

# **Tornado-AS Low Light Camera Operator & Installation Manual**

**The electronic version of this document is the controlled copy.  
Therefore all printed versions of this document are uncontrolled.**

**For the latest manual revision always visit – [www.tritech.co.uk](http://www.tritech.co.uk)**

Supplied by

## **COPYRIGHT**

© Tritech International Ltd

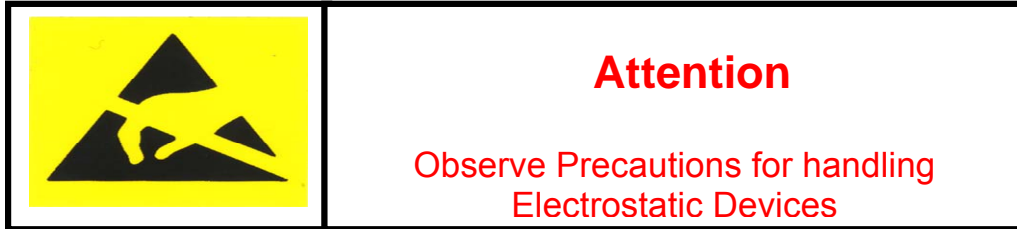
The copyright in this document is the property of Tritech International Limited. The document is supplied by Tritech International Limited on the understanding that it may not be copied, used, or disclosed to others except as authorised in writing by Tritech International Limited.

Tritech International Limited reserved the right to change, modify and update designs and specifications as part of their ongoing product development programme.

## **CONTENTS**

<b>Handling of Electrostatic-Sensitive Devices</b>	<b>5</b>
<b>WARRANTY STATEMENT</b>	<b>6</b>
<b>Safety Statements</b>	<b>7</b>
<b>Technical Support</b>	<b>7</b>
<b>INTRODUCTION</b>	<b>8</b>
Optional features	8
<b>OPERATING CONDITIONS</b>	<b>8</b>
<b>SETTING UP PROCEDURES</b>	<b>9</b>
Long line amplifier (Rev B)	9
<b>DISASSEMBLY PROCEDURES</b>	<b>10</b>
<b>APPENDIX 1 Product Specification</b>	<b>12</b>
<b>APPENDIX 2 Tornado Camera Pin Configuration</b>	<b>13</b>
<b>APPENDIX 3 Circuit Schematics</b>	<b>14</b>

## Handling of Electrostatic-Sensitive Devices



### Caution

## Handling of Electrostatic-Sensitive Devices

**Certain semiconductor devices used in the equipment are liable to damage due to static voltages.**

Observe the following precautions when handling these devices in their unterminated state, or sub-units containing these devices:

- Persons removing sub-units from any equipment using electrostatic sensitive devices must be earthed by a wrist strap via a 1MΩ resistor to a suitable discharge reference point within the equipment.
- Soldering irons used during any repairs must be low voltage types with earthed tips and isolated from the Mains voltage by a double insulated transformer. Care should be taken soldering any point that may have a charge stored.
- Outer clothing worn must be unable to generate static charges.
- Printed Circuit Boards (PCBs) fitted with electrostatic sensitive devices must be stored and transported in appropriate anti-static bags/containers.

F110.0

## **WARRANTY STATEMENT**

**Tritech International Limited** herein after referred to as **TIL**

TIL warrants that at the time of shipment all products shall be free from defects in material and workmanship and suitable for the purpose specified in the product literature.

The unit/system warranty commences immediately from the date of customer acceptance and runs for a period of 365 days. Customer acceptance will always be deemed to have occurred within 72 hours of delivery.

**Note:** Any customer acceptance testing (if applicable) must be performed at either TIL premises or at one of their approved distributors unless mutually agreed in writing prior to despatch.

