Ø/46/ØØØ    Ø4Ø9
        F398   1       114/7Ø   Ø/61/ØØØ    8192 F
               1Ø      114/7Ø   Ø/39/Ø1Ø    ØØ64 F
               2       114/7Ø   Ø/62/ØØØ    8192 F
               3       114/7Ø   Ø/63/ØØØ    8192 F
               4       114/7Ø   Ø/39/ØØ9    ØØ64 F
               SAM     Ø99/7Ø   Ø/39/ØØ3    ØØ45
               SAM1    Ø99/7Ø   Ø/41/ØØØ    Ø1Ø1
               TEST    Ø69/7Ø   Ø/39/ØØ2    ØØ44
               TEST1   Ø69/7Ø   Ø/39/ØØØ    Ø1Ø2
               XXC     Ø99/7Ø   Ø/42/ØØØ    Ø128 F
```

Example 2 (assumes same directory)

```
        DIR-F398
        F398   1       114/7Ø   Ø/61/ØØØ    8192 F
               1Ø      114/7Ø   Ø/39/Ø1Ø    ØØ64 F
               2       114/7Ø   Ø/62/ØØØ    8192 F
               3       114/7Ø   Ø/63/ØØØ    8192 F
               4.      114/7Ø   Ø/39/ØØ9    ØØ64 F
               SAM     Ø99/7Ø   Ø/39/ØØ3    ØØ45
               SAM1    Ø99/7Ø   Ø/41/ØØØ    Ø1Ø1
               TEST    Ø69/7Ø   Ø/39/ØØ2    ØØ44
               TEST1   Ø69/7Ø   Ø/39/ØØØ    Ø1Ø2
               XXC     Ø99/7Ø   Ø/42/ØØØ    Ø128 F
```

Example 3 (different directory)

```
DIRECTORY
    ID    NAME    DATE     DISC ADR    LENGTH
   AØØØ   ABOUT   1ØØ/69   Ø/23/Ø37    ØØ9Ø
          F3      Ø72/69   Ø/23/Ø35    ØØ87
          FORGET  1ØØ/69   Ø/23/Ø33    ØØ9Ø
          HELLO   1ØØ/69   Ø/23/Ø32    ØØ27
          PROGN   Ø72/69   Ø/23/Ø3Ø    Ø1Ø1
          RFET    Ø7Ø/69   Ø/23/Ø28    ØØ73
          RGET    Ø64/69   Ø/23/Ø27    ØØ27
          ROOTS   Ø64/69   Ø/23/Ø24    Ø147
          TGET    Ø64/69   Ø/23/Ø23    ØØ5Ø
          THAT    Ø72/69   Ø/23/Ø21    ØØ73
          THIS    1Ø1/69   Ø/23/Ø19    ØØ9Ø
          ZAP     1Ø1/69   Ø/23/Ø17    ØØ93
   C111   CCC     Ø72/69   Ø/23/Ø15    ØØ93
          CCCC    Ø72/69   Ø/23/Ø13    Ø1Ø1
   E444   ELECT   1ØØ/69   Ø/23/Ø11    Ø127
          EPROG   Ø64/69   Ø/23/Ø1Ø    ØØ32
          ERUPT   1ØØ/69   Ø/23/ØØ8    Ø1Ø4
   Q123   QPROG   Ø7Ø/69   Ø/23/ØØ6    Ø111
          QUICK   Ø72/69   Ø/23/ØØ4    Ø113
   Z987   THIS    1Ø1/69   Ø/23/ØØ2    ØØ9Ø
          Z!!     1Ø1/69   Ø/23/ØØØ    ØØ9Ø
```

PURGE

With the PURGE command, the operator can remove user library programs and files from the system if they have not been used since a specified time; this releases disc space that would otherwise be unavailable. The format of the PURGE command is:

PURGE-*day-of-the-year/year*

where

> *day-of-the-year* is the day of the year starting with 1 and counting in decimal.

> *year* is the last two digits of the year (i.e., 69 for 1969).

DIRECTORY COMMANDS

Examples

PURGE-32/69   Removes all programs and files which have not been
                referenced since February 1, 1969. (Programs which
                were last used on February 1, will remain in the system.)

If the date given in the PURGE Command has not yet occurred, then the system
prints:

ILLEGAL PARAMETER

Example of PURGE and DIRECTORY Commands

Below, the PURGE command is repeatedly applied to the third Directory ex-
ample (page 3-3) to show how the command works.

PURGE-65/69

```
DIRECTORY
   ID   NAME    DATE     DISC ADR     LENGTH
  AØØØ  ABOUT   1ØØ/69   Ø/23/Ø37     ØØ9Ø
        F3      Ø72/69   Ø/23/Ø35     ØØ87
        FORGET  1ØØ/69   Ø/23/Ø33     ØØ9Ø
        HELLO   11Ø/69   Ø/23/Ø32     ØØ27
        PROGN   Ø72/69   Ø/23/Ø3Ø     Ø1Ø1
        RFET    Ø7Ø/69   Ø/23/Ø28     ØØ73
        THAT    Ø72/69   Ø/23/Ø21     ØØ73
        THIS    1Ø1/69   Ø/23/Ø19     ØØ9Ø
        ZAP     1Ø1/69   Ø/23/Ø17     ØØ9Ø
  C111  CCC     Ø72/69   Ø/23/Ø15     ØØ93
        CCCC    Ø72/69   Ø/23/Ø13     Ø1Ø1
  E444  ELECT   1ØØ/69   Ø/23/Ø11     Ø127
        ERUPT   1ØØ/69   Ø/23/ØØ8     Ø1Ø4
  Q123  OPROG   Ø7Ø/69   Ø/23/ØØ6     Ø111
        QUICK   Ø72/69   Ø/23/ØØ4     Ø113
  Z987  THIS    1Ø1/69   Ø/23/ØØ2     ØØ9Ø
        Z!!     1Ø1/69   Ø/23/ØØØ     ØØ9Ø
```

All the programs with dates 64/69 have been removed (RGET, ROOTS, TGET,
EPROG), but the programs with dates later than 65/69 are still in the sys-
tem. The date of HELLO has been changed from 100/69 to 110/69

(the current date). HELLO is updated only when a PURGE command is given, instead of whenever the HELLO program is referenced, thus making it impossible to PURGE the HELLO program. (See Section VI.)

PURGE-75/69

DIRECTORY

ID	NAME	DATE	DISC ADR	LENGTH
A000	ABOUT	100/69	0/23/037	0090
	FORGET	100/69	0/23/033	0090
	HELLO	110/69	0/23/032	0027
	THIS	101/69	0/23/019	0090
	ZAP	101/69	0/23/017	0090
E444	ELECT	100/69	0/23/011	0127
	ERUPT	100/69	0/23/008	0104
Z987	THIS	101/69	0/23/002	0090
	Z!!	101/69	0/23/000	0090

The programs with date 70/69 (RFET, QPROG) and 72/69 (F3, PROGN, THAT, CCC, CCCC, QUICK) have been deleted from the system. User-C111 and User-Q123 are no longer listed in the directory because they have no library.

PURGE-100/69

DIRECTORY

ID	NAME	DATE	DISC ADR	LENGTH
A000	ABOUT	100/69	0/23/037	0090
	FORGET	100/69	0/23/033	0090
	HELLO	110/69	0/23/032	0027
	THIS	101/69	0/23/019	0090
	ZAP	101/69	0/23/017	0090
E444	ELECT	100/69	0/23/011	0127
	ERUPT	100/69	0/23/008	0104
Z987	THIS	101/69	0/23/002	0090
	Z!!	101/69	0/23/000	0090

The PURGE command caused no change in the directory. Programs last used on the PURGE date (100/69) are not purged.

```
PURGE-1Ø1/69
DIRECTORY
   ID   NAME    DATE     DISC ADR    LENGTH
  AØØØ  HELLO   11Ø/69   Ø/23/Ø32    ØØ27
        THIS    1Ø1/69   Ø/23/Ø19    ØØ9Ø
        ZAP     1Ø1/69   Ø/23/Ø17    ØØ9Ø
  Z987  THIS    1Ø1/69   Ø/23/ØØ2    ØØ9Ø
        Z!!     1Ø1/69   Ø/23/ØØØ    ØØ9Ø
```

All 100/69 programs have been purged, but 101/69 programs still remain.

