LONDON FIRE BRIGADE

Thermal imaging camera - FLIR K55 - technical information

New policy number:	**1007**
Old instruction number:	
Issue date:	**3 October 2023**
Reviewed as current:	
Owner:	**Assistant Director, Property and TSS**
Responsible work team:	**Fleet Liaison Engineering and Equipment Team**

Contents

1 Introduction

1.1 This policy describes the FLIR K55 thermal imaging camera (TIC) and explains how to operate and maintain it.

1.2 The FLIR K55 replaces the ISG X380 in London Fire Brigade (LFB) service.

LFB Image id:1518377

2 Description

2.1 The FLIR K55 kit includes the following:

- Thermal imaging camera.
- Two rechargeable batteries.
- Retractable lanyard (see right).

LFB Image id:1588990

2.2 The FLIR K55 is a simple to operate, robust, self-contained camera with fully automatic operation when in use.

2.3 It is ergonomic in design with a pistol grip and designed to be neutrally balanced.

2.4 Easy to use with three operating buttons that can be operated by a firefighter's gloved hand.

2.5 The camera is shock proof (withstand drop from 2m) and water resistant to IP67.

2.6 **Design features**

- Set up with 3 modes of operation for LFB.
- Constant video capture with storage capacity of 200 files in total, with a maximum duration of 5 minutes each.

2.7 **Technical details**

• Dimensions (L x W x H):	120 x 125 x 280mm
• Operational weight:	1.1 kg
• Screen size:	4"
• IR resolution:	320 x 240 pixels, backlit
• Field of view (diagonal):	54°x 38°
• Depth of field:	0.84m to infinity
• Focal length:	9mm
• F-number:	1.25
• Focus:	Fixed
• Detector type:	Focal plane array, uncooled microbolometer
• Zoom:	2 x digital zoom.
• Object temperature range (high sensitivity):	-20°C to +150°C
• Object temperature range (low sensitivity):	0°C to +650°C
• Operating temperature range:	-20°C to 260°C (limited exposure)
• Battery type/voltage/capacity	Li-ion/3.6V/4.4Ah
• Battery operating time:	4 hours at +25°C (typical use)
• Charging time:	2 hours to 85%
• Power management:	Automatic shutdown and sleep mode.
• Start-up time from sleep mode:	< 4 seconds
• Start-up time:	< 17 seconds
• Lanyard breaking strain:	36 kg
• Lanyard retraction/pull force:	1.6 kg

3 Safety precautions

3.1 Only to be used by personnel familiar with the usage and limitations of a thermal imaging camera, including a general understanding of thermal images and how they are interpreted.

3.2 Appropriate PPE appertaining to the type of incident must be worn when operating this equipment.

3.3 Standard operational procedures/techniques apply when operating this equipment.

3.4 Always perform a visual check on the equipment prior to use.

3.5 Users should be conscious of the battery life. Only enter a hazardous environment when a full battery charge is indicated on the battery charge indicator.

3.6 Failure to exit a hostile environment immediately on observation of the low battery warning may result in system failure.

3.7 The TIC will not provide images through glass, water, or shiny objects. These surfaces act like reflective mirrors to the system.

