TO: Distribution
FROM: M. L. Goudy
DATE: 30 November 1973
SUBJECT: BOS CONFIGURATION DECK

This M0SN applies to Model 6180 processor for the Multics system; it supercedes Revision 0 of MOSN-4.3, MOSN-4.3.1, and Temporary MOSN's 99.2 and 99.3.

I. PURPOSE

The purpose of this M0SN 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. 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 905 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
IOM
DSS
BULK
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.

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 bootstrap processor.

Example (Site 1):
CPU A 6 *PROCESSOR A (BOOTLOAD PROCESSOR)
CPU B 7 *PROCESSOR B

Example (Site 2):
CPU A 3

MEM port size state

Defines the system controllers which are part of the Multics system configuration. There is one "MEM" card for each system controller configured in the system. These MEM cards must be placed in the CONFI5 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 (2048 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 booted. 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 A 200 ON *128K MEMORY
MEM B 200 ON *128K MEMORY
MEM C 200 ON *128K MEMORY
WOSN-4.7
Revision 1
0355

---

0355 tag chan Int IOM

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

tag is a letter which identifies the DATANET-355 communications computer. There can be up to three DATANET-355's configured; for example, at MIT, the current possible values of tag are A, or B, or C for DATANET-355's 0, 1, or 2 respectively.

chan is a number which corresponds to the IOM channel 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.

IOM is the tag of the IOM to which the DATANET-355 is connected.

**Example**

0355 A 21 0 A

---

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 A 0 4 14 24 34

---

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BULK free nrec port into

Defines the Bulk Storage device in the Multics system configuration.

free    is the number of the first useable 1024 word record (usually 0).

nrec    is the number of 1024 word pages which may be used. Currently, at MIT, nrec is 2043. There are two-million words of storage on the bulk store at this time.

port    is the memory port to which the bulk store is attached. (For example, at MIT, this value is 2.)

into    is the interrupt cell assigned to the bulk store. (For example, at MIT, this value is 2.)

Notes

If one wishes to use the bulk store as a paging device, (the normal way in which it is used), a PAGE card and a PAP1 card must also be provided. (See the example provided in the descriptions of these cards.)

Example

BULK 0 2043. 2 2
V. CARDS THAT DESCRIBE PERIPHERAL CONFIGURATION

The following cards describe the configuration of peripheral devices:

PPOH
IDC
D139
D141

-------------------------------

PPQH tag soc 1 soc 2 soc 3 soc 4

Identifies those peripheral devices which are connected to the IOM.

tag is the tag of the IOM.

soc1 ... soc4 represent peripheral device descriptions which
specify the devices attached to the IOM. From one to four descriptions may be placed on a PPOH card. Each of these consists of three items:

<device_identification> unique identification of the
device. The following device
identifications have been used.
These device identifications have
not been registered as a system
data base. The purpose of this
list is to give as complete a list
as possible so that programmers and
operators specifying PPOH cards in
the future will not duplicate a
device description.

Device_Description Device

PPOA printer A
PPOB printer B
PPOC card punch
PPO7 7-track tape drive
PPO9 9-track tape drive
IMP Multics Imp

<channel_number> channel on the IOM to which the
device is connected.

<device_information> device dependent information. For
example, if the device
Identification field specifies a printer, the following values have meaning:

- **0 = Model 202**
- **1 = Model 300 (Chain Type - MAC)**
- **2 = Model 300 (Chain Type # 8)**
- **3 = Model 300 (Chain Type # 2)**

**Examples**

```
PRPH 1 PRG 15 0 PUKA 17 0 PRGN 16 0
```

specifies devices attached to the IOM as follows:

- A line printer whose unique identification is prga is attached to IOM 1 via channel 15 (octal), and it is a model 202 printer. The card punch whose unique identification is "muna" is attached to IOM 1 via channel 17 (octal) and can punch 7C information only.
- The card reader whose unique identification is "rind" is attached to IOM 1 via channel 16 and no device information is specified.

