Bullard
It's your life and you're worth it™

Bullard MX Thermal Imager User Manual

Congratulations

Congratulations on the purchase of your new Bullard MX Thermal Imager. The Bullard MX Thermal Imager combines the most advanced thermal imaging technology with our expertise in high heat, impact resistant thermoplastics to bring you the most durable thermal imager on the market. Our innovative design includes many unique features making Bullard Thermal Imagers the best choice for today's firefighters.

The benefits of using thermal imaging technology as a fire fighting tool encompass just about every aspect of a firefighter's job. Thermal imaging is not, however, a technology designed to replace current fire fighting tactics. Rather, it is a tool that allows the firefighter to be more effective and make better decisions. Some of the many uses for your Bullard MX Thermal Imager include:

- Search and rescue
- Scene assessment
- Locating the seat of the fire
- Determining the spread of the fire
- Locating hot spots
- Identifying potential flashover situations
- Determining ventilation points
- Determining entry points
- Overhaul
- Hazmat
- Wildland firefighting
- Training

NOTE

To help us better serve you, please fill out the warranty card enclosed with your Bullard MX Thermal Imager.

⚠WARNING

Read all instructions and warnings before using this product. Failure to observe these instructions could result in death or serious injury.

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Bullard MX Thermal Imager

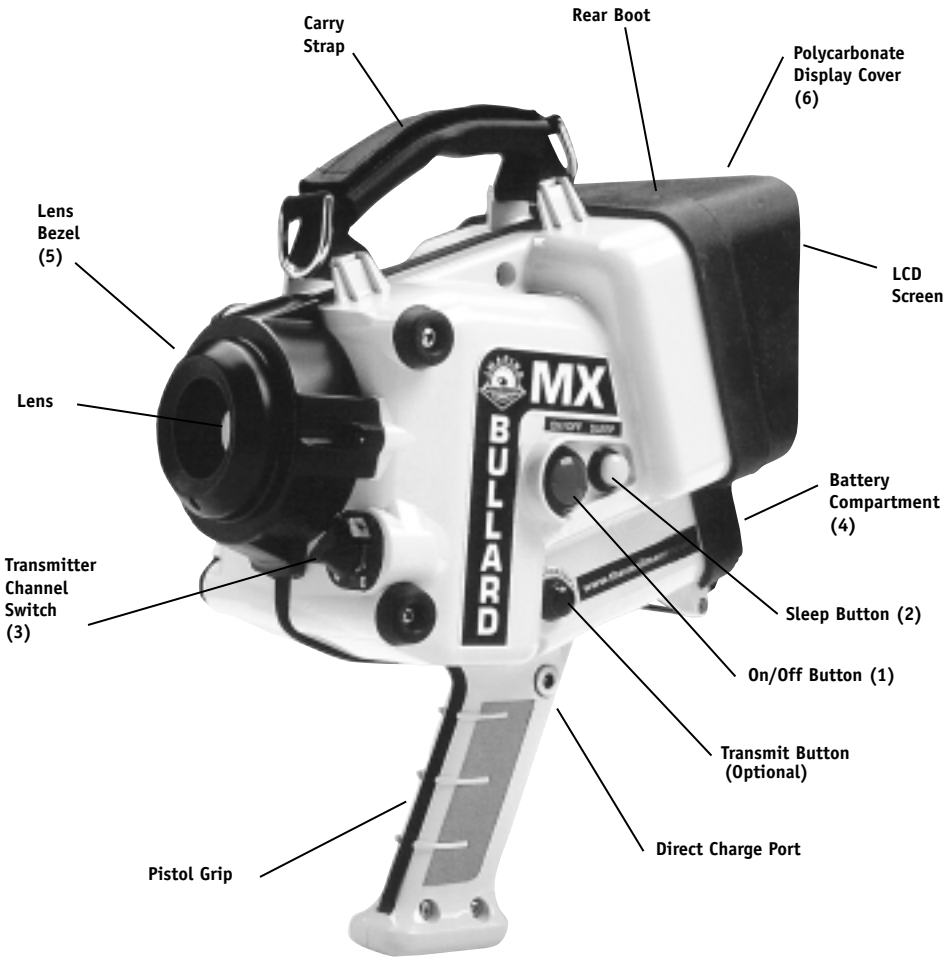


Figure 1

Use and Operation

Power: To turn on your Bullard Thermal Imager, simply depress the large green "On/Off" button on the left side of the unit (Item 1, Figure 1). Upon depressing the "On/Off" button, the "Sleep" indicator light will appear on the viewing screen. However, the thermal image will not appear immediately as the unit requires a few moments to warm-up and complete the self-calibration process. After approximately 15 seconds, the display screen will light up and the camera will complete its self-calibration.

