PEARPOINT

P374

Intrinsically safe colour camera

User Manual

HC374UMAN-1/08

SPX

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CONTENTS

GENERAL INFORMATION

1.1 WARNINGS, CAUTIONS AND NOTES

Within this handbook, pay particular attention to Warnings, Cautions, and Notes, examples of which are shown below.

INDICATES THE POSSIBILITY OF PERSONAL INJURY IF INSTRUCTIONS ARE NOT FOLLOWED CAREFULLY.

Indicates a possibility of equipment damage if the instructions are not followed carefully.

INDICATES SERVICEABLE PARTS

NOTE. Gives added information that will make operation of the equipment easier.

1.2 SAFETY PRECAUTIONS

The P374 Inspection System is designed to reduce hazards from electric shock provided that proper operating procedures are followed. If it is operated in an outdoor environment it is imperative that proper earthing procedures are followed. Use of a Residual Current Detector (RCD) is strongly recommended [USA - Ground Fault Interrupter (GFI)]

Ensure the system is not placed in or near surface water.

Always ensure that cabling is properly connected.

Always transport a generator with the minimum amount of fuel in the tank.

Never connect or disconnect any part of the equipment when it is switched on.

Always switch the system on and off using the mains supply switch.

Clean and sterilise equipment at regular intervals.

ALWAYS USE HEAVY DUTY INDUSTRIAL GLOVES WHEN HANDLING ROD OR CABLE WHICH IS BEING WITHDRAWN FROM A SEWER.

TO AVOID RISK OF BURNS, DO NOT TOUCH THE CAMERA HEAD WHEN IT IS SWITCHED ON OR IMMEDIATELY AFTER SWITCH OFF. LEAVE AMPLE TIME FOR IT TO COOL BEFORE HANDLING.

A RISK ASSESSMENT SHOULD BE PERFORMED PRIOR TO COMMENCING WORK AS IT MAY HIGHLIGHT ADDITIONAL SAFETY ISSUES SPECIFIC TO THE APPLICATION

1.3 SIRA CERTIFICATION

1 **EU-TYPE EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

3 Certificate Number: **Sira 01ATEX2153** Issue: **6**

4 Equipment: **Type P374 Intrinsically Safe Camera System**

5 Applicant: **Pearpoint Ltd (a division of Radiodetection Ltd)**

6 Address: Western Drive
Bristol BS14 0AF
UK

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Articles 17 and 21 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 50014:1997 (amendments 1 & 2) EN 50020: 1994 EN 50284:1999

The above list of documents may detail standards that do not appear on the UKAS Scope of Accreditation, but have been added through Sira's flexible scope of accreditation, which is available on request.

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to Specific Conditions of Use identified in the schedule to this certificate.

11 This EU-Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:

Rod-Cage Assembly

II (1) G
[EEx ia] IIC

Camera

II 1 G
EEx ia IIC T6

Project Number 70128319

N Jones
Certification Manager

Sira Certification Service
Unit 6 Hawarden Industrial Park,
Hawarden, CH5 3US, United Kingdom
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Email: ukinfo@csagroup.org
Web: www.csagroupuk.org

Form 9400 Issue 4

SCHEDULE

EU-TYPE EXAMINATION CERTIFICATE **Sira 01ATEX2153**
Issue 6

13 **DESCRIPTION OF EQUIPMENT**

The P374 system comprises of a stationary frame to which is mounted a rod-cage assembly containing a length of flexible rod (200 feet maximum), at the end of the rod is a video camera with built-in lighting. The system is used for inspecting areas that are not normally accessible for human inspection, such as pipelines where the camera is pushed down the pipe using the flexible rod while watching the picture on the built-in monitor. The P374 unit contains all the electronics required to operate the system and can be used as a stand-alone system requiring only mains electricity to power the unit.

The non-hazardous area electronics are contained in three areas, the rod-cage assembly, the frame assembly and the monitor assembly. The rod-cage assembly contains the intrinsically safe associated apparatus regulator assembly. The monitor and the frame assembly are unspecified equipment and are not within the scope of this assessment. The frame assembly electronics contains two PCB's and the monitor assembly comprises video monitor, keyboard assembly, control panel and monitor interconnect PCB.

The interface between the non-hazardous area and the hazardous area is made in a regulator unit that is located in the centre of the rod-cage assembly. The maximum non-hazardous area supply voltage, Um is 250V. The P374 camera is fitted to the end of the push-rod (7mm diameter). The push-rod is wound within the rod-cage assembly and terminated in the regulator unit

The rod is constructed from a central core of 4 wires with a coaxial screen. This is covered by a layer of glass-fibre and then protected by an outer polyurethane sheath. The rod is terminated in the intrinsically safe associated apparatus regulator assembly and provides the interface between the safe area electronics and the hazardous area electronics.

The camera is located in the hazardous area and is fully encapsulated. The equipment comprises the following main parts; lens assembly, lighthead, inner metalwork, mask and sensor PCB, inner assembly and outer enclosure.

Variation 1 (Dated 17 November 2004) - This Variation introduced the following changes:

i. The value of resistor R1, fitted in the P374 small light head, was increased from 1.2 kΩ to 1.5 kΩ.
ii. Resistor R21 was added to drawing No. B374/15.02.0.
iii. The introduction of new marking drawings reconfirming the previous change of the Applicant's name and address.

Variation 1 (Dated 12 January 2007) - This Variation introduced the following changes:

i. The potting was allowed to be deeper than 10 mm.
ii. The hardener was correctly identified as HY1300

Variation 2 - This Variation introduced the following changes:

i. The Littelfuse KLK 1/10 to be redesignated as the Littelfuse KLK.100.
ii. The use of alternative LEDs and transistors types was endorsed.
iii. The recognition of minor drawing modifications; these amendments do not affect the aspects of the product that are relevant to explosion safety.
iv. The introduction of an alternative resonator.

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SCHEDULE

EU-TYPE EXAMINATION CERTIFICATE **Sira 01ATEX2153**
Issue 6

Variation 3 - This Variation introduced the following changes:

i. The permissible cable parameters were amended.
ii. The drawings were updated to recognise component changes.

14 **DESCRIPTIVE DOCUMENTS**

14.1 **Drawings**

Refer to Certificate Annexe.

14.2 **Associated Sira Reports and Certificate History**

Issue	Date	Report/File no.	Comment
0	22 October 2001	R52A7836A	The release of prime certificate.
1	29 August 2003	51V10720	The prime certificate was re-issued to change the Applicant's name from Pearpoint Ltd., 47 Woolmer Way, Bordon, Hampshire GU35 9QE, to Pearpoint Ltd (a division of Radiodetection Ltd), Western Drive, Bristol BS14 0AF, UK.
2	17 November 2004	R52V12461A & R52V11333A	The introduction of Variation 1.
3	16 August 2006	R51A15407A	Re-issued to incorporate Variation 1 (ONE) dated 17 November 2004 and to include the changes described in the associated report.
4	12 January 2007	R52A16123A	The introduction of Variation 1.
5	07 June 2011	R24601A/00	The introduction of Variation 2.
6	09 May 2017	R70128319A	This Issue covers the following changes: • EC Type-Examination Certificate in accordance with 94/9/EC updated to EU Type-Examination Certificate in accordance with Directive 2014/34/EU. *(In accordance with Article 41 of Directive 2014/34/EU, EC Type-Examination Certificates referring to 94/9/EC that were in existence prior to the date of application of 2014/34/EU (20 April 2016) may be referenced as if they were issued in accordance with Directive 2014/34/EU. Variations to such EC Type-Examination Certificates may continue to bear the original certificate number issued prior to 20 April 2016.)* • The introduction of Variation 3.

