Scout

Thermal Night Vision Camera
Operator's Manual

Document Number: 431-TS00-00-10
Revision: 110
June 2011



FLIR®

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1 Introduction

FLIR's Scout handheld thermal imaging cameras give hikers, hunters, and outdoorsmen the ability to see clearly in total darkness, providing a wealth of valuable information during any nighttime excursion.

The Scout camera enables the outdoorsman to:

- See animals and difficult terrain in reduced visibility and total darkness
- See through smoke, dust, and light fog
- See camouflage and foliage in any lighting conditions
- See more—and see farther—than with low-light night vision goggles

The Scout camera makes images from heat, not light, a feat impossible for the naked eye or even image intensified (I^2) night vision devices, which means you can see clearly even without any visible light at all. People, animals, and objects all make their own heat and their own contrast, and are clearly seen by the Scout in even the most adverse conditions.



Visible Image



Image with Scout Camera

1 – 1 Scout Camera Features



- Rugged design—Built to withstand the demands of outdoor use. It is fully submersible (IP67).
- 240×180 or 320×240 microbolometer sensor for excellent image quality and clarity
- Hot Shoe—Provides convenient power input and video output.
- Choose the 19 mm lens with 24° field of view or include a removable 2× optical extender. Or, for longer-range viewing a 65 mm lens with 7° field of view is available.
- Two-sided Hand Strap—Accommodates both left-handed and right-handed users.
- Software upgrades using an SD card.
- SD Card Slot—Allows for storing captured still images and video (Pro models only) on the removable SD card.[1]
- USB 2.0 Connection—Rapid transfer of files from the camera to a PC.
- Four rechargeable AA NiMH batteries—Provides up to 5 hours of camera operation on a single charge.

1. Available only with the TS24 Pro, TS32 Pro, or TS32r Pro models.

1–2 Detection Range[1]

The illustration below shows the comparative range performance of the Scout camera with different lens configurations. The data is based on detecting a man 1.8 meters tall (and one-half meter wide).

19 mm Lens	**500 yd. (450 m)**
19 mm Lens with 2× Extender	**863 yd. (790 m)**
65 mm Lens	**1586 yd. (1.45 km)**

1. Actual range may vary depending on camera set-up, environmental conditions, and user experience.

1 – 3 Cautions

Do not disassemble the camera enclosure. Disassembly can cause permanent damage and will void the warranty. Keep the compartment covers closed to avoid exposing the cameras electronics to water or debris.

Do not point the camera directly at extremely high-intensity radiation sources, such as the sun, lasers, arc welders, etc.

Only use the auxiliary power adapters provided with your Scout camera. Connecting the camera to an improper power source may damage the camera and void your warranty.

Be careful not to leave fingerprints on the camera's infrared optics.

Caution!

The camera window has an anti-reflective coating and should only be cleaned with low pressure fresh water and a lens cloth. Improper care of the camera window can cause damage to the anti-reflective coating, degrade the camera's performance, and void the camera warranty.

2 Getting Started

The Scout cameras shown below are available with the features, options, and accessories described in this manual.



19 mm Lens Configuration



TS32r with 65 mm Lens

2 – 1 Shipping Kits

Refer to the packing list enclosed with your camera shipment to determine the actual contents of your camera package.

- **TS24, TS32, and TS32r Cameras**

In addition to the camera, Quick Start card, and Documentation/ Training CD or DVD; the following items are included in the camera package:



- **TS24 Pro, TS32 Pro, and TS32r Pro Cameras**

In addition to the camera, Quick Start card, and Documentation/ Training CD or DVD; the following items are included in the camera package:



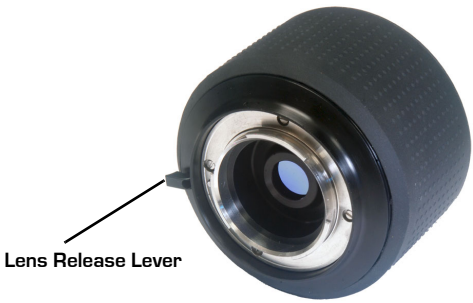
2–2 Options and Accessories

2× Optical Extender for 19 mm lens configurations:

Note

The 2× Optical Extender is not waterproof and should not be used in wet environments.

The attachable 2× Optical Extender lens doubles the range of performance when needed, without sacrificing the situational awareness benefits of the wide field of view lens.