Once this boot-up process is complete, the thermal image will appear on the screen. If the camera has been in recent use, immediately prior to turning on, thermal stabilization may not be required during the self-calibration process. Therefore, as soon as the screen lights up, the thermal image will appear.

Always use the power switch to turn the camera off. If the battery is removed before the power is switched off, the normal self-diagnostics could be interrupted and upon reinsertion of the battery, the screen may not display a thermal image. In this case, the camera must be switched off using the power switch and rebooted by pressing the power switch.

Sleep Mode: To conserve battery life, the Bullard Thermal Imager includes a unique "Sleep" feature. To put the unit into "Sleep" mode, simply press the yellow "Sleep" button on the left side of the unit (Item 2, Figure 1). When in the "Sleep" mode, the "Sleep" indicator light will appear on the viewing screen. To bring the unit out of the "Sleep" mode, simply push the yellow button again. The thermal image will immediately reappear on the screen. The "Sleep" mode disengages the transmitter, if activated.

LED Low-Battery Warning Lights: Five LED lights located to the left of the LCD screen indicate the life of the battery in the thermal imager. The green LED light at the top indicates a fully charged battery. As the battery begins to discharge the lights will change to yellow and then red, indicating the battery is low and should be taken out and re-charged.

On-Screen Battery Status Indicators: The on-screen battery display is located in the upper right-hand corner of the LCD screen. This battery indicator resembles a small battery and is green in color. When the battery icon appears completely green this indicates that the thermal imager battery is fully charged. As the battery in the imager begins to discharge, the level of green color in the battery icon will decrease. When the battery nears total discharge, a warning triangle will begin to flash in the middle of the screen indicating the need to change the battery.

EI (Electronic Integration) Mode: The Bullard MX is equipped with a state-of-the-art, *Automatic Thermal Throttle*. The Bullard "smart" iris automatically manages the level of thermal energy that reaches the sensor, ensuring that the image on the screen is always as sharp as possible, regardless of the level of heat the imager detects. When the "smart" iris engages, the lettters EI will appear on the screen just below the battery icon.

NOTE

You may observe a momentary freeze in the image as the unit switches into or out of the "smart" iris mode.

Red Hot Feature: To assist the operator in interpreting the image on the screen, the Bullard MX comes standard with the "*Red Hot"* feature. Once the "smart" iris activates indicating increased thermal energy, the Bullard MX will paint the hottest area in the view red. This feature only operates in the EI mode.

Relative Heat Indicator (RHI): The Bullard MX Thermal Imager is equipped with an on-screen "*Relative Heat Indicator" (RHI)*. The RHI provides a relative temperature for the object, or objects, framed in the on-screen cursor. The relative temperature is then displayed on the bar style gauge located on the right side of the screen. The RHI will not register temperatures below 100° F or above 1,100° F. The accuracy of the indicated temperatures is affected by many factors. For example, the relative temperature displayed on the gauge is an average of the surface temperatures of all objects targeted in the cursor.

⚠WARNING

The Relative Heat Indicator (RHI) cannot be relied on to provide accurate temperature measurements. Making tactical decisions based on the temperatures indicated on the RHI scale could result in death or serious injury.

Additionally, the RHI is programmed to assume that all objects exhibit an emissivity coefficient of 0.95. This emissivity factor was chosen based on an average of the most probable objects that would appear in a fire related scene. However, some objects, especially those with shiny silver surfaces, will exhibit very different emissivity factors and thus adversely affect the accuracy of the RHI. Therefore, operators should not use the RHI to try to determine exact temperatures. This tool is best used to provide a general idea of heat conditions and to compare the relative heat of one object to that of another.

Charging the Nickel Metal Hydride Battery

Before using a battery for the first time, be sure to charge and drain the battery at least three times. This will enable the battery to achieve maximum life.

Using the Battery Charger: The battery should be charged in the battery charger, using either the AC or DC adapter provided. To charge battery, simply insert battery into charger base so that the metal connectors on the battery are aligned with the metal connectors in the charger. A red light will illuminate on the charger to indicate that the battery is charging. When the light on the charger turns to green, your battery will be fully charged. You may leave the battery in the charger indefinitely. You cannot overcharge the battery.

Using the Direct Charge System: The direct charge system will allow the NiMH battery of the Bullard Thermal Imager to be charged inside the camera. The system can be used to charge one or two NiMH batteries at a time, one inside the camera and/or one inserted into the charger base. The charge system can be powered by either 110V AC power supply or the 12V DC adapter cable. Connect the power source into the rear of the charger base.