15 **SPECIFIC CONDITIONS OF USE** (denoted by X after the certificate number)

15.1 None

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

17 **CONDITIONS OF MANUFACTURE**

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.

17.2 Holders of EU-Type Examination Certificates are required to comply with the conformity to type requirements defined in Article 13 of Directive 2014/34/EU.

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1.4 FM CERTIFICATION

FM Approvals
1151 Boston-Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781 762 9375 www.fmglobal.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

P374 Intrinsically Safe Camera System

P374 Camera
IS / I / 1 / ABCD / T6

Cage Assembly Coiler
AIS / I / 1 / ABCD

Equipment Ratings:

P374 Camera
Intrinsically Safe for installation in Class I, Division 1, Groups A, B, C and D Temperature code T6 Hazardous (Classified) indoor Locations.

Cage Assembly Coiler
Associated Apparatus with Intrinsically Safe Connection to equipment in Class I, Division 1, Groups A, B, C and D Hazardous (Classified) indoor Locations.

Approved for:

Pearpoint Ltd.
Woolmer Way
Bordon, Hampshire QU35 9QE

An FM Global Enterprise

3012779
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FM Approvals

This certifies that the equipment described has been found to comply with the following Factory Mutual Research Approval Standards and other documents:

Class 3600	1998
Class 3610	1999
Class 3810	1989

Original Approval Job Identification: 3012779 Approval Granted: June 28, 2002

Subsequent Revision Reports / Date Approval Amended

Factory Mutual Research Corporation

Nicholas P. Ludlam
Technical Team Manager
Approvals Division

28 June 2002
Date

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3012779
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1.5 EMC COMPLIANCE STATEMENT

FCC CLASS B RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

DOC Notice (Canada Only)

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.
Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicable aux areils numeriques de Classe B prescrites dans le Reglement sur le Brouillage Radioelectrique edicte par le Ministere des Communications du Canada.

EUROPEAN COMMUNITY RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment has been tested and complies with the following harmonised standards:

CE
EN 50082-2 Provisional Immunity Standard encompassing static, RF, and line borne transient immunity. EN 50081-1 EMC emission standard. EN 61000-3-2 Line Borne Harmonic Distortion

RADIODETECTION

Declaration of Conformity
UK-DOC-2016-040-R1.DOCX

EC Declaration of Conformity

We: **Radiodetection Limited**
Western Drive
Bristol
BS14 0AF

Declare that the products listed below satisfy the essential requirements of the following Council Directives:

2014/34/EU Equipment for explosive atmospheres (ATEX) Directive
2014/30/EU Electromagnetic Compatibility (EMC) Directive

P374 intrinsically safe camera system comprising:

Description	Part No
10/HK3745001-1	Rod-cage assembly
10/HC3740001-1	Camera (optional PAL format)
10/HC3740201-1	Camera (optional NTSC format)
Product marking: Ⓔx **II, (1) G** [EEx ia] IIC (Rod–cage assembly)	
Ⓔx **II, 1 G** EEx ia IICT6 (Camera)	

Type examination certificate number Sira 01ATEX2153
Notified body 0518 (Sira Certification, Rake Lane, Eccleston, Chester CH4 9JN, England)

The product has been assessed by application of the following standards:

BS EN 50014:1997 (A1 & A2)	Electrical apparatus for potentially explosive atmospheres. General requirements
BS EN 50020:1994	Electrical apparatus for potentially explosive atmospheres. Intrinsic safety 'i'
BS EN 50284:1999	Special requirements for construction, test and marking of electrical apparatus of equipment group II, category 1 G
BS-EN-61326-1-2013	Electrical equipment for measurement, control and laboratory use EMC requirements Part 1: General requirements

The requirements of these standards have been checked against current harmonised standards and there were no differences affecting the latest technical knowledge for the product identified on this declaration.
Technical files supporting the assessment are held at Radiodetection Bristol

Signed

Darren Hill
Engineering Director

Date: May 2017

SPX
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1.6 INTRINSICALLY SAFE CONSIDERATIONS

The Pearpoint P374 system has been designed to be Intrinsically Safe even when faults occur or when the equipment has been damaged due to misuse. However, there are situations where the operator can cause a fire hazard if the following guidelines are not adhered to:

Equipment earthing
The equipment must be operated at the same electrical potential as the subject being inspected. This means that the P374 system and the subject being inspected must be joined together electrically otherwise it is possible that a high potential might exist between the equipment and the subject. Here are a few examples:

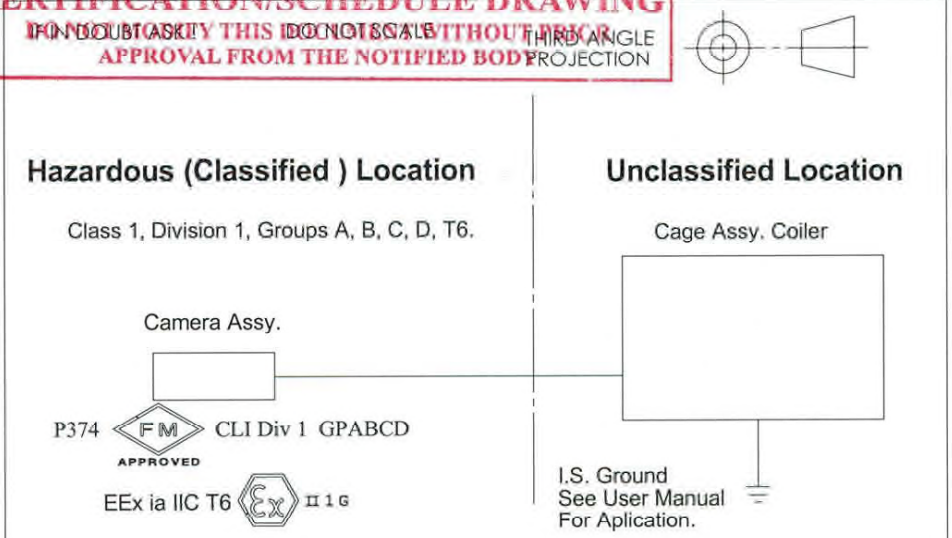
Underground pipework. If the P374 is operated from a mains supply rather than a generator there is usually no problem as any buried pipework will be at mains earth potential ensuring that there is no potential difference between the camera and subject. However, if the equipment is operated using a generator rather than a mains supply then there is a possibility that a potential difference exists between the P374 system and the pipework. As a general rule the potential difference will not be sufficient to cause a problem as the P374 camera is insulated to a voltage of greater than 500V. However, it is good practice to ensure that the P374 system is bound to the same potential as the subject, this is because an operator may build up a certain amount of static electricity and this may be discharged through the P374 system.

When working with a generator it is imperative that the generator is earthed, this can be done via the generator earthing point (see the generator manual for this information). An earth wire must run from the generator to the subject, in the case of underground pipes this can be an earthing stake. Where working on oil platforms the metal structure of the platform can be used. If your generator does not have an earthing point then an additional earth wire must be run from the distribution connector (see your dealer for details).

When working with mains power ensure that the equipment is properly earthed, be aware that some extension leads only carry 2 conductors for Live and Neutral and miss out the earth conductor altogether. Also be aware that some isolating transformers do not continue the earth conductor through between input and output (although this is rare); ensure that the transformer you are using has a continuous earth.

