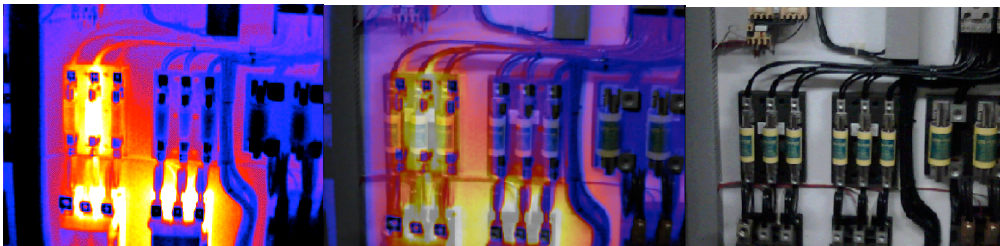# HeatSeeker® 160 and HeatSeeker® 320 Dual View Thermal Imaging Camera Instruction Manual

Safety Warning:
The equipment described in this document uses a Class 2 laser. Under no account should anyone look directly into the laser beam or the laser beam exit aperture, irreversible damage to the eye may occur. The laser should not be operated when there are personnel in the imager's field of view.
Caution – use of controls or adjustments or performance of procedures other than those specified in this document may result in hazardous laser radiation exposure.

635nm 0.9mW

635nm
<1mW
<0.2mr

LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT

THIS PRODUCT COMPLIES
WITH 21CFR 1040.10
AND 1040.11 EXCEPT
FOR DEVIATIONS PURSUANT
TO LASER NOTICE No.50
DATED JULY 26th2001
COMPLIES WITH
IEC/EN 60825-1 (2001)

Contents   Page

1. Contents of the Case

- ♦ Carrying Case.

- ♦ Camera.

- ♦ USB PSU and International Adaptors.

- ♦ CD – 61-846 Instruction Manual and ThermalVision™ 160 Software and Software Instruction Manual

- ♦ USB Cable (Camera to PC).

- ♦ Quick Start Guide.

2. Main Controls

2.1. Back

Microphone

Speaker

Function Keys 1 to 4

Power Button

Centre Navigation Key

Laser button

4 Navigation Keys

2.2. Front

Laser

Light

Infrared lens

Visible camera

Capture Button

2.3. Function Keys

The Function Key functions are indicated by the icons or text displayed on the screen above them. These functions vary according to the operating options chosen by the user.

Function Key 1   **Function Key 2**   **Function Key 3**   **Function Key 4**

3. Getting started

3.1. Switching the camera on/off

Press the on/off button and hold it for two seconds to switch the camera on.

Press and hold for three seconds to switch the camera off.

After switching on, it will take up to 30 seconds for the infrared image to appear. The image will periodically freeze for one or two seconds while the camera re-calibrates itself. This is normal operation, and the time between these calibrations will increase as the operating temperature of the camera stabilises.

3.2. Charging the battery

The camera's battery is charged via the USB port. A fully charged battery will last approximately 5 hours. A green LED indicates charging which turns to red when the battery is charged.

Note: When the camera is connected to a PC via the USB cable it switches off and the PC sees the SD card as an external memory.

3.3. Changing the battery

Open the lock on the battery cover and remove the cover

Remove battery.

Insert new battery, ensuring the terminal pads are towards the front of the camera.
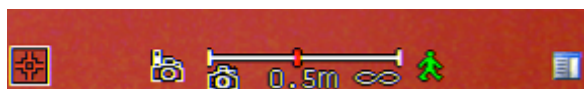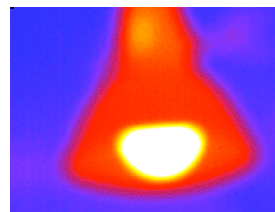
Replace and lock the cover

3.4   Focusing

Gently rotate the lens clockwise and counter-clockwise to focus the image.

♦ *Remember to remove the lens cap.*

Focus Bar   **Out of Focus**   **Focused**

When focusing a focus bar appears on the screen to assist in focusing the image. It indicates the approximate distance in metres (in feet when °F is selected) of a focused target from the camera.

3.5.   Saving an image

Save image button

To save a live or frozen image, press the Save button once.   If Caption Mode or Voice Annotation has been turned on, a text caption or voice annotation can be attached to the image (see section 6).

3.6.   Temperature measurement

One of the key functions of a thermal imager is obtaining temperature information about the scene. The IDEAL 61-846EU has a variety of measurement options to provide maximum flexibility.

The display of temperature values and related items depends on the combination of the measurement and display options selected. Temperature readings are displayed at the top of the display. In the default mode, a single reading in ℃ indicates the temperature at the centre point of the cursor. The other reading at the top of the display is the reflected temperature setting (see section 5.1.). The temperature range within the scene is indicated by a scale on the right hand side of the display.

4.   Function buttons

Function Key1   **Function Key2**   **Function Key3**   **Function Key4**

Pressing any of the Function Key buttons reveals the icons which indicate the functions of these buttons. A box around the icon for Function Key1 or Function Key2 indicates that this option is selected and this defines the operation of the navigation buttons. With the default settings, the key functions are as follows:

Function Key 1 toggles between Align Image and Cursor.
Function Key 2 cycles through Visible on/off, Auto/Manual, and Light on/off.
Function Key 3 toggles between Live and Freeze.
Function Key 4 opens the menu.

See appendix A2 for a full list of Function Key button functions.

4.1. Moving the cursor

4.1.1.   Press Function Key 1 to toggle to the Cursor icon . The emissivity value will be displayed at the top of the screen.

