Glider Canopy Flasher

Installation Manual and Operating Instructions

Installation • Configuration • Flight Operation • Safety • Maintenance

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Contents and document control

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Safety wording

WARNING identifies a risk that may cause injury. CAUTION identifies a risk of equipment or installation damage. NOTE provides information that helps complete the task correctly.

1 Safety and intended use

Read this section before installation, testing or operation.

WARNING	The flasher produces intense pulsed light. Direct viewing at close range can cause glare, temporary flash blindness, after-images and disorientation, and may present a risk of eye injury. Never stare into the illuminated unit or direct it at a person's eyes.

1.1 Intended use

The Glider Canopy Flasher is a supplementary visual-conspicuity aid for gliders and sailplanes. It is intended for installation inside the forward canopy and for operation in daylight/VFR conditions. It does not guarantee detection by another aircraft.

1. Maintain an effective visual lookout and normal collision-avoidance procedures at all times.
2. Do not use the system as a substitute for FLARM, radio procedures, transponder equipment, airspace awareness or pilot judgement.
3. Do not operate outside the 12-28 V DC supply range or with damaged wiring, loose mounting, moisture ingress or evidence of overheating.

1.2 Installation responsibility

The owner and installer are responsible for confirming that the installation is permitted for the particular aircraft and operation, for applying the current aircraft maintenance data, and for completing the required installation records. Where applicable, use the current UK CAA or EASA standard-change process for visual awareness lights.

WARNING	The installation must not obstruct the pilot's view, canopy locking or jettison, emergency opening, ventilation controls, flight controls or any safety-critical equipment.

1.3 Connected-equipment safety

Before connection to FLARM or any other aircraft equipment, verify supply voltage, polarity, ground, pin allocation and serial-signal direction against the documentation for both devices. If any detail is uncertain, have the installation checked by a suitably qualified person.

CAUTION	Isolate the aircraft electrical supply before installing, disconnecting or modifying wiring. Use the supplied harnesses; connector shape alone is not evidence of a compatible pin assignment.

2 Product description

The Glider Canopy Flasher combines a six-LED canopy unit with a separate control box. Two independent LED-driver channels provide functional redundancy. The control box can use FLARM data to select configured patterns for normal operation and collision-warning levels.

