Revision 1

TO: Distribution
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SUBJECT: BOS CONFIGURATION DECK

This MOSN supersedes MOSN-204.

I. PURPOSE

The purpose of this MOSN is to give the operator enough information to prepare his own CONFIG deck.

II. INTRODUCTION

This document describes cards in the BOS CONFIG (configuration) deck. Information in the BOS CONFIG deck corresponds to the switch settings and operational readiness of hardware, peripheral devices, and some software data bases. This information is passed on to Multics and is considered by the Multics system software to be the configuration within which the system has to operate. BOS also makes use of the cards in the CONFIG deck.

Each card description in this document is preceded by a general format illustration. In these general illustrations, the fields whose values are shown in capital letters depict constant (literal) values. The fields whose values are shown in small letters depict variable fields. (For example, " CPU tag port"; CPU is a literal value always present and tag and port are variables replaced by numbers or letters when the card is punched).

The examples at the end of each description usually reflect an operating environment of two processors and up to 384K of memory. At times, examples are added to reflect the operating environment of other sites. The CONFIG cards do not vary in form from site to site but some of the arguments specified on these cards vary to conform to the equipment configuration that is particular to a site.

III. GENERAL DESCRIPTION OF CONFIG CARDS

All cards in the CONFIG deck contain free-formatted, individual card fields separated by blank characters.

Remarks may be punched on cards by punching an asterisk followed by the remark. Remarks on a card follow the last field which would normally appear on the card.

Numbers on BOS CONFIG cards are usually octal. Decimal numbers are represented by punching a decimal point immediately after the

number (e.g., 10.) .

In some card fields, numbers 1 through 8 may be represented by punching the letters A through H, respectively. For example, the number representing one of the CPU's is a "2" on the processor panel but is punched as "B" on the CONFIG card which describes that CPU.

IV. CARDS THAT DESCRIBE MAJOR MODULES OF HARDWARE

The following cards describe configuration of major modules of hardware.

CPU
MEM
GIOC
IOM
D355
CLOK

CPU tag port

Identifies a processor in the Multics system configuration.

tag is a letter (A through H) corresponding to the processor number set in the processor configuration switches. These switches are behind the front panel on the processor.

port is a number (0 through 7) which corresponds to the memory port to which the processor is connected. If more than one processor is used, the first CPU card must be for the bootload processor.

Example (Site 1)

```
CPU  A  6   *PROCESSOR A  (BOOTLOAD PROCESSOR)
CPU  B  7   *PROCESSOR B
```

Example (Site 2)

```
CPU  D  3
```

MEM port size state

Defines the memory controllers which are part of the Multics system configuration. There is one "MEM" card for each memory controller configured in the system. These MEM cards must be placed in the CONFIG deck in the order in which the memories are configured, the lowest memory first and the highest last.

port is a value (A through H) which corresponds to the number of the processor port to which the memory controller is connected.

size is the number of 1024 (2000 octal) word blocks of core storage in the controller.

state is either "ON" or "OFF". The argument "ON" signifies that the memory is actively connected at the time Multics is bootloaded. The argument "OFF" signifies that the memory is available and while not actively connected may be brought into the Multics system configuration dynamically.

Example

```
MEM C 200 ON        *128K MEMORY
MEM D 200 ON        *128K MEMORY
MEM E 200 ON        *128K MEMORY
MEM F 100 OFF       * 64K MEMORY
```

GIOC tag port int1 int2 int3 int4

Identifies a GIOC in the Multics system configuration.

tag is a letter (A through H) which corresponds to the GIOC number.
port is a number (0 through 7) which specifies the memory port to which the GIOC is connected.
int1 ...
int4 are the four interrupt cell assignments for the GIOC being specified.

Examples

```
GIOC  A  2  0  7  11  13   *GIOC A
```

D355 tag port int

Describes the DataNet-355 communications computer in the Multics system configuration.

tag is a letter which identifies the DataNet-355 communications computer.
port is a number 0 through 7 which corresponds to the memory port to which the DataNet-355 is connected.
int is the interrupt cell number assigned to the DataNet-355.

