

Technology Design

ADVANCED ULTRASONIC HARDWARE

PocketScan PS45

USER GUIDE AND TECHNICAL REFERENCE MANUAL

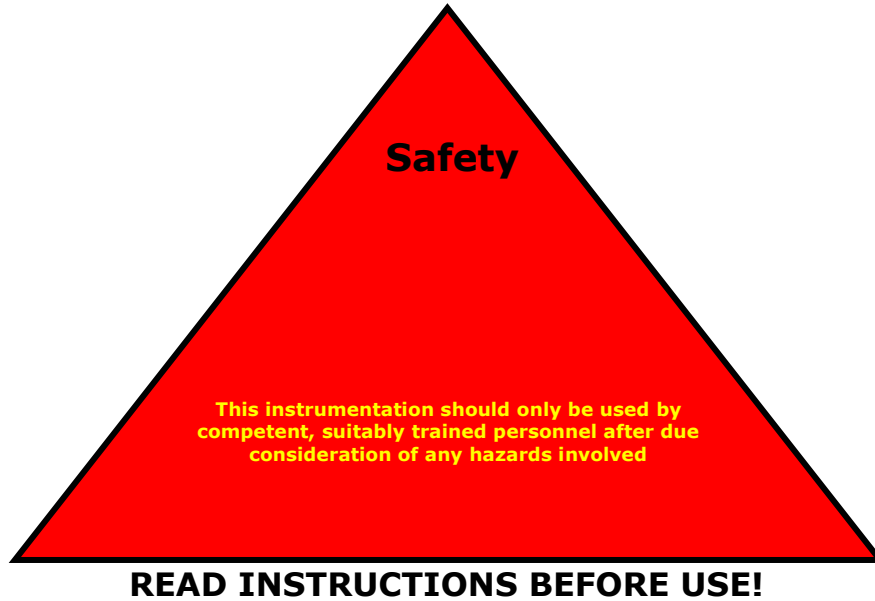


Manufactured in Great Britain



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Important Safety Information



Due to the potential hazards associated with any electrical equipment it is important that the user is familiar with the instructions covering the capabilities and operation of the instrument. The user should ensure that all reasonable safety precautions are followed and if in any doubt, should seek advice from a suitably qualified and trained person before proceeding.



NO attempt should be made to remove protective covers or access the internals of the system unless the equipment is isolated from the electrical supply and then only by a suitably trained and qualified technician. Failure to comply with these instructions may expose the user to electrical hazard.



All equipment supplied MUST only be used in dry conditions and is not suitable for operation in damp or wet environments.

Regulatory Information

The TD range of equipment conforms to the following European and International Directives and Specifications:

- 2006/95/EC (Low Voltage Directive)
- 2004/108/EC (Electromagnetic Compatibility Directive)
- 93/68 / EEC (CE-Marking Directive).
- EN55022 Class B and EN 50082-1 for use in the following areas: residential, business, and light industry
- BS/EN 61326: 2006 Electrical equipment for measurement, control, and laboratory use. EMC requirements, General requirements.

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USER GUIDE - HARDWARE

Thank you for choosing Technology Design's advanced TD Ultrasonic systems. This document will guide you to recognise and understand the various components and controls that will enable you to use the system effectively and safely.

The PS45 is a small format multi-channel industrial Ultrasonic acquisition and signal processing device. The PS45 is controlled by the TDScan advanced ultrasonic software from any Windows® based PC or laptop computer using Ethernet.

Accessories for application specific procedures may be supplied separately. These accessories could include probes, scanners, and positional encoders.

