HRPT/CHRPT Grabber

32-bit automatic HRPT, CHRPT and SeaStar image acquisition, archiving, conversion and processing software

Software user guide

Ninth edition (June 2006)
Copyright © 1998–2006 Dartcom

This software is based in part on the work of the Independent JPEG Group.

Includes PaintLib version 2.6.2, copyright © 1996–2005 Ulrich von Zadow and other contributors.

Includes LibPNG version 1.2.5, copyright © 1998–2002 Glenn Randers-Pehrson, 1996–1997 Andreas Dilger, 1995–1996 Guy Eric Schalnat, Group 42, Inc.

Includes ZLib version 1.2.3, copyright © 1995–2005 Jean-loup Gailly and Mark Adler.

Includes LibTIFF version 3.8.1, copyright © 1988–1997 Sam Leffler, 1991–1997 Silicon Graphics, Inc.

Includes LibUnGIF version 4.1.0.

Includes a version of the GCTP library.

Dartcom, Powdermills, Postbridge, Yelverton, Devon, PL20 6SP, UK
Telephone (01822) 880253 • International +44 1822 880253
Fax (01822) 880232 • International +44 1822 880232
support@dartcom.co.uk • http://www.dartcom.co.uk

Contents

1 Overview

Introduction 1-1
Data types and storage 1-1
Normal configuration....1-1
The acquisition drive....1-2
Paths used by the HRPT/CHRPT Grabber software 1-2
The structure of a rolling archive....1-2
The file set for a raw image 1-3
Stability and security....1-3

2 Software reference

Introduction 2-1
The HRPT/CHRPT Grabber window....2-1
Timetable of predicted passes....2-2
Status displays....2-3
Mode control check-boxes 2-3
Track passes 2-3
Ingest data....2-3
Control buttons 2-4
Acquisition status tab....2-4
Satellite status area....2-4
General status area 2-5
Locking the software....2-5
Unlocking the software 2-5
Station tab....2-6
Scheduling mode… button....2-6
Diagnostics… button....2-7
General area 2-8
GPS status area 2-9
Paths area 2-9
Rolling archives area 2-10
Satellites tab 2-10
Capture passes from this satellite area....2-11
Prediction data area 2-11
Acquisition settings area 2-11
Rotator tab....2-12
Rotator area....2-12
Parking area 2-13
Receiver area 2-14
Manual control area 2-15
Ingest tab 2-16
Ingest channel area....2-17
Synchronisation area 2-17
Manual grab area 2-18
Ingest driver status area....2-18
Satellite status area....2-18
Display area 2-18

Post-capture processing tab 2-18
Archiving area 2-18
SeaWiFS area 2-19
Convert raw image file to other format area 2-19
Decommutation and sub-sampling area 2-20
Decommutate area 2-20
Sub-sample area 2-20
Channel and plane selections area 2-21
NOAA level 1B export area 2-21
SHARP level 1B export area 2-22
Auto update tab 2-22
Internet connection area 2-23
Download settings area 2-23
Update settings area 2-24
Setup tab 2-24
Antenna system area 2-24
Receiver rack area 2-25
GPS receiver area 2-25
NMEA input area 2-25

3 Troubleshooting

Introduction 3-1
Lost or damaged settings 3-1
Hardware and software diagnostics 3-2

Appendices

A Dartcom HRPT/CHRPT file formats

Introduction A-1
Image acquisition files A-1
RAW file A-1
RPD file A-2
Note 1 ....A-3
Note 2 ....A-3
Note 3 ....A-3
Note 4 ....A-3
Note 5 ....A-3
Note 6 ....A-3
QLK file A-3
NMF file A-3
STA file A-3
ECF file A-3
Image decommutation files A-4
DCM file A-4
Disclaimer A-5

Figures

2.1 The **Dartcom HRPT/CHRPT Grabber** window 2-1
2.2 The timetable of predicted passes in automatic scheduling mode 2-2
2.3 The timetable of predicted passes in manual scheduling mode 2-2
2.4 The **Acquisition status** tab 2-4
2.5 The **Lock HRPT/CHRPT Grabber** window 2-5
2.6 The **Unlock HRPT/CHRPT Grabber** window 2-6
2.7 The **Station** tab 2-6
2.8 The **Scheduling mode** window 2-7
2.9 The **Diagnostics** window 2-7
2.10 An example of a path selection window 2-9
2.11 The **Satellites** tab 2-10
2.12 An example of a prediction data window 2-11
2.13 The **Rotator** tab 2-12
2.14 The **Rotator status** window 2-13
2.15 **Point to longitude** parking mode controls 2-14
2.16 **Track geostationary** parking mode controls 2-14
2.17 **Point to heading** parking mode controls 2-14
2.18 **Point to azimuth/elevation** parking mode controls 2-14
2.19 The **Receiver status** window 2-15
2.20 The **Ingest** tab 2-16
2.21 The **Post-capture processing** tab 2-18
2.22 The **Auto update** tab 2-22
2.23 The **Setup** tab 2-24

Tables

1.1 Drive functions and minimum free space required 1-1
1.2 Recommended path settings 1-2
1.3 An example of the structure of a rolling archive 1-3
1.4 File extensions and corresponding file types for raw (streamed) storage 1-3

2.1 Explanation of the column headings in the table of predicted passes....2-2
2.2 Coding used in the **Way** column of the table of predicted passes 2-3
2.3 Events which cause an e-mail alarm to be sent 2-8
2.4 Recommended settings for the paths in the **Station** tab....2-9
2.5 Recommended settings for the rolling archive paths 2-10
2.6 Antenna parking modes 2-13
2.7 Receiver frequency presets and their corresponding satellites....2-15
2.8 Supported third-party raw file formats 2-19
2.9 Suggested files to download using the automatic update facilities 2-23

A.1 Word allocations for each frame (line) of an HRPT image A-2
A.2 Encoding of the **way** bit A-3

SECTION

1

Overview

Introduction

The Dartcom HRPT/CHRPT Grabber software deals with the task of capturing HRPT, CHRPT and SeaStar images. It automatically acquires satellite passes according to a user-defined schedule, and archives them in up to three separate archives. A wide range of automatic post-capture processing is available, including decommutation, conversion and exporting to third-party formats. Captured images can be viewed and processed in the Dartcom iDAP and MacroPro software which is supplied with all Dartcom systems.

Data types and storage

The Dartcom HRPT/CHRPT Grabber software typically grabs HRPT, CHRPT and SeaStar images of between 30MB and 240MB. Such large amounts of data require correspondingly large hard disk drives. This is particularly true when maintaining separate archives of HRPT, CHRPT and SeaStar images with post-capture processing switched on.

Normal configuration

The HRPT/CHRPT Grabber software is usually installed by Dartcom engineers prior to shipment. However, it is useful to know the minimum amount of free hard disk space required on the four drives used by the system, as shown in table 1.1.

Table 1.1 Drive functions and minimum free space required

Drive	Normal functions	Minimum free space
C:	System files	1GB
D:	User storage	1GB
E:	Acquisition drive	150MB (300MB for CHRPT)
F:	Decommutated and work area data	300MB
G:	Rolling archive storage	6GB

Assuming **D:**, **E:**, **F:** and **G:** were limited to the minimum sizes, on a 9GB hard disk drive there would still be about 1GB available on the **C:** drive.

The acquisition drive

The **E:** drive should be used as the acquisition drive. This is where the HRPT/CHRPT Grabber software writes image data during acquisition.

Do not store any other data on the acquisition drive. It must be left completely empty for use only by the HRPT/CHRPT Grabber software, otherwise there may not be sufficient space to store captured images.

Paths used by the HRPT/CHRPT Grabber software

Drive **C:** is where the HRPT/CHRPT Grabber software (**C:\Program Files\Dartcom\HRPT CHRPT Grabber\Rotator.exe**) and map overlays (in **C:\Program Files\Dartcom\Map overlays**) are located. It also contains all the necessary system files. Drive **E:**, as discussed above, is where image data is written during capture.

Remember that the E: drive is unique and must not contain any sub-directories or user files. It is for use only by the HRPT/CHRPT Grabber software. If any other files are stored on this drive, there may not be sufficient space to store captured images.

Drive **G:** is where images are archived after they have been captured, stored in *rolling archives*. A rolling archive contains a preset number of previously-captured images (up to a maximum of 99). When a new image is added to a rolling archive, the oldest image in the archive is removed to make space. The structure of a rolling archive is described in detail below.

The HRPT/CHRPT Grabber software can maintain three different rolling archives, corresponding to the three different types of image which it captures (HRPT, CHRPT and SeaStar). Each type of rolling archive can have a different path and size, allowing three separate rolling archives to be created if desired. Alternatively, a single rolling archive containing a mixture of image types can be created by setting the paths and sizes identically for all three types.

The recommended paths for the HRPT/CHRPT Grabber software are shown in table 1.2.

Table 1.2 Recommended path settings

Path	Setting
Raw	E:
Maps	C:\Program Files\Dartcom\Map overlays
HRPT rolling archive	G:\HRPT images
CHRPT rolling archive	G:\CHRPT images
SeaStar rolling archive	G:\SeaStar images

The structure of a rolling archive

Each type of rolling archive (HRPT, CHRPT or SeaStar) can be stored in a separate path if desired. Within the path specified for an archive type, each image is stored in a separate sub-directory. Within the sub-directory are all the files relating to the raw image, together with further sub-directories containing the decommutated image data and structured output files (if these types of post-capture processing are switched on).

An example of the structure of a rolling archive is shown in table 1.3, where *nn* is the specified size for the archive. The example shows an HRPT rolling archive, but the same structure is used for CHRPT and SeaStar archives.

Table 1.3
An example of the structure of a rolling archive

Path	Contents
G:\HRPT images\Arch01\…	Raw (streamed) image files
G:\HRPT images\Arch01\Decom\…	Decommutated image files
G:\HRPT images\Arch01\Sample\…	Projected sub-sample files
G:\HRPT images\Arch01\Struct\…	Structured output files
…	…
G:\HRPT images\Arch*nn*\…	Raw (streamed) image files
G:\HRPT images\Arch*nn*\Decom\…	Decommutated image files
G:\HRPT images\Arch*nn*\Sample\…	Projected sub-sample files
G:\HRPT images\Arch*nn*\Struct\…	Structured output files

When a new image is added to the archive, the existing images are "rolled" down (so **Arch01** becomes **Arch02**, **Arch02** becomes **Arch03**, etc) and the oldest archive (**Arch*nn***) is removed to make space. The new image is then added to the archive as **Arch01**. In this way, the archive, once filled to its maximum size, remains at a constant size of *nn* images. The latest image is always **Arch01**, and the proceeding archives (**Arch02**, **Arch03**, etc) are progressively older, with **Arch*nn*** being the oldest.

The file set for a raw image

As explained previously, an image is streamed directly to the **E:** drive (or other specified raw path) as it is captured. There are also a number of other ancillary files stored with the raw image data. All the files related to a raw image have the primary name **$WHRPT32**, with extensions as shown in table 1.4.

Table 1.4
File extensions and corresponding types for raw (streamed) storage

File extension	Description of file type
RAW	Streamed raw image and data file as transmitted
RPD	Satellite prediction data (SGP4, etc)
STA	Image statistics
QLK	Quicklook (preview) of image
NMF	Vector map overlay for Quicklook
NAV	Navigational data for Quicklook
TLE	NORAD two line elements (SGP4 prediction data)
TBS	TBUS prediction data (required for NOAA level 1B and SHARP level 1B export)
TBR	TBUS record (calculated from two-line elements)

Stability and security

It is not possible to start more than one copy of the HRPT/CHRPT Grabber software. If an attempt is made to start a second copy, an error window is displayed informing you that another copy is already running on the computer.

