Part V
QUICK REFERENCE GUIDE

10 Quick Reference Guide

This section is intended to provide a guide for the experienced user, and contains one line summaries of some of the most commonly used commands, arranged approximately in the order of an observing session. More detail of the individual commands is given in Part VI. In this section some abbreviations (set up as Defstrings under ICL) are used. If in doubt about a particular function please refer to Part VI.

10.1 Starting Up

– Create a DECTERM window on the observing VaxStation (usually, LPVS2) and login as OBSERVER

– Now type `LPVF` and login to LPVF (the VAX 4000) with the same username and password

– Read the news and the see the diskspace available on the datadisk displayed

– Type `ICL` to start the observing system. Answer the prompts – the MIMIC displays are usually put on LPVS2.

– As the MIMIC screens fill with mechanism positions and settings, check for any 'bad status' colours. The colour coding is as follows:

Green:	set ok	Blue:	mechanism moving
Red:	error status	White:	not in use

– During 3pm handover tests, SA or observer should check for bad status, and move some mechanisms in ISIS, A&G Box, Autoguider and AuxPort (if being used). Also, `SETUP` and `WINDOW` all the CCDs to be used, and take quick arc or test exposures on ISIS/FOS/AuxPort to check optical paths are clear and data flow to the DMS is ok. The Duty Tech will test the Telescope, and jointly you should fill in the handover log.

10.2 Taking Data - the Data Acquisition System

A typical command specifies a *channel* (`RED`, `BLUE`, `FOS` or `AUX`); an exposure time t (sec); a *title*; an observation type *obstype* (e.g., `ARC`, `BIAS`, `TARGET`, etc); and sometimes the number *num* of the output file in a scratch area. The DAS commands are:

`RUN`	*chann*	t	*title*	Take an exposure of an astronomical target
`TARGET`	*chann*	t	*title*	Same as `RUN`
`FLAT`	*chann*	t	*title*	Take a flat-field exposure
`SKY`	*chann*	t	*title*	Take a sky-flat exposure
`ARC`	*chann*	t	*title*	Take an arc (doesn't control the lamps)

`MAP`	*chann*	*t*	*title*	Take a dekker-map exposure
`DARK`	*chann*	*t*	*title*	Take a dark exposure (shutter not opened)
`BIAS`	*chann*		*title*	Take a 0-sec exposure
`FLASH`	*chann*		*title*	Ditto with preflash
`GLANCE`	*chann*	*obstype*	*t*	A 'quicklook' - put data in DMS only (no headers)
`KEEP`	*chann*		*title*	Keep a `GLANCE` file
`SCRATCH`	*chann*	*num*	*obstype*	*t title.* As `RUN`, but data saved as file *num* in scratch area
`WINK`	*chann*	*num*	*obstype*	*t title.* As `SCRATCH`, but no headers are collected
`PROMOTE`	*num*			Promote scratch file *num* to normal `RUN` file status

It is possible to take a set of n identical exposures with the command

`MULTRUN` *chann* n *title*

and there are similar commands `MULTFLAT`, `MULTARC`, etc.

DAS commands to modify or end exposures are:

`PAUSE`	*chann*		Pause an exposure
`CONTINUE`	*chann*		Continue a paused exposure
`FINISH`	*chann*		End an exposure and save the data
`ABORT`	*chann*		End an exposure and discard the data
`NEWTIME`	*chann*	*t*	Set a new exposure time

The command

`DIR`

lists the `RUN` and `SCRATCH` files taken during the night.

10.3 Setting Up The CCDs

The typical configuration is CCD1=RED, CCD2=BLUE, CCD3=FOS (or AUX).
This may change; `DET_SHOW_CONF` shows the actual configuration.

Check when CCDs were last filled with liquid N_2 and fill if necessary. Check CCD temperatures are correct (see MIMIC screen for CCD1, etc).