1. Description

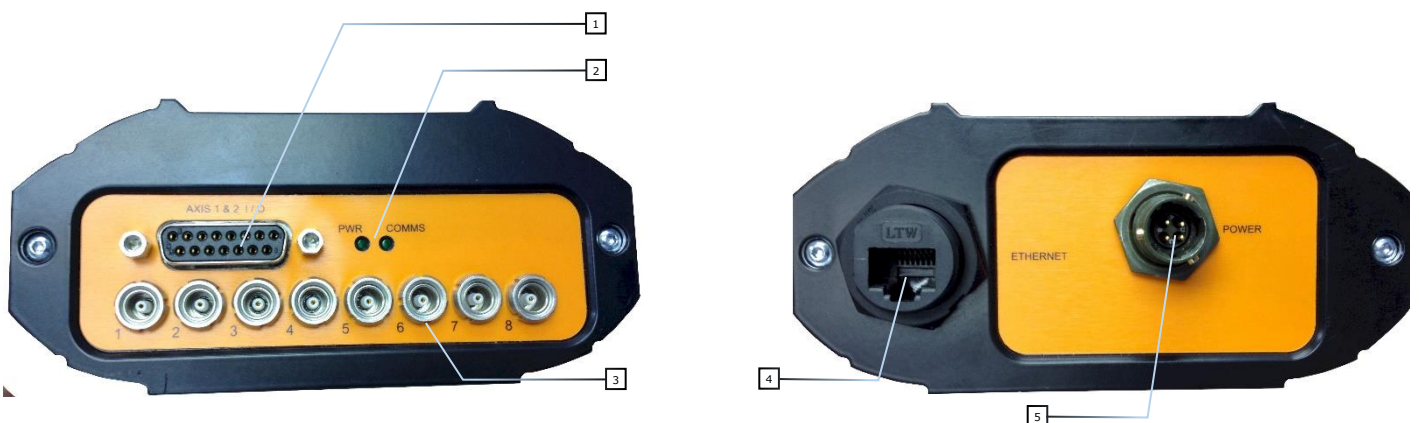
The PocketScan PS45 (PS45) is a small format multifunctional industrial ultrasonic data acquisition and processing system. The PS45 is equipped to acquire Pulse echo and ToFD data using its advanced hardware and software. The architecture of the PS45 ensures high quality ultrasonic signals with minimal noise interference.

The PS45 is supplied in the following hardware formats: 4-Channel, 8-channel, 16-channel, 32-channel, 64-channel.

2. Identification of Components (8-channel version used for illustration)



General view of PocketScan PS45



3. Description of Parts and Connectors

1	Encoder Output Connector	Dual axis encoder output.
2	LED's	Information LED's. The sequence of light flashes provides information about the system's operational state.
3	Probe connections	4, 8, 16, 32 or 64 x Lemo® 00 connectors for ToFD and conventional Pulse echo probes.
4	Ethernet Connector	RJ45 Ethernet connector for linking to a PC. The PS45 is controlled from the PC using the TDScan software.
5	Power Input Connector	The PS45 is supplied with a mains power supply.

4. Power

The PS45 is powered by AC mains electricity through a DC power adapter. The adapter is supplied with the system. The adapter input is autosensing and can operate from 90VAC - 260VAC at 40Hz - 60Hz. The adapter output is 6VDC - 12.5VDC at 40W (Operating). Connect power cable from power adapter to the Power Supply input (5)

5. Starting and Stopping the System

The PocketScan PS45 has no on/off switch. It is safe to disconnect the power supply or switch off at the plug while connected to the PC.

6. Ethernet

The PS45 is controlled from a Windows® laptop or desktop PC using an Ethernet cable link. If the link is in excess of 100m, a fibre-optic cable may be used.

A cross-over Ethernet cable is supplied with the PS45. A standard Ethernet cable may be used if connecting directly to a Gigabit (10/1000) enabled Laptop/PC or if connecting to a computer through a network switch/hub.