When working with the 12V supply input it is imperative that the *negative* conductor is earthed. Quite often the 12V supply is derived from a motor vehicle, this means that the P374 earthing system is connected to the chassis of the vehicle and thus the P374 will assume the same potential as the vehicle. It is well known that the chassis of **vehicles can carry high voltages due to static build-up** and this voltage will be conducted to the P374 unit. For this reason the chassis of the vehicle must be bonded to the subject being inspected, usually (in the case of underground pipework) this means that the chassis of the vehicle is connected to a ground-stake.

CERTIFICATION/SCHEDULE DRAWING
IF IN DOUBT ASK! DO NOT SCALE
DO NOT MODIFY THIS DRAWING WITHOUT PRIOR APPROVAL FROM THE NOTIFIED BODY
THIRD ANGLE PROJECTION



Notes :-
1. No revision to drawing without prior Factory Mutual Approval.
2. Control equipment connected to the Frame Assy.,(Regulator Unit) or Cage Assy., (Coiler) must not use or generate more than 250 Vrms or Vdc.
3. Resistance between Instrinsically Safe Ground and earth ground must be less than 1.0 Ohm.
4. Installation should be in accordance with ANSI/ISA-RP12.6 " Installation of Instrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70).

Warning - Substitution of components may impair Instrinsic Safety.
Warning - To prevent ignition of flammable or combustable atmospheres, disconnect power before servicing or ;
Warning - To prevent ignition of flammable or combustable atmospheres, read, understand and adhere to the manufacturer`s live maintainance procedures.

MOD REC																			
C/N. No	DATE	PROTO	08.05.02	PROTO	09.05.02	5932	13.12.05												
ISSUE		A		B		C													

MATERIAL N/A	FINISH N/A REMOVE BURRS AND SHARP EDGES	TOLERANCES:- (UNLESS OTHERWISE STATED) 0 DECIMAL PL. ± 0.5 1 DECIMAL PL. ± 0.1 2 DECIMAL PL. ± 0.05 ANGULAR ± 0°25'
DRN. BY davee	Pearpoint Ltd England	DIMENSIONS IN:- mm
CHECKED		CLASSIFICATION
APPROVED	TITLE	PEARPOINT DRAWING NUMBER A 374/99.CS.1 SHEET 1 OF 1
SCALE 1:1	Control Drg. For P374 Instrinsically Safe Camera System	PEARCODE A4

1.7 RETURNS PROCEDURE

If any equipment has to be returned to Pearpoint for repair or servicing, please note the following precautions to be taken to ensure safe passage:

- Always contact your service agent in advance.
- Retain the original packaging material and re-use wherever possible.
- If the original packaging material is not available, select a heavy duty cardboard box and make liberal use of bubble pack or polystyrene material to cushion and prevent movement of the component.
- Clearly identify all equipment with the customer's name and address.
- Where relevant, attach "Fragile" and "This Way Up" labels to the packaging.
- To the outside of one box, attach a copy of your order or work instructions. Enclose these in an envelope, including your name and address.
- Never transport generators with fuel on board.
- Always clean all contamination from the equipment prior to sending it to Pearpoint.
- Flexirods must be securely retained within the coiler or transportation cage.
- Equipment should be insured for carriage damage or loss.

2. SYSTEM PREPARATION AND CONNECTION

2.1 INTRODUCTION

The P374 is a colour inspection system specifically designed for intrinsically safe inspection needs. The P374 is a solid state, high resolution colour camera which is fully immersible and can travel down pipes up to 60 metres (200 feet) in length. The P374 camera operates from a Intrinsically safe low current supplied through the coiler.
A variety of skids allow inspection of pipes from 25mm (1") to 100mm (4").

2.2 OVERVIEW

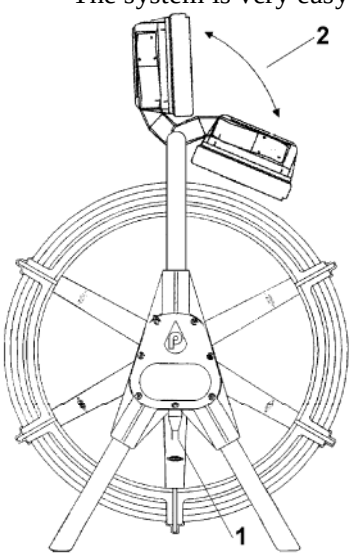
The system provides a self-contained video inspection system including camera, rod, power supply and video monitor. When connected to a mains power supply or a 12V supply the unit will be fully operational with the simplest of preparation. The system also provides the means to play-back recorded media on the integral LCD monitor by connecting any composite video source (PAL or NTSC) to the 'Video in' BNC connector on the underside of the electronics enclosure, video from the unit may also be recorded from the 'Video out' BNC connector. The unit is supplied with a video text-writer, this can display the users' text messages on-screen along with the cameras' distance measurement and the date and time (this is updated automatically). The system is fully water resistant to IP55, allowing for total wash-down of all components for cleaning

Do not use a high pressure water jet on the camera and electrical housing, as there is a possibility of equipment damage.

The coiler is constructed from durable, cast aluminium and all parts are designed for low maintenance.

2.3 CONNECTIONS

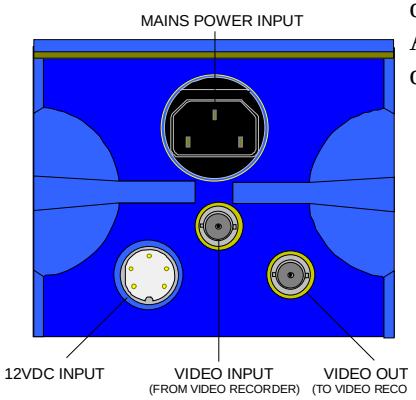
The system is very easy to prepare for use.



1. Ensure that the Power Lead is firmly plugged into the socket (1) (see Connectors Diagram)
2. Push the monitor to the up-right position (2).
3. The P374 will power up as soon as it is connected to an electrical supply.
4. If you wish to connect a VCR to your system, to record or playback your survey the BNC connectors are situated adjacent to the mains cable (item 1) (see Connectors Diagram). You will require a BNC cable which can be supplied by Pearpoint as an option. When connected to Video IN, the monitor will automatically display your survey video.
5. If you wish to power your system from a 12V DC supply, the socket is situated adjacent to the mains connector (1). The cable will connect to a Vehicle Cigarette/Cigar Lighter and is available with the equipment as standard.

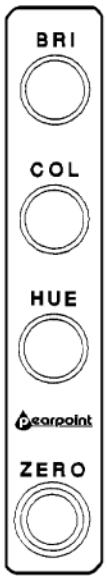
Connectors Diagram

FRONT



On powering up, the Pearpoint message will be displayed briefly and the camera and lights will operate. The system is now ready to use.
A pull-out sun shade is available to reduce the effects of bright sunlight on the monitor.

2.4 SET MONITOR DISPLAY



For the best quality monitor picture it is best to view the monitor straight-on, the picture quality will degrade when viewed from different angles.
You can adjust the quality of the displayed picture by using the monitor set-up controls situated on the left hand side of the monitor.
You can turn the knobs to adjust the brightness and colour of the picture to suit your own requirements.

NOTE. The Hue control is for NTSC systems only.

2.5 ROD COUNTER SYSTEM

The rod counter display appears in the centre of the screen. The rod counter requires calibrating on a regular basis to maintain accuracy.

NOTE. Should the counter run outside calibration the message "counter needs cal" will be displayed. You should carry out the procedure detailed below.

