

Hercules System/370, ESA/390, z/Architecture Emulator

Hercules – Reference Summary

Version 3



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1. Preface

1.1 Edition information

This edition applies to the Hercules S/370, ESA/390 and z/Architecture Emulator, Release 3.06.0 and to all subsequent versions, releases and modifications until otherwise indicated in new editions. Make sure you are using the correct edition for the level of software you are using.

1.2 Revision Notice

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1.3 Readers Comments

If you like or dislike anything of this book please send a mail or email to the address below. Feel free to comment any errors or lack of clarity. Please limit your comments on the information in this specific book and also include the "Revision Notice" just above. Thank you for your help.

Send your comments by email to the Hercules-390 discussion group:

hercules-390@yahooigroups.com

2. Hercules Configuration File

2.1 System Parameters

System Parameter	Description
#	Comment line
ARCHMODE	Initial architecture mode
ASN_AND_LX_REUSE (ALRF)	ESAME ASN and LX REUSE feature
AUTOMOUNT	Tape automount root directory
AUTO_SCSI_MOUNT	Autodetect of SCSI tape mounts
CCKD	Compressed CKD DASD options
CNSLPORT	Telnet client port
CODEPAGE	Codepage conversion table
CONKPALV	Console and telnet clients keep-alive option
CPUMODEL	CPU model
CPUPRIO	CPU thread process priority
CPUSERIAL	CPU serial number
CPUVERID	CPU version code
DEFSYM	Define symbol
DEVPRIO	Device threads process priority
DEVTMAX	Maximum number of device threads
DIAG8CMD	DIAGNOSE 8 cmd setting

System Parameter	Description
ECPSVM	ECPS:VM support status (VM)
ENGINES	Processor engine type
HERCLOGO	Hercules 3270 Logo
HERCPRIO	Hercules process priority
HTTPPORT	HTTP server port
HTTPROOT	HTTP server root directory
IGNORE	Ignore subsequent INCLUDE errors
INCLUDE	Include configuration file
IODELAY	I/O interrupt wait time (LINUX)
LDMOD	Additional dynamic load modules
LEGACYSENSEID	SENSE ID CCW ('X'E4') feature
LOADPARM	IPL parameter
LOGOFILE	Hercules 3270 Logo (deprecated)
LOGOPT	Log options
LPARNAME	LPAR name returned by DIAG x'204'
MAINSIZE	Main storage in MB
MANUFACTURER	Manufacturer name returned by STSI instruction
MODEL	Model name returned by STSI instruction
MODPATH	Dynamic load module path
MOUNTED_TAPE_REINIT	Tape drive reinitialization behaviour

System Parameter	Description
NUMCPU	Number of emulated CPUs
NUMVEC	Number of vector facilities
OSTAILOR	Intended operating system
PANRATE	Panel refresh rate
PANTITLE	Window Panel Title
PGMPRDOS	Emulation of IFL HW
PLANT	Plant name returned by STSI instruction
SHCMDOPT	Shell command option
SHRDPORT	Shared device server port
SYSEPOCH	Base date for TOD clock
TIMERINT	Internal timer update interval
TODDRAG	TOD clock drag factor
TODPRIO	Timer thread process priority
TRACEOPT	Instruction trace display option
TZOFFSET	TOD clock offset from GMT
XPNDSIZE	Expanded storage in MB
YROFFSET	TOD clock offset from actual date

Table 1: Hercules System Parameters

2.2 Device Definitions

Device Type	Device	Emulated by
3270, 3278	Local non-SNA display or printer	TN3270 client connection
SYSG	Integrated 3270 (SYSG) console	TN3270 client connection
1052, 3215	Console printer-keyboards	Telnet client connection
1052-C, 3215-C	Integrated console printer-keyboards	Integrated on Hercules console
1442, 2501, 3505	Card readers	Disk file(s), ASCII or EBCDIC
3525	Card punch	Disk file, ASCII or EBCDIC
1403, 3211	Line printers	Disk file, ASCII
3410, 3420, 3422, 3430, 3480, 3490, 3590, 9347, 8809	Tape drives	Disk file, CD-ROM or SCSI tape
3088	Channel-to-Channel Adapter	"CTCT" driver
((CTCI))	Channel-to-Channel link to host TCP/IP stack	"CTCI" TUN/TAP driver
((LCS))	IBM 2216 router, IBM 3172 running ICP, IBM 8232 LCS device, LCS3172 driver of a P/390, IBM Open Systems Adapter (OSA)	"LCS" (LAN channel station) TUN/TAP driver

Device Type	Device	Emulated by
3310, 3370, 9332, 9335, 9336, 0671	FBA direct access storage devices	Disk file
2305, 2311, 2314, 3330, 3340, 3350, 3375, 3380, 3390, 9345	CKD direct access storage devices	Disk file
2703	Communication line	TCP socket

Table 2: Hercules Device Definitions

3. System Parameter Descriptions

(Comment Lines)

[anything]

ARCHMODE

ARCHMODE { S/370 | ESA/390 |
 ESAME | z/ARCH }

ASN_AND_LX_REUSE (ALRF)

ASN_AND_LX_REUSE { DISABLE | ENABLE }
or
ALRF { DISABLE | ENABLE }

AUTOMOUNT

AUTOMOUNT [± | -] directory

AUTO_SCSI_MOUNT

AUTO_SCSI_MOUNT { NO | n }

CCKD

CCKD option=value [,option=value
 [,option=value] ... , n]

where option can be:

[CACHE={ 8 | cn }]
[,L2CACHE={ 512 | c2n }]
[,RA={ 2 | ran }]
[,RAQ={ 4 | raqn }]
[,RAT={ 2 | ratn }]

```
[ ,WR={ 2 | wrn } ]
[ ,GCINT={ 5 | gcintn } ]
[ ,GCPARM={ 0 | gcparmn } ]
[ ,NOSTRESS={ 0 | 1 } ]
[ ,FREEPEND={ -1 | fpn } ]
[ ,FSYNC={ 0 | 1 } ]
[ ,FTRUNCWA={ 0 | 1 } ]
[ ,TRACE={ 0 | tracen } ]
```

CNSLPORT

```
CNSLPORT { port | host:port }
```

CODEPAGE

```
CODEPAGE { DEFAULT | codepage }
```

CONKPALV

```
CONKPALV (idle,intv,count)
```

CPUMODEL

```
CPUMODEL model
```

CPUPRIO

```
CPUPRIO { 15 | nn }
```

CPUSERIAL

```
CPUSERIAL serial
```

CPUVERID

```
CPUVERID verid
```

DEFSYM

DEFSYM symbol value

DEVPRIO

DEVPRIO { 8 | nn }

DEVTMAX

DEVTMAX { -1 | 0 | 1-n }

DIAG8CMD

DIAG8CMD { DISABLE | ENABLE
[ECHO | NOECHO] }

ECPSVM

ECPSVM { YES | NO | LEVEL nn }

ENGINES

ENGINES [nn*] { CP | IL | AP | IP } [, ...]

HERCLOGO

HERCLOGO filename

HERCPRIO

HERCPRIO { 0 | nn }

HTTPPORT

HTTPPORT port [{ NOAUTH |
AUTH userid password }]

HTTPROOT

HTTPROOT path

IGNORE

IGNORE INCLUDE_ERRORS

INCLUDE

INCLUDE filepath

IODELAY

IODELAY usecs [NOWARN]

LDMOD

LDMOD module module module ... n

LEGACYSENSEID

LEGACYSENSEID [{ OFF | DISABLE } |
 { ON | ENABLE }]

LOADPARAM

LOADPARAM iplparm

LOGOFIELD

The LOGOFIELD system parameter is deprecated. Use the HERCLOGO system parameter instead.

LOGOPT

LOGOPT { TIMESTAMP | NOTIMESTAMP |
 TIME | NOTIME }

LPARNAME

LPARNAME { HERCULES | lparname }

MAINSIZE

MAINSIZE nnnn

MANUFACTURER

MANUFACTURER { HRC | name }

MODEL

MODEL { EMULATOR | name }

MODPATH

MODPATH path

MOUNTED_TAPE_REINIT

MOUNTED_TAPE_REINIT { ALLOW | DISALLOW }

NUMCPU

NUMCPU number

NUMVEC

NUMVEC number

OSTAILOR

OSTAILOR { z/OS | OS/390 | VM | VSE |
LINUX | QUIET | NULL }

PANRATE

PANRATE { SLOW | FAST | rate }

PANTITLE

PANTITLE { text | "text text text" }

PGMPRDOS

PGMPRDOS { RESTRICTED | LICENSED }

PLANT

PLANT { ZZ | name }

SHCMDOPT

SHCMDOPT { DISABLE | NODIAG8 }

SHRDPORT

SHRDPORT { 3990 | port }

SYSEPOCH

SYSEPOCH { 1900 | year
[+years | -years] }

TIMERINT

TIMERINT { 50 | interval }

TODDRAG

TODDRAG factor

TODPRIO

TODPRIO { -20 | nn }

TRACEOPT

TRACEOPT { TRADITIONAL | REGSFIRST |
NOREGS }

TZOFFSET

TZOFFSET { 0000 | +hhmm | -hhmm }

XPNDSIZE

XPNDSIZE nnnn

YROFFSET

YROFFSET { +years | -years }

Process and Thread Priorities

Process Priorities

Unix Process Priority	Windows Priority Class
-20 to -16	Realtime
-15 to -9	High
-8 to -1	Above Normal
0 to 7	Normal
8 to 15	Below Normal
16 to 20	Low

Table 3: Process Priority Conversions

Thread Priorities

Unix Thread Priority	Windows Thread Priority
-20 to -16	Time Critical
-15 to -9	Highest
-8 to -1	Above Normal
0 to 7	Normal
8 to 15	Below Normal
16 to 19	Lowest
20	Idle

Table 4: Thread Priority Conversions

4. Device Definition Descriptions

Local non-SNA 3270 Devices

```
devaddr devtype [ groupname ]
          [ ipaddr [ mask ] ]
```

Integrated 3270 (SYSG) Console

```
devaddr SYSG [ groupname ]
          [ ipaddr [ mask ] ]
```

Note: The device address is ignored for the integrated 3270 (SYSG) console.

