



LRTV Course

This Brief is Classified UNCLASSIFIED//FOR OFFICIAL USE ONLY



Long Range Thermal Video (LRTV)

C4ISR - SPAWAR - AUSGAR

- Enabling Learning Objectives
- Terminal Learning Objectives
- What is the LRTV
- How to use the LRTV
- How to employ the LRTV
- Care and cleaning of the LRTV





Long Range Thermal Video

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Enabling Learning Objectives:

Upon completion of this period of instruction the Warfighter will be familiar with the following:

- A. Specifications
- B. Basic functions
- C. Manipulation of the lasers
- D. Manipulation of the Menu Options
- E. Maintenance, Care and Cleaning

Terminal Learning Objective:

Upon completion of this period of instruction, you the Warfighter will have a better understanding on how to operate LRTV optic.





Multifunction Imaging Device

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LRTV Specifications

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Thermal Imaging Channel:

Wavelength	3 to 5 microns (μm)
Field of view	(2x)WFOV= 9x6.7 degrees / (4x) NFOV= 3x2.3 degrees
Magnification	x2, x4, x8
Start up time	4 to 6 minutes
Target ID	2000m with 2x afocal adapter
Target Detection	9000 meters
Max Range	7000 to 10,000 meters
Lens material	Zinc Sulfide (ZnS)

Video Day Channel:

Field of view	3x2.3 degrees
Magnification	WFOV, x2, x4
Start up time	Immediate
Tgt ID	1000 meters +
Tgt Detection	5000 meters +
Max Range	7000 to 11,900 meters





LRTV Statistical Data

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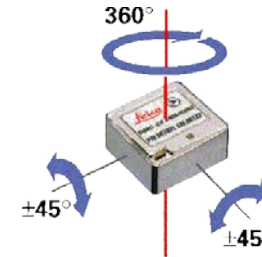
Laser Range Finder:

Waveband	1.54 microns (μm)
Range	4000 to 7000 meters
Class	Class 1 eye-safe EN 60825-1



Digital Magnetic Compass:

Compass Type	Flux gate
Azimuth Range	360 degrees / 6400mils
Elevation range	+ / - 30 degrees



GPS: Disabled for SOCCENT

GPS Type	WGS 84 or ED 50
External type	PLGR / DAGR



Laser Pointer:

Waveband	0.8mm
Class 1 eye-safe EN 60825-1	





LRTV Statistical Data

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Acoustical Noise:

Uncovered	65 decibels (or less)
Covered	25 decibels (or less)

Acoustical Detection:

Uncovered	+/- 10 meters
Covered	+/- 2 meters

Battery:

Type-7.2V	BB-2847
(Battery life is 4 hours @ 73 Degrees F)	

Weight:

Without battery	6.1 lbs
With battery	6.6 lbs

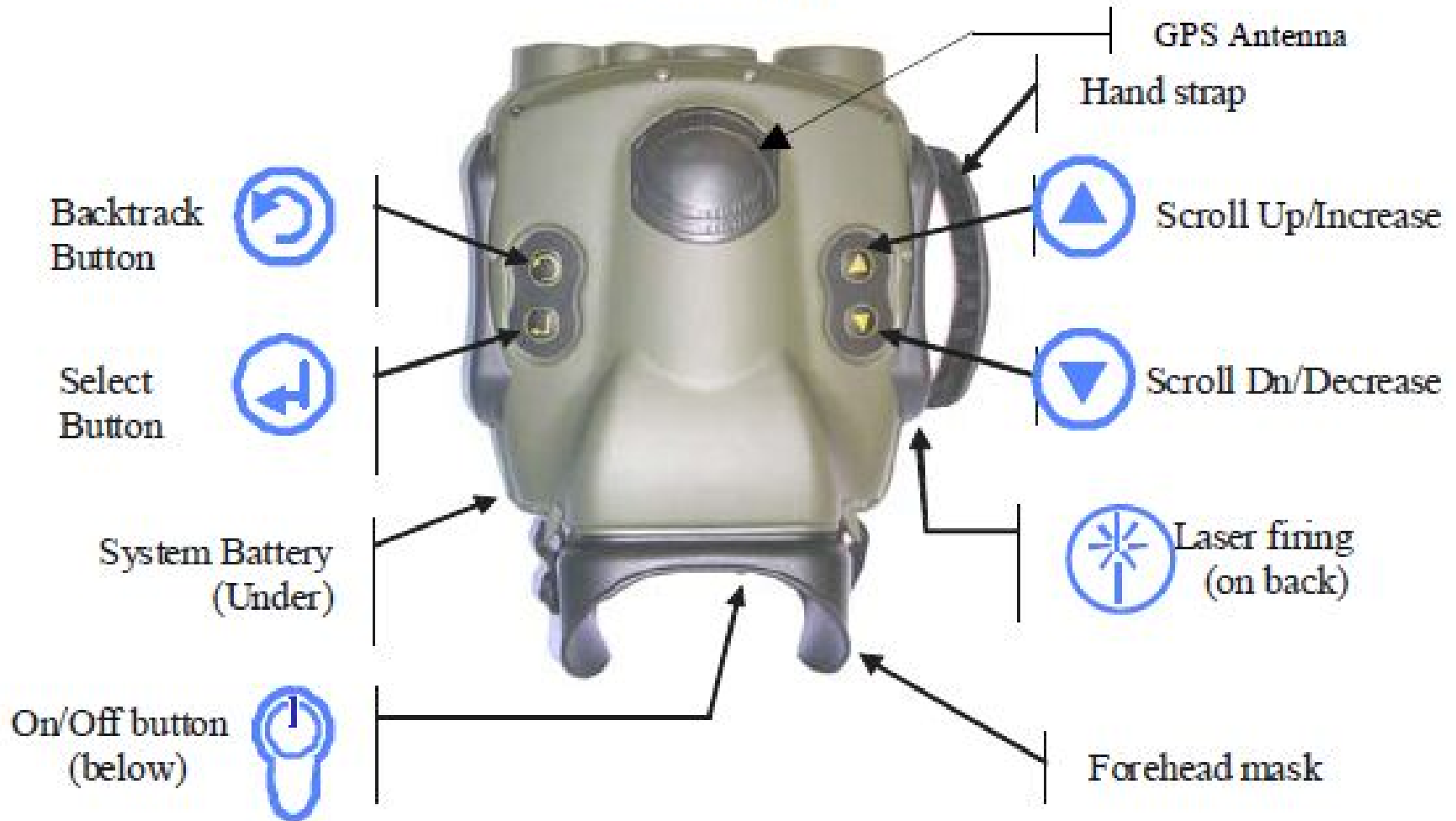




LRTV Nomenclature

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Top View

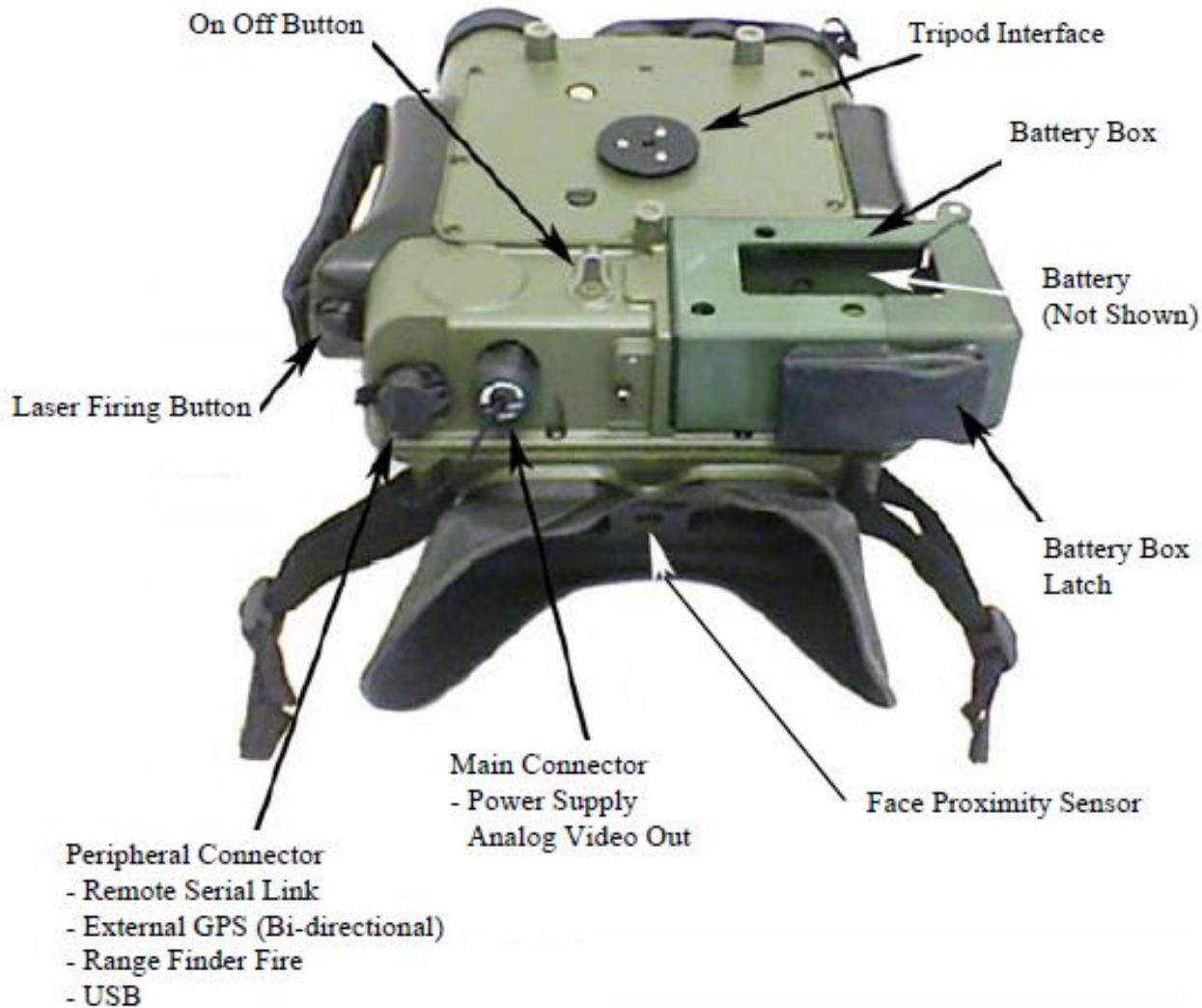




LRTV Nomenclature (Cont'd)

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Bottom View



BB-2847 A/U
Rechargeable
Battery

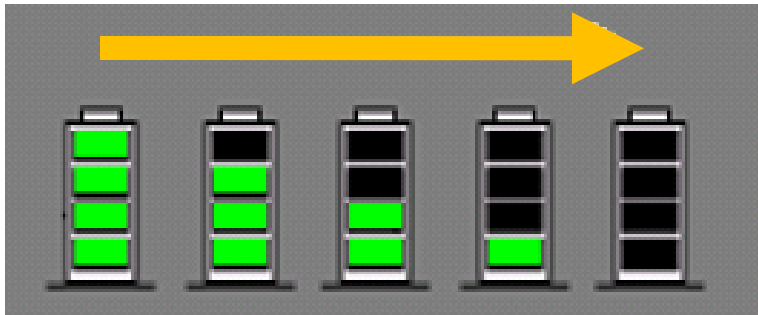




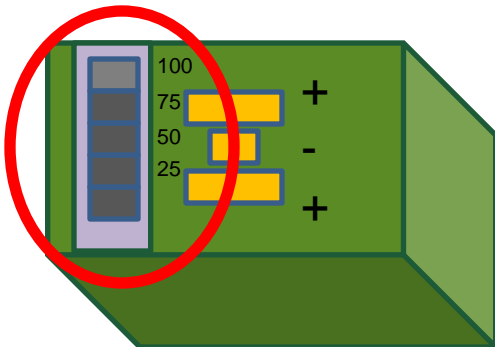
BB-2847 Battery charge status

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- The figure below indicates the battery charge status as depicted on screen
- The battery should be changed as soon as there is only one green segment remaining



- Turn OFF the LRTV **before changing the battery**
- Data may be lost if the battery is removed without proper shut-down procedure



Refer to the state of charge indicator on the BB-2847 battery for the most accurate indication of the battery's state of charge