4.1.2.   Use the left/right and up/down navigation buttons to move the cursor to the desired position.

4.2. Image alignment

As the visible and thermal cameras are not co-axial the visible and thermal image may need to be aligned. This is usually required when moving to view objects at different distances.

4.2.1.   Press Function Key 1 to toggle to the alignment icon .

4.2.2.   Use the up/down and left/right navigation buttons to align the thermal and visible images.

Note   The visible image is moved during alignment.

Examples of alignment.

Fully Aligned

Align left
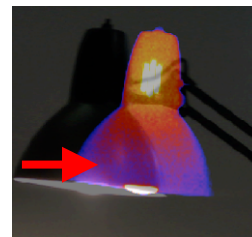
Align right
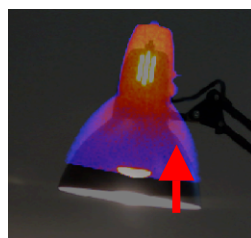
Align up
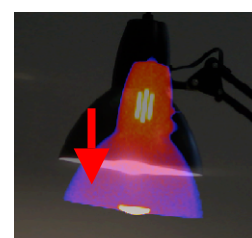
Align down

Four pre-programmed alignment distances are included. These are at 0.5 metre, 1 metre, 2 metres and 4 metres ranges. With the alignment option selected by function key 1, pressing the centre navigation button once aligns at 2 metres. Pressing the centre navigation button repeatedly allows you to cycle through to 4 metres, 0.5 metre and 1 metre.

Note: These values appear in Feet if °F is selected.

4.3. Turning the visible image off and on

4.3.1.   Press Function Key 2 to toggle to the Visible On icon .

4.3.2.   Press the centre navigation button to toggle to Visible Off .

4.3.3.   Press the centre navigation button again to toggle to Visible On .

4.4. Thermal and visible image blending

The camera can show a thermal image, a visible image of the scene, a mixed blend of both visible and thermal, a thermal picture in the visible picture (PiP) and a blended version of the thermal image in the PiP.
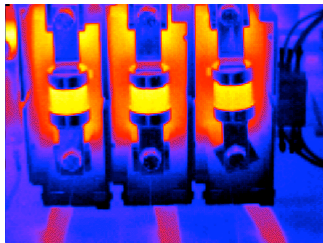
100% thermal
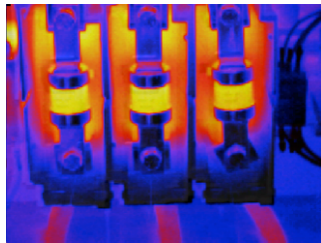
25% visible 75% thermal
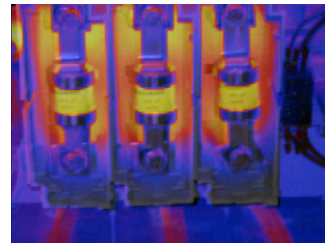
50% visible 50% thermal

75% visible 25% thermal

100% visible
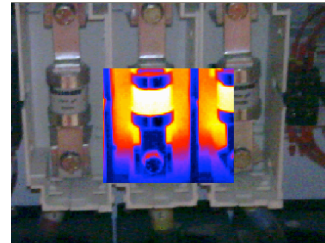
Picture in Picture

THERMAL ABOVE
Thermal Above shows parts of the scene which are at the upper end of temperature range.
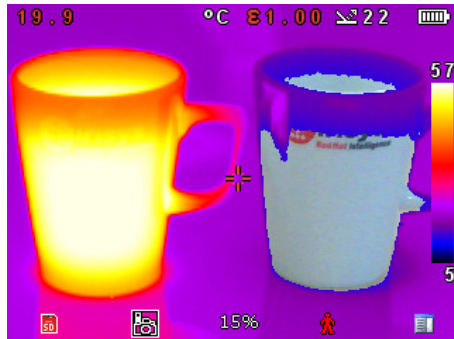
In this example the parts of the scene with temperatures above 15% of the displayed temperature range are shown as a thermal image; whilst the rest of the scene is shown as a visible image.

In this example the parts of the scene with temperatures above 50% of the displayed temperature range are shown as a thermal image; whilst the rest of the scene is shown as a visible image.

In this example the parts of the scene with temperatures above 85% of the displayed temperature range are shown as a thermal image; whilst the rest of the scene is shown as a visible image.

THERMAL BELOW
Thermal Below shows parts of the scene which are at the lower end of temperature range.

In this example the parts of the scene with temperatures that lie below 15% of the displayed temperature range are shown as a thermal image; whilst the rest of the scene is shown as a visual image.

In this example the parts of the scene with temperatures that lie below 50% of the displayed temperature range are shown as a thermal image; whilst the rest of the scene is shown as a visual image.

In this example the parts of the scene with temperatures that lie below 85% of the displayed temperature range are shown as a thermal image; whilst the rest of the scene is shown as a visual image.

4.4.1.   Press Function Key 2 until the Visible On/Off icon appears

4.4.2.   If off press the centre navigation button to toggle to Visible On.

4.4.3.   Use the up/down navigation buttons to merge (blend) the visible and thermal images. Repeatedly pressing the up button cycles through the options 0%, 25%, 50%, 75%, 100%, PiP.

