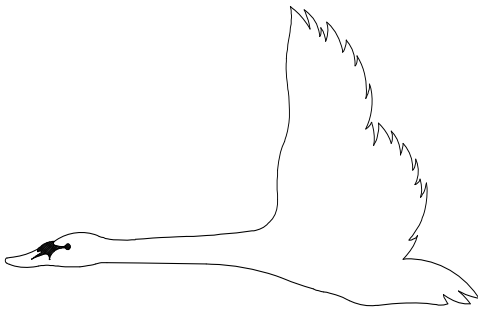


# CYGNUS 1

**ROV-MOUNTABLE  
SYSTEM**

*Digital Ultrasonic  
Thickness Gauge*

**OPERATION MANUAL**



**CYGNUS**  

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**INSTRUMENTS**

**Ultrasonic NDT Equipment**

---

***CYGNUS 1 ROV ULTRASONIC  
THICKNESS GAUGE***

***ROV-MOUNTABLE SYSTEM***

## ***QUALITY POLICY STATEMENT***

*“It is the policy of Cygnus Instruments to provide all customers with products and services of a quality that complies in all respects with the requirements contained in their orders and specifications.*

*“It is our firm belief that excellence can only be achieved and maintained by continual appraisal. The organisation, methods, and procedures adopted by the company aim to both fulfil this policy and ensure adherence to it.”*

Cygnus is an ISO-9001 accredited company.  
The scope of our accreditation covers all our products and services.



# **CYGNUS 1 ROV ULTRASONIC THICKNESS GAUGE**

## **OPERATION MANUAL**

<b>INTRODUCTION</b>	<b>5</b>
<i>Cygnus 1 ROV Ultrasonic Thickness Gauge</i>	6
<i>Cygnus Instruments</i>	7
<i>The Multiple-Echo Method</i>	8
<i>Cygnus 1 ROV Specification – Deep-Water Gauge</i>	9
<i>Cygnus 1 ROV Specification – Shallow-Water Gauge</i>	10
<i>Cygnus 1 ROV Specification – Mini-ROV Lightweight Gauge</i>	11
<i>Selection of Ultrasonic Probes</i>	12
<i>Serial Data Format</i>	13
<b>INSTALLING THE UNDERWATER GAUGE</b>	<b>15</b>
<i>Cygnus 1 ROV Kit Contents – Deep-Water &amp; Shallow-Water Gauge</i>	16
<i>Cygnus 1 ROV Kit Contents – Mini-ROV Lightweight Gauge</i>	17
<i>Gauge Assembly &amp; Disassembly</i>	18
<i>Underwater Cable Connector</i>	18
<i>Probe/Knurled Ring Assembly</i>	20
<i>Data &amp; Power Connections</i>	21
<b>VIEWING MEASUREMENTS ON THE PC</b>	<b>23</b>
<i>Computer Connection Options</i>	24
<i>Installing the CygLink Program</i>	25
<i>Installing the USB-to-Serial Adaptor Drivers</i>	26
<i>Connecting the System Together</i>	27
<i>Using the CygLink Remote Display Program</i>	31

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<b>MEASURING WITH THE GAUGE</b>	<b>34</b>
<i>Controls</i>	35
<i>Calibrating the Gauge</i>	35
<i>Measurement</i>	38
<i>Probe Usage</i>	39
<i>Troubleshooting</i>	40
<i>General Points on Thickness Gauging</i>	42
<i>A Guide to Sound Velocities</i>	43
<i>Table of Sound Velocities</i>	44
<b>WORKING WITH LOG-FILES</b>	<b>45</b>
<i>About Log-Files</i>	46
<i>Viewing Log-Files</i>	47
<i>Creating a Report File</i>	48
<i>Printing Files Using CygLink</i>	50
<i>File Format</i>	51
<b>CREATING TEMPLATE-FILES USING CYGLINK</b>	<b>52</b>
<i>About Template-Files</i>	53
<i>Creating a Single-Record File</i>	54
<i>Creating a Multi-Record File</i>	55
<i>Creating a Key-Point File</i>	56
<i>Creating a Grid-Point File</i>	61
<b>REMOTE-LOGGING</b>	<b>63</b>
<i>Using Remote-Logging</i>	64
<i>Quick Logging</i>	65
<i>Remote-Logging to Datalogger Files</i>	68
<i>Logging to a Single-Record File</i>	69
<i>Logging to a Multi-Record File</i>	71
<i>Logging to a Key-Point File</i>	72
<i>Logging to a Grid-Point File</i>	74
<b>CARE AND SERVICING</b>	<b>80</b>
<i>Care of the Cygnus 1 ROV Gauge</i>	81
<i>Servicing</i>	82
<i>Recycling &amp; Disposal</i>	83
<i>RoHS Directive</i>	83

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## ***INTRODUCTION***

*Cygnus 1 ROV Ultrasonic Thickness Gauge*

*Cygnus Instruments*

*The Multiple-Echo Method*

*Cygnus 1 ROV Specification – Deep-Water Gauge*

*Cygnus 1 ROV Specification – Shallow-Water Gauge*

*Cygnus 1 ROV Specification – Mini-ROV Lightweight Gauge*

*Selection of Ultrasonic Probes*

*Serial Data Format*

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## **CYGNUS 1 ROV ULTRASONIC THICKNESS GAUGE**

The *Cygnus 1 ROV Multiple-Echo Ultrasonic Thickness Gauge* is designed for high-reliability thickness measurement using the multiple-echo technique.

The Gauge is designed to be mounted onto most types of work-class ROV with or without a manipulator facility. There is also a lightweight version of the Gauge for use with smaller ROVs.

All versions of the Gauge are fully-waterproof, and can be used both underwater and in air - *Cygnus* manufactures the *Cygnus 1 ROV Thickness Gauge* in three system options :

➤ ***Deep-Water Version :***  
*pressure-tested down to 3000 metres*

➤ ***Shallow-Water Version :***  
*pressure-tested down to 1000 metres*

➤ ***Mini-ROV Lightweight Version :***  
*pressure-tested down to 500 metres*

All versions of the Gauge are supplied with dedicated PC-software for displaying and logging the thickness readings at the surface.

The Gauge is supplied with one Ultrasonic Probe – the Probe-type must be specified at the time of purchase of the Gauge. Probes are not freely interchangeable – please consult with *Cygnus* if you wish to use a different Probe with the Gauge.

*The Cygnus 1 ROV Ultrasonic Thickness Gauge is a solid-state electronic instrument which, under normal operating conditions, will give many years of active service.*

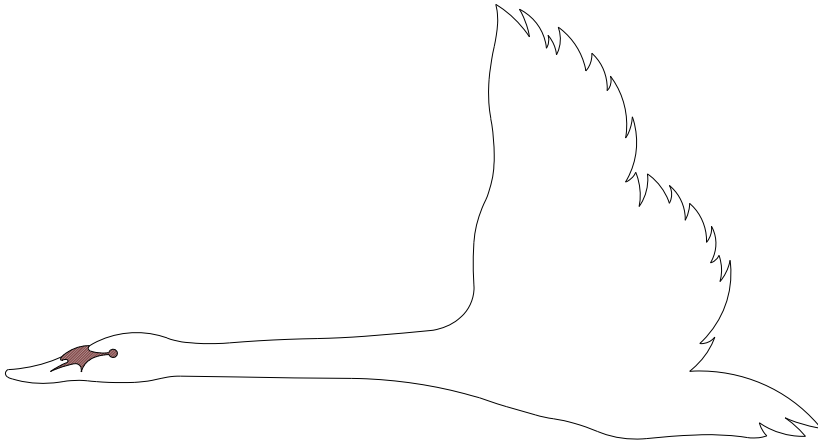
*Although designed for ease of operation, the first time user should carefully read this manual to familiarise themselves with the features of the instrument.*

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**CYGNUS INSTRUMENTS**

*Cygnus Instruments Limited*, founded in 1983, were pioneers in the development of the *Ultrasonic Multiple-Echo Technique* used for measurement through coatings. This has long been the standard required to ensure that accurate measurements are taken without the need to first zero the Gauge or remove coatings.

Our philosophy is to work closely with each of our customers to provide a range of products specifically for each application. *Cygnus Ultrasonic Thickness Gauges* are designed to be simple to use and to withstand the harsh environments that they are intended for. We have built up an enviable reputation with our customers in over 45 countries around the world.



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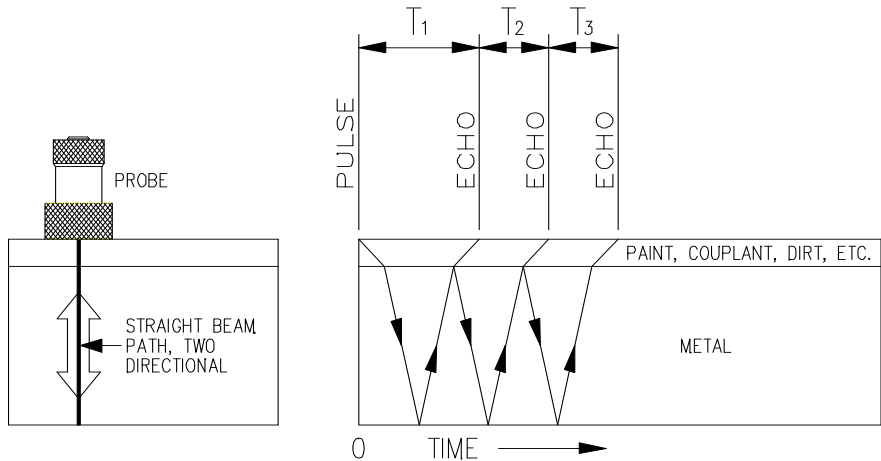
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## THE MULTIPLE-ECHO METHOD

The *Cygnus 1 ROV Ultrasonic Thickness Gauge* works on the pulse-echo principle. The Probe is made to vibrate for a very short period, creating a pulse of ultrasound which enters the test piece. The Probe waits for returned echos and acting as a receiver, converts them into electrical signals which are processed to produce timings in digital form.



The *multiple-echo* beam travel is depicted above, spread out for time, to illustrate the timing method. The beam path is in fact straight, at 90 degrees to the surface and the ultrasonic energy reverberates up and down within the metal (as shown in the small sketch above - left). Each time the echo is reflected back down, a small portion of the energy comes up through the coatings, striking the Probe which now acts as a receiver.

The delay between echoes at the Probe-face is exactly equal to the time taken to pass through the metal twice, therefore coatings such as paint are ignored and the measurement displayed is of the metal thickness only.

**CYGNUS 1 ROV SPECIFICATION – DEEP-WATER GAUGE**

<b>Materials</b>	Sound Velocity from 1000 m/s to 9995 m/s [0.0400 in/uS to 03998 in/uS]
<b>Range</b>	<i>Typical Measurable Range in Steel :</i> with 2¼ MHz Probe : 3mm to 250mm [0.120 in. to 10.0 in.] with 3½ MHz Probe : 2mm to 150mm [0.080 in. to 6.0 in.]
<b>Resolution</b>	0.1 mm [0.005 in.] or 0.05 mm [0.002in.]
<b>Accuracy</b>	± 0.1 mm [± 0.005 in.] or ± 0.05 mm [± 0.002 in.]
<b>Probes</b>	<i>Single-Crystal, Soft-face Compression Probes :</i> ➤ 2¼ MHz : 13mm [0.5 in.] ➤ 2¼ MHz : 19mm [0.75 in.] ➤ 3½ MHz : 13mm [0.5 in.]
<b>Operating Temperature</b>	<i>Recommended :</i> -10°C to +50°C [14°F to 122°F]
<b>Power Supply</b>	<i>Power Supply Requirement :</i> 7.5 – 30 Vdc @ 100mA typical, 150mA maximum
<b>Data-link</b>	RS-422 Communication, differential pair, single direction
<b>Display Software</b>	<i>Computer Requirement :</i> Windows®-compatible PC or Laptop (486 minimum) with 45 MB free hard disk space One free Serial COM-port, or a USB connection
<b>Size</b>	<i>Gauge-Body dimensions, excluding cabling :</i> Length 237 mm x Diameter 70 mm [9.3 in. x 2.8 in.] <i>Probe-Cable length : 5 metre [16 ft. 5 in.]</i>
<b>Weight in Air</b>	With Remote Probe – 4.0 Kg [141 ounce]
<b>Water Depth</b>	<i>Fully Waterproof :</i> Pressure tested to a depth of 3000 m [9842 ft.]

**CYGNUS 1 ROV SPECIFICATION – SHALLOW-WATER GAUGE**

<b>Materials</b>	Sound Velocity from 1000 m/s to 9995 m/s [0.0400 in/uS to 03998 in/uS]
<b>Range</b>	<i>Typical Measurable Range in Steel :</i> with 2¼ MHz Probe : 3mm to 250mm [0.120 in. to 10.0 in.] with 3½ MHz Probe : 2mm to 150mm [0.080 in. to 6.0 in.]
<b>Resolution</b>	0.1 mm [0.005 in.] or 0.05 mm [0.002in.]
<b>Accuracy</b>	± 0.1 mm [± 0.005 in.] or ± 0.05 mm [± 0.002 in.]
<b>Probes</b>	<i>Single-Crystal, Soft-face Compression Probes :</i> ➤ 2¼ MHz : 13mm [0.5 in.] ➤ 2¼ MHz : 19mm [0.75 in.] ➤ 3½ MHz : 13mm [0.5 in.]
<b>Operating Temperature</b>	<i>Recommended :</i> -10°C to +50°C [14°F to 122°F]
<b>Power Supply</b>	<i>Power Supply Requirement :</i> 7.5 – 30 Vdc @ 100mA typical, 150mA maximum
<b>Data-link</b>	RS-422 Communication, differential pair, single direction
<b>Display Software</b>	<i>Computer Requirement :</i> Windows®-compatible PC or Laptop (486 minimum) with 45 MB free hard disk space One free Serial COM-port, or a USB connection
<b>Size</b>	<i>Gauge-Body dimensions, excluding cabling :</i> Length 237 mm x Diameter 70 mm [9.3 in. x 2.8 in.] <i>Probe-Cable length : 5 metre [16 ft. 5 in.]</i>
<b>Weight in Air</b>	With Remote Probe – 1.25 Kg [44 ounce]
<b>Water Depth</b>	<i>Fully Waterproof :</i> Pressure tested to a depth of 1000 m [3281 ft.]

**CYGNUS 1 ROV SPECIFICATION – LIGHTWEIGHT GAUGE**

<b>Materials</b>	Sound Velocity from 1000 m/s to 9995 m/s [0.0400 in/uS to 03998 in/uS]
<b>Range</b>	<i>Typical Measurable Range in Steel :</i> with 2¼ MHz Probe : 3mm to 250mm [0.120 in. to 10.0 in.] with 3½ MHz Probe : 2mm to 150mm [0.080 in. to 6.0 in.]
<b>Resolution</b>	0.1 mm [0.005 in.] or 0.05 mm [0.002in.]
<b>Accuracy</b>	± 0.1 mm [± 0.005 in.] or ± 0.05 mm [± 0.002 in.]
<b>Probes</b>	<i>Single-Crystal, Soft-face Compression Probes :</i> ➤ 2¼ MHz : 13mm [0.5 in.] ➤ 2¼ MHz : 19mm [0.75 in.] ➤ 3½ MHz : 13mm [0.5 in.]
<b>Operating Temperature</b>	<i>Recommended :</i> -10°C to +50°C [14°F to 122°F]
<b>Power Supply</b>	<i>Power Supply Requirement :</i> 7.5 – 30 Vdc @ 100mA typical, 150mA maximum
<b>Data-link</b>	RS-422 Communication, differential pair, single direction
<b>Display Software</b>	<i>Computer Requirement :</i> Windows®-compatible PC or Laptop (486 minimum) with 45 MB free hard disk space One free Serial COM-port, or a USB connection
<b>Size</b>	<i>Gauge-Body dimensions, excluding cabling :</i> Length 160 mm x Diameter 62 mm [6.3 in. x 2.4 in.] <i>Probe-Cable length : 100 mm [3.9 in.]</i>
<b>Weight in Air</b>	With Remote Probe - 550 gm [19.4 ounce]
<b>Water Depth</b>	<i>Fully Waterproof :</i> Pressure tested to a depth of 500 m [1640 ft.]

## SELECTION OF ULTRASONIC PROBES

The Cygnus 1 ROV Gauge is supplied with a single heavy-duty Ultrasonic Probe, which comes in a waterproof assembly with the Probe fixed to a cable which connects to the removable nose-cone of the Gauge.