3.8 The thermal imaging camera will not provide thermal images underwater.

3.9 Do not disconnect the battery without undertaking the power off procedure.

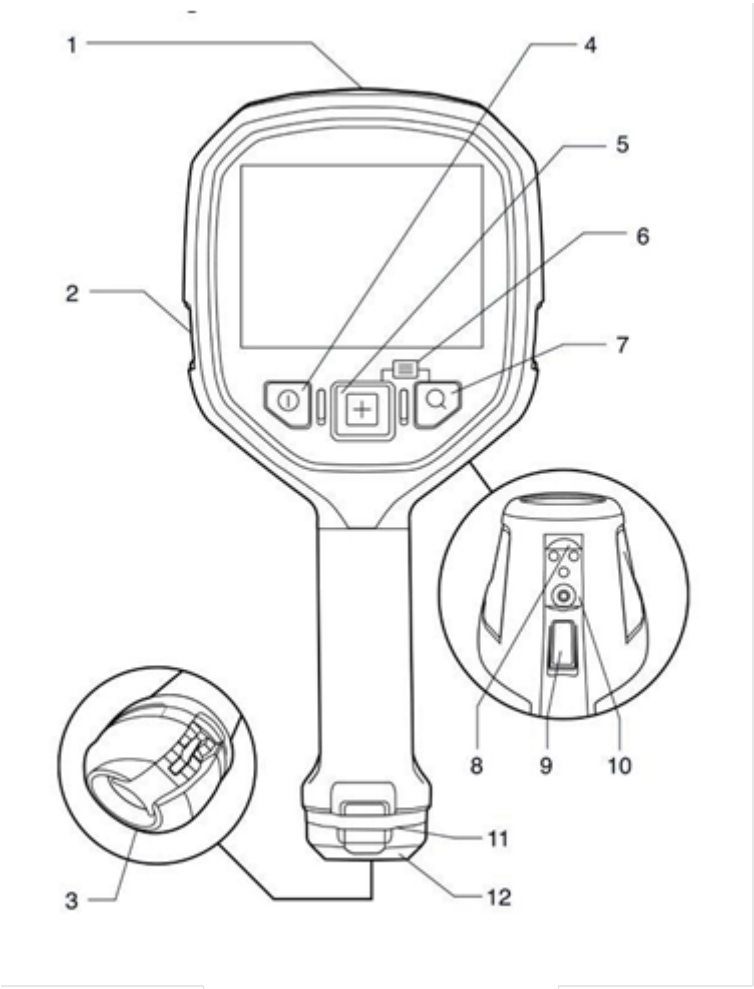
3.10 The TIC and spare battery must be properly secured in the appliance charger when stowed.

3.11 Do not cover the charger or expose the unit and/or power adapter to rain or moisture.

3.12 Be aware that the karabiner for the lanyard may still be hot after exiting a fire, therefore the karabiner should be removed with a gloved hand.

4 Operating instructions

4.1 System parts



LFB Image id:1518377

1 USB Mini-B connector

2 Attachment point

3 Eccentric latch

4 On/off button

5 Mode button ----------

6 Access to setup menus and stored images ---------- 5 and 7 together = Main menu

7 Zoom button ----------

8 Connector for appliance charger

9 Trigger

10 Mount for tripod (not available)

11 Attachment point for retractable lanyard

12 Battery

LFB Image id:1583510

4.2 Screen elements

1 **Basic mode** - A multipurpose mode for the initial fire attack with life-saving operations and control of the fire.

2 **Search and rescue mode -** Optimized for maintaining high contrast in the infrared image while searching for people.

3 **Heat detection mode** - Optimized for searching hotspots during overhaul after the fire is out.

4 **Low-sensitivity mode indicator** - The indicator is displayed when the camera identifies a hot area and automatically switches to low-sensitivity mode in Basic mode.

5 **Overheating indicator** - The indicator provides a visual warning to the user that the thermal imager is about to shut down due to internal overheating.

6 **Change in the colour reference indicator symbol** - When a new mode is selected, a change in the colour temperature reference triangle appears above the reference bar. The triangle remains visible for 1 second.

7 Reference bar.

8 Temperature bar.

9 Spotmeter temperature.

10 Battery condition indicator.

11 Spotmeter.

LFB Image id:1518402

12 Plus, sign (+), indicating that the camera is not in Basic mode.

Notes:

(a) The green icon colour indicates that the camera automatically switches between the high-sensitivity range and the low-sensitivity range, depending on the object.

(b) The blue icon colour indicates that the temperature range is locked.

(c) Working in camera modes other than Basic mode may require additional training.

4.3 Battery condition indicator

Auto range	High sensitivity range	Explanation
		75% power.
		50% power.
		25% power.
		Flashing indicator. At least 5 minutes of available power remains.

4.4 Settings menu icons

Icon	Explanation
	Temperature unit settings.
	Temperature indication settings.
	Date settings.
	Time settings.
	Factory default settings.

4.5 **Removing the battery**

- Pull the eccentric latch

LFB Image id:1518395

- Pull out the battery from the battery compartment

LFB Image id:1518396

4.6 **Turning on and turning off the camera**

- Push the on/off button to turn on the camera.
- Push and hold the on/off button for more than 3 seconds but less than 10 seconds to put the camera into standby mode. The camera then automatically turns off after 6 hours.
- Push and hold the on/off button for more than 10 seconds to turn off the camera.