To prevent accidental closing and deliberate tampering, the HRPT/CHRPT Grabber software can be locked by entry of a user-defined password. When locked, only the

Acquisition status tab can be viewed, the states of the **Track passes** and **Ingest data** check-boxes cannot be changed and the software cannot be closed. However, it can still be minimised. The password which was used to lock the system must be entered in order to unlock it again.

The passwords required for the various engineering functions (such as rotator calibration and changing the hardware configuration) are not published within this manual due to the critical nature of the items which they protect. Please contact Dartcom to obtain these passwords if necessary.

S E C T I O N

2

Software reference

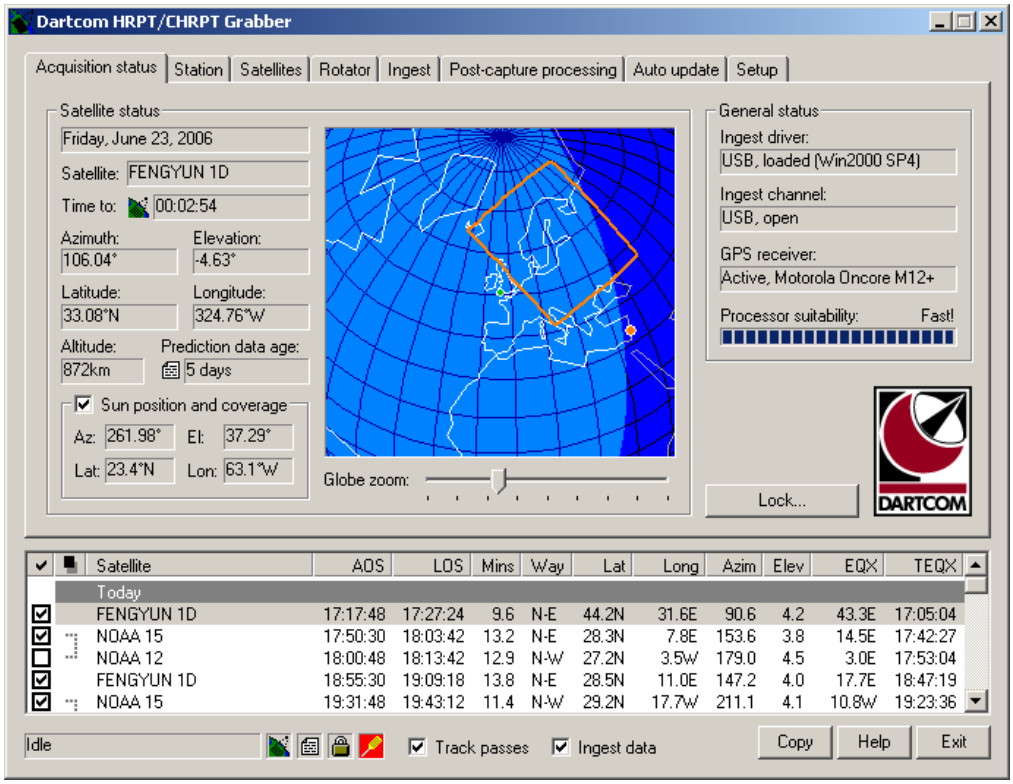
Introduction

This section describes how to use the HRPT/CHRPT Grabber software. The main window is explained first, followed by each of the tabbed pages (or *tabs*) and other windows.

The HRPT/CHRPT Grabber window

The **Dartcom HRPT/CHRPT Grabber** window (figure 2.1) allows the HRPT/CHRPT Grabber software to be configured, controlled and monitored.

Figure 2.1
The **Dartcom HRPT/CHRPT Grabber** window



The main functions of the HRPT/CHRPT Grabber software are grouped into a number of tabs in the upper part of the window. A *timetable of predicted passes* is displayed in the lower part of the window. *Mode control check-boxes*, *status displays* and *control buttons* are located at the bottom of the window.

Timetable of predicted passes

The timetable of predicted passes in the lower part of the window contains information about the scheduled satellite passes for the period specified in the **Station** tab. Its appearance depends upon the selected scheduling mode (see **Station tab**). In automatic scheduling mode (figure 2.2) the passes chosen by the scheduler are listed.

Figure 2.2
The timetable of predicted passes in automatic scheduling mode

Satellite	AOS	LOS	Mins	Way	Lat	Long	Azim	Elev	EQX	TEQX
Today										
FENGYUN 1D	17:17:48	17:27:24	9.6	N-E	44.2N	31.6E	90.6	4.2	43.3E	17:05:04
NOAA 15	17:50:30	18:03:42	13.2	N-E	28.3N	7.8E	153.6	3.8	14.5E	17:42:27
FENGYUN 1D	18:55:30	19:09:18	13.8	N-E	28.5N	11.0E	147.2	4.0	17.7E	18:47:19
NOAA 15	19:31:48	19:43:12	11.4	N-W	29.2N	17.7W	211.1	4.1	10.8W	19:23:36
FENGYUN 1D	20:37:24	20:50:00	12.6	N-W	27.3N	14.3W	202.7	4.3	7.8W	20:29:33

In manual scheduling mode (figure 2.3) all available passes are listed, including two extra columns to the left of the **Satellite** column.

Figure 2.3
The timetable of predicted passes in manual scheduling mode

✓	■	Satellite	AOS	LOS	Mins	Way	Lat	Long	Azim	Elev	EQX	TEQX
		Today										
☑		FENGYUN 1D	17:17:48	17:27:24	9.6	N-E	44.2N	31.6E	90.6	4.2	43.3E	17:05:04
☑	⋮	NOAA 15	17:50:30	18:03:42	13.2	N-E	28.3N	7.8E	153.6	3.8	14.5E	17:42:27
☐	⋮	NOAA 12	18:00:48	18:13:42	12.9	N-W	27.2N	3.5W	179.0	4.5	3.0E	17:53:04
☑		FENGYUN 1D	18:55:30	19:09:18	13.8	N-E	28.5N	11.0E	147.2	4.0	17.7E	18:47:19
☑	⋮	NOAA 15	19:31:48	19:43:12	11.4	N-W	29.2N	17.7W	211.1	4.1	10.8W	19:23:36

The first column contains a check-box for each pass which enables it to be switched on or off. If the check-box for a pass is ticked, the pass will be captured. If it is not ticked, the pass will not be captured, but will still remain in the timetable until its start (AOS) time is reached. If a check-box is clicked, its corresponding row in the timetable changes to yellow, indicating that the pass has been edited manually.

The second column indicates which passes overlap with each other. If two or more passes overlap, only one of them can be switched on. In some cases, not all of the passes shown as overlapping may necessarily overlap. For example, in a group of three overlapping passes, the first and third passes may not overlap. In this case, the first and third passes can be switched on at the same time, but not the first and second or second and third.

The column headings in the timetable of predicted passes are explained in table 2.1.

Table 2.1
Explanation of the column headings in the table of predicted passes

Heading	Description
Satellite	Satellite from which the pass will be received
AOS	Time of acquisition of signal (start of image capture)
LOS	Time of loss of signal (end of image capture)
Mins	Duration of the pass, in minutes
Way	Direction in which the satellite will pass the station (see table 2.2)
Lat	Latitude of the satellite at AOS
Long	Longitude of the satellite at AOS
Azim	Azimuth of the satellite from the ground station at AOS
Elev	Elevation of the satellite from the ground station at AOS
EQX	Longitude at which the satellite crosses the equator (0° latitude)
TEQX	Time at which the satellite crosses the equator

The **Way** column indicates the direction in which the satellite is travelling and whether it will pass to the east of, west of or directly over the ground station (an *overhead* pass). The coding used in the **Way** column is described in table 2.2.

Table 2.2
Coding used in the **Way** column of the table of predicted passes

Coding	Description
N	The satellite will be travelling Northbound (ascending node)
S	The satellite will be travelling Southbound (descending node)
E	The satellite will pass to the East of the ground station
W	The satellite will pass to the West of the ground station
O	The satellite will pass directly over the ground station

When the **Acquisition status** tab is visible, click a pass in the table to display the *swathe* (area of coverage) of the pass on the globe. The highlighted pass in the table is the one whose swathe is currently displayed on the globe.

The satellite displayed on the globe and the pass details displayed in the Satellite status area refer to the next satellite from which a pass will be captured, which is not necessarily the pass highlighted in the table.

Status displays

The current status of the HRPT/CHRPT Grabber software is displayed in the bottom left corner of the window. Next to it are four small icons, described below.

Grab warning. This icon starts to flash red one minute before an automatic image capture operation begins. If you are configuring settings in a tab other than the **Acquisition status** tab, it reminds you to finish making changes as soon as possible.

Prediction data out-of-date warning. This icon lights up red if the age of the polar-orbiter prediction data exceeds 10 days. If automatic prediction data updating is not switched on (see **Auto update tab**), it reminds you to obtain new prediction data.

Security state indicator. This icon lights up red if the HRPT/CHRPT Grabber is locked. When locked, no settings can be changed and the software cannot be closed. This ensures that image capture is not affected by unauthorised tampering.

Scheduling mode indicator. This icon lights up red if the HRPT/CHRPT Grabber is in manual scheduling mode. The scheduling mode can be set in the **Station** tab.

Mode control check-boxes

Track passes

This check-box determines whether or not satellite passes in the table of predicted passes are automatically tracked by the antenna and rotator. If switched on, passes are not automatically captured unless the **Ingest data** check-box is also switched on. Tracking satellite passes without acquiring them can be useful when testing the system. Note that when tracking is switched off, the controls in the **Rotator** tab are disabled as the rotator communications channel is only open when tracking is on. During normal system operation the **Track passes** check-box should be switched on.

Ingest data

This check-box determines whether or not satellite passes in the table of predicted passes are captured automatically. It is only available when the **Track passes** check-box is on. During normal system operation the **Ingest data** check-box should be switched on.

Control buttons

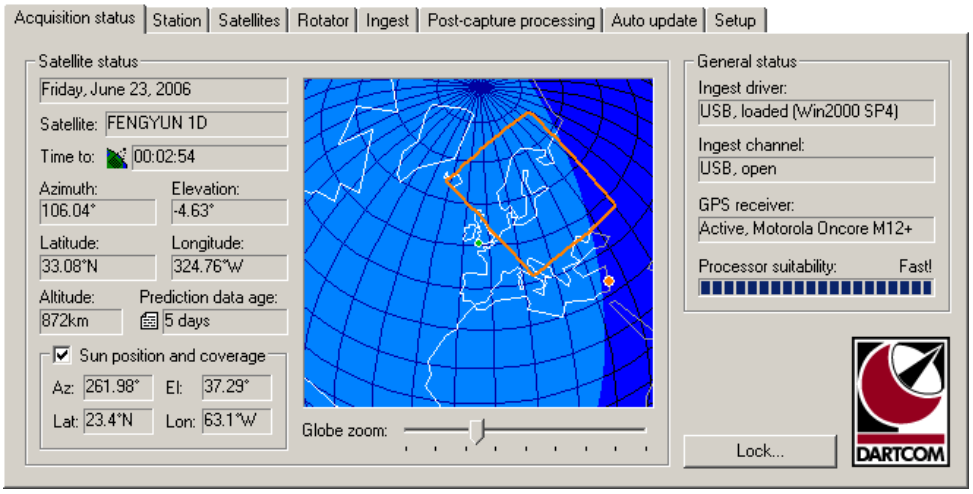
To copy the timetable of predicted polar-orbiter passes to the clipboard in text form, click **Copy**. To browse the on-line help system, click **Help**. To exit from the HRPT/CHRPT Grabber, click **Exit**.