2× Optical Extender

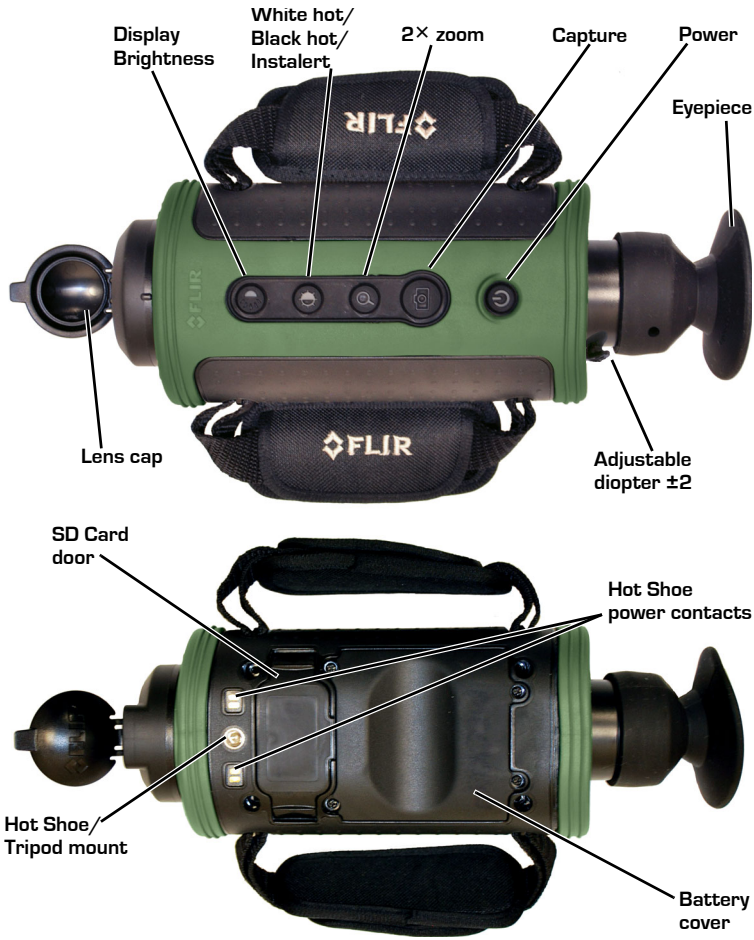
Camera Case

Protection for your camera and all accessories (standard on all Pro models).



3 Operating Your Scout Camera

3–1 Camera Features and Controls



3–2 Installing the Batteries and SD Card

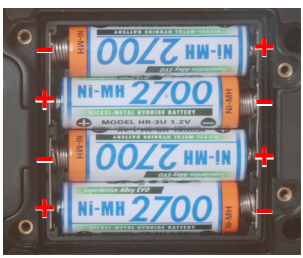
The batteries must be installed and charged before using your camera. Also install your SD card at this time.

1. To aid in removal of the battery cover, remove the SD card door first. No tools are needed.
2. Loosen the four captive screws securing the battery cover.
3. Remove the battery cover by grasping the front edge, this will be exposed when the SD card door is removed.



4. Install the batteries as shown.
5. Install your SD card.





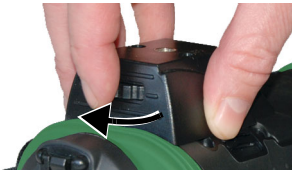
6. Snap the SD card door back into place, ensuring that the rubber lanyard retracts into the camera.
7. Re-install the battery cover—it only fits one way.
8. Tighten the four screws.

If you have installed rechargable batteries, they must be charged before using the camera. Regular AA batteries will provide about one and a half hours of camera use.

3–3 Charging the Camera

The batteries in the camera must be fully charged prior to use. If not fully charged or if the recommended batteries are not installed, the battery status indicator may not accurately reflect the remaining battery life. Only use the auxiliary power adapter provided with your Scout camera.

1. Connect the Hot Shoe to your camera.
2. Rotate the attachment wheel in the clockwise direction until tight.
3. Plug the power adapter provided with the camera into its power source and also into the Hot Shoe.