4.7 **Selecting camera modes**

Note: The camera in LFB service is set up with three modes available:

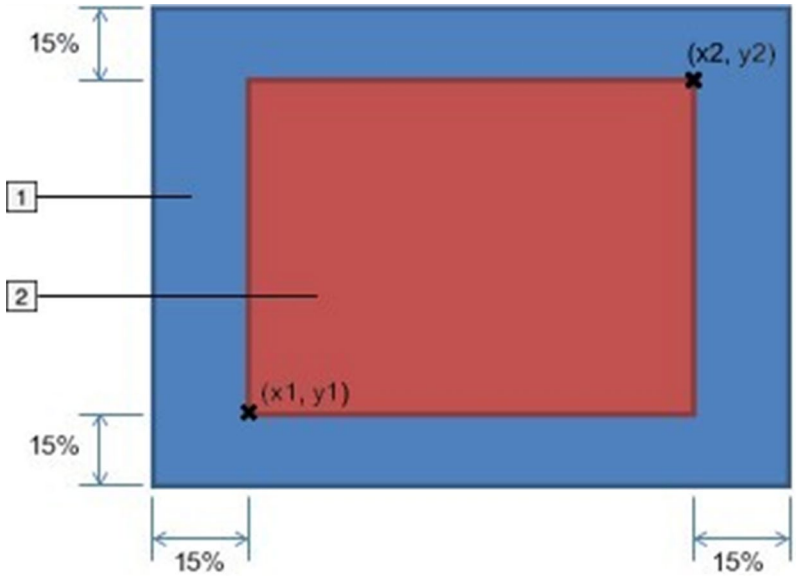
- Basic mode.
- Search and rescue mode.
- Heat detection mode.

4.8 Each mode is optimised for a certain type of firefighting application. In addition, the modes differ in the following way.

4.9 **Modes with green icons (basic mode):** The camera switches between the high-sensitivity range (-20 to +150°C) and the low sensitivity range (0 to +650°C) automatically when objects with a temperature above 150°C enter the field of view of the camera.

4.10 **Modes with blue icons (search and rescue mode and heat detection mode):** The temperature range is locked to the high-sensitivity range (-20 to 150°C). This is useful if you need to maintain the best possible image for objects with a temperature below 150°C, even if they are objects with a temperature above 150°C in the field of view of the camera.

4.11 **The automatic temperature range selection** is based on a measured area defined by a rectangle covering (x1, y1) = (15% of the width, 15% of the height) to (x2, y2) = (85% of the width, 85% of the height) of the LCD area. (See below).



LFB Image id:1518397

4.12 Explanation:

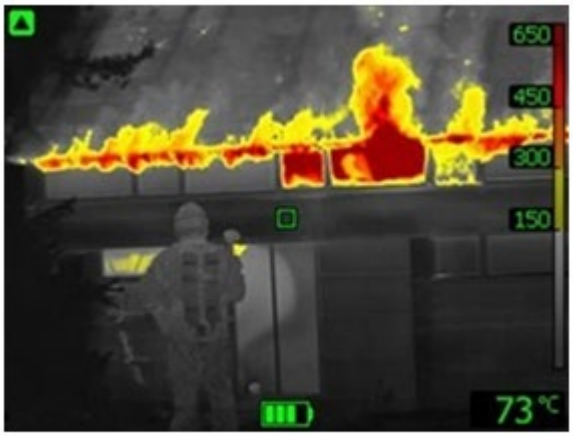
1. LCD area.
2. Area activating the automatic range change.

4.13 An automatic change from high-sensitivity range to the low-sensitivity range occurs if more than 2% of the pixels within the measured area constantly (for more than 1 second) have a temperature above the maximum temperature of the high sensitivity range.

4.14 An automatic change from low-sensitivity to high sensitivity range occurs if more than 98% of the pixels within the measured area constantly have, for more than 1 second, a temperature lower than 50°C below the maximum temperature of the high-sensitivity range.

4.15 **Explanation of the different camera modes**

Basic mode



LFB Image id:1518398

4.16 **Basic mode** is the default mode of the camera.

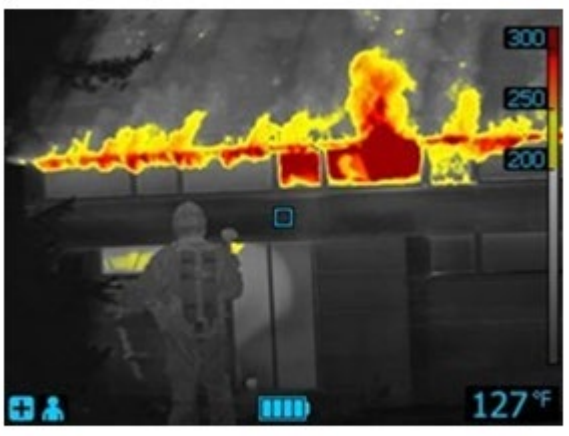
4.17 It is a multipurpose mode for the initial fire attack with lifesaving operations and control of the fire.