An example of current PRPH cards used in the configuration deck are:

```
PRPH A TAP 12 1 TAPG 12 3 IMP 23 0
PRPH A PITA 16 0 PUKA 17 0
PRPH PRGA 15 1
```

Configuration information for the IMP software is also specified on the PRPH cards. Note that the PRPH card affecting the IMP software, above, has the identifier IMP. The information field of this PRPH card is used for debugging and for specifying global parameters to the IMP software. Unless directed otherwise, the last field of this card contains a zero.

**PRPH_CARD_FOR_THE_IMP**

```
PRPH lom_tag IMPR rchn 0 IMPW wchn host_no
```

This PRPH card describes the ARPA Network IMP connected to the MULTICS IOM through an ASI (Asynchronous 7 bit Serial Interface). The parameters are as follows:

- **lom_tag** refers to the IOM to which the IMP is connected.
- **rchn** is the IOM channel number of the IMP read channel.
- **wchn** is the IOM channel number of the IMP write channel.
Identification field specifies a printer, the following values have meaning:

- 0 = Model 202
- 1 = Model 300 (Chain Type - MAC)
- 2 = Model 300 (Chain Type # 8)
- 3 = Model 300 (Chain Type # 2)

**Examples**

```plaintext
PRPH 1 PRTA 15 U DUNA 17 0 RORD 16 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 "duna" is attached to IOM 1 via channel 17 (octal) and can punch 307 information only. The card reader whose unique identification is "rord" is attached to IOM 1 via channel 16 and no device information is specified.

An example of current PRPH cards used in the configuration deck are:

```plaintext
PRPH A TAP7 12 1 TAP9 12 3 IMP 22 9
PRPH A PRTA 16 0 DUNA 17 0
PRPH PRTA 15 1
```

Configuration information for the IMP software is also specified on the PRPH cards. Note that the PRPH card affecting the IMP software, above, has the identifier IMP. The information field of this PRPH card is used for debugging and for specifying global parameters to the IMP software. Unless directed otherwise, the last field of this card contains a zero.

**PRPH CARD FOR THE IMP**

```plaintext
PRPH IOM-TAG IMPR rchn 0 IMPW wchn host-no
```

This PRPH card describes the ARPA Network IMP connected to the MULTICS IOM through an AHSI (Asynchronous 8-bit Serial Interface). The parameters are as follows:

- `IOM-TAG` refers to the IOM to which the IMP is connected.
- `rchn` is the IOM channel number of the IMP read channel.
- `wchn` is the IOM channel number of the IMP write channel.
TAPF sys_drives oroc_drives device_info1 device_info2

The TAPE card along with an associated PRPH card describe the Multics tape configuration. Both these cards are required by the Multics tape package.

The format of the PRPH card is described above. The PRPH card and the TAPE card must be consistent.

sys_drives is the number of drives reserved for system use. A drive reserved for the system is always a 9-track drive.

proc_drives is the number of drives any one process can attach at a time.

device_info1 is the starting drive number of 7-track tape drives to be configured.

device_info2 is the starting drive number of 9-track tape drives to be configured.

Example

TAPE 1 2 0 1

In the example, there is one 7-track drive and it is on drive 0, and there are three 9-track drives starting at drive 1. Note that the information on the TAPE card and the PRPH card must be consistent, i.e., there cannot be four 7-track drives starting at drive 1 and three 9-track drives starting at drive 2.

With the complete information on the PRPH and TAPE cards about the number and type of drives, the tape mounting programs are able to select the correct drive.

In order to get more accurate error reporting on a per-drive basis, operations should not change the drive selection switches on the tape controller after they have been set according to the information in the TAPE card.
Defines the NUS-131 disks on the Multics system configuration.

- **frec**: is the first available record on the NUS-131 disk.
- **nrec**: is the number of available records on all the NUS-131 disks.
- **lom**: is a tag of the LOM to which the NUS-131 disks are connected.
- **channel**: is the LOM channel to which the NUS-131 disks are connected.
- **area**: is the number of areas (NUS-131 disks) to be used.
- **areamap**: is the octal value of one or more computer words which describe the logical device address of the NUS-131 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.
- **logical_chn**: is the number of logical channels available for block multiplexing.
- **chn_online**: is the number of logical channels to be used when the system is brought up. If not specified, it will be set equal to logical_chn.

**Example**

