

4400 Series Laser Imaging System Overview

The Maptek I-Site™ 4400LR system is an efficient, easy to use and reliable solution for detailed surface measurement in topographic, mining, forensic and general surveying work. The system has been designed for incorporation with normal survey practice, and provides excellent laser scanning and panoramic digital imaging tools.

The I-Site 4400LR system is a complete package of hardware and software tools targeted to undertake a wide variety of measurement tasks.

The I-Site 4400LR consists of a compact laser scanner, digital panoramic camera, digital tilt compensator and survey alignment telescope. The system is powered by a rechargeable, removable battery pack and is controlled and set-up via an easy to use interface.

The I-Site Studio software is recognised as the world's leading software package for managing terrestrial laser scan data. Development in conjunction with the 4400LR scanner ensures a seamless workflow for users. Increased processing productivity is provided through a combination of advanced algorithm technology and an intuitive, simple user interface.

I-Site Product Development Team

System Components

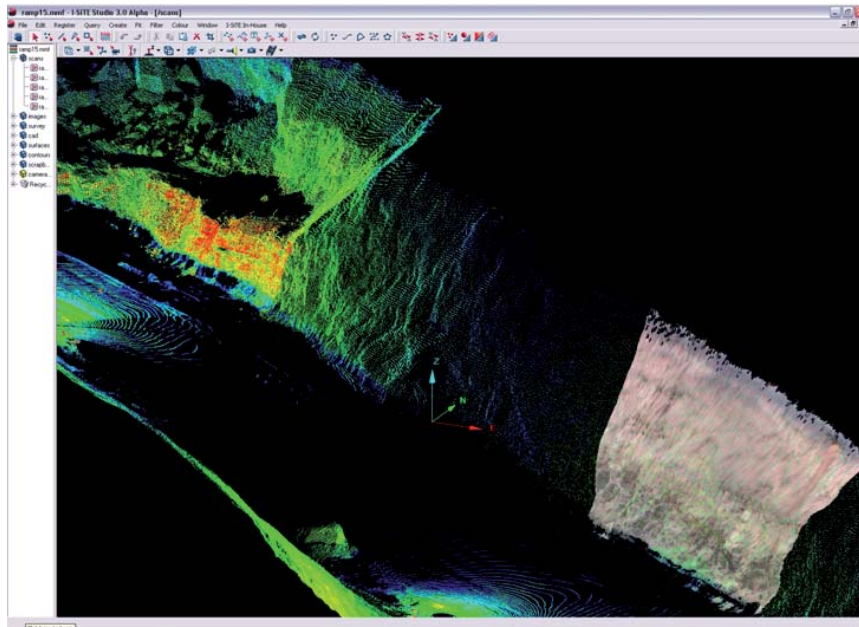
The I-Site 4400LR system is a combination of various hardware and software components. This section provides a brief description of these components.

I-Site Studio

I-Site Studio is a laser scan data processor with a comprehensive set of software tools for visualisation, modelling, manipulation, mapping, survey, CAD and analysis. Laser scan data from various sources can be combined with survey data, CAD or other spatial data to provide the ideal working environment to extract information from laser scan data.

A document is enclosed with the I-Site 4400LR scanner with further information regarding I-Site Studio 3.0 installation and licensing.

Note: Operation and help documentation for I-Site Studio software is included in the software installation, and therefore is not covered in this document.



User interface of the I-Site Studio 3.0 software.

I-Site HHC Data Recorder and Software

The I-Site HHC (hand held controller) is a compact, tablet style data recorder that includes a colour graphical interface with active pen for user input. The ActiveTFT screen is ideal for outdoor viewing.

The HHC software runs continuously and is used to input scan acquisition parameters, record scan data files collected from the 4400LR and view acquired scans (including their details), as well as display diagnostic information about the 4400LR scanner. The HHC and software connects to the 4400LR scanner via an Ethernet cable, and scan data is transferred from the HHC to the workstation using a USB key. A stylus is provided for users to input information through the screen.



I-Site 4400LR Laser Scanner

The I-Site 4400LR is an advanced measurement instrument comprising of several electro-optical sensing systems (active and passive), and associated control and data acquisition systems necessary for integration into a simple, durable and compact package.

The primary sensing system is a time of flight laser scanner which records 3D point data from wide areas as well as the intensity of the return from each point. The effective speed of acquisition of this system is 4400 points per second. The secondary sensing system is the panoramic digital camera that is designed to provide colour texture overlays for the laser scan data at a higher spatial resolution than the 3D point cloud.