Note: although it is not shown on the card, there are actually two interrupt cells assigned to the DataNet-355, the second being used for emergency interrupts. The number of the second interrupt cell is always 16 (decimal) greater than the interrupt cell specified in the DataNet-355 card.

Example

```
D355  F  5  16
```

IOM tag port int0 int1 int2 int3

Describes an Input/Output Multiplexer (IOM) as part of the Multics system configuration.

tag is a letter which identifies the IOM.
port is the memory port to which the IOM is connected.
int0 ...
int3 are the interrupt cells assigned to the IOM.

Example

```
IOM  D  4  7  17  27  37
```

CLOK port int0 int1 zone delta -state- -port-

Defines a calendar clock in the Multics system configuration.

port is a letter (A through H) which identifies the processor port to which the clock is connected (if the clock is a prototype clock) or identifies the memory controller which contains the clock (if the clock is a Mod-B type).
int0 ...
int1 are the clock interrupt cell assignments.
zone is up to four characters describing the time zone (e.g., "EDT" or "EST").
delta is the time difference (number of hours earlier) from GMT (Greenwich Mean Time). The range of this field should be -12 <= DELTA <= +12.

state is an optional argument either "ON" or "OFF". ON means that the clock is to be used; OFF means that the clock can be configured later as part of the Multics system. (The software to do this is not currently available).

port is the hardware processor port to which the clock is connected.

Examples

```
CLOK  A  0  25  EDT  4  *PROTOTYPE CLOCK
CLOK  G  2  25  EDT  4  *MOD B CLOCK
```

V. CARDS THAT DESCRIBE PERIPHERAL CONFIGURATION

The following cards describe the configuration of peripheral devices:

PRPH
DRUM
D270
D170

PRPH tag spc1 spc2 spc3 spc4

identifies those peripheral devices which are connected to the IOM or GIOC.

tag is the tag of the IOM or GIOC.

spc1 ...
spc4 represent peripheral device descriptions which specify the devices attached to the IOM or GIOC. From one to four descriptions may be placed on a PRPH card. Each of these consists of three items:

<device_identification>	unique identification of the device.
<channel number>	channel on the IOM to which the device is connected.
<device_information>	device dependent information.

Examples

```
PRPH  1  PRTA  15  202.  PUNA  20  BCD  RDRD  5  0
```

specifies devices attached to the IOM as follows:

A line printer whose unique identification is prta is attached to IOM 1 via channel 15 (octal), and it is a model 202 printer. The card punch whose unique identification is "puna" is attached to IOM 1 via channel 20 (octal) and can punch BCD information only. The card reader whose unique identification is "rdrd" is attached to IOM 1 via channel 5 and no device information is specified.

```
PRPH  1  OPCN  20  0
```

The operator's console is attached to IOM 1 via channel 20 and no device information is specified.

DRUM frec nrec port int0 int1 int2

Defines a Librafile drum in the Multics system configuration.

frec is the first available record on the drum.
nrec is the number of records available on the drum.
port is the memory port to which the drum is connected.
int0 ...
int2 are interrupt cell assignments for the drum.

Example

```
DRUM 0 7700 1 4 5 6
```

D270 frec nrec gioc channel area areamap chn

Defines the DSU-270 disks in the Multics system configuration.

frec is the first available record on the DSU-270 disk .
nrec is the number of available records on all the DSU-270 disks.
gioc is the tag of the GIOC or IOM to which the DSU-270 disks are connected.
channel is the GIOC or IOM channel to which the DSU-270 disks are connected.
area is the number of areas (DSU-270 disks) to be used.
areamap is the octal value of one or more computer words which describe the logical device addresses of the DSU-270 disks to be used. Each 6-bit element (octal number pair) is interpreted as an electronics and disk unit number. Multics maps each number pair into a physical device address.
chn if set to "2" will cause two channel DSU-270 operation.

