Super SeaSpy Camera

Product Manual

0514-SOM-00001, Issue: 02

Tritech

Table of Contents

Help & Support

First please read this manual thoroughly (particularly the Troubleshooting section, if present). If a warranty is applicable, further details can be found in the Warranty Statement, 0080-STF-00139, available upon request.

Tritech International Ltd can be contacted as follows:

	Mail	*Tritech International Ltd* Peregrine Road Westhill Business Park Westhill, Aberdeenshire AB32 6JL, UK
	Telephone	++44(0)1224 744 111
	Email	support@tritech.co.uk
	Website	www.tritech.co.uk

Prior to contacting *Tritech International Ltd* please ensure that the following is available:

1. The Serial Numbers of the product and any *Tritech International Ltd* equipment connected directly or indirectly to it.
2. Software or firmware revision numbers.
3. A clear fault description.
4. Details of any remedial action implemented.

Contamination

If the product has been used in a contaminated or hazardous environment you *must* de-contaminate the product and report any hazards *prior* to returning the unit for repair. *Under no circumstances should a product be returned that is contaminated with radioactive material.*

The name of the organisation which purchased the system is held on record at *Tritech International Ltd* and details of new software or hardware packages will be announced at regular intervals. This manual may not detail every aspect of operation and for the latest revision of the manual please refer to www.tritech.co.uk

Tritech International Ltd can only undertake to provide software support of systems loaded with the software in accordance with the instructions given in this manual. It is the customer's responsibility to ensure the compatibility of any other package they choose to use.

Warning Symbols

Throughout this manual the following symbols may be used where applicable to denote any particular hazards or areas which should be given special attention:

Note

This symbol highlights anything which would be of particular interest to the reader or provides extra information outside of the current topic.

Important

When this is shown there is potential to cause harm to the device due to static discharge. The components should not be handled without appropriate protection to prevent such a discharge occurring.

Caution

This highlights areas where extra care is needed to ensure that certain delicate components are not damaged.

Warning

DANGER OF INJURY TO SELF OR OTHERS

Where this symbol is present there is a serious risk of injury or loss of life. Care should be taken to follow the instructions correctly and also conduct a separate Risk Assessment prior to commencing work.

1. Introduction

The Super SeaSpy underwater video camera is a compact, high resolution, full colour camera with integral low voltage lighting. It is built to survive in the harsh underwater inspection environment and has been designed to be compact, rugged and provide a high quality colour picture.

The camera has an integrated ring of white LEDs providing uniform illumination across the viewing area. A sensor is incorporated into the camera face which provides feedback to control the lighting intensity so optimum picture quality is achieved regardless of the reflectivity of the work surfaces. The light can also be adjusted manually if required. To prevent damage from warm environments the LEDs also incorporate an automatic thermal cut-out.

The Super SeaSpy has an internal focus adjustment which allows the focal range to be factory set at values between 50mm and infinity. The camera power supply provides excellent protection for the efficient operation of the camera module. Fitted with an integral video line driver the Super SeaSpy compensates attenuation of the video signal when used over various umbilical lengths. This line driver is adjustable and is protected against over-voltage.

A water corrected port is fitted to optimise the picture quality. This water corrected view port results in a camera that provides a crisp picture during close proximity viewing in murky water.

Features

- High resolution colour CCD sensor
- Standard depth rating of 4000m
- Highly resistant to shock and vibration
- Wide power supply of 12V to 48V DC
- LED brightness control (manual or auto)
- Wide angle version available