If the **Point to heading** parking mode is selected in the **Rotator** tab, a **Disable** button is displayed next to the **Copy** button. The **Disable** button can be clicked at any time to abort any grab in progress, park the antenna and disable the software. Whilst disabled, no passes are tracked or grabbed and the software is locked. To re-enable the software, click **Disable** again.

Acquisition status tab

The **Acquisition status** tab (figure 2.4) shows the details of the next pass to be captured and the status of the ingest driver and GPS receiver.

Figure 2.4
The **Acquisition status** tab



Satellite status area

This area shows the details of the next satellite pass which will be captured. The current date is shown at the top of the area. **Satellite** is the satellite from which the next pass will be received. **Time to** is the time remaining until the start of capture of the next pass. The azimuth and elevation of the satellite from the ground station and the latitude, longitude and altitude (in kilometres) of the satellite are also displayed. **Prediction data age** is the age, in days, of the prediction data which was used to calculate the predicted passes.

The globe displays the point directly below the satellite named in the **Satellite** box as an orange dot, the ground station position as a green dot and the swathe (area of coverage) of the pass highlighted in the table of predicted passes with an orange frame. Click another pass in the table to see its swathe on the globe.

If another pass is clicked in the table of predicted passes, only the swathe displayed on the globe refers to that pass. The satellite position and details refer to the next satellite from which a pass will be captured.

The **Globe zoom** slider below the globe can be used to adjust the magnification of the globe. Drag the slider to the right to zoom in or to the left to zoom out.

The **Sun position and coverage** area displays the sun's current azimuth and elevation relative to the ground station position, and the latitude and longitude of the point on the

earth where the sun is directly overhead (elevation 90˚). If the check-box is switched on, the globe shows this point as a large yellow dot, and shows the area currently illuminated by the sun as light blue and the area in shadow as dark blue.

The globe is automatically redrawn when the ground station position is updated if it has changed by more than 1˚ (latitude or longitude), assuming valid position data is available from the GPS receiver.

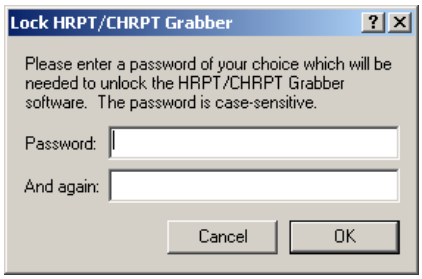
General status area

This area shows the status of the ingest driver, ingest channel and GPS receiver. The **Processor suitability** gauge indicates the suitability of the computer on which the HRPT/CHRPT Grabber software is running for capturing live HRPT and CHRPT images. The higher the level of the gauge, the more suitable the computer.

Locking the software

The **Lock…** button allows the software to be protected from unauthorised tampering. When locked, only the **Acquisition status** tab can be viewed, the states of the mode control check-boxes cannot be changed, and the software cannot be closed. When **Lock…** is clicked, the **Lock HRPT/CHRPT Grabber** window (figure 2.5) is displayed.

Figure 2.5
The **Lock HRPT/CHRPT Grabber** window



Enter a suitable password in the **Password** box. The password is concealed on the screen by asterisks ('*') to prevent others from seeing it.

The password is case-sensitive, which means that upper-case letters are treated as being different to their lower-case equivalents (for example 'A' is not the same as 'a').

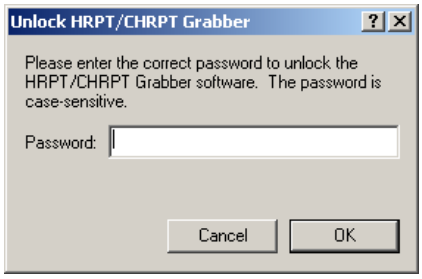
Make a note of the password entered, as it will need to be entered again to unlock the software. There is no direct way to unlock the software other than re-entering the password used to lock it. If you forget the password, you will have to contact Dartcom for technical support.

Type the password again in the **And again** box, exactly as it was typed in the **Password** box. Click **OK** to lock the software, or **Cancel** if you don't want to lock it. If the passwords in the **Password** and **And again** boxes matched, the software will now be locked, indicated by the icon at the bottom of the window lighting up red and the **Lock…** button changing to **Unlock…**. If the passwords did not match, a window appears informing you of this. Re-type the password in both boxes, then click **OK** again.

Unlocking the software

Click **Unlock…** to display the **Unlock HRPT/CHRPT Grabber** window (figure 2.6).

Figure 2.6
The **Unlock HRPT/CHRPT Grabber** window



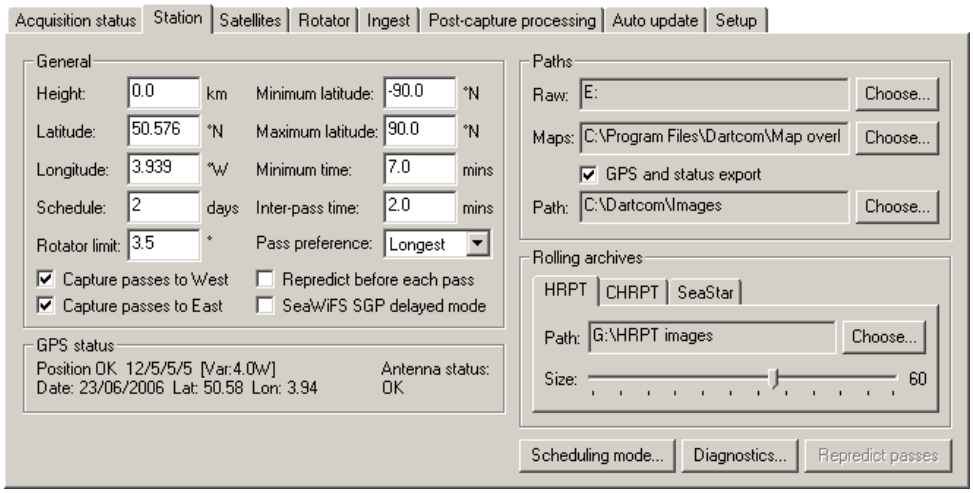
Type the password which you used to lock the software in the **Password** box, remembering that it is case-sensitive. Click **OK** to unlock the software, or **Cancel** if you don't want to unlock it. If the password you typed in the **Password** box matches the password which was used to lock the software, it will now be unlocked, indicated by the icon at the bottom of the window turning grey again and the **Unlock…** button changing to **Lock…**.

If the passwords did not match, a window appears informing you of this. Re-type the correct password, then click **OK** again.

Station tab

The **Station** tab (figure 2.7) allows the ground station details, scheduling mode and paths to be specified. It also shows status information for the GPS receiver and GPS antenna.

Figure 2.7
The **Station** tab

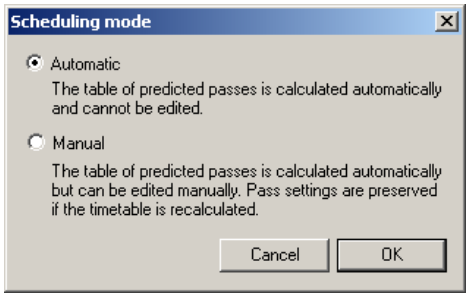


If any settings which affect the predicted passes are changed, the table of predicted passes will be recalculated automatically when a different tab is displayed. Alternatively, click Repredict passes when you have finished making changes.

Scheduling mode… button

To set the scheduling mode, click **Scheduling mode…**. The **Scheduling mode** window (figure 2.8) is displayed.

Figure 2.8
The **Scheduling mode** window



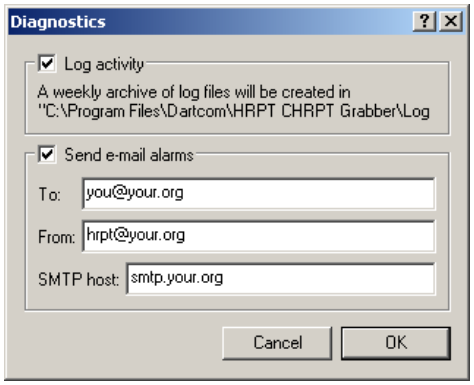
Select the required scheduling mode and click **OK**. In automatic scheduling mode, the scheduler chooses which passes to include in the timetable of predicted passes according to the setting of the **Pass preference** drop-list in the **Station** tab.

In manual scheduling mode, the scheduler initially includes all available passes in the timetable of predicted passes, switching them on or off according to the **Pass preference** setting. The timetable can then be edited manually to switch on or off passes as required. If the timetable is recalculated (in the event of the settings, time or station position changing, for example) the check-box settings are preserved as far as possible, and any new passes within the period covered by the previous timetable are switched off by default.

Diagnostics... button

To change the current diagnostics settings, click **Diagnostics...**. The **Diagnostics** window (figure 2.9) is displayed.

Figure 2.9
The **Diagnostics** window



If you want a weekly archive of log files to be maintained listing all software activity and events, switch on **Log activity**. The log files are stored in a folder called **Log files** within the HRPT/CHRPT Grabber software folder (usually **C:\Program Files\Dartcom\HRPT CHRPT Grabber**).

If you want alarms giving notification of problems, failures and serious events to be sent to support personnel via e-mail, switch on **Send e-mail alarms**. Table 2.3 shows the events which cause an e-mail alarm to be sent.

In order for e-mail alarms to be sent, an SMTP server must be available on the network at all times. If the SMTP server or network is down, e-mail alarms will not be able to be sent.

Table 2.3
Events which cause an e-mail alarm to be sent

Category	Event
Failures	Scheduled pass not grabbed
	Error during automatic archiving
	Error during automatic raw file conversion
	Error during SeaDAS level 0 file creation
	Error during automatic decommutation
	Error during automatic sub-sampling
	Error during automatic exporting
	Error during automatic prediction data update
	Receiver communications lost
Warnings	Software shut down
	Software unlocked

Enter the e-mail address to which to send alarms in the **To** box. Enter the e-mail address assigned to the HRPT/CHRPT capture computer in the **From** box. The domain should be acceptable to your SMTP server. Enter the host name or IP address of your SMTP server in the **SMTP host** box. The SMTP host should be accessible at all times via LAN or WAN.

To apply the new diagnostics settings, click **OK**, or to restore the previous settings, click **Cancel**.

General area

This area allows the ground station details to be specified. **Height** is the height above sea level, in kilometres. **Latitude** is specified in degrees North of the equator (0˚). Latitudes in degrees South must be converted to degrees North by making them negative. **Longitude** is specified in degrees West of the Greenwich meridian (0˚). Longitudes in degrees East must be converted to degrees West by subtracting them from 360˚.

Schedule is the number of days, including the current day, for which satellite passes should be predicted. A value between 1 and 15 days can be specified. **Rotator limit** is the angle, in degrees above the horizon, above which passes should be captured. **Minimum latitude** and **Maximum latitude** allow the North and South limits within which passes should be captured to be specified. Latitudes in degrees South must be converted to degrees North by making them negative. **Minimum time** is the length, in minutes, of the shortest pass which should be captured by the software. **Inter-pass time** is the minimum time, in minutes, to allow between consecutive passes, to provide time for post-capture archiving and processing. The **Pass preference** drop-list specifies which pass the scheduler should choose when two or more overlap with each other. **Earliest** chooses the first pass in a group of overlapping passes, and **Longest** the longest pass.

