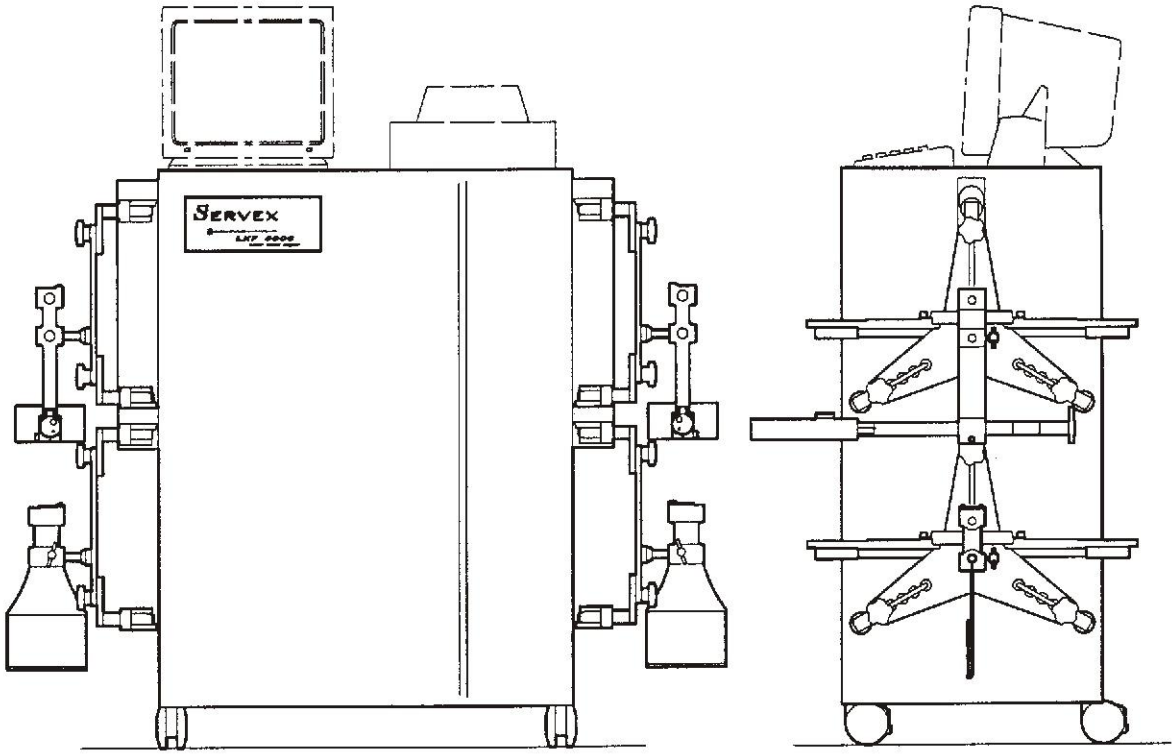
SERVEX

LX7-3000

LASER WHEEL ALIGNER

OPERATION MANUAL

HA 0922



- COMPUTER & ACCESSORIES NOT PART OF STANDARD SUPPLY.
- WHEEL ALIGNMENT DATA IS KEYED INTO THE COMPUTER BY THE OPERATOR.

AUSTRALIAN MADE

REV. N

April 2005

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designed and manufactured by

SERVEX EQUIPMENT

a division of
CEM International
A.B.N. 24 004 933 135

INDEX

WARNING

Before using the LX7-3000 Check the setting of the laser modules and mirrors.

The beam alignment of the laser modules and mirrors are accurately set at the factory, however transport and handling may have affected the settings.

Follow the Check/Calibration Procedure in the Manual.

These checks should be carried out routinely and/or when the accuracy of the aligner is suspect.

Important Notice

The CD supplied with the Servex Wheel Aligner has two (2) sets of alignment specifications.

- One set of specifications is based on a 28” diameter tyre and is used on the LX7-3000 Aligner. This system is highlighted with a yellow banner.
- The second set of specifications is based on a 14” diameter rim and is to be used with the LX7-2000 Aligner fitted with 14” toe decals.

Special Note:

14” diameter rim specifications, when used with the LX7-3000 must first be converted using the 28” column of the Toe Conversion Chart in this manual.

Follow the computer prompts and warning screens carefully before logging into any specifications.

WARRANTY

The Company warrants that all new goods and components manufactured by the Company and all services provided by the Company are free from defects in material or workmanship for a period of 12 months from the date of dispatch from our Melbourne works.
This warranty excludes any operational difficulties arising from:

1. improper adjustment, calibration or operation by the buyer.

2. the use of accessories which were not manufactured by, or approved in writing by, the Company;

3. any modification of the product which was not authorised in writing by the Company.

4. any misuse of the product by the buyer or anyone for whom the buyer has legal responsibility (including a minor);

5. any use or operation of the product outside of the physical, electrical or enviromental specifications of the product; or

6. inadequate or incorrect site preparation and inadequate or improper maintenance of the product.

All transportation or freight charges or any other charges incurred in returning defective products, or any of its component parts, for repair, together with the cost of returning them to the buyer must be paid by the buyer.

To the extent permitted by the Trade Practices Act and any other relevant State legislation, the sole obligation of the Company is to use its best endeavours to provide the products or to repair the products or repair or replace (at the Company's discretion) any part of the product which is found to be defective during the 12 month warranty period and the Company shall not be liable for any other claims or damages including, but not limited to, claims for faulty design, negligent or misleading advice, damages arising from loss or use of the products and any indirect, special or consequential damages or injury to any person, corporation or other entity.

Subject to the condition of any contrary State or Federal law, the Company limits its liability to replacement of the goods or the resupply of the services or payment of an amount equal to the lowest of:

1. the cost of replacing the goods;

2. the cost of repairing the goods;

3. the cost of having the goods repaired or replaced; or

4. the cost of resupplying the services.

LX7-3000 LASER SAFETY

The laser modules for the LX7-3000 are manufactured according to the guidelines established by *Australian Standard AS/NZS-2211.1: 1997 Laser Safety* for the safe use of lasers. According to calculations based on the above Standard, this laser is classified as a 'Class 2' laser product.

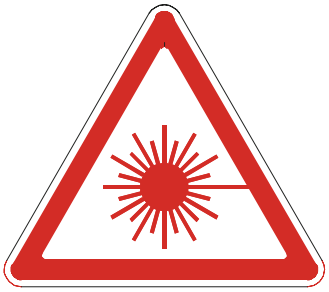
Class 2: Laser products emit visible radiation in the wavelength range from 600 to 700 nm. The blinking reflex is a normal protective response to an eye aversion.

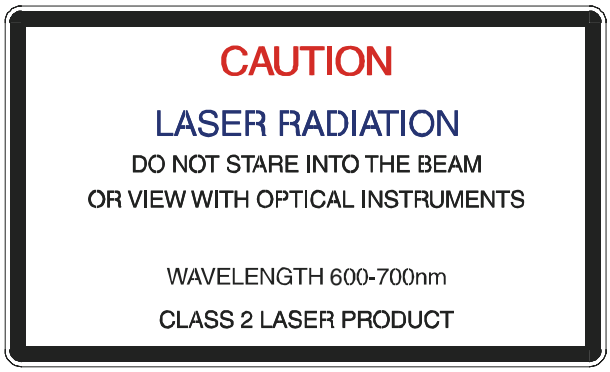
However the laser beam should not be aimed at eye level towards any person and should not be viewed directly using optical instruments under any circumstances, as this may cause the beam to focus.

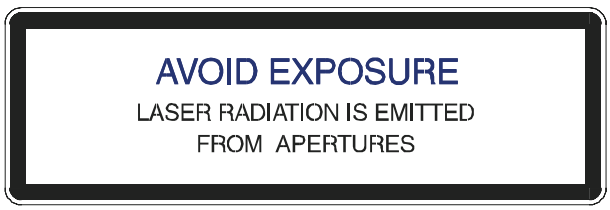
The laser radiation appears to be very intense due to its monochromatic nature (single colour).

When not in use, the beam should be terminated against known targets that do not disrupt any person.

THIS PRODUCT IS A PRECISION INSTRUMENT
and SHOULD BE HANDLED AS SUCH







Charging The Laser Modules

On Receipt of Your LX7-3000

Allow time for charging the Batteries, before putting the unit into operation.

For further information refer to the technical data sheet supplied with the battery charger.

The laser modules may have been “on” for an extended period while in storage and transport, therefore the batteries may be fully discharged.

Charger Operation and Battery Test Procedure.

1. When plugged into the modules the red light should flash for approx. 6 seconds and then remain on- this indicates that the batteries have tested OK and are now on charge.
   The battery pack charge time from flat to full charge is approx. 4 hours, red light remains on during the charging process.

2. If the red light continues to flash after approx. 6 seconds, this indicates that there may be a problem with the batteries.

   Check the following faults:

   - ☐ Faulty Battery
   - ☐ Wrong Polarity
   - ☐ Incorrect Batteries Fitted
   - ☐ Contacts, etc

3. Once the battery pack is fully charged it will go into trickle charge mode, the red light now changes to green. Laser operation storage would now be approx. 18 hours.

4. Keep your charger in a dry place (indoor use only). The charger should be disconnected from the mains when not in use. Do not plug in the charger if it has loose connections or shows any signs of damage. This may cause damage to laser modules.

5. To avoid damage to the D.C. plugs they must be placed in the dock holes when not in use.

To avoid damage put the DC plugs into the dock holes when not in use.

Danger of Explosion!
If incorrect batteries are used.

Correctly conditioned batteries are only available from Servex. Contact your distributor for replacements.

SPECIFICATIONS

Camber ..... ± 20°
Caster ..... ± 30°
Toe-in (each wheel) ..... -1° to +2° -16mm to +28mm on 28" Diameter Tyre
Steering Axis Inclination SAI ..... 0° to 20°
Set-back ..... ±30mm
Toe-Out-On Turns (TOOT) ..... ±40°

Wheel Clamps:

..... Quick Acting Self Centering 3 Claws/Fingers
..... Run-out compensation by adjusting the fingers

Range of Rims:

With standard lugs ..... 10" to 18"
HA0937 Adaptor Kit ..... up to 20"
HA1191 Adaptor Kit ..... up to 24"
HA0935 Tyre Gripper Kit ..... Larger Tyres

Turntables:

Capacity per wheel ..... 2,500 kg
per axle ..... 5,000 kg
Type ..... Nylon Ball Bearing
Top Plate Diameter 315mm
Rotation ..... Continuous
Side Movement 50mm