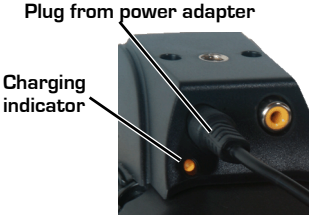


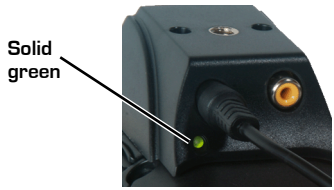
4. Ensure that the plug is fully seated in the Hot Shoe.

   When charging correctly, the charging indicator will be lit yellow and will blink green for one second within about 35 seconds.

   The charging indicator will continue to blink at decreasing intervals until the batteries are fully charged.

   When fully charged, the charging indicator will be lit solid green. The initial charge time is approximately 4 hours.





Note

The charging indicator will be lit solid green when the Hot Shoe is not connected to the camera or the recommended batteries are not installed. Ensure the batteries are charging by verifying the green blink described above.

3–4 Scout Power Management

Your Scout camera is equipped with a power management system that provides up to five hours of continuous operation and up to five days of standby time between battery charges. To make the best use of the camera and to assure it is always ready when you need it, it is important to understand the basic power states of the camera.

The Scout camera is designed to operate much like your cell phone:

- It is rarely turned off unless you do not plan to use it for a few days or more.
- When near a power source or when not in use, keep the charger plugged into the camera.
- When the camera is turned on from the Off state, it takes about 90 seconds to become operational.
- In Standby, it is always ready to go. Press the Power button and it is on in about two seconds.
- It will automatically put itself in Standby to conserve the battery.

A red state LED located next to the display indicates the current power state and can only be seen when the shuttered eyepiece is opened (for example, when the camera is held up to the eye) or when the eyepiece is removed as shown in the photograph below.



Power States

- Three power states: Off, On, and Standby
- The initial power-on Bootup process between the Off state and the On state takes about 90 seconds (fast flashing red state LED). During the Bootup process, pressing the Power button again will turn the camera off. After the camera finishes its power-on Bootup process, it is in the On state (state LED is off). After the camera is On, pressing the Power button will toggle the camera between On and Standby (state LED is flashing slowly).
- When battery powered, if Auto-Standby is enabled (see "Auto-Standby Operation" on page 22), the camera goes to Standby after three minutes if no buttons are pushed. A warning is shown in the display.
- From the Standby state, the camera comes back on within about two seconds when the Power button is pushed.
- The Auto-Standby function is disabled if the camera is powered with external power.

During most use scenarios you will change between Standby and On. When the camera will not be used for extended periods, you might consider putting the camera into the OFF state.

Camera State	How do you know?
Off	The display and the state LED are off
On	Power-on Bootup—Color bars on the display and the state LED is flashing quickly
	There is a thermal image on the display and the state LED is off
Standby	The display is off and the state LED is flashing slowly

3–5 Buttons and Controls

Power Button



Changing between the Off, On, and Standby power states is controlled by the Power button. The table below describes how the camera moves between states.

From State	To State	Method
Off	On	Press the Power button for 1 second. (This will put the camera in power-on bootup for about 90 seconds before going to On.)
On	Standby	Momentarily press the Power button
Standby	On	Momentarily press the Power button
On	Off	Press and hold the Power button for 8 seconds
Standby	Off	Press and hold the Power button for 8 seconds

To shut off the camera completely press and hold the Power button for eight seconds.

After holding the Power button for three seconds this message will be shown in the display and the camera will enter the Off state if the countdown finishes.



Release the Power button at any time during this countdown to terminate Shutdown and resume normal operation.

ESD Recovery Sequence

In the unlikely event of a large Electrostatic Discharge (ESD) to the camera it is possible for the camera system to lose video or become frozen. If this occurs, the following recovery sequence should restore the video:

- Hold down the power button for fifteen seconds and then release.
- Wait for five to ten seconds.
- Press the power button again. The camera should begin its bootup sequence.

Capture Button—Pro models only



Use this button to capture snapshots (in JPEG format) or video clips (in AVI format). The files are stored on the integrated SD card. AVI files are viewable via the FLIR Viewer Utility included on the H-Series resource CD.

- Momentarily pressing the button captures a single snapshot.
- Pressing and holding the capture button for three seconds puts the camera in video record state. The video record icon should be displayed. The button may now be released and the camera will continue to record until the capture button is pressed again. The video file is then written to the SD card in AVI format.

Twenty-five seconds of video requires about one megabyte (MB) of storage on the SD card. The image and video files must be transferred to a computer for viewing.