The **Capture passes to West** and **Capture passes to East** check-boxes determine whether or not satellite passes to the West and East of the ground station respectively are included in the pass schedule. Overhead passes are included by default.

The **Repredict before each pass** check-box determines whether or not the predicted passes are recalculated five minutes before acquisition of signal of each pass to be captured. It is advisable to switch on this feature if your system is installed in a marine or mobile situation, as the change in position of the ground station affects the times and positions of acquisition of signal of polar-orbiter passes.

The **SeaWiFS SGP delayed mode** check-box determines whether or not encrypted SeaWiFS images are being captured for delayed decryption by a station ground processor.

If switched on, orbital data is included with archived images so that they can be decrypted at a later date.

GPS status area

This area displays the type and status of the GPS receiver (if connected), and also the status of the GPS antenna if a Motorola Oncore GT+ GPS receiver is connected. If the GPS receiver is connected and functioning correctly, the ground station position, magnetic variation and clock are updated every minute using the data obtained from the GPS.

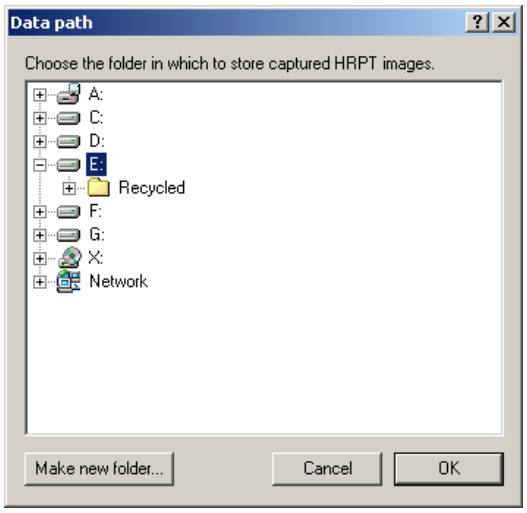
Paths area

The **Raw** path is where raw images are stored as they are captured. The **Maps** path is where the map overlay files may be found.

The **GPS and status export** check-box switches on or off exporting of the current ground station position to a file. If the HRPT/CHRPT Grabber is not running on the same computer as the Dartcom iDAP and MacroPro software (in a network situation, for example), switch this feature on to allow iDAP and MacroPro to obtain the current ground station position. The path in which the ground station position will be exported is displayed below the check-box. iDAP and MacroPro should also be configured to use this path for obtaining its ground station position. If they are running on the same computer as the HRPT/CHRPT Grabber, switch **GPS and status export** off, as in this case iDAP and MacroPro use the Windows DDE (Dynamic Data Exchange) mechanism to obtain the current ground station position.

To change a path, click its corresponding **Choose…** button. A path selection window is displayed (an example of which is shown in figure 2.10) which can be used to navigate to the required local or network path. To make a new folder, click the folder in which the new folder should be created and click **Make new folder…**. Enter a name for the new folder in the window which appears and click **OK**.

Figure 2.10
An example of a path selection window



The recommended path settings are shown in table 2.4.

Table 2.4
Recommended settings for the paths in the **Station** tab

Path	Single-computer system	Networked system
Raw	E:\	E:\
Maps	C:\Program Files\Dartcom \Map overlays	C:\Program Files\Dartcom \Map overlays
GPS export	Not required	A suitable network path

Rolling archives area

This area allows the settings for the three different types of rolling archive (HRPT, CHRPT and SeaStar) to be changed. The tabs switch between the archive types.

Path is the folder in which images of the selected type will be archived. To change the path, click **Choose…** and select the required folder in the window which appears (an example of which is shown in figure 2.10). **Size** is the maximum number of images to keep in the archive. Drag the slider up or down to change the archive size.

Before changing the size of a rolling archive, check that there is sufficient storage space available for the required number of images, taking into account any post-capture processing which has been set up (see Post-capture processing tab) and the sizes of the other rolling archives.

The recommended paths for the three rolling archive types are shown in table 2.5.

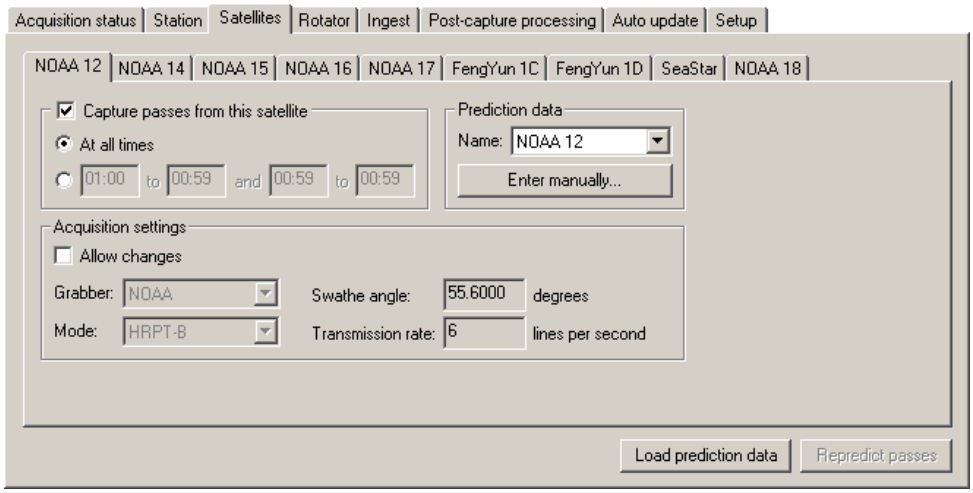
Table 2.5 Recommended settings for the rolling archive paths

Archive type	Recommended path
HRPT	G:\HRPT images
CHRPT	G:\CHRPT images
SeaStar	G:\SeaStar images

Satellites tab

The **Satellites** tab (figure 2.11) allows the settings for each of the available polar-orbiter satellites to be changed.

Figure 2.11 The **Satellites** tab



Within the **Satellites** tab are several other tabs, one for each polar-orbiter satellite for which a data file is present, which enable the settings for each satellite to be changed.

If any settings which affect the predicted passes are changed, the table of predicted polar-orbiter passes will be recalculated automatically when a different tab is displayed. Alternatively, click Repredict passes when you have finished making changes.

If automatic prediction data updating is not switched on (see **Auto update tab**), you can use the **Load prediction data** button below the satellite tabs to update the prediction

data for all the satellites manually. To do this, copy the new prediction data file (which must be called **TwoLine.tle**) into the HRPT/CHRPT Grabber folder (usually **C:\Program Files\Dartcom\HRPT CHRPT Grabber**), then click **Load prediction data**.

The latest prediction data file can be downloaded from Dartcom's FTP site or sent to you via e-mail by Dartcom's free subscription service. Visit the Dartcom web site (http://www.dartcom.co.uk) for more information.

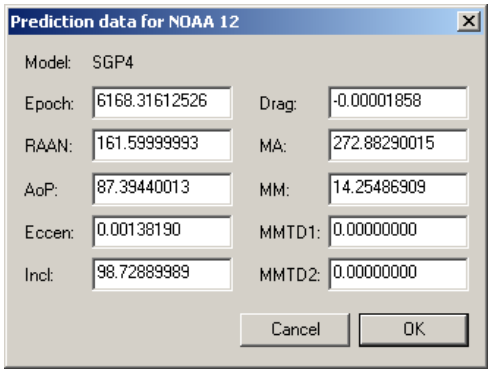
Capture passes from this satellite area

This area allows capture of images from the satellite to be switched on or off, and, if switched on, allows the times between which images are captured to be set. Switch on the **Capture passes from this satellite** check-box if you want images to be captured from the satellite. To capture all passes from the satellite, click the **At all times** radio button. To capture passes between particular times only, click the radio button below it and enter the start and end times of the two time windows in the boxes next to it.

Prediction data area

If nothing is selected in the **Name** drop-list, choose the name in the prediction data file (**TwoLine.tle**) which corresponds to the satellite. If you want to enter the prediction data for the satellite manually (not recommended), click **Enter manually…**. A window (an example of which is shown in figure 2.12) is displayed allowing the prediction data to be typed by hand.

Figure 2.12
An example of a prediction data window



Dartcom does not recommend entering the prediction data manually unless you have no way of obtaining the prediction data in a file (from Dartcom's FTP site or via e-mail from Dartcom's free subscription service, for example). If you do enter it manually, ensure that each number is absolutely correct, otherwise images may not be captured properly.

Acquisition settings area

This area allows various settings which control how images are captured from the satellite to be changed. In order to change any of the settings, it is necessary to switch on the **Allow changes** check-box.

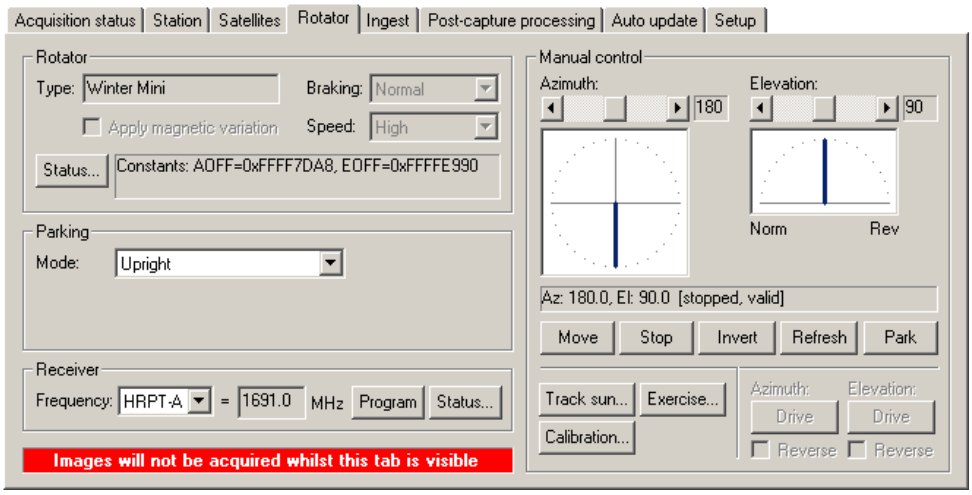
The values in the Acquisition settings area should not be changed unless you have been instructed to do so by Dartcom or you know what you are doing, otherwise images may not be captured properly.

Grabber is the type of satellite (**NOAA**, **NOAA KLM**, **SeaStar** or **CHRPT**). **Mode** selects the frequency on which the satellite transmits data. The presets available correspond to those in the **Frequency** drop-list in the **Rotator** tab. The presets and their corresponding frequencies and satellites are described in table 2.7 (later in this section). **Swathe angle** is the scan swathe angle of the radiometer. **Transmission rate** is the rate at which the satellite transmits image data, in lines per second.

Rotator tab

The **Rotator** tab (figure 2.13) allows the rotator to be configured, controlled manually and its status obtained. It also allows the receiver frequency to be programmed manually, the frequency presets to be edited and the receiver status obtained.

Figure 2.13
The **Rotator** tab



Whilst the Rotator tab is visible, satellites will not be tracked, so images will therefore not be acquired. This is a safety measure to allow tracking to be temporarily disabled whilst the antenna and rotator are worked on.