Up/Down
buttons

| Blended |
| PiP |
| Thermal Above |
| Thermal Below |
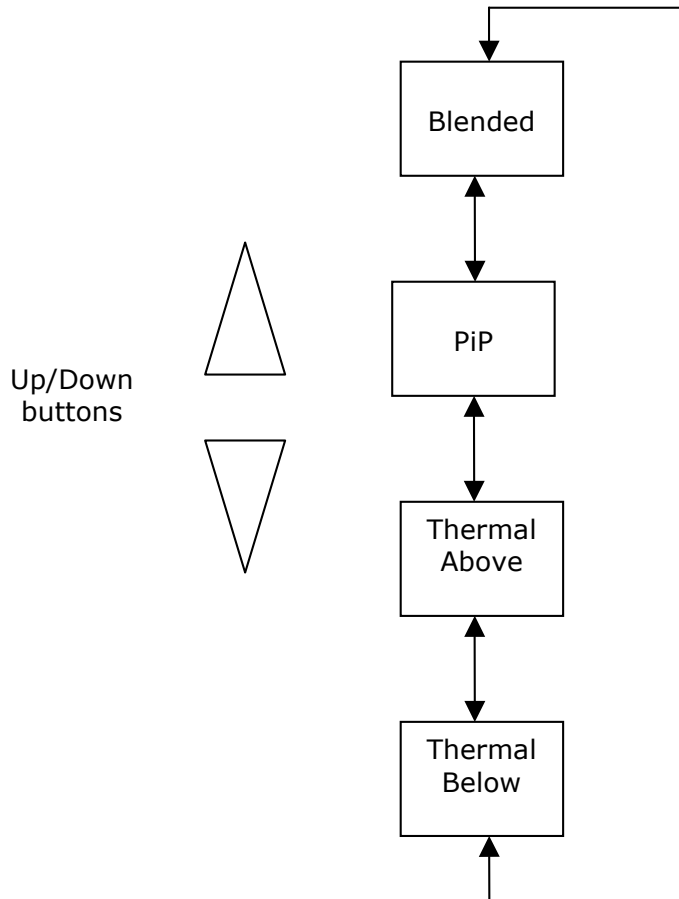
Left / Right Buttons

| Blend – 0% -25%-50%-75%- 100% -0% |
| PiP – 25% - 50% - 75% - 100% - 25% |
| Thermal above/below -- in 5% steps |

4.5. Manual control

The thermal image gain and offset are normally controlled automatically in order to give a meaningful display on the screen. However, Function Key 2 offers the option of switching to manual control if desired:

4.5.1.   Press Function Key 2 to toggle to the Auto icon .

4.5.2.   Press the centre navigation button to toggle to Manual or Persistent manual. If Persistent manual is selected, then the manual settings are stored. When the camera is switched on again, and Manual selected, the stored span and level settings are used.

4.5.3.   Use the left/right navigation buttons to change the span of the displayed temperature range.

4.5.4.   Use the up/down navigation buttons to change the level of the displayed temperature range

4.5.5.   Press the centre navigation button again to revert to Auto.

4.6. Light

There is a visible illuminator for use in poor ambient lighting:

4.6.1.   Press Function Key 2 to toggle to the Light Off icon .

4.6.2.   Press the centre navigation button to toggle to Light On .

4.6.3.   Press the centre navigation button again to turn the light off.

It is advisable to turn the light on only when necessary in order to conserve battery power.

4.7. Image freeze

Pressing Function Key 3 freezes both the infrared and the visible image. Pressing again reverts to a live image. The image save facility works with either a live or a frozen image, but once a frozen image has been saved the camera will revert to a live image.

4.8. Menu

Function Key 4 opens the menus. See section 5 for details of the menu structure.

5.   Menu structure.

- Centre Navigation button
- Up/Down, Left/Right
- Function Key1
- Function Key2
- Function Key3
- Function Key4
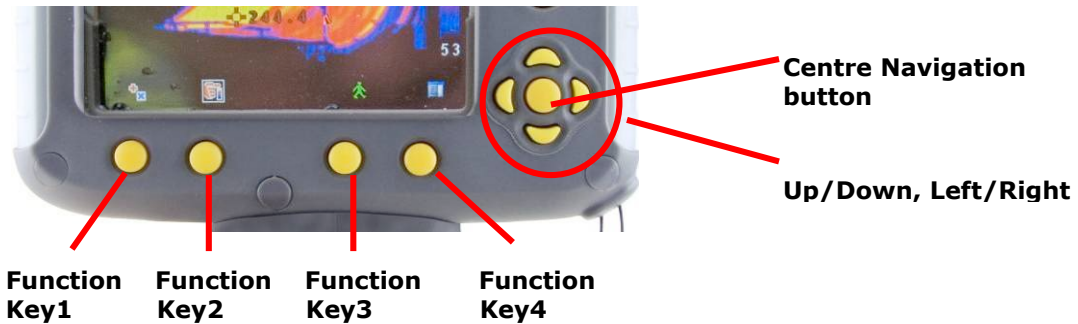
♦   Select the menu by pressing Function Key 4.
♦   Navigate through the menu using the navigation buttons and press Function Key 3 to select the required option. The highlighted item will have a box around it.
♦   Use the up/down buttons to move in the selected list and select the required item.
♦   Use the left/right buttons to change values and options for the specific item.
♦   Press Function Key 4 to exit or Function Key 1 to go back to the previous menu.