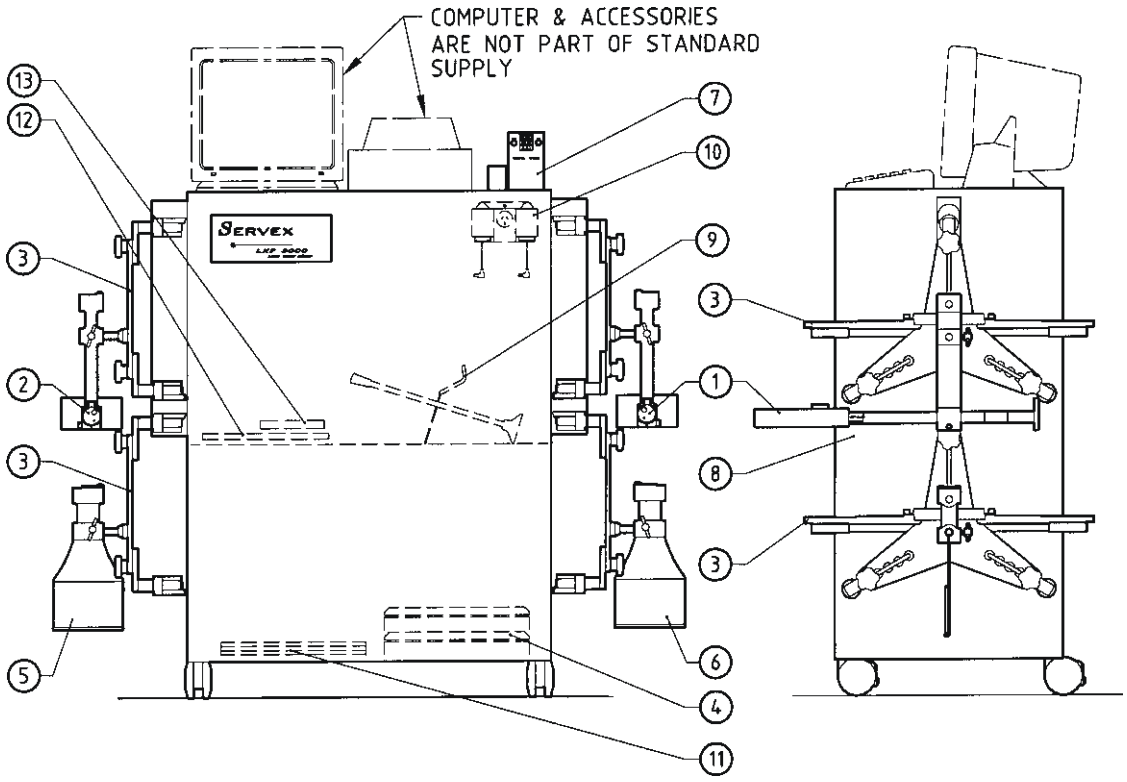
Lasers:

Number of Lasers ..... 4 Lasers - 2 beams each side
Power Output and Wave Length ..... 1mW each Beam 635 nm
Safety Classification ..... Class 2
Battery Pack ..... 4 AA Nickel Metal Hydride, Rechargeable Batteries
Batteries Charge Time ..... Flat to Full Charge Aproximately 4 hours
Continuous Operating Time ..... Between Charge Approximately 18-24 hours

Digital Camber Caster and SAI Gauge:

Display Reads In ..... Degrees and Decimal Points of a Degree
Threshold and Resolution ..... 0.1°
Battery ..... Non Rechargeable Alkaline 9 Volt D.C.
Linear Range ..... -45° to +45°
Location of Sensor. Magnetic base locates on mounting pads on laser heads and mirrors
Portable LCD Read-Out ..... Can be placed in operator's view under the vehicle

LX7-3000 EQUIPMENT LIST



ITEM	PART No.	DESCRIPTION	QTY.
1	HA 0870	LASER HEAD LH - LINE TOE	1
2	HA 0871	LASER HEAD RH - LINE TOE	1
3	HA 0853	WHEEL CLAMP	4
4	HA 0373	TURNTABLE	2
5	HA 1189-1	REAR MIRROR RH	1
6	HA 1189-2	REAR MIRROR LH	1
7	HA 0907-2	DIGITAL GAUGE	1
8	HA 1070	MOBILE DISPLAY CABINET	1
9	HA 0205	STEERING WHEEL CLAMP & BRAKE ACTUATOR	1
10	HA 1161	LASER HEAD CHARGER - TWIN OUTPUT	1
11	HA 0737	SLIP PLATE KIT (4 Plates)	1
12	HA 0922	OPERATION, SERVICE & SPARE PARTS MANUAL	1
13	HA 1073	CD - VEHICLE SPECIFICATIONS - MANUAL - VISUAL INSTRUCTIONS	1

ALL EQUIPMENT SHIPPED IN PACKING CASE 1120 x 960 x 615mm (LxWxH)
TOTAL WEIGHT APPROX. 130 kg

GENERAL DESCRIPTION

The Australian LX7-3000 wheel aligner is delivered with all components packed inside a mobile display cabinet and because it is partially assembled there is very little effort required to commence operation.

As a Laser Wheel Aligner the LX7-3000 requires no cords or strings to carry out an alignment.

This system has two alignment heads with each head incorporating a Laser Module which houses two separate beams, a Line beam for the front TOE readings and a Dot beam for the rear TOE readings.

Each module contains it's own Metal Hydride Battery Pack and the charger supplied will charge both laser modules at the same time. A full charge will provide approximately 18 hours of continuous laser operation.

The electronic Digital Read-Out Gauge measures Camber, Caster and SAI (KPI).

TOOT (Toe Out On Turns) is read directly off the turntables.

Four quick acting self centering Wheel Clamps fit easily to the wheel with the pull of a lever.

Run-out compensation is normally not required, however the facility to perform runout compensation on distorted rims is built into the clamp.

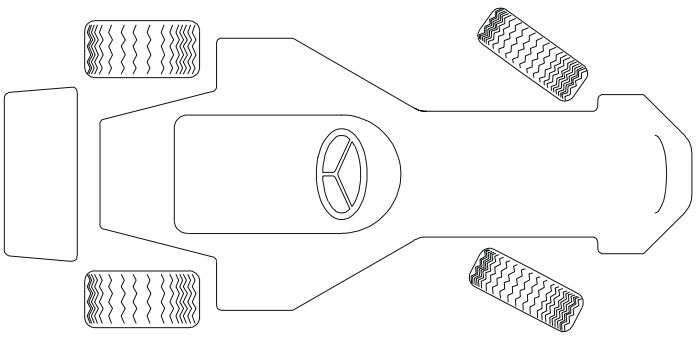
Included in this alignment system is two sets of rear slip plates.

When not in use the LX7-3000 is stowed on a functional moble cabinet so as to take up minimum floor space, it's portability provides the flexibility and the convenience to utilise the equipment in any alignment bay.

As Servex has an extensive history in design and manufacturing, our customers can be assured of the reliability of our equipment including the availability of spare parts together with continuing product improvement for the LX7-3000.

SETTING - UP the LX7 - 3000
GENERAL NOTES

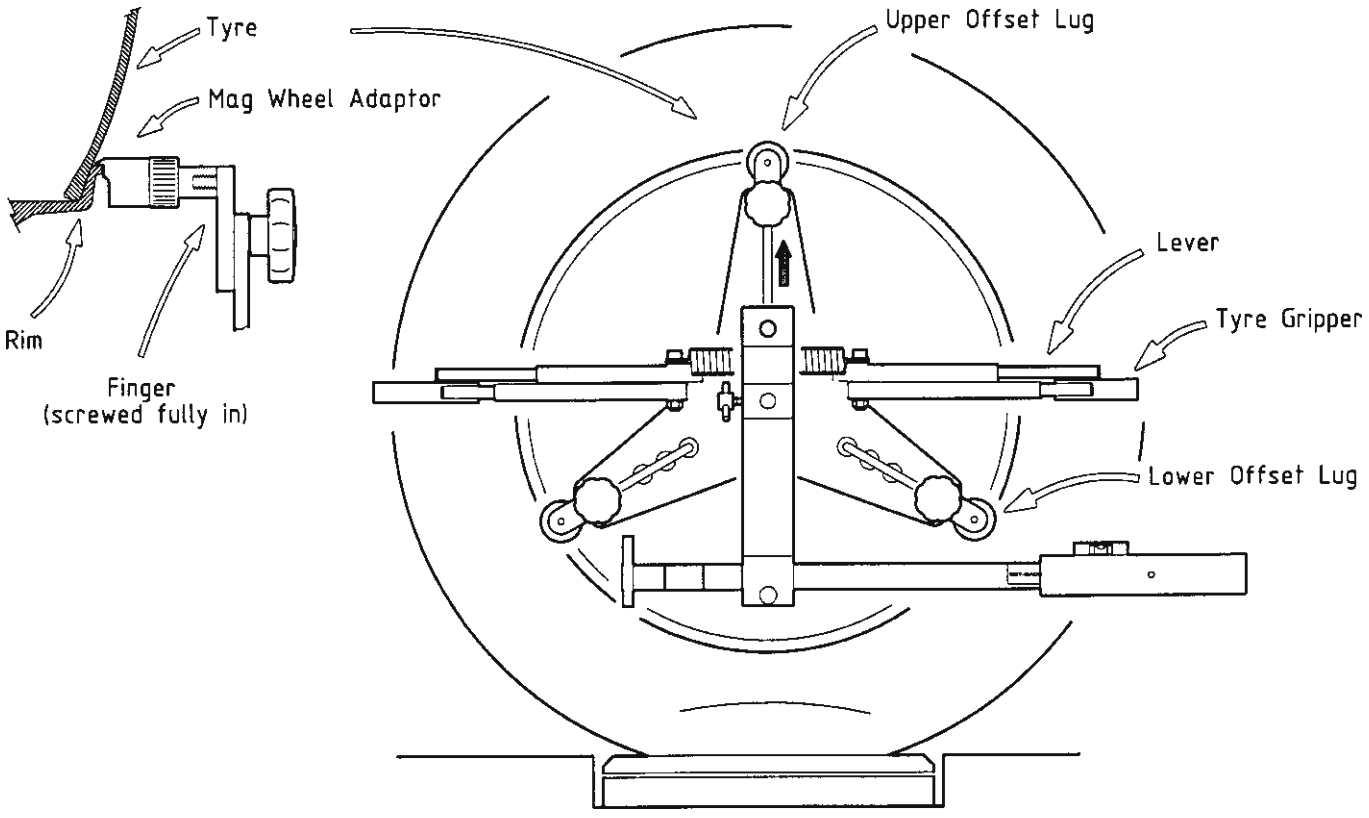
1. Check the steering rack (box), ball joints, tie rod adjusters, wheel bearings, spring shackles, draglink, etc.
2. Correct any looseness by adjustment or replacement of worn parts.
3. NOTE: Wheel alignment can only be measured accurately when the steering mechanism and wheel bearings are correctly adjusted, all slack has been eliminated and the vehicle is **certified as roadworthy.**
4. Check the position of the steering wheel relative to the steering rack (box); when the steering arm is in the central position, the steering wheel should be straight and level.
5. Beware of steering wheels that have been positioned on the wrong spline.
6. Refer to vehicle manufacturer's manual for correct fitment.
7. Check that the vehicle is fitted with the correct size tyres and that all tyres are wearing evenly.
8. Check that the TYRES ARE INFLATED TO THE CORRECT PRESSURE.
9. The vehicle can be on a set of ramps, on a hoist supporting all four wheels or on a level floor. (If used on a floor, pack up the "Lower" wheels to level the vehicle).
10. The vehicle wheels support area must be level side-to-side and front-to rear **within 1mm per metre over all**.
11. Drive or pull the vehicle on to the turntables. The wheels should be central to the turntable top and the top should be on the ***zero*** mark. The turntable top should be pushed inwards to help compensate for suspension release if the vehicle wheels are lifted without suspension lifting supports.
12. Always apply the handbrake and/or chock the wheels to prevent vehicle movement.
13. In this manual the RH side and the LH side of the vehicle are indicated as per the following diagram.