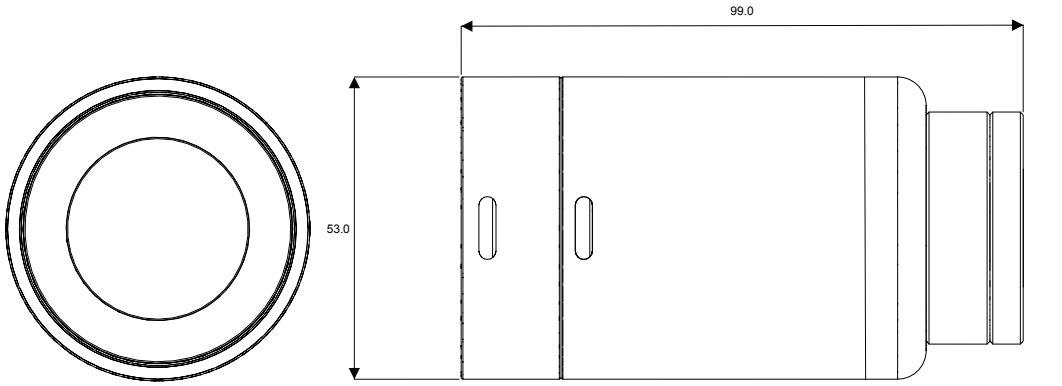
Applications

- ROV inspection work
- ROV tooling package monitoring
- Hazardous environments
- Harbour, river and canal inspection
- Police, customs and emergency services

- On-line industrial machinery inspection
- Restricted access areas

2. Specification

2.1. Super SeaSpy Dimensions



Not to scale, dimensions in mm.

2.2. Optical

	PAL	NTSC
Vertical resolution	550 lines	470 lines
Scanning system	625 lines at 50 Hz	525 lines at 60 Hz
CCD module	1/3" Interline Transfer CCD	
Viewing angle	72° in water (diagonal)	
Focus range	50mm to infinity	
Primary lens	Fixed, 4.2mm (f/2.2) Ivanoff water corrected optics	
Iris control	Auto Iris	
Video output	1V peak to peak composite, 75Ω unbalanced	
Signal to noise ratio	>48dB (AGC off)	
Other features	Auto white balance, back light compensation, gamma correction	

2.3. Illumination

Minimum illuminance	0.5 lux
Illumination	10lux at 1m and 110 lux at 0.3m
Illumination control	Dynamic Light Control, on/off, manual override

2.4. Electrical and Communication

Power requirement	12 to 48V DC (drawing 4.8W at 24V)
Standard connector	Tritech 6-pin connector
Optional connector	Schilling SeaNet

2.5. Physical

Weight in air	0.65kg
Weight in water	0.45kg
Depth rating	4000m
Temperature	-10 to 35°C operating (-20 to 50°C in storage)
Shock	$30g_n$ for 6ms in each axis (operating)
Vibration	Sinusoidal sweep & dwell in each axis from 5 to 150Hz at $10g_n$ (operating)
Materials	Housing: Stainless steel 316 Lens: Water corrected optical acrylic
Diameter	53mm
Body length	82mm
Overall length	99mm (with Tritech connector)

3. Installing the SeaSpy

3.1. General Guidelines

If the camera is to be used as part of an ROV setup then care should be taken during the installation to ensure that any chance of damaging it is kept to a minimum. While it has a very robust housing it should not be mounted in such a manner which results in it protruding excessively from the ROV body. If such a setup is desired a suitable guard should be considered which would keep any chance of severe impact to a minimum.

The camera should be installed using non-metallic clamps so that any effects of galvanic corrosion are kept to a minimum. If metallic clamps are unavoidable they should be insulated from the camera body by means of rubber or plastic strips of at least 3mm in thickness and extending 3mm beyond the clamp boundary. They should also be painted or lacquered with at least three coatings.

3.2. Test Cable Wiring

To connect the camera to a computer for testing or operation it will be necessary to construct an appropriate test cable. The pin-out diagram for units fitted with the Tritech 6 pin standard water block is shown in the specification section, for any other connectors it will be necessary to refer to the documentation that was provided with the camera to establish the correct wiring scheme.

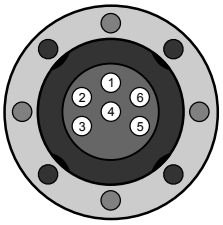
To connect to a computer it will be necessary to provide the camera a minimum of three connections:

1. DC Power

2. DC Ground

3. Connection to a PC video capture card, either external or internal

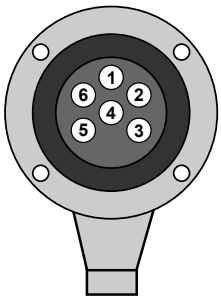
Waterblock Pin-out Diagram



Tritech Waterblock

Pin	Function
1	Lights +/-
2	not connected
3	+DC Power
4	-DC Power
5	Video Out
6	not connected

Cable Pin-out Diagram



Tritech Cable

Pin	Colour
1	Yellow
2	Blue
3	Red
4	Black
5	Green
6	SCREEN

4. Using the SeaSpy

4.1. Operating Conditions

The Super SeaSpy Camera is compatible with any video recorders or monitors working with PAL or NTSC depending on the transmission standard selected at point of sale.