- Infrared settings
- Measurement options
- Camera settings
- Audio settings
- Display Settings
- Image browser
- Date & Time settings
- Language selection
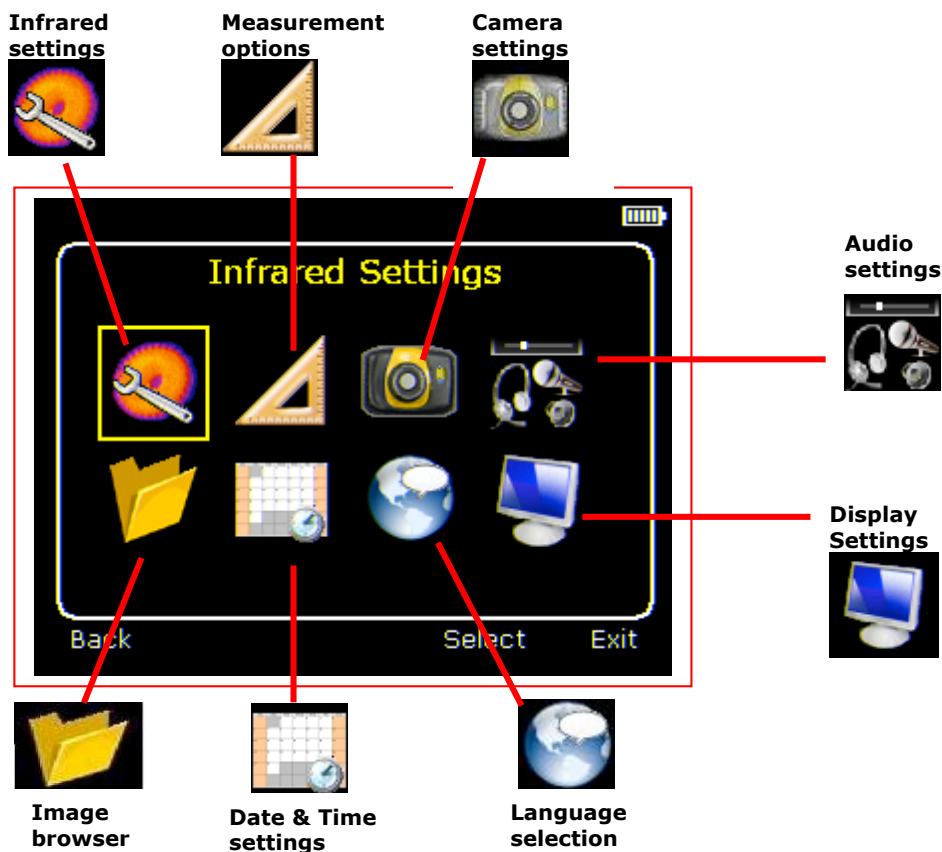
5.1. Infrared settings
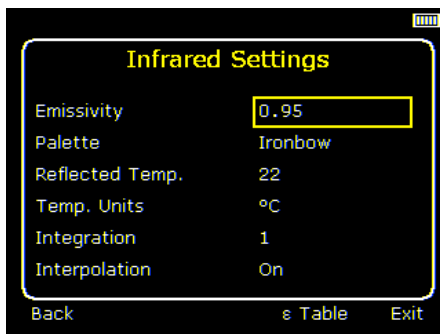
♦ Emissivity
Set the emissivity value between 0.10 and 1.00 using the left/right navigation buttons.
Pressing Function Key 3 (ε Table) gives a table of emissivity values of common materials from which a selection can be made.
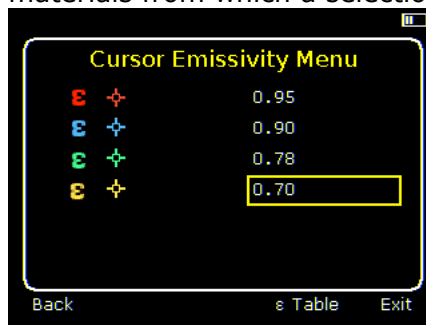
Note that if more than one cursor is selected, individual emissivity's can be assigned to each cursor.

♦ Palette
Display the image using different colour palettes.

1.	Ironbow		5.	High Contrast
2.	Rainbow		6.	Rainbow 16
3.	Isotherm Style		7.	Black Hot
4.	Hot Metal		8.	White Hot

♦ Reflected Temp
Set this to the ambient temperature to correct for reflected radiation when an emissivity of less than 1 is selected.

♦ Temp units
Choose between °C and °F.

♦ Integration
Chose an integration period from 1 (fast) to 4 (slow).
A longer integration time will reduce the noise in the image, but will slow down the response to moving images.

♦ Interpolation
Choose Off or On.
This shows or hides the thermal image pixelation.

5.2. ◢ Measurement options
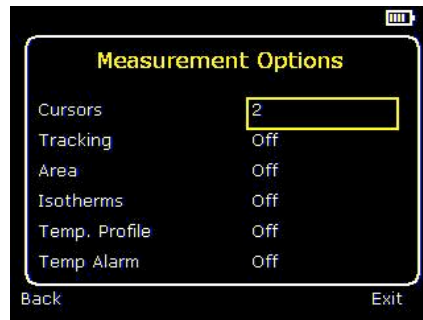
This menu enables the selection of options for temperature measurements. The symbols shown below indicate the icons shown for Function Key 1 when the various options are selected.

♦ Cursors

◈ ◈ ◈ ◈. Choose from one to four cursors. When more than one cursor is selected, the temperatures of all the cursors are displayed in a table or are tagged next to the cursors (see section 5.8). When two cursors are chosen, the temperature difference between them is also displayed. When one of the cursors is selected by Function Key 1, it can be moved around on the display by the navigation buttons.