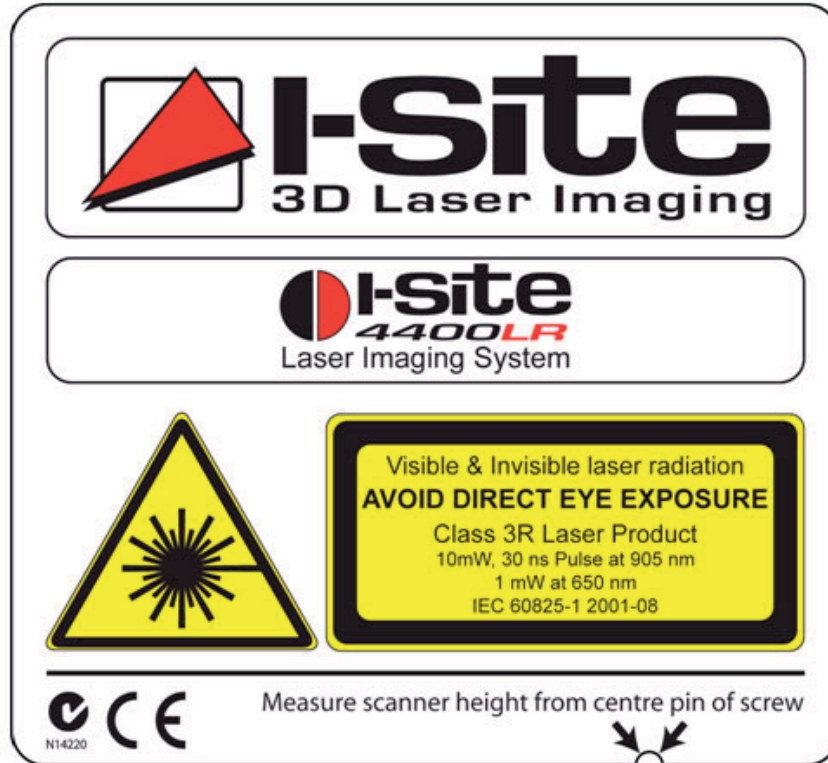
The camera operates through a wide dynamic range and includes filters to remove laser effects from the image and algorithms to correct for lens distortion. Other features of the I-Site 4400LR include a digital tilt compensator, a survey alignment telescope with motorised control, a red diode laser pointer for alignment underground or inside, and an easy to use remote for scanner control. A removable, rechargeable battery is housed within the instrument chassis, and a standard tribrach mount and plate level bubble are included.

Accessories and Cables

Several ancillary components are also included with the I-Site 4400LR system, as follows:

- ❏ 1 x Ethernet cross-over cable
- ❏ 1 x 2Gb USB key
- ❏ 1 x 'Pelican' transport and storage case
- ❏ 1 x 100-240V battery charger for HHC
- ❏ 1 x 12V charger for HHC
- ❏ 1 x 100-240V battery charger power supply
- ❏ 1 x 12V battery charger power supply
- ❏ 1 x Platinum EX battery charger





Important Information

Any person operating the I-Site 4400LR scanner should be aware of the following safety considerations and precautions:

1. Class 3R laser products may cause damage to the eye if prolonged continual exposure to the beam occurs.
2. Precautions should be taken to prevent any person staring into the laser aperture at close range while the instrument is operating.
3. Every effort should be made to inform other people in the direct vicinity of the operating instrument of the safety considerations listed here.
4. Safety measures should be taken to ensure the laser beam is not directed towards any mirror-like (specular) concave surface that may focus the beam.
5. Precautions should be taken to ensure that no optical instruments are used to view the laser aperture while the 4400LR is operating.
6. Under no circumstance should any panel or cover be removed from the 4400LR scanner. Doing this constitutes a high risk of eye damage and/or electrical shock. There are no user serviceable parts inside the 4400LR instrument, and only trained, qualified I-Site personnel may perform alignment and calibration.
7. Do not remove any of the laser safety and warning labels from the 4400LR scanner, or this manual.

The location of the laser radiation aperture in the I-Site 4400LR scanner is shown in the diagram below.



System Care

The I-Site 4400LR has been designed to withstand operation in harsh industrial environments; however it is also a high precision optical surveying instrument. Care should be taken to preserve stability of measurement and calibration, as this will ensure good operation for many years.

The system may need to be realigned or calibrated if the 4400LR scanner experiences a significant impact or if the eyepiece or any other optical component appears to have suffered damage.

