TO: Multics Distribution
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SUBJECT: BV.1.00 - .04
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The Bootload Operating System (BOS) is described in the
attached BV.1.00 and the accompanying BV.1.01 - BV.1.04.
Please note that BV.1.02 supersedes the BV.1 of 12/07/67;
the Dumper, which BV.1 described, is now a BOS command,
although it still exists as a card deck as well.

Identification

BOS - bootload operating system
S. D. Dunten, T. H. Van Vleck

Purpose

BOS is a utility system for operating the GE 645, designed
to aid in performing Multics bootloads and debugging.

Overview

BOS consists of three parts: the toehold, a 200 (8) word
program permanently in core at location 0; the control
program, which is kept on the firehose drum when not active;
and the command programs, which are also kept on the firehose
drum when not in use. While Multics is running, only the
toehold is in core. If a programmer decides to take a
snapshot or core dump, or in general to exercise any of the
BOS functions, he enters BOS by a manual transfer at the
645 processor panel. The toehold then saves the machine
state and brings in the control program in another drum
area. BOS then accepts commands from the operator's console
or the card reader. The commands may be requests to the
control program directly or calls to BOS command programs.
If a command program is requested, it will be brought
in from the drum and executed. When programmer intervention
is completed, BOS may be used to initiate a new bootload.
(It is also possible to continue the run which was interrupted).
Figure 1 presents an abstract view of the steps involved
in invoking BOS.

The control-program commands are:

TTY	read from operator's console
(null)	read from card reader
LIST	list command programs
CONTIN	restore machine state and continue

There may be any number of drum-loaded command programs.
Currently, there are four:

DUMP	segment dumper
SNAP	snapshot generator
SHOT	snapshot restorer
BOOT	Multics bootload simulator

Setting up BOS

In order to use BOS, the drum must be loaded and the toehold placed in core. The following steps should be performed whenever it is desired to load BOS:

1. **set configuration**

    a. hit the INIT button
    b. set processor base address to 40
    c. set GIOC base address to 60
    d. set drum base address to 120
    e. set bootload base address to 41
    f. ready the card reader with the BOS deck. If the drum is already loaded and the GIOC is the same as when the drum was loaded, use the small "warm boot" deck. Otherwise, use the large "BOS cold boot" deck.

2. Push BOOTLOAD. The deck should boot in completely and BOS should enter the command program. If the machine stops on a DIS while using the "warm boot" deck, start over, using the "cold boot" deck.

Using BOS

To enter BOS at any time, give a manual XED 0 from the processor panel. That is,

    a. set the processor INSTRUCTION switches to
            000000717200
    b. set EXECUTE SWITCHES switch up.
    c. stop the processor by turning PROG ENABLE to STEP
    d. hit EXECUTE
    e. hit STEP 3 times
    f. turn PROG ENABLE off
    g. hit STEP

Unless the toehold or the drum is clobbered, BOS will load the control program, save machine conditions for a possible subsequent CONTIN, and then look for commands from the card reader. If the reader is empty or not ready, BOS will switch to accepting commands from the operator's console. It will indicate this by typing "BOS READY" and unlocking the keyboard (KEY BD UNLOCKED light will come on). Command lines consist of a command word, followed by arguments if necessary, separated by spaces. An asterisk will stop the scan and indicate that the rest of the line is a comment.
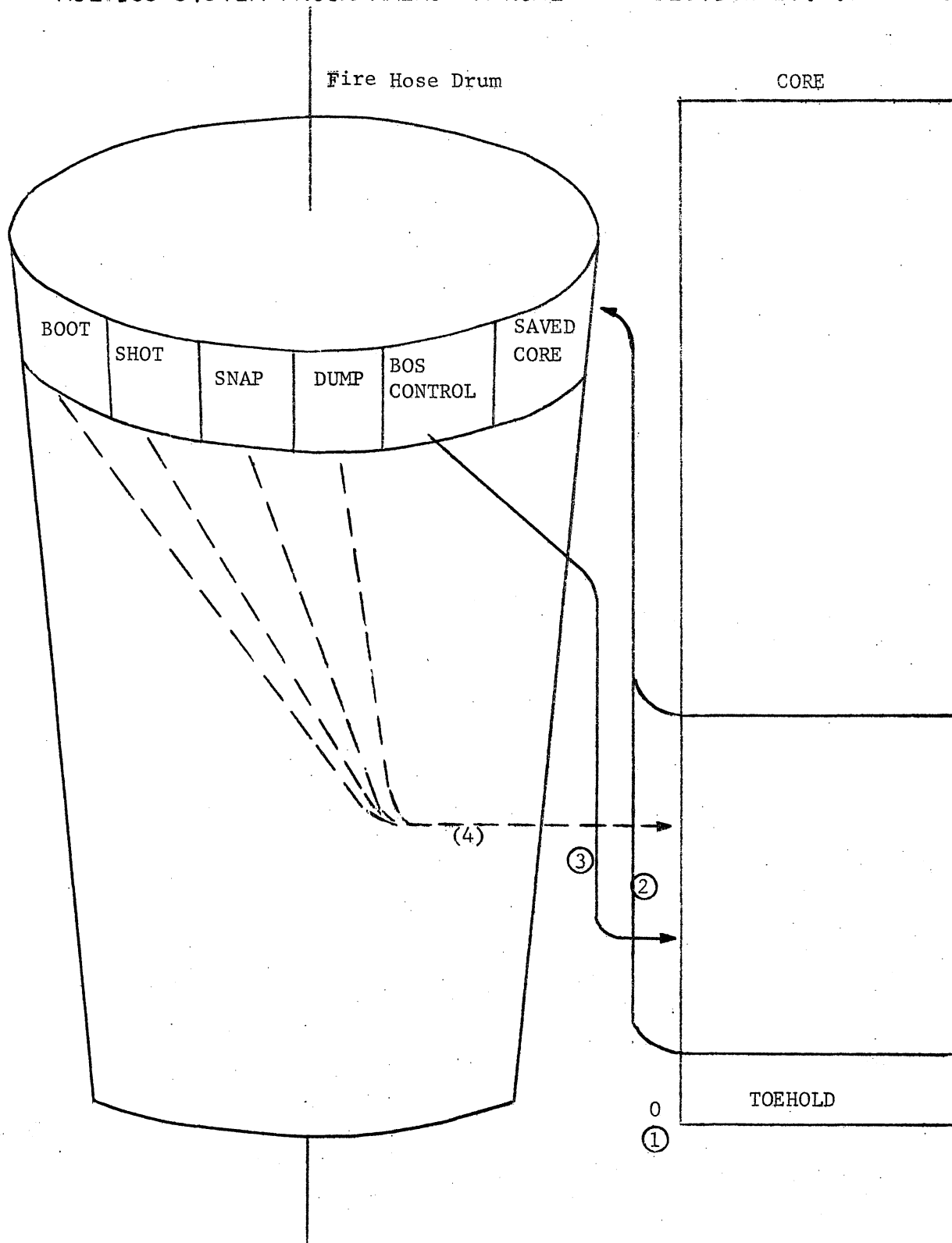
Fire Hose Drum

CORE

BOOT

SHOT

SNAP

DUMP

BOS CONTROL

SAVED CORE

(4)

③

②

①

0

TOEHOLD

Figure 1. BOS Operation (Circled numbers indicate sequence of operations)