```
PURGE-11Ø/69
DIRECTORY
   ID   NAME    DATE     DISC ADR    LENGTH
  AØØØ  HELLO   11Ø/69   Ø/23/Ø32    ØØ27
```

This PURGE command specifies the current date (110/69) and eliminates all programs last used on 101/69. However, the HELLO program still remains; it cannot be purged by the operator.

SECTION IV
HARDWARE CONFIGURATION COMMANDS

When a Time Shared BASIC System is first loaded in the computer (Section VIII), the software assumes that the minimum hardware configuration exists. The required channel assignments are listed in the Introduction. They can be expanded on-line without restarting the TSB System from scratch. For example, a magnetic tape unit can be added or moved from one channel to another, or a supplemental disc storage unit can be added. Only the minimum hardware configuration cannot be altered with hardware configuration commands.

The operator uses various commands to notify the TSB System of hardware changes: MAGTAPE, DISC, PHONES, LOCK and UNLOCK. The TSB System has no means of checking on the validity of the specified I/O channels. If used improperly, these commands can cause TSB System failure; thus, they should only be used with extreme care.

If the operator specifies an incorrect disc I/O channel, the first attempt to write on that disc causes a TSB system failure. If the magnetic tape is introduced incorrectly, the TSB System does not complete the SLEEP operation; instead it attempts indefinitely to dump onto a non-existent magnetic tape.

The hardware commands are the only TSB exception to decimal numbering. The select codes (I/O channels) used as parameters in these commands are octal (base eight) numbers. All other numbers, including disc track numbers are decimal (base ten).

MAGTAPE

An HP 3030 or 7970 magnetic tape unit can be added as a hardware
option. Once the TSB System is aware of the magnetic tape, a
copy of the software is dumped whenever a SLEEP Command is exe-
cuted. This copy can be reloaded if the TSB System is destroyed
on disc or in core.

The format for the MAGTAPE command is as follows:

MAGTAPE-sc[*]

where sc is the high priority (lower numbered) select code in
octal of the magnetic tape unit. A select code of zero tells
the TSB System that the magnetic tape unit has been removed.

* is included if the magnetic tape interface board is number
  18131.

DISC

Up to 256 tracks of 90 or 128 sectors each are defined in the
TSB System. The 256 tracks are allocated into four logical
discs of 64 tracks each, numbered 0 through 3. A physical
disc unit of 128 tracks is defined for the TSB System as two
logical discs of 64 tracks each; 96 (drum) tracks are de-
fined as 64 and 32; and 192 (drum), as three 64 track discs.
A drum of 48 tracks must be defined as a disc of 64 tracks
with tracks 48 through 63 locked. Disc units of less than
384,000 words (64 tracks) are not allowed.

The DISC command informs the TSB System that a new disc has
been added or an old disc removed. Since Disc-0 is always
assumed to reside in I/O channels 14_8 and 15_8, only 1 through
3 can be disc number parameters in the DISC command. DISC
commands are also accepted by the TSB Loader. (See Section VIII.)

The format of the DISC command is as follows:

   DISC-*disc number, select code, track length*

where   *disc no.*   is a number from 1 to 3 indicating the
            disc logical number,
      select code is an octal number indicating the high
            priority I/O channel of the disc, and
      track length is a decimal number (90 or 128) in-
            dicating the number of sectors per track.
            See Table I-1.

If the select code is 0, the specified disc is removed from
the TSB System. This is allowed only if all tracks on the
disc have previously been LOCKed. A disc is removed this
way if the track length or select code is to be changed.

For the drum, logical track *n* refers to physical track 4*n* through 4*n* + 3.
(For example, logical track 0 is physical tracks 0 to 3; logical track 1
is physical tracks 4 to 7.)

When a disc has more than 64 logical tracks and is used as more than one
logical disc, the order of entering DISC commands determines the relation
of disc numbers to disc tracks. Each DISC command assigns the lowest avail-
able block of 64 tracks to the disc number specified in the command. For
example, the following commands are entered:

                    DISC-1,14,9Ø
                    DISC-2,16,128
                    DISC-3,16,128
                    LOCK-3,32,63

Where channels 14-15 contain a 128 track disc and channels 16-17 contain a
96 track drum, then disc-0 refers to tracks 0-63 of the disc, disc-1 refers
to tracks 64-127 of the disc, disc-2 refers to tracks 0-63 of the drum, and
disc-3 refers to tracks 64-95 of the drum.

If the system contains only a 192 track drum, it is defined as 3 discs of
64 tracks each:

                    DISC-1,14,128
                    DISC-2,14,128

PHONES

When one or two disconnect boards are connected to channels $14\text{-}15_8$ of the 2114B, the operator uses the PHONES command to set or change the number of seconds allowed the user to log on through a data set.

PHONES-n

where n is the number of seconds (255 maximum). If the PHONES command is not used, the TSB System allows the user 120 seconds to log-on after connecting to the system.

LOCK

The LOCK Command allows the operator to make certain disc tracks unavailable to the TSB System. The format of the LOCK Command is as follows:

LOCK-*n,track[,track]*

where *n* is the disc logical number (0 through 3) and *track* is a decimal quantity specifying a track on that disc (0 through 63). If only one track is specified, just that one track will be locked. If two track parameters are given, they determine the first and last tracks to be locked.

If a LOCK Command specifies an area containing user programs, these will be lost. If the area contains TSB System tables, the command is rejected. TSB System tables cannot be removed without destroying the TSB System. Track 0 of disc 0 cannot be locked.

The LOCK Command can be used to replace a disc in the TSB System, by locking all the tracks of the disc. When the new disc is installed, the tracks can be unlocked. The LOCK Command is also used to eliminate tracks that are believed to be physically faulty.

Discs which do not have exactly 64 tracks can be used by LOCKing those tracks which do not physically exist (i.e., locking tracks 32-63 of the second logical disc of a 96 track drum).

When the system is reloaded from magnetic tape (see Section VIII), any tracks can be locked without loss of information.

UNLOCK

The function of the UNLOCK Command is the opposite of
the LOCK Command. The operation makes the specified
tracks available to the TSB System. The format is
identical to that for LOCK:

UNLOCK-n, *track* [, *track*]

Examples:

Command	Action
LOCK-3,5,23	Locks disc-3 tracks 5 through 23 inclusive.
UNLOCK-3,5,1∅	Unlocks disc-3 tracks 5 through 10 inclusive.
UNLOCK-3,11,23	Unlocks disc-3 tracks 11 through 23 inclusive.

FAST

The FAST Command tells the system to operate the terminals on the specified ports at 220 baud, 20 characters per second (rather than the normal 10 characters per second). If the command contains a format error, the list of terminal numbers is processed up to the illegal terminal number. The format of the FAST command is:

FAST-*terminal number*[,*terminal number*....]

NOTE: This command should only be used on ports with terminals capable of operation at this speed.

SLOW

The SLOW Command changes the specified terminals back to 110 baud, 10 characters per second. All terminals begin as SLOW terminals. If the command contains a format error, the list of terminal numbers is processed up to the illegal terminal number. The format of the SLOW Command is:

SLOW-*terminal number*[,*terminal number*....]

NOTE: The 2114 can only handle 320 characters per second maximum. Therefore, for every port that is made FAST, a port is lost.

SECTION V

MISCELLANEOUS SYSTEM COMMANDS

There are three other system commands which have not been previously mention-
ed: ROSTER, SLEEP and STATUS.

ROSTER

Up to 32 user terminals (or data sets) are logged on to the TSB
System at one time. These terminals are numbered 0 through 31
by the TSB System. The ROSTER command, allows the operator to
know which user IDcode is logged on at each terminal.

The output from ROSTER is formatted into four lines of eight
items each. The first line lists, from left to right, the users
logged on to terminals 0 through 7. The second line lists
terminals 8 through 15; the third 16 through 23; and the fourth,
24 through 31. An active terminal is denoted by the user's
IDcode; an inactive terminal is denoted by four dots (....).
The same ID code can be active on more than one terminal.

EXAMPLES

```
ROSTER
    ....    ....    ....    ....    ....    ....    AØØØ    ....
    ....    ....    ....    ....    ....    ....    AØØØ    ....
    ....    ....    ....    ....    ....    ....    ....    ....
    ....    ....    ....    ....    ....    ....    ....    ....
```

User AØØØ is logged on terminal 6 and terminal 14. The remaining terminals
are inactive.

ROSTER

....	B453	....	B555	....	Q123	Z999	....
AØØØ	....	....	....	....	....	....	AØØØ
....	....	....	T7Ø7	T7Ø8	T7Ø9	....	....