Rotator area

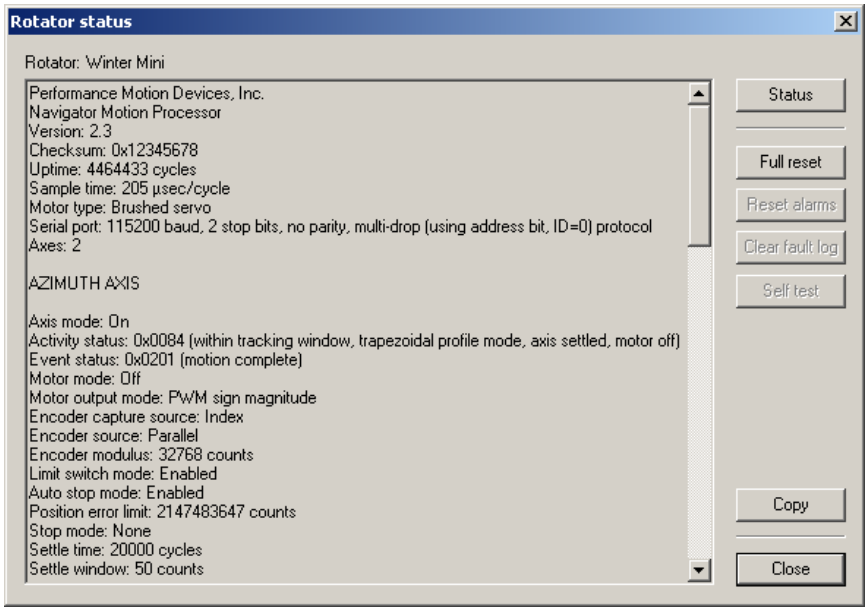
This area shows details about the rotator connected to your system, and allows status reports to be obtained from it. The rotator type is shown in the **Type** box. The **Braking** and **Speed** drop-lists apply to the Winter rotator only, and allow the braking severity and motor speed respectively to be set.

The **Include magnetic variation** check-box is only available for antenna platforms which use an internal flux-gate compass. It determines whether or not the magnetic variation received from the GPS receiver is used to correct the azimuth of the antenna.

The area to the right of the **Status…** button shows the rotator constants, if applicable to the current rotator type.

Click **Status…** to obtain the status of the rotator or execute diagnostics functions. The **Rotator status** window (figure 2.14) is displayed.

Figure 2.14
The **Rotator status** window



To obtain the current status of the rotator, click **Status**. To copy the status text to the clipboard (for pasting into an e-mail, for example), click **Copy**.

The remaining buttons are only available if they are relevant to your rotator type. To reset and re-initialise the rotator, click **Full reset**. To clear the rotator's alarm flags, click **Reset alarms**. If the alarm flags become set again, there is a problem with the rotator. To clear the rotator's internal fault log, click **Clear fault log**. To make the rotator perform a self-test, click **Self test**.

Do not click the Full reset button unless you are instructed to by Dartcom or by maintenance personnel trained to maintain the Dartcom system.

Parking area

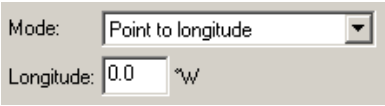
This area allows configuration of the way in which the antenna is parked between passes. Choose the required parking mode using the **Mode** drop-list. The modes available are described in table 2.6. Some modes cannot be selected for certain types of rotator.

Table 2.6
Antenna parking modes

Mode	Description
Upright	Parks at 90˚ elevation (straight upwards)
Point to longitude	Parks pointing towards a geostationary satellite at a specified longitude, allowing LRIT/HRIT reception
Track geostationary	Tracks a specified geostationary satellite, allowing LRIT/HRIT reception from a satellite in inclined orbit
Point-to-sat	Tracks a pre-programmed geostationary satellite, allowing satellite TV reception (Orbit AL-7200 series only)
Point to heading	Keeps the antenna pointing at an offset from the current vessel heading (Orbit AL-7200 series and KVH ASAP only)
Go to point	Parks at a predefined encoder position configured in the antenna controller (Orbit AL-7200 series only)
Point to azimuth/ elevation	Parks at the specified azimuth and elevation

If **Point to longitude** mode is selected, the controls in the **Parking** area change as shown in figure 2.15.

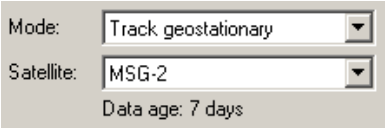
Figure 2.15
Point to longitude parking mode controls



Enter the longitude (in degrees West) of the geostationary satellite towards which the antenna should point in the **Longitude** box.

If **Track geostationary** mode is selected, the controls in the **Parking** area change as shown in figure 2.16.

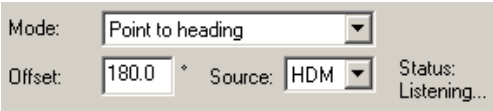
Figure 2.16
Track geostationary parking mode controls



Choose the geostationary satellite you want the antenna to track using the **Satellite** drop-list. The age of the prediction data for the selected satellite is shown below the drop-list.

If **Point to heading** mode is selected, the controls in the **Parking** area change as shown in figure 2.17.

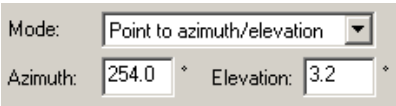
Figure 2.17
Point to heading parking mode controls



Enter the offset (in degrees clockwise) from the current heading to which the antenna should point in the **Offset** box. Choose the NMEA 0183 sentence type (**HDM**, **HDT**, **HDG** or **OSD**) from which to obtain the current vessel heading using the **Source** drop-list. The status of the NMEA input is shown next to the drop-list, and should be "Listening…" in normal operation.

If **Point to azimuth/elevation** mode is selected, the controls in the **Parking** area change as shown in figure 2.18.

Figure 2.18
Point to azimuth/ elevation parking mode controls



Enter the azimuth and elevation (in degrees) at which the antenna should park in the **Azimuth** and **Elevation** boxes respectively.

Receiver area

This area allows the receiver frequency to be programmed and the preset frequencies to be edited. Choose a preset in the **Frequency** drop-list. The frequency (in MHz) which corresponds to the selected preset is shown in the edit box next to the drop-list.

There are four fixed presets (**HRPT-A** to **HRPT-D**) and ten user-defined presets (**USER-0** to **USER-9**). Table 2.7 shows a summary of the presets and their frequencies.

Table 2.7
Receiver frequency presets and their corresponding satellites

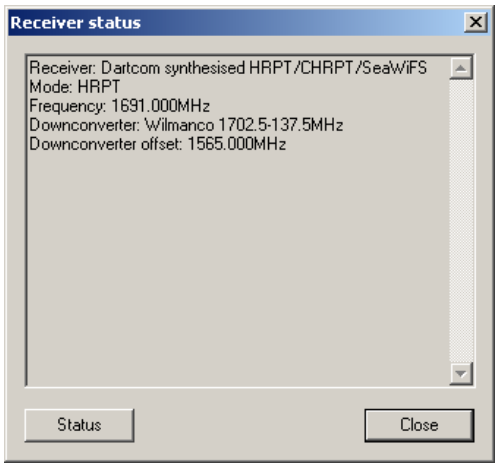
Preset	Frequency	Satellites
HRPT-A	1691MHz	None – used for antenna calibration only
HRPT-B	1698MHz	NOAA 12 and NOAA 18
HRPT-C	1702.5MHz	NOAA 15, NOAA 16 and SeaStar (SeaWiFS)
HRPT-D	1707MHz	NOAA 14 and NOAA 17
USER-0	1700.4MHz	Feng Yun 1C and Feng Yun 1D

To program the receiver with the current frequency, click **Program**.

To change the frequency for a user-defined preset, choose the preset in the **Frequency** drop-list, enter the new frequency in the edit box next to it, then click **Program**.

To see status information for the receiver, click **Status…**. The **Receiver status** window (figure 2.19) is displayed.

Figure 2.19
The **Receiver status** window



The available status information will vary according to the type of receiver fitted to your system. To refresh the information, click **Status**.

Manual control area

This area shows the last azimuth and elevation positions and status obtained from the rotator, and allows the rotator to be controlled manually for diagnostics purposes.

The **Azimuth** and **Elevation** sliders allow the azimuth and elevation to which to move the rotator to be set. To the right of each slider is a numerical readout of the current slider position. Below each slider is a graphical display of the current rotator position. The last status obtained from the rotator is shown below the graphical displays.

After adjusting the sliders, click **Move** to move the rotator to the new position. During the move, the controls are disabled and the position and status displays are updated every second. If you need to stop the rotator before it reaches the new position, click **Stop**.

The **Invert** button inverts the azimuth and elevation. If you click **Invert**, then **Move**, the antenna position should not change. This verifies that the alternate trajectory functions of the software are working correctly.

To update the position and status displays manually at any time, click **Refresh**. To park the antenna using the settings specified in the **Parking** area, click **Park**.

The **Track sun…** button causes the rotator to track the path of the sun across the sky, which can be useful for diagnostics purposes. If the rotator is calibrated accurately and

functioning correctly, the shadow of the feed should fall exactly in the centre of the dish. This function is password-protected.

Do not click the Track sun… button unless you are instructed to by Dartcom or by maintenance personnel trained to maintain the Dartcom system. In any case, please contact Dartcom to obtain the required password.

The **Exercise…** button allows the full range of travel and limit switches on the azimuth and elevation axes of the rotator to be tested. The rotator is moved continuously between the limits on both axes simultaneously. This function is password-protected and only available for the Winter XPA and Winter Mini rotators.

Do not click the Exercise… button unless you are instructed to by Dartcom or by maintenance personnel trained to maintain the Dartcom system. In any case, please contact Dartcom to obtain the required password.

The **Calibration…** button allows the rotator offsets to be calibrated during installation or maintenance. This function is password-protected and only available for azimuth/elevation rotators (such as the Videmech/Bewator and Winter series).

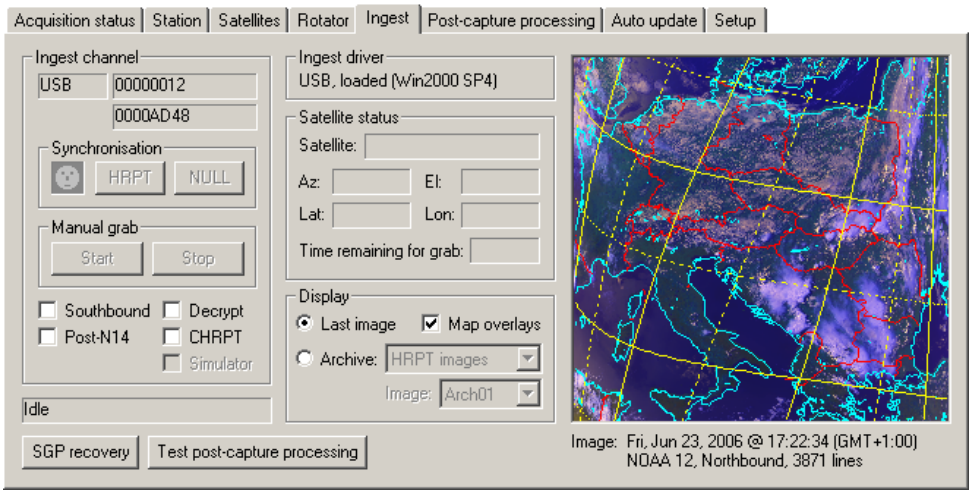
Do not click the Calibration… button unless you are instructed to by Dartcom or by maintenance personnel trained to maintain the Dartcom system. In any case, please contact Dartcom to obtain the required password.