`SETUP RED/BLUE/FOS/AUX`	to setup the default formats: 1280 in X, 1180 in Y for EEV3 & EEV6; 1124×1124 for Tek
`WINDOW RED/BLUE/FOS/AUX`	to window, just answer the questions.
`DISABLE_WINDOWS RED/BLUE/FOS/AUX`	to disable windows (and `ENABLE_WINDOWS` to restore).
`SEND CCDn OBEY CANCEL_WINDOWS MOVE` *h*	to clear windows completely (h=head number)

To change CCD readout speeds:

`SLOUCH RED/BLUE/FOS/AUX`	set slow readout speed
`SPEEDY RED/BLUE/FOS/AUX`	set fast speed (NB slightly higher readout noise)
`BIN RED/BLUE/FOS/AUX`	set on-chip binning factors in X and Y

To manually open and close the CCD shutters, use:
`OP`n, `CL`n, where n=R, B, F or A.

10.3.1 Rotation and Focus

Rotation: Use the narrow (`1.2"`) dekker, and tungsten lamp. On the DMS measure the position of the left & right ends of the narrow spectrum with `Y-FIND` command. Rotate cryostat manually (as described in section 8.3.1) if shift exceeds 0.3 pixels.

Focus: Setup a wide window on chip, with `WINDOW` params:

RED (CCD1; EEV3 chip) 1,210,1278,720
BLUE (CCD2; Tek chip) 1,160,1122,680

Use arc lamps: CuNe is usually best around 7000Å for the RED arm, CuAr around 4500Å for the BLUE arm. The 'focus-loop' is:

`SLIT 200`	Set slit width of 200 μm
`DEKKER 6`	Select the long–slit dekker
`B(R)HART 1`	Close blue (or red) arm left Hartmann shutter only
`GLANCE BLUE(RED) ARC` t	Take a t sec test exposure
DMS> `FOCUS`	and select 3 strong unblended lines with the cursor
DMS> `FOCUS-LEFT`	See the 9 centroid positions & FWHM values listed
`B(R)HART 2`	Close the blue (or red) arm right shutter only
`GLANCE BLUE(RED) ARC` t	Take a second t sec test exposure
DMS> `FOCUS-RIGHT`	List new positions, FWHMs and Hartmann shifts
	If average shift >0.1pixel, move collimator and loop back to `B(R)HART 1` line

Moving the BLUE or RED collimator position (`RCOLL, BCOLL` command) by 1000 units will change the Hartmann shift by 0.5 pixels. See Whiteboard for the *direction* to go.

Current collimator settings are on the white-board.

10.4 Setting Up The IPCS

10.4.1 Starting Up and Scan Correction

Check the N_2 supply is ok, the shutter is closed and lights are out.
'Fast start' the EHT supply, on the IPCS rack mounted on the Cassegrain cage.

As of February 1993, the 'old' data acquisition system is needed with IPCS (*i.e.*, use `EXPOSE` and `KEEP` commands). Perform scan correction on the DMS by typing `IPCSSCAN` and following

Table 10: Some default IPCS Formats

	on-axis	*on-axis*	*Full frame*	*On-axis*
Rows read out	64	64	255	64
Start of window	70	70	1	81
Read into buffer	50	30	254	50
Y-res (spatial)	4	8	1	2
Spectral	320	320	320	320
X-res (spectral)	8	8	8	8
PROC	IPCSY4	IPCSY8	OVERSCAN	IPCSY2

instructions (use `CALC-SDC`);
or load previous one with:
`EAGLE`
`GET-SDC-ARRAY`
and enable it with
`1 ESD`
all on the DMS terminal.

N.B. *Always* check IPCS with OVERSCAN first. There can be a bright ghost that appears at the top of the IPCS field and which is believed to be caused by reflection off the ANAMORPHOTIC slide if it is not fully out.

10.4.2 Setting up the IPCS Format, and Focussing ISIS

`$ LOAD IPCSFORMAT`
Use default formats from the following table:

(The IPCSY2 settings put the 1.2 arcsec dekker in the centre of the frame, as of 28.10.90)
Or make your own format with `IPCSFORMAT`.
(N.B. Current size limit for DMS IPCS buffer is 2560×480.)

Note that the number of rows read into the DMS buffer must be less than the number of rows read out of the IPCS.
To change the Y window only, use `IPCSWIN`. (Max. rows = 64; spectral direction fixed at 320, X8).