F913	....	....	....	....	....	....	J325

User B453 is on terminal 1, B555 on terminal 3, Q123 on 5, Z999 on 6, AØØØ
on 8 and 15, T7Ø7 on 19, T7Ø8 on 20, T7Ø9 on 21, F913 on 24, and J325 on 31.
The other terminals are inactive.

ROSTER

....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....

This response indicates that no one is using the TSB System.

SLEEP

The SLEEP command is used whenever the Time Shared BASIC System
is to be shut down. The command provides a systematic shut
down procedure that allows easy start-up at a later time.

The format of the SLEEP command is:

> SLEEP-*character string*

where *character string* is a message to be sent to all users.

SLEEP causes the following actions to be taken by the TSB System:

a. The *character string* message is sent to all active users.

b. All users are disconnected from the TSB System.

c. The entire current TSB System is dumped onto the disc.

d. The packing routine is run on the library portion of the TSB System.

e. If a magnetic tape unit is available, the entire TSB System will be
    dumped onto that tape for later reloading. When complete, the system
    prints: VERIFY?
    The operator responds YES to read back and compare the tape, or NO
    to bypass verification.

f. After a successful dump or verify, the message

        DONE

    is printed and the 2116 halts. (The 2114 does not halt.) If the
    operator wants another dump, he mounts a new magnetic tape and presses RUN.
    If a write error occurs, the message

        TAPE BAD OR TOO SHORT

    is printed and the 2116 halts. The operator can then mount a new
    magnetic tape and press RUN: then the entire magnetic tape dump procedure
    is restarted. (Or, the operator can move the load point on the tape.)

Examples of SLEEP Commands

    SLE
    SLEEP-GOOD BYE. TSB IS SHUT DOWN FOR REPAIRS.

To resume operations after sleeping, consult Procedure 4 (Reloading from
Magnetic Tape) or Procedure 6 (Reloading from the Disc) in Section VIII.

STATUS

The STATUS command gives the operator information about the system
hardware and disc storage. STATUS should be used at least once a
day to record the location of the essential parts of the TSB System.
(For diagnostic purposes in case of TSB System failure, see
Section VIII.)

Disc addresses are printed as three decimal numbers, separated by
slashes, which specify the disc logical number, the track number,
and the sector number. The disc address format is D/TT/SSS. For
example, Ø/22/Ø13 means disc Ø, track 22, sector 13.

The following information is output by STATUS:

Output Heading   Information Supplied

IDT   The location of the TSB System IDcode table and the decimal
          number of words stored there. Each distinct user IDcode
          recognized by the TSB System requires an eight-word entry in
          the IDT. This table is essential to the TSB System.

ADT   The location of the available disc table, and the decimal
          number of words used. This table is essential to the TSB
          System. Every two words in the ADT represent a block of a-
          vailable disc storage.

DIREC   Up to four disc locations of each track, each containing a
          portion of the directory of user library programs. The num-
          ber of directory tracks allocated equals the number of discs
          that have been defined on the TSB System (although there is
          no requirement that the directory tracks be distributed
          throughout all four discs, i.e., they all could be on the
          same disc). The total directory consists of an alphabetic
          list, ordered first by IDcode and then by program or file

Output Heading	Information Supplied
DIREC (Cont.)	name, of all the library programs which have been saved by users. Each program requires an eight-word entry.
SYSTEM	The location of the five disc tracks containing the TSB system modules. These tracks may be regenerated without loss of information.
USERS	The location of the 32 disc tracks allocated to the 32 possible simultaneous users. Output is organized similarly to that of ROSTER. These tracks are not essential to the TSB System (i.e., they may be locked during loading if faulty).
MAG	The octal I/O channels of the magnetic tape unit. An entry of 00 indicates the absence of the device.
DISC	The octal I/O channels of discs 0 through 3. An entry of 00 indicates the absence of the disc. The track length in sectors is recorded for each disc.
TRACKS	Four rows of 64 items each, corresponding to the maximum possible four discs of 64 tracks each. A zero indicated the track is available, and a 1 indicates that the track is inaccessible (either LOCKED or not defined).

Example:

STATUS

IDT Ø/37/ØØØ Ø12Ø   ADT Ø/37/ØØ2 Ø116

DIREC

Ø/38/ØØØ 1352 Ø/39/ØØØ ØØØØ Ø/ØØ/ØØØ ØØØØ Ø/ØØ/ØØØ ØØØØ

SYSTEM Ø/ØØ/ØØØ Ø/Ø1/ØØØ Ø/Ø2/ØØØ Ø/Ø3/ØØØ Ø/Ø4/ØØØ

USERS

Ø/Ø5/ØØØ Ø/Ø6/ØØØ Ø/Ø7/ØØØ Ø/Ø8/ØØØ Ø/Ø9/ØØØ Ø/1Ø/ØØØ Ø/11/ØØØ Ø/12/ØØØ

Ø/13/Ø12 Ø/14/ØØØ Ø/15/ØØØ Ø/16/ØØØ Ø/17/ØØØ Ø/18/ØØØ Ø/19/ØØØ Ø/2Ø/ØØØ

Ø/21/ØØØ Ø/22/ØØØ Ø/23/ØØØ Ø/24/ØØØ Ø/25/ØØØ Ø/26/Ø15 Ø/27/ØØØ Ø/28/ØØØ

Ø/29/ØØØ Ø/3Ø/ØØØ Ø/31/ØØØ Ø/32/ØØØ Ø/33/ØØØ Ø/34/ØØØ Ø/35/ØØØ Ø/36/ØØØ

MAG= 17 DISC= 14-128 14-128 ØØ-ØØØ ØØ-ØØØ

  TRACKS

Ø ØØ

1 ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ1111111111111111111111111111111

2 1111111111111111111111111111111111111111111111111111111111111111

3 1111111111111111111111111111111111111111111111111111111111111111

SECTION VI

LOGGING

OPERATOR CONSOLE MESSAGES

Whenever a user gives a HELLO or BYE Command at a terminal, the System Operator Console will print a message recording the event. The format is as follows:

LOGON, LOGOFF

**LOGON *IDcode time terminal #*

or

**LOGOFF *IDcode time terminal #*

where

 IDcode is the users IDcode.

 time is the time (on a 24-hour clock).

 terminal # is a decimal number from Ø to 31 identifying the

   terminal.

Examples:

   **LOGON AØØØ Ø9Ø5 #Ø5

   **LOGOFF AØØØ Ø9Ø5 #Ø5

The printing of the LOGON and LOGOFF messages will interrupt any printing currently being done on the System Operator Console. If the mode switch is set to "KT" or "T", the message will be punched as well as printed.

EXAMPLE:

```
DIRECTORY
      ID    NAME      DATE     DISC ADR    LENGTH
     AØØØ   BARREL   Ø69/69   Ø/14/Ø32    Ø383
            CAR      Ø69/69   Ø/14/Ø26    Ø383
            FIG      Ø66/69   Ø/14/ØØØ    Ø128

  **LOGOFF  AØØØ   Ø9Ø5   #Ø5
            GETH     Ø69/69   Ø/14/Ø14    Ø383
            H123     Ø69/69   Ø/14/ØØ8    Ø383
            VANPO    Ø69/69   Ø/14/ØØ2    Ø383
            YTELL    Ø69/69   Ø/14/Ø2Ø    Ø383
```

A user may log on with a HELLO Command when the previous user has not
logged off with a BYE Command. In this case the system will automatically
log off the previous user before logging on the current user.

Figure 6-1 represents the sequence of events occurring when users log on
and off two user terminals. Note that user-AØØØ logs on to terminal #14
while user-H9Ø9 has not logged off.

TERMINAL #14	SYSTEM OPERATOR CONSOLE	TERMINAL #5
	**LOGON B434 Ø814 #Ø5	HELLO-B434,FRGH READY
HELLO-H9Ø9,JKIL READY	**LOGON H9Ø9 Ø818 #14	
	**LOGOFF B434 Ø82Ø #Ø5	BYE ØØ6 MINUTES OF TERMINAL TIME
HELLO-AØØØ,A READY	**LOGOFF H9Ø9 Ø824 #14 **LOGON AØØØ Ø824 #14	
	**LOGON C555 Ø825 #Ø5	HELLO-C555,C READY

Figure 6-1. Logging

HELLO LIBRARY PROGRAM

When the user logs on with a HELLO Command, the system will search through
the system library to see if a program exists with the name HELLO. If one
does exist, this program will be executed. User-AØØØ can use the HELLO
program to pass information about the system to other users. The HELLO pro-
gram runs only once and is removed from the user area when it terminates.