The camera should not be used outside of the limit conditions specified in this manual. For any special requirements please contact *Tritech International Ltd*

Caution

The camera has an internal temperature sensor and circuitry which will protect it from damage due to overheating, however, it is not recommended that the camera be operated out of water for extended periods.

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

Caution

The power supply is polarised. Ensure that the correct polarity is used before switching on the unit. Incorrect polarity may damage the internal electronics.

DO NOT STARE DIRECTLY AT THE LIGHTS

The light emitted form the camera LEDs is extremely concentrated and may damage the eye if shined directly into it so do not stare at the lights when the unit is operational.

4.2. Camera Characteristics

4.2.1. Focus

The Super SeaSpy is a fixed-focus camera and the focal length is factory set. The focus can be adjusted by the user, or by returning the unit to *Tritech International Ltd* for servicing. The length can be specified from 50mm to infinity.

To alter the focus of the Super SeaSpy, carefully open the unit following the instructions detailed in Section 5.2, “Dis-assembly and Re-assembly procedures”.
By rotating the nuts on either side of the camera module (see Section 6.1, “General layout”)the mounting collar will be compressed or released, affecting the focus of the unit accordingly.

4.2.2. Dynamic Light Control (DLC)

Upon initial power up the Super Seaspy camera will start up in Dynamic Light Control (DLC)mode. This means that the ring LED’s will react automatically to any changes in the reflectivity of the work surface or scenery ambient light conditions: - In darker areas the ring LED’s will brighten and the reverse in lighter areas.

Manual control mode of the ring LED’s can be obtained by applying an analogue voltage to the +/- LIGHT line (PIN1 on Tritech connector). See Section 6.3, “Electronic light control” for details on the nature of the voltage signal to be sent.
If you wish to return to DLC mode, after making a manual control input, the camera must be switched OFF for several seconds. Upon switching ON again the camera will revert to DLC mode.

4.2.3. Water Corrected Lens

The Super SeaSpy is fitted with an "Ivanoff Corrected" lens system which effectively compensates for the different refractive index of water vs that of air. This means that the picture quality is optimised through the reduction of radial distortion and chromatic aberration.

5. Maintenance

5.1. General guidelines

After use in a marine environment the unit should be washed down with fresh water in order to remove any salt build up.

Prior to stowing, the camera should be inspected for any signs of damage. If the camera is damaged in any way it may be possible to fix it without replacing the entire unit, contact *Tritech International Ltd* for more details and advice.

5.2. Dis-assembly and Re-assembly procedures

It may be necessary to open the Super SeaSpy in order to inspect the 'O' ring surfaces, adjust the video amplifier, or to adjust the focus of the unit.

Warning
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.

To extract the main electronics of the Super SeaSpy camera perform the following actions:

1. Unscrew the water block and disconnect it carefully
2. Extract the nylon cord fitted between the front part of the housing and the camera body
3. Gently pull off the body, as straight as possible
4. Inspect all exposed 'O' ring surfaces and 'O' rings. If in any doubt change the 'O' ring, clean and lightly smear with silicone grease

Re-assembly of the Super SeaSpy is completed in the reverse order. Ensure that the water block 'O' ring is in position and that the water block is correctly aligned with the main 6-pin DIN connector before pushing it gently back into position.