LRTV View Screen

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Latitude
Longitude

White / Black
Hot Indicator

Compass Heading

Graduation units
Azimuth value

Current
Magnification

Altitude
EXT GPS
on/off
Sat. # / Qual

N 035 .41'11.4
W 213.52'87.4
1437m EXT
S:11 Q:1



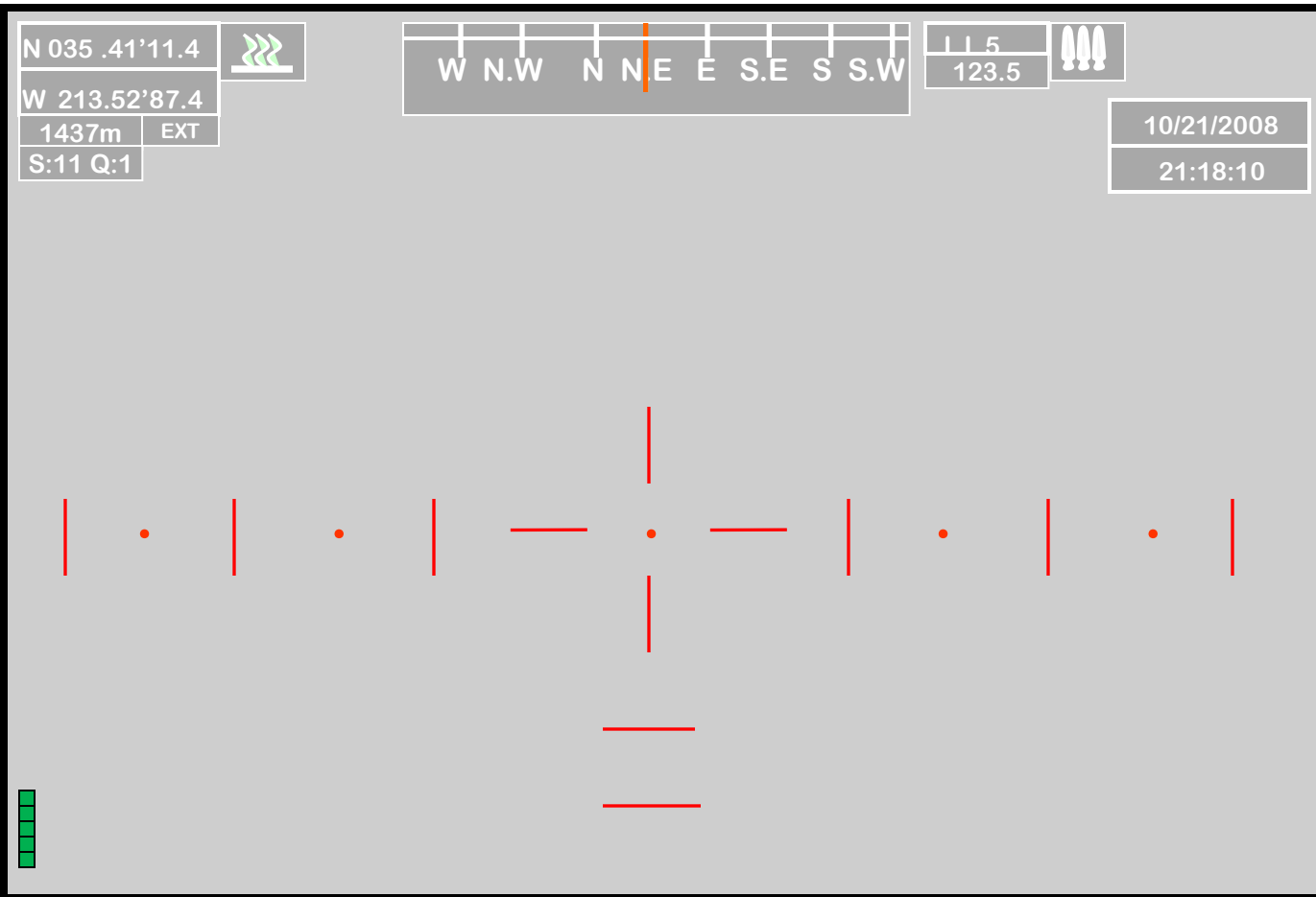
115
123.5



10/21/2008
21:18:10

Date / Time
Group

Reticle



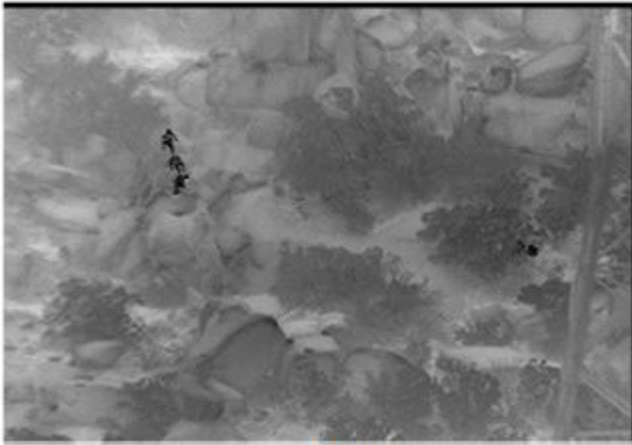
Battery Power



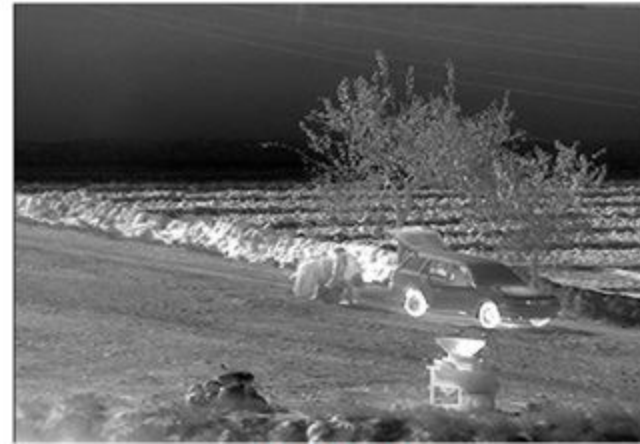


LRTV – IR and Day Channels

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Black Hot



White Hot



Day Imager





LRTV Control Buttons

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**Direct Menu
(Back)**



**LRTV Menu
(Validate)**

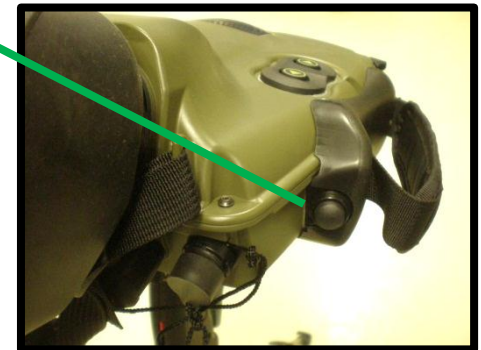


**Start On/Off Button
(Underneath)**

**Function Key
(Scroll Up)**



**Function Key
(Scroll Down)**



**Laser Pointer &
Laser Range
Finder Actuator
Button**



Picture Function

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“Picture” captures still photos with no image overlay from the data screen

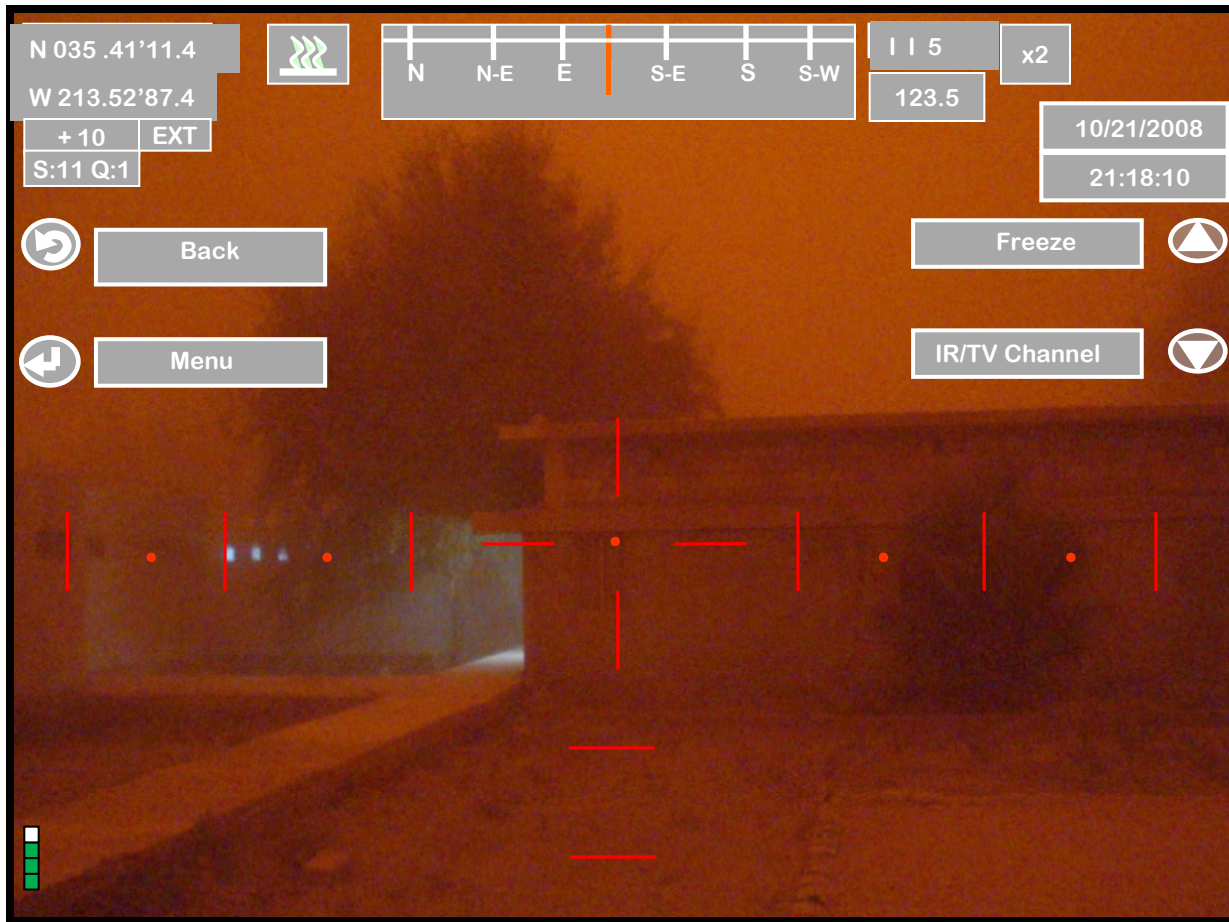
“256 Pictures” is the approximate amount of memory left expressed as # of pictures storage remaining