If no HELLO program exists, the message READY will be printed on the user
terminal. After a BYE Command the system prints on the user terminal the
elapsed time since the HELLO Command.

SECTION VII
SYSTEM LIBRARY

The TSB System Library makes useful BASIC Language programs available to all users. Programs in the System Library provide the user with information about the status of the system, give him training, provide him with mathematical subroutines, or carry out any other useful operations. Library programs may be left unprotected, or they may be protected. An unprotected program can be fetched, executed, listed, punched and saved by the general user. Protected programs can only be fetched and executed ("run only").

The general user cannot modify the System Library. Programs are entered and removed from the System Library through a user terminal, not through the operator console. To make this possible, the TSB System recognizes a special user IDcode as privileged to modify the System Library. Consult 2000B: *A Guide to Time Shared BASIC* (HP 02000-90010) for reference on the 2000B Time Shared BASIC Language.

THE PRIVILEGED USER - AØØØ

The user IDcode AØØØ in the TSB System has a special status: only programs saved by AØØØ become part of the System Library and only AØØØ can modify the System Library. AØØØ might be considered the system operator's IDcode. AØØØ has two special user commands, PROTECT and UNPROTECT, which allow him to make library programs "run only" and library files inaccessible to other users.

THE SEMI-PRIVILEGED USERS

All users with IDcodes beginning with "A" (e.g., AØØ1, AØØ2) are semi-privileged users: they can write on their files even when the files are being accessed from more than one terminal.

PROTECT

The PROTECT command is a user command, available only from a user terminal and only to user-AØØØ. The format is as follows:

PROTECT-*name*

where *name* is either a program name or a file name.

A protected program can not be listed, punched, or saved by any user except AØØØ. A protected program may, however, be fetched and executed by any user. A protected file cannot be accessed at all by another user. These restrictions, of course, do not apply to user-AØØØ.

UNPROTECT

The format of the UNPROTECT command is similar to that of the PROTECT command.

UNPROTECT-*name*

The program or file specified is made available to all users.

NOTE: Remember that when a program file is updated by a GETting and modifying it, KILLing the old version, and SAVing the new version, the new version is unprotected.

SECTION VIII
LOADING THE TSB SYSTEM

The software for 2000B Time Shared Basic System includes two TSB System
tapes -- TSB BINARY (PART I) and TSB BINARY (PART II) -- and two short tapes,
the 2114 system, and the TSB Loader. TSB Loader loads the TSB System tapes
and relocates them on the disc. In addition, the Basic Binary Disc Loader
(BBDL), a protected 64-word program, is always resident in high core. BBDL
is used to load absolute punched tape programs (such as the TSB Loader) and
disc-resident software systems (such as the TSB System or the Disc Operating
System) into core memory.

The TSB Loader is used to generate an initial TSB System on the computer, to
update the TSB System software, to reload a dumped TSB System from magnetic
tape and to attempt emergency recovery when a TSB System fails.

This section consists of twelve procedures or groups of operating instructions,
a discussion of system halts, and a list of TSB Loader halts. The procedures
cover:

        Procedure 1:   Turning on all equipment.

        Procedure 2:   Loading the 2114 System.

        Procedure 3:   Generating an Initial TSB System.

        Procedure 4:   Updating the TSB System--retaining user files.

        Procedure 5:   Reloading from Magnetic Tape.

        Procedure 6:   TSB Loader Patch Option.

        Procedure 7:   Reloading from the Disc.

        Procedure 8:   Emergency Recovery.

        Procedure 9:   BBDL loading of paper tape.

        Procedure 10:   Reloading the 2116 BBDL.

        Procedure 11:   Reloading the 2114 BBL.

        Procedure 12:   Shutting down the TSB System.

CONVENTIONS USED IN THIS SECTION

Information printed on the teleprinter by the computer or the operator appears in the text as

    INPUT EXAMPLE
    OUTPUT EXAMPLE

except that special, non-printing characters appear in underlined italics (eg., *return*).

The contents of registers on the 2114 and 2116 computers (i.e., switch registers, memory data registers, etc.) appear as a series of 16 binary digits (bits) organized into octal digits:

```
0/000/000/000/000/000
↑                    ↑
Bit 15              Bit 0
```

    0 means the bit is off or down (equal to a binary 0).

    ● means the bit is on or up (equal to a binary 1).

    /000 represents an octal digit (e.g., /0●0 = 2_8).

For example, ●/000/0●0/000/●●●/●●● = 102077_8.

PROCEDURE 1

TURNING ON ALL EQUIPMENT

First, turn on the master power switch of the system cabinet, then:

1. 2116 Computer:

    Press POWER button on front panel.

2. System console (ASR-35 teleprinter):

    Turn LOCAL-OFF-ONLINE switch to ON LINE.   (See Section I.)

3. 2114 Computer:

    Open cabinet front panel.

    Turn POWER switch to ON.

    Check that all mode switches are set to NORMAL.

4. Tape Reader:

    Press POWER button.

    Sensing light should go on.

    After Loading is completed, tape reader

    can be turned off (press POWER).

5. Disc Memory:

    Turn POWER ON.

    Wait for status lights to go off.

    Open 2116 cabinet door, set switch on disc interface board
    down.

6. Drum Memory:

    Turn AC POWER switch to ON.

    Turn DC POWER switch to ON.

    Set HEADS switch up for heads IN.

Wait for READY light to go off.

Open 2116 cabinet door, set switch on drum interface
board down.

7. 3030 Magnetic Tape Unit:

   To start unit and mount tape:

   a. Open door in the back of the cabinet.

      On the floor of the cabinet there are two switches:

      TRANSPORT POWER AND DATA ELECT. Turn them both to ON.

      Close the cabinet door and turn the handle to start
      the ventilation fans.

   b. Slide the front window door down to the bottom.

   c. If you want to write on the magnetic tape, check that the
      magnetic tape contains a Write Enable Ring.

   d. Slide the magnetic tape reel onto the right hub with
      the tape unwinding on the right side. Hold the reel
      on the hub (press down in the middle of the reel, not
      along the outside, as this may damage the tape) and
      turn the hub to the right until it locks.

   e. Hold the BRAKES switch down and unwind the tape until
      it reaches the floor.

   f. Put the tape around the guide so that the dull side
      is facing up.

   g. Thread the tape through the read/write mechanism.

   h. Holding the BRAKES switch down, tighten the tape
      around the takeup reel on the left hub. The tape
      should be wrapped around the reel about three times.

   i. Raise the BRAKES switch to START.

   j. Raise the front door to protect the operator.

   k. Press LOAD POINT.

l. Press AUTO.

m. Check that the Write Enable light is on if the magnetic
    tape contains a Write Enable Ring.

8. 7970 Magnetic Tape:

To start unit and mount tape:

a. Open the front door on the unit and set the POWER switch
    to ON (up). The POWER switch is in the lower, left-hand
    corner.

b. Pull out the quick release latch on the upper reel hub.

c. Slide the source reel onto the upper hub (with the Write
    Enable Ring present and facing the back); the tape
    should unwind from the reel on the right.

d. Hold the reel flat against the hub; then flip down the
    latch. The reel should be locked in place.

e. Unwind about three feet of tape from the source reel.
    Thread this tape according to the tape diagram. Be
    sure that the tape always is threaded to the left of the
    tape guide posts.

f. Pull the tape across the top of the takeup reel and wind
    until taut. Then give the takeup reel another two turns.

g. Close the front door.

h. If the tape is to be written on, check that the Write Enable
    light is lit. If it is not, the Write Enable Ring is miss-
    ing from the source reel; press REWIND and remove the source
    reel. Insert the Write Enable Ring and start over.

i. Press LOAD, ONLINE, and the 0 (zero) switch.

j. When the LOAD light is on, the unit is ready for use by
    the computer

CAUTION: DO NOT OPEN THE DOOR OF THE MAGNETIC TAPE WHILE THE UNIT IS
          OPERATING ON LINE TO THE COMPUTER. THIS CAUSES THE UNIT TO
          RETURN TO MANUAL MODE.