**✘** Probe-assemblies are not freely interchangeable – the Gauge is preset for optimum performance with the supplied Probe

Cygnus offers a selection of different Probe-types – the table below shows which Probe to choose, depending on the application.

① The Deep-Water and Shallow-Water versions of the Gauge are normally supplied with a 5 metre Probe-cable assembly, and the Mini-ROV Lightweight version is normally supplied with a 0.1 metre cable – other cable-lengths are available on request.

CRYSTAL DIAMETER	FREQUENCY	MEASUREMENT RANGE	APPLICATION
13 mm ½ inch	2¼ MHz Red face	3.0 – 250 mm 0.12 – 10 inch	<i>This is the standard probe – suitable for most applications</i>
19 mm ¾ inch	2¼ MHz Red face	3.0 – 250 mm 0.12 – 10 inch	<i>Use with castings and other attenuative materials if the 13mm probe is inadequate – the larger diameter gives greater penetration power on badly corroded or heavily coated steel. Some metallic coatings are also highly attenuative.</i>
13 mm ½ inch	3½ MHz Orange face	2.0 – 150 mm 0.08 – 6 inch	<i>Suitable for measurement on thinner sections where surfaces are relatively rough</i>

---

## **SERIAL DATA FORMAT**

CygLink program is provided to automatically decode the measurement data sent from the Gauge, and to provide a calibrated display of the results

For users who want to display and log the data using their own software : this describes the arrangement of the data sent from the Gauge

### **Data Communication Format**

#### ➤ **Data Output Standard**

- ⇒ Differential RS-422 line drivers [TX+, TX-]
- ⇒ Unidirectional - Gauge is transmit only

#### ➤ **Data-byte Format**

- ⇒ 8 Data bits, 1 Start bit, 1 Stop bit, No Parity; 2400 baud

#### ➤ **Data-Packet Arrangement**

- ⇒ 4 packets per second
- ⇒ *Valid-Reading* packet-length : 7 bytes
- ⇒ *No-Reading* packet-length : 3 bytes

### **Interpreting the Reading sent from the Gauge**

#### ➤ **Scaling**

- ⇒ The Gauge takes measurements using an accurate fixed-rate crystal oscillator
- ⇒ Readings are scaled for an equivalent Velocity of Sound of 6400 m/s
- ⇒ Displayed readings have to be scaled by multiplying by the Velocity of Sound (in m/s) for the Material-under-Test, and then dividing by 6400
- ⇒ Decimal Point position is implied from the combination of Range, Resolution, and Units bits in the Status byte of each Reading [see table below]

#### ➤ **Range**

- ⇒ The Gauge returns all Readings in a 4-byte decimal string
- ⇒ Readings which require 5-bytes [eg 100.00+mm, or 10.000+inch] are autoranged to the 4 most significant bytes
- ⇒ Range bit for every Reading must be read from the Status-byte

#### ➤ **Resolution**

- ⇒ The Gauge has a default Hi-Resolution setting : 0.05 mm, or 0.002 inch
- ⇒ Lo-Resolution setting is not normally used : 0.1 mm, or 0.005 inch
- ⇒ Resolution bit must be read from the Status-byte

#### ➤ **Units**

- ⇒ The Gauge has a default Metric Units-setting
- ⇒ Units bit must be read from the Status-byte

**Valid-Reading packet arrangement**

7 byte sequence :

1. SOH [hex 01]
2. Status-byte
3. Data-byte 0
4. Data-byte 1
5. Data-byte 2
6. Data-byte 3
7. ETB [hex 17]

**No-Reading packet arrangement**

3 byte sequence :

1. SOH (hex 01)
2. Status Byte
3. ETB (hex17)

**Status-byte structure**

decodes into bit-fields :

- |              |                           |  |                  |
|--------------|---------------------------|--|------------------|
| ➤ bit 7 - ms | <b>Cygnus Gauge type</b>  | HI = Mark2+<br>[LO = Mark1 – not used] | <b>[default]</b> |
| ➤ bit 6      | <b>Reading Resolution</b> | HI = Hi-Resolution                     | <b>[default]</b> |
| ➤ bit 5      | <b>Measurement Units</b>  | LO=Metric<br>HI = Imperial             | <b>[default]</b> |
| ➤ bit 4      | <b>Reading Range</b>      | HI = Hi-Range                          |                  |
| ➤ bits 3, 2  | <b>Echo Count</b>         | 0 to 3 Echoes found                    |                  |
| ➤ bit 1      | <b>Calibration</b>        | HI = Remote<br>LO = Local              | <b>[default]</b> |
| ➤ bit 0 - ls | <b>No-Reading flag</b>    | HI = No-Reading<br>LO = Valid-Reading  |                  |

**Data-bytes arrangement**

- The four data bytes are ASCII-encoded, decimal thickness value
- Data byte 0 is most-significant
- Leading-zeroes are replaced by ascii Space [hex 20]
- Decimal points are implied from the Status-byte – Units, Resolution and Range bits :

<b>Reading-type</b>	<b>Hi-Range</b>	<b>Lo-Range</b>
⇒ Imperial, Lo-Resolution	x x . x x	x . x x x
⇒ Metric, Lo-Resolution	x x x . x	x x x . x
⇒ Imperial, Hi-Resolution	x x . x x	x . x x x
⇒ Metric, Hi-Resolution	x x x . x	x x . x x

## ***INSTALLING THE GAUGE***

*Cygnus 1 ROV Kit Contents – Deep-Water Gauge & Shallow-Water Gauge*

*Cygnus 1 ROV Kit Contents – Mini-ROV Lightweight Gauge*

*Underwater Cable Connector*

*Gauge Assembly & Disassembly*

*Probe/Knurled Ring Assembly*

*Data & Power Connection*



## **CYGNUS 1 ROV KIT CONTENTS**

### **DEEP-WATER GAUGE & SHALLOW-WATER GAUGE**



#### **Deep-Water Gauge and Shallow-Water Gauge – Kit Contents**

- Instrument Body
- Blanking-Plug
- Heavy Duty Remote Probe
- Bottle of Membrane Oil, and Packet of Membranes [*not shown*]
- O-Rings, type A and B
- Nose Cone Torque Bar
- Locking Ring Key
- Steel Test Block
- Molykote
- 4-way Impulse Connector with flylead [*not shown*]
- 9-way D-connector [*not shown*]
- Surface Test Cable [*not shown*]
- KKE/K3 RS422-to-RS232 Adaptor
- RS232-to-USB Adaptor [*not shown*]
- *CygLink* Remote Display Software CD

## CYGNUS 1 ROV KIT CONTENTS

### MINI-ROV LIGHTWEIGHT GAUGE



#### **Mini-ROV Lightweight Gauge – Kit Contents**

- Instrument Body
- Blanking-Plug
- Heavy Duty Remote Probe
- Bottle of Membrane Oil, and Packet of Membranes [*not shown*]
- O-Rings, type A and B
- Nose Cone Torque Bar
- Locking Ring Key
- Steel Test Block
- Molykote
- 4-way Impulse Connector with flylead [*not shown*]
- 9-way D-connector [*not shown*]
- Surface Test Cable [*not shown*]
- KKE/K3 RS422-to-RS232 Adaptor
- RS232-to-USB Adaptor [*not shown*]
- CygLink Remote Display Software CD

## GAUGE ASSEMBLY & DISASSEMBLY

### Fitting the Probe-module

Fit the two O-Rings, A and B, then attach the Probe-module to the Gauge-body :

- ⇒ Cover both O-Rings with a light coating of Dow Corning *Molykote*, then fit as shown in the diagram below
  - A is fitted into the O-Ring groove in the Nose-cone housing
  - B is to be fitted in the O-Ring groove at the front of the instrument
- ⇒ Ensure that the O-Rings are properly located  
***There is no need to stretch or force the O-Rings into their locations***
- ⇒ Screw the Probe-module onto the Gauge-body, hand tight.  
***Do not use the Nose-cone torque bar to tighten.***

- ① Only use the torque bar to undo the Nose-cone after a dive : both *O-Rings* should be discarded after each dive.



- ✗ ***Both O-Rings must be replaced after every dive***  
***See : Care of the Cygnus 1 ROV Underwater Gauge section on page 81***

- ✗ ***All parts are designed to ensure a good water-tight fit : incorrect fitting will result in the instrument leaking.***

## **UNDERWATER CABLE CONNECTION**

The *Cygnus 1 ROV Underwater Gauge* is provided with a fully-waterproof external cable connection. To maintain the integrity of the electrical operation and watertight-seal it is essential that these precautions are observed :

- ⇒ *Cable connection should only ever be made in dry ambient conditions at the surface. Connections must never be made, or broken, underwater*
- ⇒ *Both the male Underwater Cable connector and the Blanking-plug should have Molykote smeared on the pins before inserting into the Gauge*
- ⇒ *The male plug-connector should be pushed fully into the female socket-connector, and then the rubber retaining-loop should be pushed into the groove on the male-connector, to complete the fully-waterproof connection*



① *A Blanking-plug is supplied for use - for safety we recommend that the Blanking Plug is fitted at all times that there is no cable attached to the Gauge body*

## **PROBE/KNURLED RING ASSEMBLY**

### **Use of the Membrane**

- *The polyurethane membrane covering the Probe-face provides better contact on rough surfaces and protects the Probe-face from damage.*
- *If making measurements manually : to avoid excessive wear of the membrane, do not use pressure nor 'screw' the Probe when trying to obtain readings on rough surfaces - a light touch is normally sufficient*
- *Check the membrane regularly and renew when it becomes worn.*



### **Replacing the Membrane in the Knurled-ring**

- ⇒ To replace the membrane unscrew the Knurled-ring from the end of the Probe. The membrane is held in place by a locking-ring.
- ⇒ Unscrew the locking-ring using the locking-ring key provided
- ⇒ Remove the old membrane and clean the locating groove in the knurled ring before fitting a new membrane
- ⇒ Replace the locking-ring and screw up tight, checking that the membrane is properly located.

### **Refitting the membrane**

- ✘ *There must always be a thin film of mineral oil such as glycerine or liquid paraffin between the membrane and the Probe-face to ensure good contact and exclude any air.*
- ✘ *Do not overtighten the knurled ring assembly as this will affect the performance of the Probe.*

## DATA & POWER CONNECTIONS

The Cygnus 1 ROV Gauge can be electrically-connected by one of two methods, depending on suitability :

### ⇒ Independent-Cable Connection

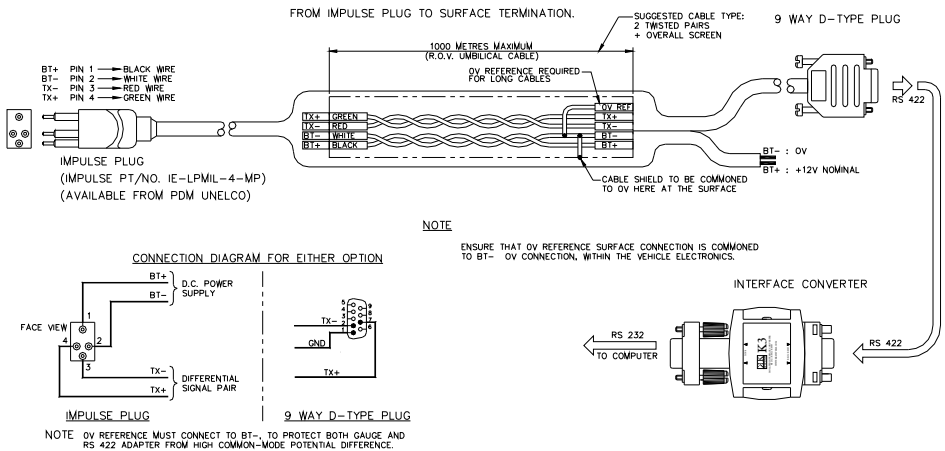
- This is a single cable connecting the Gauge to the surface.  
*This cable can be supplied, on request, by Cygnus.*
- This cable is independent of the ROV's own cabling and has a maximum length of 1000 metres

### ⇒ ROV Local-Termination Connection

- In this method the connection from the Gauge is taken to the ROV, and is merged with the ROV's own cabling to connect to the surface
- It is essential that the Data-connections from the Gauge are maintained throughout as twisted-pair
- Power for the Gauge can be taken from the ROV's own power supply, if suitable
- The Data-output from the Gauge has a maximum capability of 1000 metres : if the distance from the Gauge to the surface is greater than 1000 metres the Data-output from the Gauge must be electronically buffered within the ROV.

### Independent Cable Connection

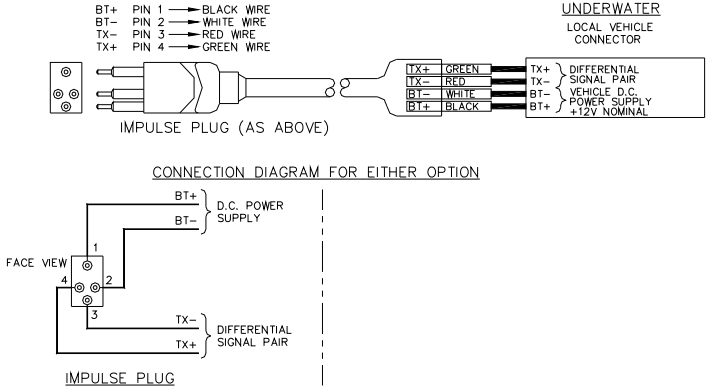
Recommended cable connection for direct-cabling from Cygnus 1 ROV Gauge to the computer at the surface :



① **Cable-termination** : for long cables it may help to fit a 120 Ω resistor, in series with a 1 nF capacitor, between the TX+ and TX- connections inside the 9-way D-type plug. See datasheets on the supplied CD for the K3 receiver, and MAX483 line driver.

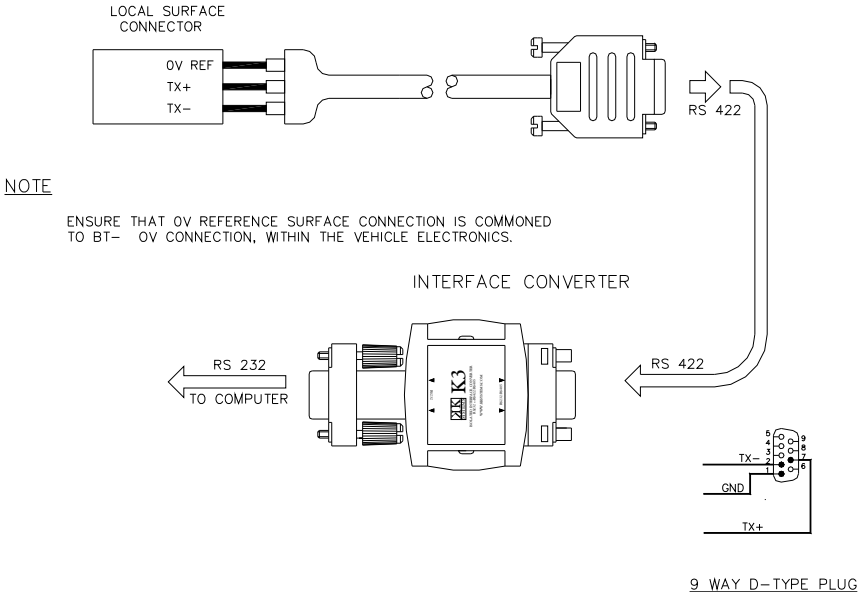
### ROV Local-Termination Connection

Recommended cable connection from Cygnus 1 ROV Gauge to ROV :



NOTE OV REFERENCE MUST CONNECT TO BT-, TO PROTECT BOTH GAUGE AND RS 422 ADAPTER FROM HIGH COMMON-MODE POTENTIAL DIFFERENCE.

Recommended connection at surface, taken from ROV cabling to PC :



① Alternatively - if you intend to convert the serial data sent from the Cygnus 1 ROV Gauge using your own electronics and/or software : the TX+ / TX- data-pair may be connected directly to any RS-422 compatible receiving equipment.

## ***VIEWING MEASUREMENTS ON THE PC***

*Computer Connection Options*

*Installing the CygLink Program*

*Installing USB-to-Serial Adaptor Drivers*

*Connecting the System Together*

*Using the CygLink Remote Display Program*



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## COMPUTER CONNECTION OPTIONS

### Standard RS232 connection

The *Cygnus 1 ROV Gauge* is normally connected via an *RS422-to-RS232 Converter* to any spare *Serial COM-port* on your *PC*

The *K3 RS232-to-RS422 Converter* is supplied with the Gauge kit – connect to the computer as shown in *Data and Power Connections*, page 21.