The **Drive** buttons apply only to the Winter rotator. They allow the azimuth and elevation motors respectively to be started and stopped, and are *toggle* buttons, which means that they stay "pushed in" when clicked, and are released when clicked again. The **Reverse** check-boxes control the direction of the respective motor. If ticked, the corresponding motor is driven anti-clockwise (reverse), otherwise it is driven clockwise (normal).

Ingest tab

The **Ingest** tab (figure 2.20) allows the status of a grab operation to be monitored, allows quick viewing of the image archives and provides facilities for testing the ingest mechanism. The tab is displayed automatically during an automatic grab operation.

Figure 2.20
The **Ingest** tab



The **SGP recovery** button allows a pass which has been stored by an SGP (station ground processor) unit to be decrypted and replayed into the HRPT/CHRPT Grabber software.

This is currently only required for encrypted SeaWiFS passes. To replay a stored pass into the HRPT/CHRPT Grabber, follow the instructions below.

1. Prepare the SGP unit so that it is ready to begin replaying the stored pass.
2. Click the **Archive** radio button in the **Display** area and choose **SeaStar images** in the drop-list.
3. Choose the archive slot in which you wish to store the replayed pass in the **Image** drop-list.
4. Click **SGP recovery**.
5. A window appears asking you to confirm that you want to overwrite the contents of the chosen archive slot with the replayed pass. Click **Yes** to overwrite the archive.
6. Another window appears asking you to start replay from the SGP. At the same time as starting playback on the SGP unit, click **OK** to begin recovery of the pass. The pass is then captured in the normal way and stored in the chosen archive as decrypted data.

Any data replayed by the SGP unit in the time between playback commencing and clicking OK in the HRPT/CHRPT Grabber software will be lost. Ensure that this delay is minimised to maximise the amount of data captured.

The **Test image post-processing** button allows the processing configured in the **Post-capture processing** tab to be tested on the image selected in the **Display** area.

Ingest channel area

This area displays the status of the ingest channel and allows testing of the receiver rack and ingest channel. The boxes at the top of the area display device driver information if the ingest channel is functioning correctly, or error messages if a problem has occurred.

The check-boxes at the bottom of the area can be used in conjunction with the controls in the **Synchronisation** and **Manual grab** areas and the optional HRPT simulator to test the operation of the receiver rack and ingest channel. The **Southbound** check-box switches the pass direction between northbound and southbound. The **Post N14** check-box switches between pre-KLM and KLM Quicklook creation methods. The **Decrypt** check-box switches the receiver between HRPT (unencrypted) and SeaWiFS (encrypted) modes. The **CHRPT** check-box switches the receiver between HRPT/SeaWiFS and CHRPT modes (if it is capable of both). The **Simulator** check-box switches between the receiver's normal and simulator inputs, and is only available if the receiver supports this.

Synchronisation area

The icon indicates whether or not good frame synchronisation has been achieved, as shown below:

Good frame synchronisation

Poor or no frame synchronisation

The **HRPT** and **NULL** buttons are only available if the software is being used with a DMA ingest card. They can be used in conjunction with the check-boxes at the bottom of the **Ingest channel** area, the controls in the **Manual grab** area and the optional HRPT simulator to test the operation of the receiver rack and ingest channel. Please refer to the second line maintenance manual supplied with your system for more information.

Manual grab area

The controls in the **Manual grab** area can be used in conjunction with the check-boxes at the bottom of the **Ingest channel** area, the controls in the **Synchronisation** area and the optional HRPT simulator to test the operation of the receiver rack and ingest channel. The **Start** button starts the software grabbing data from the ingest channel. The **Stop** button stops grabbing. A manual grab continues until the preview area on the right-hand side of the tab is filled or **Stop** is clicked.

Ingest driver status area

This area shows the status of the ingest driver and the platform on which it is running.

Satellite status area

This area duplicates some of the satellite status displays in the **Acquisition status** tab to allow monitoring during an automatic grab operation, when the **Ingest** tab is displayed.

Display area

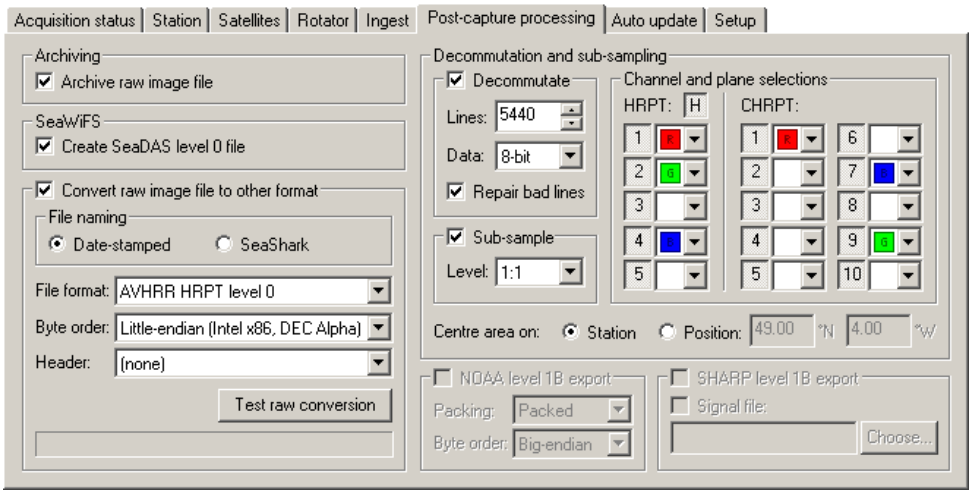
This area allows the image preview (or *Quicklook*) on the right-hand side of the tab to be controlled. The details of the image are shown underneath it. You can drag the mouse up and down on the Quicklook to scroll it up and down. Whilst an image is being captured, its Quicklook appears line-by-line. If the satellite is travelling northbound, the preview appears from the bottom. If it is travelling southbound, the preview appears from the top.

When the **Ingest** tab is first displayed, the **Last image** radio button is selected by default. This radio button displays the image which was last captured. Use the **Map overlays** check-box to switch on or off display of map overlays on the Quicklook. To browse the rolling archives, click the **Archive** radio button and choose the type of rolling archive to browse from the drop-list. Choose images to look at using the **Image** drop-list.

Post-capture processing tab

The **Post-capture processing** tab (figure 2.21) allows the processing performed after each pass is captured to be switched on or off and configured.

Figure 2.21
The **Post-capture processing** tab



Archiving area

The **Archive raw image file** check-box determines whether or not you want the raw image data file to be included in the archived files for the image. It should normally be

switched on unless automatic decommutation is also switched on and disk space is at a premium. Even if switched off, the ancillary files for the raw image are still archived.

If both the Archive raw image file check-box and the Decommutate check-box are switched off, no image data (raw or decommutated) will be archived.

SeaWiFS area

The **Create SeaDAS level 0 file** check-box determines whether or not a SeaDAS level 0 file is created after an image has been captured. If enabled, each time a pass is captured from the SeaStar satellite it will be converted to a SeaDAS level 0 file and stored in the **Struct** sub-directory of the image's archive slot.

Convert raw image file to other format area

This area controls conversion of Dartcom HRPT and CHRPT raw images to other raw formats. Converted images are stored in the **Struct** sub-directory of the image's archive slot. The **Convert raw image file to other format** check-box determines whether or not conversion is performed. If switched on, the conversion settings can be changed.

The **File naming** area allows the required type of file naming to be chosen. Click the **Date-stamped** radio button if you want converted raw files to be named with the date and time of capture (in the format **yyyymmdd_hhmm.raw**). Click the **SeaShark** radio button if you want the files to be named for use with the *SeaShark* processing package.

The **File format** drop-list allows the third-party raw format to which to convert captured raw files to be chosen. Currently, two third-party formats are supported. Summaries of their structures are shown in table 2.8.

Table 2.8 Supported third-party raw file formats

Format	Frame composition (words)
AVHRR HRPT level 0	HRPT: 6 frame sync; 10984 data; 100 auxiliary sync; 6 sync CHRPT: not applicable
Standard raw	HRPT: 6 frame sync; 10984 data; 100 auxiliary sync CHRPT: 6 frame sync; 22074 data; 100 auxiliary sync

AVHRR HRPT level 0 is the format required by the *SeaShark* processing software, set out in the *SeaShark Detailed Design Document*, section 5.1.1. **Standard raw** is the complete HRPT or CHRPT frame, including all frame sync and auxiliary sync words.

The **Byte order** drop-list allows the byte order for the converted data to be chosen. If the converted data is to be used on an Intel x86 or DEC Alpha platform, choose **Little-endian**. If the data is to be used on a Sun SPARC or Motorola platform, choose **Big-endian**. In little-endian byte order, the least significant byte of a word is stored first. In big-endian byte order, the most significant byte of a word is stored first.

The **Header** drop-list allows the header file to accompany the converted data to be chosen. If a header file is not required, choose **(none)**. If the converted data is to be used with the *SeaShark* processing system, choose **SeaShark (AQTIM.DAT)**. The **AQTIM.DAT** file contains the satellite number, start date, start time, end date, end time and total number of frames (or lines) of its associated image.

If the converted data is to be used with the CRISP processing system, choose **CRISP**, in which case three pseudo-frames are appended to the raw file. The first contains the two-line elements in ASCII format, with a line feed character separating the lines. The second contains the start time in standard UNIX timestamp format (seconds since midnight on

1st January 1970 as a 32-bit long integer). The third contains the resynchronisation time in UNIX format. In all three pseudo-frames, unused bytes are filled with zero.

The **Test raw conversion** button allows the chosen settings to be tested. It converts the most recently captured raw data (stored in the **Raw** path), storing it in the **Struct** sub-directory of **Arch01** in the HRPT archive path. When conversion is complete, load the converted file into the appropriate software to confirm that it has been converted correctly.

Decommutation and sub-sampling area

This area controls automatic decommutation and sub-sampling of captured HRPT and CHRPT images. Automatically sub-sampled images can be opened in the Dartcom iDAP viewing and processing software as image documents without the need for manual decommutation or sub-sampling. They can also be processed automatically using the Dartcom MacroPro automatic processing software. See the separate *iDAP/MacroPro software user guide* for more information.

The decommutation and sub-sampling settings can be tested by switching to the Ingest tab, choosing an image on which to perform the test in the Display area, then clicking on Test post-capture processing.

The **Centre area on** radio buttons at the bottom of this area allow the centre point of the decommutated and sub-sampled data to be specified. Click the **Station** radio button to use your station position at the time of processing, or click the **Position** radio button and enter the latitude (in degrees North) and longitude (in degrees West) of the specific point on which the decommutated and sub-sampled data should be centred.

Decommutate area

The **Decommutate** check-box determines whether or not automatic decommutation is performed. Decommutated data is stored in the **Decom** sub-folder of each image's archive slot. If **Decommutate** is switched on, the decommutation settings and selected channels can be changed.

If both the Archive raw image file check-box and the Decommutate check-box are switched off, no image data (raw or decommutated) will be archived.

Enter the maximum number of lines to decommutate in the **Lines** box. You should normally leave this set to the maximum (5440) to maximise the amount of data available for further processing or sub-sampling. The area decommutated will be centred on your chosen point, as specified using the **Centre area on** radio buttons.