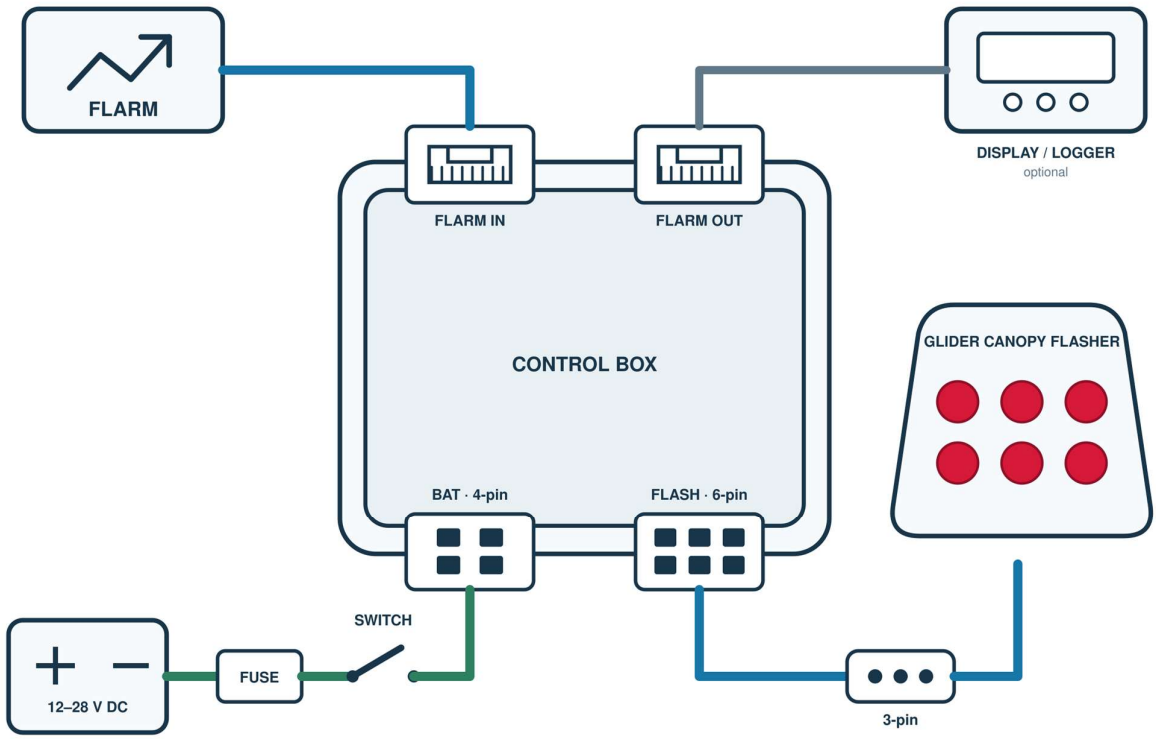


Figure 1 - System architecture. The display/logger connection and magnetic canopy connector are optional.

2.1 Main functions

4. 22 predefined flash patterns plus 4 user-programmable patterns: 26 selectable patterns in total.
5. Independent pattern assignment for Normal and FLARM alarm levels 1, 2 and 3.
6. Configurable 30 km/h speed gating, alarm override and 5-second alarm-pattern hold.
7. Wi-Fi configuration without DIP switches or a USB configuration connection.
8. Optional FLARM stream cloning over Bluetooth Classic, Bluetooth Low Energy and UDP.

2.2 Typical scope of delivery

The exact contents depend on the ordered kit. A normal installation set contains:

9. Glider Canopy Flasher, control box, FLARM cable, power cable and control-box-to-flasher cable.
10. Curvature base and TPU gasket appropriate to the selected canopy profile, with 1.1 mm VHB mounting tape.
11. Optional inline magnetic canopy connector where specified for the aircraft installation.

3 Control box connections

Identify sockets from their labels and pin count before inserting any cable.

FLARM side: FLARM IN (left) and FLARM OUT (right), viewed from the socket side.

Power side with logo upright: BAT 4-pin (left) and FLASH 6-pin (right).

3.1 Connector functions

Label	Physical connector	Function
FLARM IN	RJ45 / 8P8C	Input from the FLARM device using a compatible straight-through IGC cable.
FLARM OUT	RJ45 / 8P8C	Optional continuation to a display or logger.
BAT	4-pin	Switched and fused 12-28 V DC aircraft supply.
FLASH	6-pin	Control-box end of the supplied flasher cable.
Flasher end	3-pin	Cable termination at the canopy flasher.

Figure 2 - Canopy flasher body and cable-entry/connector side.

CAUTION	The FLASH connector is 6-pin only at the control-box end. The canopy-flasher end of the cable is 3-pin.

4 Installation

4.1 Electrical connection

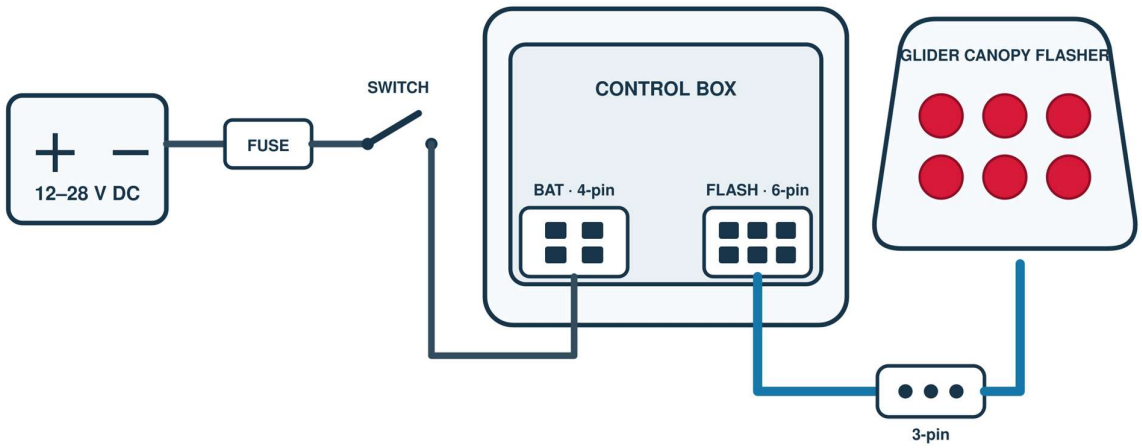


Figure 3 - Basic electrical installation. The aircraft-side fuse and pilot-accessible switch are required.