If two or more cursors are selected then individual emissivity values can be assigned to each cursor. When an emissivity less than 1.00 is selected for a cursor, then that cursor flashes on the screen.
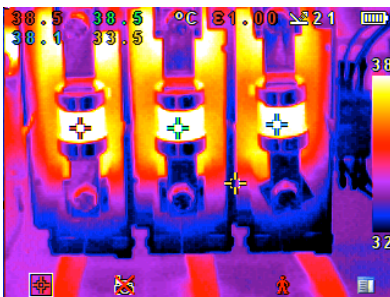
Tabular temperature values
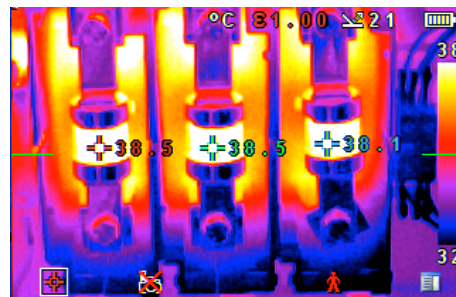
Tagged temperature values

♦ Tracking

.Select "High", "Low", or "High & Low" in order to track and measure the hottest point, the coldest point, or both hottest and coldest points in the image.

♦ Area

.If this option is turned on, three different rectangular areas can be selected via Function Key 1. The maximum, minimum, and average temperatures within the designated area will be displayed in the top left hand corner of the display.

Note that the above three items are mutually exclusive, i.e. when one is turned on the other two are disabled.

♦   Isotherms
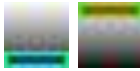
.Select "High", "Low", or "High & Low" in order to highlight areas of the scene with temperatures within a high (red) or low (blue) temperature band. The temperature bands are adjustable by means of Function Key 1 and the navigation keys.

| **Red isotherm** | **Blue isotherm** | **Combined isotherms** |
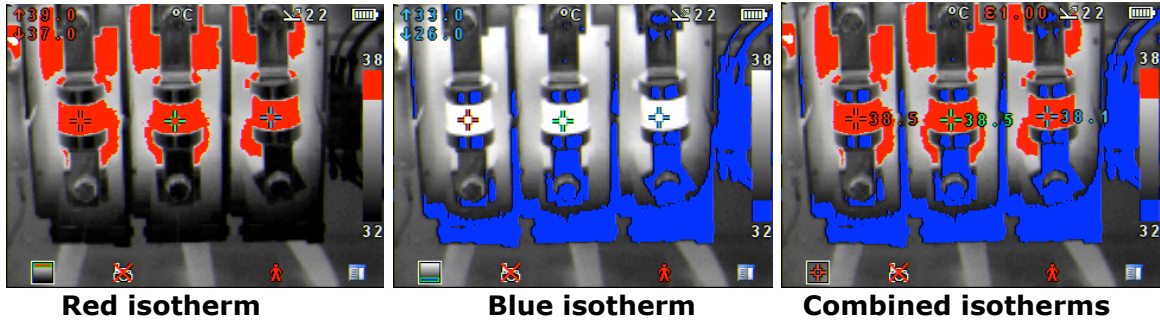
♦   Temp. profile
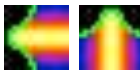
.Select "Horizontal" or "Vertical" to enable a histogram of temperature values along a horizontal or vertical cross section to be displayed on the right hand side or the bottom of the display. The position of the cross section is indicated by small arrows at the left and right or top and bottom of the image and can be adjusted by means of Function Key 1 and the navigation buttons.

Vertical Profile   **Horizontal profile**
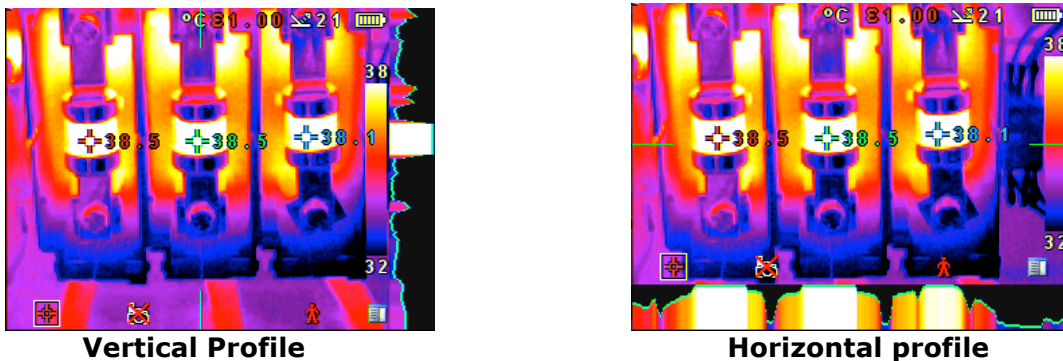
♦   Temp alarms

.Select "High", "Low", or "High & Low". Visual and audio alarms will be triggered if either cursor or a point within the designated area is higher or lower than a set temperature. The high and low set temperatures may be adjusted by means of Function Key 1 and the navigation buttons.

5.3. Camera settings
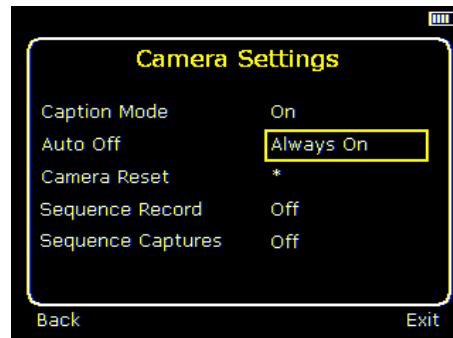
◆ Caption mode

Select "On" to enable the addition of a text caption when saving an image. Options will then be displayed when saving an image, to be selected by means of Function Key 2 and Function Key 3.

◆ Auto off

Select "5 Mins", "10 Mins", "20 Mins" to allow the camera to switch itself off after a defined period of inactivity in order to save power. There is also an "Always On" option. In addition there is a "10 Min (dim)" where the LCD display is dimmed after 10 minutes of inactivity.