Never remove any external covers, panels or fixtures, other than the eyepiece cover. These panels are all environmentally sealed, and there are no user serviceable parts or systems inside the I-Site 4400LR. Removal of any panel, cover or fixture will void any warranty or service agreement. If a problem occurs with the I-Site 4400LR scanner, please contact your local I-Site dealer or sales office.

Cleaning of the instrument should be carried out regularly. The panels and covers are powder coated metal and coloured plastic. A soft cloth with warm water is sufficient to remove dust and dirt. Ensure that the eyepiece is in place prior to cleaning.

Optical surfaces (main window and eyepiece lens) should be cleared of dust using lightly compressed nitrogen. Fingerprints or other superficial marks can be removed using a clean damp lens cloth using no solvents. Both of these optical surfaces are coated with an anti-reflective surface. Care should be taken not to damage this by wiping hard.

The HHC should be cleaned using lightly compressed air or wiped with a soft, dry lens cloth. Screen protectors are supplied with the HHC and should be used to prevent damage. Care should be taken to avoid foreign objects entering ports on the HHC (covers should be left on when not in use).

Always store the HHC and 4400LR scanner in the 'Pelican' provided when not in use, or for transportation. Always remove the battery from the 4400LR scanner when not in use. Leaving the battery in the scanner for an extended period risks reducing its service life.

Getting Started

When you are ready to go into the field and acquire scan data, ensure that you have all the required system parts, as follows:

- 4400LR scanner
- Hand held Controller
- Ethernet crossover cable
- Batteries for 4400LR scanner
- Tripod and tribrach (not supplied with 4400LR scanner)

Installing a battery into the 4400LR scanner will bring it to a standby status (this will take several seconds and is indicated by a single flash of the green indicator light at the rear of the scanner). When installing batteries, ensure that the latch on the battery cover closes securely to prevent the battery accidentally falling out. Never leave the battery in the scanner for extended periods, as there is a small current draw, which will over time flatten the battery.

Instrument Set-up and Initialisation

1. Set-up the tripod with tribrach at the desired location. If site survey control is being used, set-up over the point location required.
2. Level the tribrach using the bullseye bubble and centre over a survey point if required.
3. Place the 4400LR scanner in the tribrach and close the tribrach latch.
4. Remove the eyepiece covers from the 4400LR scanner by unscrewing them. These covers protect the scanner from damage and ingress of water or dust, and should always be replaced when not in use.
5. Turn on the scanner using the red Power button located on the remote. The scanner will initialise by rotating a small amount and returning to the central position, and the green indicator light should now be flashing (see annotated image on page 10).
6. Fine levelling of the scanner can now be achieved using the plate level bubble located inside the scanner window. Use the tribrach foot screws to level this bubble in one axis, and then use the 'toggle' button (see annotated image on page 11) to turn the scanner head through 90 degrees and level the other axis. Press the toggle button and indicate a direction to turn using the left or right buttons.
7. The control systems and electronic systems on board the 4400LR scanner will take approximately one minute to initialise after turning the power on. This is indicated by an audible 'beep' from the scanner; the green light will also now stop flashing. Once this occurs, the scanner is ready for operation and connection to the HHC using the Ethernet crossover cable can now be carried out.

Please note that this is not a standard Ethernet patch cable but an Ethernet cross over cable.

4400LR Scanner Operation

Control of the 4400LR scanner is achieved through control panels on the rear of the scanner, and within the HHC software.

The Instrument is set-up on a standard surveyor's tripod, and is suitable for use with a tribrach. Field set-up and components are shown in the following picture.



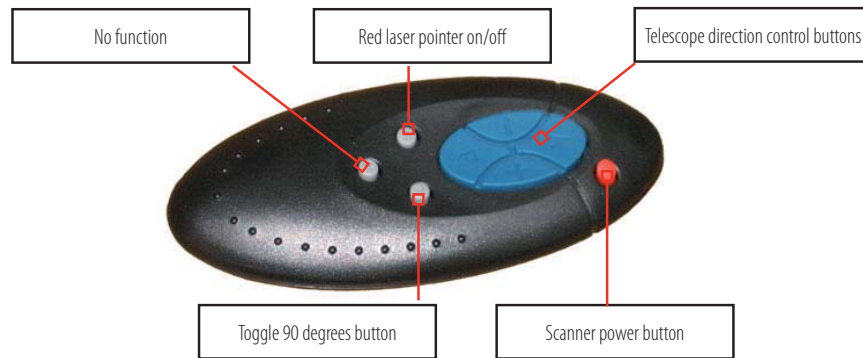
The rear of the scanner contains all of the user control inputs. The rear of the scanner and individual items located here are shown in the following image.



