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WheelScan LT

Owners Manual

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WheelScan LT Owners Manual

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WheelScan LT Basic System + Scanning + QuickCheck HF

WheelScan LT Basic System including scan tower and QuickCheck HF instrument WLT-002KIT

Comprising:

WheelScan LT Base Unit	WLT-001
Scan tower sub-assembly	WLT-501A
Scan tower base sub-assembly	WLT-501B
Probe WheelScan 500kHz 3/8" dia head	50PA24/500k
Probe Lead, BNC to LEMO 3 Pin, 2.35m long	50A007
QuickCheck HF Instrument	34I001
Accessory Power Cord. IEC plug to IEC socket.	WLT-J9
Operating/owners manual	WLT-001DOC
A.C. power cord - UK/US/Eur	9A095/94/96

Accessories and Spares

Test Block, NFe, 7075-T6, with slots 0.2, 0.5, 1.0 deep	29A029
Probe WheelScan 500kHz 3/8" dia head	50PA24/500k
Probe Lead, BNC to LEMO 3 Pin, 2.35m long	50A007
Accessory Power Cord. IEC plug to IEC socket.	WLT-J9
Operating/owners manual	WLT-001DOC
Scan tower base sub-assembly	WLT-501B
Scan tower sub-assembly	WLT-501A
Retaining Screw with RED Cap for Scan Tower and Probe Holder	WLT-501D
Retaining Screw with RED Cap for Wheel Clamp	WLT-010A
Locking Screw for Wheel Clamp	WLT-311
Upper Limit Switch assembly	WLT-501K
Lower Limit Switch assembly	WLT-501L
Location Peg	WLT-313
Support Cup	WLT-312
A.C. Power cord	

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Important notice

PLEASE READ THE FOLLOWING INFORMATION PRIOR TO USE OF ANY PRODUCT MANUFACTURED BY HOCKING NDT LTD.

Hocking NDT Owner's Manuals provide functional information about a particular instrument or group of instruments. Proper set-up and use of this equipment and the performance of electromagnetic tests requires familiarity with factors which are beyond the scope of such documents. These factors include, but are not limited to, the following:

A. Selection of appropriate cables, probes, fixtures, mechanical handling equipment and other accessories.

B. Selection of proper test frequency, test mode and other test settings.

C. Preparation of the test surface.

D. Characteristics of the test material for example: conductivity, hardness, permeability, geometry, magnetic properties, heat treatment etc.

E. Environmental factors such as temperature humidity, dust and electrical interference.

F. Any individual factors that will depend on the particular test object or test being performed. Eg. knowledge of the sub-surface structure when only one side is accessible

It is therefore important that operators are properly trained in both general procedure for electromagnetic testing and in the set up and execution of the particular test to be performed. It is the responsibility of the instrument user to ensure that test operators are trained to a sufficiently high standard, that suitable equipment is used in the correct manner and that any test variables which may affect specific tests are taken into account. Similarly, compliance with standards such as ASTM, ASNT, API, ASME, BS, EN etc., as well as the observance of any test procedure specified by any government, manufacturer or other regulating authority is the responsibility of the user.

Periodic cleaning, maintenance and performance verification may be necessary to ensure proper operation of the equipment. Environmental conditions and regularity of use should be considered when determining the frequency of such checks.

Incidents such as physical shock, immersion in liquid and exposure to damaging environments such as excessive heat, moisture, dirt or dust can

adversely affect equipment performance. After any such incident the equipment shall be examined for damage and subjected to functional checks before further use. Do not use any product which you know or suspect to be faulty.

Reference samples used for calibration should, ideally, have the same material properties as the object to be tested, or a known relationship to it, established by a laboratory test.

Instrument performance should be verified frequently during testing to assure valid test measurements. In the event an instrument is outside the specified limits, all components or materials inspected since the last successful performance verification shall be treated as suspect. As a matter of good practice and wherever possible, suspected flaws in critical areas should be cross checked using appropriate alternative indication techniques.

Any question about the use, operation, specifications or special considerations relative to the particular Hocking NDT product you are using may be addressed to your local sales representative, distributor or directly to Hocking. Communication may be made through our website at www.hocking.com, by email at info@hocking.com, or by telephone or fax. (See back of manual).

Eddy current instruments work by measuring electromagnetic fields. Interfering signals, even at a level satisfying CE mark requirements, may mask or distort this information. The user is responsible for ensuring that no such effect is occurring.

Hocking NDT pursues a policy of continual development of its products. The company reserves the right to change specifications without prior notice.

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WheelScan LT Parts List

Description	Ref No.

WheelScan LT Basic System

WheelScan LT Basic System (without scan tower) WLT-001

Comprising:	
WheelScan LT Base Unit	WLT-001
Operating / owners manual	WLT-001DOC
A.C. power cord - UK / US / Eur	29A095 / 94 / 96

WheelScan LT Basic System + Scanning

WheelScan LT Basic System including scan tower WLT-001KIT

Comprising:	
WheelScan LT Base Unit	WLT-001
Scan tower sub-assembly	WLT-501A
Scan tower base sub-assembly	WLT-501B
Operating / owners manual	WLT-001DOC
A.C. power cord - UK / US / Eur	29A095 / 94 / 96

Power cords:
These are supplied with each kit

Chapter 6 - Options and Accessories

Options

Manual Scanning Option (52I001)

WheelScan LT base unit plus wheel clamp

Automatic Scanning Option (52I001A)

WheelScan LT base unit plus wheel clamp
Scanning Tower
WheelScan LT Probe

Spares

WheelScan LT Probe (50PA16/500k)
Clamp Mechanism (WLT-010)

Recommended Accessories

Aluminium Test Block (29A029)

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Chapter 5 - Specifications

Power Supply

AC power supply autoranging between 85 and 264 VAC, 47-73 Hz.
DC power supply between 14 and 28 VDC. Approx 4 Amps nominal.