4.18 The camera automatically switches between the high-sensitivity range and the low-sensitivity range, to maintain an optimal infrared image while at the same time maintaining a safe and consistent heat colourisation of the fire scene.

- Automatic range.
- Colourisation of heat: +150 to +650°C.
- High-sensitivity range: -20 to +150°C.
- Low-sensitivity range: 0 to +650°C.

Note: To go to Basic mode from any other mode, push and hold the on/off button for less than 1 second.

Search and rescue mode

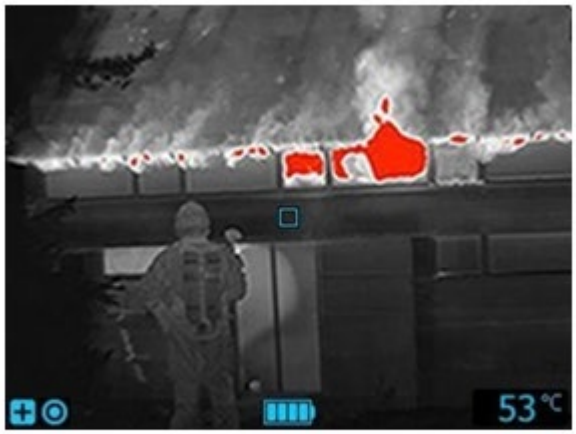


LFB Image id:1518401

4.19 **Search and rescue mode** is optimized for maintaining high contrast in the infrared image while searching for people in landscapes, buildings, or traffic accident scenes. (**Note**: the image above is showing Fahrenheit (°F) but LFB version will be shown in Centigrade (°C)).

- High-sensitivity range only.
- Colourisation of heat: +100 to +150°C.
- High-sensitivity range: -20 to 150°C.

Heat detection mode



LFB Image id: 1518402

4.20 **Heat detection mode** is optimized for searching hotspots during turning over after the fire is out, typically to ensure that there is no remaining hidden fire.

4.21 This mode can also be used to find thermal patterns (e.g., signs of people in car seats after accidents), to ensure that everyone has been found.

4.22 This mode can also be used to search for people in water and open landscapes.

- High-sensitivity range only.
- Colourisation of heat: The 20% highest temperatures in the scene.
- High-sensitivity range: -20 to 150°C.

Continuous video recording

4.23 The camera is configured for continuous recording once the camera is turned on. The recording cannot be stopped.

4.24 Nothing will happen when you press the trigger.

Viewing saved video clips

4.25 When you save a video clip, it is stored in the camera's archive. To view the video clip, you can recall it from the archive as follows:

Main menu

4.26 Push the Mode and Zoom buttons at the same time. This displays the main menu.

LFB Image id:1588987

4.27 Select  by pushing the Mode button. This displays the screen below. Video clips are indicated by a filmstrip icon.

LFB Image id:1518415

4.28 Do the following:

- To navigate to the next item in the archive, select  by pushing the Mode button.
- To navigate to the previous item in the archive, pull the trigger.

4.29 Do the following:

- To start viewing the video clip, select  by pushing and holding the Zoom button.
- To stop viewing the video clip, release the Zoom button.

4.30 To exit the archive, select  by pushing the on/off button.

4.31 **Changing settings (in the camera)**

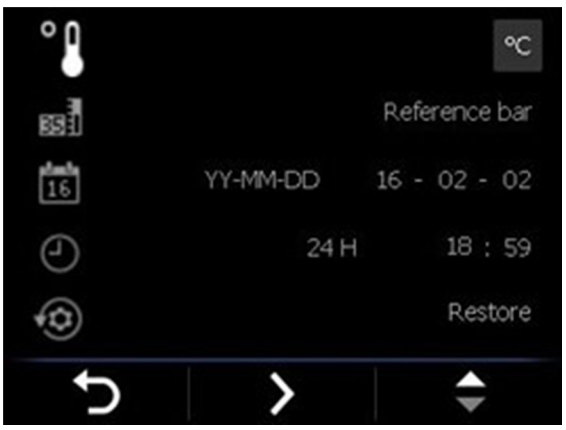
4.32 You can change a variety of settings. These settings include the following:

- Temperature unit. **This is set to Celsius and must not be altered.**
- Temperature indication.
- Date: Check date is correct.
- Time: Check time is correct. **This is set to 24 hours and must not be altered.**
- Factory default settings: **DO NOT USE UNDER ANY CIRCUMSTANCES.**

