## Identification

Overview of the Bootload
A. Bensoussan

## Purpose

We call "Bootload" a set of hardware and software functions,
the purpose of which is to get loaded the Multics General
loader (MGL) and transfer to it.

It operates in two phases:

> The system initialization and bootload (hardware)
> The bootstrap loader (software).

In fact, these two distinct parts must be thought as a
unique program, with a unique function that is to load
any 645 program and to transfer to it.   It is understood
that the 645 program to be loaded has to satisfy the interface
conditions as described in section BL.1.02.

The hardware part of the Bootload is located in the GIOC
diodes and is loaded in core when the operator pushes
the bootload button; this program, known as the "bootload
program", reads from the Multics System Tape the beginning
of the software part, known as the "bootstrap loader"
and transfers to its entry point.  (It is not possible
to read the whole bootstrap loader because it would require
more than 64 words in the diodes).  The bootstrap loader
starts reading the rest of itself in the Multics System
Tape, then loads the Multics General Loader and transfers
to its entry point.

The bootload program and the bootstrap loader contain
configuration independent code; the former is stored in
binary in the GIOC diodes, the latter is coded in assembly
language and stored at the beginning of the MST.

## System Initialization and Bootload

It is a hardware function.   Two buttons are provided in the GIOC:

a)  The initialize button, which, when depressed, places
     all the active and passive units of the system in
     an initial state

b)  The bootload button, which, when depressed causes a 64
     word program to be transferred from the GIOC diodes
     to selected locations in core.   This program is
     called the "Bootload Program".

The bootload program will read the first two
physical records of the Multics System Tape (MST);
the first physical record is a label, the second
one contains a physical header followed by the
beginning of the "Bootstrap Loader", followed by a
physical trailer.
Then it transfers control to the beginning of the
Bootstrap Loader.

```
+----------------------------+
|  LABEL                     |   First Physical Record
+----------------------------+   of MST
```

```
+---+--------------------+----+
|PH | Bootstrap Loader   | PT |   Second Physical Record
+---+--------------------+----+   of MST
```
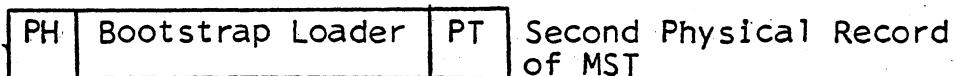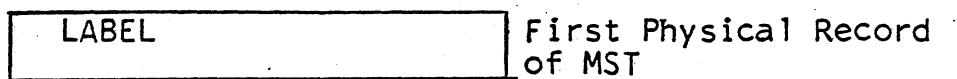
PH = Physical Header

PT = Physical Trailer

## The Bootstrap Loader

The beginning of the Bootstrap Loader has been read from the
Multics System Tape by the Bootload program.  When it receives
control it starts reading the rest of itself on the MST.  Then
it determines the processor base address, creates a descriptor
segment and sets the appending mode.  Up to this point the
Bootstrap Loader is executing in absolute mode and must
be written in such a way that it is independent of the
location in which it is loaded.  The following steps will
then be executed in appending mode.

The Bootstrap Loader, then, sets its fault and interrupt
vector and reads on the MST all the segments that make
up the Multics General Loader (MGL).  For each segment
it creates a segment descriptor word, that is appended
to the actual descriptor segment, and creates an entry
in the Segment Name Table associated with the MGL.  This
Table will be referred to as SNT.MGL, and will be used
by the MGL to establish a dynamic linkage between its
different segments.  Each entry of this Table contains
the segment name and the corresponding segment number.

When all the segments are read the bootstrap loader transfers
to the MGL entry point, which must be given in the MST,
as described in BL.4.01.

## Multics System Tape format

The Multics System Tape format is described in MSPM section
BL.4.01.

## List of abbreviations used in the bootload sections

Po  =  Processor base address

Bo  =  Bootload base address

Go  =  GIOC base address

Lo  =  First location of the Bootstrap Loader

COW =  Connect Operand Word

SCW =  Status Control Word

CPW =  Command Pointer Word

CCW =  Channel Command Word

DCW =  Data Control Word

LPW =  List Pointer Word

MST =  Multics System Tape.

MGL =  Multics General Loader.

SNT.MGL =  Segment Name Table of the Multics General Loader.