Focus: Setup for CuAr arc with λ_{cen} ~4500Å, slit-width ~ 150 microns and COMPFILTA ND1.8 (depends on grating). A typical focus procedure would be:

`OVERSCAN`	use full IPCS frame
`BHART 1`	Left Hartmann shutter in; Right out

EI 120	120 sec exposure (short for EXPOSE IPCS)
DMS>FOCUS	choose 3 strong, unblended lines (left, middle & right end)
DMS>FOCUS-LEFT	
BHART 2	Right shutter in; Left out
EI 120	
DMS>FOCUS-RIGHT	which will give centroid differences at 3 points along each line.

The centre positions at each point indicates rotation and can be analysed with FOCUS.
Also check line rotation with DMS command X-FIND.
Then use

IPROT *n*	to rotate IPCS camera head to position *n*

where n is 32768 ± *rot*; and *rot* is 50/IPCS-pix displacement from top to bottom (+ve to move line anticlockwise).

To reduce centroid differences to 0, change collimator by 600 units for 0.5 IPCS-pix (+ve to make shift go +ve).
(N.B. if you use the DMS command l_1, l_2, l_3 FOCUS-SET the line positions are in **screen** pixels, not IPCS pixels.
Write them down when you first choose them.)

Best IPCS focus is currently 2–2.5pixels (check with the Local IPCS Expert)

The last BCOLL setting will be written on the whiteboard.

10.4.3 Observing with IPCS

OVERSCAN mode should always be used for a new objects/arc, etc., and then return to normal format with default proc, IPCSWIN or IPCSFORMAT.

Always observe new objects with your finger on the PANIC button. If used it is necessary to IPC before IPO will work.
If the IPCS *Overillumination* circuit is tripped, then it must be cleared with the command:-
SPO OVERILLUM INIT

IPO	opens IPCS shutter
IPC	closes IPCS shutter
EI *t*	performs a *t* secs IPCS exposure (short for EXPOSE IPCS
KI	'keeps' the exposure (transfers it from DMS to the 4000)
IPPAUSE	pauses the exposure
IPCONT	restarts the exposure
IPSTOP	stops (aborts) the exposure
IPNEWT *t*	changes the exposure time during the integration
IPUPDATE	causes exposure time to update on MIMIC
IPWIN *r* *w*	changes Y window to *w* rows read out starting from *r*
IPCLEAR	clears DMS IPCS buffer

10.5 The DMS Display

- Both CCD and IPCS images are read out into the DMS and displayed on the screen.
- The first CCD exposure read out after startup (or a DMS reset) will just be displayed as a small ikon. Click the cursor on this ikon (with the LH mouse button) for a full size display. You can switch between CCDs (and between CCD & IPCS) in this way.
- The mouse is disabled during CCD readout or when the IPCS display is being updated (when a BUSY message is displayed).

10.6 ISIS Commands

10.6.1 Slit area

`SLIT` *w*	sets slit width to *w* microns
`LSLIT`	selects long slit unit
`MSLIT`	selects multi-slit unit
`DEKKER` *n*	moves dekker to position *n*, where 0=out; 1=narrow(`1.2"`); 2=`20"`(for FOS); 6=long slit observing
`SLIT_DOOR OPEN`	releases slit area access door N.B. the DEKKER should be in position 0 for access to the slit area.
`SLIT_DOOR CLOSE`	locks slit area access door

10.6.2 Folds and Filters

`RFOLD` *n*	moves red fold to position *n* (0=flat mirror; 1=out)
`BFOLD` *n*	moves blue fold to position *n* (0=out; 1=flat; 2=dichroic) N.B. As of Oct 91, the BFOLD flat only reflects the central 2.5 arcmins of the field (or from 100-700 on the CCD). Important limit for Multislit users.
`RHART` *n*	moves Red Hartmann shutter to position *n* (0=both out; 1=L in,R out; 2=L out,R in; 3=both in)
`BHART` *n*	moves blue Hartmann to position *n* (same convention as for RHART)
`RCOLL` *n*	moves red collimator to setting *n*
`BCOLL` *n*	moves blue collimator to setting *n*
`RFILTA` *n*	moves red filter A to position *n* N.B. Check whiteboard & mimic for current filter slides loaded
`RFILTB` *n*	moves red filter B (see whiteboard)
`BFILTA` *n*	moves blue filter A to position *n*
`BFILTB` *n*	moves blue filter B to position *n*
`CHANGE`	to change grating & to update MIMIC database on gratings & ISIS filters