Examples

```
D270 0 600650 A 37 8. 000102030405 0607
```

(In this example, the areamap argument is punched in groups; the first group is six pairs and the second, two pairs).

```
D270 0. 10000. A 27 4. 00010204
```

D170 frec nrec gioc channel area areamap

Defines the DSU-170 disks in the Multics system configuration.

frec is the first available record on the DSU-170 disk.
nrec is the number of available records on all the DSU-170 disks.
gioc is a tag of the GIOC or IOI to which the DSU-170 disks are connected.
channel is the GIOC or IOI channel to which the DSU-170 disks are connected.
area is the number of areas (DSU-170 disks) to be used.
areamap is the octal value of one or more computer words which describes the logical device address of the DSU-170 disks to be used. Each 6-bit element (octal number pair) is interpreted as a disk unit and spindle number. Multics maps each number pair into a physical device address.

Examples

```
D170  0  105340  A  37  3.  000102030405  0607
```

(In this example, areamap is punched in groups; the first group is six pairs and the second, two pairs).

```
D170  0.  26664  A  33  6.  000102030405
```

VI. CARDS WHICH DESCRIBE TERMINAL DEVICES

There are three types of cards which describe the terminals connected to the Multics system configuration. These are:

TTY
LSLA
HSLA (may be implemented later)

TTY adapter channel nchannels baud -LSLA- -lsla_no-

Describes the various teletype adapters configured to the Multics system.

adapter is a letter which corresponds to the GIOC or DataNet-355 tag.
channel is the first channel number in the GIOC (or DataNet-355) to which the tty adapter is connected.
nchannels is the number of channels in the tty adapter.
baud is the baud rate of the adapter.
LSLA is an optional argument to tell the Multics initialization software that the lines represented on this tty card are attached to a low-speed-line-adapter (LSLA) on the DataNet-355 rather than to a GIOC adapter.
lsla_no designates which LSLA on the DataNet-355. This field can have a value from 0 to 5.

Examples

```
TTY  A  60   3  1200.      *ARDS
TTY  A  70   3  1200.      *ARDS
TTY  A  100 32.  133.      *1050 OR 2741
TTY  A  200 32.  133.      *1050 OR 2741
TTY  A  400 14.  110.      *110 BAUD TTY
TTY  A  300 24.  150.      *150 BAUD TTY
TTY  B  200  10  150.  LSLA  0   *150 BAUD TTY TO LSLA ON D355
TTY  B  300  5  133.  LSLA  1    *133 BAUD TTY TO LSLA ON D355
```

LSLA tag Isla_no sequence baud channels baud channels ...

Describes the low-speed-line-adapters (LSLA) used in the Multics system configuration.

tag is a letter A through H corresponding to the tag of the Datanet-355 to which this LSLA is attached.
Isla_no is the number of the Isla which this card describes.
sequence is used to allow the presence of multiple cards to describe the same LSLA.
baud is a baud rate.
channels is the number of channels at that baud rate.

Examples

```
LSLA  B  0  1  150. 10
LSLA  B  1  1  133.  5
LSLA  C  0  1  300.  6

LSLA  A  0  1  150.  10  133.  2  110.  2  300.  4
```

The above card is equivalant to:

```
LSLA  A  0  1  150.  10
LSLA  A  0  1  133.  2
LSLA  A  0  3  110.  2
LSLA  A  0  4  300.  4
```

VII. CARDS WHICH DESCRIBE SOFTWARE

The following cards describe software which is related to the configuration in which the Multics system must operate:

TTYB
SST
TCP
INT
SCHD
PART
THRS
PAGE

TTYB size

Describes the size of the terminal (teletype) buffer in the Multics system configuration.

size is the number of 1024 word pages of the teletype buffer.

Example

```
TTYB  5
```

SST size ast1 ast2 ast3 ast4

Describes the size of the System Segment Table in the Multics system configuration.

size is the number of 1024 word pages occupied by the System Segment Table.
ast1 is the number of active 4K segments allowed.
ast2 is the number of active 16K segments allowed.
ast3 is the number of active 64K segments allowed.
ast4 is the number of active 256K segments allowed.

The value for the size of the sst in pages is calculated from the following formula, rounded-off.

size = ((header+ 12*(ast1)+ 24*(ast2)+ 72*(ast3)+ 264*(ast4))+ 1023)/1024

Where header is the size in words allowed for the header.