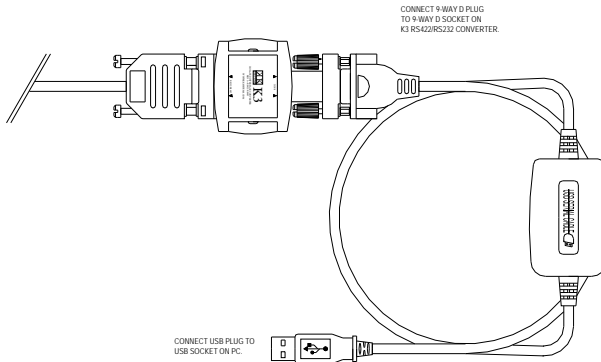
Cygnus supplies the *CygLink* program on CD, which is able to read the Gauge Measurement data from any *COM-port* on the *PC*.

### USB-to-Serial Adaptor

Connection to *USB* is available – an *RS232-to-USB Adaptor* is included in the kit contents

Software drivers must be installed in order to use the computer's *USB-port* as a *Serial-port* – drivers for the *USB-to-Serial Adaptor* which Cygnus can supply are included on the *CygLink CD*. See : *Installing USB-to-Serial Adaptor driver software*, page 26.

The *USB-to-Serial Adaptor* is used together with the *RS422-to-RS232 Converter* as shown :



### Custom Connection

If you intend to convert the serial data sent from *Cygnus 1 ROV Gauge* using your own electronics : the *TX+ / TX-* data-pair may be connected directly to any *RS-422 compatible receiving equipment*

### Custom Display Software

For Users who wish to develop their own display software : the format of the data sent from the Gauge is detailed in *Serial Data Format*, page 13

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## **INSTALLING THE CYGLINK PROGRAM**

*CygLink program is supplied on CD, and is compatible with all versions of Microsoft Windows<sup>®</sup> from Windows 95b onwards.*

① *Windows 2000, Windows XP : it may be necessary for CygLink to be installed by a user with Administrative privileges*

### **Installing the CygLink program**

- ⇒ Close all programs on your computer
- ⇒ Insert the CD into the CD-Drive of your computer  
*Autorun should automatically start the install program*
- ⇒ *Otherwise* : run the file *d:\Install.exe* (where *d*: is the drive letter of your CD drive)
- ⇒ Click on the *Install CygLink* button

*The install program will now run itself - follow the on-screen instructions :*

- ⇒ Allow your computer to be restarted if prompted by the install program
- ⇒ Do not allow newer files to be overwritten if queried by the install program

*After CygLink has been successfully installed the program will appear on the Start menu under the program group CygLink, and a shortcut will appear on the desktop*

### **Uninstalling the CygLink program**

*If problems occur during installation, or to install a new version of CygLink, always uninstall the previous version.*

Uninstall *CygLink* using *Windows Control Panel* :

- ⇒ Close all programs on your computer.
- ⇒ From the *Windows Taskbar* : click on **Start** → **Settings** → **Control Panel** to open *Control Panel*
- ⇒ Double-click on the **Add/Remove** icon
- ⇒ Find the *CygLink* entry in the list of installed programs, and click to highlight it
- ⇒ Click on the **Add/Remove...** button, and follow the instructions to remove *CygLink*
- ⇒ Do not allow any shared files to be removed if queried during the uninstall process.

### **USB-to-Serial Adaptor**

*For PCs without a spare serial connection : Cygnus also supplies a USB-to-Serial Adaptor cable to allow the Gauge to be connected to a PC via a USB connection*

Drivers must be installed on your PC if you intend to use the USB connection instead of the COM-port connection - see next : *Installing USB-to-Serial Adaptor Drivers*, page 26

## INSTALLING USB-TO-SERIAL ADAPTOR DRIVERS

If you are using the USB-to-Serial adaptor, as supplied by Cygnus, you must install the driver software which is included on the CygLink CD.

**✘ USB connection is normally only possible on computers with Windows 98 Second Edition and above**

First insert the CygLink CD :

- ⇒ Insert the CD into the CD-Drive of your computer  
*Autorun should automatically start the install program*
- ⇒ **Otherwise** : run the file *d:\Install.exe* (where *d:* is the drive letter of your CD drive).

To view more detailed information on installing drivers :

- ⇒ Click on the **Browse this CD** button
- ⇒ Navigate to the *usb2serial* subdirectory, and double-click on either of the files *usb232.doc* or *usb232.pdf*

Now plug in the USB cable into the USB port :

- ⇒ Windows will detect a USB Device and run the *Add New Hardware Wizard* to assist you in setting up the new USB Composite Device : click **Next** to continue
- ⇒ Select the option : *Search for the best driver for your device*, then click **Next**

The following steps depend on which version of Windows you have :

- ⇒ Select **Specify a location** and click **Browse**  
**Or** : select *CD Drive* option, and click **Next**  
*Windows will try to automatically find the suitable driver on the CD*
- ⇒ **Otherwise** : navigate to the folder on your CD which corresponds to your operating system (eg *D:\usb2serial\Win2K, Win95, Win98\_ME, WinXP*) and click **OK**
- ⇒ When a suitable driver has been detected, and Windows shows the *USB to Serial Bridge Cable* : click **Next** to continue, until the installation is complete

### Uninstalling USB-to-Serial Adaptor driver software

- ⇒ Insert the CygLink CD into the CD-Drive of your computer  
*The install program should automatically start* : click on the **Browse this CD** button
- ⇒ *Windows Explorer will open* : navigate to the *usb2serial* subdirectory, and double-click on **DRemover98\_2K.exe**
- ⇒ **Windows XP only** : navigate to the *usb2serial\WinXP* subdirectory, and double-click on **DrvRemover.exe**
- ⇒ *A new window will pop-up* : click the **OK** button to accomplish the uninstallation.

## **CONNECTING THE SYSTEM TOGETHER**

① *Cygnus 1 ROV System is supplied with a Test-Cable which can be used to verify the Gauge operation if there are problems establishing the datalink with the computer*

### **Preparing the Cygnus 1 ROV Gauge**

- ⇒ Remove the Blanking-plug from the Cygnus 1 ROV Gauge and store in a safe place
- ⇒ Apply a thin coating of *Molykote* lubricant to the four pins of the black Underwater plug on the Cable-Assembly  
*This is to ease mating and unmating, and also to maintain water-resistance*
- ⇒ Insert the Underwater plug fully into the Gauge :  
*ensure the retaining loop is correctly seated in the groove in the plug body*

### **Connecting to the Computer**

- ⇒ Plug the 9-way D-connector on the Data-Link cable assembly into the **K3** interface adapter, at the end marked **RS422**.
- ⇒ Plug the other end of the **K3**, marked **RS232**, into any free serial connector on your Computer - this requires a free 9-way serial connector :
  - if there is only a 25-way serial connector available, a standard 9-to-25-way serial adaptor must be obtained.
  - if there is no spare serial port it may be necessary to install a standard PC Multi-I/O expansion card to obtain an extra COM-port, and plug the **K3** adaptor into one of these
  - *alternatively* : for USB-equipped computers, Cygnus can supply on request a *USB-to-Serial* adaptor, which will provide an additional COM-port :  
*Plug the other end of the **K3** interface, marked **RS232**, into the *USB-to-Serial* adaptor, and plug the *USB-to-Serial* adaptor into a spare USB port on the computer.*

### **Connecting Power to the Gauge**

- ⇒ Connect a nominal 9Vdc power-supply to the Gauge [*any voltage between 7.5V and 30V is acceptable*] – but don't turn the power on yet  
If you are using the Test-Cable : connect Red to positive, Black to negative

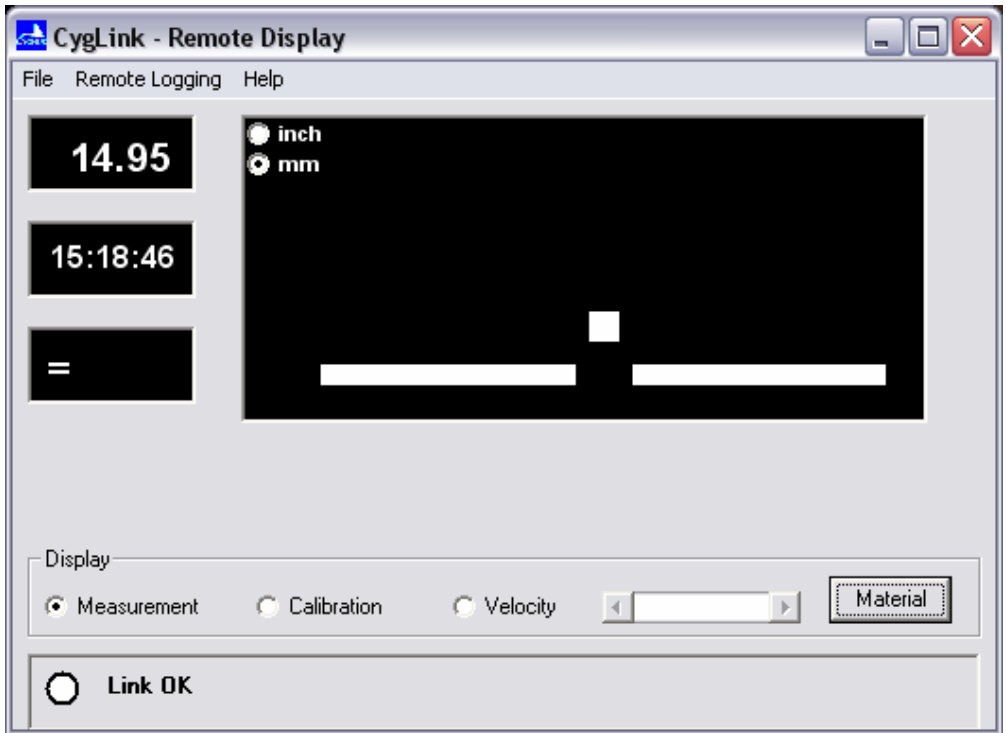
① *Install the *CygLink Remote Display* software now, if this has not already been done See : *Installing the CygLink Program*, page 25*

① *If you are using a *USB-to-Serial Adaptor*, you must also install the drivers provided with the adaptor, to enable the *USB-to-Serial adaptor* to act as an extra COM-port See : *Installing USB-to-Serial Adaptor driver software*, page 26*

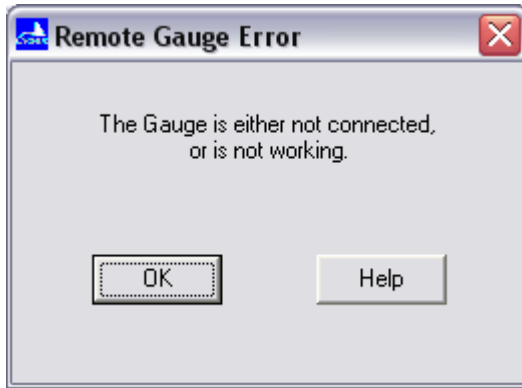
**Establishing the datalink from the Gauge to the PC**

With all connections from the Gauge to the PC in place : turn the PC on, then turn on the power to the Gauge :

- ⇒ Start the *CygLink* program on the PC, by double-clicking on the *CygLink* desktop icon, or by clicking on *CygLink* option in the *CygLink* program group from the Windows *Start* menu
- ⇒ If there is a valid connection from the Gauge to the PC, and the *CygLink* Comms-settings are correct :
  - there will be a Green indicator in the bottom left of the window, with the message *Link OK*



- ⇒ If there is a problem with the electrical connection, or if the Comms-settings not correct :
- After about six seconds a pop-up will appear saying *Remote Gauge Error* : click **OK** to close the error pop-up

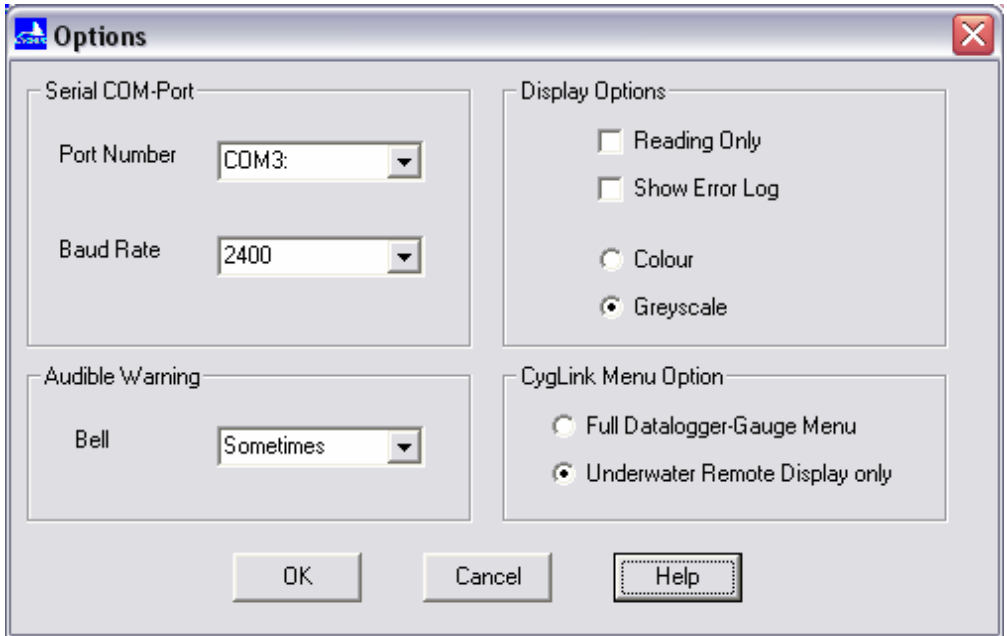


- There will then be a Red indicator in the *CygLink* main window, with an error message showing *Link Timeout*
- ⇒ Check that the Gauge has been correctly connected, and that the power supply has been turned on : if there is no problem with the electrical connection then it may be necessary to adjust the Comms-settings  
See : [Adjusting the Comms-settings using CygLink](#), page 30

① *If you are having difficulty getting a valid connection from the Gauge to the PC : try using the supplied Test Cable to verify that the Gauge is operating correctly*

## Adjusting the Comms-settings using CygLink

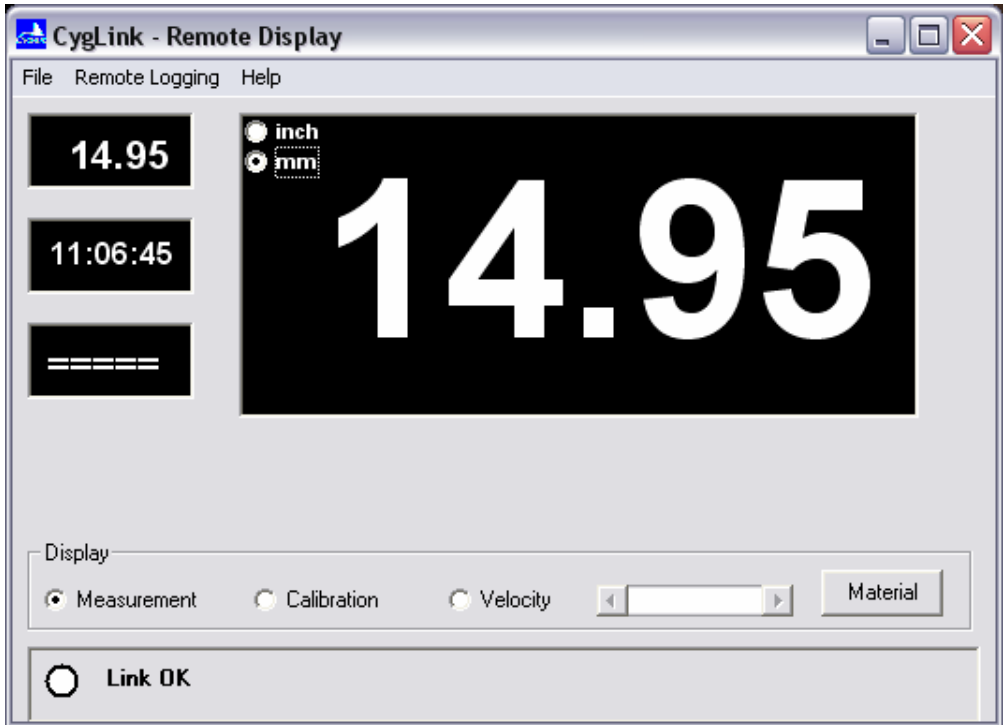
- ⇒ Click on the *File* option on the menu-bar.
- ⇒ Move the cursor down, and click on *Options...*
  - The *Options* window will open – change settings as needed :
    - ⇒ Change the *Port Number* to match the COM-port that the Gauge is to be connected to
    - ⇒ Change the *Baud Rate* to match the rate that the Gauge is preset for  
*The Gauge is supplied with Baud Rate normally preset to 2400*