10.6.3 Gratings and Wavelength Settings

REDGRAT θ	moves red grating to angle θ (units of 0.001 degs)
BLUEGRAT θ	moves blue grating to angle θ
CENWAVE RED λ	moves red grating to wavelength λ Å
CENWAVE BLUE λ	moves blue grating to wavelength λ Å
CHANGE	use this to change a grating and then to enter the new item in the MIMIC's database. MANDATORY for a grating change.
GRATING_DOOR OPEN	unlocks both grating doors N.B. Do *not* issue this command until gratings have reached 35000.
GRATING_DOOR CLOSE	locks both grating doors. NB: Use CHANGE to change gratings; these commands to reset the doors only.

10.6.4 Polarisation Module

The main commands used for operating the polarisation elements are:

FCP_OUT	Remove calcite block or polaroid from the beam
FCP *pos*	Move FCP tray to *pos*. Options are: CLEAR - remove from beam FIELD_LENS - the old position of the FOS field lens POLAROID - select the Polaroid analyser position CALCITE - move to the Calcite analyser position.
CALC	Inserts calcite block into the beam
POL	Move Polaroid analyser into the beam
HW_POLAR MOVE IN or OUT	Moves the HW plate into or out of the beam
HW_POLAR ANGLE *n*	Sets angle of HW plate to *n* (in tenths of a degree)
HW_POLAR ROTATE *n*	Rotates the HW plate at *n* Hz
HW_POLAR STOP ROTATE	Stops the rotation of the HW plate, sets angle to 0
HW_POLAR INIT	Initialize the halfwave plate
QW_POLAR MOVE IN or OUT	Moves the QW plate into or out of the beam
QW_POLAR ANGLE *n*	Sets angle of QW plate to *n* (in tenths of a degree)
QW_POLAR ROTATE *n*	Rotates the QW plate at *n* Hz
QW_POLAR STOP ROTATE	Stops the rotation of the QW plate, sets angle to 0
QW_POLAR INIT	Initialize the quarterwave plate.

10.6.5 Initialising mechanisms

INSLIT	initialises slit unit (*not* the slit width)
INRG	initialises red grating
INBG	initialises blue grating
INRFOLD	initialises red fold slide
INBFOLD	initialises blue fold slide
INRCOLL	initialises red collimator
INBCOLL	initialises blue collimator
INHW	initialises 1/2 wave plate
INQW	initialises 1/4 wave plate
INFCP	initialises FCP tray
INDEK	initialises dekker

ISIS_INIT *mechanism*	for any ISIS mechanism.
mechanism INIT	for some ISIS mechanisms.

ISIS mechanism names include:-
DEKKER, SLIT_JAWS, SLIT_UNIT, HW_POLAR, QW_POLAR, FLENS_CALC_POL, BLUE_FOLD, RED_FOLD, BLUE_FILTER_A, BLUE_FILTER_B, RED_FILTER_A, RED_FILTER_B, BLUE_COLLIMATOR, RED_COLLIMATOR, BLUE_GRATING, RED_GRATING.

The slit jaws cannot be initialised - get technical help if they stick.
Updating the MIMIC for ISIS: use ISIS_UPDATE ALL.

10.7 A&G Box Commands

AGMIRROR OUT	removes all mirrors (e.g. for Hitch-Hiker to operate)
AGCOMP	moves mirror to acquisition/comparison lamp position
AGSLIT	moves mirror to slit-viewing position
AGAUX	equivalent to AGMIRROR SMALLFEED (for Auxiliary Port imaging)
AUXFILTER *n*	chooses auxiliary focus filter *n*, 0–5 (usually UBVRIZ) but check whiteboard for details of last filter set used. N.B. offsets to telescope focus (wrt ISIS/FOS slit) are : U Filter: -0.24mm; R Filter: -0.17m; Hα (8.2mm) Filter: -0.28mm and change AUTOFOCUS by approx -500.
MAINFILTND *number*	main filter slide to OUT, 2, 3, 4, 5, 6 (see whiteboard)
MAINFILTC *number*	main filter colour to OUT, 2, 3, 4, 5, 6 (see whiteboard)
TVFOCUS *n*	moves TV focus to *n* (range 0–18,000) Typically 14000 for 5"/mm, 12750 for 12"/mm for slit viewing
TVFILT *name*	TV filter to CLEAR, B, V, R or EMPTY

Beware of position empty, it may not be!!