Freeze / Channel Functions

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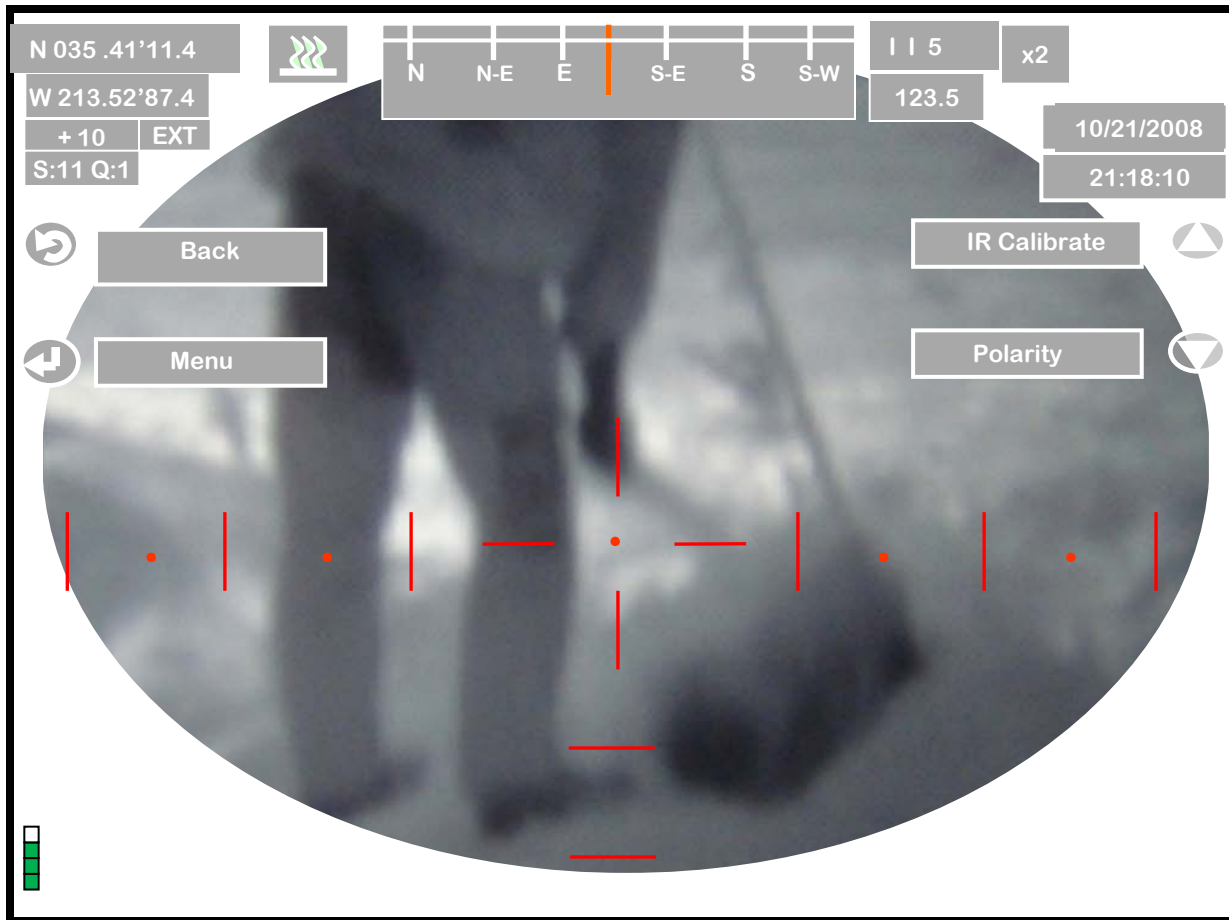
“Freeze” allows the user to freeze the image seen in the LRTV view screen

“Channel” allows the user to switch between IR (thermal) imaging and video day imaging



IR Calibration

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“IR Calibrate ” recalibrates the IR sensor in the LRTV to improve image quality







Polarity Functions

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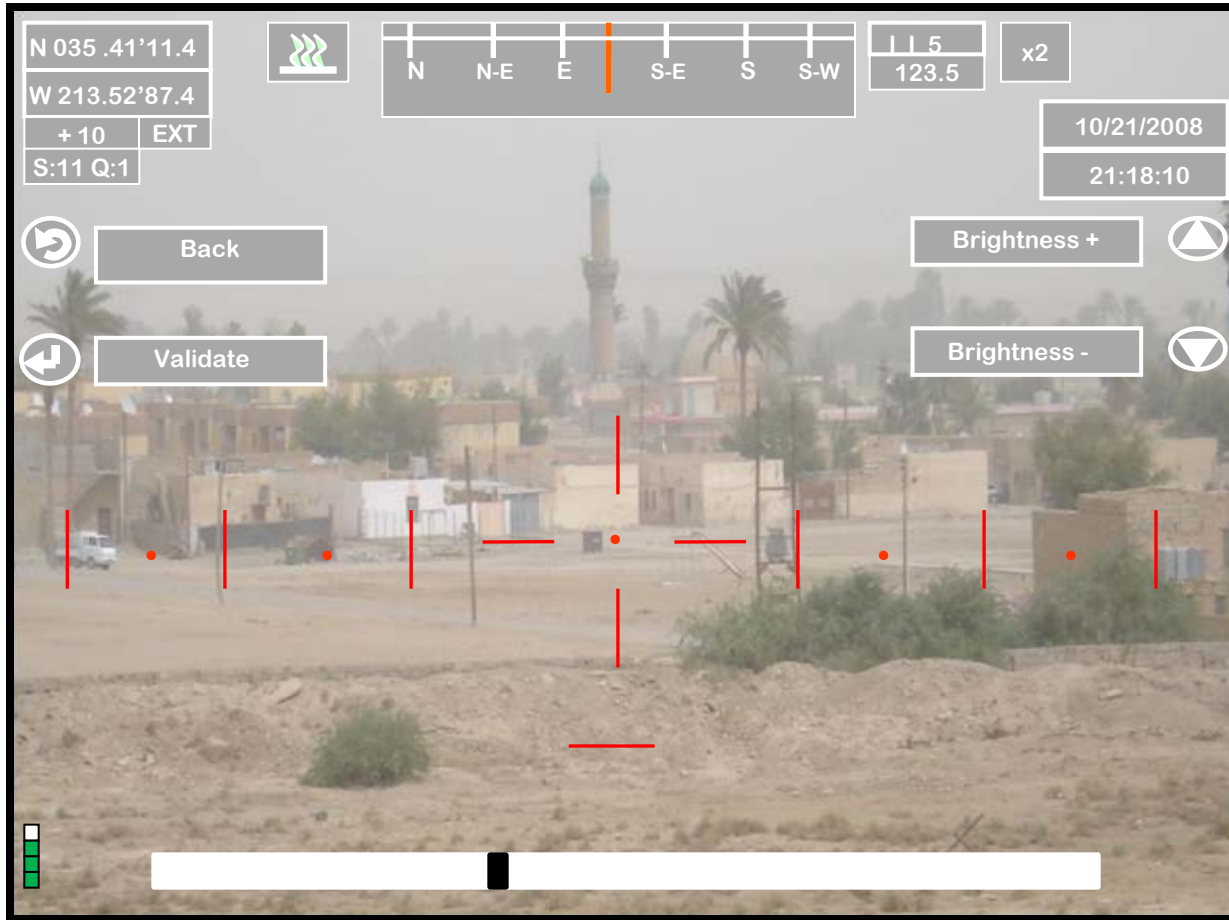