Console Printer-Keyboard Devices

```
devaddr devtype [ NOPROMPT ] [ groupname ]
          [ ipaddr [ mask ] ]
```

Integrated Console Printer-Keyboard Devices

```
devaddr devtype [ { prefix | / } ]
```

Card Reader Devices

```
devaddr devtype filename [ arguments ]
```

where arguments are:

```
[ SOCKDEV ] [ EOF ] [ INTRQ ] [MULTIFILE ]
[ EBCDIC [ AUTOPAD ] ] [ ASCII [ TRUNC ] ]
```

Card Punch Devices

```
devaddr devtype filename
          [ ASCII ] [ CRLF ]
```

Line Printer Devices

devaddr devtype filename [CRLF]

Emulated Tape Devices

SCSI Tapes

devaddr devtype devname
[--no-erg]
[{ --blkid-32 | --blkid-22 }]

Optical Media Attach (OMA) virtual files

devaddr devtype tdf

AWSTAPE virtual files

devaddr devtype { aws_filename | * }
[optional arguments]

where optional arguments are:

[[MAXSIZE={ n | 0 }] |
[MAXSIZEK={ n | 0 }] |
[MAXSIZEM={ n | 0 }]]
[EOTMARGIN=n]
[READONLY={ 0 | 1 }]
[{ RO | NORING }]
[{ RW | RING }]
[DEONIRQ={ 0 | 1 }]
[NOAUTOMOUNT]

Fake Tape virtual files

devaddr devtype { fake_filename | * }
[optional arguments]

where optional arguments are:

```
[ [ MAXSIZE={ n | 0 } ] |  
  [ MAXSIZEK={ n | 0 } ] |  
  [ MAXSIZEM={ n | 0 } ] ]  
[ EOTMARGIN=n ]  
[ READONLY={ 0 | 1 } ]  
[ { RO | NORING } ]  
[ { RW | RING } ]  
[ DEONIRQ={ 0 | 1 } ]  
[ AUTOMOUNT | NOAUTOMOUNT ]
```

HET virtual files

```
devaddr devtype { het_filename | * }  
    [ optional arguments ]
```

where optional arguments are:

```
[ AWSTAPE ]  
[ COMPRESS={ 0 | 1 } ]  
[ IDRC={ 0 | 1 } ]  
[ METHOD={ 1 | 2 } ]  
[ LEVEL={ n | 4 } ]  
[ CHUNKSIZE={ nnnnn | 65535 } ]  
[ [ MAXSIZE={ n | 0 } ] |  
  [ MAXSIZEK={ n | 0 } ] |  
  [ MAXSIZEM={ n | 0 } ] ]  
[ EOTMARGIN=n ]  
[ READONLY={ 0 | 1 } ]  
[ STRICTSIZE={ 0 | 1 } ]  
[ { RO | NORING } ]  
[ { RW | RING } ]  
[ DEONIRQ={ 0 | 1 } ]  
[ AUTOMOUNT | NOAUTOMOUNT ]
```

Channel-to-Channel Adapters

CTCI (Channel-to-Channel link to Linux TCP/IP stack)

```
devaddr  CTCI  [ { -n | --dev } name ]
           [ { -d | --debug } ]
           guestip
           hostip
```

CTCI (Channel-to-Channel link to Win32 TCP/IP stack)

```
devaddr  CTCI  [ { -n | --dev }
                 { ipaddr | macaddr } ]
           [ { -d | --debug } ]
           [ -k { nnnn | 1024 } ]
           [ -i { nnnn | 64 } ]
           guestip
           hostip
```

CTCT (Channel-to-Channel emulation via TCP connection)

```
devaddr  CTCT  lport  rhost  rport  bufsize
```

LCS (LAN Channel Station, Linux)

```
devaddr  LCS   [ { -n | --dev } devname ]
                 [ { -o | --oat } file ]
                 [ { -m | --mac } macaddr ]
                 [ guestip ]
```

LCS (LAN Channel Station, Windows)

```
devaddr  LCS   [ { -n | --dev }
                 { ipaddr | macaddr }
                 [ { -o | --oat } file ]
```

```

[ { -m | --mac } macaddr ]
[ -k { nnnn | 1024 } ]
[ -i { nnnn | 64 } ]
[ guestip ]

```

OAT File Syntax

```

*****
* Dev   Mode  Port  Entry specific information
*****
  0400  IP    00    PRI   172.021.003.032
  0402  IP    00    SEC   172.021.003.033
  0404  IP    00    NO    172.021.003.038
  0406  IP    01    NO    172.021.002.016
  040E  SNA   00
HWADD  00    02:00:FE:DF:00:42
HWADD  01    02:00:FE:DF:00:43
ROUTE  00    172.021.003.032  255.255.255.224

```

FBA DASD Devices

```

devaddr devtype filename
        [ { origin | 0 } ]
        [ numblks ]
        [ SF=shadow ]
        [ SYNCIO ]

```

or

```

devaddr devtype ipname
        [ { :port | :3990 } ]
        [ :devnum ]

```

CKD DASD Devices

```

devaddr devtype filename
        [ sf=shadow ]
        [ { NOSYNCIO | SYNCIO } ]
        [ READONLY ]

```

[FAKEWRITE]

[CU=type]

or

devaddr devtype ipname

[{ :port | :3990 }]

[:devnum]

Device Type	Default CU Type
2305, 2311, 2314	2841
3330, 3340, 3350, 3375, 3380	3880
3390	3990
9345	9343

Table 5: Default CU Types

Communication Lines (Preliminary 2703 BSC Support)

devaddr devtype

DIAL={ IN | OUT | INOUT | NO }

LHOST={ hostname | ipaddress | * }

LPORT={ servicename | port }

RHOST={ hostname | ipaddress }

RPORT={ servicename | port }

[RTO={ 0 | -1 | nnn | 3000 }]

[PTO={ 0 | -1 | nnn | 3000 }]