Once the steps described in the **Instrument set-up and initialisation** are complete, the scanner may need to be aligned with a backsight coordinate prior to scan data acquisition. This concept is comparable to that used for total station survey data.

Remove the telescope eyepiece cover by unscrewing it. The eyepiece contains a focus ring for focus of the reticule. The image focus is achieved by using the focus knob located below the eyepiece. To move the focus away from the scanner, rotate the focus knob counter clockwise.

Control of the telescope 'look' direction is achieved using the remote, as shown below. The remote clips to the rear panel of the scanner and can be removed for remote operation up to a range of 10m if required.



By directing the telescope field of view towards the required backsight target, align the scanner within the coordinate system (HHC input for this data is described in the section on HHC software operation). Since the telescope is only used for azimuth alignment, there is fine motion in this axis and coarse stepped motion in elevation. It is not necessary to align the reticle accurately in elevation, although it should be as close as possible to the target.

The azimuth motion of the telescope is motorised to provide very fine control or fast motion. A single press of the left or right direction buttons will step one minimum step. Holding this button down will start with single steps and after several seconds begin to speed up and rotate quickly, for ease of rough sighting. In low light conditions, the laser pointer can be turned on. This beam is co-aligned with the telescope and can also be used for alignment with backsight coordinates. Take care not to direct this laser beam towards anyone's eyes. Once alignment is complete move on to the acquire panel in the HHC software.

The scanner will then proceed to acquire mode and will begin acquisition of a preview image to be used for scan extent definition. When complete it is important that the scanner is turned off before being moved into a storage case. Failure to do this may result in damage to the scanner. When the power button is pressed, the scanner head will return to the default position. An audible click can be heard as the lock is engaged within the scanner to prevent movement.

Note: If this process is not followed (for example, if the battery is removed before the scanner is turned off) please DO NOT rotate the scanner head.

The scanner will be in an OFF state, but will be 'unlocked'. Press the power button as described. This will turn the instrument on and it can then be turned off again after initialising. The scanner head will only turn a maximum of +/-180 degrees before hitting a mechanical stop. Any attempt to force the scanner head past this stop will result in serious damage to the scanner. If the scanner is turned on with a flat battery, it will not unlock and may try to rotate against the lock. In this event, it will not be possible to turn the scanner off, and the battery should be removed (this is safe as the lock has not disengaged) and replaced with a new battery with full charge.

HHC Data Recorder and Software Operation

The HHC and software form a specialised combination designed to provide easy and efficient scanner control and data acquisition in a rugged outdoor environment.

The HHC is a tablet PC, configured to run HHC software only. Changing the configuration of this tablet, or altering any software or device settings may affect the operation of the system and is not recommended.

Any failure of the system operation caused by user alteration of any system settings on the HHC tablet may void the user warranty. Rectification of these failures is not covered in any I-Site service/maintenance agreements.

User interface to the HHC tablet is via the active pen. Use the stylus supplied to input information or make selections through the screen. Upon startup, the HHC data recorder will initialise the operating system and HHC software interface.

The I-Site HHC software will start up at the File Manager as shown below.

Name	Date	Points	Size
037 quarry_LHL002	00:18 27/09/2006	734,331	5.0MB
033 quarry_LMU	00:44 27/09/2006	216,293	914kB
amplats_site3_pole1_SML	01:10 27/03/2007	618,457	3.3MB
amplats_site3_pole1_SML002	01:10 27/03/2007	618,457	1.3MB
amplats_site1_pole1_SML	01:12 27/03/2007	618,457	1.9MB
amplats_site2_pole1_SML	01:12 27/03/2007	618,086	2.6MB
test_t2_t1_CSFU	10:59 23/04/2007	65,000	248kB

HHC File Manager

The File Manager allows you to browse, view previews and details of scans already collected. The lower half of the screen shows a Windows style browser of scan files, with thumbnail previews, scan names, dates, number of points and file size. Individual scans can be selected on the screen, and the panoramic preview image, with scan extents shown, will be displayed in the upper half of the screen.

As with Windows, scans can be arranged by file date, name or size by clicking on the title bar of the parameter to be sorted by. The portion of the view that was scanned can be visualised using any of the five icons located at the top of this panoramic view.

These icons (from left to right) show the scanned data as either, photographic colour, intensity grey-scale colouring, range colouring (purple and white), intensity spectrum colouring and uniform colour (for easy field viewing).