PROCEDURE 2
LOADING THE 2114 SYSTEM

If the 2114 System has been loaded already but has been HALTED, restart the 2114 at Step 7. If the power was turned off, the 2114 will restart when the power is turned on.

1. Turn on all equipment (Procedure 1) and check that the 2114 CONSOLE LOCK and LOADER ENABLE switches are set to NORMAL. Halt both machines and press PRESET on the 2116.

2. Load the 2114 tape in the reader.

3. Load the first program on the tape using BBDL (Procedure 9).

4. Set the switch register of the 2116 to 2_8 and press LOAD ADDRESS and RUN on the 2116.   (0/000/000/000/000/0$\bullet$0 = 2_8) Press CLEAR REGISTER on 2114.

5. Press LOAD and PRESET on the 2114 at the same time. The 2114 tape should be read through the Photoreader and the 2114 should halt. If it doesn't, reload the 2114 BBL (Procedure 11).

6. Press HALT on the 2116. The 2114 is now loaded.

7. The 2114 program can now be started by simply pressing RUN on the 2114. However, if the 2114 memory is altered or examined, start the 2114 at 2_8.

8. Press the ESC key on any user terminal that is connected to the 2114 multiplexors. If the teleprinter does not respond with "\" and a _return-linefeed_ reload the 2114 System (Step 1).

9. Set the CONSOLE LOCK switch inside the door of the 2114 to LOCK so that buttons on the front panel are disabled. This will keep unauthorized persons from tampering with the system. The computer panel should be kept locked. When shutting down the TSB System, simply turn off the 2114 power; then to restart, turn power on again..

PROCEDURE 3
GENERATING AN INITIAL SYSTEM

1. Turn on all equipment (Procedure 1).

2. Load and start the 2114 (Procedure 2).

3. Make sure that the DISC PROTECT switch on the disc interface board (inside the computer) is off (unprotected). Proper switch setting is down.

4. Load the TSB Loader tape using BBDL (Procedure 9).

5. Set the switch register on the 2116 to 2000
    $(0/000/0\bullet0/000/000/000 = 2000_8)$.

6. Press LOAD ADDRESS and RUN on the 2116.

7. Place the first system tape (2000B, Part 1) into the photoreader.

8. The computer prints LIBRARY? on the teleprinter.
    Type NO _return_ on the keyboard.

9. The computer prints SECTORS/TRACK ON DISC Ø?
    Type in 90 or 128. (See Table I-1.)

10. The computer prints DISC MODIFICATIONS? If the 2116B contains more than one disc of 64 tracks, enter DISC commands to define their location, number, and size. (Section IV.) Each command uses a separate line, and the sequence is terminated by typing a single _return_ or NO _return_.

11. The computer prints GIVE LOCK, UNLOCK, OR LOAD COMMAND on the teleprinter.

    LOCK any tracks on the disc that are faulty, (Section IV), then type LOAD _return_.

12. The computer prints DISC OPERATING SYSTEM PRESENT?

    Type YES if DOS is present on the disc, otherwise NO.

13. The computer reads in the system tape (2000B, Part 1) from the photoreader, halts with 102077 in the T-Register (●/000/0●0/000/●●●/●●● = 102077_8), and prints END OF TAPE.

    Place the second system tape (2000B, Part 2) in the photoreader and press RUN.

14. After reading in the tape, the computer prints DATE?

    Respond with two decimal integers separated by a slash, where the first is the day of the year, and second is the year of the century. For example, 36/7∅ _return_.

    > NOTE: The operator is responsible for changing the day and year at the beginning of a new year.

15. The computer prints TIME?

    Respond with a four-digit decimal integer giving the current hour and minute on a 24-hour clock. For example, 1:15 p.m. would be 1315 _return_.

16. The computer prints READY and will now accept any legal commands from the operator. At this point, the photoreader can be turned off.

PROCEDURE 4
UPDATING THE TSB SYSTEM

Retaining user files, reloading the system from paper tape while saving the user files.

The system must be in the SLEEP condition. Turn on all equipment (Procedure 1). Check the 2114; if not running, use Procedure 2.

1. Load the TSB Loader tape using the BBDL (Procedure 9).

2. Set the Switch Register of the 2116 to 2000
   $(0/000/0\bullet0/000/000/000 = 2000_8)$.

3. Press LOAD ADDRESS on the 2116.

4. Place the first system tape (2000B Part 1) in the photoreader.

5. Press RUN on the 2116.

6. The computers prints LIBRARY? on the teleprinter.

   Type YES *return* on the keyboard.

7. The computer prints MAGTAPE SELECT CODE?

   Type only a *return*.

8. The computer prints GIVE LOCK, UNLOCK, OR LOAD COMMAND on the teleprinter.

   LOCK or UNLOCK any tracks (except user library tracks, table tracks, or track zero), desired at this time. (See LOCK Command and UNLOCK Command, Section IV.) Then type LOAD *return*.

9. The computer prints DISC OPERATING SYSTEM PRESENT?

   Type YES if DOS is present on the disc, otherwise NO.

10. The computer reads in the system tape (2000B Part 1) from the photoreader, halts with 102077 in the T-Register $(\bullet/000/0\bullet0/000/\bullet\bullet\bullet/\bullet\bullet\bullet = 102077_8)$ and prints END OF TAPE. Place the second (of two) system tape (2000B Part 2) in the photoreader and press RUN.

11. After reading in the tape, the computer prints DATE?

    Respond with two decimal integers separated by a slash, where
    the first is the day of the year and the second is the year of
    the century. For example, 36/7∅ _return_.

    > NOTE: The operator is responsible for changing the day
    >   and year at the beginning of a new year.

12. The computer prints TIME? Respond with a four-digit decimal
    integer giving the current hour and minute on a 24-hour clock.
    For example, 1:15 p.m. would be 1315 _return_.

13. The computer prints READY and will now accept commands from the
    operator or previously defined users. At this point, the photo-
    reader can be turned off.

PROCEDURE 5

RELOADING FROM MAGNETIC TAPE

When updating or reloading from magnetic tape, track lengths and select codes of the discs may be modified without first LOCKing all the tracks on the disc, as would be necessary while the system is running. Disc-0 can also be changed in length, but it must remain select code 14_8. In addition, faulty tracks may be LOCKed without loss of information.

To reload the TSB System and user files from a magnetic tape dump generated by a SLEEP Command:

1. Be sure that all equipment is on and mount the magnetic tape on the tape unit (Procedure 1).

2. Check the 2114; if not running, use Procedure 2.

3. Load the TSB Loader using BBDL (Procedure 9).

4. Set the switch register of the 2116 to 2000_8
   $(0/000/0\bullet0/000/000/000 = 2000_8)$.

5. Press LOAD ADDRESS and RUN on the 2116.

6. The computer prints LIBRARY? on the teleprinter.
   Type YES _return_.

7. The computer prints MAGTAPE SELECT CODE? on the teleprinter.

   Type the high priority select code (octal) of the controller.
   If the interface board is Number 18131, follow this by an
   "*". For example:
   17 _return_ or
   17* _return_

8. The computer prints DISC MODIFICATIONS? on the teleprinter.

   If any changes have bwwn made in the disc configuration since the
   magnetic tape was dumped, enter DISC commands now to define the
   location and size of discs. Each DISC Command is on a separate
   line and the sequence is terminated by typing a single _return_
   or NO _return_.

9. The computer prints GIVE LOCK, UNLOCK, OR LOAD COMMAND.

   LOCK or UNLOCK any tracks (except track zero) desired at this
   time; then type LOAD _return._

10. The computer prints DISC OPERATING SYSTEM PRESENT?

    Type YES if DOS is present on the disc, otherwise NO.

11. The computer reads in the magnetic tape and prints DATE?

    Respond with two decimal integers separated by a slash, where
    the first is the day of the year and second is the year of the
    century. For example, 36/70 _return._

> NOTE: The operator is responsible for changing the day
> and year at the beginning of a new year.

12. The computer prints TIME?

    Respond with a four-digit decimal integer giving the current
    hour and minute on a 24-hour clock. For example, 1:15 p.m.
    would be 1315 _return._

13. The computer prints READY and will now accept any legal commands.

    At this point, the magnetic tape unit and the photoreader can
    be turned off.