Note

The images must be transferred to a computer via the USB cable, or the SD card can be temporarily removed from the camera and inserted in a card reader.

- If the camera is not a Pro model, this message will be shown in the display.



- If an SD card is not installed, this message will be shown in the display and no image will be stored.
- If the SD card is full, a warning will be shown in the display and the image will not be stored.



Note

The stored image will include the thermal image, time and date information, and the FLIR logo. Other icons seen in the display are not stored on the saved image.

Still Frame Capture and Store—To capture and store a single still image of what is currently being shown in the display, momentarily press the Capture button. The thermal image will momentarily freeze and the following icons will appear in the display:





The SD Card Memory Gauge indicates how much memory is left on the SD card. The camera icon with the green lens indicates that a single frame was successfully stored to the SD card. Still images are stored in the JPEG file format at the captured pixel resolution. Still images are approximately 90Kb in size.

Video Capture and Store—To capture and store a video sequence of what is currently being shown in the display, press and hold the Capture button for three seconds. Video capture will begin immediately and continue until the Capture button is pressed again.

During the video store process, real-time video will be shown and these icons will appear in the display:



The lens on the camera icon will flash red/green during recording.



Zoom Button—not available on TS24 models



Use this button to switch the camera between no zoom (full resolution) and 2× zoom. The central part of the image is magnified twice its normal size when 2× is selected.

Zoom Indicator—When zoom has been selected the icon is continuously shown in the display:



White Hot/Black Hot/Instalert™ Button



Use this button to toggle between the two video and the four Instalert modes. In the default White Hot mode, hotter objects appear as white or light grey. In the Black Hot mode, hotter objects appear as black or dark grey. In the Instalert™ modes the hottest objects in the scene are highlighted in red to simplify detection of animals, people, and objects. There are four pre-set levels of Instalert that you can select based on the specific scene being viewed. All of the Instalert modes are based on the white hot video mode.

While white hot is the most commonly used and visually intuitive method of viewing thermal imagery; black hot can often enhance contrast of certain objects or provide better visual perspective in some conditions.

When switching between modes, the appropriate icon is displayed for approximately 3 seconds.

White hot Black hot Instalert™ 1 – 4



Display Brightness Button



Use this button to cycle through the five levels of display brightness. Each press of the button advances to the next level of brightness.

When the highest brightness level is reached, subsequent button presses advance to the next lower brightness levels. When the lowest brightness level is reached, subsequent button presses advance to the next higher brightness levels. One of the following icons is displayed for approximately 3 seconds after the button is pressed indicating the current brightness level:



Diopter Controls

The diopter adjustment lever allows a ±2 diopter setting range. When the diopter adjustment lever is pointing straight away from the camera, it is in the neutral position.
Adjust the diopter setting for the sharpest image in the viewfinder.

3-6 Batteries

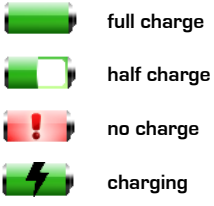
Your Scout camera is equipped with a sophisticated power system that accommodates a wide variety of AA battery types. This includes rechargeable and non-rechargeable batteries.

The camera is optimized for operation with the 2700 mAh rechargeable NiMh batteries that were supplied with your camera. It is recommended that you use these batteries in all but emergency situations.

Note

Replacement batteries are available online from FLIR Commercial Systems, Inc.

Battery Status Indicator–While the camera is On, a battery status indicator is always shown in the corner of the display image. This indicator provides an estimation of the remaining battery charge.



Note

If non-rechargable batteries are installed the battery indication may not be accurate.

Using Non-Rechargeable Batteries –The Scout camera allows Alkaline non-rechargeable batteries to be used. When non-rechargeable batteries are installed, connecting the Hot Shoe to a power source will power the camera from the power source and the battery charging circuitry will be disabled.

Note

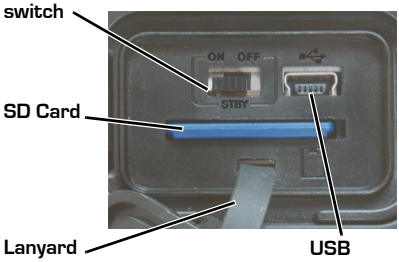
When using Alkaline batteries, operating battery life is reduced to approximately 1.5 hours.