WARNING	Confirm the aircraft supply is isolated. Verify 12-28 V DC, polarity and ground at the BAT harness before connecting the control box. Incorrect wiring can damage the flasher or other aircraft equipment.

12. Choose a protected supply point and install a dedicated fuse appropriate to the installed cable and aircraft electrical design.
13. Install a clearly identified, pilot-accessible ON/OFF switch in the supply line.
14. Route the power cable away from flight controls, sharp edges, heat sources and RF-sensitive wiring.
15. With the supply still isolated, connect the 4-pin harness to BAT on the control box.
16. Connect the supplied flasher cable to the 6-pin FLASH socket and the 3-pin termination to the canopy flasher.
17. Support the fixed cable runs. Do not restrain a connector that must separate during canopy jettison or emergency opening.
18. Inspect the installation, restore power and proceed to the commissioning checks in Section 6.

NOTE	The control box does not modify the aircraft supply voltage. Use only the specified 12-28 V DC input range.

4.2 Optional magnetic connector and cable routing

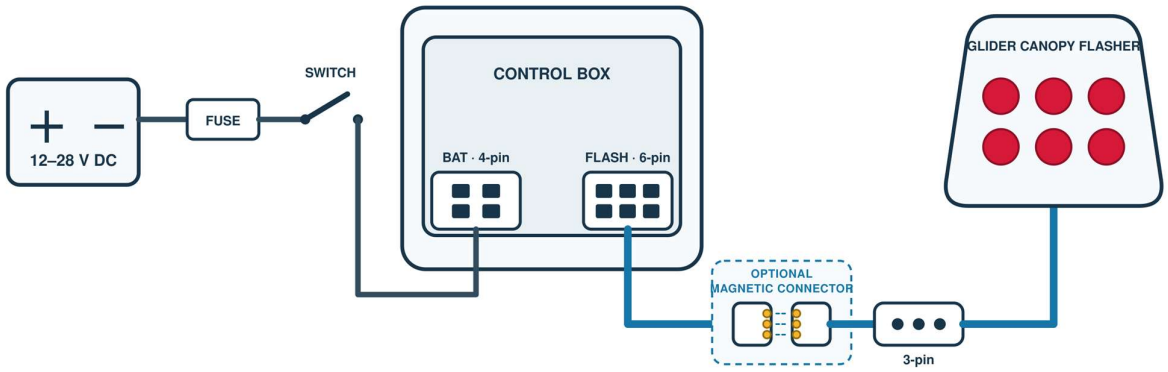


Figure 4 - Optional inline magnetic connector between the FLASH cable and the flasher-side 3-pin connector.

The optional magnetic connector provides an automatic electrical separation point for a removable or side-opening canopy. Its two halves must be aligned so that the contacts meet squarely when the canopy is fully closed and separate freely when it is opened or jettisoned.

Installation requirements

19. Install the connector where it cannot be struck, trapped or side-loaded by normal canopy movement.
20. Arrange the fixed and canopy-side cable so that neither cable pulls on the connector when the canopy is closed.
21. Keep the contact faces clean, dry and free from swarf or conductive debris.
22. Do not tie the two halves together and do not add any restraint that could prevent separation during emergency canopy release.
23. Confirm reliable contact only after the canopy is fully closed and latched.

CAUTION	Switch the flasher OFF before opening or closing the canopy. Repeated powered connection and disconnection can stress the connector and electronics. Switch ON only after normal canopy handling is complete.

Cable protection

Secure cable runs at suitable intervals, allow a gentle service loop at moving points and protect every passage through a panel or frame. The installation must remain clear of canopy hinges, locks, seals, ventilation controls and the pilot's emergency-egress path.

WARNING	Never delay or obstruct emergency canopy opening or jettison in order to protect the cable or connector.