The header above the thumbnail column contains several icons. Picking the icon with a checked scan will delete the scan following confirmation by the user. The scan can be recovered by picking the icon. When a USB key is inserted in the HHC's USB port an icon appears. Picking this icon with a checked scan will transfer the scan to the USB key following confirmation by the user. Again, the scan will be recovered by picking the icon.

In the upper right hand corner of the HHC tablet screen, three level indicators are shown, as follows:

- **Scanner** – indicates the battery levels in the 4400LR scanner (when connected). A warning will be displayed on the HHC screen when this is critically low.
- **Controller** – indicates the battery power levels in the batteries of the HHC.
- **USB Storage** – indicates the proportion of free space available on the USB key. This indicator is only displayed when a USB key is inserted in the HHC.



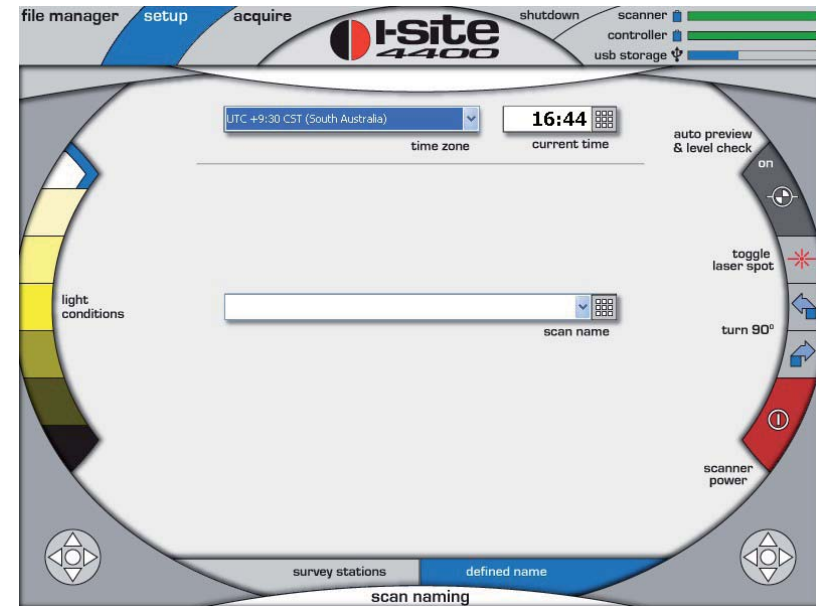
The upper section of the File Manager screen also contains a 'shutdown' tab (to hibernate or shutdown the HHC) and a 'connect to scanner' tab.

Selecting the 'connect to scanner' tab when the HHC is not connected by the Ethernet cable, will result in an error message 'Unable to connect to scanner'. Similarly, trying to connect to the scanner before the 4400LR scanner has finished initialising will result in the same message appearing. When you are ready to configure the scanner for data acquisition, click the 'connect to scanner' tab.

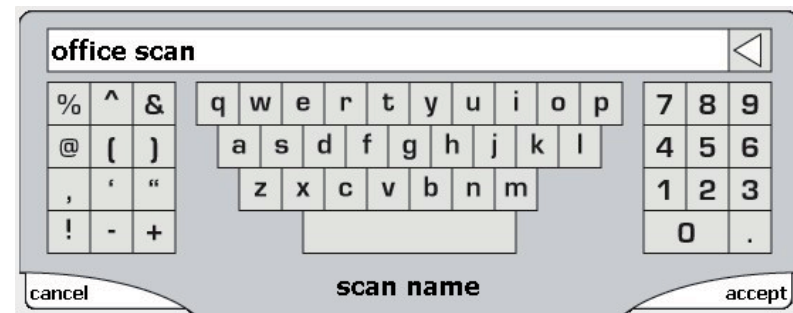


HHC Scan Naming

When the scanner connects successfully, the 'connect to scanner' tab is replaced with a 'setup' tab and an 'acquire' tab.