Choose whether to create 8-bit or 10-bit decommutated image data using the **Data** drop-list. If you want to perform automatic sub-sampling or manually sub-sample the decommutated images in the Dartcom iDAP software, choose **8-bit**. If the data is to be exported to third-party file formats (such as NOAA level 1B), choose **10-bit**.

The **Repair bad lines** check-box determines the way in which lines whose times are invalid (due to noise) are decommutated. If switched on, the image data for the line is "repaired" using the average of the nearest two good lines above and below the bad line. If switched off, a black line is inserted in place of the bad data.

Sub-sample area

The **Sub-sample** check-box determines whether or not automatic sub-sampling of the decommutated data is performed. If switched on, the latest HRPT and CHRPT images will be sub-sampled and stored in their corresponding archive paths, with file names

"Latest HRPT sample.did" and "Latest CHRPT sample.did" respectively.

The Sub-sample area and check-box are only available if the Decommutate check-box is switched on and the data size is set to 8-bit.

Choose the required level of sub-sampling (or magnification) from those available in the **Level** drop-list. The area sub-sampled will be the largest that the selected level (and amount of image data decommutated) allows, and will be centred on your chosen point, as specified using the **Centre area on** radio buttons.

Channel and plane selections area

This area allows the channels to decommutate to be specified and the sub-sample planes to be assigned to image channels.

Each numbered toggle button corresponds to an image channel. The five buttons on the left-hand side correspond to the five HRPT channels, and the ten on the right-hand side to the ten CHRPT channels. The **H** button corresponds to the HRPT header. If a toggle button is "pushed in", its corresponding channel will be included in the decommutated data for its associated image type.

The channel selection buttons are only available if the Decommutate check-box is switched on.

The drop-lists to the right of each channel selection button can be used to set the plane assignments for the sub-sampled data for each type of image. Each of the drop-lists shows which plane is assigned to its corresponding channel. If a drop-list is blank, no plane is assigned to that channel.

Planes can only be assigned to channels which are selected for decommutation. If at least three channels are selected, the red, green and blue planes can be assigned, producing a multi-plane sub-sample. If fewer than three channels are selected for decommutation, only the grey plane can be assigned, producing a single-plane sub-sample. The default plane assignments are red to channel 1, green to channel 2 and blue to channel 4, which produces a good "true colour" multi-plane sub-sample with both day and night images.

The plane assignment drop-lists are only available if the Sub-sample check-box is switched on.

NOAA level 1B export area

This area allows the settings for NOAA level 1B exporting to be specified. The **NOAA level 1B export** check-box determines whether or not decommutated HRPT data is exported to NOAA level 1B format. Exported data is stored in the **Struct** sub-folder of each image's archive slot.

Choose the type of packing required in the **Packing** drop-list. Choose the byte order for the data in the **Byte order** drop-list. PCI Geomatics and ERDAS Imagine both require big-endian data.

The NOAA level 1B export area and check-box are only available if the Decommutate check-box is switched on, the data size is set to 10-bit and your Dartcom software licence includes the NOAA level 1B exporter.

SHARP level 1B export area

This area allows the settings for SHARP level 1B exporting to be specified. The **SHARP level 1B export** check-box determines whether or not decommutated HRPT data is exported to SHARP level 1B format. Exported data is stored in the **Struct** sub-folder of each image's archive slot.

Choose whether or not to create a file signalling that new data has been exported using the **Signal file** check-box. The signal file can be watched for by a batch processing system to automate higher levels of processing. If **Signal file** is switched on, click **Choose…** to select the required path and name for the signal file.

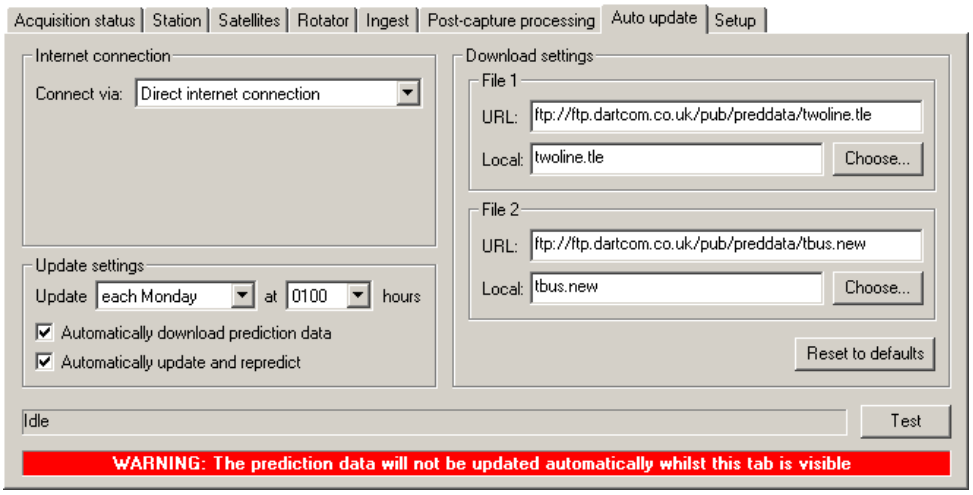
The SHARP level 1B export area and check-box are only available if the Decommutate check-box is switched on, the data size is set to 10-bit and your Dartcom software licence includes the SHARP level 1B exporter.

Auto update tab

The **Auto update** tab (figure 2.22) allows automatic downloading and updating of new prediction data from the internet to be set up and switched on or off. Note that when the **Auto update** tab is visible, automatic updates will not be performed. This is to enable the update settings to be changed without interruption by a scheduled automatic update.

To display the Auto update tab properly, and also to download new prediction data files, dial-up networking and the TCP/IP protocol must both be installed and configured correctly.

Figure 2.22
The **Auto update** tab



When the internet connection, download settings and update settings have been configured according to requirements, test the settings by clicking on **Test**. This connects to the internet using the specified connection method and downloads the specified files. The status of the test is shown next to the **Test** button. When the download operation is complete, if it was successful, **Download completed successfully** is displayed in the status box, otherwise an error message is displayed.

In the event that the test failed, check that your internet connection is reliable. If dial-up networking is being used, that the modem is switched on and functioning correctly (try switching it off and on again), and check that the ISP account details are correct. Check also that the URLs exist, and that the local files are not write-protected.

Internet connection area

The **Internet connection** area allows the type of internet connection to use to be chosen and configured. Three types of connection can be chosen from using the **Connect via** drop-list. **Dial-up networking** uses the Windows dial-up networking software to access the internet through a modem and an internet service provider (ISP) account. **Proxy server** uses a proxy server (or internet gateway) to gain access to the internet. **Direct connection** accesses the internet directly (via a leased line, xDSL router or ISDN router, for example).

To use dial-up networking, the Windows dial-up networking software must be installed and configured correctly. To use a proxy server or direct internet connection, the TCP/IP protocol must be installed and configured correctly.

To configure a **Dial-up networking** connection, choose the dial-up networking profile to dial to access the internet from the **Profile** drop-list. Enter the correct user name and password for your account with the chosen ISP in the **User name** and **Password** boxes.

If the specified dial-up networking profile has already been connected (by a web browser or FTP client, for example) when the HRPT/CHRPT Grabber software performs a download, it will not be disconnected when the download is complete. In this case, it is the responsibility of the application which made the connection to disconnect the profile, as the HRPT/CHRPT Grabber software cannot disconnect a profile which was connected by another application.

To configure a **Proxy server** connection, enter the IP address of the proxy server (or internet gateway) to use to access the internet in the **Host** box.

Download settings area

The **Download settings** area allows the files to download to be configured. Up to two different files can be downloaded, corresponding to the **File 1** and **File 2** areas. For each file you want to download, type the URL of the file in the **URL** box, then type the name and path for the downloaded file in the **Local** box (or click **Choose…** and navigate to the required path). Suggested files to download are shown in table 2.9.

Table 2.9 Suggested files to download using the automatic update facilities

URL	Description
ftp://ftp.dartcom.co.uk/pub/preddata/twoline.tle	SGP4 two-line elements (required to predict satellite passes)
ftp://ftp.dartcom.co.uk/pub/preddata/tbus.new	TBUS orbital elements (required for NOAA level 1B and SHARP level 1B export)

To restore the default download settings, click **Reset to defaults**.

Update settings area

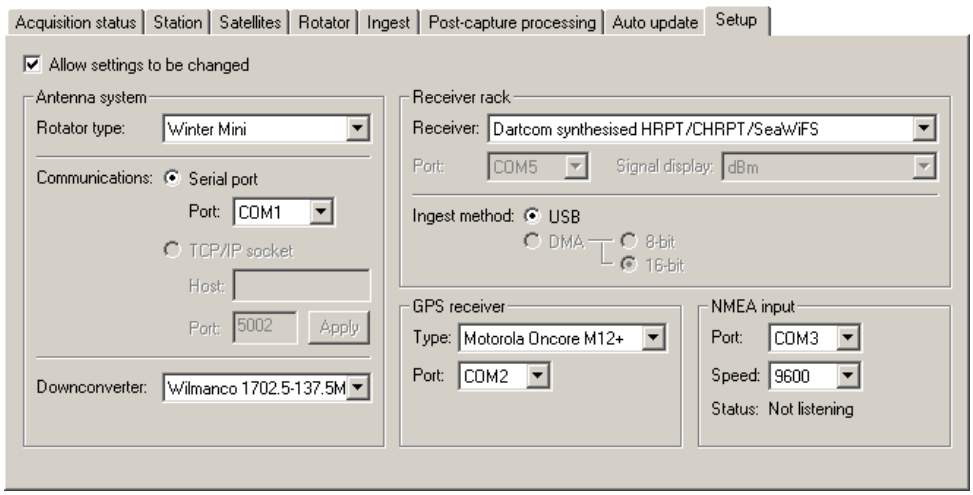
The **Update settings** area allows the frequency and time at which to perform an automatic update to be chosen, and allows automatic downloading and updating to be switched on or off. The first drop-list allows the day of the week (Monday to Sunday, or every day) on which to perform automatic updates to be chosen. The second drop-list allows the time at which to perform updates (0000 hours to 2300 hours) to be chosen. The latest prediction data is available on Dartcom's FTP site (**ftp.dartcom.co.uk**) from 0000 hours each Monday (UK local time).

The **Automatically download prediction data** check-box switches on or off automatic downloading of the files specified in the **Download settings** area. The **Automatically update and repredict** check-box switches on or off automatic updating of the prediction data elements for each satellite and reprediction of satellite passes. If only the latter check-box is switched on, if the latest prediction data is obtained manually and placed in the HRPT/CHRPT Grabber folder (usually **C:\Program Files\Dartcom\HRPT CHRPT Grabber**), it will be used to update and repredict all satellites.

Setup tab

The **Setup** tab (figure 2.23) shows the hardware setup and current configuration, and allows the setup to be changed and configured if required.

Figure 2.23
The **Setup** tab



To make changes to any of the settings, the **Allow settings to be changed** check-box must first be switched on. To prevent unauthorised tampering, this requires a password to be entered.

Do not switch on the Allow settings to be changed check-box unless you are instructed to by Dartcom or by maintenance personnel trained to maintain the Dartcom system. In any case, please contact Dartcom to obtain the required password.

Antenna system area

Choose the type of rotator connected to the system from those available in the **Rotator type** drop-list.