4.3 FLARM connection

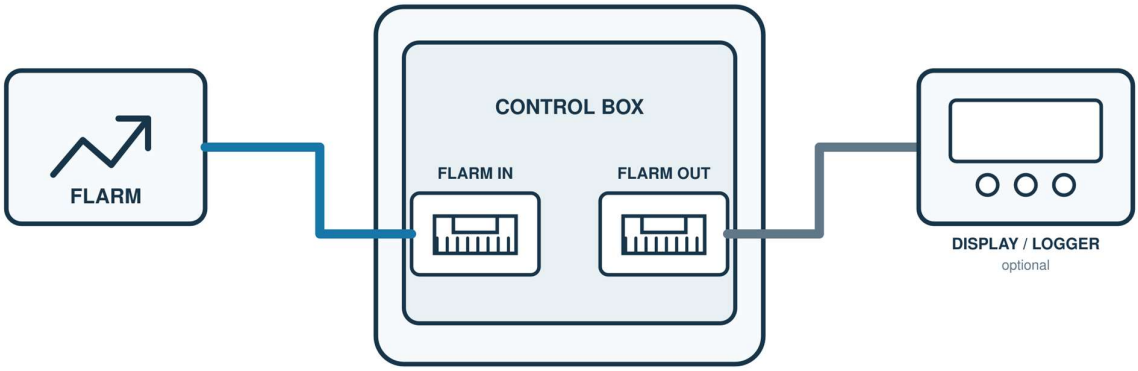


Figure 5 - FLARM connection. A downstream display or logger is optional.

FLARM IN and FLARM OUT provide a straight-through connection for a compatible IGC RJ45 installation. The control box monitors common ground and serial data transmitted by the FLARM device. It does not generate +12 V or +3 V on the FLARM ports.

CAUTION	Use a verified 1:1 IGC cable. Do not assume that every RJ45 cable or every RJ45-equipped device uses the same electrical pin assignment.

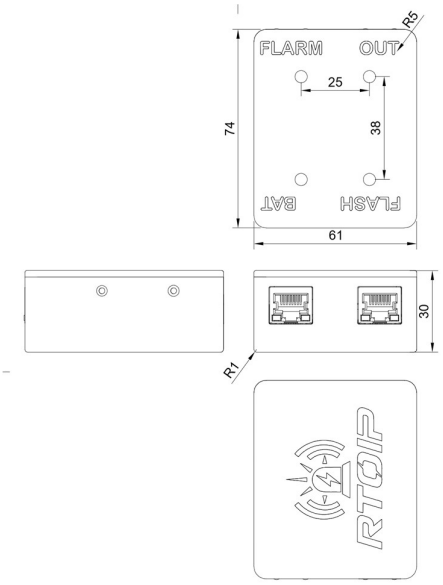
24. Isolate power to the FLARM installation and the Glider Canopy Flasher.
25. Connect the FLARM device to FLARM IN using a verified compatible cable.
26. If required, connect the existing display or logger to FLARM OUT.
27. Restore power and set the same serial baud rate in FLARM and the control box.
28. Confirm that the display/logger still receives normal data and that the control box reports valid FLARM data.

Serial setting	19200	38400	57600	115200
Use	Default	Supported	Supported	Supported

WARNING	After connection, verify normal operation of FLARM and every device connected to FLARM OUT. If any connected equipment behaves abnormally, switch the flasher off and have the wiring inspected.

4.4 Mechanical installation

Canopy flasher assembly.



Control box outline: 74 × 61 × 30 mm.

Select the location and curvature base

Install the flasher inside the forward canopy, as far forward as practical while preserving the pilot's view and clearance to the ventilation flap, canopy frame, seals and locking mechanism. The light output must face forward along the aircraft centreline.

29. Print the curvature template at 100% scale and verify the printed scale before use.
30. Bond the template to thin card, cut it accurately and compare the available 0, +1, +2, +3 and +4 mm curvature options with the canopy.
31. Choose the base whose two sides contact the canopy. A small central gap at the top, not exceeding approximately 0.5 mm, can be accommodated by the 1.1 mm VHB tape.
32. Mark the aircraft centreline and check the intended position from inside and outside the canopy.
33. Clean the bonding area only with a method approved by the glider/canopy manufacturer. Do not use an unapproved solvent on acrylic glazing.
34. Apply the VHB pad without touching the adhesive. Present the unit once, align it accurately, then press evenly over the full bonding area.
35. Allow the adhesive to develop strength for the period specified by the tape manufacturer before applying cable load or flight loads.
36. Mount the control box to a rigid protected surface and route all cables as described in Sections 4.1-4.3.

WARNING	Do not drill, abrade, heat or chemically clean the canopy unless the aircraft manufacturer's approved data explicitly permits the process.