14. Operations that are described for one side must be repeated on the opposite side.

ATTACHING THE WHEEL CLAMPS

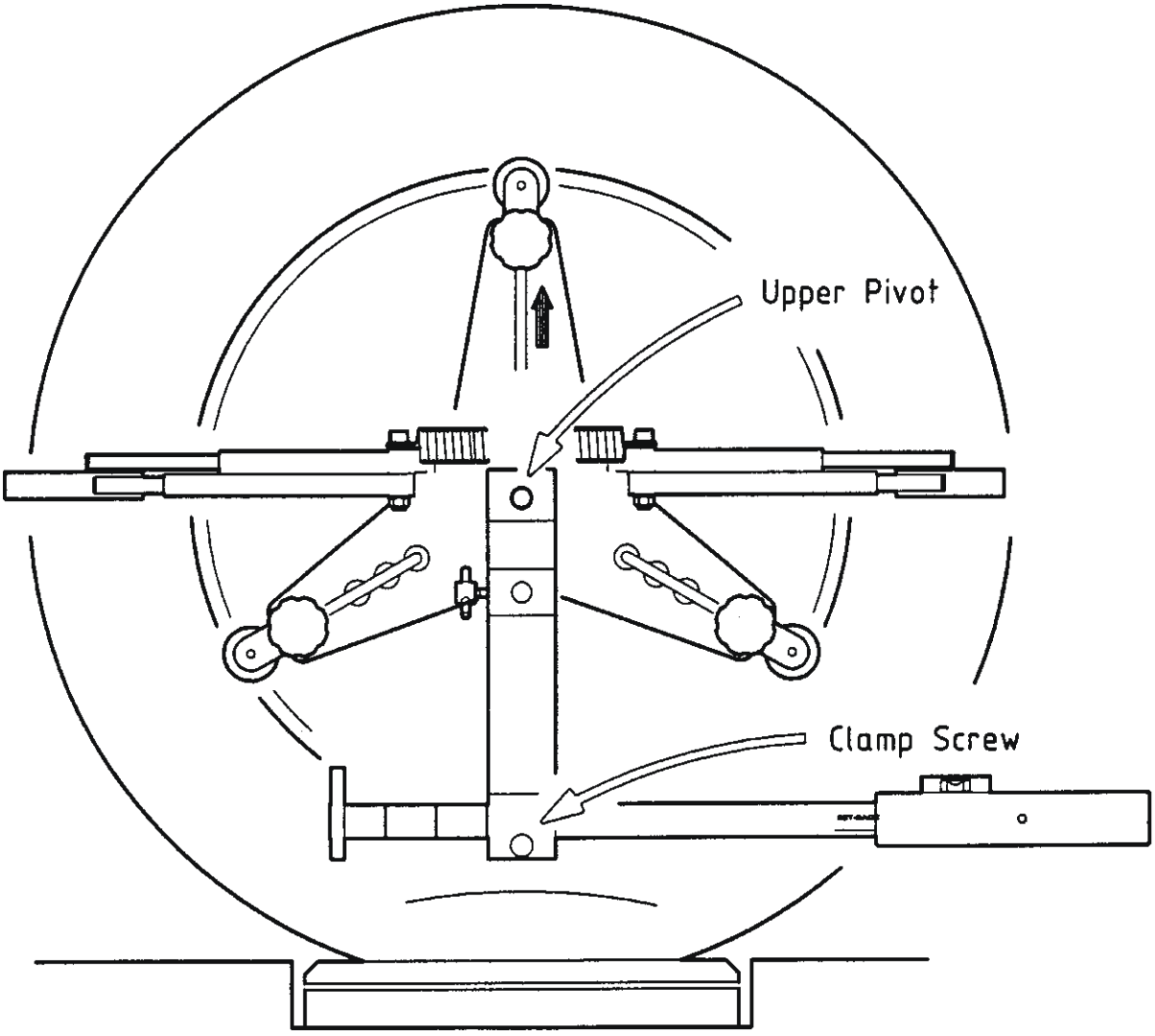
1. Check that all fingers are screwed fully in.
2. Fit the offset lug in the holes to suit the rim size. All offset lugs must be in the same hole on all wheels.
3. Hold the clamp with the arrow at 12 o' clock, bring the fingers/mag wheel adaptors on the edge of the rim at 4 o'clock and 8 o'clock.
4. Slide the upper finger/mag wheel adaptor to contact the same section of the rim as the lower fingers/mag wheel adaptors and lock in position.
5. Hold the clamp against the wheel with the fingers or mag wheel adaptors in position, push the tyre grippers towards the tyre tread to lock the grippers on the tyre.
6. Release the levers.
7. Check to ensure all fingers/mag wheel adaptors contact the rim in the same position and the entire clamp is firmly attached to the wheel.
8. Attach the wheel clamps on all four wheels in the exact same position.
9. Fit the laser heads on the front wheel clamps and the mirrors on the rear wheel clamps.



ADJUSTING THE LASER HEADS

When using the aligner on vehicles with tyres larger than 28” diameter, fit the laser head on the clamp spindle using the upper pivot point.
In addition the laser head can be lowered further by dropping the spindle to the bottom of the slot in the plate.
If this is still not sufficient to allow the toe beam to clear the tyre, loosen the clamp screw on the bottom of the drop arm. Slide the carrier tube to the next mark. Retighten the clamp. This is best done with the laser head resting on a flat surface, to ensure that the rear toe scale on the counterweight remains aligned with the drop arm.

Note that both laser heads must be on the same coloured mark on the carrier tubes within + or - 1mm.



LX7-3000 CHECK / CALIBRATION PROCEDURE

These checks should be carried out routinely and/or when the accuracy of the aligner is suspect. If the steer wheels are used lock the wheels off with the steering wheel clamp.

1. Laser Module Slack

Check laser module for **slackness** on the tube. The module should rotate and slide smoothly on the tube without slackness.
If necessary tighten the adjustment screws, with a 1.5mm Allen key.
The screws are accessible through the TOE scale decal on the 28 line and opposite.

2. Rear Beam Alignment

Check the laser beam alignment with the head attached to a vehicle as when doing an alignment. (If using the steer wheels, lock them off with the steering clamp supplied).

Check the rear beam only, (the side beam is linked into the rear beam).
Project the rear beam to a target at least 6 meters away:

Step 1 Rotate the laser module on the tube while observing the beam on the target .
The beam should remain in the red section inside the white circle.
If adjustment is needed operate as follows:
- To move the beam in direction A loosen screw 1 and tighten screw 2.
- To move the beam in direction B loosen screw 4 and tighten screw 3.

Adjust ***very carefully***, using two 1.5mm Allen keys simultaneously. Turn a fraction of a turn, loosening one screw and tightening the screw opposite. Observe the effect before proceeding.
On completion check that all 4 screws are lightly tightened. (About 1 tenth of a turn).

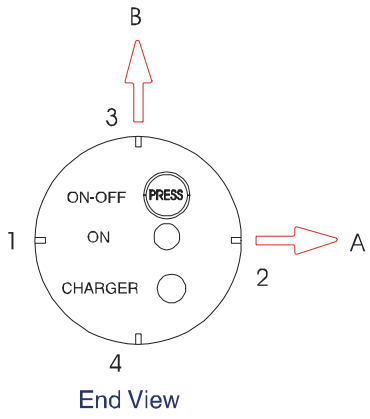
Very important note:
Overtightening will disrupt the 90º setting and void the warranty!

Recheck the size of the laser circle, when rotated, the beam should remain in the red section inside the white circle.

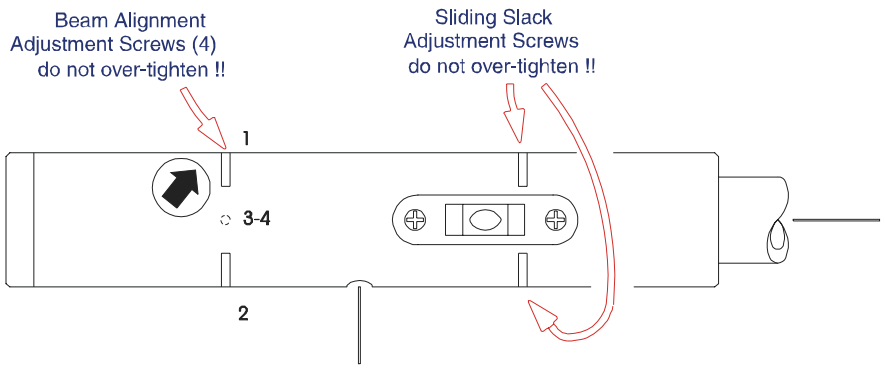
Step 2 Reset the laser module with the level bubble in the 12 o'clock position.
Note the position of the beam on the target.
Taking care not to disturb the clamp, slide the laser head from the spindle and put it back on the spindle upside down.
The rear beam should be on the exact same position on the target.
Maximum allowable difference between 2 readings is 2mm over a distance of 6m.

Do not rotate the module on the tube while doing this test. Always tighten the thumb screw in the spindle groove.

Note: A bent tube or a bent drop arm may cause a large discrepancy.



End View



LX7-3000 CHECK / CALIBRATION PROCEDURE (cont.)

3. Checking The Laser Tube for Straightness

Important Note: This check can only be done after all laser module calibrations have been carried out, otherwise an incorrect diagnosis will occur.

1. With the clamp attached to the wheel, loosen the drop arm clamping screw sufficiently to be able to just rotate the tube without any slack in the clamp spindle.
2. Observe the laser beam on the target at about 6m distance.
3. Slowly rotate the tube. Hold the laser module with the bubble level so it does not change its position during rotation.
4. The beam should remain in the red section inside the white circle. If the beam circle is outside these specifications, replace the tube.

4. Checking the wheel clamps

For this test the clamp should be attached to a wheel with an **undistorted rim**.

1. Mark the position of the clamp fingers on the rim.
2. Lift the wheel and back off the thumb screw slightly.
3. Slowly spin the wheel and observe the beam on a target at about 6m distance.
4. Mark the horizontal run-out of the beam on the target.
5. Run-out should be less than 3mm at 6m.
6. Fit the other clamps on the same rim in the same position.
7. Compare the run-out with the first clamp.
8. Excessive run-out may indicate:
   - A - Wheel rim run-out.
   - B - Bent clamp plate - Check for flatness using a straight edge.
   - C - Bent spindle.

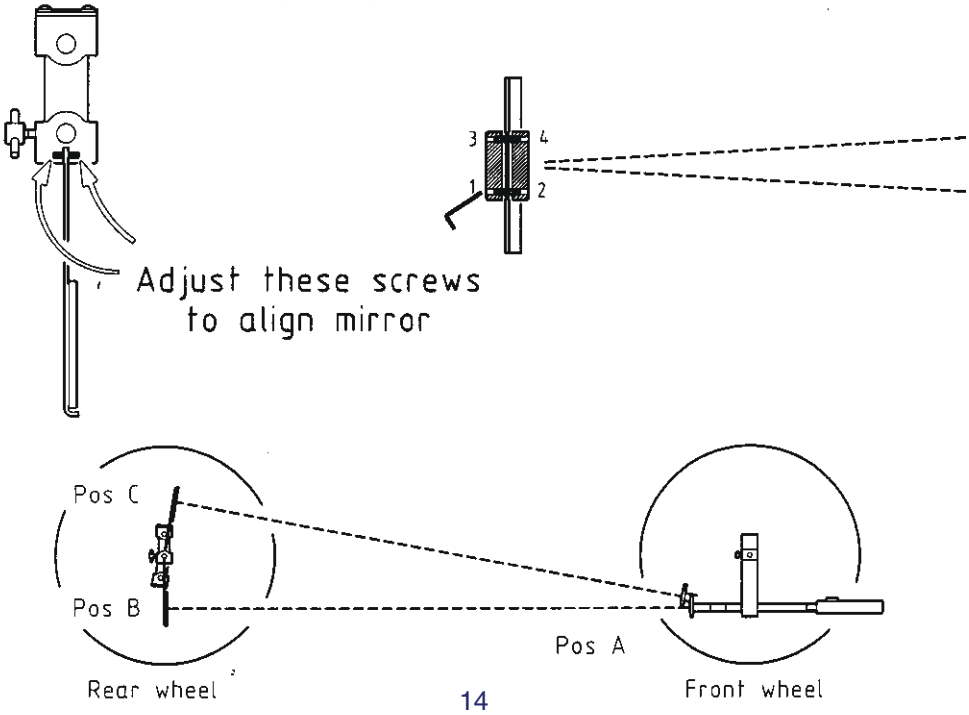
5. Checking the spindle for straightness

1. Mark the position of the beam on the target.
2. Loosen the screw that holds the spindle on the plate.
3. Turn the spindle a quarter turn, retighten the screw and mark the position of the beam.
4. Loosen the screw again and turn the spindle another quarter turn and again mark the position of the beam.
5. Repeat until the spindle has done one full turn.
6. The total side runout of the beam should be not more than 3mm.