The plug receptacle on the front of the charger base will not accept the power supply cord. Connect the charger base to the camera by using the gray connector cord provided. Insert one end of the cord into the charger base using the outlet provided on the front of the charger and the other end into the direct charger receptacle located on the handle of the thermal imager. A red light will illuminate on the charger base to indicate that battery charging is in process. When the light turns green, the charging is complete. You may leave the direct charge system in place indefinitely. The batteries cannot be overcharged.

Use only the gray connector cord leading from the charger base to plug into the camera. You cannot plug either power supply directly into the camera.

Using the Direct Charge System/Battery Charger: A battery can be charged in the charger at the same time as the battery in the camera is being charged by using the directions previously mentioned. Charging both batteries at the same time will not lengthen the charge time or cause any damage to the batteries or charging unit.

Figure 2

⚠ CAUTION

The output of the 110V AC power supply is 24V DC. Using any other 110V AC power supply may cause damage to the system, especially if two batteries are being charged simultaneously. Most 110V AC power supplies that have 12V DC outputs will not generate the current needed to charge two NiMH batteries at once. Failure to observe instructions may result in permanent damage to the thermal imager.

⚠ CAUTION

Do not use the 110V AC power supply (24V DC output) to power anything else, such as the optional video transmit receiver unit (which is designed to operate at 12V DC). The optional video transmit receiver unit will be damaged by use of the 110V AC power supply. Failure to observe instructions may result in permanent damage to the thermal imager.

⚠ CAUTION

Never connect the direct charger to the thermal imager without a NiMH battery being installed in the thermal imager's battery compartment. Failure to observe instructions may result in permanent damage to the thermal imager.

⚠ CAUTION

The Direct Charge System uses a 24V charger. Using any power supply other than the 110V AC power supply with 24V DC output or the 12V DC cord provided with your unit will cause damage to the system. Failure to observe instructions may result in permanent damage to the thermal imager.

Loading the Battery: To open the battery compartment (Item 4, Figure 1), turn the two thumb knobs outward and pull the door open. Remove battery. Now insert a fully charged battery making sure the Bullard decal is facing away from the camera and the type is right side up. If the battery has not been inserted correctly, the door will not shut and the thumb knobs can not be secured. If the door will not shut, remove the battery and review the instructions above. The battery can easily be replaced in the dark. To do so, simply locate the notched bottom of the battery. Make sure the notch is pointing away from you and is on the left-hand side. If the door will not shut, remove the battery and try again.

Additionally, as with all batteries, your Bullard rechargeable battery will experience a slow drain of its charge during storage. The amount of drain varies widely based on storage conditions. For best performance, charge each of your batteries every two weeks.

Palm and Top Straps

The palm and top straps are designed to allow the user to field replace the top and side strap without having to return the imager to the factory.

Replacing the Palm Strap: Using a 3/8" wrench, remove the nut on the right side of the strap. Remove the strap from the screw by lifting away from the camera. Remove the left side of the strap by removing the screw with a Phillips screwdriver. The new strap should be attached by first securing the left bracket to the camera using the existing screw. The right bracket should then be secured by placing the bracket on the screw and tightening the nut. The strap is correctly attached when the Bullard logo is facing outward.

Adjusting the Palm Strap: To adjust the palm strap on the side of the unit, pull open the leather hand guard and readjust the strap. Once adjusted to comfortable length, close the leather hand guard.

Adjusting the Shoulder Strap: To attach the shoulder strap, clip the hooks to any of the three D-rings on the unit. Adjust the strap to a comfortable length.

Replacing the Top Strap: Unwrap leather pad from strap to expose the ends of the strap. Remove right side of strap from Velcro® hook and loop material, wrap the end around the anchor on the top of the camera and re-attach. Remove the left side of the strap from the Velcro, wrap the end around the anchor on the top of the camera and re-attach. Wrap leather pad around the strap ends.

Wrist Strap: This strap can be used as a backup to keep the imager from falling if it should slip from your hand. The adjustable strap fits over the sleeve of your turnout gear and can adjust to any size wrist. The wrist strap can be easily attached to any D-ring located on the camera.

Care Instructions

The design of the Bullard Thermal Imager requires very little maintenance.

For best results, after each use:

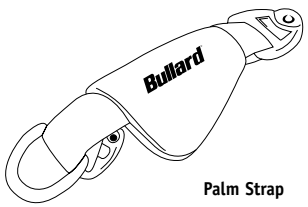
- Clean the outside of the unit with mild soap or detergent.
- Wipe the lens with a clean, soft, dry cloth.
- Clean the display with a clean, soft, dry cloth.
- Ensure screws are tight on rubber bumpers and side strap.
- When not in use, always store your Bullard Thermal Imager in the case provided.