To disassemble the water corrected port from the housing:

1. Unscrew the water block and remove it
2. Extract the nylon cord maintaining the port in position

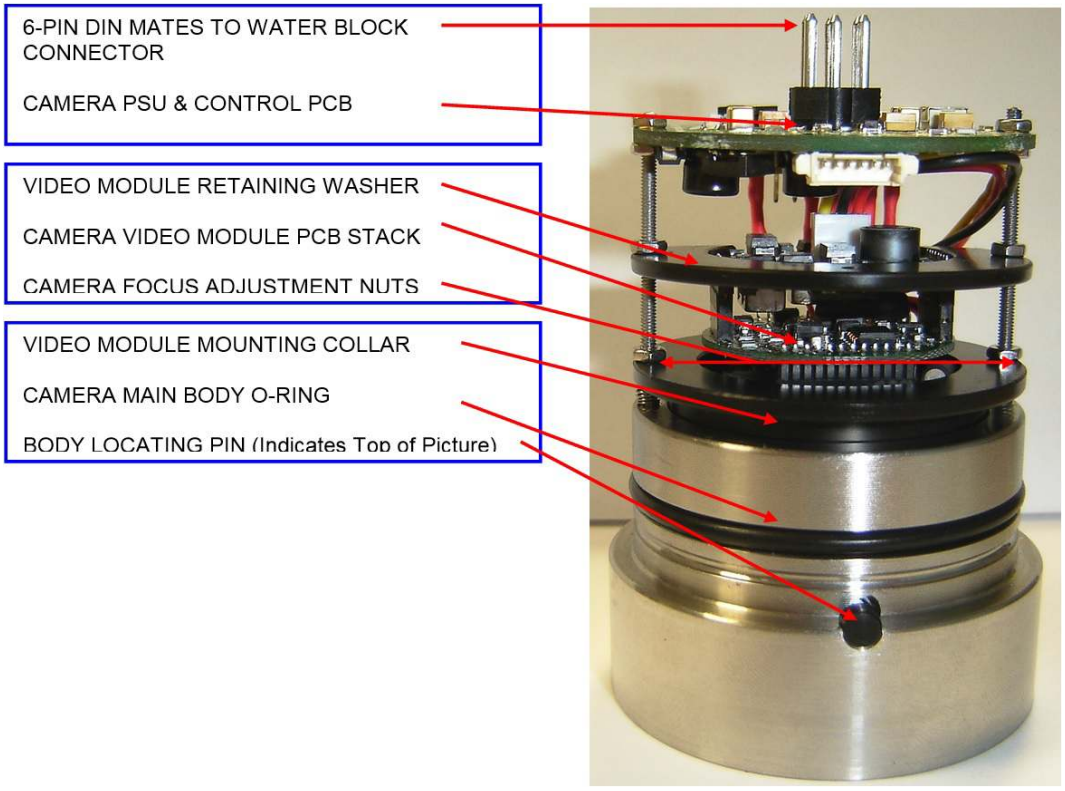
3. Using a large nylon washer to protect the body, inject air inside the body to a pressure of 1 bar max. The acrylic port will be dislodged by this light pressure and removed easily

Caution

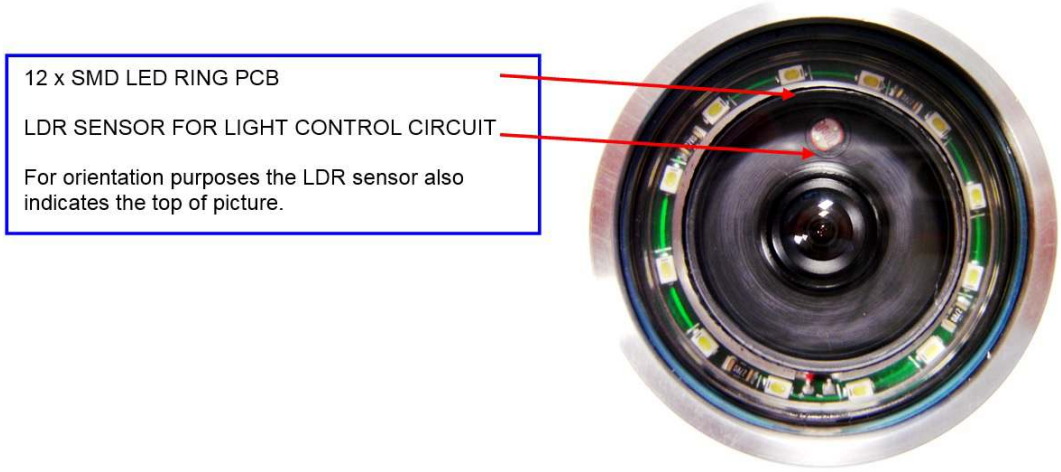
Take care not to over-pressure the body so as to eject the port - and ensure that it is retained during this operation