REAR MIRROR CHECKING PROCEDURE

This procedure is best done using a car with minimal camber on front and rear wheels.

1. Fit the Laser Head on the front wheel clamp and the Mirror to be checked on the rear wheel clamp as for the Wheel Alignment. (Position A and B on drawing below)
2. Make sure that the laser head is calibrated accurately as described previously.
3. Using the Digital Gauge **set the camber to ZERO on both clamps** by adjusting the clamp fingers.
4. Aim the beam at the mirror.
5. Tilt the mirror and move front wheel so the reflected beam is on the ZERO mark of the laser head, scale C or D. Lock the steering wheel.
6. Slide the mirror off the spindle, turn it upside down and place it back on the spindle in position C and tilt the laser head up, the beam should still reflect within two divisions (degree scale) off the ZERO mark. (1.5mm)
7. If adjustment is necessary then adjust screws 1 and 2, loosen one and tighten the opposite screw as required leaving screws 3 and 4 untouched or adjust screws 3 and 4, leaving screws 1 and 2 untouched. **Adjust 2 screws only. Adjust half the difference of the two readings.**
8. Slide the mirror off the spindle and place it back on in position B, normal operational position, and check the readings on the counterweight scale C or D.
9. The readings should be the same in both positions B and C.
10. If readings are not the same then repeat this procedure until the error is no more than two divisions (degree scale).
11. On completion ensure all screws are firmly tightened.
12. Re-tighten all the clamp fingers against the plates.



COMPENSATING FOR RUN-OUT

When fitted correctly to **undistorted rims** The LX7-3000 wheel clamp ***does not require run-out compensation.***
However if the wheel condition is suspect there is provision in the clamp design to perform run-out compensation**.**

- Fit the clamp on the wheel as previously described and lock the steer wheels.
- Jack the wheel up just clear of the turntable. The turntable top should be pushed inwards to help compensate for suspention release if the vehicle wheels are lifted without suspension lifting supports.
- Back off the thumb screw slightly and spin the wheel slowly, while observing the beam on the rear mirror scale, (invert the mirror so that the laser is on the scale).
- Keep the beam at the same height otherwise the camber angle may distort the readings.
- If the beam moves sideways more than one division with a full turn of the wheel proceed with the run-out compensation as follows:

1. Unscrew all three fingers about 2 turns.
2. With the clamp red arrow pointing up (Fig. 1) direct the beam at the mirror scale and note the reading.
3. Rotate the wheel 180 ° until the arrow points down (Fig. 2) and again note the reading on the mirror scale.
4. Turn the finger near the **front of the car** to bring the beam to the **mid point** of the reading. Call this the ***BULLS EYE***.
5. Rotate the wheel 90° until the red arrow points to the front of the car (Fig. 3). Turn the finger near the **RED ARROW** to bring the beam back to the ***BULLS EYE.***
6. Rotate the wheel a full turn. The beam should be within one division in any position.

Fig 1

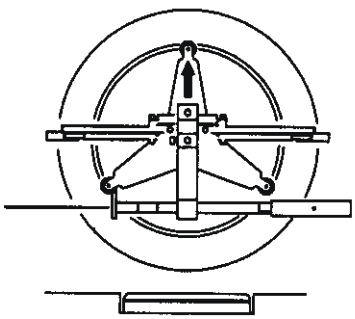


Fig 2

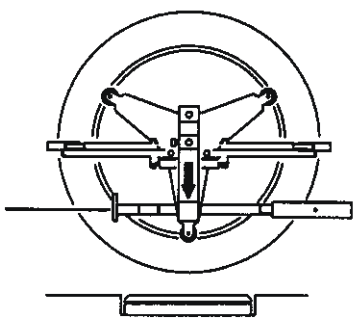
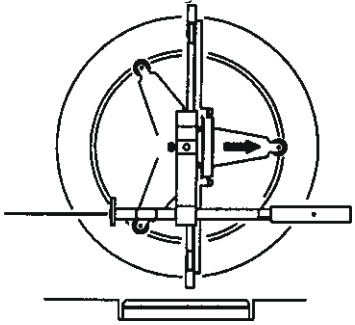


Fig 3



7. Before lowering the wheel onto the turntable, rotate it, so that the red arrow points up (Fig. 1). Make sure the wheel sits on the centre of the turntable top.
8. If necessary, repeat the above procedure on the other wheels.
9. Bounce the front of the vehicle up and down a few times to settle the springs and shock absorbers allowing the suspension to assume its normal driving height. (This may not necessarily settle the suspension, refer to the jacking procedure on this page).

MEASURING FRONT WHEEL CAMBER

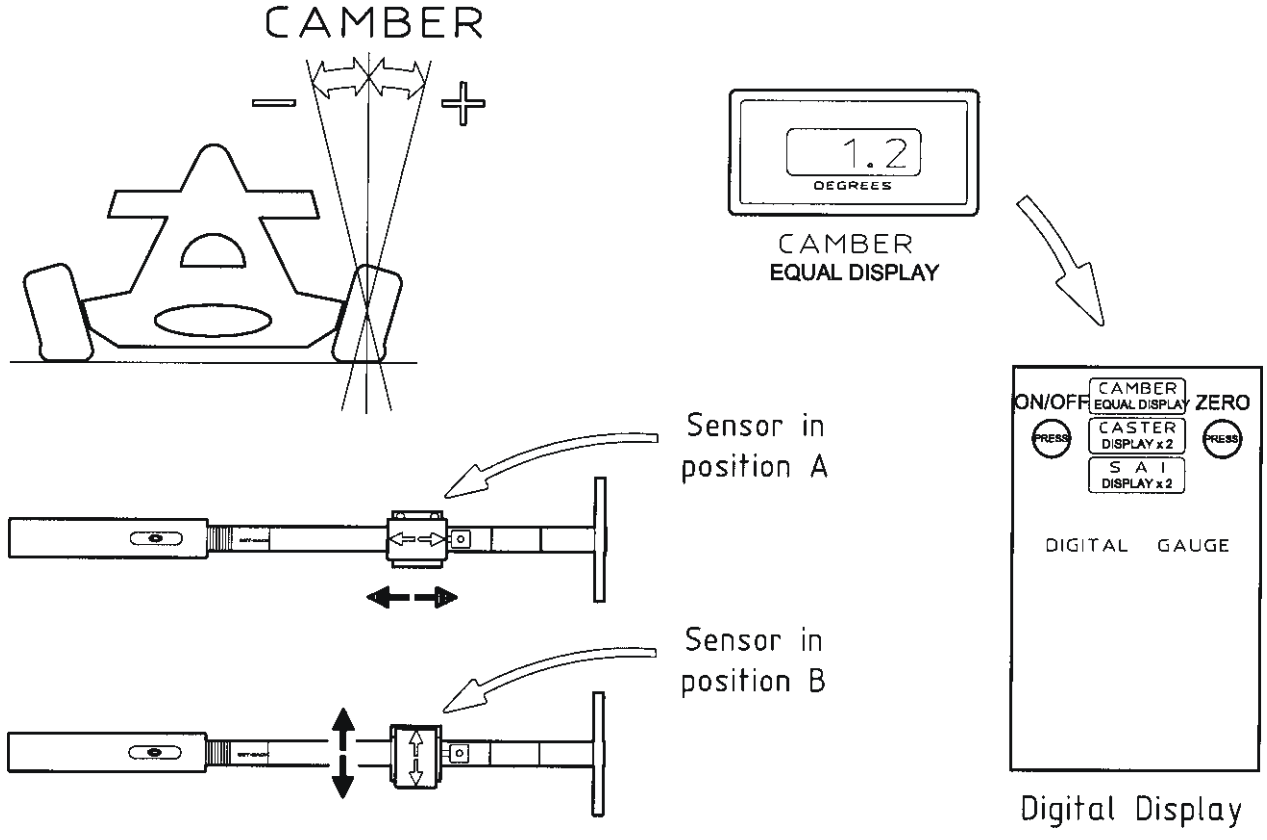
Camber is the vertical tilt of the wheel viewed from the front of the vehicle.
Camber is given in degrees and is **POSITIVE** when the top of the wheel leans outwards and **NEGATIVE** when the top of the wheel leans inwards.

Camber is measured using the **SERVEX LX7-3000 Digital Gauge.**
This gauge reads in degrees and decimal points of a degree.
There are 60 minutes in each degree and 6 minutes in each 0.1 degree.

To measure Camber the magnetic sensor is placed on the pad on top of the laser head.
The edge of the sensor base should be in contact with the shoulder of the pad.
The sensor arrow should be pointing as shown on the diagram. Position A.

1. Level the laser head and lock it with the thumb screw.
2. Zero the digital display.
3. Rotate the sensor a quarter turn to align ***RH*** with ***RH camber*** or ***LH*** with ***LH camber*** depending on which side we are working. Position B.
   Camber is now read **DIRECTLY** off the digital display.

The Digital Gauge may be placed in view of the operator, under the car, for a ***live reading*** while adjustments are carried out.