“Polarity” allows the user to switch between **white hot**  and **black hot** 



Brightness Functions

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“Brightness + / -” allows the user to increase or decrease the relevant brightness of the image in the LRTV view screen



Contrast Functions

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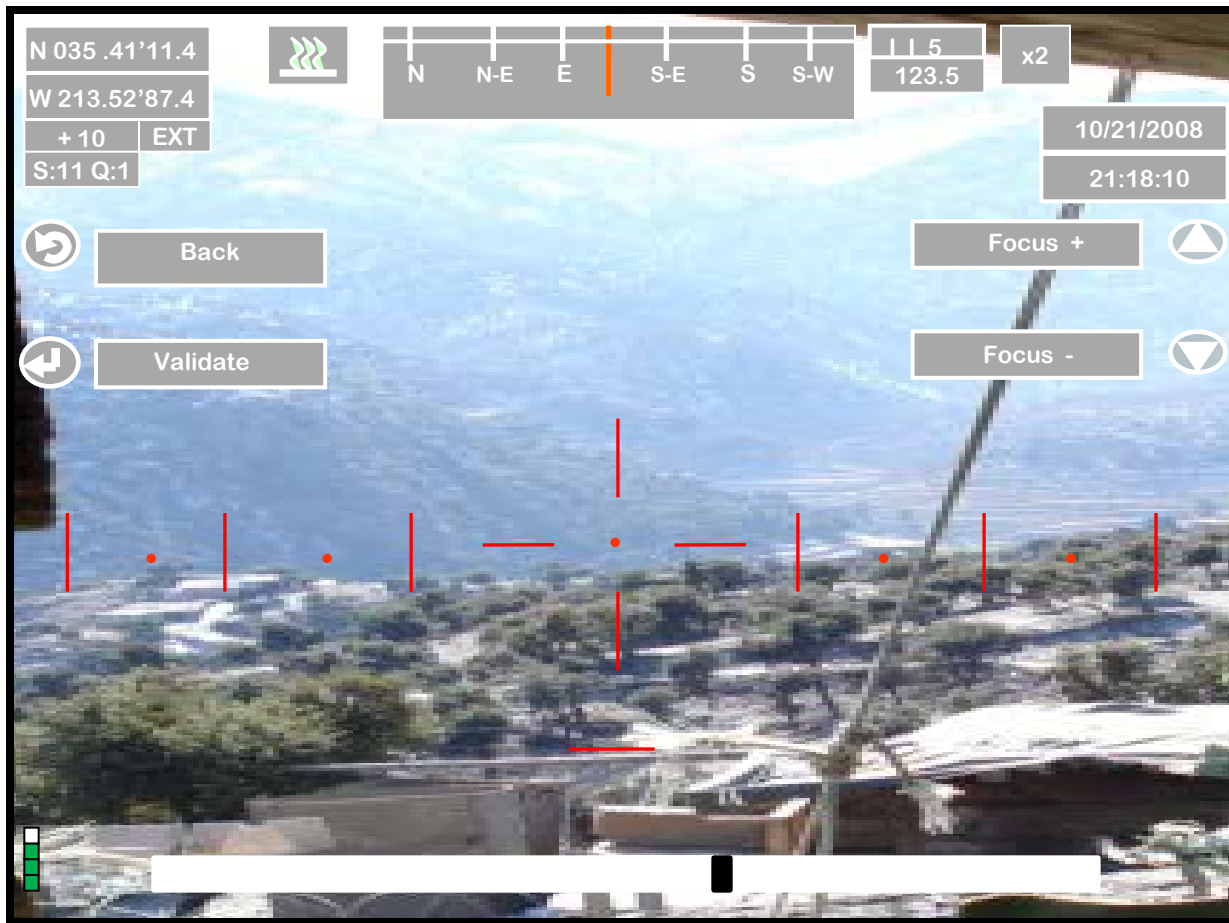
The screenshot displays the LRTV view screen with various controls and data. On the left side, there are two yellow circular buttons with arrows: the top one is a right-pointing arrow with a circular arrow around it, and the bottom one is a left-pointing arrow with a circular arrow around it. On the right side, there are two yellow circular buttons with triangles: the top one is an upward-pointing triangle, and the bottom one is a downward-pointing triangle. The main screen area shows a grayscale image with a red crosshair. At the top left, there is a data box with coordinates: N 035 .41'11.4, W 213.52'87.4, + 10 EXT, and S:11 Q:1. To the right of this is a compass rose with directions N, N-E, E, S-E, S, and S-W. Further right is a scale bar with markings for 11.5 and 123.5, and a magnification factor of x2. Below the compass is a date and time display: 10/21/2008 and 21:18:10. At the bottom left, there is a 'Back' button and a 'Validate' button. At the bottom right, there are 'Contrast +' and 'Contrast -' buttons. A vertical color calibration bar is visible on the far left of the screen.

“Contrast + / -” allows the user to increase or decrease the relevant contrast between white and black in the LRTV view screen



Focusing Functions

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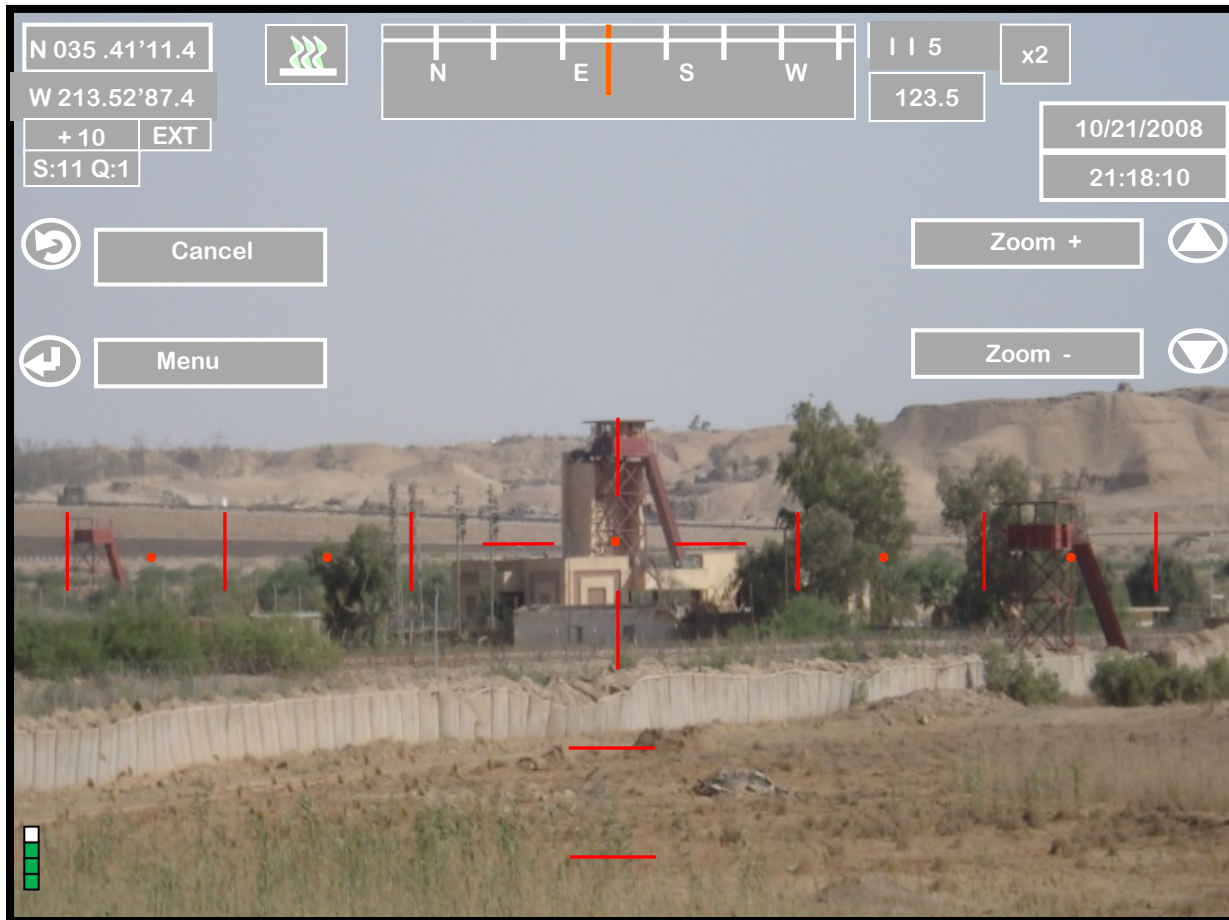
“Focus + / -” allows the user to focus the image seen in the LRTV view screen