6. Internal Layout and Configuration

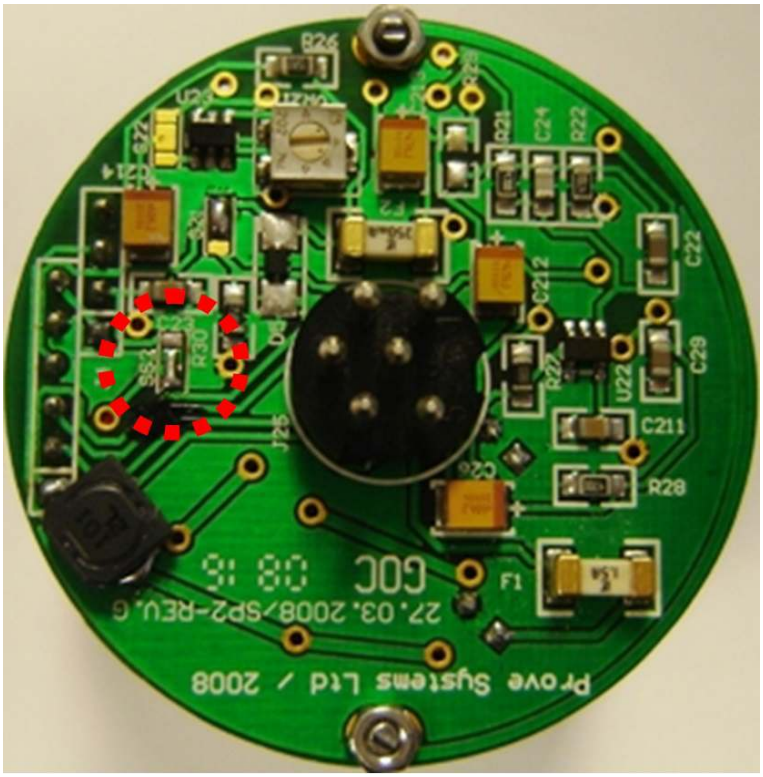
6.1. General layout



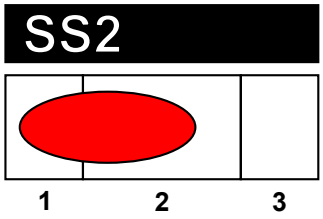
6.2. LED light ring



6.3. Electronic light control

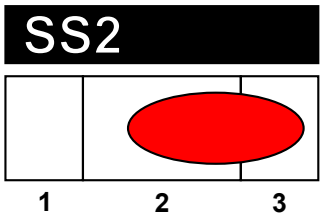


FOR +\- SINGLE WIRE (Bi-polar Control) - DEFAULT SETTING



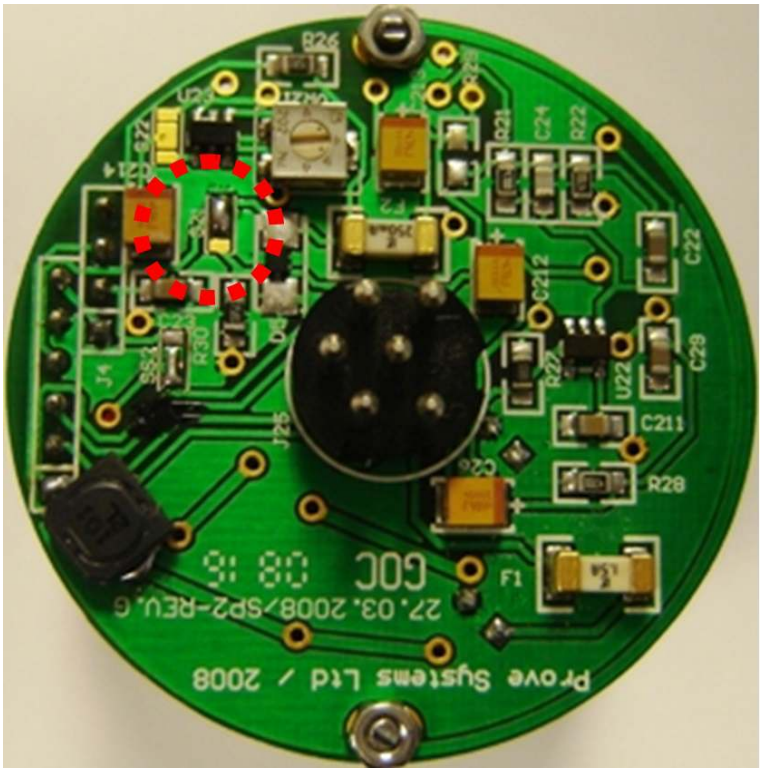
Link solder pads 1 & 2 together
+/- LIGHT is supplied with +5 to +24 volts, LED's Brighten
+/- LIGHT is supplied with -5 to -24 volts, LED's Dim
+/- LIGHT is left un-connected, LED's remain constant