2.6 ROD CALIBRATION

1. Ensure all the rod is returned to the coiler.
2. Press the [ZERO] button and hold for five seconds. The message "press again to cal" is displayed, release the [ZERO] button.
3. Press the [ZERO] button again. The message "cal complete" will be displayed.

Pearpoint recommends the system is calibrated before use or on a daily basis.

It is also advisable, on a regular basis, to confirm the absolute accuracy of your counter by means of a physical check of rod length. This involves calibrating the rod, setting the counter to zero, and pulling 20m (60 ft) of rod from the coiler. You can compare the physical measurement with the rod counter reading displayed on the screen. The displayed rod length should be within ±60cm (2 ft) of the physical length.

2.7 ZERO THE ROD COUNTER

The rod counter can be set to zero at any time. This is useful if you wish to restart your survey at a particular point. To zero the counter:

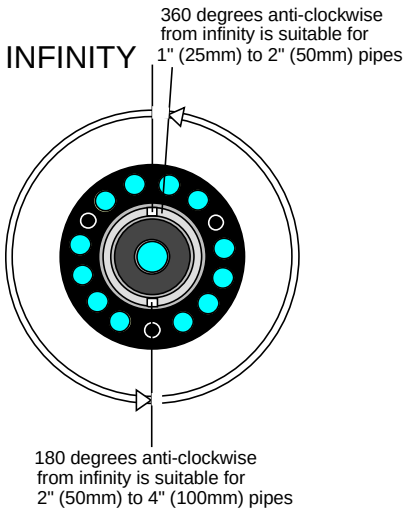
1. Press the [ZERO] button three times in quick succession. The counter will read zero.

3. P374 INTRINSICALLY SAFE FLEXIPROBE

3.1 SETTING MANUAL FOCUS

To get the sharpest image from the camera the focus can be adjusted using the focussing tool that was supplied with the system.

Focussing tool



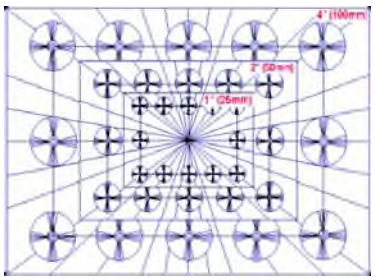
Before using this tool ensure that the front sapphire window is clean and there is no dirt in the lens recess as this may damage the tool or scratch the window.

The lens must be turned **clockwise to focus FAR** and must be turned **anti-clockwise to focus NEAR.** A good starting point is to focus the camera to ***infinity***. To do this point the camera around the workplace and note if objects in the distance are sharply in focus, if they are not point the camera at objects closer to the camera, if closer objects are in focus then the lens will need to be rotated in a clockwise direction, if *everything* is out of focus then the lens will need to be rotated in a anti-clockwise direction.

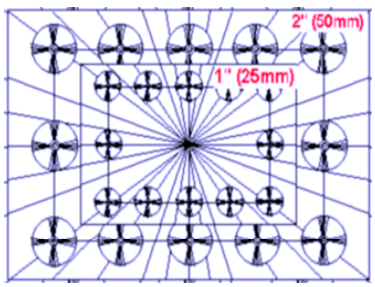
Once the lens has been focussed to infinity it is easy to judge where to set the lens, for normal use the lens will only need to be turned **one half turn anti-clockwise (180 degrees)** to focus in 2” (50mm) to 4” (100mm) pipework. Another half turn (360 degrees anti-clockwise from infinity) will focus the camera for use in 1” (25mm) to 2” (50mm) pipework.

It is not imperative that the camera is adjusted for different pipe sizes as the camera has a certain depth of field. This means that although the camera was focussed for use in 2” (50mm) pipes the picture is still acceptable in pipe sizes down to 1” (25mm) and up to 4” (100mm). This method means that in a 1” (25mm) pipe the camera focuses further down the pipe than usual but the image is still perfectly acceptable. In a 4” (100mm) pipe the camera will be focussing nearer the camera than usual but the image will still be acceptable.
In other instances the camera can be focussed to other distances depending on what it is important to observe. When the camera is adjusted to focus at very close proximity the effect is that the camera magnifies the scene. This can be very useful when inspecting surfaces for fractures or oxidisation, the magnified colour picture shows all defects that are in the visible range.

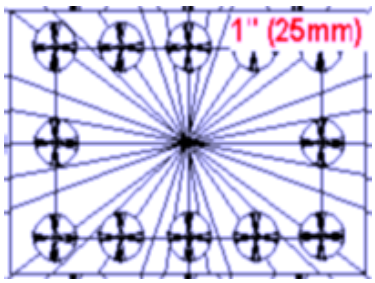
Another method of focussing is to use the focus chart, which is at the back of this manual. The picture contains three charts laid one on top of the other with the smallest chart in the middle of the picture. These charts are marked for focussing the camera for work in 1” (25mm), 2” (50mm) and 4” (100mm) pipework. To use this chart follow these instructions:
Release enough Flexirod from the unit so that is easy to hold the camera above the chart in the back of this manual. Rotate the camera until the red lettering is at the top right of the screen as shown in the pictures to the left here.



If you wish to inspect 4” (100mm) pipework, move the camera until all three charts are visible, one inside the other as shown in the top picture. Now adjust the focus until the chart is in sharp focus, try moving the camera slightly upward and downward to check that the focus is at its sharpest point. The camera is now ready for inspecting 4” (100mm) pipework.



If you wish to inspect 2” (50mm) pipework, move the camera until two charts are visible, one inside the other as shown in the middle picture. Now adjust the focus until the chart is in sharp focus, try moving the camera slightly upward and downward to check that the focus is at its sharpest point. The camera is now ready for inspecting 2” (50mm) pipework.



If you wish to inspect 1” (25mm) pipework, move the camera until the single central chart is visible as shown in the lower picture. Now adjust the focus until the chart is in sharp focus, try moving the camera slightly upward and downward to check that the focus is at its sharpest point. The camera is now ready for inspecting 1” (25mm) pipework.

Never allow the lens to become proud of the body or overtighten, either extreme may damage the lens and camera.

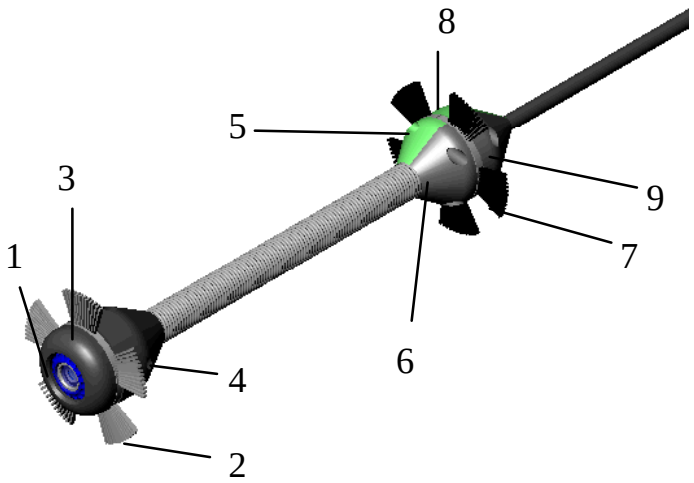
It is important that the tool is properly located before trying to adjust the lens otherwise the saphire window can be damaged.