[ETO={ 0 | -1 | nnn | 10000 }]

5. Hercules Console Commands

Command	Description
!message	SCP priority message
*	Log comment to syslog
.reply	SCP command
?	List all panel commands
aea	Display AEA tables
aia	Display AIA tables
ar	Display access registers
archmode	Set architecture mode
attach	Configure device
automount	Tape automount root directory
b / b+	Set breakpoint
b-	Delete breakpoint
cache	Cache command
cckd	CCKD command
cd	Change directory
cf	Configure CPU online or offline
cfall	Configure all CPU's online or offline
clocks	Display TOD clock and CPU timer
cmdtgt	Specify command target
conkpalv	Display/alter console TCP/IP keepalive
cpu	Define target CPU for panel display

Command	Description
	and commands
cr	Display or alter control registers
cscript	Cancel a running script thread
ctc	Enable / disable debug packet tracing
define	Rename device
defsym	Define symbol
detach	Remove device
devinit	Reinitialize device
devlist	List all devices
devtmax	Display or set max device threads
ds	Display subchannel
ecpsvm	ECPS:VM commands
evm	ECPS:VM commands (deprecated, use "ecpsvm" instead)
exit	Synonym for "quit"
ext	Generate external interrupt
f{+/-} addr	Mark frames usable / unusable
fpc	Display floating point control register
fpr	Display floating point registers
g	Turn off instruction stepping and start CPU
gpr	Display or alter general purpose registers
hao	Hercules Automatic Operator
help	Command specific help

Command	Description
herc	Send Hercules command
herclogo	Load a new logo file for 3270 terminal sessions
hst	History of commands
i	Generate I/O attention interrupt for device
iodelay	Display or set I/O delay value
ipending	Display pending interrupts
ipl	IPL normal from device xxxx
iplc	IPL clear from device xxxx
k	Display CCKD internal trace
ldmod	Load a module
loadcore	Load a core image file
loadparm	Set IPL parameter
loadtext	Load a text deck file
log	Direct log output
logopt	Change log options
lsdep	List module dependencies
lsmod	List dynamic modules
maxrates	Display maximum observed MIPS / SIOS rate for the defined interval or define new reoprting interval
msghld	Display or set timeout of held messages
ostailor	Specify intended operating system
panrate	Display or set console refresh rate

Command	Description
pgmtrace	Trace program interrupts
pr	Display prefix register
pscp	Send system control program priority message
psw	Display or alter program status word
ptt	Set / display pthread trace
pwd	Print working directory
qd	Query CKD DASD
quiet	Toggle automatic refresh of panel display data
quit	Terminate the emulator
r	Display or alter real storage
restart	Generate restart interrupt
resume	Resume Hercules
rmmod	Delete a module
s	Instruction stepping
s-	Instruction stepping off
s?	Instruction stepping query
s{+/-} dev	Turn CCW stepping on / off
s+	Instruction stepping on
savecore	Save a core image file
scp	Send system control program command
script	Run a sequence of panel commands contained in a file

Command	Description
scsimount	Automatic SCSI tape mounts
sf-	Remove a shadow file
sf+	Create a new shadow file
sf=	Rename a shadow file
sfc	Compress a shadow file
sfd	Display shadow file statistics
sfk	Perform chkdsk on the active shadow file
sh	Shell command
shrd	SHRD command
sizeof	Display size of structures
ssd	Signal Shutdown
start	Start CPU (or printer device, if argument given)
startall	Start all CPU's
stop	Stop CPU (or printer device, if argument given)
stopall	Stop all CPU's
store	Store CPU status at absolute zero
suspend	Suspend Hercules
syncio	Display syncio device statistics
sysclear	Issue system clear reset manual operation
sysreset	Issue system reset manual operation
t	Instruction trace

Command	Description
t-	Instruction trace off
t?	Instruction trace query
t{+/-} CKD	Turn CKD_KEY tracing on / off
t{+/-} dev	Turn CCW tracing on / off
t+	Instruction trace on
timerint	Display or set timers update interval
tib	Display TLB tables
toddrag	Display or set TOD clock drag factor
traceopt	Instruction trace display option
tt32	Control / query CTCI-W32 functionality
tt32stats	Display CTCI-W32 statistics (deprecated: use "tt32" instead)
u	Disassemble storage
v	Display or alter virtual storage
version	Display version information

Table 6: Hercules Panel Commands

.reply (SCP command)

.any_reply

!message (SCP priority message)

!prio_msg

*** (Log comment to syslog)**

* anytext

? (List all panel commands)

?

AEA (Display AEA tables)

AEA

AIA (List AIA fields)

AIA

AR (Display access registers)

AR

ARCHMODE (Set architecture mode)

ARCHMODE [S/370 | ESA/390 |
ESAME | z/ARCH]

ATTACH (Configure device)

ATTACH devn type [arguments ...]