◆ Camera reset

Select with Function Key 3 to restore the factory settings.

◆ Sequence Record

Select this to save a set of images of the scene. The images are saved to the micro SD card and an be saved at intervals of 5 Sec, 10 Sec, 20 Sec, 30 Sec, 1 Min, 2 Min, 5 Min, 10 Min, 20 Min, 30 Min, 1 Hour and on Alarm. The alarm setting works in conjunction with the high low alarm function. When the temperature in the scene exceeds the user defined high alarm threshold temperature an image is saved. Equally when the temperature in the scene goes below the user defined low alarm threshold temperature an image is saved.

◆ Sequence Capture

If sequence record is selected, then this option is switched on and allows the user to define the number of images to be saved. Choices available are 10, 50, 100, 500 and 1000 images.

5.4. Audio settings

♦ Imager sounds

Select "Off" to mute all audible outputs.

♦ Voice annotation

Select "Individual" to add a voice message to each saved image.

Select "Session" to add a voice message at the start of a set of images (a session ends when the imager is switched off).

Select "Combined" to add a common voice message at the start of a set of images and add additional comments for each image.

♦ Voice playback

Select "speaker" or "headset" for the desired method of audible outputs.

♦ Volume

Select the volume of the audible outputs from 1 to 9.

If "Session" or "Combined" is selected the voice message is recorded before exiting the audio settings menu by pressing Function Key 3. Recording is stopped by pressing Function Key 3 again. Function Key 2 can be used to play back the recorded message. Function Key 3 can be used to re-record if necessary.

5.5. 📁 Image browser
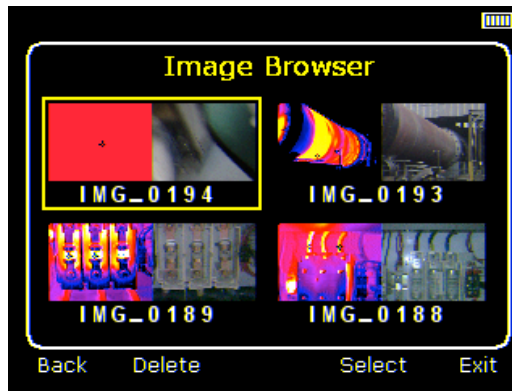
The saved images are shown on the screen with the most recently saved image first.

Select the desired image by means of the navigation keys.
To display the selected image press Function Key 3.
To delete the selected image press Function Key 2, to confirm deletion press Function Key 3.

When a stored image is displayed, press Function Key 3 to return to live imaging.

5.6. 📅 Date & Time settings
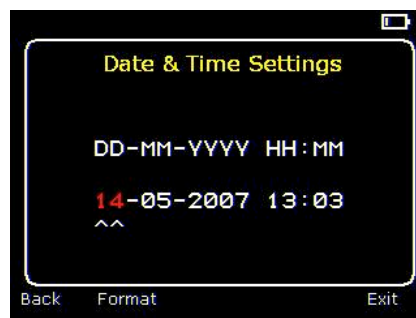
a) Use the left/right buttons ⊙ to navigate in this menu, the item that can be changed is highlighted in red. In the picture above the day (DD) 14 is highlighted.

b) Use the up/down buttons ⊙ to change the value.

c) The date formats can be changed by pressing Function Key 2 to cycle through DD-MM-YYYY, MM-DD-YYYY and YYYY-MM-DD options. Pressing Function Key 4 will select the option on the display.

5.7. Language selection

To select a language move to the relevant flag. When the language is highlighted press Function Key 3 to select.

5.8. Display Settings
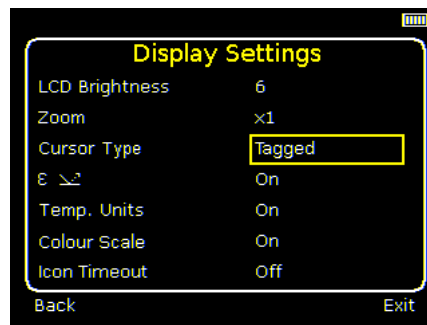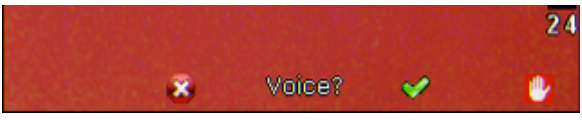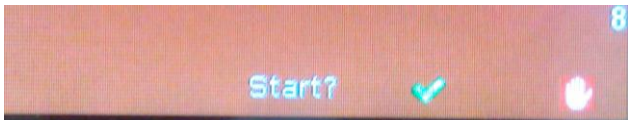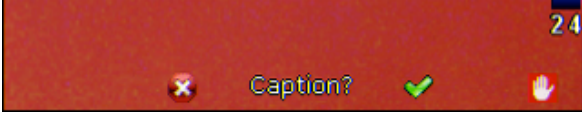
♦ LCD brightness
Select from 1 (low) to 9 (high) to control the screen brightness to save battery power.

♦ Zoom
Allows the user to digitally zoom into the image. Options are X2 and X4 zoom.

♦ Cursor Type
Select how the cursor temperature values are to be displayed on the screen. The choice is between a tabular display or a tag next to the cursor.

♦ ε
Choose whether or not to display the reflected temperature. Only applicable when emissivity is selected to be less than 1.

♦ Temp. Units.
 Choose whether or not the temperature units (°C or °F) are displayed on the screen.

♦ Colour Scale
Chose whether or not the colour scale is to be displayed.

♦ Icon Timeout
The Icons above the 4 Function Keys can be displayed either continuously or for 10 seconds after a Function Key is pressed.