4.33 Push the Mode and Zoom buttons at the same time. This displays the main menu.

LFB Image id:1588987

4.34 Select by pushing the Zoom button. This displays the settings menu.



LFB Image id:1518417

4.35 Select  by pushing the Mode button to navigate to the parameter that you want to change.

4.36 Select  by pushing the Zoom button to change the value.

4.37 Select  by pushing the on/off button to confirm the choice and exit the dialogue box.

5 Maintenance and testing

5.1 **Inspection frequency**

- On acceptance.
- After use.
- Monthly (swap batteries)
- Annually by the vehicle and equipment (V&E) contractor.

5.2 **Additionally, the TIC is to be switched on** (to check that the TIC is fully charged and operationally ready):

- Before use.
- At change of watch.

5.3 On turning on the TIC, the LFB logo should be displayed (as shown below). Check the date is correct in the top right-hand corner and the image following start up displays the correct settings as described above.

LFB Image id:1572865

5.4 The appliance charger works off the main vehicle power supply when the engine is running and when the vehicle is plugged into the shoreline. It is important that the shore lead is plugged into the vehicle when the appliance is in the station.

5.5 Upon inserting the TIC/battery into the charger, a short delay may occur prior to the initiation of the charging sequence. The charger will charge both the battery in the TIC and the spare battery at the same time.

LFB Image id:1518421

5.6 **Charging the camera with battery fitted**

(a) Pull up the top cover of the in-truck charger.

(b) Push the camera into position.

(c) Push down the top cover.

(d) The charging of the camera has now started and is finished when the blue light glows continuously.

(e) Charging a fully depleted camera takes approximately 4 hours.

5.7 **Charging the battery separately**

(a) The spare charging port is located on the lower front of the appliance charger.

(b) Pull the eccentric latch on the bottom of the camera.

(c) Push the spare battery into the slot.

(d) Secure the battery using the eccentric latch on the charger.

(e) The charging of the battery has now started and is finished when the blue light glows continuously.

(f) Charging a fully depleted battery takes approximately 4 hours.

5.8 **Charging the battery (desktop charger)**

Note: Charge the battery for 4 hours before starting the camera for the first time, or until the blue battery condition LED glows continuously.

(a) Put the battery in the charger.

(b) Connect the power supply cable to the battery charger.

(c) Connect the power supply cable plug to the mains electric socket.

(d) Disconnect the power supply cable when the blue battery condition LED glows continuously.

5.9 **Cleaning the camera**

(a) After use the TIC should always be cleaned.

Note: When handling contaminated equipment, personnel should follow the guidance in Policy number 1000 – Fire contaminants.

(b) Nitrile gloves (POMS V2481/2/3) should be worn when cleaning and maintaining this equipment.

(c) The TIC should initially be cleaned at the scene using Ultragrime wipes (POMS number: V1949).

(d) This is best carried out using warm soapy water and a cloth (keep the battery inserted whilst cleaning).

(e) Soak the cloth in the liquid and twist to remove excess liquid.

(f) Clean with the cloth.

(g) The TIC must be dried thoroughly before being re-stowed.

(h) Ensure all battery contacts of the TIC and the batteries are clean and free from debris as this may prevent electrical connection.

(i) **Caution:** Do not apply solvents or similar liquids.

5.10 **Cleaning the lens**

(a) Clean with Ultragrime wipes (POMS number: V1949).

(b) Clean the lens one time only and discard the wipe.

(c) **Caution:** Be careful when you clean the infrared lens. The lens has a delicate anti-reflective coating.

(d) **Caution:** Do not clean the lens too vigorously, as this can damage the anti-reflective coating.

5.11 **Maintenance**

(a) Clean the camera as described above.

(b) Charge the battery as described above.

(c) Inspect the lens for scratches.

(d) Inspect the screen for scratches.

(e) Inspect the camera body for damage.

(f) Verify the function of all buttons.

(g) Inspect the attachment point for the retractable lanyard (see right).

(h) Check the condition and functionality of the retractable lanyard, ensuring it operates as designed (extends to its full length and retracts fully.

(i) Check the condition of both karabiners, ensuring they operate correctly. Check functionality of the locking device on the lockable karabiner.

LFB Image id:1588989

(j) No routine maintenance is required for the TIC; however, it will be inspected annually by the V&E service provider.