AUTOMOUNT (Tape automount root directory)

AUTOMOUNT { ADD dir | DEL dir | LIST }

B / B+ (Set breakpoint)

B[+] { addr | addr - addr }

B- (Delete breakpoint)

B-

CACHE (Cache command)

CACHE

CCKD (CCKD command)

CCKD [HELP | STATS | OPTS |
option=value [,option=value
[,option=value] ... , n]]

where option can be:

[COMP=cn]
[,COMPPARM=cpn]
[,RA={ 2 | ran }]
[,RAQ={ 4 | raqn }]
[,RAT={ 2 | ratn }]
[,WR={ 2 | wrn }]
[,GCINT={ 5 | gcintn }]
[,GCPARM={ 0 | gcparmn }]
[,NOSTRESS={ 0 | 1 }]
[,FREEPEND={ -1 | fpn }]
[,FSYNC={ 0 | 1 }]
[,TRACE={ 0 | tracen }]

CD (Change directory)

CD path

CF (Configure CPU online or offline)

CF [ON | OFF]

CFALL (Configure all CPUs online or offline)

CFALL [ON | OFF]

CLOCKS (Display TOD clock and CPU timer)

CLOCKS

CMDTGT (Specify command target)

CMDTGT { HERC | SCP | PSCP | ? }

CONKPALV (Specify TCP/IP keep alive settings)

CONKPALV (idle,intv,count)

CPU (Define target CPU for panel displays and commands)

CPU n

CR (Display or alter control registers)

CR [nn=xxxxxxxx | nn=xxxxxxxxxxxxxxxxxxxx]

CSCRIPT (Cancel a running script thread)

CSCRIPT

CTC (Enable / disable debug packet tracing)

CTC DEBUG { ON | OFF } [devnum | ALL]

DEFINE (Rename device)

DEFINE olddevice newdevice

DEFSYM (Define symbol)

DEFSYM [symbol [value]]

DETACH (Remove device)

DETACH device

DEVINIT (Reinitialize device)

DEVINIT devnum [arg [arg [arg ... n]]]

DEVLIST (List all devices)

DEVLIST

DEVTMAX (Display or set maximum device threads)

DEVTMAX [-1 | 0 | 1-n]

DS (Display subchannel)

DEVTMAX devnum

ECPSVM (ECPS:VM commands)

ECPSVM [HELP | STATS | DISABLE |
ENABLE | DEBUG | NODEBUG |
LEVEL]

or (with abbreviated arguments)

```
ECPSVM [ H(elp) | ST(ats) | DIS(able) |  
        EN(able) | DEBUG | NO(debug) |  
        L(evel) ]
```

EVM (ECPS:VM commands)

The EVM command is deprecated. Use the ECPSVM command instead.

EXIT (Terminate the emulator)

EXIT

EXT (Generate external interrupt)

EXT

FPC (Display floating point control register)

FPC

FPR (Display floating point registers)

FPR

F{+/-} (Mark frames usable or unusable)

F { + | - } addr

G (Turn off instruction stepping and start CPU)

G

GPR (Display or alter general purpose registers)

GPR [nn=xxxxxxx | nn=xxxxxxxxxxxxxxxxxxx]

HAO (Hercules Automatic Operator)

HAO TGT target

HAO CMD command

HAO LIST [nn]

HAO DEL nn

HAO CLEAR

HELP (Command specific help)

HELP command

HERC (Send Hercules command)

HERC [cmd]

HERCLOGO (Load new logo file)

HERCLOGO [filename]

HST (History of commands)

HST | HST -1 | HST n | HST { 1 | 0 }

I (Generate I/O attention interrupt for device)

I device

IODELAY (Display or set I/O delay value)

IODELAY [usecs [NOWARN]]

IPENDING (Display pending interrupts)

IPENDING

IPL (IPL normal from device xxxx)

IPL { devnum | filename } [PARM string]

IPLC (IPL clear from device xxxx)

IPLC { devnum | filename } [PARM string]

K (Display CCKD internal trace)

K

LDMOD (Load a module)

LDMOD module

LOADCORE (Load a core image file)

LOADCORE filename [{ address | 0 }]

LOADPARAM (Set IPL parameter)

LOADPARAM [ipl_parameter]

LOADTEXT (Load a text deck file)

LOADTEXT filename [address]

LOG (Direct log output)

LOG newfile

LOGOPT (Change logging options)

LOGOPT [TIMESTAMP | NOTIMESTAMP |
TIME | NOTIME]

LSDEP (List module dependencies)

LSDEP

LSMOD (List dynamic modules)

LSMOD

MAXRATES (Display maximum observed MIPS / SIO rate)

MAXRATES [interval]

MSGHLD (Display or set timeout of held messages)

MSGHLD [nnn | INFO | CLEAR]

OSTAILOR (Specify intended operating system)

OSTAILOR [z/OS | OS/390 | VM | VSE |
LINUX | QUIET | NULL]

PANRATE (Display or set console refresh rate)

PANRATE [SLOW | FAST | rate]

PGMTRACE (Trace program interrupts)

PGMTRACE [[-] intcode]

PR (Display prefix register)

PR

PSCP (Send system control program priority message)

PSCP [cmd]

PSW (Display or alter program status word)

PSW [operand=value
[operand=value] [...]]

where operand is one of the following:

SM=xx

PK=nn

CMWP=x

AS=[PRI | SEC | HOME]

CC=n

PM=x

IA=xxxxxxxx

AS=[24 | 31 | 64]

PTT (Set / display pthread trace)

PTT [[{ NOTIMER | TIMER }]
[{ NOTHREADS | THREADS }]
[{ NOLOCK | LOCK }]
[{ NOTOD | TOD }]
[{ NOWRAP | WRAP }]
[{ NOLOGGER | LOGGER }]]
[TO=nnn] mmmmm

PWD (Print working directory)

PWD

QD (Query CKD DASD)

QD [address]

QUIET (Toggle automatic refresh of panel display data)

QUIET

QUIT (Terminate the emulator)

The QUIT command is a synonym for "EXIT" and initiates the Hercules shutdown. For details please refer to the EXIT command.