PROCEDURE 6
TSB LOADER PATCH OPTION

If the Switch Register bit 15 of 2116 is up (on) while loading the TSB System from either punched tape or magnetic tape (this can be done by putting it up just before pressing RUN after setting the TSB Loader address in the P-Register), the loader executes a halt with 102015_8 in the T-Register ($\bullet$/000/0$\bullet$0/000/00$\bullet$/$\bullet$0$\bullet$ = 102015_8) just prior to transferring each module of the system to the disc. The first halt is for the core-resident part of the TSB System. Each subsequent halt is for a disc-resident module of the system.

This option is convenient when it is necessary to patch or alter one or more of the modules. If the system module is as desired, pressing RUN loads it onto the disc. The computer will halt again when the next module is ready in core. Putting Switch Register bit 15 down eliminates the halts on all subsequent modules. If patches are performed, the restart address to resume loader operation must be noted before patching (in the P-Register). After patching is completed, it is placed in the P-Register before pressing RUN.

PROCEDURE 7

RELOADING FROM THE DISC

The system must have been previously shut down with the SLEEP command.

1. Make sure that all equipment is on (Procedure 1).

2. Check the 2114; if not running, use Procedure 2.

3. Set the LOADER switch of the 2116 to ENABLED.

4. Set the Switch Register of the 2116 to 077760_8
    $(0/\bullet\bullet\bullet/\bullet\bullet\bullet/\bullet\bullet\bullet/\bullet\bullet0/000 = 077760_8)$.

5. Press LOAD ADDRESS and RUN on the 2116.

6. The contents of track 0, sector 0 of disc 0 (a bootstrap
    program) are placed into memory locations $2-77_8$. The 2116
    should halt with 102077 in the T-Register.

    a. A halt with 102000 in T $(\bullet/000/0\bullet0/000/000/000 = 102000_8)$
        means a disc error on sector 0, track 0. Start over at
        step 1.

    b. A halt with 102002 or 102001 $(\bullet/000/0\bullet0/000/000/0\bullet0$ or
        $\bullet/000/0\bullet0/000/000/00\bullet)$ indicates a disc error. Press RUN
        again. If the halt occurs repeatedly or DISC FAILURE is
        printed, start over from step 1. If this fails again, the
        disc is unreadable or track 0, sector 0 has been altered.
        Reload the TSB System from paper tape, saving the library
        files (Procedure 4).

    c. If the 2116 loops with 024077 in the T-Register, the disc
        has not completely transferred sector 0 of track 0. Check
        the disc for readiness and start over at step 1.

7. If the BBDL doesn't function properly, it must be reloaded
    (Procedure 10).

8. If the computer halted with 102077 in T, $(\bullet/000/0\bullet0/000/\bullet\bullet\bullet/\bullet\bullet\bullet =$
    $102077_8)$, set the LOADER switch to PROTECTED, set all switch
    register bits to 0, and press RUN.

9. The computer prints DATE?

   Respond with two decimal integers separated by a slash, where the first is the day of the year and the second is the year of the century. For example, 36/7Ø *return*.

   > NOTE: The operator is responsible for changing the day and year at the beginning of a new year.

10. The computer prints TIME?

   Respond with a four-digit decimal integer giving the current hour and minute on a 24-hour clock. For example, 1:15 p.m. would be 1315 *return*.

11. The computer prints READY and will now accept any legal commands from the operator or users.

PROCEDURE 8
EMERGENCY RECOVERY

If the TSB System should halt for any reason during operation (see "System Halt Conditions"), it may still be possible to salvage the user library if certain portions of core memory and disc storage are intact. This procedure cannot be guaranteed to work, nor if it seems to work, can it be guaranteed to have successfully recreated the TSB System without loss. However, it will revive the TSB System if the system tables and user files were not disturbed.

1. Check that all equipment is turned on (Procedure 1).

2. Check the 2114; if not running, use Procedure 2.

3. Load the TSB Loader tape using BBDL (Procedure 9).

4. Set the switch register of an 2116 to 3000_8
   $(0/000/0\bullet\bullet/000/000/000 = 3000_8)$.

5. Press LOAD ADDRESS and RUN on the 2116.

6. Place the first system tape (2000B Part 1) in the photoreader.

7. The TSB Loader attempts to use the core resident system status.

8. The loader skips to LOCK, UNLOCK option and prints GIVE LOCK, UNLOCK, OR LOAD COMMAND on the teleprinter.

   At this point enter LOCK commands to lock any system or swap tracks that are faulty.

   > NOTE: User library tracks, the directory, the ADT, or the IDT cannot be locked during loading, and track zero of disc zero can never be locked.

9. Each LOCK or UNLOCK command uses a separate line, and the sequence is terminated by typing LOAD _return_.

10. The computer prints DISC OPERATING SYSTEM PRESENT?

    Type YES if DOS is present on the disc, otherwise NO.

11. The computer reads in the system tape (2000B Part 1) from the
    photoreader, halts with 102077 in the T-Register
    (●/000/0●0/000/●●●/●●● = 102077_8), and prints END OF TAPE.
    Place the second system tape (2000B Part 2) in the photoreader
    and press RUN on the 2116.

12. After reading in the tape, the computer prints DATE?

    Respond with two decimal integers separated by a slash, where
    the first is the day of the year, and the second is the year of
    the century. For example, 36/7Ø _return_.

    > NOTE: The operator is responsible for changing the
    > day and year at the beginning of a new year.

13. The computer prints TIME?

    Respond with a four-digit decimal integer giving the current hour
    and minute on a 24-hour clock. For example, 1:15 p.m. would be
    1315 _return_.

14. The computer prints READY and will now accept any legal commands
    from the operator.

15. At this point, user library tracks that are faulty should be
    locked. If a faulty track contains the IDT, ADT, or DIRECTORY
    (see STATUS, Section V), the only recovery is to reload from
    magnetic tape, being sure to lock the offending track while load-
    ing (Procedure 5). If a magnetic tape copy of the system does
    not exist, all user library information is lost and the TSB
    System must be regenerated (Procedure 3).

PROCEDURE 9

BBDL LOADING OF PAPER TAPE

Check that the tape is in the reader and all equipment is turned on (Procedure 1).

1. Set the switch register of the 2116 to 077700_8
   (0/●●●/●●●/●●●/000/000 = 077700_8).

2. Press LOAD ADDRESS on the 2116.

3. Set the 2116 LOADER switch to ENABLED and press RUN.

4. The BBDL should read the paper tape and halt with 102077
   (●/000/0●0/000/●●●/●●● = 102077_8) in the T-register. Set the
   LOADER switch to PROTECTED.

5. If the 2116 halts with 102011 (●/000/0●0/000/00●/00● = 102011_8)
   in the T-register, a checksum error has occurred. If the 2116
   halts with 102055 (●/000/0●0/000/●0●/●0● = 102055_8) in the T-
   register, an illegal address has been read. Check for a tear
   in the paper tape and clean any dust out of the photoreader
   with an air brush. Then reposition the tape and reread the
   record. If this does not work, restart at step 1.

6. If the BBDL does not function as described after several tries,
   it may be destroyed. Reload the BBDL (Procedure 10).

PROCEDURE 10
RELOADING THE 2116 BBDL

1. Compare memory locations 037700 through 037777 (or 077700 through 077777 for the 32K computer) with the listings on the following two pages. Set the LOADER Switch to ENABLED. Set the switch register to 037700 (or 077700), press LOAD ADDRESS, DISPLAY MEMORY, and examine the T-register.