3.2 SKID SETS

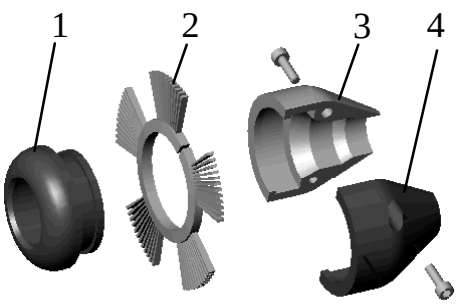
There are three different types of skid sets available with the P374

- 100mm (4”) Radial brush skids are recommended for clean pipes.
  Part No. HC3730901-1
  50mm (2”) Delrin skids without the brushes fitted
- 100mm (4”) Axis brush skids are recommended for dirty pipes.
  Part No. HC3731001-1
- 100mm (4”) Axis brush skids for live gas main insertion.
  Part No. HC3735001-1

3.3 FITTING 100MM (4") BRUSH SKIDS

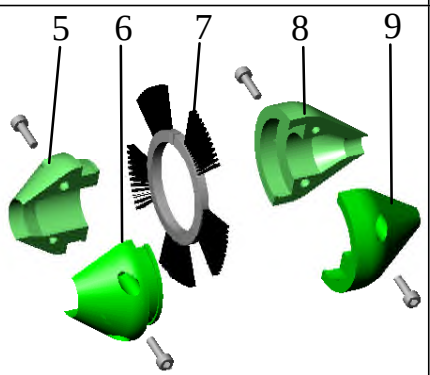


When you unpack your brush skid set, you will find two sets of brushes one set of four moulded quadrants (back skids) and one set with two moulded quadrants and the front half (front skids).
Removing the brushes from the brush skids will leave the delrin skids for use in a 50mm (2") pipes.



To fit the front skid

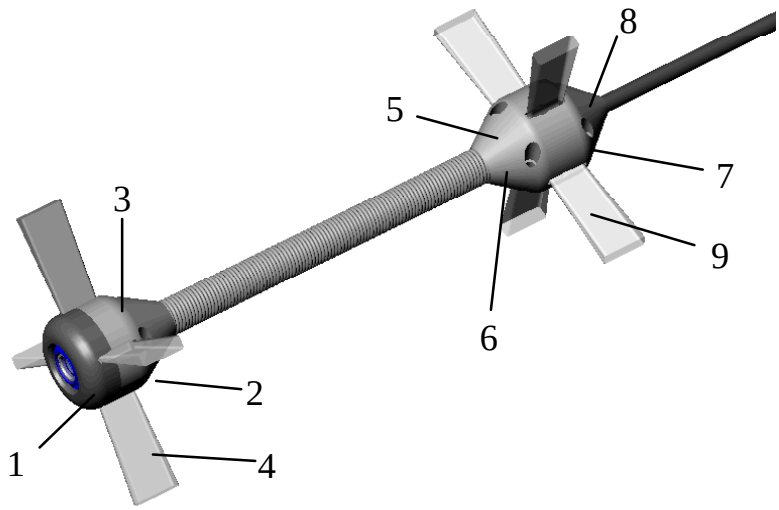
1. Place the front half of the front skid (item 1) over the front of the camera.
2. Twist the brush ring (item 2) to make a gap for the hose to fit through.
3. Press the brush ring flush with the front half skid.
4. Fix the back two halves (item 3&4) of the front skid together, ensuring to lock the flange over the collar of the front half of the skid.
5. Secure with the two M4x4 socket head cap screws.



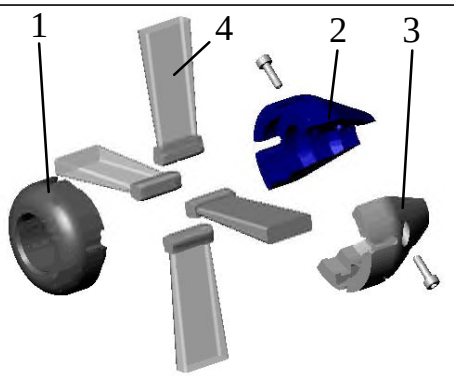
To fit the rear skid

1. Place the front two halves of the back skid (item 5&6) in place over the camera hose and lock together with the M4x4 socket head cap screws.
2. Twist the brush ring (item 7) to make a gap for the hose to fit through.
3. Press the brush ring flush with the front half skid.
4. Fix the back two halves of the rear skid (item 8&9) together, ensuring to lock the flange over the collar of the front half.
5. Lock together with the M4x4 socket head cap screws.

3.4 FITTING 100MM (4") AXIS SKIDS

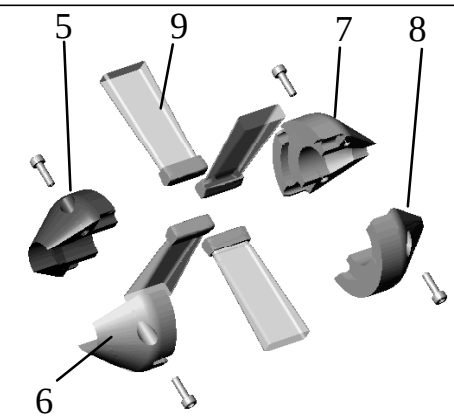


When you unpack your brush skid set, you will find two sets of 4 brushes, one set of four moulded quadrants (back skids) and one set with two moulded quadrants and the front half (front skids).



To fit the front skid

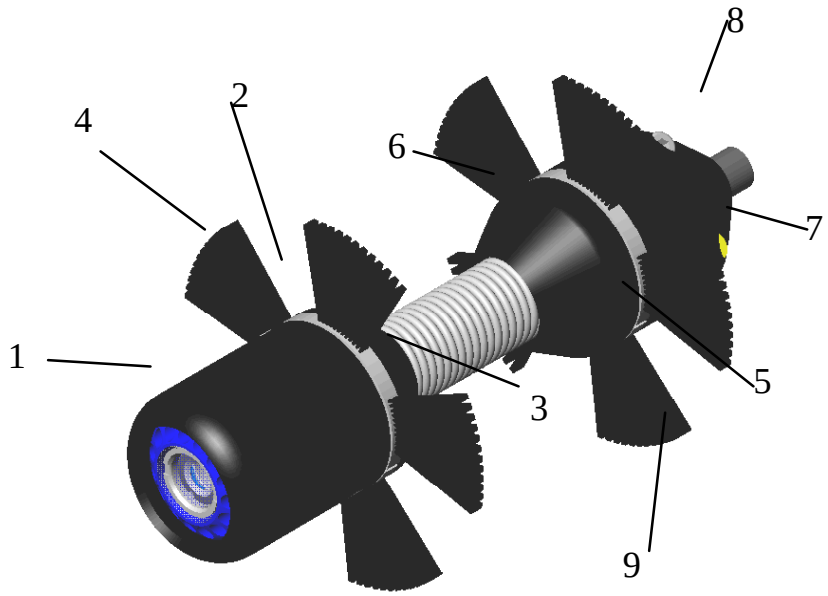
1. Insert a brush (item 4) into each of the slots on front half of the skid (item 1).
2. Fix the back two halves (item 2&3) of the front skid together ensuring to lock the flange over the collar of the front half so that the brushes slide into the slots of the rear quadrants
3. Secure with the two M4x4 socket head cap screws.



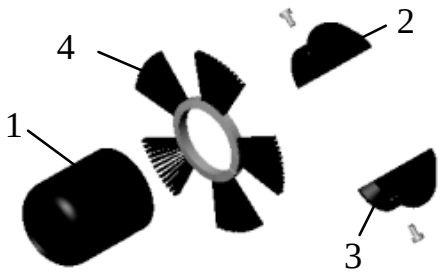
To fit the rear skid

1. Place the front two halves of the back skid (item 5&6) in place over the camera hose and lock together with the M4x4 socket head cap screws.
2. Insert a brush (item 9) into each of the slots on the front two quadrants of the skid (item 5&6).
3. Fix the back two halves (item 7&8) of the rear skid together ensuring to lock the flange over the collar of the front half so that the brushes slide into the slots of the rear quadrants
4. Secure with the two M4x4 socket head cap screws.