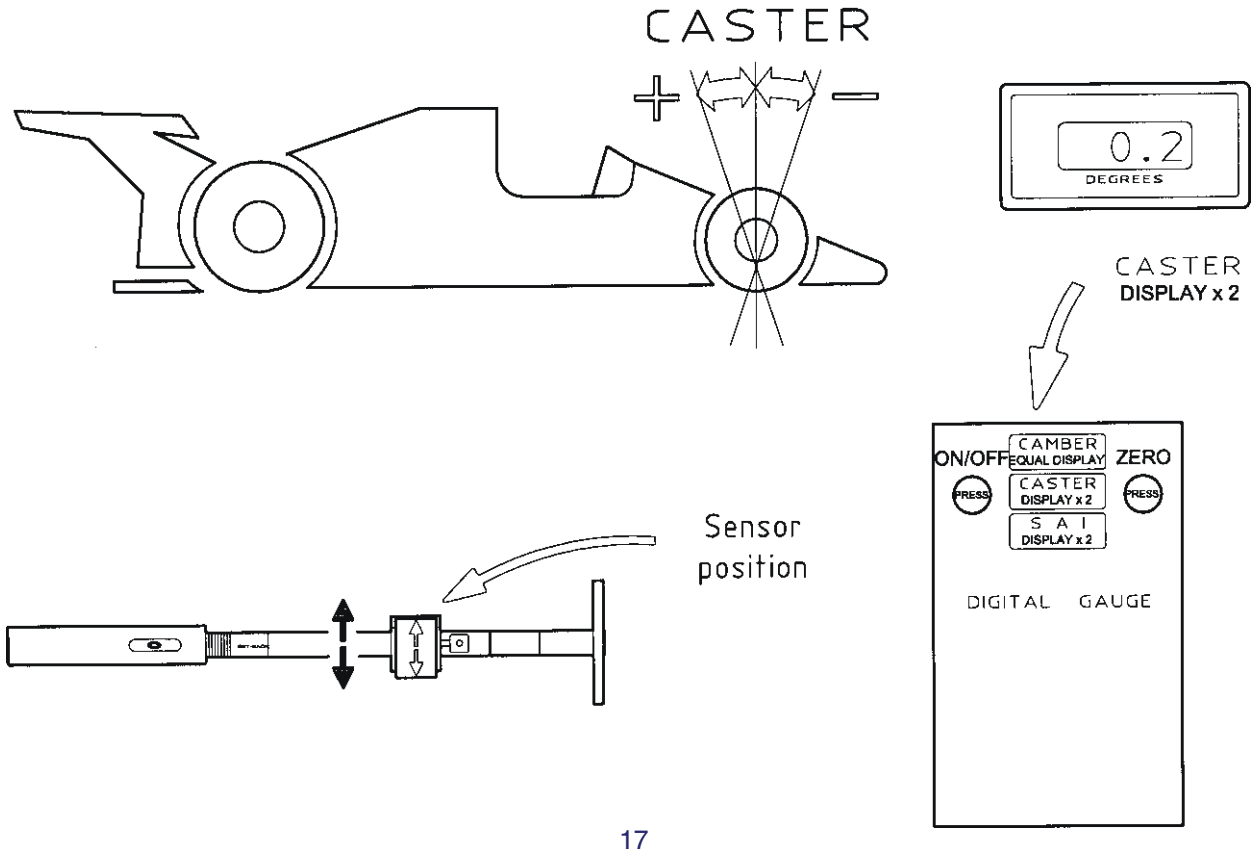
MEASURING CASTER

Caster is the backward or forward tilt of the steering axis (king pin) viewed from the side of the vehicle.
Caster is given in degrees and is **POSITIVE** when the top of the steering axis is tilted backwards and **NEGATIVE** when the top of the steering axis is tilted forwards.
Caster is measured with the Servex LX7-3000 Digital Gauge. This gauge reads out in degrees and decimal points of a degree. When measuring caster the displayed angle must be multiplied by 2 to obtain the caster angle.

1. Caster measurement must follow camber. Laser head should be levelled and locked and the sensor aligned with the drop arm, matching the LH & RH decals, whichever is applicable.
2. Turn the wheel 14° in, indicated by the 14° line on the turntable top lining up with the zero line on the turntable base.
3. The digital read-out is now switched on and zeroed.
4. Next turn the wheel back through the straight ahead position to the 14° out position.
5. The displayed angle is now **MULTIPLIED BY 2.** This is the caster reading.

Caution: Take care when turning the wheel, the laser heads may be damaged or knocked off the wheel if they contact any part of the vehicle, the ramps, or hoist.

The Digital Gauge may be placed in view of the operator, under the car while adjustments are carried out.



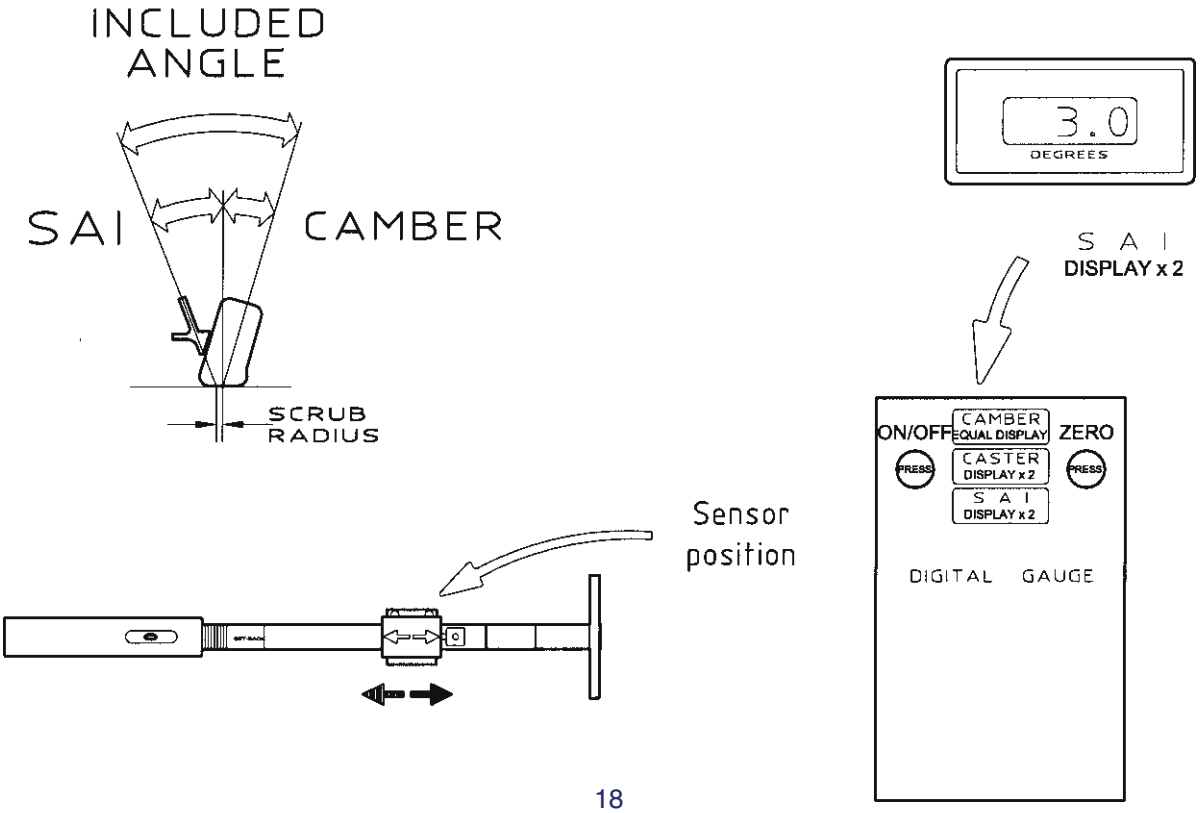
MEASURING S.A.I.

Steering Axis Inclination (S.A.I.) or King Pin Inclination (KPI) is the vertical inward tilt of the king pin (from a vertical line drawn through the centre of the ball joints) when viewed from the front of the vehicle. SAI is given in degrees and is **always positive**.
SAI is measured on each wheel individually using the Servex LX7-3000 Digital Gauge. This Gauge reads out in degrees and decimal points of a degree. When measuring SAI the displayed angle MUST BE MULTIPLIED BY 2 to obtain the SAI angle.
When measuring SAI the aligner is **set up** as for measuring camber.

1. Apply the brake actuator.
2. Turn the wheel 14° in, as done for measuring caster.
3. Level the laser head and lock in position. Switch on the digital readout and zero the display.
4. Make sure that the wheel has not moved off the 14° in position.
5. Now turn the wheel 14° out and without disturbing the laser head read the angle on the digital display.
6. The displayed angle is **MULTIPLIED BY 2. THIS IS THE SAI ANGLE.**

CAUTION: Take care when turning the wheels. The Laser Heads may be damaged or knocked off the wheel if they come in contact with any part of the vehicle, the ramps, or the hoist.

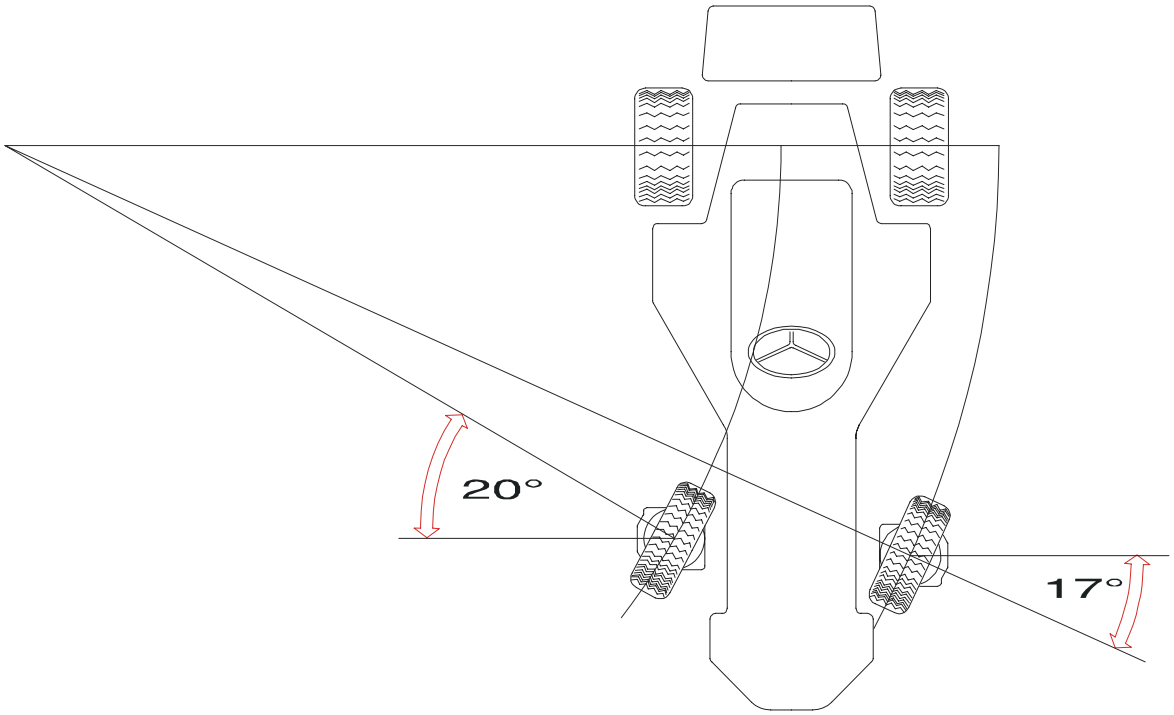
The Digital Gauge may be placed in view of the operator, under the car.



MEASURING TOE-OUT on TURNS

When cornering, the outside wheel moves a greater distance, but turns a smaller angle, than the inside wheel.

This changes the toe relationship between the two wheels so that they “toe-out-on-turns”.



1. Place the vehicle on the turntables with the steer wheels straight ahead and both turntables reading zero. The wheels should be in the centre of the top plate.
2. Turn one wheel “in” to the specified angle.
3. Read the angle through which the other wheel has turned. This is the **“Toe-out-on-turns”.**
4. Repeat this procedure on the other wheel.