2. If any locations are in error, correct them.

3. Attempt to load a tape (Procedure 8) or a system on the disc (Procedure 6) to determine if the BBDL is working.

BASIC BINARY DISC LOADER
FOR 16,384 WORD MEMORIES

Octal Address	Octal Contents	Octal Address	Octal Contents
037700	107700	037740	102055
037701	002401	037741	027700
037702	063726	037742	000000
037703	006700	037743	006600
037704	017742	037744	103713
037705	007306	037745	102313
037706	027713	037746	027745
037707	002006	037747	107413
037710	027703	037750	002041
037711	102077	037751	127742
037712	027700	037752	005767
037713	077754	037753	027744
037714	017742	037754	000000
037715	017742	037755	140100
037716	074000	037756	020014
037717	077757	037757	000000
037720	067757	037760	107700
037721	047755	037761	063756
037722	002040	037762	102606
037723	027740	037763	002700
037724	017742	037764	102615
037725	040001	037765	001500
037726	177757	037766	102602
037727	037757	037767	063777
037730	000040	037770	102702
037731	037754	037771	102602
037732	027720	037772	103706
037733	017742	037773	102714
037734	054000	037774	067776
037735	027702	037775	074077
037736	102011	037776	024077
037737	027700	037777	177700

BASIC BINARY DISC LOADER
FOR 32,768 WORD MEMORIES

Octal Address	Octal Contents	Octal Address	Octal Contents
077700	107700	077740	102055
077701	002401	077741	027700
077702	063726	077742	000000
077703	006700	077743	006600
077704	017742	077744	103713
077705	007306	077745	102313
077706	027713	077746	027745
077707	002006	077747	107413
077710	027703	077750	002041
077711	102077	077751	127742
077712	027700	077752	005767
077713	077754	077753	027744
077714	017742	077754	000000
077715	017742	077755	100100
077716	074000	077756	020014
077717	077757	077757	000000
077720	067757	077760	107700
077721	047755	077761	063756
077722	002040	077762	102606
077723	027740	077763	002700
077724	017742	077764	102615
077725	040001	077765	001500
077726	177757	077766	102602
077727	037757	077767	063777
077730	000040	077770	102702
077731	037754	077772	102602
077732	027720	077772	103706
077733	017742	077773	102714
077734	054000	077774	067776
077735	027702	077775	074077
077736	102011	077776	024077
077737	027700	077777	177700

PROCEDURE 11

RELOADING THE 2114 BBL

1. Set the 2114 CONSOLE LOCK switch to NORMAL.

2. Check memory locations 017700 through 017777 against the listing on the next page. Set the LOADER ENABLE Switch to ON, set the switch register to 017700 (0/00●/●●●/●●●/000/000 = 017700_8), press LOAD ADDRESS, CLEAR REGISTER, and DISPLAY MEMORY. Examine the contents of the Memory Data Register. Repeat DISPLAY MEMORY for each location.

3. Correct any locations that are in error: Set the switch register to the address of the incorrect word, press LOAD ADDRESS and CLEAR REGISTER. Then set the switch register to the correct value and press LOAD MEMORY.

4. Set the LOADER ENABLE switch to NORMAL.

BASIC BINARY LOADER
FOR 8,094 WORD MEMORIES

Octal Address	Octal Contents	Octal Address	Octal Contents
017700	107700	017740	102000
017701	063770	017741	037775
017702	106501	017742	037774
017703	004010	017743	027730
017704	002400	017744	017753
017705	006020	017745	054000
017706	063771	017746	027711
017707	073736	017747	102011
017710	006401	017750	027700
017711	067773	017751	102055
017712	006006	017752	027700
017713	027717	017753	000000
017714	107700	017754	017762
017715	102077	017755	001727
017716	027700	017756	073776
017717	017762	017757	017762
017720	002003	017760	033776
017721	027712	017761	127753
017722	003104	017762	000000
017723	073774	017763	103712
017724	017762	017764	102312
017725	017753	017765	027764
017726	070001	017766	102512
017727	073775	017767	127762
017730	063775	017770	173775
017731	043772	017771	153775
017732	002040	017772	160100
017733	027751	017773	177765
017734	017753	017774	000000
017735	044000	017775	000000
017736	000000	017776	000000
017737	002101	017777	000000

PROCEDURE 12

SHUTTING DOWN THE SYSTEM

1. Issue a STATUS command and save the output (Section V).
2. Mount a magnetic tape on the unit (if available). (Procedure 1)
3. Issue a SLEEP command (Section V).
4. Remove and store the magnetic tape:

   For 3030:

       a. Press REVERSE until the tape comes off the takeup reel.

       b. Slide down the front window door.

       c. Hold down the BRAKES switch.

       d. Rewind the tape onto the original reel.

       e. Hold the tape reel near the middle and turn the hub to the left.

       f. Remove the magnetic tape reel.

       g. Raise the window door.

       h. If another copy is desired, mount a fresh tape (Procedure 1) and press RUN on the 2116.

       i. Open the door in the back of the cabinet. On the floor of the cabinet there are two switches: TRANSPORT POWER and DATA ELECT. Turn them both to OFF.

   For 7970:

       a. Wait for the LOAD light to come on, indicating that the unit has been rewound. CAUTION: DO NOT OPEN THE DOOR OF THE MAGNETIC TAPE UNIT WHILE THE UNIT IS ON LINE TO THE COMPUTER. THIS CAUSES THE UNIT TO RETURN TO MANUAL MODE.

       b. Press REWIND. This causes the tape to wind completely onto the source reel.

       c. Open the front door.

       d. Pull out the quick release latch on the source reel hub. Remove the reel and push down the latch.

       e. Turn the power off. Close the door.

5. Turn the master power switch off. Do <u>not</u> press HALT on the 2114.
6. The system is now shut down. It can be restarted from the disc (Procedure 7) or from the magnetic tape dump if the disc contents are destroyed (Procedure 5).

SYSTEM HALT CONDITIONS

During the operation of the TSB System the 2114 or 2116 computers halt when certain hardware failures occur.

2114

If the computer halts and the T-register reads 102005 (●/00/0●0/000/000/●0● = 102005_8), then a memory parity error has occurred. Start the 2114 at location 100_8, and immediately try to SLEEP the TSB System and check the 2114 for hardware problems. The terminals are cut off if this emergency procedure is followed.

2116

If the computer halts and the T-register reads 102005 (●/000/0●0/000/000/●0● = 102005_8), then a memory parity error has occurred. Check the 2116 for hardware problems.

If the computer halts and the T-register reads 103004 (●/000/0●●/000/000/●00 = 103004_8), then a disc error has occurred. The A-Register contains the logical address on the disc where the error occurred. The B-Register contains the memory address related to the transfer. Depending on what information the faulty disc contained, this halt may be recoverable. The register formats are:

> A: Bits 15,14 = Disc Number; 13-8 = Track Number;
>   6-0 = Sector Number.
>
> B: Bit 15 = Read(1) or Write(0); Bits 14-0 = Memory address.

By comparing the disc number and track number of the error with the output of the STATUS command (Section V), the operator can determine what type of track the error occurred on. The system recovery procedure depends upon this type:

For IDT, ADT, or DIREC tracks: the only recovery is a magnetic tape reload (Procedure 4). If a magnetic tape copy of the system and user files does not exist, the system must be regenerated from scratch; all user files are lost.

For SYSTEM or USER tracks: carry out the emergency recovery procedure (Procedure 7) and lock the faulty track during loading.

For track zero (track number = 0, disc number = 0): there is no recovery.

For any other tracks: carry out the emergency recovery procedure (Procedure 7), but lock the faulty track after the TSB System is operating again. Any user files or programs on the track are lost. The operator can check a previous DIRECTORY command to determine what will be lost.

> NOTE: *If a magnetic tape copy of the system is available,*
> *the system can be restarted with faulty tracks locked*
> *and no information will be lost. Any changes in the*
> *files since the dump are lost, however.*

Power Failure

If the primary power to the computer system fails <u>during loading</u> or during the magnetic tape sleep, the 2116 halts with the P-register equal to 5_8 and the T-register equal to 103004_8. When power is restored, the loading or dumping process must be restarted from the beginning. A magnetic tape dump can be restarted by reloading the system from the disc and typing SLEEP again. The 2114 will always restart when power is restored.

If the primary power fails <u>during the operation of the system</u>, the 2000B resumes operation automatically when power is restored. Users who were connected through data sets are logged off, however, and a few users may not be restarted properly due to loss of communication between the 2114 and 2116. These users must press <u>carriage return</u> and <u>break</u> on their terminals before they can restart their programs.

TSB LOADER DIAGNOSTIC AND HALTS

Common errors, such as an illegal response to a TSB Loader question, are diagnosed on the teleprinter and the question is repeated. Other errors, such as a disc failure, require the re-initiation of the entire loading sequence.

Serious errors, which require some operator action, cause a halt. The T-register will contain a $1\emptyset2\emptyset XX_8$ where XX is a two-place octal number identifying the error condition. ($\bullet$/000/0$\bullet$0/000/xxx/xxx = $1020XX_8$)

A number of error halts may be corrected. Errors which cause halts are listed below, with the corresponding teleprinter diagnostics and recovery procedure, if any.

HALT #	MESSAGE & INTERPRETATION
HLT 1 (000/00$\bullet$)	Loading cannot be continued. There may be various causes:

UNEXPECTED END-OF-FILE/END-OF-TAPE

The format and/or number of records on magnetic tape is not as expected. There is no obvious correction of the tape if it is the correct one.