Low Battery Auto-Shutdown–When the batteries are almost fully depleted the camera will automatically initiate a shutdown process.

3–7 SD Card Door

The SD Card door is located on the bottom of the camera in front of the battery compartment. The SD card, the USB connector, and the Auto-Standby Enable switch are located under the door. See "Auto-Standby Operation" on page 22.





Note

The Hot Shoe must be removed to access the SD Card door.

To open the SD Card door, grasp the two edges with your thumb and finger and pull straight up.



Caution!

Do not stretch or break the rubber lanyard that keeps the door captive to the camera when opened.

To close the SD Card door, slide the lanyard strap back into the camera, position the door in place, and then firmly press in the middle of the door until it is fully seated.

SD Card Capacity and Type

The TS24 Pro and TS32 Pro model cameras support storing images and video on standard 1-Gb and 2-Gb SD cards or up to 32-Gb on SDHC cards.

If an SD card is inserted into a non-Pro model, the SD card will be ignored unless the camera software detects a valid upgrade file. In order to store images and video on the SD card, non-Pro model cameras must be upgraded to a Pro model camera: TS24 Pro, TS32 Pro, or TS32r Pro.

Installing an SD Card

To install an SD card, insert the card into the slot and press on the SD card until its edge is nearly flush with the surface and release.

To remove an SD card, use this same motion.



Downloading Stored Files via USB

The TS24 Pro and TS32 Pro camera models also support downloading stored images and video via the USB port.

With the camera on, plug the USB cable into the USB connector on the camera and a USB port on your computer.

Allow up to two minutes for the USB connection to be recognized by the computer's operating system.

3–8 Auto-Standby Operation

Auto-Standby is a feature of the Scout cameras that helps to guard against draining the batteries prematurely by inadvertently leaving the camera on. Auto-Standby puts the camera into the Standby state if the following three conditions are met:

- The camera is in the On state.
- The Auto-Standby switch (STBY) is set to ON.
- No buttons have been pressed for three minutes.

Once these conditions are met you will see the following message in the display and the camera will enter the Standby state after the countdown is finished:



Press any button during this countdown to terminate Auto-Standby and resume normal operation.

Note

Pressing any button during an Auto-Standby countdown will only terminate the countdown and abort the Auto-Standby. The normal function of the button will not occur.

Auto-Standby Switch

Some use scenarios involving unattended operation of the camera may require disabling Auto-Standby.



Select OFF to turn off Auto-Standby.

Select ON to turn on Auto-Standby.



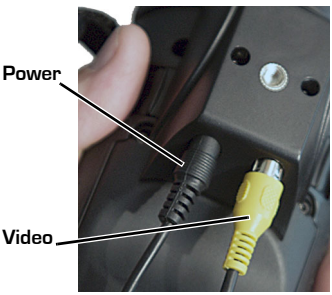
If Auto-Standby is off, a reminder message will appear in the display each time the camera enters the On state.

3–9 The Hot Shoe

Note

The Hot Shoe is not waterproof and should not be used in wet environments.

The Hot Shoe provides the connections to power the camera for continuous operation or charging the batteries; and for accessing the analog video output. The Hot Shoe attaches to the bottom of the camera and is secured via the tripod mount.



The following steps are recommended for quick and easy attachment of the Hot Shoe.

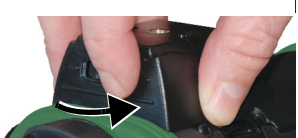
1. With the camera positioned bottom-side up, hold the Hot Shoe in position.



2. Rotate the attachment wheel in the clockwise direction until tight.



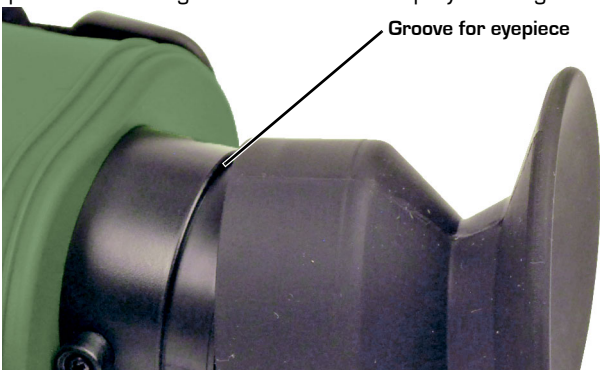
3. To remove the Hot Shoe, simply rotate the attachment wheel in the counter-clockwise direction until it is free.