Scan tower supply is derived from the main power supply unit.

Scan length

360mm (14.2”) maximum. Upper and lower stop points can be set by limit switches.

Scan speed

6 to 60mm (0.2-2.3”) per minute.

Wheel Rotation

6 to 60 rpm

Wheel Dimensions

Wheels up to 450mm (almost 18”) in diameter can be mounted on the unit and clamped externally. Somewhat larger wheels may be accommodated by internal clamping.

Maximum wheel weight

75kg (165 lbs)

Encoder Outputs

Separate encoder outputs are available from both ROTATE and SCAN. The ROTATE encoder provides one pulse every rotation. The SCAN encoder provides one pulse for every mm of travel.

Unit Dimensions

660mm x 630mm x 220mm (24.8” x 24.8” x 8.7”) WxDxH

Unit Weight

30kg (66 lbs) including clamping device.

Unit levelling facilities

The rotating table has an integral spirit level to allow the user to level the unit.

Three height adjustable legs allow easy adjustment.

Chapter 4 - Care and Maintenance

Care and Maintenance

WheelScan LT is designed to require little maintenance. A fan in fitted to blow filtered air into the unit and cool the power supply unit. Preventative actions, however, such as sitting the unit away from areas of high heat, atmospheric dust and areas where it may be damaged, will increase its reliability further.

The suggestions below will help you fulfil your warranty obligations and will keep the unit fully functional for many years.

- Keep it dry. Precipitation, humidity and most liquids contain minerals that will corrode electronic circuits.
- Do not place wheels on the turntable if they are hot or wet.
- Do not store or use WheelScan LT in hot or extremely cold areas.
- Do not use harsh chemicals, cleaning solvents or strong detergents to clean it. Wipe it with a soft cloth slightly dampened in a mild soap and water solution.

CAUTION!

- Do clean the filter element from time to time.
- High voltages are present inside the unit.
- Disconnect the unit from the AC supply before attempting to dismantle it.
- A protective fuse is fitted to the internal power supply unit which may be replaced if necessary by removal of the turntable, top plate and power supply cover. Ensure the AC supply is disconnected before opening the unit.

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Chapter 1

Unpacking and preparing for operation

Sections

Illustrations

1.1 Checking Supplied Equipment

WheelScan LT is available with a range of accessories. Check that the contents of your shipment match all the items listed on the packing note. If any items are missing or damaged please contact your supplier without delay.

1.2 Basic Knowledge

As a general rule, effective use of eddy current equipment for new applications requires the following:

- An understanding of the principles of eddy current testing, particularly aspects which may limit detectability of flaws such as depth of penetration and the way in which different probe configurations respond to different types of flaw.
- An understanding of other NDT and inspection techniques which may be appropriate or which may be required to verify results.
- A knowledge of the application, i.e. the way in which the part being tested is manufactured or stressed in use and the probable defect mechanisms.
- Existing applications require a good working knowledge of the equipment to be used plus a written technique to be followed in performing the inspection.

1.3 Brief Description of Unit

WheelScan LT is a compact, lightweight, wheel inspection unit designed to meet the requirement for eddy current wheel inspection in aerospace and similar applications.

The purpose of the equipment is to scan the outer surface of a wheel with an eddy current probe sensitive to both cracks and corrosion. The overall objective is to be able to test any wheel, manufactured from the alloys of either aluminium or magnesium, either painted or in the stripped condition.

The equipment consists of a motorised turntable which can be set to rotate at speeds from 6 to 60 rpm. The turntable is held in a base unit which has three adjustable feet and a bubble to show when it is level. An automatic centring clamping arrangement is fitted to the top of the turntable. Pins placed symmetrically in this assembly centre the testpiece; a screw to the side of the turntable locks the testpiece in place.

A scan tower can be fitted onto the base unit which can scan a WheelScan probe up and down the testpiece. The vertical speed of the probe can be set

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Switch Setting	Approximate Rotate Speed (rpm)	Approximate Scan Speed (mm/min)
1	6	6
2	12	12
3	18	18
4	24	24
5	30	30
6	36	36
7	42	42
8	48	48
9	54	54
10	60	60

Table 3.1 - Approximate rotate and scan speeds for WheelScan LT

3.3 Connecting a Test Instrument to WheelScan LT

WheelScan LT can be used in conjunction with a suitable eddy current instrument such as the QuickCheck or WheelScan E. These Hocking instruments are well suited to this task. Refer to the operating instructions for the instrument chosen.

Connect the probe lead to the WheelScan LT probe and attach the other end to the eddy current instrument selected for the inspection.

Set the frequency to 500 kHz and set up the instrument as described in the instrument operating manual.