TVSCALE *s*	selects TV scales of *s* = 5 or 12"/mm (1.5 or 4 arcmin field)

N.B. The two TV scales need slightly different TV focus settings.

Initialising:

`AGINIT` *mechanism* where *mechanism* can be :–
`ACQCOMP`, `AUTOFILT`, `AUTOFOCUS`, `AUTORADIAL`, `AUTOTHETA`, `AUXFILTER`, `COMPFILTA`, `COMPFILTB`, `LARGEFEED`, `MAINFILTC`, `MAINFILTND`, `SLITVIEW`, `SMALLFEED`, `TVFILT`, `TVFOCUS`, `TVREDUCER` (to init `TVSCALE`)

Updating the MIMIC for A&G Units:

`AGUPDATE` *mechanism*

10.7.1 Comparison lamps

Only the lamps in the horns (usually CuAr and CuNe) and Tungsten currently give enough light to be useable.

`COMPLAMPS` *name*	turns on lamp (CUAR, CUNE, CUAR+CUNE, W) or OFF
`COMPFILTA` *name*	puts in CLEAR, ND0.2, ND0.6, ND0.8, ND1.8, ND3.0, GG375, GG495
`COMPFILTB` *name*	puts in CLEAR, ND0.3, ND0.5, ND0.9, ND1.2, ND2.0, BG24, OPAQUE

10.7.2 Autoguider

To start or stop, type START-UP and SHUT-DOWN on the autoguider keyboard. Check N_2 flow on start up (On ball meter immediately above red-ccd cryostat, reading should be at least 60) .

`AUTORADIAL` n	n=0–40000 microns
`AUTOTHETA` n	n=0–180000 millidegrees N.B. for values below 35000, the probe may vignette the slit
`AUTOFOCUS` n	n=0–6000 microns (typically 1500-2500)
`AUTOFILT`	selects EMPTY, CLEAR, OPAQUE, B, V or I
`ACQINT` n	Sets acquisition time (n= 1000–50000 msec)
`GUIINT` n	Sets guiding time (n=1000–50000 msec); typical 1-2s)
`FIELD`	takes exposures and finds guide star
`FON`	initiates 'following' by autoguider
`PROBE` r θ	inform T/S of probe position (get from CAGB mimic) N.B. MANDATORY - otherwise the object may move off the slit!
`AUTOGUIDER ON`	tell T/S to initiate closed-loop autoguiding
`AUTOGUIDER OFF`	tell T/S to stop autoguiding
`FOFF`	terminates the autoguider 'following'

Other commands available on the autoguider keyboard :

n `ACQINT`	sets integration time for the field in millisecs
n `GUIINT`	sets guiding time for the field in millisecs (usually 1000-4000)
`1 FIELD`	does 4 pictures and marks brightest star, excluding edge region
`GUIDE ON`	to start guiding, averaging over i integrations
`GUIDE OFF`	to stop guiding
n `GUISIZE`	to change the size of the guiding box
`>> and <<`	to rotate colour look-up table
`+TAU and -TAU`	to change horizontal scale of guide error display
`+SCALE and -SCALE`	similarly vertical scale

To use the artificial star:
ICL>`AUTOFILT OPAQUE`
Autoguider>`4000 GUIINT`
ICL>`COMPLAMPS W`
ICL>`COMPFILTA ND0.3`
Autoguider> `1 FIELD`
Autoguider> `GUIDE ON`

this gives a 'star' of magnitude 10.4.

10.8 Typical Observing Sequence

- Move telescope to target.
- ICL> `DEKKER 0` ... for a good image of the field with the TV
- ICL> `AGSLIT` and centre star on slit.
- ICL> `FIELD` ... take a field & find guide star.
- ICL> `PROBE` $r\ \theta$
- ICL> `FON` ...begin following star
- ICL> `AUTOGUIDER ON` ...close guiding loop
- ICL> `DEKKER` n ... select dekker to be used (6 for long-slit spectra)
- ICL> `RUN/GLANCE/SKY`, etc ... take exposure on-sky
- If arc exposure is needed:
  ICL> `AUTOGUIDER OFF`
  ICL> `FOFF`
  ICL> `AGCOMP`
  ICL> `COMPLAMPS CUNE (or CUAR)`
  ICL> `ARC RED/BLUE/FOS etc` ... take arc exposure

- When arc exposure is completed:
  ICL> `COMPLAMPS OFF`
  ICL> `AGSLIT`

- To reacquire guide star return to `1 FIELD` command. Otherwise: next object !