Zooming Functions

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“Zoom + / -” allows the user to adjust the magnification of the LRTV.

When no buttons are touched for 5 seconds, the button function icons disappear and the right two buttons will control the Zoom +/Zoom - for both IR and day channel.





2X Afocal Lens for LRTV

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Afocal Lens Kit



Afocal Lens Installed

-The LRTV comes with an additional 2X Afocal Lens. This lens adds two powers of magnification to each zoom level. For example:

4X LRTV Zoom with 2X Afocal Adapter = 6X Zoom Total





Laser Pointer

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- Press the laser button and then validate POINTER
- Press and hold the laser button down while fixed on your target
- When the laser is initiated the circle will turn into an **X**





Acquiring Range

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N 035.41'11.4
W 213.52'87.4

3295 m
S:11 Q:1

10/21/2008
21:18:10

Cancel

Save

D1: 3295 m
D2: **** m
D3: **** m
Az: 143.4
El: +000.3
**** ** **
**** ** **
**** ** **
Alt: **** ft
▲ dist: **** m
▲ Az: ****
▲ alt: **** ft

115
123.5 x2

N NE S SE

Up

Down

Target ranging

- Press the thumb switch to activate the LRF
- Press the thumb switch a second time to acquire range
- Continue to press the thumb switch to reacquire ranges

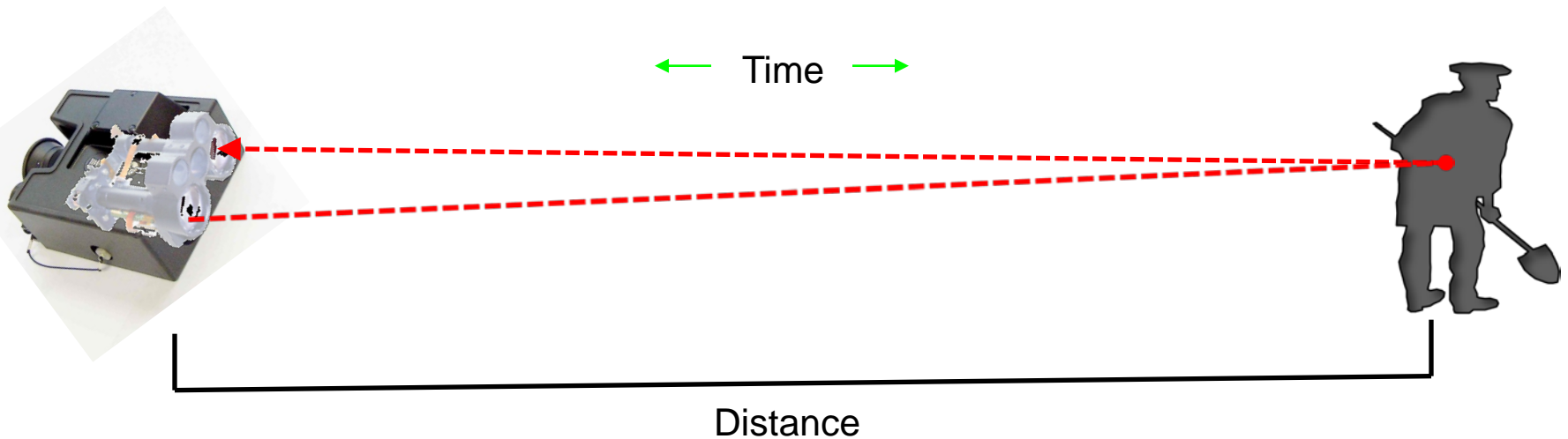




What is a Laser Range Finder (LRF)

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- The LRF determines range to a target by firing multiple pulses of laser diode energy in a short period that reflect off of the target and returns to the LRF receiver
- The elapsed time is measured and the distance to the target is determined
- Measurements are used to determine the distance value to the target





LRF Beam Divergence

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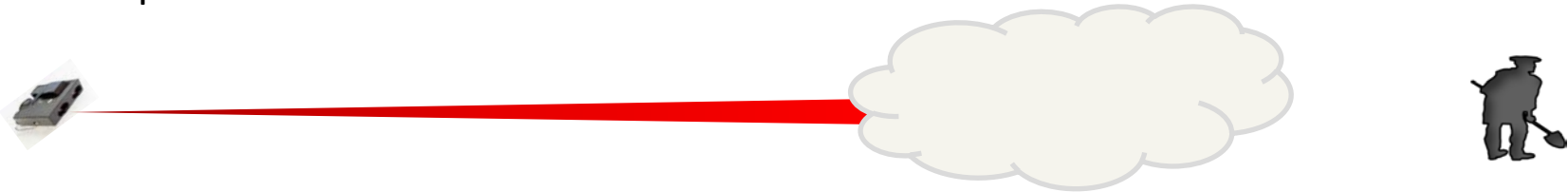




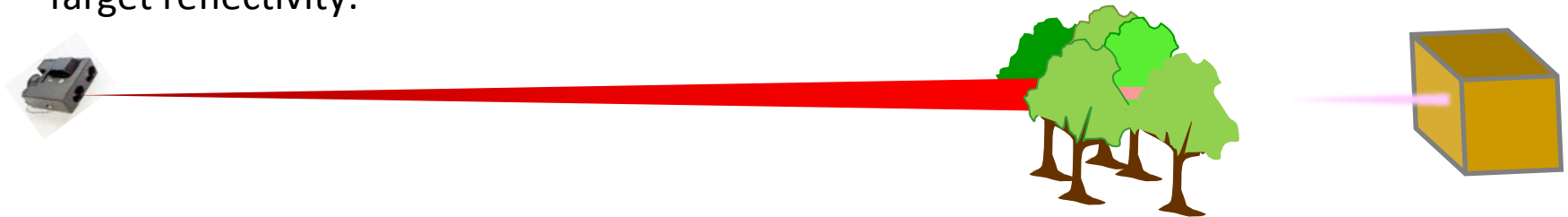
Factors Affecting Measurements

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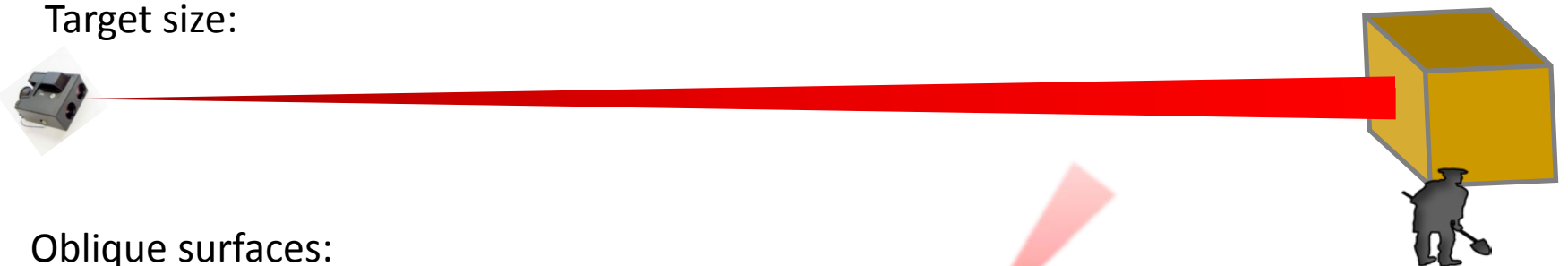
Atmospheric conditions:



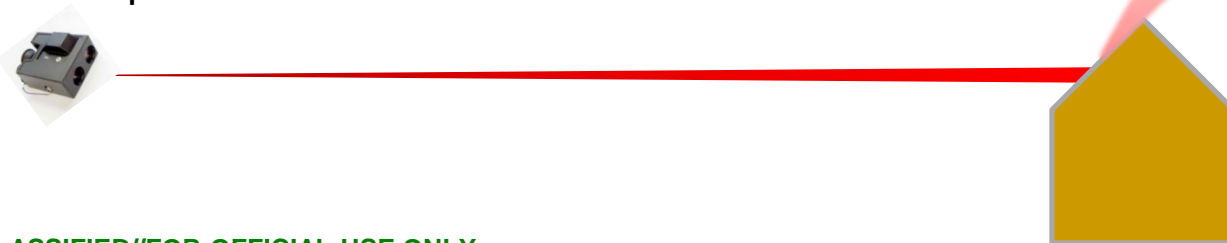
Target reflectivity:



Target size:



Oblique surfaces:



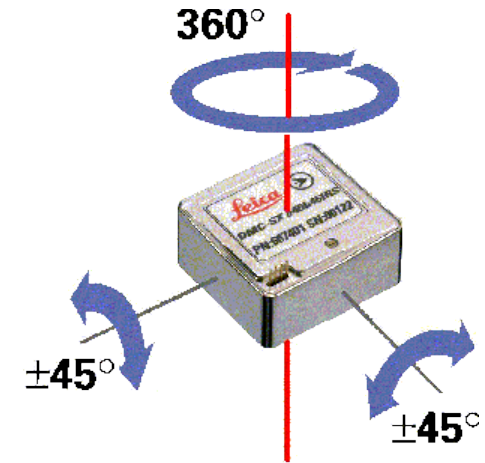


Azimuth and Inclination Measurements - Basics

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The device contains a digital magnetic Compass (DMC) which provides azimuth and inclination data

- Metal objects, magnetic fields and electronic devices can cause errors in azimuth readings





LRTV Menu

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LRTV Menu	Sub menu	Value
System	> Analog video out	> On or Off
Settings	> AGC	> On or Off
	> Integration time	> Auto, 2.5 ms, 4.0 ms, > 5.5 ms, 8.0 ms
	> Stabilization	> On or Off
	> Reticle color	
	> Reset to Default	> Yes or No
Configuration	> Display	> Auto OFF > Always ON > OFF
	> Power selection	> Auto or Internal
	> Observation	> Day + Night > Day only
	> Overlays	> GPS Date/time > GPS coord. > Compass/azimuth
	> Master reset	> Yes or No





LRTV Menus (Cont'd)

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LRTV Menu	Sub menu	Sub menu	Value
Localisation	> Compass	> Calibration > Units	> 4 Points > 12 Points > Declination > Mils > Degrees > Grads
	> Range Finder	> Minimum Distance > Distance units	> Null > 500 > 1500 > Metres > Yards > Feet
	> GPS	> C/A > MSL Alt. Units > Coord. Units > Datum > Time Zone > Date FormatED 50	> On or Off > Meters or Feet





LRTV Menus (Cont'd)

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LRTV Menu	Sub menu	Sub menu	Value
Multimedia	<ul style="list-style-type: none"> > Edition > Configuration 	<ul style="list-style-type: none"> > Internal > External > Quality > File naming 	<ul style="list-style-type: none"> > High > Standard > Enable > Disable > Modify
Maintenance	<ul style="list-style-type: none"> > Launch Tests > View Failures 		
Language	<ul style="list-style-type: none"> > English > French 		





Important System Menu functions

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Function	Description
AGC On / Off :	Automatic Gain Control “ON” when selected lets the LRTV set pre-selected parameters controlling brightness and contrast Automatic Gain Control “OFF” when selected allows the user to manually set the brightness and contrast
Stab. On / Off:	Turns the automatic stabilization function on or off. The automatic stabilization function controls the “jerkiness” of the viewed image. Stab control will help you keep the image in your view screen.
IR Calibrate:	Recalibrates the IR sensor to redefine the image on the view screen. Also done when the screen appears to “close in”.
Compass:	This function allows you to change settings in the DMC, such as changing the settings between degrees and mils or between grid and magnetic north, also compensating for declination.





4 and 12 point Compass Calibration

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4 Point:

Required after any environment changes (i.e. battery replacement, switchover from tripod to handheld use). Done in the field during tactical operations.

12 Point:

Calibration is also required after the LRTV experiences a power supply change i.e. (initial start-up completed and a power source change from internal to external), for extreme environmental change (change of terrain or operation inside of a vehicle to dismounted).