3.5 FITTING 100MM (4”) AXIS SKIDS LIVE GAS MAIN INSERTION

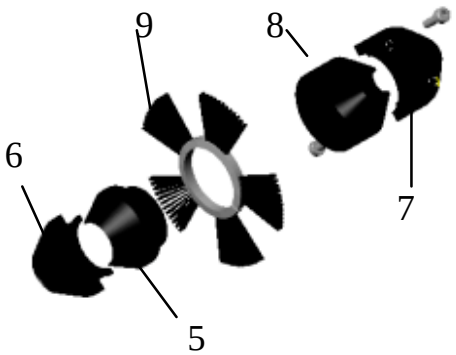


When you unpack your brush skid set, you will find two sets of 4 brushes, one set of four moulded quadrants (back skids) and one set with two moulded quadrants and the front half (front skids).



To fit the front skid

1. Insert a brush (item 4) into each of the slots on front half of the skid (item 1).
2. Fix the back two halves (item 2&3) of the front skid together ensuring to lock the flange over the collar of the front half so that the brushes slide into the slots of the rear quadrants
3. Secure with the two M4x4 socket head cap screws.

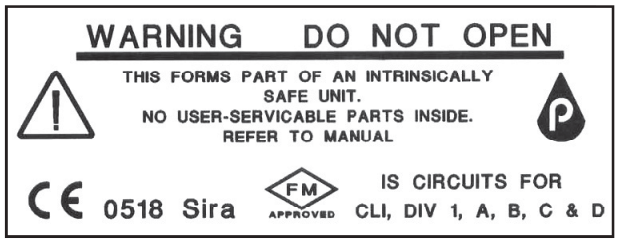


To fit the rear skid

1. Place the front two halves of the back skid (item 5&6) in place over the camera hose and lock together with the M4x4 socket head cap screws.
2. Insert a brush (item 9) into each of the slots on the front two quadrants of the skid (item 5&6).
3. Fix the back two halves (item 7&8) of the rear skid together ensuring to lock the flange over the collar of the front half so that the brushes slide into the slots of the rear quadrants
4. Secure with the two M4x4 socket head cap screws.

3.6 USER MAINTENANCE

DO NOT REMOVE the cover to the electrical box on the coiler as this will invalidate the Intrisically Safe declaration for this unit, there are no serviceable parts inside the electrical box.
The fuse must be replaced by an approved Pearpoint service engineer.



User maintenance on the system is limited to general before use checks and equipment hygiene. Before use checks include:

- Rod calibration and physical check of rod condition.
- Ensure all connections are clean and serviceable.
- Cleaning of the glass body and camera window.

Do not use any abrasive cleaner on the camera glass.

After use, ensure the equipment is thoroughly cleaned and sterilised, use a small brush to clean out any debris from the LED recesses

Looking after your camera.

To preserve the picture quality it is important that the sapphire window in front of the lens and the LED lighting is kept clean and the surface of these are not damaged. The sapphire window is especially hard to resist scratches but it is still possible to damage the surface by rubbing abrasive compounds across it as can happen if a cloth is used to clean a dirty window. It is much better to treat the window and LED's as though they were on a photographic camera, keeping them clean as much as possible.
Where the window and LED's do need cleaning it is better to flush the dirt away first and then to lightly brush out the LED cavities with a nailbrush. This is best done when the camera is immersed in water so that the dirt particles float away. When the camera is free of dirt give the sapphire window a quick wipe with a lint-free cloth (such as used to clean spectacles).

Getting the best picture from your camera:
The most important issue is to keep the sapphire window free from dirt and water-stains by following the procedure above, this is also true of the LED lighting, the more light that the camera can emit the better the picture will be (especially in the larger diameter pipes).

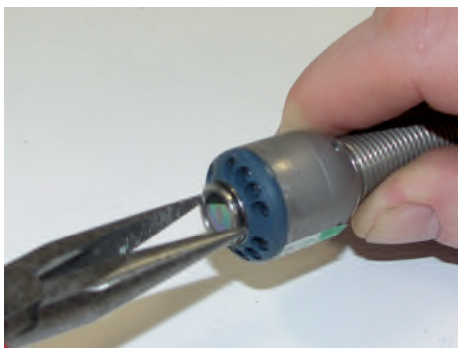
3.7 USER REPAIRS

User repairs are limited to replacing the front lens window and cleaning the LED recesses.

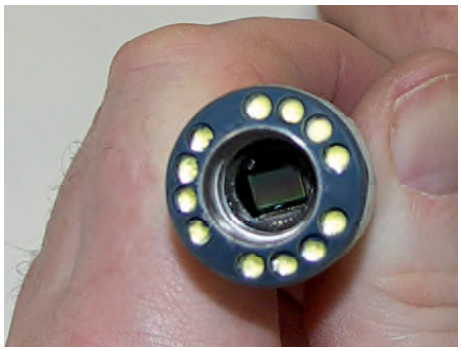
NOTE. The front window is a part of the lens assembly.

Where the front sapphire window has become scratched to a point where the quality of the picture is affected the user can replace the lens assembly. The sapphire window cannot be replaced separately as this is bonded to the lens to provide a waterproof seal. This is quite a simple process but requires that the camera is perfectly clean before starting. To replace the lens assembly follow these steps:

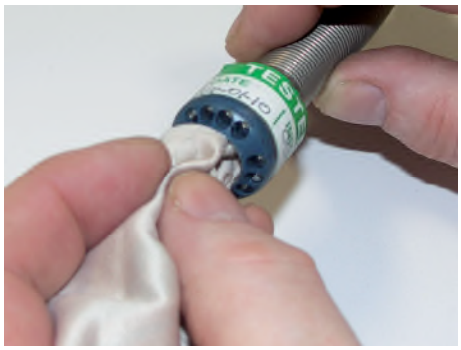
Clean the camera as shown in the previous section and ensure that the camera is dry with no water trapped in LED cavities.
Unscrew the lens in an anti-clockwise direction using the lens tool until it is proud of the body and turning further makes no affect.



Hold the lens using serrated pliers (smooth edge pliers will only damage the lens body) and carefully pull the lens away from the camera body. You will notice that it takes a reasonable pull to do this as the body is sealed and a vacuum is created behind the lens. Ensure that you hold the lens only and not the lens housing as this will damage the camera.



If the replacement of the lens is due to the sapphire window being cracked (this will take a considerable impact) then it is important to make sure that any moisture inside the lens cavity is removed. It is important that the lens cavity is cleaned only with a cotton-bud dipped in Isolpropyl Alcohol (IPA) as other cleaning agents may mark the glass face of the CMOS sensor.
In all cases clean the thread area, as this will probably have an amount of debris build-up. Always ensure that the threads and sensor glass is perfectly clean and dust-free before re-assembly.



Remove the new lens from the packaging and clean the rear element with a lint-free cloth that is suitable for optical cleaning (spectacle cleaning cloth).

Ensure that the two black ‘O’ rings are greased, if necessary rub some silicon grease

into them but avoid getting this onto any of the glass surfaces.

Replace the lens using the lens tool. Be sure that you do not cross the threads as these are fine pitch, you should need only a small amount of pressure to overcome the compressed air behind the lens.