6. Adding captions when saving images

6.1. Voice message

When saving an image with Individual Voice Annotation turned on, there is the option of saving a voice message with each image. The screen shots below describe the procedure:

a) Do you wish to attach a voice message to this saved image? Function Key 2 for no . Function Key 3 for yes .	b) Start voice recording? Function Key 3 for yes.
c) Stop Recording Function Key 3 to stop.	d) Option to Re-record the voice message? Function Key 2 for Yes Function Key 3 for No
e) If caption mode is selected this option will now be offered to save a text caption (see 6.2).	f) Image with voice message is being saved.

Playback
The voice recording can be played back when viewing saved images in the browser.

Note: *The abort Icon on Function Key 4.*
      Pressing Function Key 4 at any stage aborts the saving process.

6.2. Text captions

When saving an image with Caption Mode turned on, there is the option of attaching a text caption to each image. The screen shots below describe the procedure:
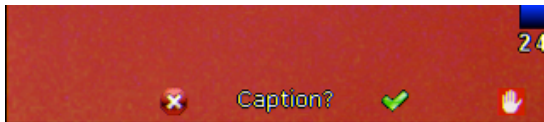
a) Do you wish to attach a text caption message to this image?
Function key 2 for No   Function key 3 for Yes
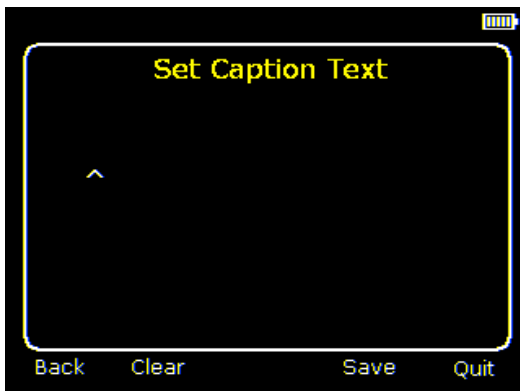
b) Start Caption Entry

2. Use the up/down arrow buttons to cycle through letters and numbers until the one required appears. The available symbols are:
ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefg hijklmnopqrstuvwxyz0123456789

3. Use the left/right arrow buttons to move to the next space and repeat the above step until the caption is completed.

4. Press Function key 2 to clear the whole message.

5. Press Function key 3 to save the image and caption.

c) Example of a Caption.

♦ *Captions cannot be viewed with the saved images in the browser due to display constraints. The captions can be viewed using the PC software.*

Appendix

A1. Emissivity Tables

Emissivity Look-up Tables in Camera

1.00 0.98 = Human skin 0.95 0.94 = Paint, oil 0.93 = Brick red 0.92 = Concrete 0.90 = Planed Oak Wood 0.85 0.80 0.79 = Oxidized steel 0.78 = Oxidized Copper 0.76 = Sand 0.75 0.70 = Red Rust 0.67 = Water 0.65 0.64 = Oxidized Cast Iron	

General Emissivity Look-up Tables

0.98 = Carbon filed surface 0.98 = Frost crystals 0.98 = Human skin 0.97 = Slate 0.96 = Water distilled 0.96 = Ice smooth 0.95 = Soil saturated with water 0.95 = Carbon candle soot 0.94 = Glass polished plate 0.94 = Paint, oil 0.93 = Brick red 0.93 = Paper white bond 0.92 = Concrete 0.92 = Soil dry 0.91 = Plaster rough coat 0.90 = Wood planed oak 0.90 = Glazed earthenware 0.89 = Snow, granular 0.88 = Glazed Silica 0.87 = Cuprous Oxide at 38°C 0.86 = Emery Corundum 0.85 = Snow 0.85 = Stainless oxidized at 800°C 0.84 = Oxidised Iron at 500°C 0.83 = Cuprous Oxide at 260°C 0.82 = Snow, fine particles 0.81 = Brass, unoxidized 0.80 = Glass, convex D	0.79 = Steel oxidized 0.78 = Copper heavily oxidized 0.77 = Cotton cloth 0.76 = Sand 0.75 = Unglazed silica 0.74 = Oxidized iron at 100°C 0.73 = Coating No. C20A 0.72 = Basalt 0.71 = Graphitized carbon at 500°C 0.70 = Red Rust 0.69 = Iron sheet heavily rusted 0.67 = Water 0.66 = Black Loam 0.65 = White cement 0.64 = Iron cast oxidized 0.63 = Lead oxidized at 1100°F 0.62 = Zirconia on inconel 0.61 = Cu-Zn, brass oxidized 0.58 = Inconel sheet at 760°C 0.56 = Smooth white marble 0.55 = Al anodized chromic acid 0.21 = Iron cast polished 0.20 = Brass rubbed 80 grit emery 0.16 = Stainless steel 18-8 buffed 0.09 = Aluminium as received 0.07 = Steel polished 0.05 = Aluminium polished sheet 0.05 = Copper polished 0.03 = Brass highly polished

A2. Full Icon List.

Function Key one	
Cursor one.	Isotherm high
Cursor two.	Isotherm low.
Cursor three	Profile horizontal.
Cursor Four	Profile vertical.
Alignment.	Alarm high.
Tracking.	Alarm low.
Area.	.

Function Key two	
Camera off.	Playback
Camera on.	Light off.
Auto temperature range.	Light on.
Manual temperature range.	No.
Manual persistent	Yes.