FOR +\- SINGLE WIRE (Tri-State Control)

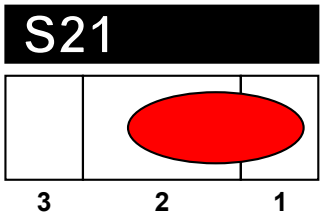


Link solder pads 2 & 3 together
+/- LIGHT is supplied with +5 to +24 volts, LED's Brighten
+/- LIGHT is linked to GND, LED's DIM
+/- LIGHT is left un-connected, LED's remain constant

6.4. Video output



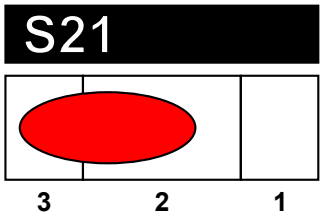
TO ENABLE VIDEO OUTPUT WITHOUT AMPLIFICATION (Default Setting)



Link solder pads 1 & 2 together

- Amplification & video filter are OFF

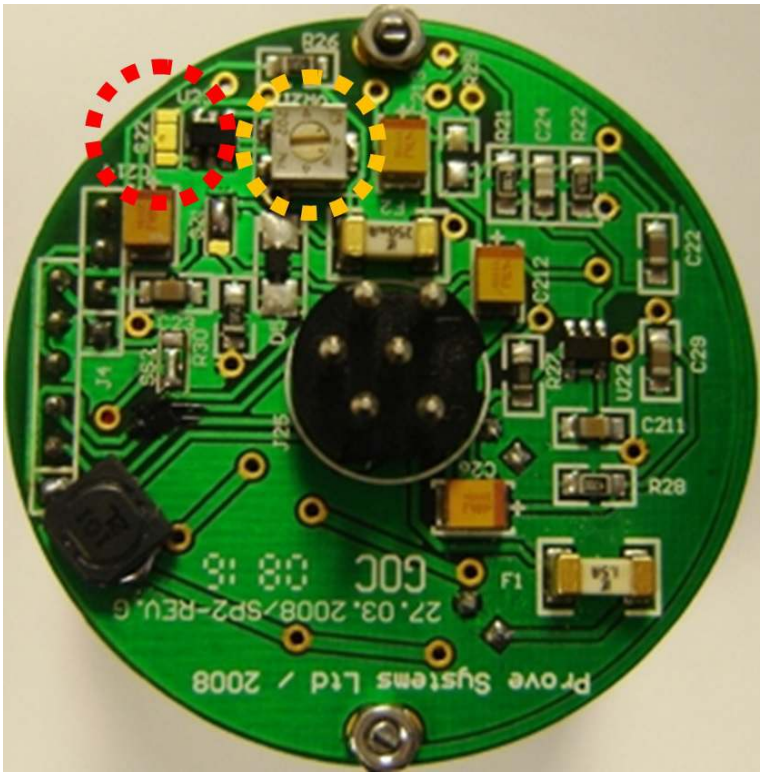
TO ENABLE VIDEO OUTPUT WITH AMPLIFICATION



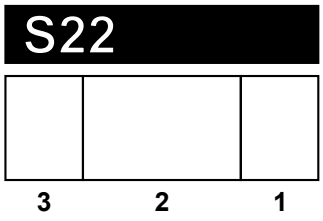
Link solder pads 2 & 3 together

- Amplification & video filter are ON

6.5. Video amplifier



NO VIDEO AMPLIFICATION (Default Setting)