Example

```
SST  32.  442.  220.  45.  0
```

TCD size apt itt dst

Describes the size of the data bases in the Multics system configuration which contain information needed by the traffic controller.

size is the number of 1024 word pages occupied by the Traffic Controller Data Segment.
apt is the number of entries in the Active Process Table.
itt is the number of entries in the Inter-Process Signal Table.
dst is the number of entries in the Device Transmission Table.

The value for the size of the traffic controller data bases in pages is calculated by the following formula, rounded off.

size = ((header+ 40*(apt)+ 8*(itt)+ (2+ 4(dst)))+ 1023)/1024

Where header is the size in words allowed for the header of the data base.

Example

```
TCD  5  75.  150.  130.
```

INT int0 int1 int2 int3 int4

Defines the process interrupt cells in the Multics system configuration. (process interrupt cells are internal, software-generated interrupts used to control operation of Multics).

int0 ...
int3 are process interrupt cell assignments (2- or 3-digit octal numbers). If a 3-digit number is given, the first digit indicates the internal software level of that interrupt. (This makes it possible to take page faults during some interrupts).

int4 is the system trouble interrupt cell assignment. (Currently, this is 35).

Example Interrupt Cell Assignments

```
INT  230  231  232  233  35
```

SCHD wsf temin temax timax mine maxe

Used to set the scheduling factors and parameters in the Multics system configuration.

wsf is a multiplicative factor used to compute the amount of core which must be available before a process is made eligible.
temin defines the amount of CPU time for which a process is guaranteed to remain eligible (if necessary) the first time it runs after an interaction.
temax defines the amount of CPU time for which a process is guaranteed to remain eligible when it is in the last scheduling queue.
timax defines the default amount of CPU time a process remains in the last scheduling queue before being rescheduled (at the end of the queue).
mine is an optional parameter which specifies the minimum number of eligible processes.
maxe is an optional parameter which specifies the maximum number of eligible processes, this parameter must be greater than or equal to "mine". If this option is specified, "mine" must be specified also.

Example

```
SCHD  400000  20  20  100
```

PART name frec1 nrec1 frec2 nrec2 frec3 nrec3 frec4 nrec4

Defines how secondary storage is partitioned among the major devices of the Multics system.

name is the name of the partition (either MULT, SALV, DUMP or PAGE).
frec1 is the first available record on the drum which may be used by the named partition.
nrec1 is the number of records on the drum which may be used by the named partition.
frec2 is the first available record on the DSU-270 disks which may be used by the named partition.
nrec2 is the number of records on the DSU-270 disks which may be used by the named partition.
frec3 is the first available record on the DSU-170 disks which may be used by the named partition.
nrec3 is the number of records on the DSU-170 disks which may be used by the named partition.

frec4 reserved for future expansion to a 4th secondary storage device
Presently, this argument is always = 0.
nrec4 Same as frec4.

Examples

```
PART MULT  0  0  0  24424.  0  48372.  0  0
PART SALV  0  0  0  24424.  512.  0  0  0  0
PART DUMP  0  0  0  0  48372.  512.  0  0
PART PAGE  0  10000  0  0  0  0  0  0
```

These cards partition vital parts of the software in the Multics system configuration over a defined area of the drum and disks. The Salvager is partitioned to the DSU-270 disks to occupy the 512 records immediately above the area occupied by Multics. Similarly, the Dump is partitioned to occupy the DSU-512 records immediately above the area occupied by Multics on the DSU-170. The areas of the drum, DSU-270, and DSU-170 specified on the "PART card" must be within the limits specified on the "DRUM, DSU-270 and DSU-170 cards".

THRS ovfl1 ovfl2

Describes secondary storage overflow thresholds for the various devices.

ovfl1 is the drum spill-over threshold.
ovfl2 is the DSU-270 spill-over threshold.

Example

```
THRS  350. 100.
```

PAGE name frec nrecs

Describes the partition and device to be used as the paging device.

name is the name of a device to be used as a paging device. It may be "NONE" to indicate that no paging device is to be used.
frec is the first record of the device to be used as a paging device record.
nrecs is the number of paging device records to be used.