```plaintext
d190 0 89443. A 24 6 582000440386 4 4
```

Defines the NUS-181 disks on the Multics system configuration.

- **frec**: is the first available record on the NUS-181 disk.
- **nrec**: is the number of available records on all the NUS-181 disks.
- **lom**: is a tag of the LOM to which the NUS-181 disks are connected.
- **channel**: is the LOM channel to which the NUS-181 disks are connected.
- **area**: is the number of areas (NUS-181 disks) to be used.
- **areamap**: is the octal value of one or more computer words which describe the logical device address of the NUS-181 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.
- **logical_chn**: is the number of logical channels available for block multiplexing.
- **chn_online**: is the number of logical channels to be used when the system is brought up. If not specified, it will be set equal to logical_chn.
VI. CARDS WHICH DESCRIBE TERMINAL DEVICES

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

- LSLA
- MLSA
- OPC

LSLA tag: Lsla_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 C corresponding to the tag of the DATANET-355 to which this LSLA is attached.
Lsla_no: Is the number of the LSLA 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 A 0 1 150. 10
- LSLA A 1 1 133. 5
- LSLA B 0 1 300. 6
- LSLA B 0 1 150. 10 133. 2 110. 2 300. 4

The above card is equivalent to:

- LSLA B 0 1 150. 10
- LSLA B 0 2 133. 2
- LSLA B 0 3 110. 2
- LSLA B 0 4 300. 4
HSLA tag hsla_no channel baud channels baud channels...

Describes the high-speed-line-adapters (HSLA) used in the Multics system configuration.

tag is a letter A through C corresponding to the tag of the DATANET-355 to which this HSLA is attached.
hsla_no is the number of the HSLA which this card describes.
channel is the subsequent number of the first (lowest numbered) subchannel described on this card.
baud is a baud rate.
channels is the number of channels at that baud rate.

Examples

HSLA A 0 10, 1200, 4 300, 2
TTY Channel Naming

The tty channel names can be derived from the LSLA/HSLA number. The TTY channel names are of the form:

TTYxnn

where nn is an number formed by concatenating 07 with either the hsla_no or lsla_no parameter. The x component of the name contains the LSLA/HSLA number and the DATANET-355 number. (Currently, up to 3 DATANET-355's may be configured to Multics).

Since a DATANET-355 may have up to six LSLA's and three HSLA's, the value for the x component is 0 to 5 for the LSLA's and 6 to 8 for the HSLA's (on DATANET-355 number 0). On DATANET-355 number 1, the value for the x component is the letters A through F for the six LSLA's and G through I for the three HSLA's. For the DATANET-355 number 2, the letters J through O are used for the six LSLA's and the letters P through R for the three HSLA's.

For example, if the configuration deck consisted of the following cards:

```
LSLA A 0 1 150. 2
LSLA A 1 1 133. 2
HSLA B 0 10 1200. 1
HSLA B 1 1 1200. 2
O355 A 0 21 O355 R 4 22
```

The TTY names (contained in a special Multics data base called the Lines file) would be as follows:

TTY000, tty001, tty100, tty101, tty610, tty601, tty602
TTY Channel Naming

The TTY channel names can be derived from the LSLA/HSLA number. The TTY channel names are of the form:

TTYxnn

where nn is an number formed by concatenating 99 with either the hsla_no or isla_no parameter. The x component of the name contains the LSLA/HSLA number and the DATANET-355 number. (Currently, up to 3 DATANET-355's may be configured to Multics).

Since a DATANET-355 may have up to six LSLA's and three HSLA's, the value for the x component is 0 to 5 for the LSLA's and 6 to 8 for the HSLA's (on DATANET-355 number 0). On DATANET-355 number 1, the value for the x component is the letters A through F for the six LSLA's and G through I for the three HSLA's. For the DATANET-355 number 2, the letters J through O are used for the six LSLA's and the letters P through R for the three HSLA's.

For example, if the configuration deck consisted of the following cards:

<table>
<thead>
<tr>
<th>Channel</th>
<th>LSLA</th>
<th>HSLA</th>
<th>DATANET-355</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>0</td>
<td>150, 2</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>1</td>
<td>133, 2</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td>0</td>
<td>1200, 1</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>1</td>
<td>1200, 2</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>0</td>
<td>20 0355, 4</td>
</tr>
</tbody>
</table>

The TTY names (contained in a special Multics data base called the Lines file) would be as follows:

TTY000, TTY001, TTY100, TTY101, TTY610, TTYR01, TTYR02
VII. CARDS WHICH DESCRIBE SOFTWARE

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

TTY8
SST
TOP
INT
SCHO
PAPR
TPRS
PAGE
DATA
SYSST
CLOCKS
DPTY

-----------------------------------------------

TTY8 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
TTY8 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 256K segments allowed.
ast4 is the number of active 256K segments allowed.

Example
SST 32, 442, 220, 45, 0

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**TON size not INT 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.
- **ant** is the number of entries in the Active Process Table.
- **itt** is the number of entries in the Inter-Process Transmission Table.
- **ist** is the number of entries in the Device Signal Table.

**Example**