7. Basic Operation

1. Connect the PS45 directly to a Windows® based PC/Laptop using an Ethernet cable. The Cross-over cable supplied with the system may be used.
2. Power the PS45 by connecting the Power cable to the power connector (5). The LED's (2) will flash brightly and intermittently until they stabilise to a low steady glow; this signifies that the PS45 is initialised and ready to receive signals from the TDScan software.
3. Set up an Ethernet link between the PC and PS45 by entering an IP address for the laptop/PC and creating a private network. This procedure only needs to be applied for first time connections; subsequent connections will be automatic as long as the IP address of the PC remains unaltered:
 - a. Assuming you are using Window10®, click the Windows icon on the taskbar to open the **Start** menu.
 - b. Select **Settings** (cog icon), then click **Network & Internet**.
 - c. Click on **Ethernet** then **Change adapter options**.
 - d. Right-Click **Ethernet** and select **Properties**.
 - e. Double click **Internet Protocol Version 4 (TCP/IPv4)**
 - f. Click **Use the following IP address** and enter **192.168.000.199** in the **IP address** text box.
 - g. Click in the **Subnet mask** text box and the value **255.255,255.0** will be entered automatically.
 - h. Click **OK** and close all other open windows by clicking **OK** or **Close**.
 - i. You can test the link using the following procedure:
 - j. Open the **Start Menu**.
 - k. Type **cmd** into the **Search Box** then press enter. The **Command** window opens.
 - l. Type **ping 192.168.0.200** and press the **Enter** key (all PS45's have this IP address). Three text replies from the IP address **192.168.0.200** should appear in the Command window. If the message **Request timed out** appears (x3) then there is no communication between the PS45 and Laptop – seek advice from a network engineer, competent person or contact Technology Design Ltd.
4. Start the TD-Scan software to control the PS45:
 - a. Start the TD-Scan software on the laptop/PC.
 - b. The communication window will display a message that **Communication has not started**.
 - c. Click **Setup – Configuration – System – Reset Ethernet Configuration**.
 - d. Click **OK**.
 - e. Shut the TD-Scan software down and restart it. The **Socket Settings** window will appear.
 - f. Select **Manual** from the **IP Addressing** menu.
 - g. Enter **192.168.000.200** into the **Remote Unit** text box.
 - h. Enter **123** into the **Port** text box.
 - i. Click **OK**. A warning may appear if no licence is detected. Close the warning window; the licence can be activated later.
 - j. The A-Scan screen should display a live A-scan trace. If no A-scan is visible, seek advice from Technology Design.

Note: Once the fixed IP address has been established on the PC and the TD-Scan software is communicating with the PS45, the links will be made automatically when the software is restarted, or the laptop is restarted. If the fixed IP address is removed or changed, this procedure will have to be repeated

8. Connecting Probes

Transducers may be safely connected to the system while it is on.

The PS45 is equipped with either 4, 8, 16, 32 or 64 Lemo® 00 probe connectors. Multiple transducers may be connected and used to acquire data simultaneously.

Combinations of ToFD and or conventional Pulse Echo transducers may be used. The system may be used with any piezoelectric transducer between 0.25Mhz and 25Mhz designed for NDT applications.

Connected transducers may be referenced to the same software channel (group) or to different channels (groups).



WARNING

When connecting High frequency transducers above 10Mhz ensure that the system's high-tension voltage is reduced to below 50v (guide only) in the TDScan software to eliminate the danger of damaging the piezoelectric crystal by over-stimulation.

The HT Voltage may be adjusted in the Global Tab: <<Setup-Collection Hardware-Global-H.T. Voltage>>

9. Connecting Scanners and Encoders

Manual and automated scanners may be used with the PS45. Scanners are external devices that carry ultrasonic probes and may incorporate encoders to ensure positional accuracy, location, and sizing of defects. Scanners may be manually propelled or driven by servo motors.

The PS45 is not equipped with motor drive controls, therefore automated scanners require an external drive control unit. X and Y encoders are connected to the PS45 using the dual axis 15-way D-type encoder connector (1).

a. Manually Propelled Scanners with Encoder

- i. Attach probe/probes to scanner.
- ii. Attach positional encoder to scanner.
- iii. Connect transducer/s to PS45 (3) using co-axial cable/s.
- iv. Connect encoder to PS45 (1).

b. Automated Scanners

- i. Attach probe/s to scanner.
- ii. Attach positional encoder to scanner. Most automated scanners have integrated encoders.
- iii. Connect transducer/s to PS45 (3) using co-axial cable/s.
- iv. Connect scanner umbilical cable to external drive control unit.