Examples

```
PAGE  DRUM  0  4096.
PAGE  NONE
```

VIII. SPECIAL CONFIG CARDS

There are three cards which do not normally appear in a CONFIG deck:

INTK
DEBG
OPTY

These have specilized meaning explained in the following paragraphs.

INTK boot name

The INTK card is not physically present in the CONFIG deck. It is a card image set up by BOS in the core-resident image of the CONFIG deck at bootload time.

boot is either 0 or 77 and specifies respectively whether the system was brought up by a COLD or a WARM bootload.
name is either MULT or SALV and specifies whether Multics or the Salvager is being run.

Example

```
INTK  77  MULT
```

DEBG -LW n0 MQB n1 DAC n2

Specifies conditions and actions when known bugs are detected in the Multics system. This card is generally used by the systems programmers at the Multics development site on new and experimental versions of Multics. The contents of the DEBG card are programmer specified and change frequently.

OPTY init_dim init_chan

The OPTY card is an optional card which specifies the dim (device interface module) to be used by the initializer. Optionally, the initializer teletype channel number, the iom, and the iom_channel number may be specified also.

init_dim is the name of the initializer dim. It can be tw_ or oc_ or another dim name less than four characters. This field must be present.

init_chan is the channel number of the initializer tty (currently 192). This parameter is needed only when tw_ is the init_dim

Examples

```
        OPTY  TW_ 192.
or
        OPTY  OC_
        PRPH  1 OPCN 200.
```

IX. LISTING THE CONFIG DECK

When the CONFIG deck has been read by BOS at bootload time, it may be listed by typing the BOS "CONFIG P" command at the operator's console. When Multics is running, a privileged Multics user may list the CONFIG deck with the print_configuration_deck (pcd) command. Two such listings are illustrated in the following text. The first listing is for the two-processor configuration and was made by typing the command "pcd" at a remote terminal. The second, is a listing of a CONFIG deck for a one processor configuration and was made by typing the "CONFIG P" command to BOS at the operator's console.

```
cpu  b  7
cpu  a  6
gioc  a  2  0  7  11  13
d355  b  5  16
drum  0  7700  1  4  5  6
mem  c  200  on
mem  d  200  on
mem  e  200  on
clok  b  1  25  edt  4
d170  0  105340  a  37  8.  000102030405  0607
d270  0  60650  a  27  10.  1201130214  03150416
part  mult  0  0  0  24424.  0  48372.  0  0
part  salv  0  0  24424.  512.  0  0  0  0
part  dump  0  0  0  0  48372.  512.  0  0
part  page  0  10000  0  0  0  0  0  0
page  drum  0 10000
sst  32.  442.  220.  45.  0.
schd  400000  20  20  100
int  27  30  31  32  35
thrs  0.  350.  1000.
ttyb  5
tty  a  60  3  1200.
tty  a  70  3  1200.
tty  b  100  32.  133.  isla  0
tty  b  200  32.  133.  isla  1
tty  b  400  14.  110.  isla  2
tty  b  300  24.  150.  isla  3
isla  b  0  1  133.  32.
isla  b  1  1  133.  32.
isla  b  2  1  110.  14.
isla  b  3  1  150.  24.
prph  a  tap0  35  1.  tap7  35  5.
tcd  5  75.  150.  130.
intk  77  mult
```

Figure 1 CONFIG Deck -- (Site 1)

```
CPU   D   3
GIOC   A   2   0   7   11   13
MEM   C   200   ON
MEM   D   200   ON
DRUM   0.  4032.   0   4   5   6
D270   0.   10000.   A   27   4.   00010204
D170   0.   26664.   A   33   6.   000102030405
CLOK   B   0   25   EDT   4
PART   MULT   0.   4032.   0.   9488.   0.   26152.   0.   0.
PART   SALV   0.   0.   9488.   512.   0.   0.   0.   0.
PART   DUMP   0.   0.   0.   0.   26152.   512.   0.   0.
SST   16.   408.   160.   90.   0.
INT   27   30   31   32   35
SCHD   400000   20   20   100
PPDS   9.   350.   1000.
TCD   5.   75.   150.   130.
TTYB   4
TTY   A   300   40   150.
TTY   A   200   40   150.
```

Figure 2 CONFIG Deck -- (Site 2)

(END)