- ⇒ For improved contrast in the Measurement Display - if you are using a Laptop with a monochrome display : click on the *Greyscale* button in the *Display Options* box
- ⇒ Click **OK** to close the *Options* window, which will save the new settings
  - If the Comms-settings are correct the Red indicator in the *CygLink* main window will immediately change to Green

**USING THE CYGLINK REMOTE DISPLAY PROGRAM****CygLink main window**

This is the typical measurement screen as it will appear when the Gauge is in use and is obtaining a measurement :



✘ *If the Display box does not appear in the screen : this indicates a fault in the internal settings of the Gauge – in this case the Gauge must be returned to Cygnus for servicing*

**Measurement Displays**

There are two Measurement displays in the CygLink main window :

- the Current Reading being sent from the Gauge appears in the large display
- the Last Reading appears in the small display  
*this reading is maintained after the Gauge stops sending new readings :*
  - ⇒ if the Probe is no longer in contact with the material being measured
  - ⇒ if a new Reading cannot be obtained from the material
  - ⇒ if the Gauge is turned off
  - ⇒ if the Datalink is disconnected



### **Echo-Strength Bargraph**

The green bargraph display indicates ultrasonic coupling-strength :

- A single flashing bar means there is no contact at all
- One or two bars, plus a flashing bar, means there is not enough contact to obtain three echoes
  - ⇒ This indicates either poor contact, or badly corroded material
  - ⇒ This can also occur if the Probe membrane has been fitted incorrectly
- Three bars, plus one flashing bar, means there is good contact, but a valid triple-echo measurement has not been obtained
  - ⇒ This probably indicates badly corroded material
- Four bars, plus one flashing bar, shows an accurate triple-echo measurement

### **Measurement Units**

CygLink is able to display Measurement in either Metric or Imperial units :

- Click on the on-screen Units switch button to toggle between Metric [mm] and Imperial [inch] units.
- Readings will stored in the Log-File in the same Units as the current on-screen Measurement display
- CygLink saves the current Units-setting, so that the same Units will be displayed next time CygLink is started

### **Display Selector**

The Display box normally has the **Measurement** option selected so that the large-reading display is showing the Current Reading

Calibration is achieved by clicking on one of the other options in the Display box – the large-reading display is then used to provide Calibration :

- ⇒ Click on **Calibration** : to Calibrate by adjusting the displayed reading using the slider
- ⇒ Click on **Velocity** : to Calibrate by adjusting the Velocity of Sound using the slider
- ⇒ Click on **Material** : to Calibrate by selecting the Material from a list

See : [Calibrating the Gauge](#), page 36

### **Lost Datalink**

If the connection from the Gauge to the PC should be broken during normal operation a Remote Gauge Error message box will pop-up, and a Red indicator with the message Link Timeout will appear in the CygLink main window :

- If the problem is temporary and clears itself, the message box will automatically disappear
- Otherwise click **OK** to close the message box – the message box will not reappear in this session of operation, but the Red indicator and Link Timeout message will remain until the connection has been re-established

## Remote-Logging

CygLink has a facility for remote-logging of Readings from the Gauge, which are then saved directly to file :

⇒ *Remote Datalogging :*

see : *Remote-Logging to Datalogger Files*, page 68

- Readings can be saved to any of the *Datalogger* file-types which have been created using *CygLink*  
see : *Creating Template-Files Using CygLink*, page 52
- A separate Logging window opens, which displays all of the current Readings, with controls to navigate to anywhere within the structure of the datalogging file - which allows non-sequential datalogging
- Readings are logged using an on-screen **LOG** button
- Results can be converted to a printable Report file  
see : *Creating a Report File*, page 48

⇒ *Alternatively - Quick-Logging :*

see : *Quick-Logging*, page 65

- to collect measurements immediately, without the need to first create a new file :  
Readings can be logged to a simple *Quick-Logging* file, which adds each new Reading to an incrementing list
- all of the logged Readings appear in a list within the main *CygLink* window
- Readings are logged using an on-screen **LOG** button
- Results can be printed immediately

① *Readings cannot be logged unless there is a valid datalink from the Gauge: the **LOG** button is greyed-out if there is no link, or if the link becomes lost*

## ***MEASURING WITH THE GAUGE***

*Controls*

*Calibrating the Gauge*

*Measurement*

*Probe Usage*

*Troubleshooting*

*General Points on Thickness Gauging*

*A Guide to Sound Velocities*

*Table of Sound Velocities*

## **CONTROLS**

*The Cygnus 1 ROV Gauge has no controls accessible to the user*

### **Switching the instrument on**

The instrument turns on immediately that there is power connected.

There will be an initial delay of about 2 seconds, and then the instrument will begin continuously transmitting thickness-measurement data

### **Switching the instrument off**

The instrument is switched off by disconnecting the power

## **Calibration**

*Calibration adjusts the Gauge Sound Velocity setting for the material under test.*

*The Cygnus 1 ROV Gauge does not have an on-board Calibration facility – instead Calibration is achieved using the CygLink Remote Display software, which has a range of Calibration options.*

See *Calibrating the Gauge*, on page 36

A *Guide to Sound Velocities* can be found on page 43

- Cygnus 1 ROV Gauge has a on-board high-accuracy crystal oscillator, which is preset for a Sound Velocity of 6400 m/s  
*The Calibration is stable and there is no warm-up time.*
- There is no zero-adjustment since the multiple-echo technique zeros automatically – the timing starts when the first echo is received.
- There is no ‘ranging in’ since the straight beam path of the single-crystal Probe ensures that the timing is related to the thickness – the linearity is perfect.
- *Calibration is vital* : whenever a reading is suspect, check that the test material is the same as the one for which the instrument has been Calibrated.

## CALIBRATING THE GAUGE

### ➤ Calibration on a Test Sample

If possible : the Gauge should always be calibrated on the actual Material-under-Test, or on a measured test-sample of the same material

### ➤ Calibration by Sound Velocity

If there is no test-sample available : the Gauge can be calibrated by setting the value of Sound Velocity directly

### ➤ Calibration by Named Material

CygLink provides a list of commonly-used engineering materials – Calibration can be achieved by selecting from this list

### ➤ Reading Conversion - not recommended

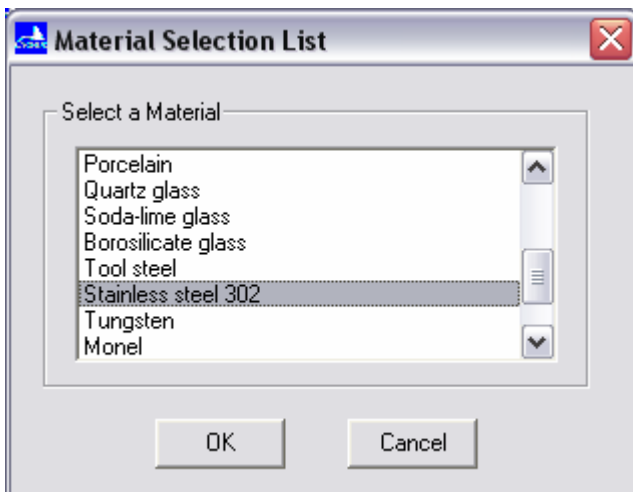
Log Readings with the Calibration preset to Mild Steel [5920 m/s or 0.2332 in/us], and then later to use a Conversion FactorSee: Reading Conversion, page 43

### Calibration on a Test Sample

- ⇒ Turn the Gauge on as normal, and place the Probe on the measured test-sample, and ensure that a stable reading is being obtained
- ⇒ Click on the **Calibration** option in the *Display* box
- ⇒ Move the slider until the displayed reading is exactly the same as the known thickness of the test-sample: *the Gauge is now Calibrated*

### Calibration by Named Material

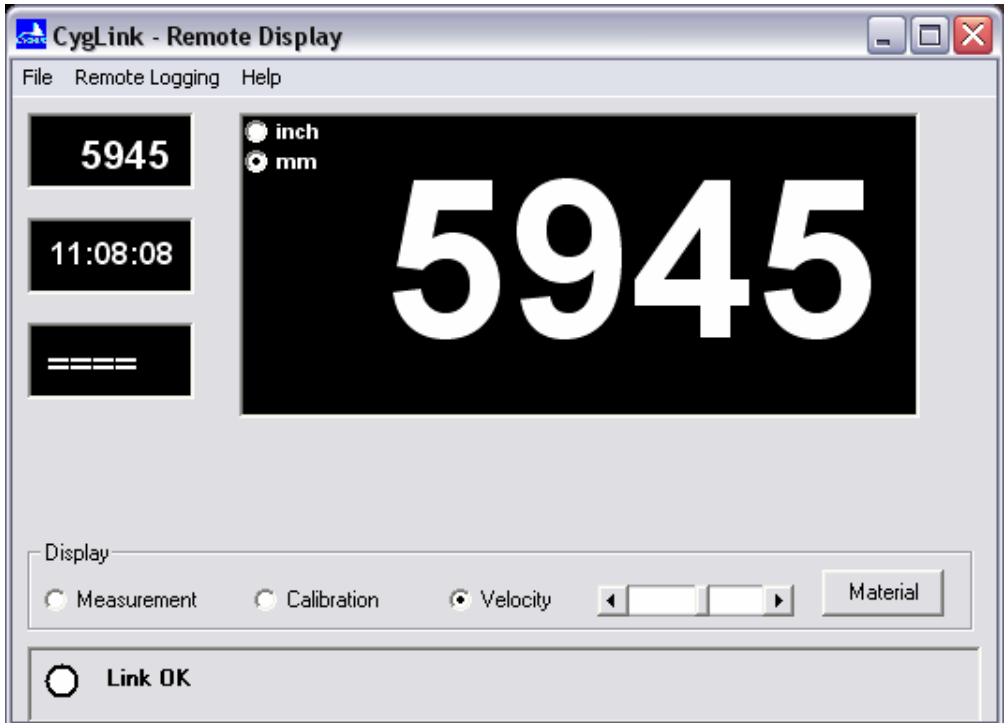
- ⇒ Click the **Material** button in the *Display* box – the *Material Selection List* will open :



- ⇒ Click in the list to select the suitable Material, then click **OK** :  
*the Gauge is now Calibrated for this Material*

### Calibration by Sound Velocity

- ⇒ Click on the **Velocity** option in the *Display* box – the Reading display will now show the current Velocity of Sound value
- ⇒ Move the slider until the desired Velocity of Sound value is displayed:  
*the Gauge is now Calibrated for this Velocity value.*



- ① *Sound Velocity is displayed in the same units as the Gauge is currently preset for. For example - if the Gauge is calibrated for Steel [5920 m/s or 0.2332 in/us] :*
    - *the display will show '5920' if the display is set for Metric[mm] units*
    - *the display will show '2332' if the display is set for Imperial [inch] units*
- See [Table of Sound Velocities](#), page 44.

### When Calibration is complete

- ⇒ Click on the **Measurement** option in the *Display* box – the main Reading display will return to normal measurement, and the new Calibration-setting will be stored
- ① **To check current Velocity-setting** : click on the **Velocity** option at any time if you want to check the current setting for the Velocity of Sound value.
  - ① CygLink has a Sound Velocity range of 1000 m/s to 9995 m/s when preset for Metric units, and 0.0394 in/us to 0.3935 in/us when preset for Imperial units.

## MEASUREMENT

The Cygnus 1 ROV Gauge is designed to provide accurate, reliable readings on most types of surfaces using the Multiple-echo method described on page 8

### Preparing to take Measurements

- ⇒ Ensure that the Probe is correctly fitted with a membrane, and with membrane oil correctly applied. See *Probe / Knurled-Ring Assembly*, page 20
- ⇒ We recommend that the complete Cygnus 1 ROV System should always be connected together, and test measurements made, before deployment – and if there are any datalink problems : use the supplied Test-cable to confirm the datalink is OK

### Measurement Underwater

- ⇒ When measuring underwater : there is no need to use a couplant - the water itself is a good couplant
- ⇒ It is not essential for the Probe to be in direct contact with the surface of the material being measured, but the Probe should be as close as possible for maximum echo-strength
- ⇒ The Probe must always be facing directly towards the surface of the material – if the Probe is facing at an angle it will not be possible to obtain a multiple-echo measurement

### Measurement in Air

- ⇒ When measuring in air : always use a couplant to enable ultrasound to enter the test material.  
*Water, oil or gel are all suitable couplants, depending on application and preference.*
- ⇒ Remove all scale, calciferous marine growth, dirt or loose coating and brush or scrape the test area clean.
- ⇒ Protective coatings such as paint or epoxy resin need not be removed, provided that their adherence is good.
- ⇒ Place the Probe-face on the clean, lubricated test surface and make firm contact.

### Echo-Strength Bargraph

The green bargraph display indicates ultrasonic coupling-strength :

- A single flashing bar means there is no contact at all
- One or two bars, plus a flashing bar, means there is not enough contact to obtain three echoes
  - ⇒ This indicates either poor contact, or badly corroded material
  - ⇒ This can also occur if the Probe membrane has been fitted incorrectly
- Three bars, plus one flashing bar, means there is good contact, but a valid triple-echo measurement has not been obtained
  - ⇒ This probably indicates badly corroded material
- Four bars, plus one flashing bar, shows an accurate triple-echo measurement

## **PROBE USAGE**

*Cygnus 1 ROV Gauge is supplied with a single Ultrasonic Probe. More than one Probe-type is available, depending on the application*

*Probes are not freely interchangeable - if you want to use the Gauge with a Probe of a different Frequency : the Gauge must be returned to Cygnus, so that it can be configured to operate with the new Probe*

### **Probe Selection**

**Probe-diameter** - apart from the physical limitations of the Probe size, the diameter of the crystal affects the probe performance :

- Larger diameter crystals produce more energy, which in turn gives better penetration.
- Smaller diameter crystals produce a narrower beam, which is a distinct advantage when looking for small reflectors - they are particularly useful on tubes of small diameter

**Probe-frequency :**

- Lower-frequency Probes are able to penetrate into corroded materials more easily, but are not suitable to measure thin materials
- Higher-frequency Probes are needed to measure thin material, but may not have enough penetration power to make multiple-echo measurements

### **Probe face colour**

*Cygnus 1 ROV Gauge should only be used with soft-face Probes, as supplied by Cygnus.*

- ① The colour of the Probe face indicates the Probe-frequency  
See Table of Probe Types, page 12

### **Using Probes at high temperature**

Heat can damage the Probe crystal. In Cygnus Probes the crystal is very near to the face. *The higher the temperature of the test material and the longer the contact with the Probe, the greater the likelihood of eventual damage to the crystal.*

- *At temperatures above normal, ie : above 75°C (170°F), always avoid prolonged contact.*
- *Teflon (PTFE) membranes are available for measurements up to 150 °C (318 °F).*
- *Thin oil couplants evaporate rapidly at high temperature – high melting-point grease is more suitable in such cases.*



## **TROUBLESHOOTING**

### **If there is no datalink from the Gauge**

- There will always be a green indicator and a *Link OK* message in the *CygLink* main window while the PC is receiving communication from the Gauge – if not :
  - ⇒ *Check that the Gauge is correctly connected to a spare Serial-port on the PC*  
See : *Data & Power Connections*, page 21
  - ⇒ *Check that CygLink COM-port setting is the same as the Serial port which the Gauge is connected to.*  
*Check that the Baud-Rate setting is correct [normally set to 2400]*  
See : *Adjusting the Comms-settings using CygLink*, page30
  - ⇒ *Check that the correct power is being supplied to the Gauge*  
See : *Gauge Specification*, pages 9, 10, 11
- If the settings are all correct, but there is a red indicator and link error messages
  - ⇒ *It may be necessary to add cable-termination at the surface end of the cable*  
See : *Data and Power Connection*, page 21
- If setting-up the *Cygnus 1 ROV System* for the first time :
  - ⇒ *Connect the system together using the supplied Test-Cable to confirm the Gauge has the correct connections to operate*
  - ⇒ *Confirm that the PC has a spare Serial port installed – use Windows® Control Panel to check System settings*
- If the datalink is OK, but there is no *Display* box in the middle of the *CygLink* main window :
  - ⇒ *This indicates an internal failure in the Gauge configuration*  
*The Gauge must be returned to Cygnus for servicing*  
See : *CygLink main window*, page 31