Appendix 1

Technical Specifications

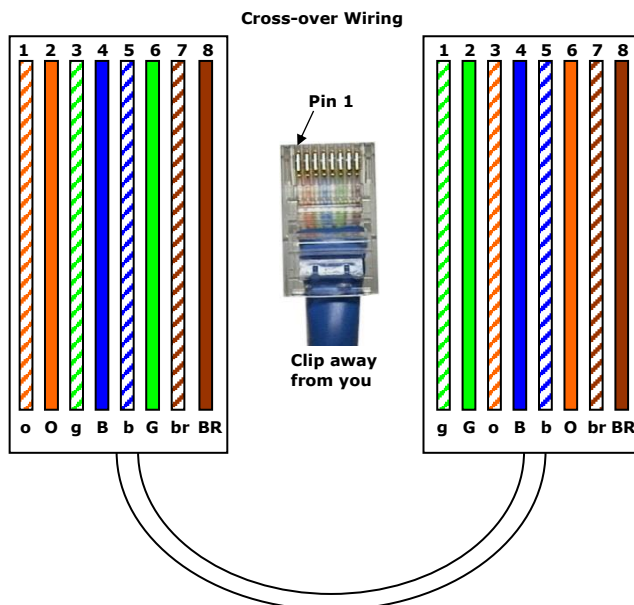
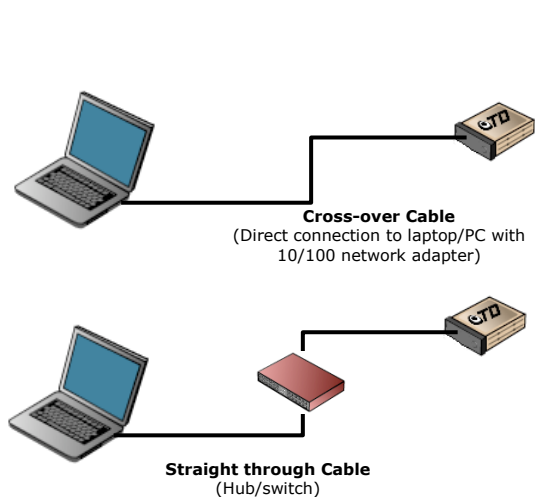
TD Pocket-Scan PS45