Select the communication method to use for the selected rotator from the **Communications** radio buttons. If **Serial port** is selected, choose the port to which the

rotator is connected using the **Port** drop-list. If **TCP/IP socket** is selected, enter the host name or IP address assigned to the rotator in the **Host** box and the port number to which the socket should connect in the **Port** box, then click **Apply** to make the new host name and port number take effect.

Choose the type of downconverter fitted to the antenna using the **Downconverter** drop-list. For most land-based systems this will be **Wilmanco 1702.5-137.5MHz** and for most marine systems **Quorum**.

Receiver rack area

Choose the type of receiver fitted to the rack from those available in the **Receiver** drop-list. If the system has a multi-mode receiver rack select **Quorum MetCom DSP**, then choose the serial port to which the receiver is connected using the **Serial port** drop-list and the required type of signal display using the **Signal display** drop-list.

If your system has a standard receiver rack, select **Dartcom synthesised HRPT/CHRPT/SeaWiFS**. There are no additional options for this receiver type.

Select the ingest method to use from the **Ingest method** radio buttons. In all cases this will be **USB**.

The DMA ingest method is no longer supported. If your system has a DMA card installed in the host computer please contact Dartcom for information about the USB upgrade kit.

GPS receiver area

Choose the type of GPS receiver fitted to the receiver rack from those available in the **Type** drop-list. In most cases this will be **Motorola Oncore M12+** or **Motorola Oncore GT+**. Select the serial port to which the GPS receiver is connected using the **Port** drop-list.

NMEA input area

The **Point to heading** parking mode obtains the current vessel heading from HDM, HDT, HDG or OSD sentences received from an NMEA 0183 data source.

Choose the serial port to which the NMEA source is connected using the **Port** drop-list. Select the data transmission rate (in bits per second, or bps) using the **Speed** drop-list.

The status of the NMEA input is shown below the drop-list. In normal operation, with the **Point to heading** parking mode selected, it should be “Listening…”.

S E C T I O N

3

Troubleshooting and diagnostics

Introduction

This section describes possible problems which may occur with the Dartcom HRPT/CHRPT Grabber software and ways in which they can be resolved.

Lost or damaged settings

It is possible that a situation may arise where the settings for your HRPT/CHRPT Grabber software get lost or damaged. If this happens, the settings that were configured when your Dartcom HRPT/CHRPT/SeaWiFS system was installed can be restored from the Registry settings file. It can be found in the directory in which the HRPT/CHRPT Grabber software was installed, and is also supplied on the software installation CD.

Ensure that the Registry settings file for the HRPT/CHRPT Grabber software is backed up and stored in a safe place, as the data it contains is unique to each system installation.

To restore the original Registry settings for the HRPT/CHRPT Grabber software, choose **Start|Run…** and enter **regedit** as the program to run. From the **Registry Editor** window which appears, choose **Registry|Import Registry File…**. Find and select the backup of the Registry settings file for the HRPT/CHRPT Grabber software, then click **Open** to restore the Registry settings from the file.

Changes made to the HRPT/CHRPT Grabber software settings to suit particular requirements will need to be repeated, as all previous settings are overwritten by restoring the Registry settings file.

Hardware and software diagnostics

Full details of the hardware and software diagnostics available are given in the *Second Line Maintenance* manual supplied with your system.

APPENDIX

A

Dartcom file formats

Introduction

This appendix describes the file formats used within the Dartcom HRPT/CHRPT Grabber software. The information in this appendix will be of most use to third-parties interested, or actively engaged, in using the Dartcom system as a front-end acquisition unit. In such cases, product processing will usually be performed by support workstations, normally connected by some form of local area network (LAN).

It is not the purpose of this appendix to discuss the possible arrangement, throughput characteristics, and so on, of any LAN used to connect the Dartcom front-end system to the workstations. As such, special note must be made by the reader of file sizes and types (text or binary). It is the reader's responsibility to effect a reasonable link in order to extract any data from the Dartcom system that may be required further downstream.

Image acquisition files

When the Dartcom HRPT/CHRPT Grabber acquires a digital AVHRR transmission from a NOAA satellite, it stores a series of what are termed as raw data files on the hard disk of the designated host computer. There are six files in total.

All the files are given the same primary name (**$WHRPT32**, for example), where "**$**" is the standard dollar character. The file extensions are **RAW**, **RPD**, **QLK**, **NMF**, **STA** and **ECF**. Only the **RPD** and **ECF** files are text files; all others are binary files. Where appropriate, the formats are described below.

RAW file

This is the primary data file containing the data-interleaved AVHRR transmission. Overall size is dependent upon the rotator limit setting within the software, but for horizon-to-horizon use (1˚ minimum setting) file sizes of between 100MB and 115MB are not unreasonable to expect.

HRPT and CHRPT data has a 10-bit word length, so it is recorded on the Dartcom system in 16-bit words (the most significant 6 bits being zero). The file is made up of image line frames, each frame consisting of 11008 words. The first word of each HRPT frame corresponds to word 6 (sync word 6) as defined in the NOAA handbook. Therefore, there is a 6-word offset between the NOAA definitions and the stored data in each frame on the hard disk. This then produces the following for each frame (line of an HRPT image):

Table A.1
Word allocations for each frame (line) of an HRPT image

NOAA word	Frame word	Usage
6 to 623	0 to 617	From sync 6 (=$0095) to TIP data
751 to 10990	745 to 10984	Interleaved pixel data (1024 pixels, 5 channels)

Note that frame words 618..744 (spare AVHRR words 624..750) and 10,985..11007 (auxiliary AVHRR sync words 10991..11013) are not used by the Dartcom HRPT/CHRPT Grabber or iDAP software.

RPD file

This holds data related to the definition of orbital parameters used to grab the RAW data file. Depending upon the actual data values, this file will be around 400–450 bytes long. It is a text file, and an example of the entries can be seen below, with descriptions added to the entries that are of use to third-party systems. All other entries can be ignored as they are related only to the operation of the Dartcom system hardware.

Example sections from within an **RPD** file are shown below:

```
Grabber related data :-
137.62
-1
3
1995                        ; Year of transmission
9                           ; Month
2                           ; Day
13                          ; Hour   NB: This time is only approximate
22                          ; Minute
23                          ; Second
1003
10                          ; Way - (see note 1)
1
SGP4 prediction/mapping related data :-
55.5                        ; Scan angle of AVHRR sensor
6                           ; Lines per second of transmission
0
1439
1440
1440
0
0
0
0
1
1000
0                           ; Time offset to epoch
6.16350982569959            ; Mean anomaly (radians) (see note 3)
3.1214724979728             ; RAAN (radians)
.121963608129364            ; Argument of Perigee (radians)
.0010175                    ; Eccentricity
1.72625803925779            ; Inclination  (radians)
6.15895684636643E-02        ; Mean motion (radians/minute) (see note 4)
2.12105985485422E-12        ;   - 1st derivative (see note 5)
0                           ;   - 2nd derivative (see note 6)
.000062972                  ; BSTAR drag term / rad. pressure coefficient
95236.85997682              ; Epoch of elements
0                           ; Magnitude at standard
```

Note 1

The **way** is bit encoded as follows:

Table A.2
Encoding of the **way** bit

Bit number	Value=0	Value=1
0	N	S
1	W	E
2	W/E	Overhead
3	Inactive	Valid

Note 2

```
Const RA2DE = 57.2957795130823
Const XMNPDA = 1440 (minutes/day)
Const TWOPI = 6.28318530717959
Const PFACT = TWOPI / (XMNPDA * XMNPDA)
```

Note 3

Values stored in radians are shown in degrees in the orbital update window.

Note 4

Mean motion shown in the orbital update window is this value divided by (*PFACT*×*XMNPDA*).

Note 5

1st derivative in the orbital update window is this value divided by (*PFACT*).

Note 6

2nd derivative in the orbital update window is this value multiplied by (*XMNPDA*/*PFACT*).

QLK file

This is the definition file used to create the 24-bit graphic quick-look facility used by the HRPT software. This preview image is created simultaneously with the acquisition of the AVHRR data and is an accurate representation of the contents of the **RAW** file.

The format is identical to a standard Windows DIB image file.

NMF file

This has the same format as a standard Windows metafile, **WMF** (vector graphic file). It contains the overlay graphics for the **QLK** file (above), in order that the user may see exactly the region covered by the grabbed data.

STA file

This is the image statistics file, and is created automatically during live acquisition. The contents of this file can be displayed as a set of five graphs during a decommutation operation, to aid in user-selected boundary conditions for 10-bit to 8-bit sampling.

ECF file

This is the enhanced calibration file. The contents of this file are used at the decommutation stage within the HRPT/CHRPT Grabber and iDAP software to enable calibrated data to be extracted for any given image planes, and corresponds to the satellite in question.

Image decommutation files

When a **RAW** file is been decommutated (split) into image and header data files, another set of files is created in a sub-directory of the image's archive slot. The decommutated image data is stored in a binary file. All the files have the primary name **$WIMAGE** in order to be compatible with decommutation files created with the WinHRPT software. A modified orbital data file (**RPD**) and the overlay graphics file (**NMF**) from the **RAW** directory are copied for later use by the system, when sub-sampling the decommutation file.

DCM file

This file contains pure image data from the decommutated channels. Although its size can vary, the resultant size per channel will be 10–20% of the original **RAW** file size, if all image lines are recovered. The file is structured as line data followed by a "footer". Each AVHRR line decommutated will produce a block containing the following data:

- **Up to 10 bands of image data as selected.** The "footer" value chanf is bit encoded (see later), and specifies the bands for which data exists. The data is line interleaved, with 2048 words or bytes, as appropriate, per line.
- **Optional header frame.** During the decommutation process the HRPT header data (TIP data, for example) can be included. It consists of frames, one frame per image line recovered, with each frame containing the 618 word record (AVHRR data words 6..623 as described in RAW file above) allocated for such information in the HRPT format. For a full description of the information held in these HRPT header words, reference should be made to the appropriate NOAA handbooks and a description of TOVS processing. Such discussions are outside the scope of this document. Again the footer value "chanf" will have the appropriate bit set if this header data exists.
- **A line time stored as a long integer (4 bytes).**
- **A line day stored as a long integer (4 bytes).**

Each **DCM** file has a footer record attached to it, describing its contents. The record structure of this fixed-length footer is as follows:

```
struct DCMREC {
     // Common HRPT/CHRPT
     short bits;              // Results (8 or 10)
     short fline;             // No. of bad lines seen during decom
     short nline;             // No. of lines in total (good + bad)
     chanf chanf;             // Channels (1024..64=chans 10..6, 32=hdr,
                                 16..1=chans 5..1)
     calbf calbf;             // Calibrated flags (as above)
     short minv[5];           // Raw method used during decommutation
     short maxv[5];
     short divv[5];
     float shift[5];          // Calibrated methods used during decommutation
     float scale[5];
     short chsel[3];          // RGB channels in saved image (0=not, 1..10)
     long tlst[2048];         // Line time list
     short xofs;              // Sub-sample parameters
     float sscale;
     short spare;
     char arcp[40];           // Archive path (normally 'raw')
     char dcmp [40];          // Decom path
     // CHRPT additions
     short cminv[5];          // Raw method used during decommutation
     short cmaxv[5];
     short cdivv[5];
     float cshift[5];         // Calibrated methods used during decommutation
     float cscale[5];
     short xchsel[17];        // Spare for true multi-band imagery (>24-bit)
};
```

Disclaimer

This document will be amended and enhanced as the Dartcom HRPT/CHRPT Grabber software develops. No warranty is implied or expressed in this document, and the stated data formats may change at any time.