**Conditions:**

**These include, but are not limited to, the following:**

- 1 The warranty is only deemed to be valid if the equipment was sold through TIL or one of its approved distributors.
- 2 The equipment must have been installed and commissioned in strict accordance with approved technical standards and specifications and for the purpose that the system was designed.
- 3 The warranty is not transferable, except or as applies to Purchaser first then to client.
- 4 TIL must be notified immediately (in writing) of any suspected defect and if advised by TIL, the equipment subject to the defect shall be returned by the customer to TIL, via a suitable mode of transportation and shall be freight paid.
- 5 The warranty does not apply to defects that have been caused by failure to follow the recommended installation or maintenance procedures. Or defects resulting from normal wear & tear, incorrect operation, fire, water ingress, lightning damage or fluctuations in vehicles supply voltages, or from any other circumstances that may arise after delivery that is out with the control of TIL.  
(**Note:** The warranty does not apply in the event where a defect has been caused by isolation incompatibilities.)
- 6 The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.
- 7 The warranty does not cover any direct, indirect, punitive, special consequential damages or any damages whatsoever arising out of or connected with misuse of this product.
- 8 Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by TIL
- 9 The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from TIL.
- 10 TIL retains the sole right to accept or reject any warranty claim.
- 11 Each product is carefully examined and checked before it is shipped. It should therefore be visually and operationally checked as soon as it is received. If it is damaged in anyway, a claim should be filed with the courier and TIL notified of the damage.

**Note: TIL reserve the right to change specifications at any time without notice and without any obligation to incorporate new features in instruments previously sold.**

**Note: If the instrument is not covered by warranty, or if it is determined that the fault is caused by misuse, repair will be billed to the customer, and an estimate submitted for customer approval before the commencement of repairs.**

F167.1

## Safety Statements



**Caution!**

*Throughout the manual certain safety related comments and requirements will be highlighted to the operator by indications identified by the adjacent symbol and text.*





**Danger!**

*Throughout the manual certain safety or operational related comments and requirements that could lead to injury or loss of life will be highlighted by the adjacent symbol and text.*

## Technical Support

Contact your local agent or Tritech International Ltd

	Mail	<b><i>Tritech International Ltd.</i></b> Peregrine Road, Westhill Business Park, Westhill, Aberdeen, AB32 6JL, UK
	Telephone	++44 (0)1224 744111
	Fax	++44 (0)1224 741771
	Email	support@tritech.co.uk
	Web	www.tritech.co.uk

**An out-of-hours emergency number is available by calling the above telephone number**

If you have cause to use our Technical Support service, please ensure that you have the following details at hand **prior** to calling :

- System Serial Number ( if applicable )
- Fault Description
- Any remedial action implemented

Due to the expansion of equipment capabilities and the fact that new sub-modules are continually being introduced, this manual cannot detail every aspect of the operation.

## **INTRODUCTION**

The TORNADO low light level camera incorporated the latest innovations in CCD sensor technology.

Complemented by an auto iris lens the system approaches the performance of a SIT camera at a fraction of the cost. A switch mode power supply board provides all the necessary voltages for the camera module.

The module is controlled internally by RS232 providing full adjustment of all the camera functions. A three stage line driver is available to compensate for cable attenuation of the video signal.

The camera module is protected from damage in the event of accidental misconnection. A water corrected port is fitted to optimise the picture quality. The overall package provides an extremely robust unit for use in harsh environments.

## **Optional features**

Stainless steel Housing 10 000psi  
Customer specified connectors

## **OPERATING CONDITIONS**

The camera is compatible with any video recorders or monitor working with PAL standard.

The camera should not be used out of the limit conditions specified in this manual. For any special requirement please contact TRITECH INTERNATIONAL LTD.

Before attaching the connector to the camera ensure that the O'ring is on position, clean and lightly smeared with silicon grease.



**Caution!**

**The power supply connection is polarised. Please ensure that the correct polarity is used before switching on the unit. Incorrect electrical connections may seriously damage the internal electronics.**



**Caution!**

**The camera is designed for use under water. Water has a cooling effect on the camera which means that it will become hot when operated in air. It is acceptable to run the camera in air for testing or repair purposes, however, unless a considerable heat sink is used, it is not recommended that the camera be left to operate in air for extended periods as the life of the camera may be reduced.**

An internal jumper and a small potentiometer are fitted on the Long Line Driver board to give up to 3 stages of boost to the video signal as required.

## SETTING UP PROCEDURES

### Power supply



**Caution!**

The power supply output is controlled through a potentiometer VR1 fitted on the topside of the PSU/Mother board. It is set at the factory and does not require any further adjustment. If for any reason it becomes necessary to readjust it **CARE must be taken not to feed the camera module with more than 9.5v as an absolute maximum.**

To adjust:

Disconnect the camera module  
Power the PSU board with 30Vdc at J1 pin 3  
Connect an accurate voltmeter to J4 pin 6 & 5  
Set-up VR1 to read between 9v and 9.5v on the voltmeter  
This setting will give you the right voltage level for the camera module under load.