Screw the lens in carefully until the top surface is below the body of the camera.

3.8 OPTIONS

Optional equipment is available at extra cost.

HC3730901-1	100mm (4") Radial Brush Skids
HC3731001-1	100mm (4") Axis Brush Skids
HC3735001-1	100mm (4”) Axis brush skids for live gas main.

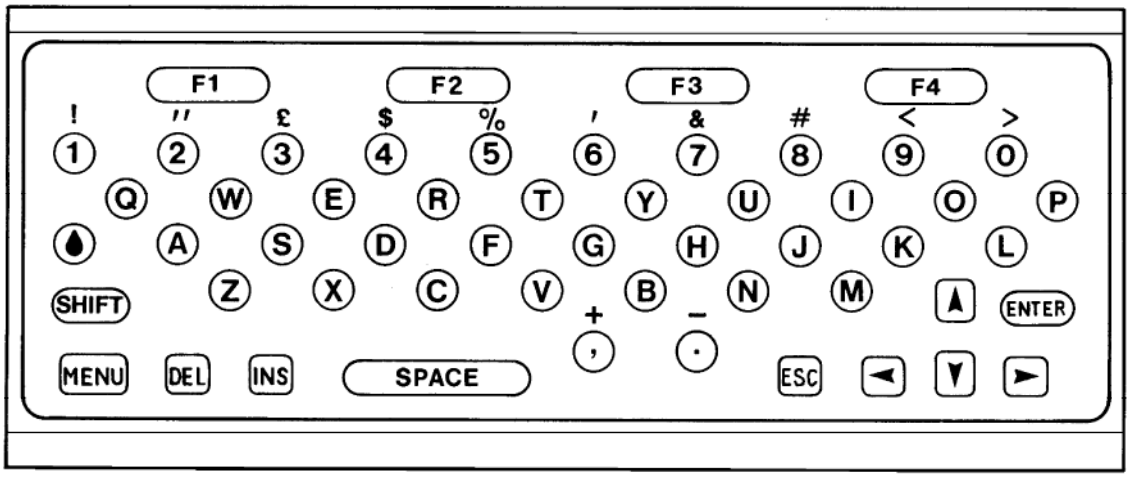
4. TEXT EDITOR

The Text Editor allows pages of text to be composed. On these pages you can put:

- System fields so that the current date, time and counter reading can be seen.
- User fields, so that commonly used text (your company name for example) can be seen.
- Other comments and observations made during the course of a survey.

4.1 KEYBOARD FUNCTIONS

The information is entered using the QWERTY keyboard.



To set the fields you first press the [MENU] key to show the top level choices of [SET], [CONF] and [EDIT]. These are indicated on the labels above each of the [FUNCTION] keys [F1] to [F3] respectively. You then press the appropriate [F] key to show the next level of choice.

To move back up the "tree" press the [ESC] key. This steps you back up, one level at a time until you reach the top level. The last press of [ESC] turns the labels off.

In the rest of this Section it is assumed that you have already pressed the [MENU] key and key sequence descriptions will not therefore start with [MENU].

4.2 SET CURRENT DATE - [SET] [DATE]

This option allows system date to be set, in the form DDMMMYY e.g. 05AUG95.
After you press [DATE], move the cursor and overtype the displayed date to set to the required value. Press [ENTER] to accept the displayed date. The date will remain current.

4.3 SET CURRENT TIME - [SET] [TIME]

This option allows system time to be set, in the form HHMM, e.g. 1530. Time is in 24-hour clock format. After you press [TIME] move the cursor and overtype the displayed time to set to the required value. Press [ENTER] to accept the displayed time. The time will remain current.

4.4 SET ROD COUNTER - [SET] [COUNT] [SET]

This option allows the electronic rod counter reading to be pre-set to any valid value within the allowable range. After you press [COUNT], move the cursor and overtype the displayed reading to set to the required value.
Press [ESC] at any time to back out without changing anything. Press [ENTER] to accept the displayed counter reading.

4.5 SET LANGUAGE - [CONF] [LANG]

Allows selection of language for on-screen text. The available languages are English (UKENG), American English (USA), French (FRNCH), and German (GERMN).

4.6 SET MEASUREMENT UNITS - [CONF] [UNITS]

Allows selection of Imperial or Metric units for the electronic rod counter display. After pressing [UNITS] choose [METR] or [IMP].

4.7 SET DISPLAY COLOUR - [CONF] [DISP]

You can select the colour of the display text. You can select [BLACK] or [WHITE].

4.8 SYSTEM RESET [CONF] [FCLR]

FCLR is short for Forced Clear. If you select this option, the computer in the system is reset and all the text pages you have created are wiped clean. When you press [FCLR] you will be asked to confirm by pressing "Y" and pressing [ENTER]. You can back out by pressing the [ESC] key. You should not need to use this function as part of your normal operations.

4.9 USER TEXT PAGES - [SET] [USR]

Used to create or edit one of the nine available text pages on which you can type any information relevant to the survey. This information will be recorded on video if used.
Nine pages, numbered 1 to 9, are available and any one of these can be overlaid onto the TV picture so that it can be recorded along with the picture. Page 0 (zero) is a special page which is always blank.
You can use this page when you do not wish to have any text on the picture, rather than clear down one of the other pages.
Each page can accept up to eight lines of 22 characters. You can use any of the characters available on the computer keyboard to compose your text. The colour of the text can be set using the [CONF] [DISP] option on the menu.

4.10 CREATING TEXT ON A PAGE.

To store or edit text in pages, start the Editor by pressing the [MENU] key then press the appropriate [FUNCTION] key for [EDIT]. When you enter the Editor you will see the four options available, namely [PAGE] [DATE], [TIME] and [COUNT].

- Press [PAGE] followed immediately by a number [1] to [9] to select the page you wish to edit.

NOTE. The [PAGE] key has a time-out on it. You must press a number key within two seconds of pressing the [PAGE] key. If you run out of time, try again.

NOTE. Make sure that the shift lock is set to upper case so that you get numbers and not the other characters when you press a number key. If you begin getting the wrong characters eg ! instead of 1, this means that the shift lock is wrongly set. Change it by pressing the key.

NOTE. The screen displays the selected page. The selected page number is shown at the top left hand corner of the screen. The cursor, a flashing asterisk, appears on line 1, position 1. Any text previously entered onto that page is visible.

NOTE. The cursor, and hence the insertion point for text, can be moved by pressing the CURSOR [ARROW] keys. If you move the cursor past the edge of the screen it will re-appear (wrap) at the opposite edge of the screen. For example, if it leaves the screen at line 8, position 22, it re-appears at line 1 position 1 and vice versa.

NOTE. Now type whatever text you wish to appear on the screen. Text wraps automatically down to the beginning of the next line, so there is no need to deliberately move the cursor.

4.11 ENTERING FIELDS ONTO A PAGE

You can add prepared text pages, which can include date, time, count and user text, to your survey screen at the touch of a button.
You use the [EDIT] function to enter one of the system fields [DATE], [TIME] or [COUNT]. Move the cursor to your desired position and simply press the [F] key with the appropriate label over it. The field will be inserted at the cursor position.

NOTE. The counter value can only be read from off the screen. There is no mechanical readout.

To enter a user field, press the [PEARDROP] key followed by a number [1] to [9]. The selected field is then inserted at the cursor position.

NOTE. The [PEARDROP] key has a time-out on it. You must press a number key within two seconds of pressing the key. If you run out of time, try again.

4.12 DELETING FIELDS FROM TEXT

This procedure is used for both system and user fields. Place the cursor on the first character of the field text then press the [DEL] key twice. The entire field will be deleted.