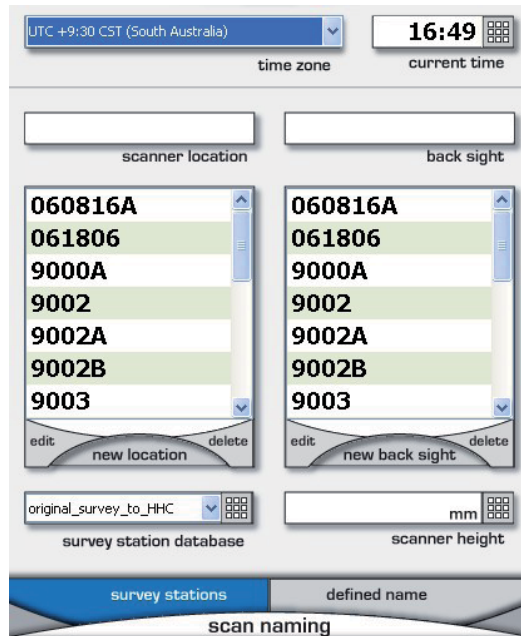


The lower half of the HHC screen is filled with the 'scan naming' screen. The scan naming screen allows you to identify the scan to be acquired using either a defined name, or reference to existing survey control points. If no survey control is being used to locate the scan data, select 'defined name' (as seen above), at the bottom of the screen (default). Enter a name and click the accept button to accept the name given.



Once this is complete, click the 'acquire' tab at the top of the screen.

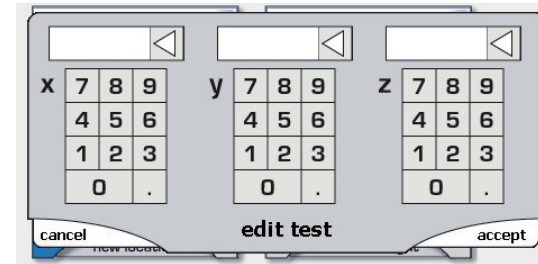
Alternatively, if the scanner is being set-up using an existing survey control, select 'survey stations' at the bottom of the screen. The screen will change to show two lists of survey stations stored in the survey library of the HHC.



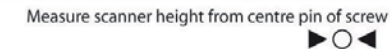
You must select a survey station or create one for the scanner location, and another for the backsight. You can create a new survey station name by clicking 'new location'. Enter a new name in the panel and click the accept button. You can delete newly entered survey stations by selecting them and clicking 'delete'. The file name can also be edited.

Multiple survey station databases can be stored on the HHC (e.g. for different sites). Select the appropriate database using the drop down menu in the lower centre of the screen. These can be uploaded from a PC workstation as a text file (with the format E,N,RL, station name) using the supplied USB key. These files should be automatically synchronised on USB key insertion.

Alternatively, the station can be highlighted on the screen and the edit option (on the bottom, left hand side of the station list) selected. The coordinates of the stations (if known) can be entered directly into the HHC.



The names of stations that have coordinates associated with them on the survey station database will be coloured black, while those stations without coordinates will be coloured red. The coordinates will also appear in the survey station database text file. You are also required to enter the instrument height in millimetres. This should be measured from the scanner location ground point, to the screw centre, as labelled on the scanner.



The scanner controls provided here are to assist in the set-up of the instrument on the tribrach. Scanner controls provided in the survey stations screen are as follows:

- Turn 90 degrees (left or right) – rotate the scanner head through 90 degrees to allow for levelling using the plate level bubble.
- Toggle laser spot – turn on/off red laser pointer to assist with backsight alignment in low light conditions.
- Light conditions – set exposure levels for digital colour imaging – pick the markers toward the bottom for darker conditions and toward the top for brighter conditions.
- Auto preview and level check on/off (leave this on if you require automatic tilt compensation for the set-up).
- Turn off the scanner.
- When all parameters for survey station set-up are entered, click the 'acquire' tab to proceed. The direction the scanner is sighted to will be in the middle (0 degrees in the preview) of the 360 degrees preview image.
- Survey set-ups will be prefixed with the survey station database name. All scan names will be automatically suffixed with four letters.
- The first letter denotes the acquire mode of the scan, either C for Combined, P for Photo only or R for Range only (configured at scan acquisition).
- The second letter denotes the resolution of the scan, either H for High or S for Standard resolution (configured at scan acquisition).
- The third letter denotes the range setting of the scan, either N for Near, or F for Far Range (configured at scan acquisition).
- The fourth letter denotes if the scan has level information (if the set-up is within the range of the compensator).

HHC Scan Acquisition

The acquire panel allows you to preview the scene before you scan. You can also set all parameters for the scan to be acquired, configure and view diagnostic messages from the scanner.

1. Preview and level of the scanner

If the auto preview and level check is left on, the scanner will start a 360 degrees preview to take the preview picture and check for level, when changing to the acquire panel. This will take about one minute. The picture preview will be displayed for a 'scan extents' selection to be made. If this preview is cancelled or turned off the area will remain black.