```
TON 5 75, 150, 130.
```

**INT into Int1 Int2 Int3 Int4 Int5**

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

- **into ...** are process interrupt cell assignments (2- or 3-digit octal numbers). The value of the field module (100 octal) is the interrupt cell number. The octal hundredths position defines the interrupt type. Values such as 230 are type 2, while values such as 22 are type 0. Type 2 interrupts execute on the POSIX stack and may take page faults. Type 1 interrupts are not currently defined. Type 0 interrupts execute on the POSIX and are not allowed to take page faults.

- **Int4** is the system trouble interrupt cell assignment. (Currently this is 22).

- **Int5** is the system log interrupt cell assignment.

**Example**

```
INT 230 231 232 233 22
```
TOP size not ltt 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.

ant

is the number of entries in the Active Process Table.

ltt

is the number of entries in the Inter-Process Transmission Table.

ist

is the number of entries in the Device Signal Table.

Example

TOP 575, 150, 130.

INT int0 int1 int2 int3 int4 int5

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 ...

are process interrupt cell assignments (2- or 3-digit octal numbers). The value of the field module (100 octal) is the interrupt cell number. The octal hundredths position defines the interrupt type. Values such as 230 are type 2, while values such as 22 are type 0. Type 2 interrupts execute on the PDS stack and may take page faults. Type 1 interrupts are not currently defined. Type 0 interrupts execute on the PDS and are not allowed to take page faults.

int4

is the system trouble interrupt cell assignment. (Currently this is 22).

int5

is the system log interrupt cell assignment.

Example

INT 230 231 232 233 22
These cards partition vital parts of the software in the Multics system configuration over a defined area of the bulk store and disks. The Salvager is partitioned to the PSU-199 disks to occupy the 512 records immediately above the area occupied by Multics. Similarly, the Dump is partitioned to occupy the PSU-181, 512 records immediately above the area occupied by Multics on the PSU-181. The areas of the bulk store, PSU-199, and PSU-181 specified on the "PART card" must be within the limits specified on the "BULK, B199, and B181 cards".

For example, when the bulk storage is used for a paging device the format of the "PART PAGE" card is as follows for the service machine:

PART PAGE 6 4096 0 0 0 0 0 0

Another example is intended to show the use of the PART log card. The format of this card is:

PART LOG 6 0 0 8765 64 0 0 0 0

This card defines a secondary storage partition for the paged syserr_log segment. This card is optional; its absence implies that the syserr logging mechanism is disabled. Note that this partition may reside only on one device. The field LOG implies that the partition is for the syserr_log.
The ovfl1 ovfl2

describes secondary storage overflow thresholds for the various devices.

ovfl1 is the DSU-190 spill-over threshold.

ovfl2 is the DSU-181 spill-over threshold.

Example

```
THRS 350. 100.
```

```
PAGE name frec nrec frec1 nrec1 ... frec5 nrec5
```

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.

nrec is the maximum number of paging device records to be used. frec1 nrec1 ... frec5 nrec5 are up to 5 optional "frec-nrec" pairs which may be specified to delimit areas of the paging device. During system initialization, these options (if given) will automatically reconfigure the specified portions of the paging device.

If one wishes to use the bulk store as a paging device, (this is the normal way in which it is used) one must provide a PAGE card of the form:

```
PAGE BULK frec nrec
```

where frec is the number of the first 1024 word record on the paging device and nrec is the number of pages to be used.

Examples