3–10 Installing the Shuttered Eyepiece

The shuttered eyepiece keeps light from coming out of the viewfinder display. Pressing your eye up against the eyepiece opens the shutter. The shutter closes automatically.

The eyepiece fits into a groove around the display housing.



When pressing the eyepiece into position, ensure that the diopter lever is free to move.

If the eyepiece is pushed too far onto the display housing it will interfere with the diopter lever.

When removing the eyepiece, grasp and pull on the base of the eyepiece. Do not pull on the shuttered eye cup.

3–11 Bayonet Lens Mounting System

All TS24 and TS32 camera models are equipped with a robust bayonet mounting system to allow for field-interchangeable optics options. As shipped, the camera comes with a lens-cover assembly mounted on the bayonet mount.

Operation of the Lens-cover Assembly

The lens cover is a simple flip-to-open lens cover that provides protection for the camera lens when not in use. To open, simply flip the lens cover down to the fully open position (45° pointing toward the ground as shown in the photograph at the right).



To remove the lens-cover assembly, rotate the outer ring of the lens cover clockwise so that the index mark on the top of the lens cover aligns with the index mark on the front body of the camera (approximately 45°), and pull straight off.



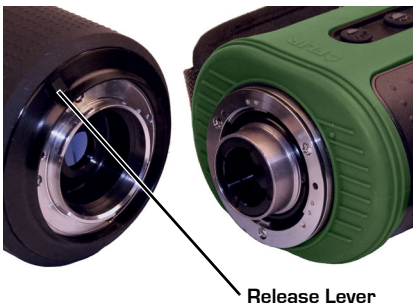
3–12 2× Extender (19 mm only)

Note

The 2× Optical Extender is not waterproof and should not be used in wet environments.

The 2× Optical Extender is compatible with all Scout camera models and provides the user the ability to see farther and/or enhance the resolution of objects in the field of view. The 2× Optical Extender is mounted on the bayonet mount in front of the existing lens on the camera.

To mount the 2× extender, first remove the lens cover assembly. Then, position the 2× extender so that the release lever on the 2× extender is in the 5 o'clock position on the bayonet mount. Firmly push the extender onto the bayonet mount, then rotate the lens counter-clockwise so that the release lever reaches the 3 o'clock position where it will hit a hard stop.



Note

The 2× extender is manually focused by rotating the outer rubber-coated ring.

To remove the 2× extender, press the release lever and rotate the extender clockwise until the release lever is roughly at the 5 o'clock position and pull straight off.

Caution!

Be sure to replace the lens cover assembly when the 2× Extender is not in use to avoid moisture, dust, or other contaminants reaching the inner lens surface of the 2× Extender.

3–13 Installing Software Upgrades

Software upgrades may become available during the life of your Scout camera. The upgrade process requires an SD card loaded with the upgrade file. After receiving the upgrade file from FLIR, load it onto your SD card.

Caution!

During a software installation, the camera must remain powered on. Turning off the camera, or losing power for any reason, may damage the system files and require that the camera be returned to the factory for repair.

Use the following procedure to install the upgrade:

1. Ensure that the camera battery is fully charged. (The software installation will not start if the battery charge is less than 50%.)
2. With the camera off, install the SD card loaded with the upgrade file. Refer to "SD Card Door" on page 20.
3. Install the Hot Shoe and connect to a power source. Refer to "The Hot Shoe" on page 23.
4. Turn on the camera. During its Bootup process, the camera will check the SD card for a valid upgrade file.
5. Watch the display. When a valid file is found, a message will be shown for about ten seconds directing you to **Press and hold Capture button for 2 seconds to initiate update**. If you ignore the message, the camera will resume normal operation and enter the On state.
6. While the message is displayed, press and hold the Capture button for two seconds. The software upgrade takes about four minutes. When finished you will see this prompt to restart the camera. **SW Upgraded: Please Shutdown & Restart now**.

3–14 Checking Software Version

To check the current installed version of software, place the camera in standby, then turn on the camera while looking in the upper right corner of the display for the software version number.



4 Technical Data

4–1 Scout Camera Model Features

The Scout cameras are available with either NTSC or PAL video output format and two resolutions. The TS24 and TS24 Pro both have video resolution of 240 × 180 pixels, while the,TS32, TS32r, TS32 Pro, and TS32r Pro both have video resolution of 320 × 240 pixels.