### **If it is difficult to obtain any reading**

- If there is only a single flashing bar in the *Echo-Strength* display - this means the Gauge is not receiving any echoes :
  - ⇒ *Check that the Probe-assembly is properly attached to the Gauge*  
See : *Fitting the probe-Assembly*, page 18
  - ⇒ *Confirm that the Probe-cable is not damaged*
- If there is mostly one fixed bar plus one flashing bar this means that the Gauge is having difficulty obtaining more than one echo :
  - ⇒ *This indicates either poor contact, or badly corroded material*
  - ⇒ *This can also occur if the Probe membrane has been fitted incorrectly*  
*Check the Probe and its membrane are properly assembled*  
See : *Probe / Knurled-Ring Assembly*, page 20

- If there is up to three fixed bars plus one flashing bar, but never any reading - this means the Gauge is receiving unrelated echoes from more than one reflector :
  - ⇒ *on heavily corroded areas this is often a problem :*  
*try check measurements on an adjacent area of the same material*
  - ⇒ *check the Gauge and Probe together on a test block :*  
*if there is still no reading the Gauge may require servicing*

### **If readings obtained are erratic or unstable**

- Check that the Probe-assembly is properly connected to both Probe and Gauge, and that the O-Rings are properly seated in their correct positions
  - ⇒ *False readings can occur if the Probe-assembly has not been fully screwed onto the Gauge-body*See : Fitting the Probe-module, page 18
- Check that the Probe and its membrane are correctly assembled with sufficient couplant
  - ⇒ *Air bubbles inside the membrane can cause false readings*
  - ⇒ *Membrane stretched too tightly over the Probe-face can cause false readings*
- Ensure that the Probe-frequency is suitable for the *probable minimum thickness* of the material being measured
  - ⇒ *Probe-frequency too low causes doubling and tripling of the actual thickness*See Probe Usage, page 39

### **Common reasons which cause difficulty getting readings**

- Is the Probe-membrane fitted correctly ?  
See : Probe/Knurlled Ring Assembly, page 20
  - ⇒ *Check that there is a thin layer of oil between the membrane and Probe-face, and with no air-bubbles trapped*
  - ⇒ *Check that the membrane has not been stretched too tightly over the Probe-face*
- Is the Probe-cable OK ?
  - ⇒ *Check that the cable is in good condition*
  - ⇒ *Check that the Probe-assembly is correctly fitted onto the Gauge-body*
- Is the material measurable at all ?
  - ⇒ *Are the front and back faces of the material parallel ?*
  - ⇒ *Is the material not too corroded ?*
  - ⇒ *Is the material not too thin for the Probe being used ?*

*It is often worth confirming that the Gauge is operating OK using a test sample – and also to confirm that the material can actually be measured by ultrasonic multiple-echo thickness measurement.*

---

**Other reasons for difficulty in getting readings**

- Is the Probe-frequency correct for the Gauge ?
  - ⇒ *Cygnus 1 ROV Gauge is always supplied with the Gauge and Probe correctly configured to operate together - check that the Gauge is still being used with the original Probe*
  - ⇒ *If this is not the case the Gauge and Probe should be returned to Cygnus, to be configured to work together*
  
- *Measuring in Air* : is there adequate couplant applied to the material being measured, and is the surface properly prepared ?  
See : *Preparing to take Measurements*, page 38  
*Check that there is plenty of couplant applied, and that there are no air-gaps between the Probe and the material when measuring in air*

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**GENERAL POINTS ON THICKNESS GAUGING**

- On very rough surfaces, and especially if both sides are badly corroded, it is often necessary to move the Probe around to locate a reflector. Sometimes a slight rocking movement can help find reflectors which are otherwise impossible.
  
- *Measuring in Air* : always ensure that there is plenty of couplant present for good contact, but beware that on a pitted surface the Gauge may just measure the couplant-filled pit – always avoid measuring directly over external pits.
  
- Beware that in extreme conditions, or if the plate is of poor quality and contains many inclusions, the ultrasound will be scattered to such an extent that measurement may not be possible.
  
- Beware that the multiple-echo technique will not work if the front and back surfaces of the material being measured are not close to parallel; also note that long narrow bars cannot be gauged along their length with the multiple-echo method.
  
- The instrument should not be used near arc-welding equipment, as this affects the performance of the Gauge.

## A GUIDE TO SOUND VELOCITIES

### Table of Sound Velocities

- Velocities can vary according to the precise grade and processing conditions.  
This table is included as a guide only.  
*Wherever possible, the Gauge should always be calibrated on the material under test.*
- These Velocities are given in good faith and are believed to be accurate within the limits described above.  
*No liability is accepted for errors.*
- Velocities given are the compressional wave velocity  $c_L$ .

### Reading Conversion

*In some circumstances it may not be possible to Calibrate the Gauge :*

- ⇒ If there is no test-sample available for the Material which is to be measured
  - ⇒ *And* : if the Velocity of Sound for the Material to be measured is not currently known
- To allow uncalibrated measurements to be made, use this procedure :*

- *When measuring :*  
the Gauge should be initially calibrated for Mild Steel, by selecting Mild Steel from the Materials List - see : Calibration by Named Material, page 36
- *Later, when preparing a report :*
  - ⇒ Choose the actual material from the *Table of Sound Velocities*, or otherwise find out the Velocity of Sound
  - ⇒ convert the readings by multiplying each reading by by the *Conversion Factor* for the material being measured - see : Table of Sound Velocities, page 44

**Example** – if the Gauge is calibrated for Mild Steel [5920 m/s], and a reading is being taken on Copper [4700 m/s] :

$$T = t \times V_{\text{COPPER}} / V_{\text{STEEL}} = t \times 4700 / 5920 = t \times 0.794$$

thus : **T = t x f**

where : **T = true thickness of Copper being measured**

**t = actual reading obtained**

**f = Conversion Factor**

$V_{\text{COPPER}}$  = Sound Velocity in Copper : 4700 m/s

$V_{\text{STEEL}}$  = Sound Velocity in Steel : 5920 m/s

### Conversion Factor f :

- *Conversion Factor* is given for various materials in the Table of Sound Velocities, page 44
- If the Material does not appear in the Table, but the Velocity of Sound,  $V_{\text{MATERIAL}}$ , is known for the Material : calculate conversion factor,  $f = V_{\text{MATERIAL}} / V_{\text{STEEL}}$

**TABLE OF SOUND VELOCITIES**

<b>Material</b>	<b>Velocity of Sound</b>		<b>Conversion Factor</b>
	<b>m/s</b>	<b>in/us</b>	
<i>Aluminium</i>	6320	0.2488	1.068
<i>Epoxy</i>	2500	0.0986	0.422
<i>Copper</i>	4700	0.1850	0.794
<i>Grey Cast Iron</i>	4600	0.1812	0.777
<i>Magnesium</i>	5770	0.2272	0.975
<i>Nickel</i>	5630	0.2218	0.951
<i>Acrylic</i>	2730	0.1076	0.461
<i>Nylon (Polyamide)</i>	2620	0.1032	0.443
<i>Porcelain</i>	5600	0.2206	0.946
<i>Glass</i>			
<i>Quartz</i>	5570	0.2194	0.941
<i>Soda-lime</i>	6000	0.2362	1.014
<i>Borosilicate</i>	5640	0.2222	0.953
<i>Steel</i>			
<i>Mild</i>	5920	0.2332	1.000
<i>Tool</i>	5870	0.2312	0.992
<i>Stainless 302</i>	5660	0.2228	0.956
<i>Tungsten</i>	5460	0.2150	0.922
<i>Monel</i>	5400	0.2126	0.912
<i>Inconel</i>	5700	0.2244	0.963
<i>Phosphor Bronze</i>	3530	0.1390	0.596
<i>Brass (70% Cu)</i>	4700	0.1850	0.794

## ***WORKING WITH LOG-FILES***

*About Log-Files*

*Viewing Log-Files*

*Creating a Report File*

*Printing Files using CygLink*

*File Format*

## ABOUT LOG-FILES

### Managing Datalogging using CygLink

*CygLink would normally be used to manage Datalogging in this way :*

#### ➤ **Preparation**

- ⇒ Create new template-files on your PC using *CygLink*  
see : [Creating Template-Files Using CygLink](#), page 52
- **Quick-Logging** : *there is no need to create a template-file*

#### ➤ **Datalogging**

- ⇒ Open a template-file to begin a new logging session
- ⇒ **Or** : reopen an existing log-file to continue a logging session
- ⇒ **Or** : open a *Quick-Logging* file for instant datalogging

#### ➤ **Creating Reports**

- View the Log-Files using *CygLink File Viewer* – see : [Viewing Log-Files](#), page 47
- ⇒ If you want *CygLink* to produce a text-based Report File :  
use the *Create Report* option – see : [Creating a Report File](#), page 48
  - ⇒ **Otherwise** use a spreadsheet program to read the file and prepare your report

### Files used at each stage of the Datalogging process

*CygLink uses three different types of file during Datalogging :* [see : [File Format](#), page 51]

#### ➤ **New Files [Templates]**

*CygLink creates templates, which are empty files used for datalogging*

- ⇒ A template-file is opened at the start of a datalogging, and is then saved as a *Gauge Log-File* at the end of the session
- ⇒ Templates can be used once, or many times over with a new name assigned each time the file is saved after a datalogging session

#### ➤ **Gauge Log-Files**

*Gauge Log-Files are the files saved, at the end of a datalogging session*

- ⇒ These files can be viewed using the *CygLink File Viewer*
- ⇒ They can be converted into *Report Files* using the *File Viewer*
- ⇒ **Or** : otherwise the file can be read into a spreadsheet program

#### ➤ **Report Files**

*CygLink can convert the Gauge Log-Files into simple text-based Report Files*

- ⇒ Report Files can be printed directly from *CygLink*

① *New Template-Files, and Gauge Log-Files, can be printed from CygLink, but this option is for reference only, and is not recommended for creating Reports*

---

## VIEWING LOG-FILES

### **Viewing Log-Files :**

- After Gauge Log-Files have been completed, they may be viewed in *CygLink* using the *View Log-File* menu
- There is a dedicated *Viewer* for each of the Datalogger file-types

① *If you want to turn the Gauge Log-File into an easy-to-read Report file you can do so now, using the Create Report option from the File Viewer.*

① *Otherwise, if you want to create a Report using your own format, you must do so by reading the Gauge Log-File into a word processor or spreadsheet program*

### **To View a Log-File**

- ⇒ From the *CygLink* main menu select **File → View Log-File ▶** , then select file-type to be viewed
  - The *File Viewer* for the chosen file-type will open
- ⇒ In the *File Viewer* window : click **Open** to select a file to be viewed
  - The *Open File* dialog will appear
- ⇒ Navigate to the file you want to view, then click **Open**
  - The contents of the file will now appear in the *File Viewer* window
  - You now have the option of creating a Report file  
see : *Creating a Report File*, page 48



## CREATING A REPORT FILE

### Creating a Report :

- Report files can be automatically generated from the *CygLink File Viewer*, and also during a *Remote-Logging* session
- Report files are text-only files, with tab-separated values : they may be viewed from *Windows Notepad*, or may be loaded into a spreadsheet program for further processing.
- Report files can be printed directly from CygLink  
see : *Printing Files Using CygLink*, page 50

### To Create a Report File

- ⇒ With the required Log-File open in the *File Viewer* window click **Create Report** :  
The *Report Details* dialog will appear :

**Report Details**

Enter optional details to be added to the Report

Where the Inspection was performed

Name of Inspection Site

Inspection Address

Inspected for Client Company

Inspection details

Report Number

Type of Inspection

Start date

Finish date

Company details

Inspection Company

Name of Inspector

Add to Report Skip Quit without Save Help

***This is optional :***

- ⇒ Enter whichever details in the boxes that you wish to appear in the Report :  
Only filled-in entries will appear in the Report - blank entries will be ignored
- ⇒ ***either*** : click on **Add to Report** to continue  
All filled-in entries will appear at the top of the Report
- ⇒ ***or*** : click on **Skip** to continue  
There will then be no entries added to the Report
- ⇒ ***or*** : click on **Quit without Save** to cancel creating a Report

*A window will now pop-up prompting you for a filename :*

- ⇒ Navigate to the required directory, and then type a name in the *File name* box.  
Click **Save** button to save the Report file.  
*By default Report files are saved with a .LOG file extension*

*The Report file is now saved automatically to your hard disk - if the Report was created during a Remote-Logging session then CygLink will return to the logging session*

## PRINTING FILES USING CYGLINK

*CygLink has a facility to print all three types of Log-Files – normally only Report Files would be printed :*

### ➤ **Report files**

*Report files are automatically generated from the CygLink File Viewer, using the Create Report option - see : [Viewing Log-Files](#) and [Creating a Report File](#), page 47*

- ⇒ These are complete Reports which provide full detail of the data collected in an easy to read form
- ⇒ *Report files* can also be read into word processor or spreadsheet program for further formatting

*Other file types can be printed for reference, if required :*

### ➤ **Gauge Log-files**

*Gauge Log-Files are the files produced after a datalogging session*

- ⇒ The printed output is in a simple text form, and is not intended to be used directly to produce the final report – they should only be printed for reference
- ⇒ For more advanced formatting the file should be loaded into a word processor or spreadsheet program, such as *Microsoft Excel*
- ⇒ Alternatively use *CygLink File Viewer* to convert the Gauge Log-File into a *Report* file, as above

### ➤ **New Log-Files**

*New Log-Files are the empty template files created by CygLink, before they have been sent to the Gauge*

- ⇒ these should only be printed for reference

① Each type of Log-file is saved with special default file-extensions see : [File Format](#), page 51.

① Log-files may be viewed and edited using Windows *Notepad* – very large files (larger than 64KB) should be opened using Windows *Wordpad*..

### **To print a Log-File from CygLink**

- ⇒ Select **File → Print ▶** on the *CygLink* menubar, and then select the required Log-File option, as described above...
  - *This brings up the File Open window :*
- ⇒ Navigate to the subdirectory of the File you want to print, and then click on the filename
- ⇒ With the File selected, click on the **Open** button
  - *This brings up the Print window:*
- ⇒ Click on the **Print** button to print the File from the default printer
- ⇒ **Or** : select from the list of printers, if available, then click **Print**  
*The entire File will now be printed*

## FILE FORMAT

**✘ Only files created by CygLink may used for Datalogging**

### CygLink File Extensions

*CygLink creates files with special file-extensions to ensure no other files are used*

#### New Files [Templates]

*CygLink is used to create new template-files, which are assigned filenames according to the file-type :*

- Single-Record : <filename>.SS0
- MultRecord : <filename>.MS0
- Key-Point : <filename>.KS0
- Grid-Point : <filename>.GS0

#### Gauge Log-Files

*Gauge Log-Files saved at the end of a datalogging session are again assigned filenames according to the file-type :*

- Single-Record : <filename>.SS1
- MultRecord : <filename>.MS1
- Key-Point : <filename>.KS1
- Grid-Point : <filename>.GS1

#### Report Files

*Gauge Log-Files can be opened using the CygLink File-Viewer function, and the file may then be converted into a Report format, with a default name :*

- All file-types : <filename>.LOG

#### CygLink File Format

*Log-files created by CygLink are saved in tab-separated text format, intended for opening by a spreadsheet program.*

① *For a full description of the Log-file format open CygLink Help from the CygLink menubar*

*Gauge Log-Files saved after datalogging may also be opened using the CygLink File-Viewer option, and then saved in a Report format*

*Report files are also saved in a tab-separated format, and can be opened by either a word processor or a spreadsheet program*

## ***CREATING TEMPLATE-FILES USING CYGLINK***

*About Template-Files*

*Creating a Single-Record File*

*Creating a Multi-Record File*

*Creating a Key-Point File*

*Creating a Grid-Point File*

## ABOUT TEMPLATE-FILES

*CygLink offers a facility for creating new template-files : these are empty files used for datalogging*

*CygLink provides four different formats for templates, allowing for various different physical situations where measurements are to be logged :*

- Single-Record : see *Creating a Single-Record File*, page 54
- Multi-Record : see *Creating a Multi-Record File*, page 55
- Key-Point : see *Creating a Key-Point File*, page 56
- Grid-Point : see *Creating a Grid-Point File*, page 61

① *CygLink can be used at any time to create new Files – there is no need to have a Gauge connected to the PC.*

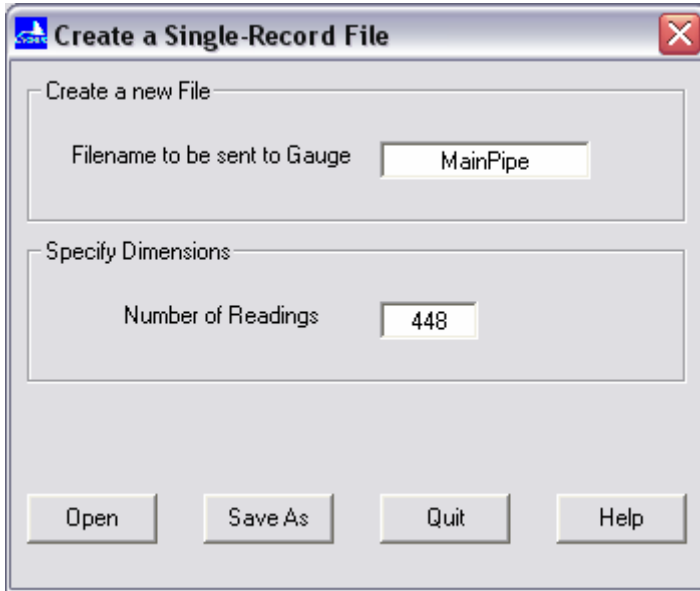
*See Installing the CygLink Program, page 25, if CygLink has not yet been installed.*

### To create new Files on the PC

- ⇒ Start *CygLink* program
  - If there is no Gauge connected a message box will appear : *Remote Gauge Error*  
*It is not necessary to have a Gauge connected when creating files using CygLink*
    - ⇒ Click on the **OK** button to remove the message box
- ⇒ Select **File → Create a New File ▶** option on the menu-bar
- ⇒ Click on one of the four file-types available :
  - **Single-Record...**
  - **Multi-Record...**
  - **Key-Point...**
  - **Grid-Point...**

✘ **File Format** : only files created by *CygLink* may be used for datalogging – *CygLink* creates files with special default file-extensions to prevent other files being used.