```
PAGE BULK 0 2048.
PAGE NONE
PAGE BULK 0 4000 2400 400
```
This is an optional card which specifies that a wired-down buffer be created for use by the system printer or tape trace routine. Such a buffer allows I/O to the trace device (printer or tape) to be buffered thereby preventing system slowdown.

size is the number of 1024 word blocks to be used for the buffer.

Example

```
DATA size
```

This is an optional card which specifies that a wired-down buffer be created for use by the system trace routine. The system trace routine is used to store various data in a circular fashion in this buffer for help in finding a system bug.

size is the number of 1024 word blocks to be used for the buffer.

Example

```
SYST size
```
CLOK delta zone

Defines a calendar clock in the Multics system configuration.

delta is the time difference (number of hours earlier) from GMT (Greenwich Mean Time). The range of this field should be -12 <= DELTA <= +12.

zone is up to four characters describing the time zone (e.g., "EDT" or "EST").

Examples

CLOK 5 EST
CLOK 4 EDT

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 try. This parameter is needed only when tw_ is the init_dim.

Examples

OPTY TW_ 02
or
OPTY OC_
VIII. SPECIAL CONFIG CARDS

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

- INTK
- DFBG
- MFTP

These have specialized 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 DOS 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
METR meters -parameters-

Provides a standard mechanism for controlling the operation of specialized system meters (i.e., meters that need not be kept daily, but are useful in evaluating design changes).

meters is the name of the group of meters for which parameters are specified.

parameters are any parameters appropriate to the specified group of meters.

The proper operation of Multics should not be affected by the presence or absence of any METR card.

At present, the only meters controlled by the METR cards are disk load, seek time and access time histograms kept by the OSU 190 control. The format of this METR card is:

METR disk indx orior int_st int_sze cyl_st cyl_sze acc_st acc_sze

disk is the disk type, either: D190 or D181.

indx is the logical number of the disk unit whose access requests are to be metered. (If this parameter is 0, requests to all disk units are metered). This parameter is not the same as the physical disk unit number on the panel on the front of the disk drive, but is an index into the list of physical disk units specified on the D190 or D181 card.

orior controls the priority of requests to be metered. 0 = low priority only; 1 = high priority only; 2 = all priorities.

int_st is the lower limit of the disk request interarrival time histogram to be taken (in microseconds).

int_sze is the size of each "interval" in the interarrival time histogram (in microseconds).

cyl_st is the lower limit of the number-of-cylinders-crossed histogram to be taken (in units of cylinders crossed).
cvl_sze is the size of each interval in the number-of-cylinders-crossed histogram (in units of cylinders crossed).

acc_st is the lower limit of the disk access time histogram to be taken (in microseconds modulo 512).

acc_sze is the size of each interval in the disk access time histogram (in microseconds modulo 512).

The above meters may be interrogated with the disk_performance_graphs (dpn) command.

Examples

```
METR 0181 0 1 20000, 20000, 5, 5, 20490, 10240,
```

causes histograms to be kept for all DSU 131 disk units configured for high-priority requests only. The interarrival time histogram starts at 20 milliseconds (20000 microseconds) and has intervals of size 20 milliseconds. The number of cylinders crossed histogram starts at 0 cylinders crossed, 10-14, 15, 19 etc. The access time histogram begins at 20.43 milliseconds and has intervals 10.43 milliseconds wide.

```
METR 0190 3 2 200000, 200000, 0, 10, 10240, 5120,
```

causes histograms to be kept for the third logical DSU 130 disk unit configured for all requests regardless of priority. The interarrival time histogram is the same as in the previous example. The number of cylinders crossed intervals are 10 wide and start at 0 (e.g., 0-10, 10-19, etc). The access time histogram starts at 10.24 milliseconds and has intervals 5.12 milliseconds wide.

Defaults

If no METR card is included in the CONFIG deck for a disk of a given type, the default action is to bypass the coding in the DIM that collects the metered information.

If for a given disk type, multiple METR cards appear in the CONFIG deck: the first card encountered takes precedence.

If an error is discovered while reading a METR card at initialization time, a message is printed on the Operator's Console as follows:

```
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```
DSUxxx-INIT: param_name ON METR Dxxx CARD IS OUT OF RANGE, CARD IGNORED.

param_name is the name of some parameter on the METR card. This message and error has no effect on correct system operation, but the meters specified will not be collected. (Programming staff should be notified).