3.4 Setting Rotate Speed

The available speeds vary from approximately 6 to 60 rpm. Set ROTATE speed switch to desired number (see table 3.1) and set the power switch to ON. The turntable will start rotating, and the rpm indicator lamp will flash once per revolution. This can be used with a stop watch for determining rotate speeds precisely.

The rotate motor may be switched on and off at any speed setting. With heavy wheels it is advisable to start the rotation at a low speed setting and increase the speed one step at a time.

3.5 Setting Scan Speed

Select the appropriate speed with the SCAN speed switch (see table 3.1) and set the direction switch in the required direction. The scan indicator lamp will flash once per mm upwards or downwards.

When the probe reaches the pre-set limit, the limit-switches will operate and the probe will stop scanning. The rotation will continue until switched off by the operator.

between 6 and 60mm per minute, independently of the rotation speed of the turntable. Thus the inspection helix can be decided and set by the user.

The controls for rotation speed, scan speed and direction are on the front panel of the base unit together with displays to indicate the direction of scan and the output signals giving one pulse per revolution and one pulse per millimetre of scan. The rear panel accommodates the AC input switch, fuse and filter, an AC output for instrument or accessories, a DC input for powering the unit from batteries, the logic outputs from the rotate and scan encoders and a filtered fan unit.

The probe is in a sprung mounting, which may be arranged to exert light pressure radially on the testpiece, or, by using an angle bracket, press at a 45 degree angle to the surface to increase the range of the inspection of flanges. Adjustable limit switches are fitted to the rear of the tower to stop the scan at

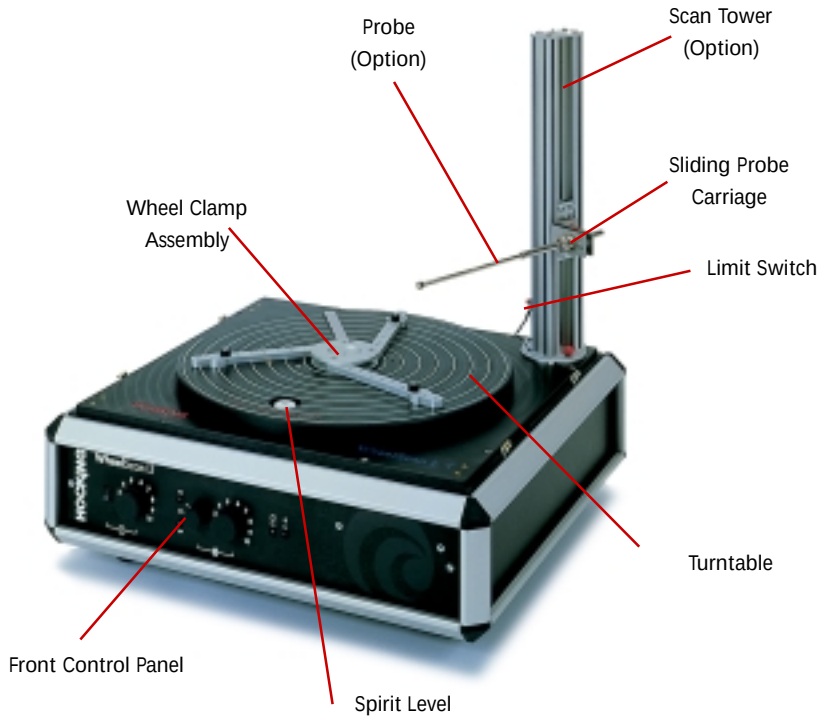


Figure 1.1 - WheelScan LT with optional scan tower

user pre-settable upper and lower limits. During setting operations the probe may be moved rapidly up and down the tower by releasing the scan nut from the leadscrew by squeezing and holding the nut assembly between fingers and thumb. This will then slide freely up and down the tower.

The tower, clamp assembly, cables, accessories, tools etc. are housed in a foam block within the lid, with an inner lid to retain them during packing. The outer lid is retained on the base unit during transit by high-quality lockable toggle catches. A Locator 2 unit and accessories, which may be used for manual scan of internal areas, can also be fitted inside the cover.

A wheel inspection using WheelScan LT with the scan tower option may be set up to be almost totally automatic, making it simple to operate. This allows the system to be successfully used by operators across the widest range of skills, without fatigue and with a high probability of detection of significant flaws.

1.4 Unpacking WheelScan LT

- To remove the plastic lid from the top of WheelScan LT slide down the lock barrels on the catches and pull outwards to release.
- Lift the lid and place it upside down on a flat, supportive surface.
- Remove the inner lid and the protective foam sheet to expose the accessories and components.