Scout Model	
TS24	Scout Handheld Thermal Camera with video resolution of 240 × 180 pixels
TS24 Pro	Scout Handheld Thermal Camera with video resolution of 240 × 180 pixels, 2× electronic zoom, still image capture, video capture, and enabled USB2 port. Camera case is included with Pro camera models.
TS32/ TS32r	Scout Handheld Thermal Camera with video resolution of 320 × 240 pixels, 2× electronic zoom.
TS32 Pro/ TS32r Pro	Scout Handheld Thermal Camera with video resolution of 320 × 240 pixels, 2× electronic zoom, still image capture, video capture, and enabled USB2 port. Camera case is included with Pro camera models.
Included with all camera models	Hot Shoe Charging & Video Output Attachment, 4 Rechargeable AA Batteries, AC Power Adapter/Charger, Neck Lanyard, Operator's Manual, Video Output Cable, and USB Cable

Feature	
Start up from stand-by	<1.5 seconds
Thermal Sensitivity, Waveband	<50 mK @ f/1.0, 7.5 - 13.5 µm
Detector Type	VOx Microbolometer
Resolution	240 × 180 pixels TS24 and TS24 Pro
	320 × 240 pixels TS32 and TS32 Pro
Image Processing	FLIR Proprietary Digital Detail Enhancement
Focus, Zoom	Fixed focus. 2× electronic zoom on applicable models only.
Video Output	NTSC or PAL composite video; RCA jack; <9 Hz frame rate

4–2 Power

Battery Types	4 AA Batteries; NiMH or Alkaline
Battery Life Operating (Stand-By)	Approximately 5 Hours on NiMH batteries at 25°C, (120 hours on NiMH batteries)

4–3 Environmental

	TS24 and TS24 Pro	TS32 and TS32 Pro	TS32r and TS32r Pro
Operational Temp.	32°F – 122°F (0°C – 50°C)	-4°F – 140°F (-20°C – 60°C)	-4°F – 140°F (-20°C – 60°C)
Storage Temp.	-4°F – 158°F (-20°C – 70°C)	-40°F – 158°F (-40°C – 70°C)	-40°F – 158°F (-40°C – 70°C)
Ratings (not including the Hot Shoe or the 2× Optical Extender)	IP-67, Submersible, 1 meter drop		

4–4 Physical

TS24, TS24 Pro, TS32, and TS32 Pro	
Weight (incl. lens)	1.59 lb. (721 g) with batteries; add 0.7 lb. (315 g) for 2× extender
Size (L × W × H)	9.36" × 3.33" × 2.62" (238 × 84.5 × 66.5 mm)
TS32r, TS32r Pro	
Weight (incl. lens)	2.17 lb. (985 g) with batteries
Size (L × W × H)	10.96" × 3.33" × 2.62" (278.5 × 84.5 × 68.4 mm)

4–5 Lens Choice

TS24, TS24 Pro, TS32, and TS32 Pro	
FOV	24° × 18°
FOV (w/Optional 2× Extender)	12° × 9°
TS32r, TS32r Pro	
FOV	7° × 5°

4–6 Storage File Formats

	TS24 Pro	TS32 Pro and TS32r Pro
Still Image Storage, Format	SD, SDHC card, JPEG; 240 × 180 resolution	SD, SDHC card, JPEG; 320 × 240 resolution
Video Storage, Format	SD, SDHC card, 240 × 180 AVI	SD, SDHC card, 320 × 240 AVI

4–7 Range Detection[1]

TS24, TS24 Pro	
Detect Man (1.8 m × 0.5 m)	350 yd. (320 m)
Detect Vehicle (2.3 m × 2.3 m)	980 yd. (900 m)

TS32, and TS32 Pro/with 2× Optical Extender	
Detect Man (1.8 m × 0.5 m)	500 yd. (450 m)/863 yd. (790 m)
Detect Vehicle (2.3 m × 2.3 m)	1400 yd. (1.2 km)/1.3 mi. (2.15 km)

TS32r, TS32r Pro	
Detect Man (1.8 m × 0.5 m)	1586 yd. (1.45 km)
Detect Vehicle (2.3 m × 2.3 m)	4265 yd. (3.9 km)

1. Actual range may vary depending on camera set-up, environmental conditions, and user experience.

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