R (Display or alter real storage)

R addr [.len]

or

R addr=value

RESTART (Generate restart interrupt)

RESTART

RESUME (Resume Hercules)

RESUME

RMMOD (Delete a module)

RMMOD module

SAVECORE (Save a core image to a file)

SAVECORE filename

[{ start | * }]

[{ end | * }]

SCP (Send system control program command)

SCP [cmd]

SCRIPT (Run a sequence of commands contained in a file)

SCRIPT filename [filename [... [n]]]

SCSIMOUNT (Automatic SCSI tape mounts)

SCSIMOUNT [NO | n]

SF+ (Create a new shadow file)

SF+ { device | * }

SF- (Remove a shadow file)

SF- { device | * }
[MERGE | NOMERGE | FORCE]

SF= (Rename a shadow file)

SF= device newfile

SFC (Compress a shadow file)

SFC { device | * }

SFD (Display shadow file statistics)

SFD { device | * }

SFK (Perform chkdsk on an active shadow file)

SFK { device | * } [n]

SH (Shell command)

SH command [arg_1
 [arg_2 [...]]]

SHRD (SHRD Command)

SHRD TRACE[=n]

SIZEOF (Display size of structures)

SIZEOF

SSD (Signal shutdown)

SSD

START (Start CPU or printer device)

START [devicenum]

STARTALL (Start all CPUs)

STARTALL

STOP (Stop CPU or printer)

STOP [devicenum]

STOPALL (Stop all CPUs)

STOPALL

STORE (Store CPU status)

STORE

SUSPEND (Suspend Hercules)

SUSPEND

SYNCIO (Display SYNCIO device statistics)

SYNCIO

SYSCLEAR (Issue system CLEAR RESET manual operation)

SYSCLEAR

SYSRESET (Issue system RESET manual operation)

SYSRESET

S (Turn instruction stepping on or off)

S { + | - | ? | 0 }
[addr-addr | addr:addr | addr.length]

S{+/-}dev (Turn CCW stepping on or off)

S { + | - } devaddr

TIMERINT (Display or set timers update interval)

TIMERINT [interval]

TLB (Display TLB tables)

TLB

TODDRAG (Display or set TOD clock drag factor)

TODDRAG [factor]

TRACEOPT (Instruction trace display options)

```
TRACEOPT [ TRADITIONAL | REGSFIRST |  
          NOREGS ]
```

TT32 (Control / query CTCI-W32 functionality)

```
TT32 [ debug | nodebug |  
      stats { devnum } ]
```

TT32STATS (Display CTCI-W32 statistics)

The TT32STATS command is deprecated. Use the TT32 command instead.

T (Turn instruction tracing on or off)

```
T { + | - | ? | 0 }  
  [ addr-addr | addr:addr | addr.length ]
```

T{+/-}dev (Turn CCW tracing on or off)

```
T { + | - } devaddr
```

T{+/-}CKD (Turn CKD_KEY tracing on or off)

```
T { + | - } CKD
```

U (Disassemble storage)

```
U address [ .length ]
```

V (Display or alter virtual storage)

```
V [ { P | S | H } ] addr [ .len ]  
  or
```

```
V [ { P | S | H } ] addr-addr  
  or
```

V [{ P | S | H }] addr=value

VERSION (Display version information)

VERSION

6. Hercules Utilities

DASDCAT (Display PDS datasets and members)

```
DASDCAT [ -i image [ sf=shadowfile ]
         pdsname/spec:flags ]
```

DASDCONV (DASD image file conversion program)

```
DASDCONV [ -option [ -option [ ... ] ] ]
          { infile | - } outfile
```

where options are:

```
-r      (replace output file)
-lfs   (create single file even if > 2GB)
-q     (quiet option, suppress progress
       messages)
```

DASDCOPY (Copy DASD file to another DASD file)

```
DASDCOPY [ -option [ -option [ ... ] ] ]
          infile [ SF=shadowfile ] outfile
```

where options are:

```
-v      (display version info and help text)
-h      (display help text and quit)
-q      (quiet mode, suppress status)
-r      (replace output file)
-z      (compress using zlib (default))
-bz2    (compress using bzip2)
-0      (do not compress output)
-BLKS n (size of output FBA file)
```

-CYLS n (size of output CKD file)
-a (create output CKD file with alternate cylinders)
-lfs (create single file even if > 2GB)
-o type (output file type: CKD, CCKD, FBA, CFBA)

DASDINIT (DASD image file creation)

```
DASDINIT [ -option [ -option [ ... ] ] ]  
          filename devtype[ -model ]  
          volser [ size ]
```

where options are:

-v (display version info and help text)
-z (compress using zlib; default is bzip2)
-0 (build image file with no compression)
-lfs (create single file even if > 2GB)
-a (include alternate cylinders)
-linux (null track images will look like linux DASDFMT'ed images)

DASDISUP (Fix XCTL tables in SVCLIB)

```
DASDISUP outfile [ SF=shadowfile ]
```

DASDLOAD (DASD loader program)

```
DASDLOAD [ -option [ -option [ ... ] ] ]  
          ctlfile outfile msglevel
```

where options are:

-z (compress using zlib)
-bz2 (compress using bzip2)
-0 (do not compress output)
-lfs (create single file even if > 2GB)

-a (include alternate cylinders)

Control File

The control file is an ASCII text file consisting of a *volume statement* followed by one *dataset statement* for each dataset to be created.

