



FIRE PROTECTION TRAINING

Procedures Handbook 4300

TOOLS AND EQUIPMENT

TOPIC: INTRODUCTION TO THERMAL IMAGING CAMERAS (TIC)

TIME FRAME: 1:00

LEVEL OF INSTRUCTION: Level I

BEHAVIORAL OBJECTIVE:

Condition: Given a written quiz

Behavior: The student will be familiar with the Thermal Imaging Camera (TIC) basic operations, technology and emergency response application and uses.

Standard: With a minimum 80% accuracy, according to the information in this lesson plan.

MATERIALS NEEDED:

- Appropriate visual aids and supplies
- Thermal Imaging Camera (TIC)
- Spare TIC Battery
- Thermal Imaging Camera manufactures operating manual
- Appropriate video equipment and screen

REFERENCES:

- Appropriate Thermal Imaging Camera Operations Manual

PREPARATION: Thermal Imaging Cameras or (TICs) have become common in the fire service and are used in a wide variety of applications. Safe and effective operation with this state of the art technology is critical to correctly understand what the thermal imager indicates about the environment and its potential hazards.



PRESENTATION	APPLICATION
<p>I. BASIC OPERATING PROCEDURES</p> <p>A. Inspection of camera</p> <ol style="list-style-type: none">1. Exterior<ol style="list-style-type: none">a) Check for cracks in housing or lenses, deep scratches, holes or burned surfaces, rubber shrouds, etc.b) Visually inspect all mechanical hardware to ensure all screws are securely tightenedc) Ensure battery compartment is closed, clean and all connectors are intact <p>B. Powering camera</p> <ol style="list-style-type: none">1. Activating the unit (turning on)<ol style="list-style-type: none">a) Place a fully charged battery in the unitb) Locate camera's power button or switch and activate the device<ol style="list-style-type: none">1) Camera may take up to 5-20 seconds to power up depending on type of devicec) Locate batteries status or battery status on camera screen to ensure a fully charged battery<ol style="list-style-type: none">1) Battery life is 60 minutes to 3 hours depending on model and use2. Deactivating the unit (turning off)<ol style="list-style-type: none">a) Locate camera's power button or switch and deactivate the device <p>C. Cleaning and maintenance</p> <ol style="list-style-type: none">1. Cleaning	<p>Demonstrate unit/station specific TIC Model</p>



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<ul style="list-style-type: none"> a) Use mild soap and water with a soft bristle brush to clean exterior of the camera only b) Isopropyl alcohol may be used on stubborn stains <p>2. Maintenance</p> <ul style="list-style-type: none"> a) Polycarbonate LCD covers, straps, and rubber bumpers are field replaceable <ul style="list-style-type: none"> 1) Must use camera’s manufactured parts b) For any other service issues contact the manufacturer <p>II. BASIC THERMAL IMAGING TECHNOLOGY</p> <p>A. Thermal Imaging</p> <ul style="list-style-type: none"> 1. The detection of Infrared Radiation (IR) 2. The translation of the detected energy levels into a viewable image 3. It is a way to look at the “Heat Signature” of an object or person <ul style="list-style-type: none"> a) Heat signature would be identified as white in the TIC’s field of view b) Heat signatures are not visible through solid objects, glass, steam or water c) Infrared energy can be reflected off shiny surfaces and mirrors <p>B. IR energy can be blocked.</p>	<p>Use TIC to show various levels of heat signatures</p> <p>Give examples of different “Heat Signatures”</p>



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<ol style="list-style-type: none">1. Under certain conditions energy levels can be undetected.<ol style="list-style-type: none">a) IR energy will not penetrate glassb) IR energy may or may not penetrate steamc) IR energy will not penetrate waterC. Heat / Energy Principles<ol style="list-style-type: none">1. Conduction<ol style="list-style-type: none">a) Occurs in a solid or liquid, a heat source is in direct contact with the material and transfers energy directly through it.<ol style="list-style-type: none">1) Example: Fire in contact with a metal pipe heats the pipe and transfers energy down the length of it2. Convection<ol style="list-style-type: none">a) Occurs in gases, an energy source will heat the gases which will carry or transfer the energy on air currents<ol style="list-style-type: none">1) Example: Fire heats the surrounding air, which transfers the energy to the surrounding areas and objects it contacts<ul style="list-style-type: none">• Convected heat tends to rise or travel upwards3. Radiation<ol style="list-style-type: none">a) Occurs through air, energy is emitted in the form of electromagnetic waves which travels through the air and transfers the energy to objects as it strikes them<ol style="list-style-type: none">1) Example: Fire radiates energy, which heats nearby objects	



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<ul style="list-style-type: none">• Unlike convection, the energy travels in straight lines from the source <p>III. THERMAL IMAGING APPLICATIONS</p> <p>A. Emergency services applications</p> <ol style="list-style-type: none">1. EMS<ol style="list-style-type: none">a) Scene Assessmentb) Hazard Identificationc) Victim Identificationd) Patient Assessment2. Structural firefighting<ol style="list-style-type: none">a) Size - Upb) Search & Rescuec) Fire Attackd) Ventilatione) Overhaul3. Haz-Mat<ol style="list-style-type: none">a) Identify product levels in containersb) Identify product release pointsc) Identify product movementd) Identify changing temperatures4. Wildland Firefighting<ol style="list-style-type: none">a) Identify fire linesb) Identify remaining hot spotsc) Identify & track wildlife and livestockd) Identify & track personnel	<p>Give any examples based on past TIC experiences</p>



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<ul style="list-style-type: none">5. Training<ul style="list-style-type: none">a) Monitor student activity in zero visibilityb) Monitor overall conditions for safety6. Firefighter Safety<ul style="list-style-type: none">a) Identify Hazardsb) Personnel Accountabilityc) Identify emergency egress pointsd) Evaluate structural integrity7. Additional Applications<ul style="list-style-type: none">a) Identifying missing personsb) Alarm callsc) Fire & Explosion Investigationd) Urban and rural search and rescue	<p>Can you think of any other applications?</p>



SUMMARY: Thermal Imaging Cameras or (TIC) have revolutionized the way fire service personnel evaluate and mitigate various response situations. Knowing how to care for and operate a TIC greatly enhances firefighting ability to safely and efficiently conduct his/her job.

EVALUATION:

The student will complete a written quiz at a time determined by the instructor.

ASSIGNMENT:

Refer to TIC model specific user guides for more specific information. Practice using home unit/station TIC model.