5.12 Tests and inspections should be recorded on appropriate standard test card (it is not necessary to record 'before use' and 'at change of watch' inspections on the standard test card).

6 Defects

6.1 **If the TIC will not turn on:** ensure the battery is inserted correctly and is fully charged.

6.2 **If the TIC switches off by itself:** replace/charge the battery.

6.3 **If the battery will not charge:** clean the battery charging contacts with a dry cloth.

6.4 **If the image appears blurred or will not focus:** ensure the lens window is clean.

6.5 If any of the above fail to rectify the fault, the TIC should be reported as defective.

6.6 The FLIR K55 thermal imaging camera and its component parts are Category B items under the V&E contract.

6.7 Defects should be reported via POMS. Component parts with part numbers as follows:

- Thermal imaging camera FLIR K55 (without battery) S8582
- Thermal imaging camera FLIR K55 rechargeable battery S8583
- Thermal imaging camera FLIR K55 retractable lanyard (complete) S8584
- Thermal imaging camera FLIR K55 retractable lanyard karabiner locking S8585
- Thermal imaging camera FLIR K55 retractable lanyard karabiner non-locking S8586
- Thermal imaging camera FLIR K55 desktop charger S8587
  (Complete with mains adaptor with lead) Training, FIT, DIM, only.

6.8 Where possible the TIC should be cleaned and dried prior to being returned for repair.

6.9 If the TIC is defective the battery should be removed before being sent away.

6.10 The TIC and battery should be treated as separate items. If a TIC and a battery are required (i.e., lost or stolen) they should both be ordered as separate items.

6.11 If the TIC appliance charger becomes defective, this should be sent up as a Code 2 vehicle defect to the V&E contractor and a TLG1 started.

7 Associated material

7.1 To be read in conjunction with the following material where necessary:

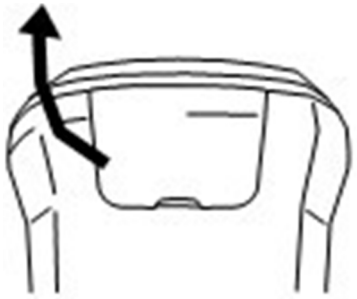
- Policy number 0215 – Gathering, recording and presenting information for legal proceedings
- Policy number 0301 – Capturing and managing images on behalf of the brigade
- Policy number 0540 – Manual handling operations procedure
- Policy number 0598 – Provision and use of work equipment
- Policy number 0707 – The control of infection and infectious diseases
- Policy number 0724 – Appliance inventories and operational readiness
- Policy number 0985 – Operational safety management – knowledge skills and competence – NOG
- Policy number 1000 – Fire contaminants

Appendix 1 - Connecting the camera to a computer (for FIT and SAI purposes)

You can connect the camera to a computer using the USB cable. Once connected you can move the images from the camera's archive to the computer.

Procedure

1 Fold up the rubber cover at the top of the camera.



LFB Image id:1518406

2 Hold the metal ring firmly.

LFB Image id:1518407

3 Rotate the ring about 90° anti-clockwise.

LFB Image id:1518409

4 Pull out the plastic insert.

(Caution, the plastic insert has an O-ring seal. Do not damage the O-ring seal).

LFB Image id:1518410

5 Connect the USB cable to the USB Mini-B connector in the connector bay.

LFB Image id:1518411

6 Do one of the following:

- Move the images to the computer using a drag and drop operation in Microsoft Windows Explorer.
  Note: Moving an image using a drag and drop operation does not delete the image in the camera.
- Move the images to the computer using FLIR tools (workshops only).

Notes:

- For further instruction on continuity and handling of images refer to Policy number 0301 - Capturing and managing images on behalf of the Brigade.
- To download and view footage from the TIC, a PC with security permission to use a USB connection is required. This can be set up through ITC Security Section.
- Contact Photographic Section (photosandvidoes@london-fire.gov.uk) to request download or capture of stills from video if required.
- Or for downloads out of office hours contact FIT at Dowgate.

Document history

Assessments

An equality, sustainability or health, safety and welfare impact assessment and/or a risk assessment was last completed on:

EIA	20/03/22	SDIA	29/03/23	HSWIA	29/03/23	RA	

Audit trail

Listed below is a brief audit trail, detailing amendments made to this policy/procedure.

Page/para nos.	Brief description of change	Date

Subject list

You can find this policy under the following subjects.

Freedom of Information Act exemptions

This policy/procedure has been securely marked due to:

Considered by: (responsible work team)	**FOIA exemption**	**Security marking classification**