See : *File Format*, page 51

**CREATING A SINGLE-RECORD FILE****Create a new Single-Record File**

- ⇒ Click in the *Filename to be sent to Gauge* box, then enter a name of up to 8 characters, made up of numbers and letters
- ⇒ Click in the *Number of Readings* box, then enter a number between 1 and 2000

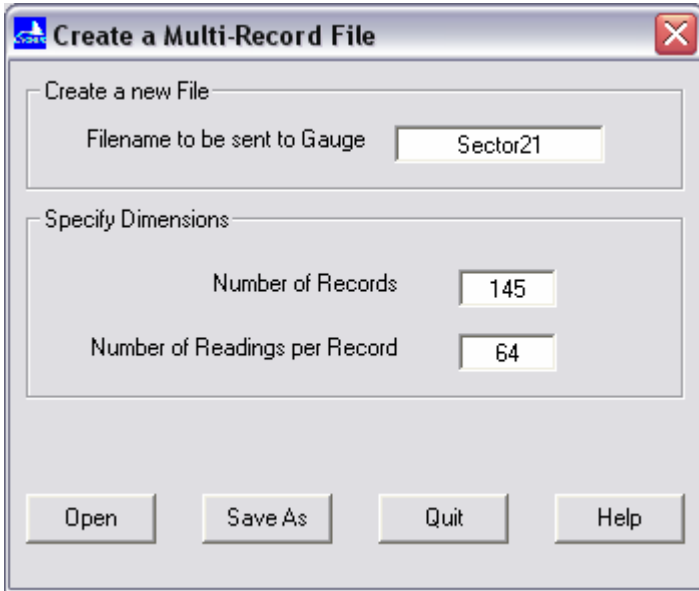
**Open an existing Single-Record File**

*An existing Single-Record file can be used as a template to create new files :*

- ⇒ Click on the **Open** button  
*The Open Single-Record File dialog window will open :*
- ⇒ Navigate to the location of the existing Single-Record file required, and then double-click on the filename  
*The file will open and its values will be copied into the boxes in the Create a Single-Record File window : edit the Filename and Dimensions if required*

**Save and close the new File**

- ⇒ Click on the **Save As** button to save this new File  
*The Save Single-Record File dialog window will open :*
- ⇒ Click the **Save** button to save the suggested filename into the current directory
- ⇒ **Or** : change the Filename and/or Directory if desired, then click **Save**  
*The new file is now saved to disk, ready for use in a new datalogging session*

**CREATING A MULTI-RECORD FILE****Create a new Multi-Record File**

- ⇒ Click in the *Filename to be sent to Gauge* box, then enter a name of up to 8 characters, made up of numbers and letters
- ⇒ Click in the *Number of Records* box, then enter a number between 1 and 9999
- ⇒ Click in the *Number of Readings* box, then enter a number between 1 and 100

**Open an existing Multi-Record File**

*An existing Multi-Record file can be used as a template to create new files :*

- ⇒ Click on the **Open** button  
*The Open Multi-Record File dialog window will open :*
- ⇒ Navigate to the location of the existing Multi-Record file required, and then double-click on the filename  
*The file will open and its values will be copied into the boxes in the Create a Multi-Record File window : edit the Filename and Dimensions if required*

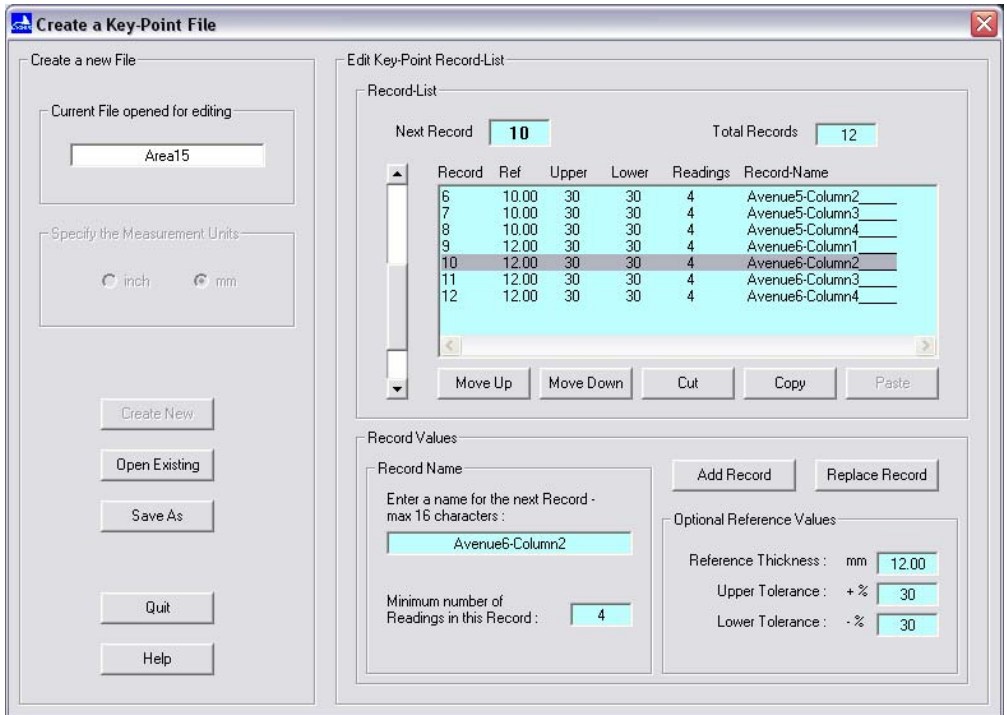
**Save and close the new File**

- ⇒ Click on the **Save As** button to save this new File  
*The Save Multi-Record File dialog window will open :*
- ⇒ Click the **Save** button to save the suggested filename into the current directory
- ⇒ **Or** : change the Filename and/or Directory if desired, then click **Save**  
*The new file is now saved to disk, ready for use in a new datalogging session.*



## CREATING A KEY-POINT FILE

Creating a new Key-Point file can be a lengthy process – the editing process can be stopped and saved by clicking Done, and the file can be reopened later to continue editing



### **To create a new Key-Point File**

First enter a filename :

- ⇒ Click in the *Filename to be sent to Gauge* box, then enter a name of up to 8 characters, made up of numbers and letters.

Now set the *Measurement Units* :

- ⇒ click on the desired button for the *Measurement Units*  
*CygLink will automatically switch to measure in these units when this file is in use*
- ⇒ Click on the **Create New** button :  
The *Add a Key-Point Record* dialog will become active, and you can now begin adding a series of Key-Point Records

### **To open an existing Key-Point File**

An existing Key-Point file can be used as a template to create new files, or it can be re-opened to continue a previous editing session :

- ⇒ Click on the **Open Existing** button

*The Open Key-Point File dialog window will open :*

- ⇒ Navigate to the Directory where the existing file was saved, then click on the filename
- ⇒ Click the **Open** button to re-open the file  
*The file will open, and its values will be copied into the boxes in the Edit Key-Point Record-list window*

### **Creating a Key-Point file**

- A *Key-Point file* consists of a set of *Key-Point Records*, and each file can contain up to 999 *Records*
- Each *Key-Point Record* has an individual set of values : a *Name* and a specified minimum number of required *Readings*, and an optional *Reference Thickness* plus *UpperTolerance* and *Lower Tolerance* figures
- New *Records* can be added to the end of the list of *Records*
- The contents of each *Record* in the list can be edited
- *Records* can be cut, copied and pasted within the list, and the order of the *Records* in the list can be changed

Create a new file by entering a series of *Key-Point Records* :

- In a new file : the *Total Records* box will initially show zero *Records* added so far
- *Next Record* box will initially show *Record* number 1, as the next *Record* to be added
- *Both counters will increase each time the **Add** button is pressed*

---

## To Add new Key-Point Records

### *Move the slider down to the bottom :*

- The *Next Record* box will show that the next Record is to be numbered one more than the current *Total Records* value
- Nothing will be highlighted in the *Record-list* box, because a new Record is to be added to the end of the list

### *Enter a name for the next Record :*

- ⇒ Click in the *Edit a name for the next Record* box, then enter a name of up to 16 characters, made up of letters, numbers, spaces and hyphens
- ⇒ **Or** : click in the box and edit the existing name

### *Enter optional values for the current Key-Point Record, or else leave as default :*

- ⇒ **Optionally** : click in the *Number of Readings* box, enter a number between 1 and 100  
This is the least number of Readings which must be taken at this Key-Point
- ⇒ **Optionally** : click in the *Reference Thickness* box, then enter a number between 0 and 75 mm [or between 0 and 3 inches, if units are set to inches]  
Set the value to 0 if Reference Thickness if not required
- ⇒ **Optionally** : enter Alarm percentages based on the Reference Thickness value  
Either an *Upper Tolerance*, or a *Lower Tolerance*, or both may be entered  
Set either value to 0 if not required

### *Add the new Record to the list :*

- ⇒ When all of the values desired values have been entered click on the **Add** button  
*The Key-Point Record will be added to the list,  
the Next Record pointer will increase by one,  
and the Total Records counter will increase by one*
- ⇒ Use the scroll bar to change the *Next Record* counter – when the **Add** button is pressed the new Record will be inserted into the list at this location  
*the Record numbers in the list will all be automatically adjusted  
the Next Record pointer will increase by one, to continue inserting Records from this point onwards*

### *Keep adding new Records :*

- ⇒ Repeat the above to keep entering new Key-Point Records, pressing **Add** for each new Record  
*Key-Point Records can be added up to a maximum of 999 Records*
- ⇒ Click **Save As** at any time, to save the current editing session
- ⇒ **Or** : Click **Quit** to end the editing session, and close the *Create a Key-Point File* window

---

**To Add or Replace Records within the list****Move the scrollbar up or down, or click on any Record within the list :**

- The *Next Record* value will change, and the selected Record will be highlighted
- The values for the selected Record will appear in the *Record Values* box

**Edit the Record Values, if desired :**

- ⇒ Click in any of the *Record Values* boxes, and type a different value

**Either** : click **Add** to insert a new Record at this position in the list

- the currently-selected Record, and all remaining Records will be pushed down in the list, and will be renumbered
- the *Next Record* number will automatically step on
- the *Total Records* count will increase by one

**Or** : click **Replace** to overwrite the selected Record with the edited values

- the *Next Record* number will automatically step on
- the *Total Records* count will be unchanged

**To Edit the list of Key-Point Records****Highlight a Record to be edited :**

- ⇒ Move the Scrollbar up or down, or click on any Record within the list :
  - The *Next Record* value will change, and the selected Record will be highlighted
  - The values for the selected Record will appear in the *Record Values* box

**To change the order of the Records in the list :**

- ⇒ Click on **Move Up** or **Move Down** :
  - The highlighted Record will move up or down the list
  - The Records in the list will be renumbered automatically
  - The *Total Records* count will be unchanged

**To copy a highlighted Record :**

- ⇒ Click on **Copy** :
  - The highlighted Record will be ready to copy,
  - The **Paste** button will be enabled
  - The *Total Records* count will be unchanged

**To delete the highlighted Record from the list, or to cut and paste a Record :**

- ⇒ Click on **Cut** :
  - The highlighted Record will disappear from the list
  - The **Paste** button will be enabled
  - The Records in the list will be renumbered automatically
  - The *Total Records* count will decrease by one

**To paste a cut or copied Record :**

- ⇒ *Move the Scrollbar up or down, or click on any Record within the list :*
  - The *Next Record* value will change, and the selected Record will be highlighted
  - The values for the selected Record will appear in the *Record Values* box
- ⇒ *Now click **Paste**, to paste the cut or copied Record into this new position :*
  - the currently-selected Record, and all remaining Records will be pushed down in the list, and will be renumbered
  - the *Next Record* number will automatically step on
  - the *Total Records* count will increase by one

**Save and close the File**

*The current file can be saved at any time*

- ⇒ Click on the **Save As** button to save this new File

*The Save Key-Point File dialog will open, with the current filename highlighted :*

- ⇒ Click **Save** to save the file with the current name
- ⇒ **Or** : edit the name, then click **Save**, to save to a new filename

*The current editing session will continue until the **Quit** button is clicked*

- ⇒ Click **Quit** to close the *Create a Key-Point File* window - all unsaved edits from this session will be lost

**CREATING A GRID-POINT FILE**

**Create a Grid-Point File**

Create a new File

Filename to be sent to Gauge

Measurement Units for this File  mm  
 inch

Grid Dimensions

Number of Rows

Number of Columns

Number of Readings at each Point

Preferred Working Axis :

Take Measurements across Rows  
 Take Measurements down Columns

Reference Values for all Readings

Reference Thickness : inch

Upper Tolerance : + %

Lower Tolerance : - %

Open Save As Quit Help

### **Creating a new Grid-Point File**

*Enter Filename and Dimensions :*

- ⇒ Click in the *Filename to be sent to Gauge* box, then enter a name up to 8 characters long, made up of numbers and letters.  
*This is the name that will appear on the Gauge*
- ⇒ click on the desired button for the *Measurement Units*  
*CygLink will automatically switch to measure in these units when this file is in use*
- ⇒ Click in the *Number of Rows* box, then enter a number between 1 and 100
- ⇒ Click in the *Number of Columns* box, then enter a number between 1 and 100
- ⇒ Click in the *Number of Readings* box, then enter a number between 1 and 10

*Select Preferred Working Axis - choose the working axis best suited to the physical situation where the Measurements will be taken :*

- ⇒ **Either** : select *Take Measurements across Rows* – the Datalogger will make each set of Measurements on a horizontal axis, before moving on to the next Row
- ⇒ **Or** : select *Take Measurements down Columns* – the Datalogger will make each set of Measurements on a vertical axis, before moving on to the next Column

*Enter optional Alarm values :*

- ⇒ **Optionally** : click in the *Reference Thickness* box, then enter a number between 0 and 75 mm [or between 0 and 3 inches, if units are set to inches]  
*Set the value to 0 if Reference Thickness is not required*
- ⇒ **Optionally** : enter Alarm percentages based on the Reference Thickness value *either an Upper Tolerance, or a Lower Tolerance, or both may be entered*  
*Set either value to 0 if not required*