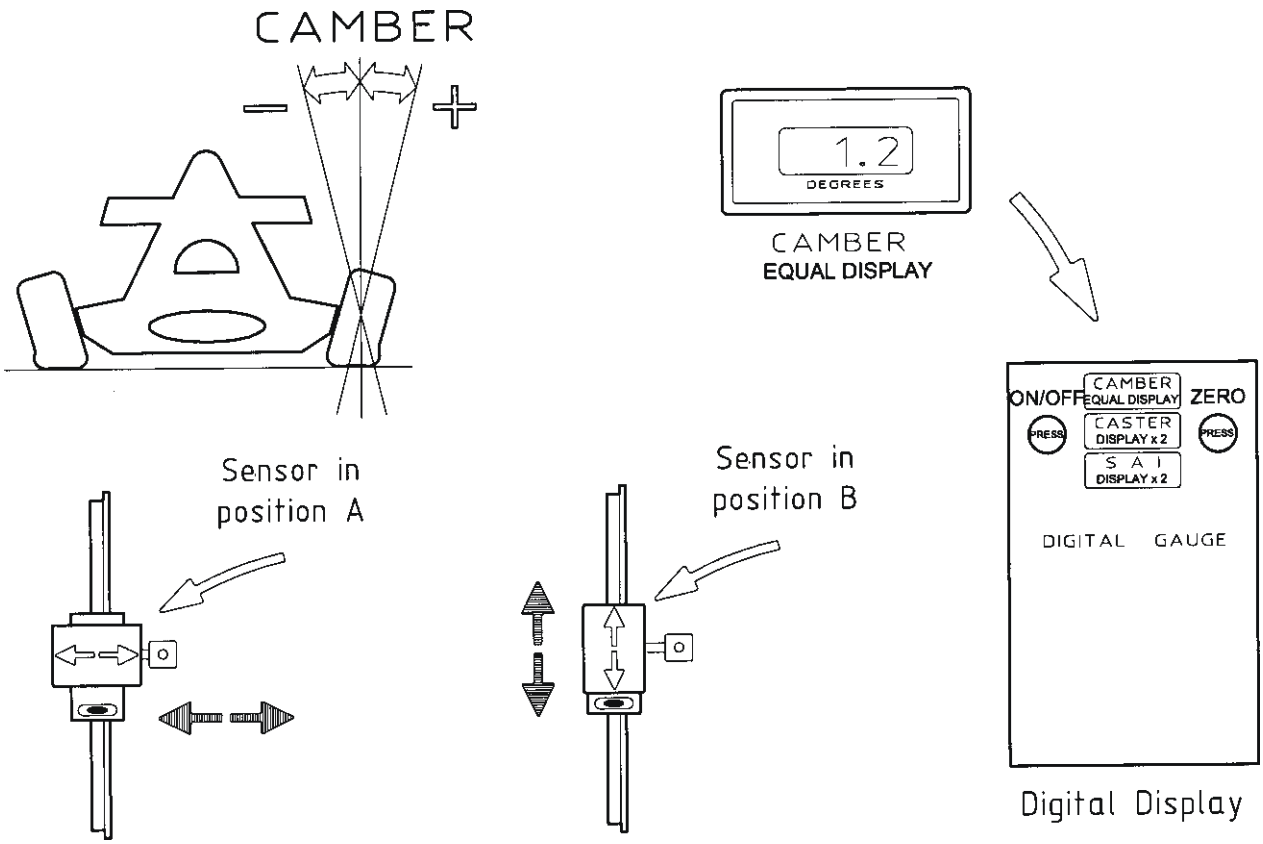
MEASURING REAR WHEEL CAMBER

Camber is the vertical tilt of the wheel viewed from the rear of the vehicle.
Camber is given in degrees and is positive when the top of the wheel leans outwards and negative when the top of the wheel leans inwards.
The slip plates should be in place under the rear wheels if adjustments are to be made.
Camber is measured with the SERVEX LX7-3000 Digital Gauge.
This gauge reads out in degrees and decimal points of a degree.
There are 60 minutes in each degree and 6 minutes in each 0.1 degree.

To measure camber, place the magnetic sensor on the pad located on the rear wheel mirror carrier.
The edge of the sensor base should be in contact with the shoulder of the pad.
The sensor arrow should be pointing as shown on the diagram. Postion A.

1. Level the mirror head and lock it with the thumb screw.
2. Zero the digital display.
3. Rotate the sensor a quarter turn to align ***RH*** with ***RH camber*** or ***LH*** with ***LH camber*** depending on which side of the vehicle you are working on. Position B.
4. Camber is now shown directly on the digital display. If adjustments are to be made then the slip plates should be in place, under the rear wheels.

The Digital Gauge may be placed in view of the operator, under the car, for a ***live reading*** while adjustments are carried out.



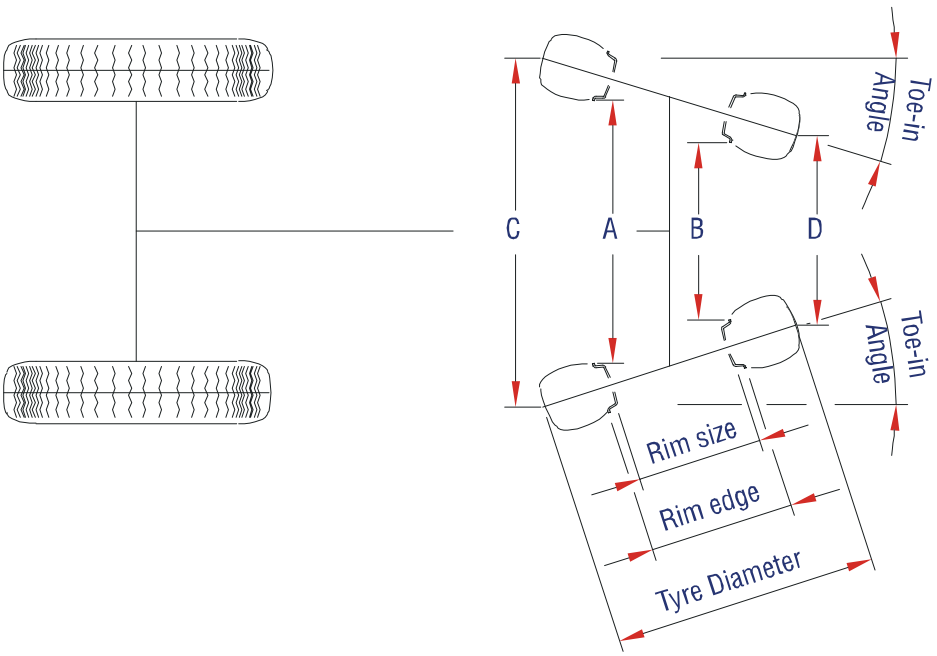
INTRODUCTION TO MEASURING TOE

Toe is the angle between the two wheels viewed from the top of the vehicle.
Toe is POSITIVE when the wheels point IN and is NEGATIVE when the wheels point OUT.

a] - European specifications are based on a 14" rim and represent the difference between distances A and B, measured at the edge of the rim in mm or decimal degrees.
b] - American specifications are based on 28"(711mm) tyre diameter and represent the difference between distances C and D, measured at the outside of the tyre in inches.
c] - Most Australian specifications are based on 28" (711mm) tyre diameter and represent the difference between distances C and D measured at the outside of the tyre in mm or decimal degrees. **The LX7-3000 uses type C. specifications**

It will always be necessary to check how the toe is specified for the particular vehicle.

The SERVEX LX7-3000 reads TOE in either degrees and minutes or in millimetres.
The millimetre markings on the toe in scales, are calculated for 28" tyre diameter.
Use the FRONT TOE CONVERSION TABLE in this manual if the toe is specified for 14" rims.



FRONT TOE CONVERSION TABLE

		TOE - IN mm										
RIM SIZE inches Nominal		10"	12"	13"	14"	15"	16"	17"	18"	20"	22.5"	28" TYRE DIAMETER
TOE-IN Angle degrees	10'	0.8	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.6	1.7	2.1
	20'	1.7	1.9	2.1	2.3	2.4	2.5	2.7	2.8	3.1	3.4	4.1
	30'	2.5	2.9	3.1	3.4	3.6	3.8	4.0	4.2	4.7	5.1	6.2
	40'	3.3	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.3	6.9	8.3
	50'	4.1	4.9	5.2	5.7	6.0	6.3	6.7	7.1	7.8	8.6	10.3
	1° 00'	5.0	5.8	6.3	6.8	7.2	7.6	8.1	8.5	9.4	10.3	12.4
	1° 10'	5.8	6.8	7.3	7.9	8.3	8.9	9.4	9.9	11.0	12.0	14.5
	1° 20'	6.6	7.8	8.4	9.1	9.5	10.1	10.7	11.3	12.5	13.7	16.5
	1° 30'	7.5	8.8	9.4	10.2	10.7	11.4	12.1	12.7	14.1	15.4	18.6
	1° 40'	8.3	9.7	10.5	11.3	11.9	12.7	13.4	14.2	15.6	17.2	20.7
	1° 50'	9.1	10.7	11.5	12.5	13.1	13.9	14.8	15.6	17.2	18.9	22.7
	2° 00'	9.9	11.7	12.6	13.6	14.3	15.2	16.1	17.0	18.8	20.6	24.8

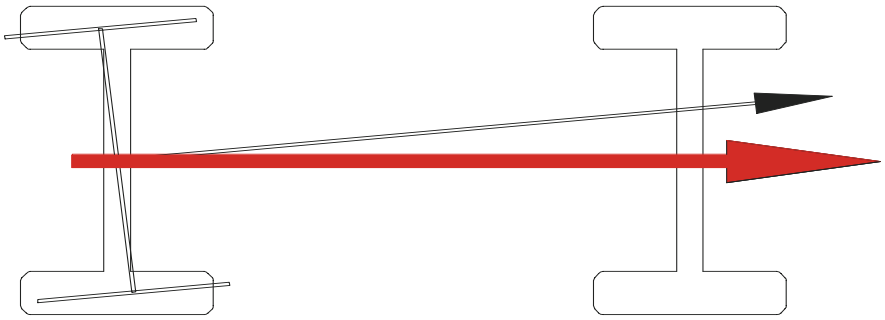
MARKING OF LX7-3000 HEADS

mm to Inches Conversion Scale

ATTENTION
SELECTION OF WHEEL ALIGNMENT PROCEDURES

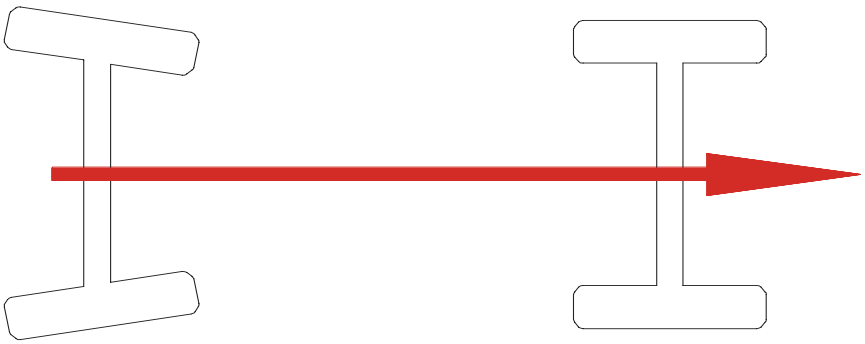
Thrust corrected alignment - Method A

Used on vehicles without rear TOE adjustment.



Four Wheel Toe Alignment – Method B

This type of alignment should be performed on vehicles that are equipped with adjustable rear TOE. Four wheel alignments start with the adjustment of the rear wheels and finish with a **thrust corrected alignment (A).**



QUICK ALIGNMENT CHECK

FOR ASSESSMENT ONLY

The most direct way of measuring front TOE is to read the TOE of each individual wheel on the toe scales A& B attached to the inside front of the laser heads.

