1. What is hexed?

The Hexed is short for Hexapod Daemon. The IRTF secondary mirror is mounted on a Physik Instrumente HEXEAPOD unit. For details about the HEXAPOD unit refer to the vendor's documentation. The HEXAPOD Controller (HEXC) provides serial data communication to the HEXAPOD unit.

The HEXC's RS-232 interface is connected to digimim, a Digi portserver II terminal server. digimim provides access to the HEXC RS-232 interface over TCP/IP. The Digi Portserver only services a single TCP/IP connect per port. The hexed daemon runs on an IRTF computer. Its purpose is to multiplex this single TCP/IP port, providing users and telescope application simultaneous access to the HEXC serial interface. Hexed replaces the Tip-Tilt ttconx/hexe programs that ran on mother (ttconx/hexe only provided exclusive access to HEXC's RS-232).

Hexed actually provide up to 5 concurrent TCP/IP connections. Normally host programs should connect, communication, then disconnect to the Hexed. Used in some cases permanent socket connection are used (Telnet for example).

2. Starting and Stopping the HexeD

Hexed is automatically started when the hexed_host is running. To stop and restart the daemon you should used the start/stop script /etc/init.d/hexed, for example do:

    1. Login to hexed_host and become root.

    2. Kill the hexed (if it is running):
```
% /etc/init.d/hexed stop
```

    3. Start the hexed
```
% /etc/init.d/hexed start
```

3. How do I use HexeD?

Here are 3 methods to used the HexeD to command the HEXAPOD. They are presented here in order of preference:

3.1 HexeGUI

An X based GUI to the HexeD is available on all IRTF Suns. HexeGUI is the HEXAPOD interface for observers and the IRTF staff. Refer to the HexeGUI Documentation.

3.2 HexeIO

A simple hexeio program does a single command/reply sequence. This is a useful utility for 3rd party application and scripts. Refer to the HexeIO documentation.

3.3. Telnet

You may also telnet to the hexed. Up to 5 network connections are provide by the hexed. A telnet session consumes 1 network connection. The user should exit then the telnet session is not needed. To open a telnet session you must be login into one of the IRTF workstation on the summit (a firewall restrictions). Used Stefan or boltzmann. Next, telnet to the hexed_host using port 30015. There is an example session. The bold letter indicated what the used typed:

```
> telnet duke 30015
Trying 128.171.165.3...
Connected to duke.
Escape character is '^]'.
version
HexeDaemon v02.08 Aug 29 2002
Right now is 08/29/2002 12:48:56
no error   -HD.EOC
stat n20
Commanded hexapod positions
Dimension             X         Y         Z         U         V         W
Transl. [mm]     -1.2500   -1.5000   -1.7010
Rotation [rad]                                  0.0125    0.0067    0.0000
no error   -HD.EOC
exit
closing connection.
Connection closed by foreign host.
```

After connecting with telnet, you can type HEXEAPOD, or built in hexed commands.

Type 'exit' to close the session.

4. HexeD built-in commands

Normally the hexed just passes commands to the hexapod. There are a few internal hexed commands. These commands are described here:

die – Kills hexed.

    Syntax   `die`

exit – closes the telnet session used by the current client.

    Syntax   `exit`

focus – Set the focus value by setting the Z value on the hexapod.

    Syntax   `Focus z`
    Range   *z* – Value for Z. Limit to -8.0 to 8.0.

getfocus – prints the current Z values. Z indicated the focus value..

    Syntax   `GetFocus`

help – prints a summary of all the internal hexed commands.

    Syntax   `help`

hexe – passes a string to the hexed.

    Syntax   `Hexe string`
    Range   *string* – Any legal Hexapod Command.

IncFocus – Changes the focus value by incrementing the Z value on the hexapod by N.

    Syntax   IncFocus *n*
    Range   *n* – A value between -2.0 to 2.0. Note the resulting Z value is limited to -8.0 to 8.0.

log – Make the hexed writes a string to stdout.

    Syntax   `log string`
    Range   *string* – Any string.

show.GV – Prints out some hexed application variables.

    Syntax   `Show.GV`

verbose – Set the level of debug output printed by the deamon.

    Syntax   `verbose v`
    Range   *0 to 2* – The Lowest is 0 (default). Higher the value the move debug output.

version – Prints out the name and version number for hexed.

    Syntax   `version`

sim – Set the simulation flag. In simulation mode, no data is set to the digiport. Any HEXAPOD string are just reversed and returned to the caller.

    Syntax   `sim { off | on }`
    Range   *off* – disable simulation (default).
               on – enables simulation..

Z – Set the focus value by setting the Z value on the hexapod. (same as Focus).

    Syntax   `z z`
    Range   z – Value for Z. Limit to -4.0 to 4.0.

5. HexeD FAQ

5.1 Where is the source code?

Contact the IRTF.

5.2 Any details on the RS-232 to digiPortServer II interface?

The HEXC's RS-232 was connected to port 2016 of a Digi PortServer II named digimim. The configuration for port #16 is

```
set line range=16 parity=N csize=8 error=null
set line range=16 baud=9600 stopb=1 break=ignore inpck=off istrip=off onlcr=off otab=off
set flow range=16 ixon=off aixon=off ixoff=off ixany=off itoss=off altpin=off
set flow range=16 rts=on dtr=off cts=on dcd=off dsr=off ri=off
set keys range=16 xon=^Q xoff=^S xona=^Q xoffa=^S
set keys range=16 eof=^D erase=^H intr=^C kill=^U tesc=^]
set port range=16 dev=prn sess=4 termtype=host uid=0 edelay=1 auto=off bin=off group=0
set port range=16 dest=0.0.0.0 dport=0
```

5.4 Prior the digimin. Hexapod was connected to digicass, a port server 16. What was the configuration information for that setup?

The HEXC's RS-232 was connected to port 2004 of a Digi PortServer 16 named digicass. The configuration for port #4 is:

```
set ports range=4 termtype="host" dev=prn sess=4 uid=0 edelay=1^M
set ports range=4 auto=off bin=off group=0 dport=0 dest=255.255.255.255^M
set line range=4 baud=9600 csize=8 parity=N stopb=1 break=ignore^M
set line range=4 error=null inpck=off istrip=off onlcr=off otab=off^M
set flow range=4 ixon=off aixon=off ixoff=off ixany=off itoss=off altpin=off^M
set flow range=4 rts=on dtr=off cts=on dcd=off dsr=off ri=off^M
set keys range=4 eof=^D erase=^H flush=^@ intr=^C kill=^E lnxt=^V^M
set keys range=4 tesc=^] xon=^S xoff=^Q xona=^S xoffa=^Q^M
set logins range=4 cmdprompt="digi>" logprompt="login:"^M
set logins range=4 passprompt="passwd:"^M
set logins range=4 write=off login=on passwd=on verbose=off^M
```

On Nov 14, 2002 the serial port was moved from digicass to digimim (a portserver II).

5.5 If I have a question about hexed, who should I contact?

The hexed was written by Tony Denault denault@irtf.ifa.hawaii.edu.