10.9 Observing With FOS

- Fill with liquid N_2 in the early evening before observing.

- If all mechanisms are initialised you can set the system for FOS by entering :-
  `ISISCONFIG FOS` (or, set `RFOLD` and `BFOLD` mirrors clear
  `SETUP FOS` (answer x:400 y:590)

- As standard FOS dekker is only 20" long (Dekker 2), take a test exposure with this dekker to determine where the slit centre is (or, use bright sky or tungsten lamp to illuminate the dekker)

10.10 Offsetting the Telescope

10.11 Blind Offsets

`BLIND` is best for blind offsets to invisible targets, whereas `OFFSET` is okay for small offsets only. Use of `BLIND` ensures that the WHT keeps the correct rotator centre, etc. during long exposures. Proceed as follows :

- Enter coords of *standard* (PPM recommended) and faint *blind target* into the observing catalogue (on TCS keyboard).

- Make sure that `CALIBRATE` and a check for rotator centre position are done at start of night.

- `GOCAT` *offset star*

- Set desired position angle on sky, and centre star on slit.

- `BLIND` *blind target*

- Try to find a guide star and start guiding as quickly as possible now.

10.11.1 Small Offsets

This is used e.g. to move a few tens of arcsecs from the nucleus of a galaxy. The offsets may either be in the form $\Delta x, \Delta y$ (arcsecs) or $\Delta(\alpha), \Delta(\delta)$ (co-ord differences). Proceed as follows :

- Acquire main target

- Set desired position angle on sky and centre target on slit

- `OFFSET` *type da dd* where *type* is either ARC (units are arcsecs on sky) or SEC (secs of time and arcsecs), *da,dd* are the offsets in α, δ in the above units.

- do `FIELD` and find a good guide star but don't start guiding yet
- `PROBE` r θ on TCS console.
- `OFFSET` *type* 0 0 to return to main target to check it's still centered on the slit
- `OFFSET` *type* *da* *dd* and start exposures
- do `FIELD` again and quickly start closed-loop autoguiding

10.11.2 Data Files

- To see what files have been saved on the 4000 look in the directory: DISK$WHTDATA:[OBSDATA.dd-mm-yyyy].

  ¿From ICL use: `DCL DIR DCT_OBSDIR:[dd-mon-year].`

- To write a FITS tape from the 4000 :-

  - Login to LPVE as OBSERVER in an independent session.
  - `ALLOCATE MUD0: or MUE0:` Allocate one of the tape drives that are connected to LPVE
  - `MOUNT/FOR/DENS=6250 MUD0: or MUE0:` Mount the tape
  - `FITSINIT` and answer the questions
  - `WRITE_FITS` ditto.

  To write an EXABYTE in FITS format:

  - Login to LPVE as OBSERVER
  - Allocate the exabyte (`ALLOC MUC0: or MUE0:`)
  - `MOUNT/FOREIGN MUC0: or MUE0:`
  - `FITSINIT` ... answer the questions
  - `WRITE_FITS` ... ditto.

  To write DAT in FITS format:

  - Login to LPVE as OBSERVER
  - Allocate the DAT (`ALLOC MUC3:`)
  - `MOUNT/FOREIGN MUC3:`
  - `FITSINIT` ... answer the questions
  - `WRITE_FITS` ... ditto.

10.12 Shutdown

- `STANDBY` shuts down IPCS. Then set the switch on the electronics cubicle to OFF.
- `SHUT-DOWN` the Autoguider (type this on the autoguider keyboard).
- `COMPLAMPS OFF`
- `EXIT` and then logoff from LPVF and the Vaxstation.
- Fill CCDs with liquid N_2.
- Enter requests for next day in the Telescope Log book, and enter faults in the FAULT database on LPVS3.