### **Open an existing Grid-Point File**

*An existing Grid-Point file can be used as a template to create new files :*

- ⇒ Click on the **Open** button  
*The Open Grid-Point File dialog window will open :*
- ⇒ Navigate to the location of the existing Grid-Point file required, and then double-click on the filename  
*The file will open and its values will be copied into the boxes in the Create a Grid-Point File window : edit the Filename and Dimensions if required*

### **Save and close the new File**

- ⇒ Click on the **Save As** button to save this new File :  
*The Save Multi-Record File dialog window will open :*
- ⇒ Click the **Save** button to save the suggested filename into the current directory
- ⇒ **Or** : change the Filename and/or Directory if desired, then click **Save**  
*The new file is now saved to disk, ready for use in a new datalogging session*

## **REMOTE-LOGGING**

*Using Remote-Logging*

*Quick-Logging*

*Remote-Logging to Datalogger File-types*

*Logging to a Single-Record file*

*Logging to a Multi-Record file*

*Logging to a Key-Point file*

*Logging to a Grid-Point file*



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## USING REMOTE-LOGGING

*CygLink has a facility for remote-logging of Readings from the Gauge, which are then saved directly to file :*

- *Remote Datalogging* : Readings can be saved to any of the *Datalogger* file-types which have been created using *CygLink*
- *Alternatively* : to collect measurements immediately, without the need to first create a template-file, Readings can be saved to a *Quick-Logging* file, which allows instant logging to a simple incrementing list

### **To remote-log Readings**

*The Gauge must be connected to the PC - Readings can only be remote-logged when there is a valid link between the Gauge and the PC*

- A valid link is shown by the Green indicator and the *Link OK* message in the *CygLink* main window - see : *Connecting to the Computer*, page 27

### **Remote-Logging to Datalogger File-types**

*Remote-logging to Datalogger file-types is basically the same as logging on the Gauge :*

- *Datalogger* template files are created using *CygLink* : these files are then opened on the PC, and Readings are collected by clicking on the on-screen **Log** button
- Readings can also be added to previously opened files

### **Quick-Logging**

*Quick-Logging simply requires a Logfile to be opened on the PC, and then single Readings can then be logged immediately to disk :*

- Each Reading contains the logged thickness value, plus the Date and Time, and also an optional comment added by the user
- A *Quick-Logging* file can be closed and then opened later, to append further Readings to the File
- Only one Logfile may be open at any time
- A *Quick-Logging* file can store up to 999 Readings

### **Creating and Printing Reports**

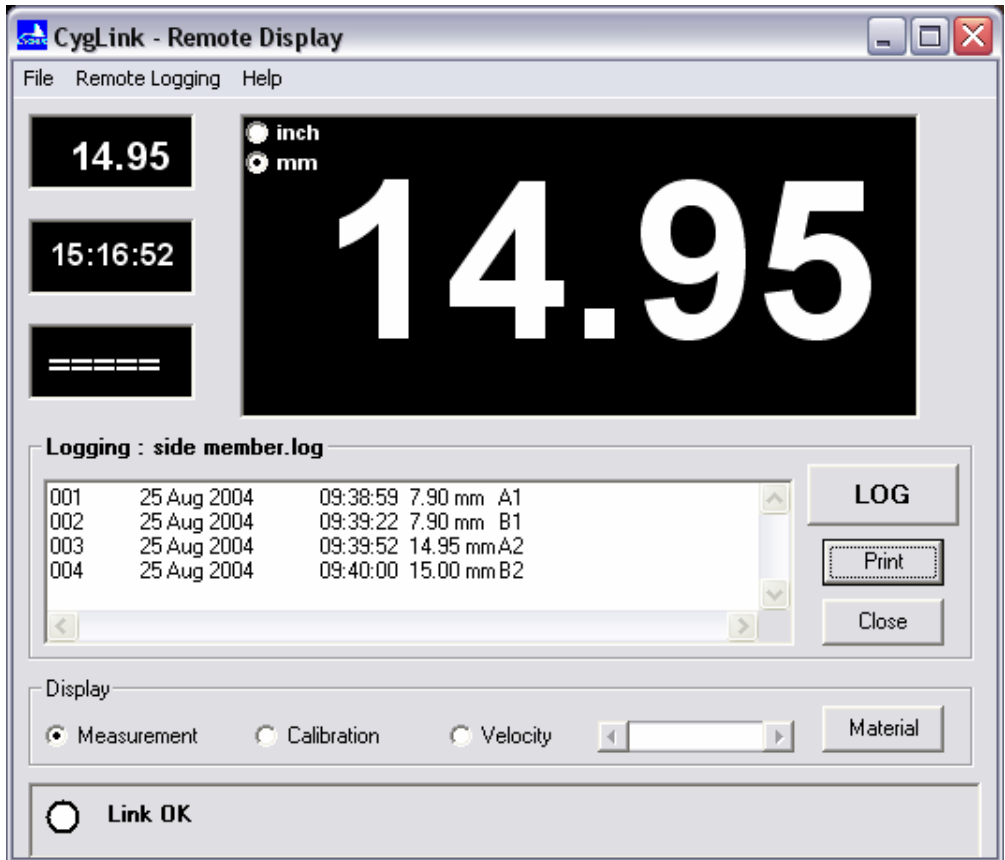
*Report files can be created from any of the Remote-Logging files :*

- Files created during *Quick-Logging* can be printed immediately as a simple Report file
- Log-Files saved during logging to *Datalogger* file-types can be converted to Reports during the logging session, using the *Create Report* option

## QUICK-LOGGING

### Open a Quick-Logging file :

- ⇒ Select **Remote-Logging → Open File for Quick-Logging...** option on the main window menu-bar.
- ⇒ The *Open File for Quick-Logging* dialog window will open :
- ⇒ **Either** : type a new name in the file name box, to open a new Logfile
- ⇒ **Or** : click on an existing name, to reopen an existing Logfile  
*You will be prompted whether to append the new readings to the file :*
  - ⇒ Choose **Yes** : to leave the file unaffected until a reading is logged, and then new readings will be appended to the file
  - ⇒ Choose **No** : the file will be emptied at this point, ready to accept new readings into an empty file.

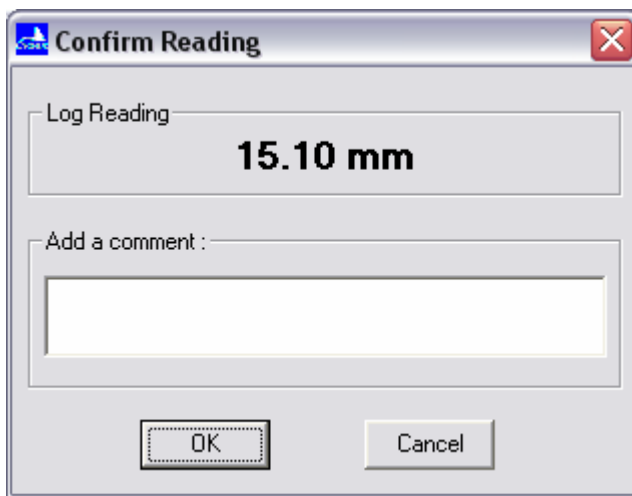


- The quick-logging box appears in the *CygLink* main window, with the name of the current logfile showing
- A numbered list of all of the Readings in the current file appears in the box. : each Reading has a Date and Time entry, and also any comment added by the user
- There is a scroll-bar to allow viewing of the entire list of current readings - new Readings are always added at the end of the list

#### ***Capture Readings to be saved :***

- ⇒ ***Either*** : Click on the Log button in the main window
- ⇒ ***Or*** : Double-click on the current reading in the main window

**Note** : If the *CygLink* main window is in *Reading-Only* mode, then the double-click method must be used.



#### ***Now save the Reading to File :***

- A *Confirm Reading* dialog box is displayed for you to confirm the Reading which will be logged, and to add optional comment
  - ⇒ If desired : click in the Add a comment box, then type the comment
- ⇒ Click the **OK** button to log the held value : the Reading is stored using the currently selected units, along with the date and time, and any comment text
 

*If there is not a valid current reading displayed, the last valid reading (displayed in the Held Reading box) is logged*
- ⇒ **Or** : click **Cancel** to close the dialog box, without saving the Reading.

① **Tip** : to quickly log an uncommented Reading - just hit the keyboard Enter key twice : the new Reading will be immediately added, without comment, to the end of the list

## **Printing**

*The file currently open can be printed immediately, by clicking on the **Print** button :*

- a print dialog will pop-up, prompting you to select the required printer :
  - ⇒ click on **Print** to print directly
- *CygLink* will then return to logging to the current logfile, and further Readings can continue to be added to this file

## **Finishing with Quick-Logging**

- ⇒ Click on the **Close** button to end the current session :  
*the current log-file will be saved automatically, and CygLink will return to the normal measurement window*

---

## REMOTE-LOGGING TO DATALOGGER FILES

With a Gauge connected to the PC, Readings can be logged directly to any of the *Datalogger* file-types which are created using *CygLink* :

*Logging to a Single-Record File*, page 69

*Logging to a Multi-Record File*, page 71

*Logging to a Key-Point File*, page 72

*Logging to a Grid-Point File*, page 74

*The logging session is managed the same way in all cases :*

### Gauge to PC Connection

- If a Gauge is currently connected to the PC : the **Log** button will be enabled
- If there is no connection, or if the connection becomes lost : the **Log** button will be greyed-out, and Readings cannot be logged
- The current Reading received from the Gauge is shown in the *Log Reading* box : if there is currently no connection with the Gauge then **No Link** will be displayed instead

### Saving the current logfile

*The current logging session may be saved at any time :*

⇒ Click on the **Save As** button :

the *Save updated Single-Record File* window will open :

⇒ **either** : click **Save** to update the existing file, and then continue using this file

⇒ **or** : enter a new filename, and then click **Save** :

*the existing file will be closed without being updated, and logging will continue to the new file, with the new filename appearing in the *Filename* box*

### Creating a Report

*A new Report file may be created at any time during the current logging session :*

- The Report will include all logged Readings, including any Readings from the current session which have not yet been saved - see : *Creating a Report File*, page 48

### Finishing the Logging session

⇒ Click on the **Done** button to end the logging session :

- *If there are logged Readings which have not yet been saved a pop-up will appear prompting you to save :*

⇒ click **No** to quit without saving

⇒ click **Yes** to save :

the *Save updated Single-Record File* window will open :

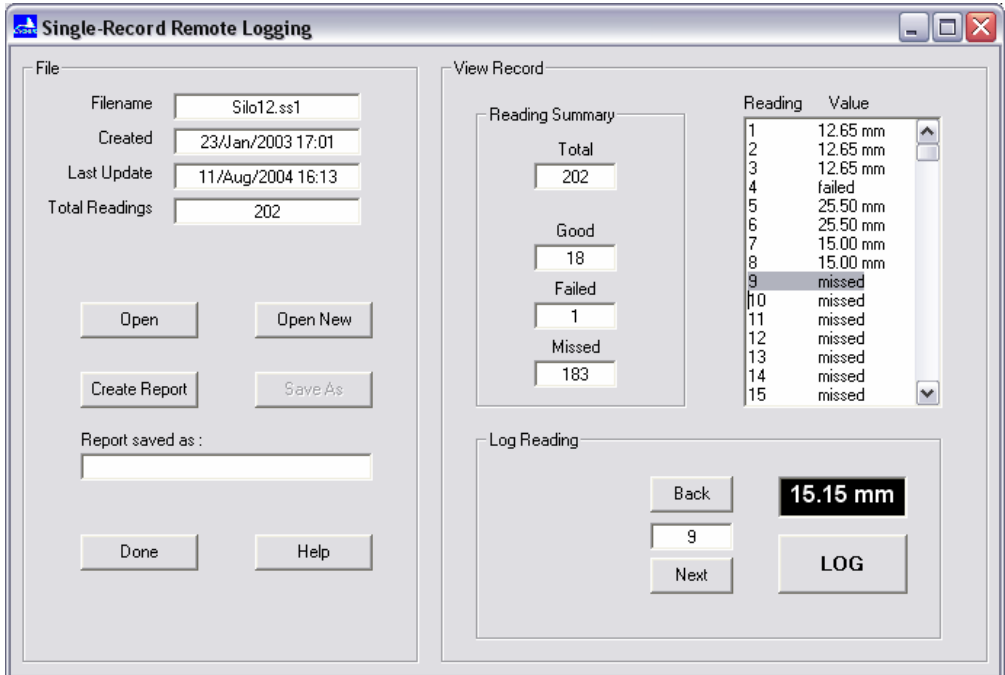
⇒ **either** : click **Save** to save and update the existing file

⇒ **or** : enter a new filename, and then save to the new file

## LOGGING TO A SINGLE-RECORD FILE

To start a Single-Record logging session :

- ⇒ Select **Remote-Logging** → **Open Log-File** → **Single-Record...** option on the main window menu-bar :
  - The *Single-Record Remote-Logging* window will open



**Open a file for Remote-Logging :**

- ⇒ **Either** : click on the **Open New** button open a new Logfile  
This allows you to open a new file, using a Template file [with a *.ss0* file extension] :  
*a file previously created in CygLink from the Create a New File menu*  
See : [Creating a Single-Record File](#), page 54
- ⇒ **Or** : click on the **Open** button to open an existing Logfile  
This allows you to reopen an existing Single-Record file [with a *.ss1* file extension] :  
*a file previously opened for a Remote-Logging session*

The file contents are now read into the *View Record* pane :

- **For a new file** : all of the Reading values will be listed as missed, meaning that the no Readings have yet been attempted
- All of the Readings in the Single-Record file will appear in the list in the *View Record* pane : use the scrollbar on the right-hand side of the list to view the current Readings

---

## Logging Readings to a Single-Record File

The next Reading to be logged is the highlighted Reading in the list, and the number of this Reading appears in the *Log Reading* box :

- ⇒ click on the **Log** button to log the currently displayed Reading :
  - the new value will now appear in the list, and will overwrite any existing value
  - the highlighted Reading will now become the next reading, and the number in the *Log Reading* box will increment
  - values in the *Reading Summary* box will be updated, showing the new summary

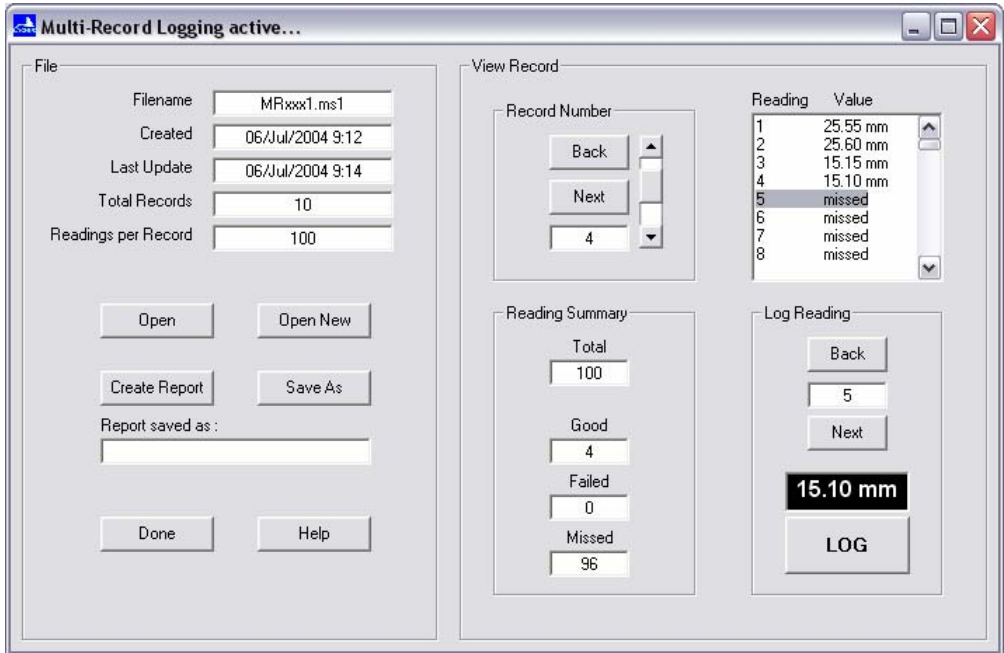
① **Tip** : you can click **Back** to return to the previous Reading if you wish to change the value which has just been logged

① **Tip** : use the scrollbar in the reading-list to scroll to any reading-number in the list, and then click on the new Reading : the new Reading will be highlighted, and the new number will appear in the *Log Reading* box

## LOGGING TO A MULTI-RECORD FILE

To start a Multi-Record logging session :