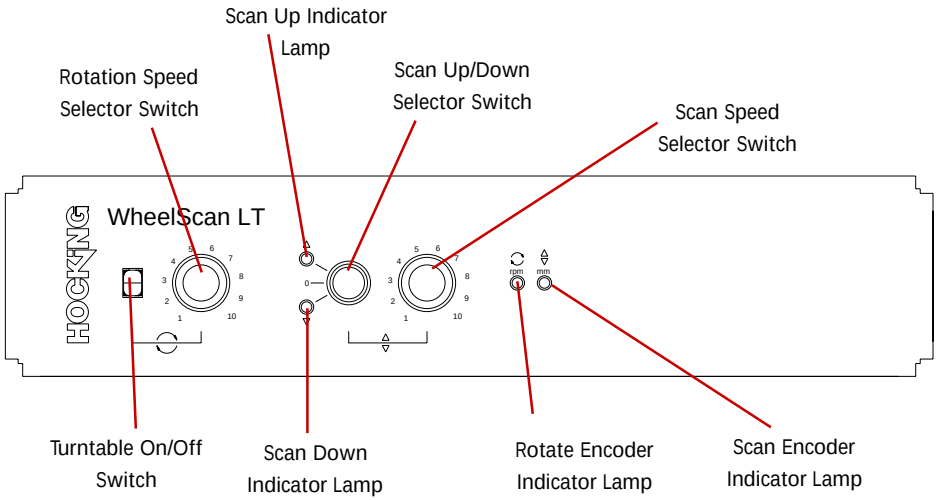
cable to an AC supply (88-264 VAC, 47-73 Hz).

Switch AC input switch to ON. The fan will start.

If AC power is not available the unit may be run from a DC supply between 14 and 28 volts. This can be connected into the nut using the DC input socket on the rear panel.

3.2 Rear Panel

- The AC outlet socket on the rear panel is provided for powering instruments
- An input socket is provided to permit WheelScan LT to be run from an external DC power source in the range of 14-28 volts.
- A rear panel socket provides signals from the ROTATE and SCAN encoders which may be connected to printers and computers.



Chapter 3 - Operating WheelScan LT

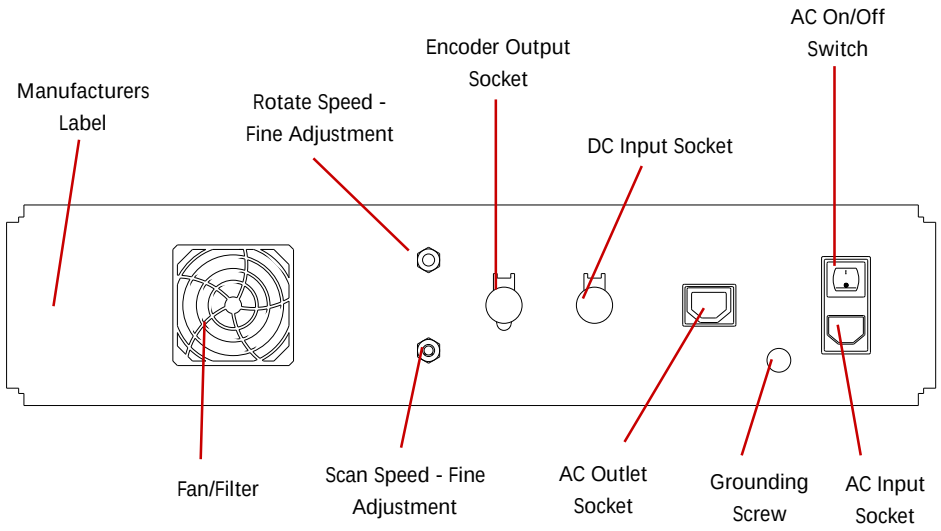
Section

Tables

3.1 Power

Before connecting power to WheelScan LT, ensure that the turntable ON / OFF switch on the front panel is set to OFF and the rotate speed switch to 1. Similarly, set the scan selector switch to 0 (central position) and the speed selector switch to 1 (see figure 1.2 for labels).