TAPE CANNOT BE READ

Tape unit may be malfunctioning, or there may be faulty interface cards or a bad tape. The remedy will correspond to the cause.

OUT OF DISC SPACE

This error can be corrected only by unlocking some disc tracks on a subsequent load attempt.

HLT 4
(000/●00)   There has been a power failure during loading. Restart the
               loading procedure from the beginning.

HLT 11
(00●/00●)   The following error message is printed:

                    TAPE BAD OR TOO SHORT

               Writing of the dump tape may be attempted again by pressing RUN.
               The tape unit may require repair or cleaning, or the tape may
               need replacing (SLEEP error message).

HLT 15
(00●/●0●)   Put switch register bit 15 down and press RUN. (Patch option)

HLT 22
(0●0/0●0)   Load TSB Loader Tape using BBDL.

HLT 33
(0●●/0●●)   The following message is printed:

                    WRITE NOT ENABLED

               Put the write ring into the tape reel. Restart the magnetic
               tape and press RUN. (SLEEP error message)

HLT 44
(●00/●00)   The following message is printed:

                    CHANGE MAG TAPE TO AUTO

               Do so, then press RUN.

HLT 55
(●0●/●0●)   The following message is printed:

                    ILLEGAL ADDRESS

               The address read from the paper tape (displayed in the A-Register)
               cannot belong to the TSB System. The cause may be a dirty tape
               or photoreader. Reposition the offending tape record under the
               photoreader and press RUN. Alternatively, restart the loading
               procedure from the beginning.

HLT 66   The following message is printed:

(●●0/●●0)   CHECKSUM ERROR

The checksum read from the tape (which is displayed in the
A-Register) does not match that calculated from the tape record
as it was read in (this sum is displayed in the B-Register).
The corrective action is the same as for HLT 55.

HLT 77   The following message is printed:

(●●●/●●●)   END OF TAPE

If the TSB System tape is actually on several different
binary tapes, place the next one in the photoreader and press
RUN. Otherwise, restart the loader procedure from the beginning.

APPENDIX A
SUMMARY OF COMMANDS

Command	Meaning
CHANGE-*IDcode,[password],[time],[disc]*	Modifies password, time, or disc limit of a user.
DIRECTORY*[-IDcode]*	Lists library programs and files by user (optional: start list at specified ID code).
DISC-*disc number,select code,track length*	Informs TSB that a disc has been added or removed.
FAST-*list of ports*	Sets specified ports "fast."
KILLID-*IDcode*	Removes a user from TSB.
LOCK-*n,track[,track]*	Prevents TSB from using specified tracks of the disc.
MAGTAPE-*sc,type*	Informs TSB that magnetic tape unit has been added or removed.
NEWID-*IDcode,password,time,disc*	Enters a new user into TSB.
PHONES-*n*	Sets number of seconds allow user to sign-on after phoning into system
PURGE-*day-of-the-year/year*	Removes library programs and files which have not been used since a specified date.
REPORT	Prints a list of all users with time and disc used to date.

Command	Meaning
RESET-*IDcode,time*	Resets terminal time clock of any user.
ROSTER	Lists all active users.
SLEEP-*character string*	Sends message to all active users and shuts down TSB.
SLOW-*list of ports*	Resets specified ports to normal speed.
STATUS	Returns information about hardware status.
UNLOCK-*n,track[,track]*	Makes specified tracks of a disc available for use.

APPENDIX B
SYSTEM ERROR MESSAGES

ILLEGAL FORMAT is printed whenever an operator command does not conform to the format rules given in this text.

COMMAND	MESSAGE	MEANING
CHANGE	NO SUCH ID	The user specified is not within the system; therefore, he cannot be CHANGEd.
NEWID	ID TABLE FULL	The system does not have room for any more users
	DUPLICATE ENTRY	The user specified already exists within the system.
KILLID	NOT ALLOWED	User AØØØ cannot be KILLed.
	NO SUCH ID	The specified user is not within the system; therefore, he cannot be KILLed.
UNLOCK	NONEXISTENT	Operator has attempted to UNLOCK a track on a disc or drum that is not defined.
	ILLEGAL PARAMETERS	The numbers specified in the UNLOCK command are not legal.
LOCK	CAN'T LOCK TRACK	The specified track cannot be LOCKed (e.g., it is a track containing essential system tables).
	NO SUCH DISC	The disc specified does not exist within the system.
	ILLEGAL PARAMETERS	The numbers specified in the UNLOCK command are not legal.

PURGE	ILLEGAL PARAMETER	A date specified in the PURGE command is not legal (e.g., it may not have occurred yet).
	BUSY FILES	PURGE cannot be used if any current user program contains a FILES Statement. Operator must wait until system is inactive.

GLOSSARY

Underlined words are defined elsewhere in the glossary.

WORD	DEFINITION
DIRECTORY	A table within the TSB System that records all library programs and files, including for each the name, disc location, and last date referenced. To determine the location of the directory tracks on the disc, use the STATUS command.
DISC	Mass storage device used to store the TSB System and user files; a disc is a fixed-head rotating disc memory or a fixed-head rotating drum memory.
IDCODE	An alphanumeric code consisting of one letter and three digits that acts as an accounting vehicle within the TSB System. Each IDcode has associated with it a password, the amount of terminal time allowed, the amount of disc space used, and the maximum amount of disc space allowed. Each user on a terminal must have an IDcode, although more than one user can use the same IDcode at the same time.
ID TABLE	A table within the TSB System that records the information associated with each IDcode. To determine the location of the ID table on the disc, use the STATUS command. To modify the ID table, use the commands in Section II.
LOGGING ON (AND OFF) THE SYSTEM	Whenever a user types a HELLO command on his terminal, he is logged onto the system and time begins accumulating on his IDcode. Whenever a user types a BYE command, he is

WORD	DEFINITION

logged off the system.   Messages are printed on the operator console to record these events.

OPERATOR

The person who is responsible for starting, monitoring, controlling access to, and shutting down a TSB System and carries out these functions by entering operator commands through an operator console.

OPERATOR COMMANDS

On-line commands that the operator types on the operator console to control operation of a TSB System. Commands modify the ID table, directory, hardware configuration, system status, and terminal usage.

OPERATOR CONSOLE

An HP 2754 Teleprinter (ASR-35) that the operator uses to communicate with the TSB System.

PASSWORD

A unique combination of up to six characters, printing or non-printing, that is associated with each IDcode. When a user logs on to the system, he must give his password.   This keeps unauthorized persons from using a particular IDcode.

PRIVILEGED USER

One user IDcode, A∅∅∅, is privileged; i.e., programs that are stored in the library files by A∅∅∅ become system library programs and can be accessed by all users regardless of IDcode.   A∅∅∅ has two system commands, PROTECT and UNPROTECT, that allow him to control access to his programs.

SEMI-PRIVILEGED USER

Any user IDcode beginning with an "A" (e.g., A∅67) is semi-privileged.   When a semi-privileged IDcode is logged on to more than one terminal, the current users with that IDcode can all alter their files simultaneously.

WORD	DEFINITION
	Non-privileged users, however, can only access their files simultaneously; they cannot alter them simultaneously.
SLEEP THE SYSTEM	To issue a SLEEP command through the operator console that causes the system to dump a copy of itself on a magnetic tape (if available), log all the current users off the system, and halt the system. The system can be restarted from the disc or from the magnetic tape copy.
SYSTEM LIBRARY	A collection of BASIC language programs stored by user AØØØ, the privileged user, which can be used by all user IDcodes.
TERMINALS	An HP 2752 Teleprinter (ASR-33) or equivalent device through which a user communicates with the TSB System. Terminals are connected to the system through direct wiring or over telephone lines. Up to 32 terminals can be logged on the system at a time, and each has an assigned number between 0 and 31.
USER	A person with access to a legal IDcode and a terminal. More than one user can use the same IDcode at the same time.

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READER COMMENT SHEET

2000B: TIME-SHARED BASIC SYSTEM
OPERATOR'S GUIDE

HP 02000-90009   AUGUST, 1970

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FROM

NAME: _____

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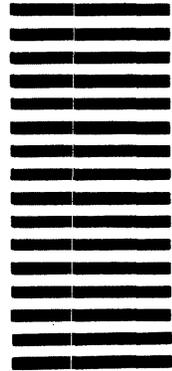
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