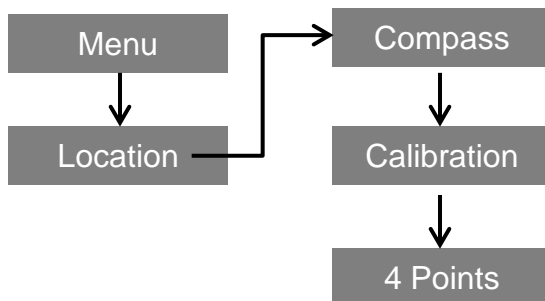
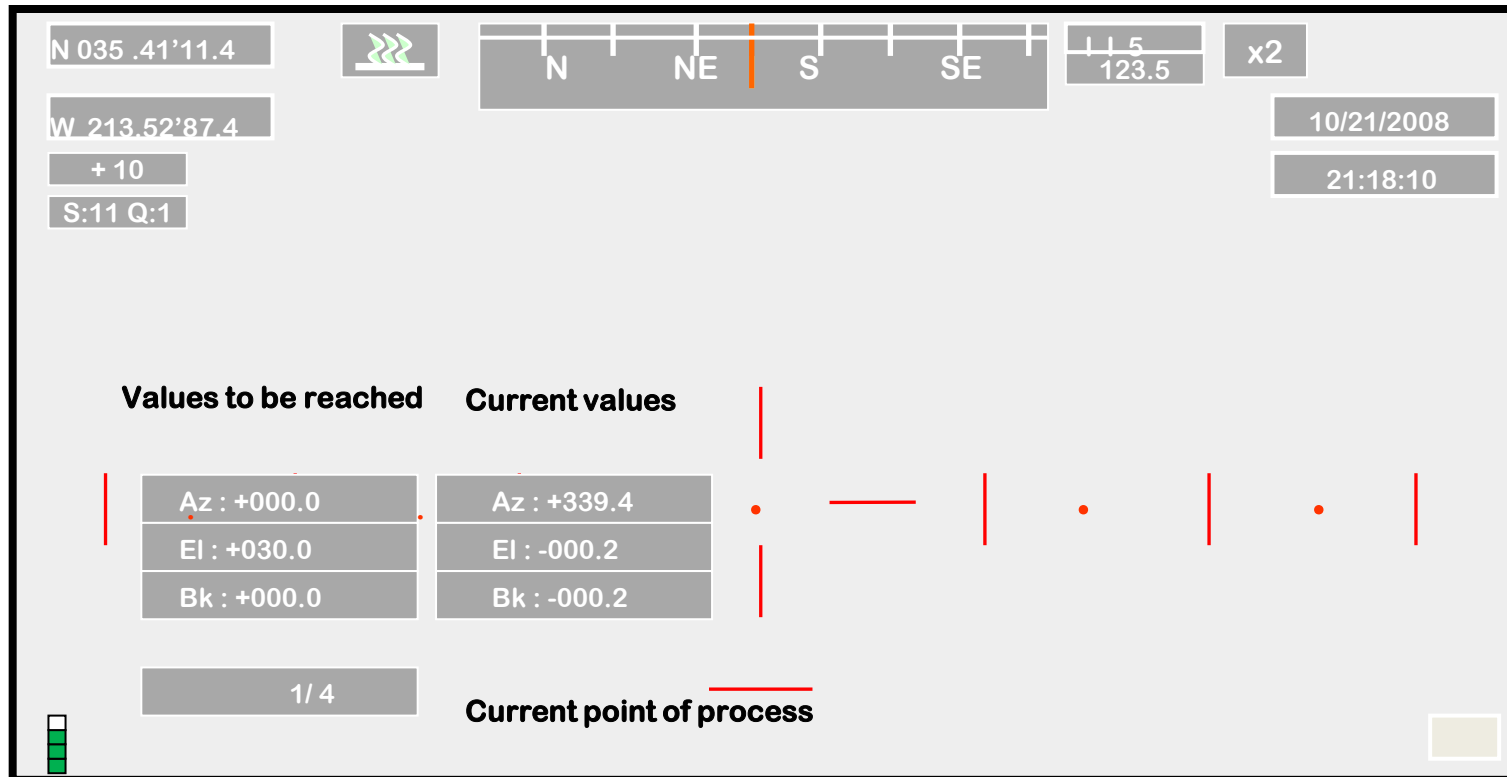
-Calibration is intended to take into account the magnetic disturbances surrounding the user's position and the LRTV.

-Perform calibration from the tripod whenever possible.



4 Point (North Finder Calibration)

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-Move the LRTV until the Current Values are equal to, or near equal to (within + or - 5 degrees or + or - 89 mils) the Values to be Reached, then press the laser function button.

-Do this successively four times. Once 4/4 is displayed the LRTV will display "Success" or "Failure." Repeat until "Success" is achieved.

-For 12 point calibration, twelve measurements/validations are required.

























LRTV Warning/Failure Icons

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-If the LRTV experiences an internal or external system failure, it will display an icon corresponding to the specific problem.

-If restarting or resetting the LRTV settings does not fix the failure, report the item as needing replacement.

-For battery failures, simply replace the battery.

Failure Icon		Name of Failure
Total	Partial	
		Night Channel Failure
		Day Channel Failure
		Compass Failure
		Range Finder Failure
		GPS Failure
		Communication Failure
		Button Failure
		Battery Failure
		Multimedia Function Failure
		Reticle Failure





LRTV Laser Warning

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- THE LRTV INCORPORATES A CLASS 1 “EYE SAFE” LASER FOR THE LASER POINTER AND LASER RANGE FINDER.
- ALL LASERS SHOULD BE TREATED AS A WEAPON NO MATTER THEIR CLASSIFICATION.
- PROLONGED OR CLOSE RANGE EXPOSURE TO ANY LASER CAN CAUSE MEASURABLE EYE DAMAGE.
- REMEMBER WHEN YOU OPERATE THE IR LASER FOUND ON THE LRTV AND POINT AT A TARGET, THE LASER WORKS BOTH WAYS.

Think before you actuate!!!!

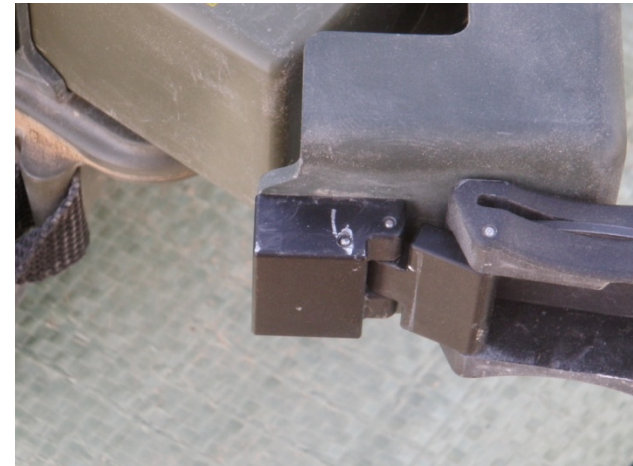




Preventing Damage To The LRTV

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- Do not lay your LRTV down while mounted to the tripod.
- The LRTV is ruggedized but rough treatment will damage it.
- Always properly secure the LRTV to the mounting plate and the pan/tilt head.
- Always extend the tripod legs for maximum stability.
- Always push the battery box closed while securing the battery box latch. Do not slam the latch closed or force it to close. Doing so will break the latch.
- 550 cord and a sand bag should be used to anchor the tripod when used in static positions.





Care and Cleaning

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- ENSURE YOU REMOVE THE BATTERY AND OBJECTIVE LENS COVERS WHEN YOU STORE THE EQUIPMENT.
- AFTER EACH OPERATION TAKE A SOFT PENCIL ERASER AND RUB THE BATTERY CONTACTS TO CLEAN THEM.
- WHEN STARTING A NEW OPERATION ENSURE YOU USE NEW/FULLY CHARGED BATTERIES.
- YOUR EQUIPMENT IS WEATHER PROOFED. DO NOT SUBMERGE IT IN WATER OR ANY OTHER LIQUID.
- AFTER EACH OPERATION TAKE A CLEAN DAMP CLOTH TO WIPE DOWN THE OUTER CASING.
- ALWAYS (NEVER USE ANYTHING ELSE BUT) USE LENSE CLEANING PAPER TO CLEAN THE EYE PIECE AND OBJECTIVE LENSE.
- RUB YOUR EYE CUP DOWN WITH SILICONE (VASELINE JELLY IS A GOOD SUBSTITUTE) WIPING IT CLEAN AFTER IT CONDITIONS.





Maintenance and Repairs

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- IF ANY ITEM OF YOUR OPTICS KIT BECOMES INOPERABLE, PLEASE CONTACT THE FOLLOWING BY E-MAIL OR PHONE;

SSC Pacific C4I Help Desk - 24/7/365

ssc_pac_c4isrhd@navy.mil

(619/DSN) 524-3888

- IF ANY ITEM OF YOUR OPTICS KIT BREAKS OR BECOMES DAMAGED (FOR ANY REASON) CONTACT THE ABOVE WEB ADDRESS TO CONFIRM SHIPPING INSTRUCTIONS. PLEASE BOX BROKEN OR DAMAGED GEAR AND SHIP TO;

Receiving Officer

Attn: Ron Brown Tel:(619) 524-3882

SPAWAR Systems Center Pacific (41420)

4297 Pacific Highway, Building 7

San Diego, CA. 92110

- Once confirmation of shipping of damaged equipment takes place, replacement gear will be sent to you. Ensure you put your units RUC or DODDAC numbers and units address and a point of contact with email and phone number.



QUESTIONS?

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