Fit power cable to AC input socket on rear panel. Connect the other end of the



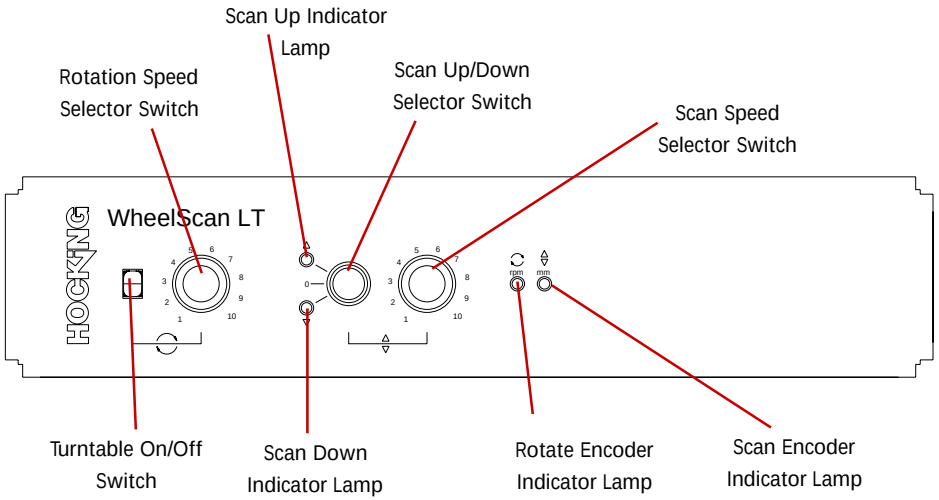


Figure 1.2 - Front Panel

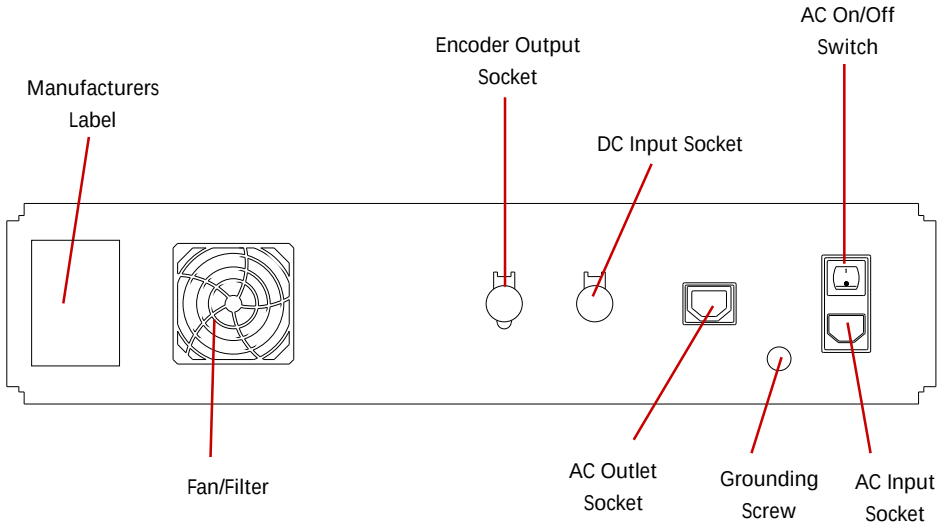


Figure 1.3 - Rear Panel

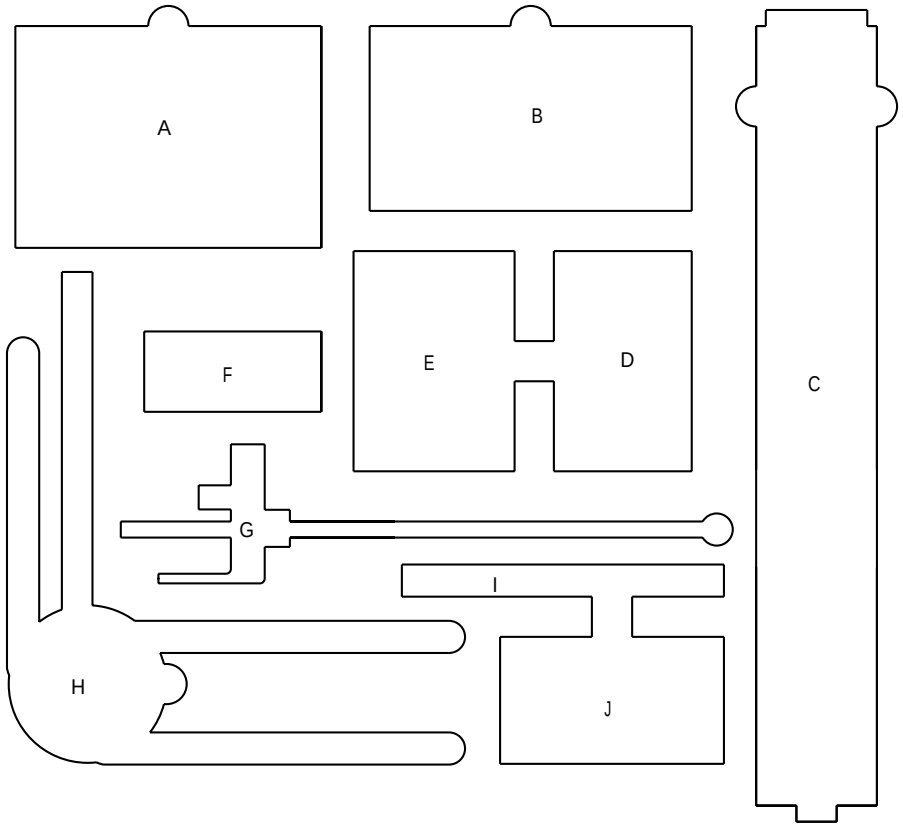


Figure 1.4 - WheelScan Lid Storage Locations

A Locator 2
B Locator 2 charger
C Scan Tower
D Locator 2 batteries
E Cables & General Storage
F General Storage
G Probe Holder Assembly
H Wheel Clamp Assembly
I Tool Storage
J Accessories Box

The limit switch may be removed if desired by further loosening and lifting the nut out of the slot. It may be refitted by loosening fully, inserting into slot and re-tightening the screw.

Set the probe to the lowest point of the required scan (see section 1.5.3) and adjust the limit switch so that the microswitch just operates (you will hear a click when the carriage touches the switch).

2.3 Setting Probe Radial Position

Set the probe vertically to the level of the smallest wheel radius and rotate the scan tower so that the probe contacts the wheel surface lightly. Tighten the three scan tower base retaining screws. When the probe is reset down (or up) to the start of the scan, the spring in the probe holder will absorb the difference in radius so that the probe will remain in contact as the wheel radius decreases.

The probe holder, fitted as described in 1.5.2, allows the probe to be angled upwards or downward slightly by setting the probe holder onto the carriage at a slight angle and tightening the red screws. The probe contacts the wheel tangentially and with pressure radially onto the surface.

When large flanges are to be inspected, the angle bracket may be used to convert the probe pressure from a radial direction to a compound radial and downward pressure giving a resultant pressure at 45 degrees. This creates a downward pressure on the flange, giving a smoother seal of near horizontal flanges and a comprehensive inspection of the wheel bead seat area.