From the preview the following level indications will be made. This information is displayed at the lower left of the acquire screen.



There are three states for the level indication:

No preview, or cancelled preview (no information).

Scanner within inclinometer extents for level adjustment of scan.

Scanner outside inclinometer extents thus cannot be adjusted for level in software.

If the preview comes up with the scan outside inclinometer extents then the scanner should be re-levelled (if the scan is required to contain this information). Another preview should then be taken to make sure the scanner is within the extents on the inclinometer and the data can be captured.

2. Selecting the area to be scanned

Through the centre of the screen, a scale showing angles in degrees is displayed. This scale represents scanning the azimuth angle from the backsight or from the default (forward) position if no backsight is defined.



The area below this (covering approximately one quarter of the screen) represents the maximum scan area (360 degrees horizontal x 80 degrees vertical). The portion of this area to be scanned is defined by dragging the stylus of the HHC across the black area to form a rectangle. The rectangle can be resized by dragging the stylus across the existing rectangle.



The entire 360 degrees horizontal x 80 degrees vertical can be selected by either double clicking in the preview picture or by clicking on the select full extents button.

Pressing the clear extents button will clear the selection.

Pressing the magnify button will magnify the preview image for more accurate selection of scanning areas.

Making a selection by pressing and dragging the stylus in the azimuth bar will result in the full 80 degrees vertical being taken over the selected horizontal angle.

3. Selecting the scan properties

Tools for selecting the number of scans to be acquired are displayed in the upper part of the screen.



Working from left to right, the original preview can be redone by pressing the preview button. This may be needed to see adjustments made to levelling or light condition setting. Next, select the data to be recorded; the default will collect both photo and range data, with options to take only one of these components.

Acquiring multiple passes of the same scene provides the advantage of reducing the standard deviation of range error in the scan points. The increase in accuracy is proportional to the square root of the number of single scans. Therefore, acquiring four scans will decrease the standard deviation of the resulting data by a factor of two. Acquiring eight scans will decrease the standard deviation of the resulting data by a factor of nearly three.

Near or far range can be selected. The scanner is optimised for these range settings: near - from 5m to 180m and far from 50m to 700m (@ 80% target reflectivity). Next, select the scan point density. Two density settings are provided as follows:

- High** - 0.108 degrees
- Standard** - 0.216 degrees

It is clear that a high density scan will contain four times the number of points as a standard density scan. Once all scan parameters are set, click the 'scan' tab. The scan progress bar will appear, and the scanner head will begin to position itself for the scan.



The survey telescope field of view is automatically shielded during scanning making it not possible to look through or operate the telescope. When the scan starts, the green indicator light at the rear of the scanner will flash to indicate that the laser is operating. Do not touch the scanner during operation. To cancel a scan once it has started, click the 'scanning cancel' tab on the HHC.

Once scanning is complete, the scanner head will return to the default position and the HHC will display a data transfer progress indicator, which may persist for several seconds before a message appears to inform you that the scan is complete. Click OK to configure the next scan or move to the next location. You may return to the set-up screen at this time to rename or select new survey station locations. If moving location, turn off the scanner via the HHC or by pressing the red button on the remote control.

Due to data transfer buffer sizes inside the scanner, high resolution scans covering more than 180 degrees of azimuth cannot be stored entirely onboard the scanner. To overcome this, the scanner will pause for around one minute during these scans, to download the completed portion of the scan to the HHC, and then continue with the acquisition. Do not touch the scanner or HHC during this process. When you return to the HHC file manager, you will now see the new scans acquired appear in a list, and the preview areas (if taken) are available for viewing and confirmation.

Procedure:

1. Ensure all power is off until all cables are plugged in.
2. Plug power supply into wall socket.
3. Plug PlatinumEX battery charger into the power supply.
4. Plug 4400 NiMH battery into the PlatinumEX charger.
5. The PlatinumEX charger will now read "<CHARGE>, M1, NiMH, C=1.5, D=1.0 3800" The "CHARGE" word will be flashing.

The 4400LR scanner uses a NiMH battery supply. To ensure maximum life of the battery it is recommended that the correct charging procedure be followed. The 4400LR scanner will be supplied with the following components to enable you to charge the battery packs safely and fully.

- 1 x 100-240V charger power supply unit
- 1 x PlatinumEX charging unit
- 2 x 4400LR NiMH battery packs





Press the "START/SELECT" button to commence charging the 4400LR battery. The progress will be displayed continuously while the battery is being charged. The charger will beep several times upon completion of the charging process, and will display the final charging statistics for the charging process that has been just completed (see below).