5 Configuration

Carry out configuration only on the ground with the aircraft secured.

5.1 Connect to the setup interface

37. Close the canopy or otherwise complete the flasher connection, then switch the unit on.
38. On a phone, tablet or computer, open Wi-Fi settings and select RTOIP-<serial number>.
39. Accept the warning that the network may not provide internet access. Open the captive portal when prompted.
40. If the setup page does not appear automatically, use the current configuration address stated on the product support page.
41. Complete the settings, select Save, confirm the acknowledgement and switch the unit off before any further canopy work.

NOTE	The configuration access point normally switches off automatically after the configured interval; the default is 120 seconds. Power-cycle the unit on the ground to make it available again.

5.2 Principal settings

Setting	Purpose
Patterns	Select from 22 predefined and 4 user-programmable patterns.
Assignments	Assign any pattern to Normal and FLARM alarm levels 1, 2 and 3.
Speed gate	Default 30 km/h. FLARM alarm data can override the normal gate.
Alarm hold	Default 5 seconds before returning from the alarm pattern.
Power / ECO	Choose the required output profile and review estimated consumption/duty cycle.
FLARM clone	Enable the required BLE, Bluetooth SPP or UDP output only.
Wi-Fi timeout	Choose the access-point auto-off interval; 0 keeps Wi-Fi on.

CAUTION	A duty cycle above 20% produces a persistent warning and requires explicit acceptance. Confirm that the selected pattern is suitable for the installation, electrical load and intended operation.

6 Commissioning and functional test

WARNING	Clear all people from the forward beam and reflective surfaces before testing. Verify operation from an off-axis position; never look directly into the LEDs.

6.1 Inspection before power-up

42. Installation approval and aircraft records completed or prepared for completion.
43. Flasher and control box secure; VHB bond, base and gasket fully seated.
44. No obstruction to controls, ventilation, canopy locking, jettison or emergency egress.
45. Cable runs protected, supported and free from tension, chafing or trapped sections.
46. Magnetic connector, if installed, aligns squarely and separates freely.
47. BAT supply verified at 12-28 V DC with correct polarity and a suitable fuse/switch.
48. FLARM cables and serial baud rate verified; downstream equipment operates normally.

6.2 Functional test

49. Close and latch the canopy. Confirm that no further canopy handling is required.
50. Switch the Glider Canopy Flasher on.
51. Connect to the setup interface and confirm that the expected unit and configuration are shown.
52. Select the required pattern and start Test. The test runs for 10 seconds and then automatically reverts.
53. Observe indirectly that all six LEDs flash and that the selected pattern is correct.
54. Where FLARM is connected, confirm valid data, correct alarm assignments and normal operation of FLARM OUT equipment.
55. Switch the flasher off before opening the canopy.

CAUTION	Stop the test and switch off immediately if there is continuous illumination, unexpected heating, smell, smoke, arcing, intermittent operation or interference with any aircraft equipment.

6.3 Handover

Record the installed configuration, serial number, software version, fuse information, connection method and any aircraft-specific operating limitation. Insert the separate operating-and-safety pages into the glider's flight manual or pilot operating handbook and brief every pilot.

7 Operation

Once switched on, the system normally requires no pilot input in flight.

7.1 Before take-off

56. Complete boarding, checks and all normal opening and closing of the canopy.
57. Close and secure the canopy. When no further routine opening is expected, switch the Glider Canopy Flasher on just before take-off.
58. Verify normal operation indirectly and confirm that FLARM, radio and instruments remain normal.

CAUTION	Do not leave the flasher powered while repeatedly opening and closing the canopy. If the canopy must be reopened, switch the flasher OFF first; close and secure the canopy again before switching ON.

7.2 In flight

No routine pilot action is required. The configured Normal pattern is used during ordinary operation; supported FLARM alarm data can select the assigned Level 1, 2 or 3 pattern. After the configured hold period, the unit returns automatically. Loss of valid FLARM data returns the system to the Normal assignment.

59. Do not configure the system, start a test or connect a phone while airborne.
60. Do not repeatedly switch the system off and on in flight.
61. Continue normal lookout, navigation, radio and collision-avoidance procedures.