Many wheels have apertures for inflation, overheat protection and so on. Cover all such holes in the area to be scanned with a suitable thin tape. This will help avoid damage to the probe when scanning and reduce wear on the probe head.

Do not scan over areas with components fitted thought the wheel surface which would cause damage to the sensitive probe.

2.2 Limit Switches (Fig 2.3)

Set the probe to the highest part of the scan and set the upper switch into position so that its lever is operated by the scan nut assembly to the rear of the probe carriage.

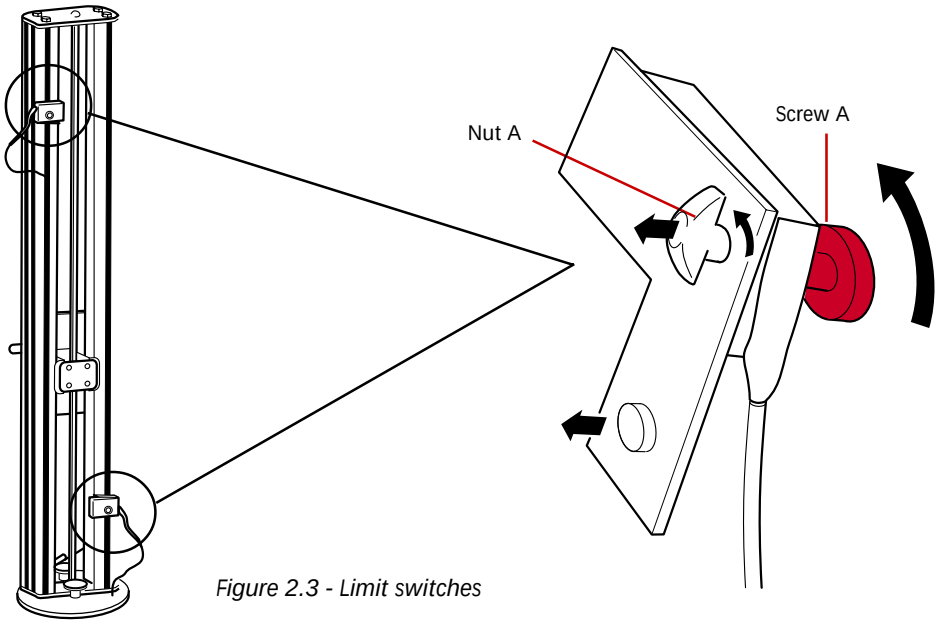


Figure 2.3 - Limit switches

1.5 Assembly

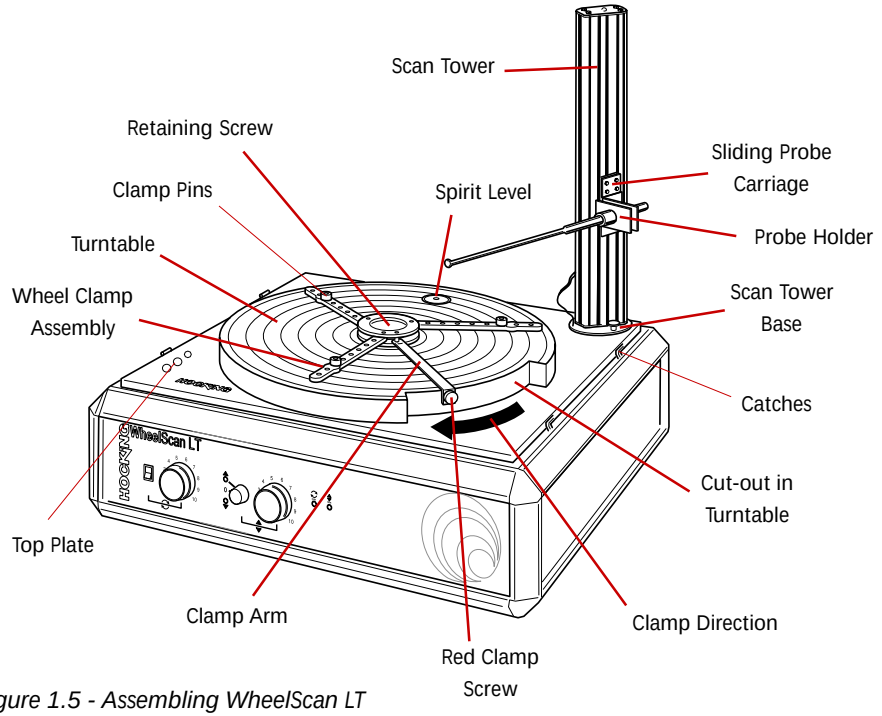


Figure 1.5 - Assembling WheelScan LT

1.5.1 Turntable

The turntable with its clamp holds and turns the wheel. It is motorised with adjustable speeds from 6 to 60 RPM. The speeds are approximate and the scan encoder output can be used to measure the actual speed of rotation.

Place the base unit in its working position on a stable surface. Ensure that the surface is able to support both the unit and the wheel to be tested.

Observe the spirit level on the turn table. If it is not level, adjust the feet on the base of the unit. Each foot can be adjusted independently to ensure that the unit is completely level. Do not wind down a foot beyond its threaded shaft. Take care that a foot does not leave its thread completely.

1.5.2 Scan Tower (Optional Accessory)

The scan tower supports the probe and provides vertical motion of the scan over a possible 360mm. Combined with the motorised rotation this creates a helical scan pattern over the wheel surface.