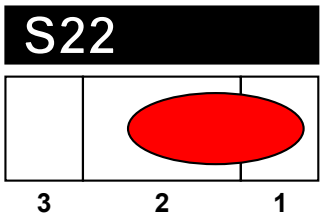
No solder links on S22

S21 must have solder pads 1 & 2 linked together

Buffer with gain of one: OFF

Set amplifier with high-frequency boost: OFF

VIDEO AMPLIFICATION (Medium cable length)

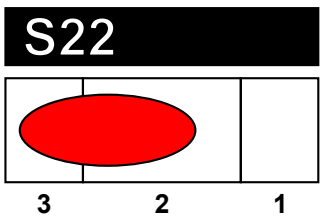


Link solder pads 1 & 2 together

Buffer with gain of one: ON

Set amplifier with high-frequency boost: OFF

VIDEO AMPLIFICATION (Long cable)



Link solder pads 2 & 3 together

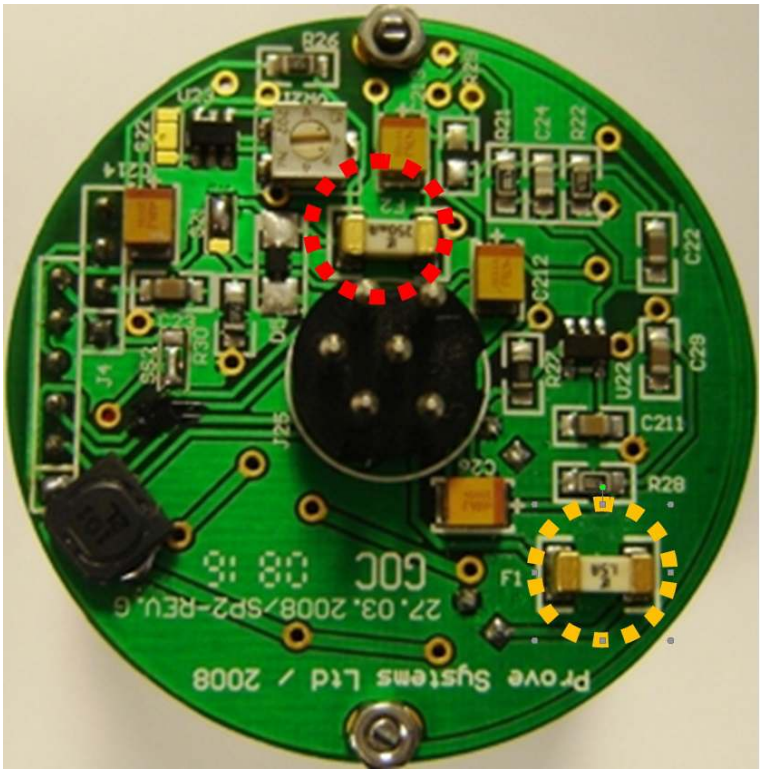
Buffer with gain of one: ON

Set amplifier with high-frequency boost: ON

Standard buffered video output with colour boost

VR21 (Gain trimmer) allows a manual adjustment of video signal amplitude via variable resistor, up to a maximum of (2Vp-p). To have any effect S22 must have pads 2 & 3 linked and S21 must have pads 2 & 3 linked.