METR cards for disk types not configured in the operating configuration have no effect.
DEBS - LW n1 MOD 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 DEBS card are programspecified and change frequently.

The following are the current known options that may be used on the DEBS card:

- **MOD**: Is a check in "quota" to crash the system if a "move_quota" bug is detected. (i.e., check to see if the total quota of a parent and entry is different after a move.)

- **DEAC n**: Is a check in "deactivate" to call "syserr" with a control argument of n if a step is bad after a call to "lock". (This is used to cause an out_of_bounds_error invoking a call to the "online_started".)

- **-LW n**: Is a check in "oxss" for the "loop wait" bug. (It calls "syserr" with the number n specified as a control argument.)

- **CKDV did n**: Is a check in "page control" for bad reads from the specified device identification (did). It accomplishes this by storing a pattern in core before the read is issued and then checks for that pattern after the read is issued. When a misread is detected, a "fatal page read error" is signalled and syserr is called with the number specified as n as a control argument.

- **DBLW code**: Is used to control the "store through" or "double write" option in page control. If the option is enabled, the page written to the paging device will also be written to secondary storage. This will be true only for pages which are not inferior to the directory process_dir_dir. For the values of code shown, the following actions will occur:

<table>
<thead>
<tr>
<th>code</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No double write</td>
</tr>
<tr>
<td>1</td>
<td>Double write of only directory pages</td>
</tr>
</tbody>
</table>
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 D" 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. The following is a typical CONFIG deck which has been listed by typing the pcd command:

cou 7

cou b 6

cou a 128, on

cou b 128, on

cou c 128, on

cou k 5 est

cou m 0 4 14 24 34

cou bulk 0 4000 2 2

cou page bulk 0 4000

cou part page 0 4000 0 0 0 0 0 0 0 0

cou part 190 88440, a 24 6 70200040305 4

cou part mult 0 0 0 0 87529, 0 0 0 0 0

cou part salv 0 0 87523, 40305 0 0 0 0 0 0

cou part dump 0 0 87523, 512, 0 0 0 0 0 0

cou tcd 6 92, 196, 154

cou sst 18, 475, 200, 44, 0

cou dtr 0 a 21 0 a

cou porh a tan7 12 1 tan3 12 3 imo 23 0

cou porh a rda 15 0 ouna 17 0

cou porh a ota 15 1

cou tape 1 2 0 1

cou Int 237 231 232 233 ??

cou schd 4000000 4 10 100

cou ty oc

cou lsia a 1 1 133, 22

cou lsia a 1 1 150, 6 300, 5 133, 4

cou lsia a 1 1 150, 1 110, 1 300, 2

cou lsia a 4 1 110, 2 150, 5

cou ttyb 3

cou intk 77 mult

(End)
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 LISTINGS" 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) The following is a typical CONFIG deck which has been listed by typing the pcd command:

```
cou a 7
mem a 128, on
mem b 128, on
mem c 128, on
clok 5 est
com a 0 4 14 24 34
bulk 0 4000 2 2
page bulk 0 4000
part page 0 4000 0 0 0 0 0 0 0 0 0 0
part 30200040305 4
part mult 0 0 0 57529 0 0 0 0 0 0
part salv 0 0 87923, 400, 0 0 0 0 0 0 0
part dump 0 0 97923, 512, 0 0 0 0 0 0 0
fcd 6 92, 196, 154.
sst 18, 475, 200, 44, 0
ss 35 a 21 0 a
oroh a tap? 12 1 tap? 12 3 imp 28 0
oroh a rdra 16 0 uma 17 0
oroh a orta 15 1
tape 1 ? 0 1
int 231 231 232 233 22
schd 400000 4 10 100
ctty oc_
isla a 0 1 133, 22.
isla a 1 1 150, 6 300, 5 133, 4
isla a 1 2 150, 1 110, 1 300, 2
isla a 4 1 110, 2 150, 5
ttyb 3
intk 77 mult
```

(ENOT)