Volume Statement

```
volser devtype[ -model ]  
      [ cyls [ ipltext ] ]
```

Dataset Statement

```
dsname method units pri sec dir ...  
... dsorg recfm lrecl blksize keylen
```

DASDLS (List datasets on a volume)

```
DASDLS filename [ SF=shadowfile ]
```

DASDPDSU (PDS unload utility)

```
DASDPDSU filename [ SF=shadowfile ]  
          pdsname [ ASCII ]
```

DASDSEQ (Display sequential datasets)

```
DASDSEQ [ -DEBUG ] [ -EXPERT ] [ -ASCII ]  
        image [ SF=shadowfile ] filespec
```

CCKDCDSK (CCKD DASD file integrity verification, recovery and repair utility)

```
CCKDCDSK [ -option [ -option [ ... ] ] ]  
          filename
```

where options are:

-v (display version info and exit)

-f (force check even if OPENED bit is on)

-ro (open file read-only, no repairs)
-level (level of checking, 1-4)

CCKDCOMP (CCKD DASD file compression utility)

CCKDCOMP [-option [-option [...]]]
filename

where options are:

-v (display version info and exit)
-f (force check even if OPENED bit is on)
-level (level of checking, 1-4)

CCKDDIAG (CCKD DASD file diagnostics utility)

CCKDDIAG [-option [-option [...]]]
Filename

where options are:

-v (display version info and exit)
-d (display DEVHDR)
-c (display CDEVHDR)
-l (display L1TAB (l = numeric one))
-g (enable debug output)

CKD track related options:

-a cc hh (display absolute CCHH data)
-r tt (display relative TT data)
-2 (display L2TAB related to -a or -r)
-t (display track data)
-x (hex display track / key data)
-o oo ll (hex display data at offset oo of length ll)

CCKDSWAP (CCKD DASD file swap-endian program)

CCKDSWAP filename

CKD2CCKD

The CKD2CCKD is obsolete, it is replaced through the DASDCOPY utility which performs the same and additional functions.

CCKD2CKD

The CCKD2CKD is is obsolete, it is replaced through the DASDCOPY utility which performs the same and additional functions.

TAPECOPY (Copy a SCSI tape to or from an AWSTAPE disk file)

TAPECOPY [tapedrive] [awsfile]

or

TAPECOPY [awsfile] [tapedrive]

TAPEMAP (Show content of an AWS or HET tape)

TAPEMAP filename

TAPESPLT (Split an AWS tape file)

TAPESPLT infile outfile count

HETGET (Extract files from an AWSTAPE or HET tape file)

HETGET tapefile outfile filenum

HETINIT (Initialize an AWS or HET tape file)

HETINIT [-option [-option [...]]]

Filename [volser] [owner]

where options are:

- d (disable compression, create AWSTAPE file)
- h (display help text)
- i (create IEHINITT formatted tape, default)
- n (create NL (non labeled) tape)

HETMAP (Show content of an AWS or HET tape file)

HETMAP filename

HETUPD (Update and/or copy an AWS or HET tape file)

HETUPD [-option [-option [...]]]
source [destination]

where options are:

- 1...9 (compression level (1=fast, 9=best))
- b (use bzlib compression)
- c n (set chunk size to n)
- d (decompress source tape file)
- h (display help text)
- r (rechunk tape file)
- s (strict AWSTAPE specification)
- v (verbose information)
- z (use zlib compression)

DMAP2HRC (P/390 DEVMAP conversion program)

DMAP2HRC filename

7. Shared Device Support

```
loc_devnum  devtype
             host[:port][:rem_devnum]
             [ COMP=n ]
```

8. Hercules 3270 Logo

Set Buffer Address

Set Buffer Address to row x and column y.

@SBA x,y

Set Field

Set Field to highlight ("H") and/or protected ("P").

@SF { H | P | HP }

New Line

Force a skip to a new line.

@NL

Align

Specify text alignment.

@ALIGN { NONE | LEFT | RIGHT | CENTER }

Variables

\$(VERSION)

The Hercules version.

\$(HOSTNAME)

The host name, on which Hercules is running.

\$(HOSTOS)

The host operating system.

\$(HOSTOSREL)

The release of the host operating system.

\$(HOSTOSVER)

The version of the host operating system.

\$(HOSTARCH)

The host architecture.

\$(HOSTNUMCPUS)

The number of host CPUs. UP (Uniprocessor for one CPU), or MP=n (Multiprocessor for more than one CPUs).

\$(CSS)

The logical channel subsystem set or channel set for the terminal.

\$(SUBCHAN)

The subchannel number for the terminal.

\$(CCUU), \$(ccuu), \$(CUU), \$(cuu)

Various forms of the device number of the terminal.

9. Starting the Hercules Emulator

Starting Hercules in Native Mode

```
HERCULES [ -f filename ]  
         [ -d ]  
         [ -b logfile ]  
         [ -p dyndir ]  
         [ [ -l dynmod ] ... ]  
         [ >logfile ]
```

Starting Hercules with the Windows GUI

```
HERCGUI [ -f filename ]
```

10. Using the keyboard

Normal cursor handling

The normal cursor handling is available on all platforms (Windows and Unix).