7.3 After landing

62. At the first appropriate safe opportunity, switch the flasher off before opening the canopy.
63. Open the canopy only after the unit is off, except where immediate opening is required for safety or emergency egress.
64. Record and report any abnormal operation, interference, damaged mounting or intermittent connection.

WARNING	Aircraft control and emergency action always take priority. Never delay opening or jettisoning the canopy in an emergency in order to switch the flasher off.

7.4 Ground testing

Carry out configuration and extended testing only on the ground with the aircraft secured and people clear of the beam. Avoid unnecessary repeated tests and allow a warm unit to cool before handling.

8 Abnormal operation and troubleshooting

WARNING If the flasher or any connected equipment does not operate correctly, switch the flasher OFF as soon as this can be done safely. Do not troubleshoot, reconfigure or repeatedly reset the unit in flight.

Condition	Possible cause/check	Required action
No power or no test flash	Switch, fuse, BAT supply, cable seating or canopy connector.	Switch OFF. Verify supply and connectors with the aircraft isolated.
No expected in-flight pattern	FLARM data absent, baud-rate mismatch, speed gate or pattern assignment.	Use ground test/configuration. Do not rely on the unit until corrected.
Unexpected or continuous illumination	Configuration fault, control-line fault or internal fault.	Switch OFF immediately. Do not repeatedly reset.
Intermittent operation	Loose/damaged cable, magnetic-contact alignment, contamination or chafing.	Switch OFF. Inspect and repair before further use.
FLARM/display data lost	Wrong cable, incompatible pin assignment, baud mismatch or damaged connector.	Switch OFF flasher and confirm connected equipment returns to normal.
Wi-Fi setup unavailable	Access-point timeout expired or device connected to another network.	Power-cycle on the ground and reconnect within the configured interval.
Unusual heat, smell, smoke, sparks or tripped protection	Electrical short, damaged wiring or internal failure.	Switch OFF and isolate if safe. Follow aircraft procedures; do not re-energise.

Return to service

A system switched off because of a defect, overheating, electrical smell, interference, damaged wiring, insecure mounting or abnormal illumination must not be returned to service until the cause has been corrected. A competent person must then repeat the applicable inspection and functional test.

NOTE When requesting support, provide the unit serial number, software version, aircraft type, configuration export or screenshots, and a clear description of the fault and circumstances.

9 Maintenance, technical data and support

9.1 Continued airworthiness

The Glider Canopy Flasher contains no user-serviceable parts. Do not open or modify the flasher or control box. Include the following checks in the aircraft's normal inspection programme and repeat them after any canopy work, wiring change or abnormal event:

65. Security and condition of the flasher, curvature base, TPU gasket and VHB bond.
66. Security of the control box and freedom from moisture, deformation or heat damage.
67. Condition and support of all wiring; no chafing, crushing, tension or sharp bends.
68. Cleanliness, alignment and free separation of any magnetic canopy connector.
69. Ground functional test and normal operation of all connected FLARM/display equipment.

9.2 Technical data

Item	Value
Supply voltage	12-28 V DC
Canopy light source	6 high-intensity red LEDs
LED drive	Two independent driver channels
Selectable patterns	22 predefined + 4 user-programmable = 26 total
Control box dimensions	74 × 61 × 30 mm
Mass - canopy flasher	Approximately 150 g
Mass - control box	Approximately 55 g
Control-box interfaces	FLARM IN/OUT, Wi-Fi, BLE, Bluetooth SPP, UDP
Default serial baud rate	19200; also supports 38400, 57600 and 115200
Canopy-unit materials	ASA body, TPU gasket, aluminium heat sink
Mounting system	Curvature base with 1.1 mm VHB tape

9.3 Firmware updates

Perform updates only on the ground, using firmware released for the Glider Canopy Flasher. Keep the aircraft supply stable throughout the update.

70. Download the current firmware file from www.canopy-flasher.com.
71. Switch the unit on, connect to its Wi-Fi setup interface and open Software Update.
72. Select the downloaded file and start the upload. Do not remove power or close the update page while the transfer is in progress.
73. After the unit restarts, reconnect and confirm the reported software version and saved configuration.
74. Repeat the complete ground functional test and verify all equipment connected to FLARM OUT.

9.4 Support

For technical assistance, replacement mounting materials or the latest documentation, contact RTOIP Ltd:

RTOIP Ltd | office@canopy-flasher.com | www.canopy-flasher.com