- ⇒ Select **Remote-Logging** → **Open Log-File** → **Multi-Record...** option on the main window menu-bar :
  - The *Multi-Record Remote-Logging* window will open



**Open a file for Remote-Logging :**

- ⇒ **Either** : click on the **Open New** button open a new Logfile  
This allows you to open a new file, using a Template file [with a *.ms0* file extension] :  
*a file previously created in CygLink from the Create a New File menu*  
See : *Creating a Multi-Record File*, page 55
- ⇒ **Or** : click on the **Open** button to open an existing Logfile  
This allows you to reopen an existing Multi-Record file [with a *.ms1* file extension] :  
*a file previously opened for a Remote-Logging session*

*The file contents are now read into the View Record pane :*

- **For a new file** : all of the Reading values will be listed as missed, meaning that the no Readings have yet been attempted
- All of the Readings from the first Record in the Multi-Record file will appear in the list in the *View Record* pane : use the scrollbar on the right-hand side to view the list



---

## Logging Readings to a Multi-Record File

The next Reading to be logged is the highlighted Reading in the list, and the number of this Reading appears in the *Log Reading* box :

- ⇒ click on the **Log** button to log the currently displayed Reading :
  - the new value will now appear in the list, and will overwrite any existing value
  - the highlighted Reading will now become the next reading, and the number in the *Log Reading* box will increment
  - values in the *Reading Summary* box will be updated, showing the new summary

① **Tip** : you can click **Back** to return to the previous Reading if you wish to change the value which has just been logged

① **Tip** : use the scrollbar in the reading-list to scroll to any reading-number in the list, and then click on the new Reading : the new Reading will be highlighted, and the new number will appear in the *Log Reading* box

When all required Readings in the current Record have been obtained, use the controls in the *Record Number* box to select the next Record :

- ⇒ move on to the next Record in the file using the **Next** button in the *Record Number* box
- ⇒ use the **Back** button or the scrollbar to choose any other Record from the file
  - a new *Reading Summary* will appear each time a new Record is chosen

## LOGGING TO A KEY-POINT FILE

### To start a Key-Point logging session :

- ⇒ Select **Remote-Logging → Open Log-File → Key-Point...** option on the main window menu-bar :
  - The *Key-Point Remote-Logging* window will open

### Open a file for Remote-Logging :

- ⇒ **Either** : click on the **Open New** button open a new Logfile  
This allows you to open a new file, using a Template file [with a *.ks0* file extension] :  
*a file previously created in CygLink from the Create a New File menu*  
See : [Creating a Key-Point File](#), page 56
- ⇒ **Or** : click on the **Open** button to open an existing Logfile  
This allows you to reopen an existing Key-Point file [with a *.ks1* file extension] :  
*a file previously opened for a Remote-Logging session*

### The file contents are now read into the Key-Point box :

- **For a new file** : all of the Reading values will be listed as missed, meaning that the no Readings have yet been attempted
- All of the Readings from the first Key-Point Record in the Key-Point file will appear in the list in the *Key-Point* pane : use the scrollbar on the right-hand side to view the list

The screenshot shows the 'Key-Point Logging active...' window. It is divided into several sections:

- File:** Contains fields for Filename (1303Port.ks1), Created (17/Mar/2003 10:26), Last Update (09/Sep/2004 14:13), Measurement Units (inches), and Key-Point Records (60). Buttons for 'Open', 'Open New', 'Create Report', 'Save As', 'Done', and 'Help' are present.
- Key-Point:** Contains fields for Key-Point name (Plate E-E Port), Last Update (15/Sep/2004 16:49), Reference Thickness (0.626), Upper Tolerance (+% 5), and Lower Tolerance (-% 10). It also has 'Back' and 'Next' buttons and a 'Key-Point Record Number' field set to 12.
- Reading Summary:** A table showing counts for Total (3), Good (1), Bad (2), Failed to Measure (0), Missed Attempts (0), and Out of Tolerance (2).
- Log Reading:** A table with columns for Reading, Value (inch), Change (inch), Change (%), and Error. The current reading is 4 with a value of 0.596 in. A 'LOG' button is visible.

Reading	Value inch	Change inch	Change %	Error
1	0.311	-0.315	-50.3	Bad
2	0.494	-0.132	-21.1	Bad
3	0.596	-0.030	-4.8	Good
4	add ?			

---

## Logging Readings to a Key-Point File

The next Reading to be logged is the highlighted Reading in the list, and the number of this Reading appears in the *Log Reading* box :

- ⇒ click on the **Log** button to log the currently displayed Reading :
  - the new value will now appear in the list, and will overwrite any existing value
  - the highlighted Reading will now become the next reading, and the number in the *Log Reading* box will increment
  - values in the *Reading Summary* box will be updated, showing the new summary

① **Tip** : you can click **Back** to return to the previous Reading if you wish to change the value which has just been logged

① **Tip** : use the scrollbar in the reading-list to scroll to any reading-number in the list, and then click on the new Reading : the new Reading will be highlighted, and the new number will appear in the *Log Reading* box

After a value has been logged to the last Reading in the current Record :

- an extra Reading-number will appear in the list, with the value **add?**
- this allows extra Readings to be freely added to the current Record, up to a limit of 100 total Readings within the current Record
  - ⇒ Click on **Log** to continue adding Readings to the current Record

When all required Readings in the current Key-Point Record have been obtained, use the controls in the *Key-Point Record Number* box to select the next Record :

- ⇒ move on to the next Record in the file using the **Next** button in the *Key-Point Record Number* box
- ⇒ use the **Back** button or the scrollbar to choose any other Record from the file
  - a new *Reading Summary* will appear each time a new Record is chosen

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## LOGGING TO A GRID-POINT FILE

### To start a Grid-Point logging session :

- ⇒ Select **Remote-Logging Open → Log-File → Grid-Point...** option on the main window menu-bar :
  - The *Grid-Point Remote-Logging* window will open

### Open a file for Remote-Logging :

- ⇒ **Either** : click on the **Open New** button open a new Logfile  
This allows you to open a new file, using a Template file [with a *.gs0* file extension] :  
*a file previously created in CygLink from the Create a New File menu*  
See : *Creating a Grid-Point File*, page 61
- ⇒ **Or** : click on the **Open** button to open an existing Logfile  
This allows you to reopen an existing Grid-Point file [with a *.gs1* file extension] :  
*a file previously opened for a Remote-Logging session*

### The file contents are now read into the Grid-Point pane :

- **For a new file** : all of the Reading values will be listed as missed, meaning that the no Readings have yet been attempted
- All of the Readings from the first Grid-Point Record in the Grid-Point file will appear in the list in the *Grid-Point* pane : use the scrollbar on the right-hand side of the list to view the current Readings

The presentation of the Grid-Point Records, and of the Readings which appear in the list, depends on whether the file was designated to take Readings *across Rows* or *down Columns*, and also whether there are *single* or *multiple* Readings required at each Grid-Point

### There are thus three variations for the Grid-Point file display :

- Grid-Point file with multiple Readings at each measurement point
- Grid-Point file with a single Reading at each measurement point, specified for measurement across Rows
- Grid-Point file with a single Reading at each measurement point, specified for measurement up/down Columns

## Grid-Point file with multiple Readings at each measurement point

- ⇒ Use the **Grid Position Row** and **Column** sliders to select each measurement grid-point
  - **Reading list** :  
shows the current Readings obtained at the selected grid-point
  - **Log Reading** number :  
is the next Reading to be logged in the current list
  - **Reading Summary** :  
shows the current status of the Readings at the selected grid-point

**File**

Filename: GPxyz.gs1  
 Created: 08/Jan/2003 11:27  
 Last Update: 09/Sep/2004 14:18

Preferred Measurement Axis: down Columns  
 Measurement Units: inches  
 Grid-Point Rows: 12  
 Grid-Point Columns: 12  
 Readings at each Grid-Point: 4  
 Reference Thickness: 0.750  
 Upper Tolerance : +%: 0  
 Lower Tolerance : -%: 40

Open Open New  
 Create Report Save As  
 Report saved as :  
 Done Help

**Grid-Point**

Grid Position  
 Column: 4  
 Row: 9

**Log Reading**

Back 0.596 in  
 4  
 Next LOG

**Reading Summary**

Total: 4  
 Good: 3 Bad: 1

**Bad Readings**

Failed to Measure	Missed Attempts	Out of Tolerance
0	0	1

Reading	Value inch	Change inch	%	Error
1	0.591	-0.159	-21.2	Good
2	0.587	-0.163	-21.7	Good
3	0.494	-0.256	-34.1	Good
4	0.311	-0.439	-58.5	Bad

## Grid-Point file with single Reading at each measurement point, specified for measurement across Rows

- ⇒ Use the **Grid Position Row** slider to select each Row to measure across :
  - **Column list :**  
shows the current Readings obtained at each Column-point in the selected Row
  - **Log Reading number :**  
is the Reading to be logged at the next Column-point in the current Row
  - **Row Summary :**  
shows the current status of all the Column-point Readings in the selected Row

**File**

Filename: RowAxis.gs1  
 Created: 22/Oct/2003 14:54  
 Last Update: 19/Aug/2004 10:48

Preferred Measurement Axis: across Rows  
 Measurement Units: inches  
 Grid-Point Rows: 12  
 Grid-Point Columns: 4  
 Readings at each Grid-Point: 1  
 Reference Thickness: 0.750  
 Upper Tolerance: +%: 0  
 Lower Tolerance: -%: 40

Buttons: Open, Open New, Create Report, Save As, Report saved as: \_\_\_\_\_, Done, Help

**Grid-Point**

Grid Position: Row: 4

**Log Reading**

Back | 0.596 in | Next | LOG

**Row Summary**

Total: 4  
 Good: 1 | Bad: 3

**Bad Readings**

Failed to Measure	Missed Attempts	Out of Tolerance
0	0	3

Column	Value	Change	%	Error
	inch	inch	%	
1	0.314	-0.436	-58.1	Bad
2	0.274	-0.476	-63.5	Bad
3	0.234	-0.516	-68.8	Bad
4	0.592	-0.158	-21.1	Good

## Grid-Point file with single Reading at each measurement point, specified for measurement up/down Columns

- ⇒ Use the **Grid Position Column** slider to select each Column to measure up/down :
  - **Row list :**  
shows the current Readings obtained at each Row-point in the selected Column
  - **Log Reading number :**  
is the Reading to be logged at the next Row-point in the current Column
  - **Column Summary :**  
shows the status of all of the Row-point Readings in the selected Column

**File**

Filename: ColAxis.gs1  
 Created: 22/Oct/2003 14:54  
 Last Update: 19/Aug/2004 10:47

Preferred Measurement Axis: down Columns  
 Measurement Units: inches  
 Grid-Point Rows: 4  
 Grid-Point Columns: 12  
 Readings at each Grid-Point: 1  
 Reference Thickness: 0.750  
 Upper Tolerance: +%: 0  
 Lower Tolerance: -%: 40

Open Open New  
 Create Report Save As  
 Report saved as:  
 Done Help

**Grid-Point**

Grid Position:  Column

Log Reading: Back **0.596 in** Next LOG

**Column Summary**

Total:   
 Good:  Bad:

**Bad Readings**

Failed to Measure	Missed Attempts	Out of Tolerance
<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="2"/>

Row	Value inch	Change inch	%	Error
1	0.594	-0.156	-20.8	Good
2	1.000	+0.250	+33.3	Bad
3	failed	-	-	Bad
4	0.314	-0.436	-58.1	Bad

---

## Logging Readings to a Grid-Point File

The next Reading to be logged is the highlighted Reading in the list, and the number of this Reading appears in the *Log Reading* box :

- ⇒ click on the **Log** button to log the currently displayed Reading :
  - the new value will now appear in the list, and will overwrite any existing value
  - the highlighted Reading will now become the next reading, and the number in the *Log Reading* box will increment
  - values in the *Reading Summary* box will be updated, showing the new summary

① **Tip** : you can click **Back** to return to the previous Reading if you wish to change the value which has just been logged

① **Tip** : use the scrollbar in the reading-list to scroll to any reading-number in the list, and then click on the new Reading : the new Reading will be highlighted, and the new number will appear in the *Log Reading* box

When all required Readings in the current list have been obtained :

- ⇒ move on to the next list using the appropriate Row or Column slider in the *Grid Position* box
- a new *Reading Summary* will appear each time a new list is selected



## ***CARE AND SERVICING***

*Care of the Cygnus 1 ROV Gauge*

*Servicing*

*Recycling & Disposal*

*RoHS Directive*

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**CARE OF CYGNUS I ROV GAUGE****➤ Cleaning the Gauge**

- ⇒ After each dive, and while the instrument is still assembled, wash the unit in fresh water and allow to dry
- ⇒ To maintain the water-tight integrity of the assembly : the Gauge should be disassembled after every dive, and the O-Rings should be replaced with new
- ⇒ Clean the O-Ring grooves, and ensure that there are no particles remaining - a mild detergent may be necessary to remove grease from the O-Ring grooves
- ⇒ Care should be taken not to allow water into the instrument body whilst cleaning
- ⇒ Do not use solvents for cleaning
- ⇒ Do not use any abrasive cleaner

**➤ Use of O-Rings**

- ⇒ When reassembling before a dive : always replace both O-Rings with new, first ensuring that they are lubricated with *Molykote*.
- ⇒ To avoid the risk of a leak : prevent accidental re-use by destroying all used O-Rings after each dive.

**➤ Data-link connector**

- ⇒ Always apply a coating of *Molykote* to the pins of the data-link connector before insertion into the socket on the Gauge
- ⇒ If the Gauge is to be stored without the cable assembly connected, it is essential that the Blanking plug is inserted in the socket instead.
- ⇒ The pins of the Blanking Plug should also be lubricated with *Molykote*

**➤ Environmental**

- ⇒ Do not subject the Gauge body to temperature in excess of 60°C (140°F).
- ⇒ Do not store the Gauge for long periods in conditions of high humidity.

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## SERVICING

① Please refer to the Gauge and Accessories brochure for our full range of Equipment.

### **Returning your Gauge for Service**

A full Manufacturer's Factory Service is available from Cygnus Instruments

① Please note : the complete Kit should always be returned for Service or Repair, including all Probes and Leads.

Cygnus Gauges are renowned for their reliability – very often problems with getting measurements are simply due to the way the Gauge is being used

See : [Troubleshooting](#), page 38

*However, if you do need to return your Gauge for Repair please let us know the details of the problem, to guarantee the best possible service :*

- Is the problem behaviour intermittent ?
- Is there a problem turning the Gauge on ?
- Is there a problem with the Gauge turning itself off ?
- Does the Gauge constantly give incorrect Readings, or unsteady Readings ?
- Is it not possible to Calibrate the Gauge ?
- Does the Gauge fail to operate correctly in certain ambient conditions ?

## RECYCLING & DISPOSAL

**WEEE** stands for *Waste from Electrical and Electronic Equipment*. WEEE Directive 2002/96/EC mandates the treatment, recovery and recycling of electric and electronic equipment (90% ends up in landfills). All applicable products in the EU market after **August 13, 2006** must pass WEEE compliance and carry the "Wheelie Bin" sticker.

*Disposal instructions for this product.*

The WEEE directive (Waste Electrical and Electronic Equipment; 2002/96/EC) has been put in place to ensure that products are recycled using best available treatment, recovery and recycling techniques to ensure human health and high environmental protection.

This product is designed and manufactured with high quality materials and components, which can be recycled and reused.

Do not dispose of this product in your general household waste bin.

Inform yourself about the local separate collection for electrical and electronic products marked by this symbol :



*Use one of the following options :*

1. Dispose of the complete product (including its cables, plugs, and accessories) in the designated WEEE collection facilities.
2. If you purchase a replacement product, hand the complete old product back to the retailer. He should accept it as required by the WEEE directive.

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## RoHS DIRECTIVE

**RoHS**, also known as Lead-Free, stands for *Restriction of Hazardous Substances*. RoHS Directive 2002/95/EC restricts the use of six hazardous materials found in electrical and electronic products. All applicable products in the EU market after **July 1, 2006** must pass RoHS compliance. RoHS impacts the entire electronics industry.

*This product was manufactured in advance of the RoHS implementation date, and has not been designed to comply with the requirements of the Directive.*

*Cygnus Instruments* future products will all be fully compliant on or after the date the Directive comes into force.

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*Cygnus Instruments* has a policy of continual product improvement. We reserve the right to make changes to the product without prior notification to any person or organisation

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