### Long line amplifier (Rev B)

If there is a need to drive a long coaxial cable then the long line amplifier board is required.

First remove the jumper at J6 (Amp Bypass) fitted beside the connector J3 of the PSU board. Fit the long line amplifier driver board (3605) in connector J3 (if not already supplied fitted to the camera). A jumper can now be fitted in one of the three possible positions to set the compensation circuit for the long line amplifier.

Position 1- S1 (pins 5 to 6)\_\_\_\_\_unity gain (standard buffered video output)

Position 2- S2 (pins 3 to 4)\_\_\_\_\_high frequency boost (standard buffered video output with colour boost)

Position 3- S3 (pins 1 to 2)\_\_\_\_\_high frequency and DC boost gain variable using VR1(As with setting S2 but allows manual adjustment of signal amplitude via variable resistor at VR1 upto a maximum of 2Vp-p)

## DISASSEMBLY PROCEDURES

To access the internal part of the camera, first remove the nylon retaining cord from the connector end-cap end of the camera. (It is not necessary to extract the nylon cord fitted between the front part of the housing and the lens-retaining ring.)

Gently pull the connector end-cap from the main body tube; you may require the aid of a vice with “vee” blocks to hold the main body tube.



**Caution!**

**Take care to avoid the pressure ejecting the port too quickly; which could cause the port and module to be dropped and damaged.**



**Caution!**

**Be aware that the camera module and electronics are attached to the connector end-cap and will slide out of the body tube when the camera is parted.**

Before re-assembly inspect the O-ring for integrity, if there are any doubts change it. The O-ring should be cleaned and lightly smeared with appropriate silicon grease.

Reassemble the camera in the reverse order. Make sure to check that the water block O-ring is in position and correctly align the water block with the main connector JP1 before gently pushing into position.



**Caution!**

**Maintenance of water integrity is the responsibility of the user. Internal damage caused by water ingress is not covered by product warranty unless the cause can clearly be identified as a manufacturing defect.**

Lens spacer \_\_\_\_\_

End-cap \_\_\_\_\_

Body Tube \_\_\_\_\_

PSU / Mother board \_\_\_\_\_

Water corrected port \_\_\_\_\_

Camera module \_\_\_\_\_

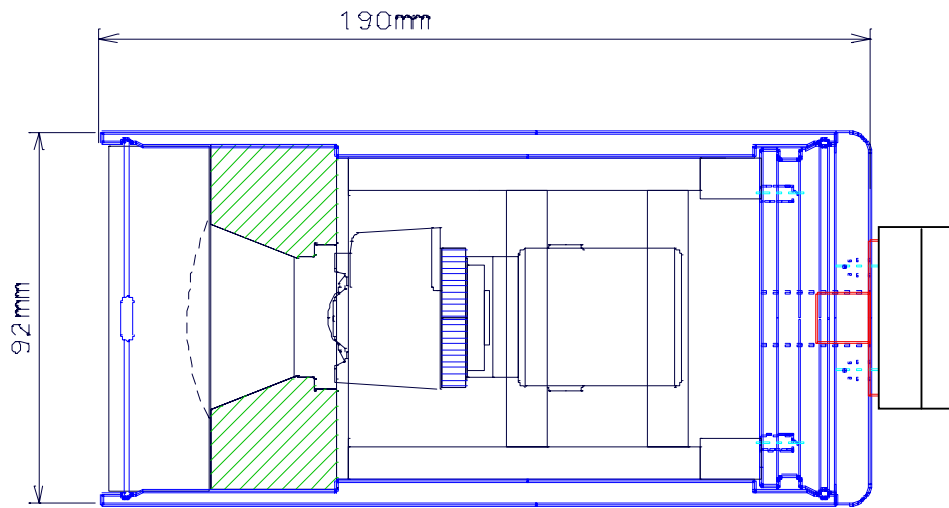
Washer support \_\_\_\_\_

Spacer camera module \_\_\_\_\_

Driver board \_\_\_\_\_

O-ring set \_\_\_\_\_

# ILLUSTRATION TORNADO-AS



# **APPENDIX 1      Product Specification**

## **APPENDIX 2      Tornado Camera Pin Configuration**

## **APPENDIX 3      Circuit Schematics**