The power can now be switched off at the power point. The 4400LR scanner battery is now fully charged, ready for use and can be safely disconnected.

IMPORTANT – If any of the settings are different on the charger to those described here, please contact your local I-Site office or representative for assistance. **DO NOT ATTEMPT TO CHARGE YOUR 4400LR BATTERIES** – doing so could risk damaging the batteries.

Troubleshooting

Problem:

Scanner will not turn on; the green light just flashes a few times.

Solution:

This is the indication of a flat battery.

Problem:

No communications.

Solution:

Check if the Ethernet cable is correctly plugged in to both the HHC and the Scanner.

Problem:

The scanner head spins freely when it is removed from the carry case.

Solution:

This means the scanner was not shut down properly, or the battery was drained to a point where locking was not possible. Replace the battery with a new one and shut down the scanner properly.

Problem:

The view in the telescope is not clear.

Solution:

Check the view direction and focus. The telescope may be aimed at the ground or into the sky, giving no clear image to focus on.

Technical Specifications

General	
Type:	Terrestrial laser scanner
Size:	430 x 250 x 360mm
Weight:	14kg (includes battery)
Battery:	24V DC NiMH; 2kg, removable
Battery Life:	Approximately 3 hours normal use
Levelling:	Tilt compensator resolution: 20" Plate level bubble: 30" divisions 20' bullseye bubble
Operating temperature range:	10, +50°C
Environmental protection:	IP-65
Durability:	Tested in accordance with AS 1099.2.27,31
Data collection:	I-Site HHC tabletPC and software, via Ethernet cable
Instrument control and setup:	Via removable IR remote control or HHC software control
Mounting:	Standard tribrach mount is included

Laser Scanner	
Type:	Time of flight pulsed rangefinder
Wavelength:	905nm
Beam divergence:	2mrad
Maximum range:	Up to 400m for higher reflectivity surfaces
Minimum range:	2.5m
Range standard deviation:	50mm
Measurement rate:	4400 measurements per second
Point angular density:	Minimum 0.108° per point, vertical and horizontal
Angular accuracy:	±0.04°
Angular range:	80° vertical, 360° horizontal
Laser class:	Class 3R laser product (IEC 60825-1)
Intensity measurement:	Yes

Technical Specifications

Digital Panoramic Camera	
Type:	Line scanning digital colour panoramic camera
Pixel resolution:	37 mega pixels maximum
Angular range:	80° vertical, 360° horizontal
Time:	Acquired during laser scan
Exposure control:	User definable
Lens:	Nikon 20mm f/2.8D, with filter
Image drupe method:	Corrected image data is automatically draped on scan surface
Depth of field:	3m to infinity

Telescope	
Angular range:	Motorised control for 80° vertical and 360° horizontal
Focus range:	5m to infinity
Focus control:	Manual focus
Objective aperture:	28mm
Magnification:	14x
Reticule:	Crosshair
Field of view:	3 degrees in field (upright image)
Resolving power:	+/-5"
Minimum azimuth step:	10"
Laser pointer:	650nm red diode laser pointer (Class 2 laser) aligned with telescope for underground survey

Control Software Features

- ✘ Panoramic colour preview image
- ✘ Select scan extents from preview image
- ✘ Query scanner status and battery power
- ✘ Control scan resolution
- ✘ Control panoramic camera image exposure settings
- ✘ Set range gate for scan data
- ✘ Enter instrument height
- ✘ Store and apply survey control from many sites for automatically coordinated scan data
- ✘ Automatic multiple scan averaging
- ✘ Intuitive scan naming
- ✘ Manage scans through explorer with preview swatches
- ✘ Fast USB transfer to workstation in I-Site 3DP open source format
- ✘ 20Gb storage space
- ✘ 10.4" Transmissive SVGA or XGA
- ✘ All-Vis Indoor/Outdoor option (direct sunlight readable)
- ✘ Battery

Open Source Software used on the I-Site 4400LR

- ✘ bash 2.05a
- ✘ busybox 0.60.3
- ✘ grub 0.92
- ✘ grub-2002-10-08-doc.patch
- ✘ libusb 0.1.7
- ✘ linux 2.4.18 (patched)
- ✘ openssh 3.5p1
- ✘ openssl 0.9.6e
- ✘ tinylogin 1.02
- ✘ uClibc 0.9.15
- ✘ util-linux 2.11u
- ✘ zlib 1.1.4
- ✘ A CD of these software products can be supplied if requested.