Function Key three	
Live.	No.
Freeze.	Yes

Function Key Four	
Menus.	Abort

Other Icons	
Level Down	Span Out
Level Up	Span In
Level Maximum	Span Maximum
Level Minimum	Span Minimum
	No Memory Card

A3. Technical specification

Performance

Field of View:	20° X 15° for 61-846EU and 21.4° X 16° for 61-848
Focus:	Manual
Minimum Focus:	30cm
Spectral response:	8µm to 14µm
Thermal Sensitivity:	NETD ≤80mK (0.08°C) @ 23°C ambient and 30°C scene temperature.
Detector:	160×120 for 61-846EU and 320x240 for 61-848 Pixels uncooled microbolometer

Measurement

Temperature range:	-10°C to +250°C (14°F to +482°F) is standard on both.
	3 further options are user selectable on the 61-846EU:
	Building range: -20°C to +125°C (-4°F to + 257°F)
	Extended range: +200°C to +500°C (392°F to 932°F)
	High Temperature range (filter to be added): +450°C to +900°C (842°F to 1652°F)
Radiometry:	Four moveable temperature measurement cursors giving automatic temperature difference measurement and auto locking onto hottest and coldest points
Emissivity Correction:	User selectable 0.1 to 1.0 in steps of 0.01 with reflected ambient temperature compensation. The four measurement cursors can have individual emissivity values assigned to them.
Accuracy:	The greater of ±2°C or ±2% of reading in °C for the operating temperature range of -15°C to +45°C.

Display

3 ½" colour LCD with LED backlight with 8 colour palettes. Thermal images or visible images or mixed thermal and visible images including picture in picture. Electronic zoom (IR and visible): x2; x4; Image integration: Up to x4

Image Storage

Between 1600 – 3000 images depending on whether voice annotation is used via the supplied micro-SD card of 2GB

Laser Pointer

A built in Class 2 laser is supplied to highlight the centre of the thermal image. (Aligned at 2 metres)

Beam Divergence:	<0.2mrad
Maximum Output:	<1mW

Imager power Supply

Battery:	Rechargeable Lithium-Ion field replaceable battery with up to 5 hours continuous operation; charge through the USB port
AC Operation:	USB AC power adaptor supplied

Mechanical

Housing:	Impact resistant plastic with over-moulded soft plastic.
Dimensions:	130mm X 95mm X 220mm
Weight:	0.8Kg
Mounting:	Handheld & tripod mounting $^{1}/_{4}$" BSW.

Settings and Controls

Auto/user selectable span and level control.

- Readout in °C or °F
- Four moveable temperature measurement cursors with individual emissivity values and temperature difference between two points.
- User selectable emissivity setting for each measurement cursor.
- Auto hot and cold seeking or hot only or cold only.
- User selectable reflected temperature compensation.
- Area analysis – 3 options.
- X-Y thermal profiles.
- Isotherms with temperature difference.
- Voice and or text annotation.
- Image capture; time and date.
- Visual/audio alarm for above/below set temperature values.
- Palette selection.
- User selectable integration.
- Image fusion control: 0 to 100% adjustment on whole image and on picture in picture.
- Electronic zoom, x2 and x4.
- Multi-language options.
- Battery power indicator.
- Image browser showing thumbnails and voice annotation playback.
- Time or Alarm sequence recording.
- Viewing option of thermal below and above

Interfaces
Data transfer direct from micro SD card or over USB.
Jack socket for headphones
Built-in microphone for voice annotation.
Sequencing of images (IR only) to the micro SD card

IDEAL 61-846EU or 61-848 Includes
Camera, Handle, Battery, AC Adaptor, Quick Start Guide, Carrying Case, CD with User Manual and Software (Analysis and Report Writer)

Optional Accessories
Light shade, battery, desk top charger, car charger and hard carry case

Computer Requirements (for PC software)
IBM Compatible PC with one of the following operating systems: Windows XP, VISTA and Windows 7

Environment
Temperature:

Operating range:	-15°C to +50°C (5°F to +122°F)
Storage range:	-20°C to +70°C (-4°F to +158°F)
Humidity:	10% to 90% non-condensing
IP rating:	IP54
CE mark (Europe)	
Vibration:	MIL-PRF-288000F
	Class 2 section 4.5.5.3.1
Shock:	MIL-PRF-288000F
	Class 2 section 4.5.5.4.1
Drop test:	MIL-PRF-288000F
	Class 2 section 4.5.5.4.2
	2 metres drop test (6 ft.)

Recommended Calibration Cycle: Every 2 years

Open Source Software
This product contains open source software. IDEAL INDUSTRIES hereby offers to deliver or make available, upon request, for a charge no more than the cost of physically performing source distribution, a complete machine readable copy of the corresponding source code on a medium customarily used for software interchange. This offer is valid for a period of 3 years after the date of purchase of this product. To obtain the source code, write to:
Development Department – Open Source, IDEAL INDUSTRIES, Unit 3, Europa Court, Europa Boulevard, Westbrook, Warrington, WA5 7TN, United Kingdom

Warranty Statement
This tester is warranted to the original purchaser against defects in material and workmanship for two years from the date of purchase. During this warranty period, IDEAL INUSTRIES, INC. will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction.

This warranty does not cover damage from abuse, neglect, accident, unauthorised repair, alteration, or unreasonable use of the instrument.

Any implied warranties arising out of the sale of an IDEAL product, including but not limited warranties of merchantability and fitness for a particular purpose, are limited to the above. The manufacturer shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss.

Country laws vary, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from country to country.

Dispose of waste electrical and electronic equipment.
In order to preserve, protect and improve the quality of environment, protect human health and utilise natural resources prudently and rationally, the user should return unserviceable product to relevant facilities in accordance with statutory regulations. The crossed-out wheeled bin indicates the product needs to be disposed separately and not as municipal waste.

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