⚠ CAUTION

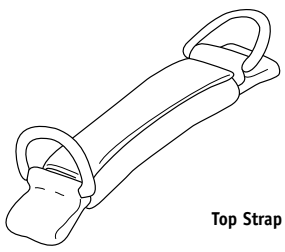
Do not use solvents or paint thinners to clean your Bullard Thermal Imager, as they could permanently mar the surface or degrade the protective properties of the casing. Failure to observe these instructions may result in permanent damage to the thermal imager.

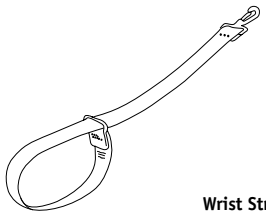
Cleaning the Lens: The thermal imager lens is protected by both a silicone gasket and a plastic lens bezel. The bezel (Item 5, Figure 1) contains a drain hole so that any water that may get into or behind the bezel will be effectively drained away.

Normally, the lens can be cleaned with a soft, dry cloth and soapy water. However, if the bezel drain becomes clogged, it may be necessary to remove the bezel in order to clean out the passageway. The bezel can be easily removed by unscrewing the two retaining screws. Once clean, re-attach the bezel ensuring that the drain is positioned on the bottom of the assembly.



Palm Strap


Top Strap


Wrist Strap

Replacing the Video Display Cover Window

The display cover (Item 6, Figure 1) has a scratch resistant hard coating to minimize marring. However, if heavy scratching or gouging does occur, the cover window can be replaced. To do this, simply remove the four stainless steel screws along the top and sides of the window. Then remove the battery door thumb knobs by loosening the two screws that retain them. Remove the plastic display cover window and replace with a new one (part number TIWINDOW), making sure that the O-ring countersink slots around the mounting holes are facing outward. When reinserting the screws, make sure each one has the sealing O-ring in place.

⚠WARNING

Do not attempt to disassemble the sealed case of your Bullard Thermal Imager. If the unit is not functioning properly return it to Bullard for evaluation. Disassembling the unit voids all warranties. Failure to follow these instructions could result in death or serious injury.

⚠WARNING

The Bullard Thermal Imager is not certified as intrinsically safe. Failure to follow this instruction may result in serious injury or death.

⚠WARNING

Thermal Imaging is not a technology designed to replace current fire fighting tactics. Rather, it is a tool that allows the firefighter to be more effective and to make better decisions. Failure to follow these instructions could result in death or serious injury.

⚠WARNING

Do not attempt to remove the lens gasket or the rear boot. These parts are sealed and removal will cause leakage. Failure to follow these instructions could result in death or serious injury.

Service

If your Bullard Thermal Imager is not performing properly, please contact Bullard Inside Sales at 877-BULLARD (285-5273).

Describe the problem to the Bullard Representative as completely as possible. For your convenience, your representative will try to help you correct the problem over the phone, or will transfer you to the Bullard Service Center. Before returning your Bullard Thermal Imager:

1. Verify with your Representative that the product should be returned to Bullard. Inside Sales or the Service Center will provide you with written permission and a return authorization number.
2. Before returning the product, decontaminate and clean your thermal imager to remove any hazardous or contaminated materials that may have settled on the product during use. Laws and/or shipping regulations prohibit the shipment of hazardous or contaminated materials. Products suspected of contamination will be professionally decontaminated at the customer's expense.
3. Ship returned products, including those under warranty, with all transportation charges pre-paid. Bullard cannot accept returned goods on a freight-collect basis.
4. Returned products will be inspected upon return to the Bullard facility. The Service Center will telephone you with a quote for required repair work that is not covered by warranty. If the cost of repairs exceeds stated quote by more than 20%, your Coordinator will call you for authorization to complete repairs. After repairs are completed and the goods have been returned to you, Bullard will invoice you for actual work performed.

Warranty

Bullard warrants to the original purchaser that the Bullard Thermal Imager is free of defects in materials and workmanship under normal use and service for a period of one (1) year from date of manufacture. The Bullard obligation under this warranty is limited to repairing or replacing articles that are returned within the warranty period, shown to be defective after inspection by Bullard, and subject to the following limitations:

a. Article must be returned to Bullard with shipping charges prepaid.
b. Article must not be altered from its original configuration.
c. Articles must not have been misused, abused, or damaged in transport.