Remove the two red screws from the scan tower base on the main body of the unit.

Remove the scan tower from the packaging and place it on the scan tower base with four square headed screws in the four holes and the dowel end of the lead screw engaging the drive slot. Place the screws in the associated holes and then rotate lead screw by hand to align the dowel with drive slot. See fig. 1.6.

Re-fit the red screws into the scan tower base to secure the scan tower. Rotate the tower on its base until the carriage is facing outward to the right hand side.

Remove the red screws from the scan tower sliding probe carriage.

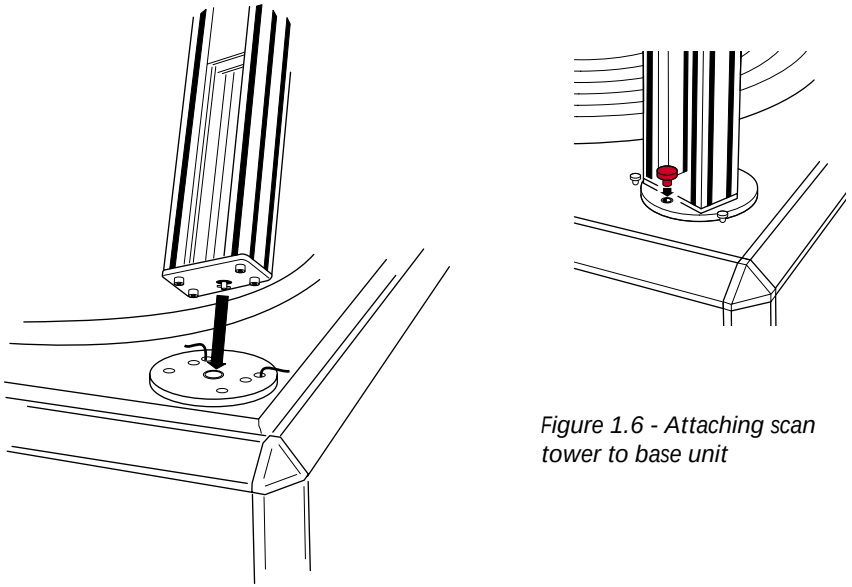


Figure 1.6 - Attaching scan tower to base unit

Chapter 2 - Setting up WheelScan LT

Sections

Illustrations

2.1 Securing the Wheel for Inspection

Rotate the turntable until the cut-out is facing the front panel and set the wheel clamp lever to the right hand end of the cut-out, to give the full range of clamping motion.

Place the wheel on the turntable approximately centrally (use the circular grooves for guidance).

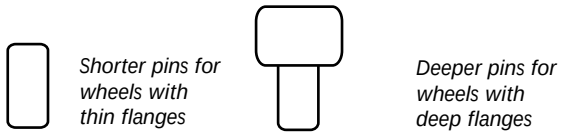


Figure 2.1 - Difference between wheel clamp pins

Select wheel clamp pins according to wheel flange and inspection access required and fit them symmetrically into holes on clamp arms nearest the wheel rim. Slide the clamp lever to the left until the three pins clamp onto the wheel rim. Tighten the red clamp screw. Before inspection at speed, rotate the wheel slowly to check the concentricity of the wheel on the turntable.

1.5.5 Wheel Clamp

The wheel clamping mechanism may be conveniently adjusted to centralise and clamp wheels up to 450mm in diameter. Coarse adjustment is available by moving the wheel clamp pins in or outwards. It is fitted to the turntable as follows:

- Remove wheel clamp assembly from the packaging in the lid.
- Place on turntable with smaller diameter counterbore facing down over the turntable shaft.
- Ensure that the stainless steel clamp arm is positioned into the cut-out in the periphery of the turntable.
- Remove the accessory box from the packaging and take out the three support cups for the clamping arms. Slide them under the clamp arms into the counterbores in the turntable.
- Fit the retaining M6 screw through wheel clamp boss into the end of the central drive shaft and screw down with light pressure.

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Using the red screws, fit the scan probe holder onto the middle two holes of the sliding carriage in the scan tower. Ensure that the 20mm clamp nut on the probe holder is facing toward the front panel.

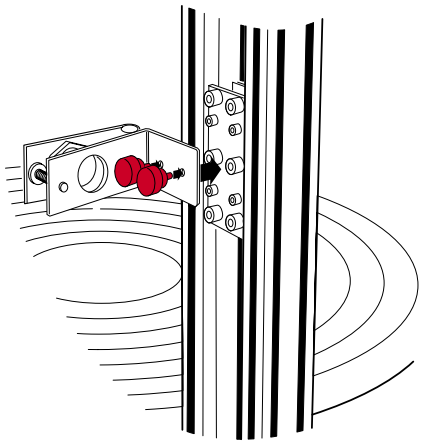
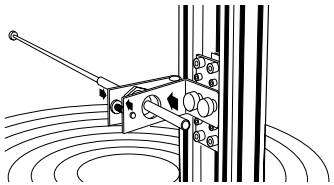


Figure 1.7 - Attaching scan probe holder to scan tower

(If the probe is not already fitted, fit it by loosening the 20mm clamp nut on the probe holder and slide the WheelScan LT probe (50PA24/500k) from the rear until the probe end is on a radius to the centre of the turntable. Adjust this position later with the wheel fitted so that the probe end is flat against the surface of the wheel to be inspected. Re tighten the 20 mm clamp unit to make sure the probe doesn't slip. Press in the bush at the rear of the probe clamp to tighten the assembly.)