Key	Action
Esc	Erases the contents of the command input area. If the command input area is already empty, switches to semi-graphical New Panel.
Del	Deletes the character at the cursor position.
Backspace	Erases the previous character.
Insert	Toggles between insert mode and overlay mode.
Tab	Attempts to complete the partial file name at the cursor position in the command input area. If more than one possible file exists, a list of matching file names is displayed.
Home	Moves the cursor to the start of the input in the command input area. If the command input area is empty, scrolls the message area to the top.
End	Moves the cursor to the start of the input in the command input area. If the command input area is empty, scrolls the message area to the bottom.
Page Up	Scrolls the message area up one screen.
Page Down	Scrolls the message area down one screen.
Up arrow	Recalls the previous command into the input area.

Key	Action
Down arrow	Recalls the next command into the input area.
Right arrow	Moves cursor to the next character of the input area.
Left arrow	Moves cursor to the previous character of the input area.
Ctrl + Up arrow	Scrolls the message area up one line.
Ctrl + Down arrow	Scrolls the message area down one line.
Ctrl + Home	Scrolls the message area to the top.
Ctrl + End	Scrolls the message area to the bottom.

Table 7: Normal cursor handling

Extended cursor handling

The following additional keyboard functions are effective when the Hercules Extended Cursor Handling feature is activated at compile time. At present, this feature is activated on the Windows platform only.

Key	Action
Alt + Up arrow	Moves cursor up one row.
Alt + Down arrow	Moves cursor down one row.
Alt + Right arrow	Moves cursor right one column.
Alt + Left arrow	Moves cursor left one column.
Tab	If the cursor is outside the command input area, moves cursor to the start of the input in the command input area.

Key	Action
	Otherwise behaves like as described in the previous table.
Home	If the cursor is outside the command input area, moves cursor to the start of the input in the command input area. Otherwise behaves like as described in the previous table.
End	If the cursor is outside the command input area, moves cursor to the end of the input in the command input area. Otherwise behaves like as described in the previous table.

Table 8: Extended cursor handling

Appendix A: Supported DASD Device Types

The symbol “[*]” in the size column means that any size can be specified, else the size defaults to the first listed model.

CKD Devices

Devicetype-Model	Cylinders	Alternate Cylinders
IBM 2311	[*]	
IBM 2311-1	200	2
IBM 2314	[*]	
IBM 2314	200	3
IBM 3330	[*]	
IBM 3330-1	404	7
IBM 3330-2	808	7
IBM 3330-11	808	7
IBM 3340	[*]	
IBM 3340-1	348	1
IBM 3340-35	348	1
IBM 3340-2	696	2
IBM 3340-70	696	2
IBM 3350	[*]	
IBM 3350-1	555	5
IBM 3375	[*]	
IBM 3375-1	959	1
IBM 3380	[*]	
IBM 3380-1	885	1

Devicetype-Model	Cylinders	Alternate Cylinders
IBM 3380-A	885	1
IBM 3380-B	885	1
IBM 3380-D	885	1
IBM 3380-J	885	1
IBM 3380-2	1770	2
IBM 3380-E	1770	2
IBM 3380-3	2665	3
IBM 3380-K	2665	3
EMC 3380 K+	3339	3
EMC 3380 K++	3993	3
IBM 3390	[*]	1
IBM 3390-1	1113	1
IBM 3390-2	2226	2
IBM 3390-3	3339	1
IBM 3390-9	10017	3
IBM 3390-27	32760	3
IBM 3390-54	65520	3
IBM 9345	[*]	
IBM 9345-1	1440	0
IBM 9345-2	2156	0

Table 9: Supported CKD DASD Devices

FBA Devices

Devicetype-Model	Blocks
IBM 3310	[*]
IBM 3310-1	125664
IBM 3370	[*]
IBM 3370-A1	558000
IBM 3370-B1	558000
IBM 3370-A2	712752
IBM 3370-B2	712752
IBM 9313	[*]
IBM 9313-1	246240
IBM 9332	[*]
IBM 9332-200	360036
IBM 9332-400	360036
IBM 9336-600	554800
IBM 9335	[*]
IBM 9335-1	804714
IBM 9336	[*]
IBM 9336-10	920115
IBM 9336-20	1672881
IBM 9336-25	1672881
IBM 0671-08	513072
IBM 0671	574560
IBM 0671-04	624456

Table 10: Supported FBA DASD Devices

Appendix B. Reading Syntax Diagrams

All syntax diagrams in this book (configuration statements, panel commands) use a common structure. This structure is explained in the following table.

KEYWORDS	Keywords are denoted with upper case letters. Obey the spelling. In the actual statements or commands they can be coded in upper case or lower case letters.
Variables	All user defined values are denoted with lower case letters. In the actual statements or commands they can be coded in upper case or lower case letters.
{ }	Signifies that all, or some portion, of the code elements between the braces are required elements. Note that the braces are not part of the statements and must be not coded.
[]	Signifies that all, or some portion of the code elements between the square brackets can optionally appear but are not required elements. Note that the square brackets are not part of the statements and must be not coded.
	The OR symbol signifies that you may use only one of the code elements or values from the possible choices. Note that the OR symbol is not part of the statements and must be not coded.

<p>... , n</p>	<p>Signifies that there can be more than one value in a comma delimited list. Note that the dots and the <i>n</i> are not part of the statements and must be not coded.</p>
<p>... n</p>	<p>Signifies that there can be more than one value in a blank space delimited list. Note that the dots and the <i>n</i> are not part of the statements and must be not coded.</p>

Table 11: Reading Syntax Diagrams