BEFORE checking Toe make sure Camber and Caster are correct.

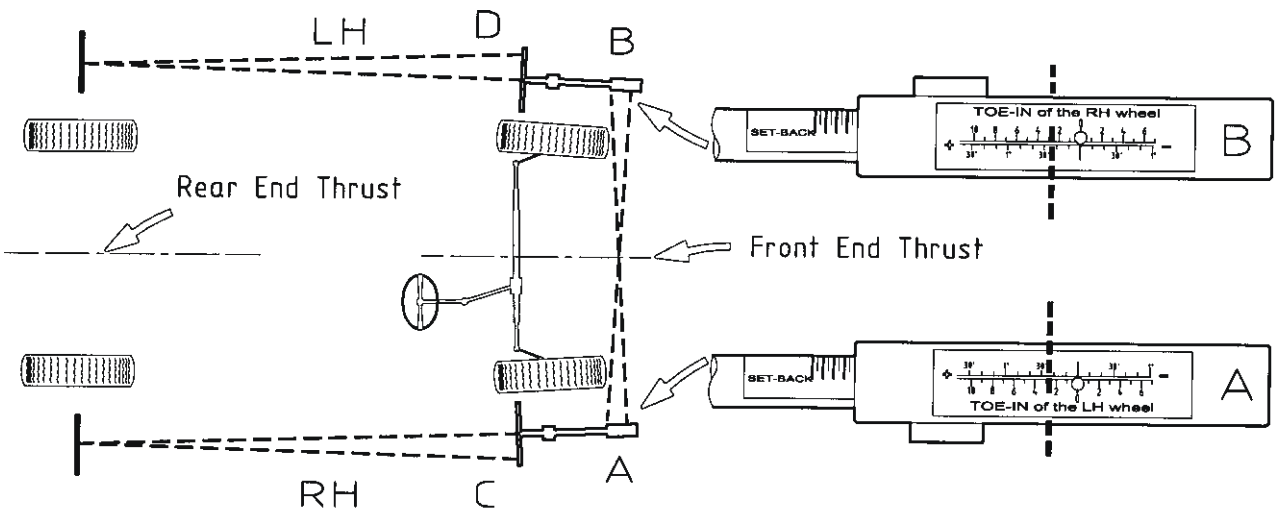
Next check that the steering rack (box) is centered and that the steering wheel, is fitted to the manufacturers specifications.

The laser beams for measuring TOE project across the vehicle.

The TOE reading for the RH wheel is displayed on the LH scale B.

The TOE reading for the LH wheel is displayed on the RH scale A.

1. Level and lock the laser heads and switch the laser beams on.
2. Push both laser modules fully in to zero on the SET BACK scale.
3. Observe the reflection of the rear beam on COUNTER WEIGHT scales C & D.
4. The readings on the scales C & D should be the same as each other. If the readings are not the same, turn the steering wheel or road wheels to achieve the same reading.
5. Slide the module with the least amount of TOE, out, until both Front TOE scales on the laser modules show the same readings. This module indicates the SET-BACK *(never move both modules during this operation).*
6. The individual TOES now are added together to give the total TOE.



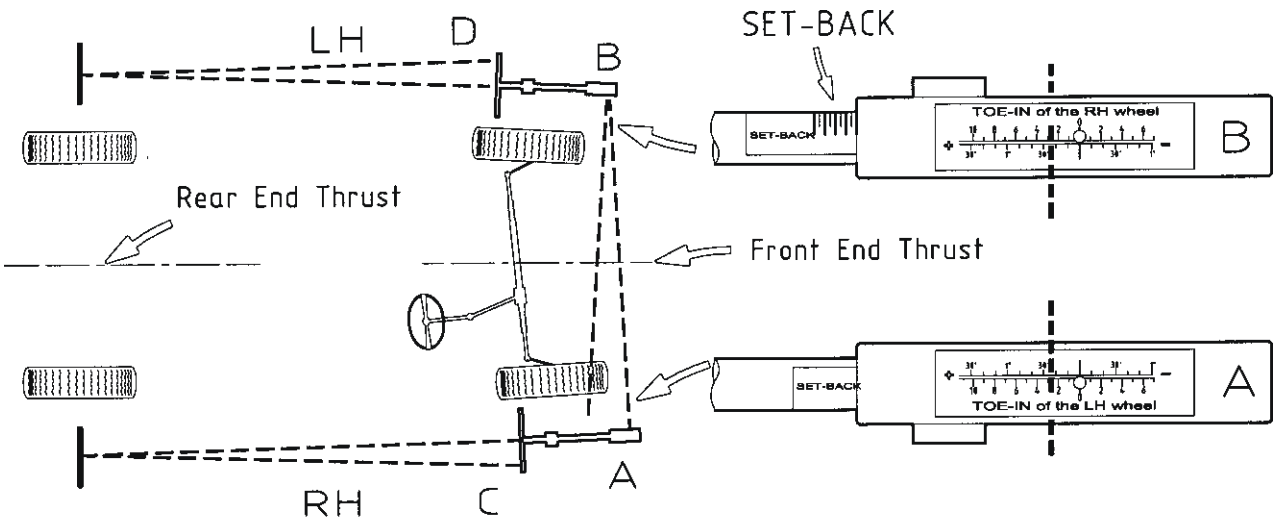
THRUST CORRECTED TOE ALIGNMENT (Method A)

BEFORE setting TOE make sure Camber and Caster are correct and run out is compensated for if required.

Next check that the steering rack (box) is centred and that the steering wheel is fitted to the manufacturers specifications.
The laser beams for measuring TOE project across the vehicle.
The TOE reading for the RH wheel is displayed on the LH scale B.
The TOE reading for the LH wheel is displayed on the RH scale A.
Thrust corrected toe alignment establishes the thrust line of the vehicle.
The front wheels are aligned to the thrust line of the rear wheels.
This will ensure that the steering wheel is straight and level when the vehicle is travelling straight ahead.

1. Lock the steering wheel in the straight-ahead position with the steering wheel holder.
2. Level the laser heads and lock them with the thumb screws.
3. Push both laser modules fully in to zero on the set-back scale.
4. Observe the reflection of the rear beams on scales C & D (tilt the mirrors if required to aim the beams at the scales).
5. The reading on scales C&D should be the same as each other.
6. If the readings are not the same the front tie rods should be adjusted so that both readings become the same.
7. Having now adjusted the front wheels in relation to each rear wheel, we need to measure and adjust the total front TOE to manufacturer specifications.
8. Slide the laser module with the lowest TOE reading out until the readings on each module are the same. (Never move both modules during this operation).
9. Adjust each tie rod to show half the specified total TOE on each module.
10. Lock the tie rods.

This completes the thrust corrected alignment.

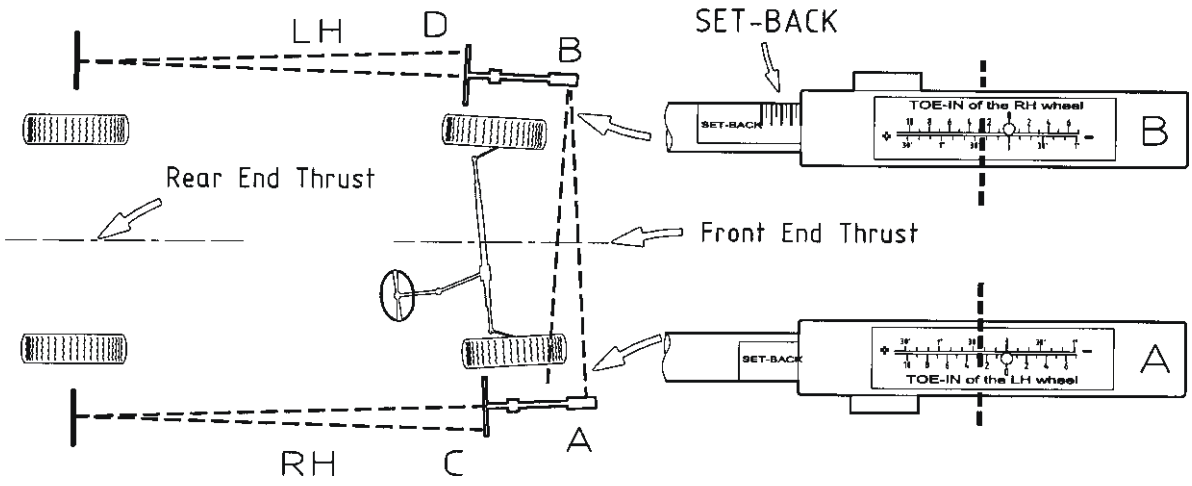


FOUR WHEEL TOE ALIGNMENT (Method B)

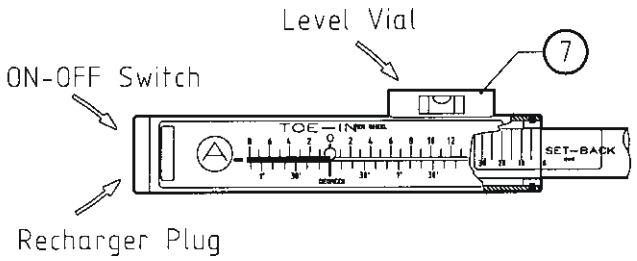
(Followed by Method A)

This type of alignment should be performed on vehicles that are equipped with adjustable rear suspensions.
All four wheel alignments start with the adjustment of the rear wheels.
BEFORE setting TOE make sure rear camber is correct and run out compensated for, if required.
The **slip plates** should be in place under the rear wheels if adjustments are to be made.

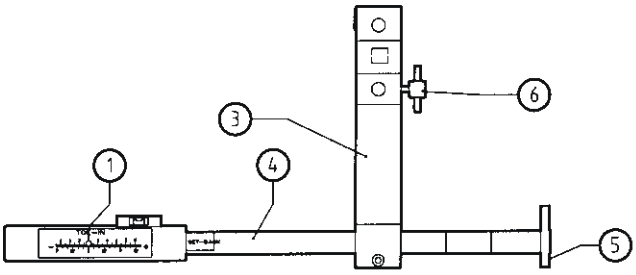
1. Push both laser modules in to zero on the SET BACK scale. Level and lock the laser heads with the thumb screw. Switch the laser beams on.
2. Observe the reflection of the rear beam on COUNTERWEIGHT scales C & D.
3. The readings on the scales C & D should be the same as each other. If the readings are not the same, turn the steering wheel or the road wheels to achieve the same readings.
4. Slide the module with the least amount of TOE, out, until both scales read the same amount. *(never move both modules during this operation).*
5. Steer the front wheel to read zero on the opposite laser module scale.
6. That rear projecting laser is now running parallel with the vehicle centre line, it is reflected off the mirror back on the rear TOE scale C or D.
7. The number that the laser dot falls on is the actual TOE of the rear wheel in millimetres and degrees. Based on the wheel base of 3 metres.
8. Adjustment of the rear TOE for that wheel can now be made and read directly off the scale C or D.
9. Repeat the above procedures for the other wheel and again adjust to the manufacturers specifications.
10. Both rear toes should be equal to half of the total specified TOE.
11. That completes the rear adjustments for a four wheel alignment. The operator now **continues on** with the adjustment of the front wheels as described in the thrust corrected alignment on the page 25 **(Method A).**