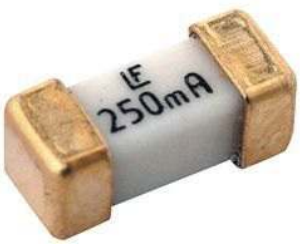
6.6. Fuse information



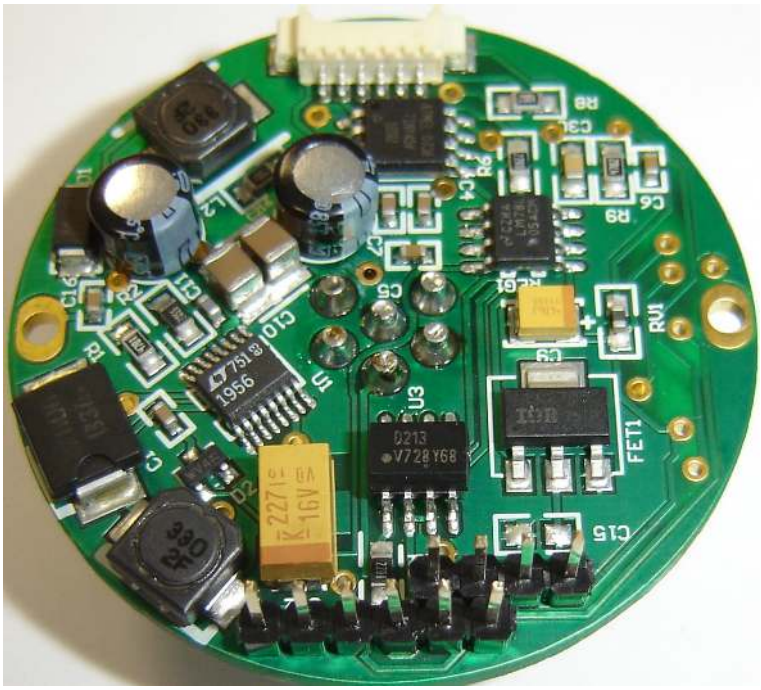
POWER SUPPLY FUSE - F1

	1.5A quick blow fuse protecting all the camera power supply circuitry against over voltage and reverse polarity.
	R45101.5L - Littelfuse - 1.5A or equivalent
	Farnell Reference Number: 1453905

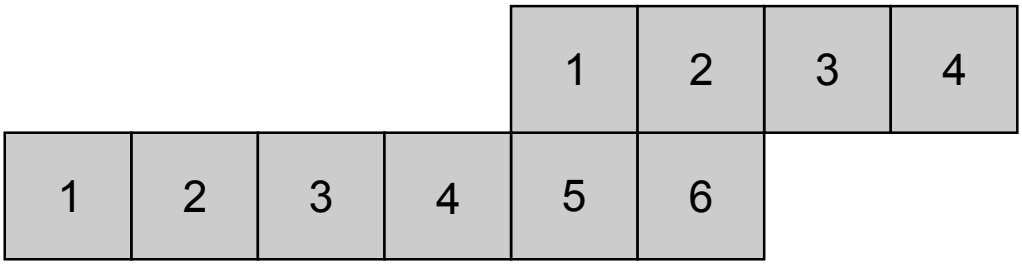
VIDEO LINE FUSE - F2

	250mA quick blow fuse protecting all the outputs of the camera module and amplifier.
	0451.250MRL - Littlefuse MD250mA
	Farnell Reference Number: 9922148

6.7. Wiring information



LED & Sensor connections: 1 to 4



Camera Module connections: 1 to 6

LED & SENSOR CONNECTIONS

Pin 1	+10V to LED board
Pin 2	Light sensor +
Pin 3	Light sensor -
Pin 4	GND LED PWM

CAMERA MODULE CONNECTIONS

Pin 1	+10V Supply to camera module
Pin 2	Not connected
Pin 3	Not connected
Pin 4	Video from camera module
Pin 5	GND for Camera module
Pin 6	Not connected

7. Troubleshooting

Symptom	Likely cause	Remedy
Image not in focus	Focal length incorrect for application	Check original specification when purchased If focal length specified matches current application (i.e. usage has not changed since initial purchase) there may be a fault with the unit Contact *Tritech International Ltd* for advice, or try adjusting focus.
LEDs not adjusting to light conditions	Fault with Dynamic Light Control	Check original specification when purchased Was DLC specified to be disabled at purchase? If not contact *Tritech International Ltd* to arrange repair (there may be a charge if the camera is out of warranty)
LEDs not adjusting to light conditions	DLC was disabled due to manual control of the LEDs being used	Cycle power to the Super SeaSpy, leaving several seconds between switching off and switching back on.
No Video output from camera	Video line fuse has blown	Check continuity of Video line fuse. Replacing blown fuse should restore video feed.

Glossary

DC	Direct Current
DLC	Dynamic Light Control - an automated control system for the LED light ring within the Super SeaSpy camera.
LED	Light Emitting Diode
NTSC	National Television System Committee - an analogue television standard used in most of North America.
PAL	Phase Alternating Line - an analogue television colour encoding system.
ROV	Remotely Operated Vehicle
Tritech waterblock	The 4000m depth rated connector developed by *Tritech International Ltd* for their subsea equipment.