Turn the scan tower anti-clockwise until the probe is in the scanning position (on the right hand side of the wheel when facing the front panel of the WheelScan LT unit.)

1.5.3 Adjusting Probe Holder (Fig 1.7)

The probe holder is attached to the scan tower and is spring loaded to hold the probe against the wheel during the entire scan. The hinge of the probe holder may be vertical in which case the probe pressure is radial to the wheel, or it may be at an angle of 45 degrees using the angle bracket WLT-531. In this case,

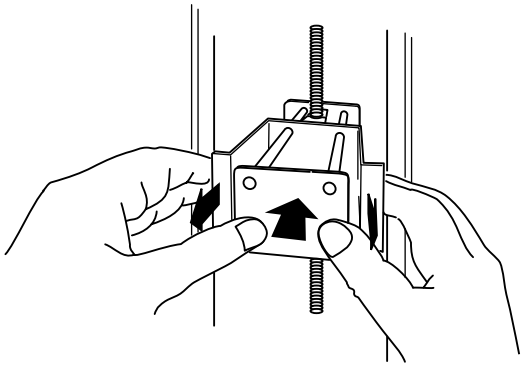


Figure 1.7 - Adjusting the vertical position of the probe

the pressure is at a 45 degree angle to the surface of the wheel. This assists inspection of the flange areas.

The vertical position is set by a nut clamped on the vertical lead screw. To reposition the probe rapidly during set up, this nut may be unclamped in the following way :

- Using both hands, hook the index and middle finger of each hand over the small flanges on the outside of the nut assembly.
- Apply both thumbs to the central plate.
- Gentle pressure on the plate will release the nut.
- The probe carriage can now slide up and down the scan tower.
- With practice it may be possible to move the assembly using only one hand.

1.5.4 Attaching the Limit Switches

Limit switches can define the upper and lower limit of the scan. When set, the scan will cease when reaching the set limit. They operate when the nut assembly touches the levers of the switches.

Fitting the limit switches to the scan tower :

- The probe assembly must be positioned between the limit switches
- Turn the scan tower so that the probe moves away from the wheel and the rear of the tower is accessible

- Ensure that the probe holder is positioned between where you intend to place the top and bottom limit switches. To adjust the probe holder, see section 1.5.3 (above).
- Attach the lower limit switch (with the shorter lead) to the bottom of the unit with the switch facing toward the centre of the scan tower (this will be on the left hand side, looking from the front). The lever of the lower limit switch should be above the switch.
- The switch can be attached by loosening the nut, placing it and the nylon screwhead in the channel on the scan tower and tightening the red screw fully.
- Repeat the procedure to fit the upper limit switch (with the longer lead), which needs to be placed near the top of the scan tower on the right hand side. The lever of this switch will be below the switch body, facing inwards.

Connect the limit switch plugs to the respective connectors, threading surplus wire through the holes in the scan tower base plate. (For permanent installations, connectors can be taped together.)

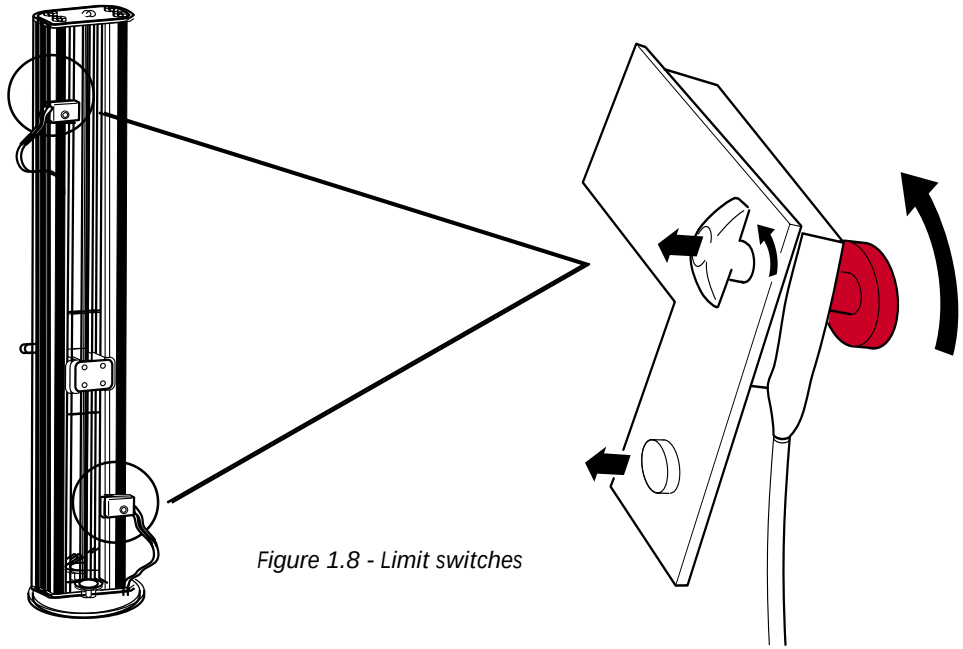


Figure 1.8 - Limit switches