General		Rectification	
Number Of Probe Inputs	4/8/16/32/64	Type	Unrectified, Full Wave, +1/2 Wave, -1/2 Wave
Number Of Software Channels	128	Linearity	Better than 1% full Scale
Digitisation		A-Scan Digitisation	
Main Sampling Frequency	100MHz@8 bit	A/D Converter	100MHz@8 bit
System Bandwidth(-3dB)	0.25MHz to 30MHz	Number Of A-Scan Points/Channel	8000 points per channel
Pulse Repetition Frequency	Up to 10KHz	Sampling delay	0 - 10ms, in 25ns steps @ 100MHz sampling rate
Pulser		Signal Averaging	
Number Of Pulsers	8/16/32/64	Number Of Channels	All
Single/Twin Crystals	Yes	Averaging Performance	100 million points per second
Output Impedance	6Ω	Averaging Rates	Real-time averaging 1- 256, user definable
HT Pulse Shape	Negative square wave	Peak Processing	
HT Pulse Voltage steps of 5V	50 - 200V user definable	Peak Storage Modes	All Peaks, First Peak, Largest Peak/s, Loss Of
HT Pulse Width Range	20ns to 500ns in 2ns steps with < 5ns rise/fall time	Thickness Measurement Modes	Thinnest/Thickest/Between Peaks
Receiver		Threshold Setup	5 to 100% in 1% steps per hardware Gate
Number Of Receivers	8/16/32/64	Number Of Peaks Per Gate	64
Signal Bandwidth (-3dB)	0.25MHz - 30MHz	Scanner Interface	
Gain Range	0dB to 100dB's in 0.1dB steps	Input Type	Encoder, Potentiometer or Video Camera
Gain Linearity	0.25dB (typical)	Number Of Axis	2, TTL compatible
Input Noise Level	1.4nV/(Hz) 1/2 (typical) across full system bandwidth	Number Of Limit Inputs	2, TTL compatible
Input Impedance	50Ω	Encoder Interface	TTL compatible, 5V @ 250mA(max), 100KHz max
Time Corrected Gain (TCG)		Potentiometer Interface	0 to 2.5V, sampled at 100Hz
Number Of Curves	8	Video Camera Input	1Vpp Composite Video (PAL, RS-170)
Gain Range	0 to 100dB in 0.1dB steps on each element	PC & Operating System (minimum)	
Rate Of Gain Change	Up to 40dB/μs	Computer Type	Notebook or Desktop
DAC Time resolution	Automatically controlled using gate Parameters	Operating System	Windows 7 Pro® 32-bit & 64-bit
DAC Start reference	Transmit Pulse or material i/f echo, user selectable	Processor	Pentium 600 (min)
Analogue Signal Filtering		Memory	512MBytes (min), 2Gbyte recommended
High Pass Filters (-3dB)	0.25, 0.5, 0.75, 1.0, 2.5, 5, 10MHz	Hard Disk/Storage	5 Gbyte(min)
Low Pass Filters (-3dB)	1, 2.5, 5.0, 7.5, 10, 15, 20, 30MHz	PS45/PC Link	Ethernet
Post Rectification/Smoothing Filters (-3dB)	No filter, 1, 2, 3, 4, 5, 6, 7MHz, all filters selectable	Size, Weight & Environmental	
Filter Roll-Off Performance	60dB per decade	Unit Dimensions	8 Channel - 175 x 120 x 53mm
Filter Type	6dB Transitional, minimal distortion		16 Channel - 175 x 120 x 73mm
Power Requirement		Weight	8 Channel - 450g / 16 Channel - 600g
DC Input	6V to 12.5V @ 5Watts (approx.)	Rating	Designed to IP54
AC Input	90 to 260VAC @ 40 to 60Hz	Temperature	0°C to 40°C operating, -25°C to 85°C storage

Appendix 2

Cross-over Ethernet Cable for PS45

TD Pocket-Scan PS45 units are supplied with a **Cross-over** Ethernet cable. This cable looks identical to a normal straight through Ethernet cable but is wired differently and is required for all direct network connections where no hub or network switch is used. On PC's equipped with Gigabit (10/1000) Ethernet adapters, a normal Ethernet cable may be used.



Appendix 3

PocketScan PS45 encoder connectors

15 Way D-Type - Encoder 1 & 2

Pin	Function
1	Video I/P
2	5V (100mA)
3	Axis 2, Limit B
4	Axis 2, Phase B
5	GND
6	Axis 1, Servo O/P
7	Axis 1, Limit A
8	Axis 1, Phase A
9	GND
10	Axis 2, Servo O/P
11	Axis 2, Limit A
12	Axis 2, Phase A
13	5V (100mA)
14	Axis 1, Limit B
15	Axis 1, Encoder B


Mating connector manufacturer: LORLIN (www.lorlin.co.uk)

Part Number: SDP15Z - Standard 15 Way D-Type Plug


Appendix 4

Contact Technology Design

If in any doubt regarding the above instructions, contact Technology Design:

 +44 (0)1606 590123

 tdsupport@technologydesign.com

 Technologydesign.com

 Dalton House
40 Hardwick Grange
Woolston
 Warrington
Cheshire,
WA1 4RF
United Kingdom