4.13 DELETING A CHARACTER

A character can be deleted by using the [CURSOR] [ARROW] keys to move the cursor over it and then:

1. Pressing [DEL] twice, removes the character under the cursor.
2. Pressing [DEL] followed by ‘ deletes the character under the cursor and moves those characters to the left of the cursor, one character to the right.
3. Pressing [DEL] followed by ’ deletes the character under the cursor and moves the characters to the right of the cursor, one character to the left.

4.14 DELETING A LINE

A line can be deleted by moving the cursor over any character on the line to be removed and then:

1. Pressing [DEL] and then [ENTER] removes the line containing the cursor with no further text shift. This effectively creates a blank line.
2. Pressing [DEL] followed by “ deletes the line containing the cursor and moves the lines of text below the cursor one line down.
3. Pressing [DEL] followed by ” deletes the line containing the cursor and moves the lines of text below the cursor one line up.

4.15 DELETING EVERYTHING ON A PAGE

The page currently being displayed can be cleared of all text and fields by pressing [DEL] followed by [PAGE].

4.16 DELETING EVERY PAGE

You can clear every page at once by using the FORCED CLEAR [FCLR] menu function. This will also reset the computer.

4.17 CORRECTING A CHARACTER

A single character can be corrected by moving the cursor over it and then typing the correct character. This is called "overtyping".

4.18 INSERTING A CHARACTER

A character can be inserted by moving the cursor to the right or left of the position where the character is to be inserted. Pressing [INS] followed by ‘ or ’ inserts a space and moves the remaining text to left or right.

4.19 INSERTING A LINE

A line can be inserted by moving the cursor to above or below the position where a line is to be inserted. Pressing [INS] followed by “ or ” inserts a blank line and moves the remaining text up or down one line.

5. SPECIFICATIONS AND TROUBLESHOOTING

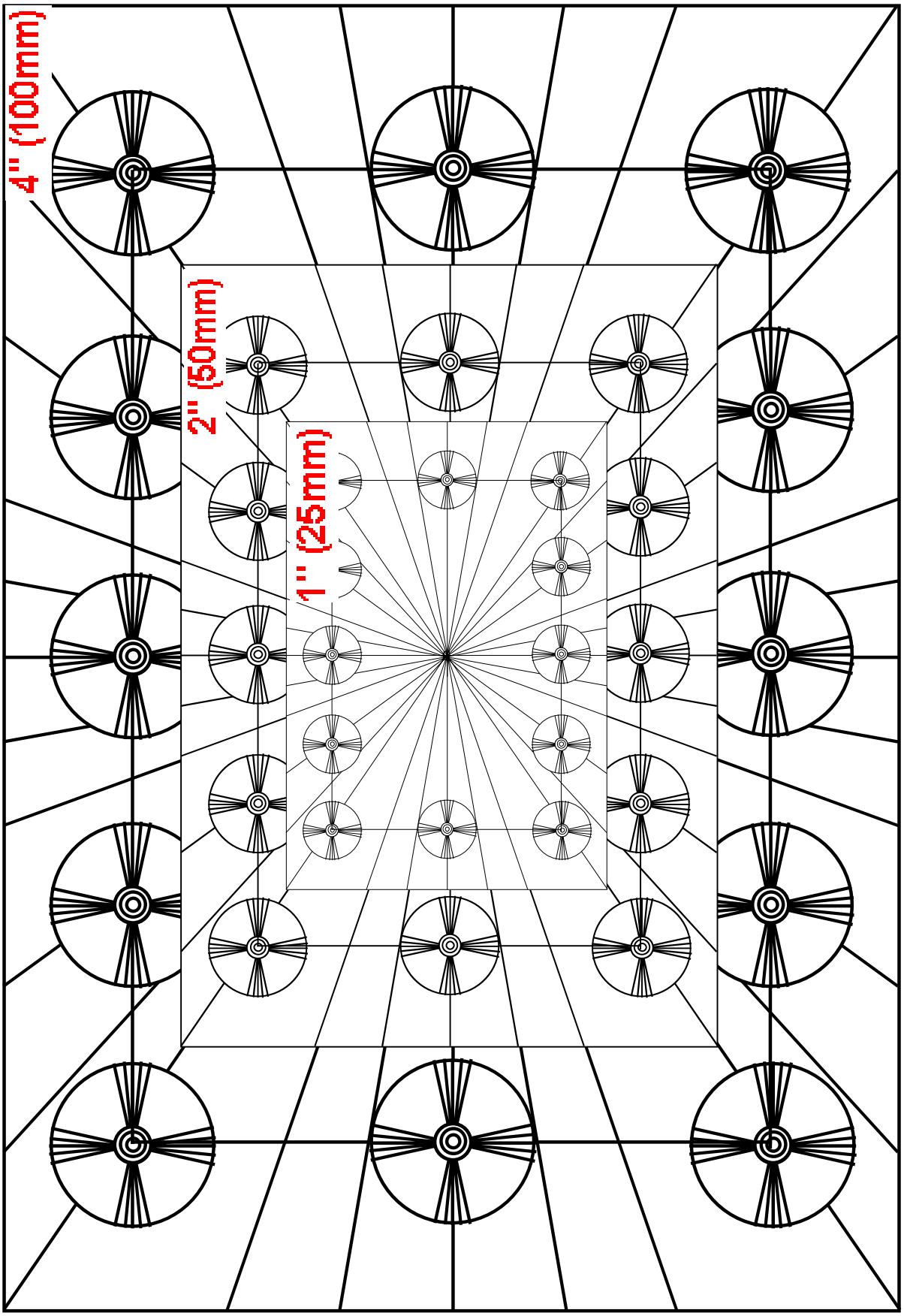
5.1 GENERAL EQUIPMENT SPECIFICATION

Weight:	21Kg (46 lbs.)
Dimensions:	915mm (36”) H x 300mm (12”) W x 600mm (23.5”) D
Voltage Requirements:	100V - 240V AC 47-63 Hz; 12V DC
Power Consumption:	30 Watts maximum
Environmental:	Camera IP68; Coiler and Monitor IP55
Input Connections:	Video - BNC; Power (100 - 240V AC) Power (12V DC)
Output Connections:	Video – BNC
Working AMB Temperature	-10° +40°c

5.2 TROUBLESHOOTING

This section deals with simple checks and procedures that can be performed by the user. The table below shows some of the more common problems together with the suggested course of action.
If any of the suggested remedies fail to resolve the problem, contact Pearpoint for further advice.

Fault	Possible Cause	Solution
Camera, lights and LCD do not operate	Power failure.	Check power supply
	Power lead disconnected or damaged.	Reconnect power lead or, if damaged, replace lead.
The LCD has power but the camera and lights do not operate.	Rod damaged or broken	Inspect rod. If damaged or broken, seek advice from Pearpoint
	Camera has come loose from the connector	Refit the Camera
Cannot record P374 pictures with a video recorder	Ensure you have purchased the correct unit PAL for UK and Europe. NTSC for US and Japan.	Ensure you have connected the video output from the P374 to the video input of your video recorder.
		The UHF, VHF or aerial socket will not work.
The picture is always blurred no matter where the focus is set.	Check the condition of the sapphire window fitted to the camera’s lens assembly, this may be scratched to a point where it starts to affect the picture quality.	This is the only user-replaceable item on the system. Please read the section on the lens assembly within this manual, this will explain how to replace the lens.


4" (100mm)
2" (50mm)
1" (25mm)

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