Bullard provides a limited lifetime warranty on the Bullard Thermal Imager outer shell. This warrants that the outer shell is free of defects in materials and workmanship under normal use and service for the original purchaser. The Bullard obligation under this warranty is limited to repairing or replacing articles that are returned within the warranty period, shown to be defective after inspection by Bullard, and subject to the following limitations:

a. Article must be returned to Bullard with shipping charges prepaid.
b. Article must not be altered from its original configuration.
c. Article must not have been misused, abused, or damaged in transport.
d. When the outer shell is obsolete and Bullard no longer stocks the part, the limited lifetime warranty will be terminated.

In no event shall Bullard be responsible for damages, loss of use, or other indirect, incidental, consequential or special costs, expenses or damages incurred by the purchaser, notwithstanding that Bullard has been advised of the possibility of such damages.

Any implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to one (1) year from the date of manufacture of this product.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Extended Warranty

The extended warranty has all the same terms and conditions as the one-year warranty, except it is for the period of two years. This warranty can be purchased directly from Bullard or through any authorized Bullard distributor.

Technical Specifications

Weight

with battery	5.38 lbs. (2.44kg)

Detector

Detector Type	Uncooled Microbolometer
Resolution	320 x 240
Sensing Material	Vanadium Oxide (Vox)
Spectral Response	8 to 14 microns
Thermal Stability	Thermoelectric Cooler
Update Frame Rate	60 Hz
NETD	<70 MK
Video Output	DC coupled digital signal converted to RS-170 format
Temperature Indication	5 x 5 pixel target size, array centered
Distance/Spot Ration	10 feet = 0.36 inches

Outer Casing

Shell Material	Ultem® Thermoplastic
Sealing Components	Silicon
Strap Material	Kevlar
Display Cover	Polycarbonate

Lens

Material	Germanium
Focal Length	18 mm
Speed	f/.87
Field of View	55°

Electrical System

Power Source	NiMH rechargeable Battery
Output Source	10 V
Capacity	1100 mA.hr
Operating Time	1.25 to 1.5 Hrs

LCD Monitor

Display Size	4" (10cm)
Dot Pitch	0.259 mm (V) x 0.210 mm (H)
Dot Format	234 x 380 Dots
Pixels	89,622
Pixel Configuration	R-B-G Delta Configuration
Display Method	TFT Active Matrix System
Input Signal Level	1.0 V P-P (Positive) 75 Ohm
Back Light	CCFT Bicklight

Wireless Remote Transmitter (Optional)

Transmitting Frequency	2.4 GHz
Power	400 mW
Power Consumption	2.8 W
Frequency Selection	4 Channel Switch
FCC License	Part 90

Ordering Information

CATALOG NUMBER	DESCRIPTION
BULLARDMX	Bullard MX Thermal Imager (Includes Bullard Thermal Imager, two 10V NiMH rechargeable batteries, 24V charger with 24V AC, and 12V DC adapters, wrist strap and carry case.)
MXTRANSCOMMAND	Includes wireless remote transmitter, TV/VCR (110 AC and 12 volt DC), 4 channel receiver mounted inside the TV, antenna, and all necessary cables.
MXTRANSMITONLY	Wireless remote transmitter (Receiving system not included.)
MXTRANSMIT	Includes wireless remote transmitter, antenna, 4 channel receiver switch box, cable, 110V AC, and 12V DC adapters.
MXRECEIVER	Bullard Transmitter Receiver System Includes the antenna, 4 channel receiver switch box, and necessary cables
MXCOMMAND	Includes TV/VCR (110 AC and 12 volt DC), 4 channel receiver mounted inside the TV, antenna, and all necessary cables.
TRUCKMNT	Truck mounted direct charge system. This system includes vehicle mount, battery charger, 2 power cables (110 and 12 volt), mounting gasket, attachment hardware, and security buckle

CATALOG NUMBER	DESCRIPTION
BATTERYNIMH	10V NiMH rechargeable battery
BATTERY10V	10V NiCad rechargeable battery
SHSTRAP	Replacement shoulder strap
STRAPKIT	Thermal Imaging Camera replacement strap kit includes wrist strap, palm strap, and top strap
TIWINDOW	Replacement hard coated polycarbonate display cover
DUALCHARGER	Dual-Direct Charger for NiMH and NiCad rechargeable batteries
TIPOWERCORD	Gray cord connecting charger base with thermal imager
TIGLARESHIELD	Attaches to Thermal Imager reducing glare in bright sun conditions
TRIPOD	Heavy-duty 4 foot tripod for Thermal Imager.
CLAMP	Thermal imaging clamping system to be used with tripod or as stand alone system to mount imager to almost any surface
OMNI	Omni directional antenna with permanent and magnetic base.

Visit our website at www.thermalimager.com.

ISO 9001 certified

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