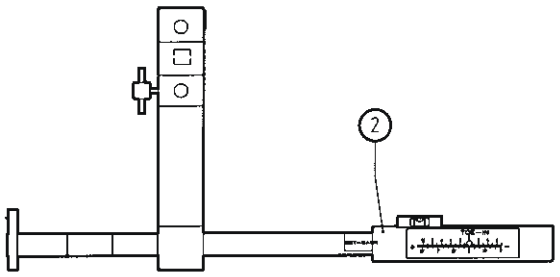
Parts List
LASER HEADS



Detail of Laser Module RH
HA 1067 R



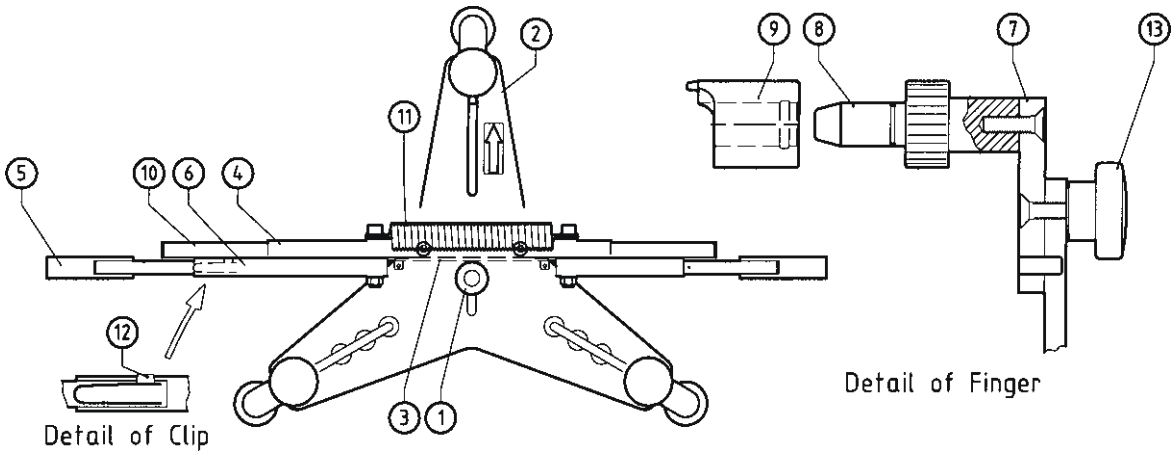
LASER HEAD RH
HA 0870



LASER HEAD LH
HA 0871

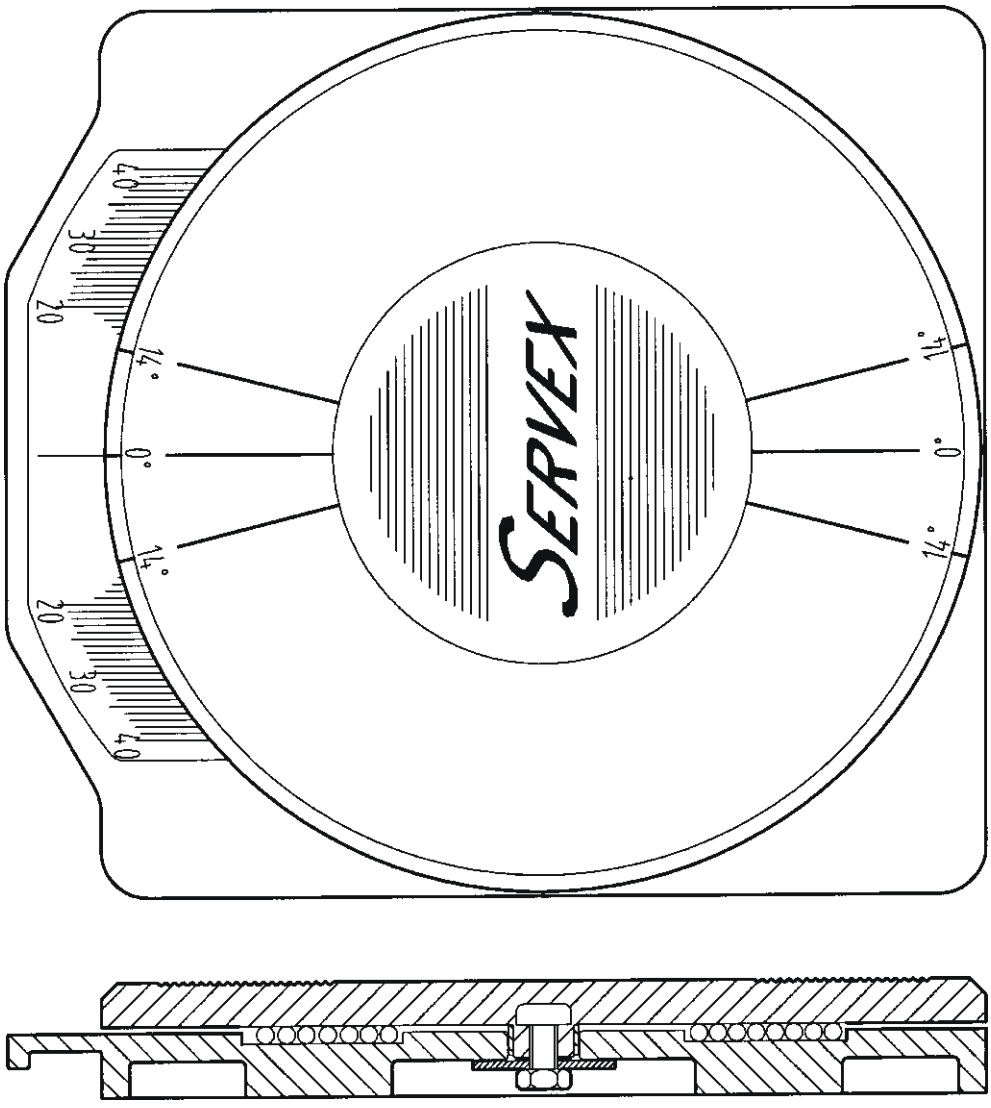
Item	PART No.	DESCRIPTION	QTY.	
			RH Head	LH Head
1	HA 1067 R	LASER MODULE RH - LINE TOE	1	
2	HA 1067 L	LASER MODULE LH - LINE TOE		1
3	HA 0855	DROP ARM	1	1
4	HA 0864	TUBE	1	1
5	HA 0863	COUNTERWEIGHT	1	1
6	HA 0872	THUMB SCREW M6x20 LG	1	1
7	HA 1036	LEVEL VIAL	1	1

Parts List
WHEEL CLAMP HA 0853

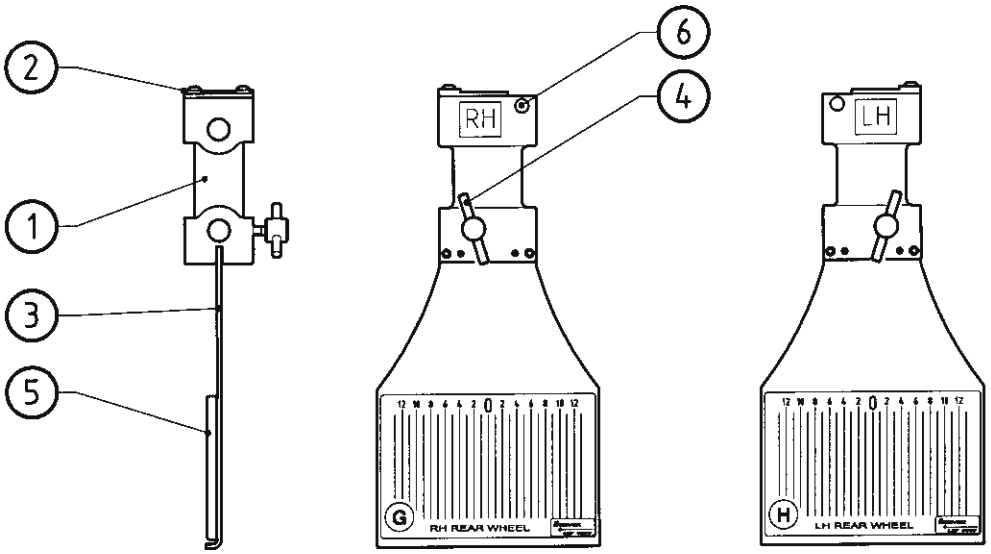


ITEM	PART No.	DESCRIPTION	QTY.
1	HA 0860	SPINDLE	1
2	HA 0856	PLATE	1
3	HA 0859	PIVOT BRACKET	1
4	HA 1010	LEVER WITH EXTENSION	2
5	HA 0795	TYRE GRIPPER	2
6	HA 0796	GRIPPER ARM	2
7	HA 0857A	OFFSET LUG	3
8	HA 0858	FINGER	3
9	HA 1186	MAG WHEEL ADAPTOR	3
10	HA 1012	LEVER EXTENSION	2
11	HA 0869	SPRING	1
12	HA 0800	SPRING CLIP	4
13	HA 0866	KNOB	3

Parts List
TURNTABLE HA 0373



Parts List
REAR MIRRORS



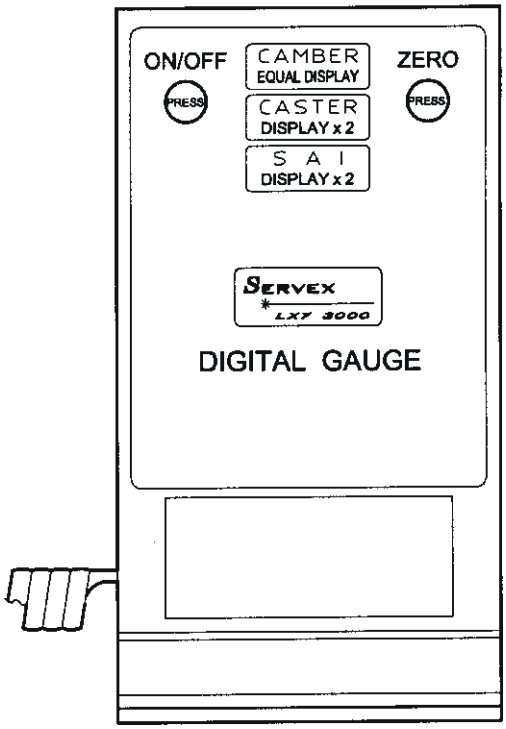
RH MIRROR
HA 1189-1

LH MIRROR
HA 1189-2

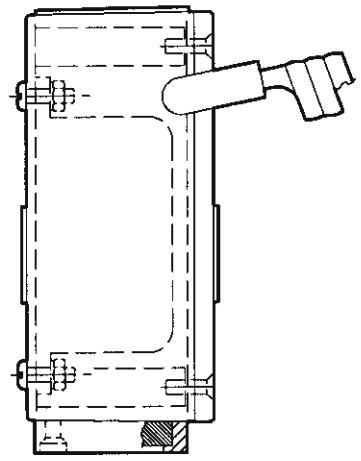
ITEM	PART No.	DESCRIPTION	QTY. RH Mirror	QTY. LH Mirror
1	HA 1187	DROP ARM	1	1
2	HA 0889	PAD - DIGITAL GAUGE	1	1
3	HA 1190	CARRIER PLATE	1	1
4	HA 0872	THUMB SCREW M6 x 20 LG	1	1
5	HA 0886	MIRROR 6mmTHICK x 150 x 100	1	1
6	1088-4N	SPIRIT LEVEL	1	1

Parts List
DIGITAL GAUGE HA 0907-2

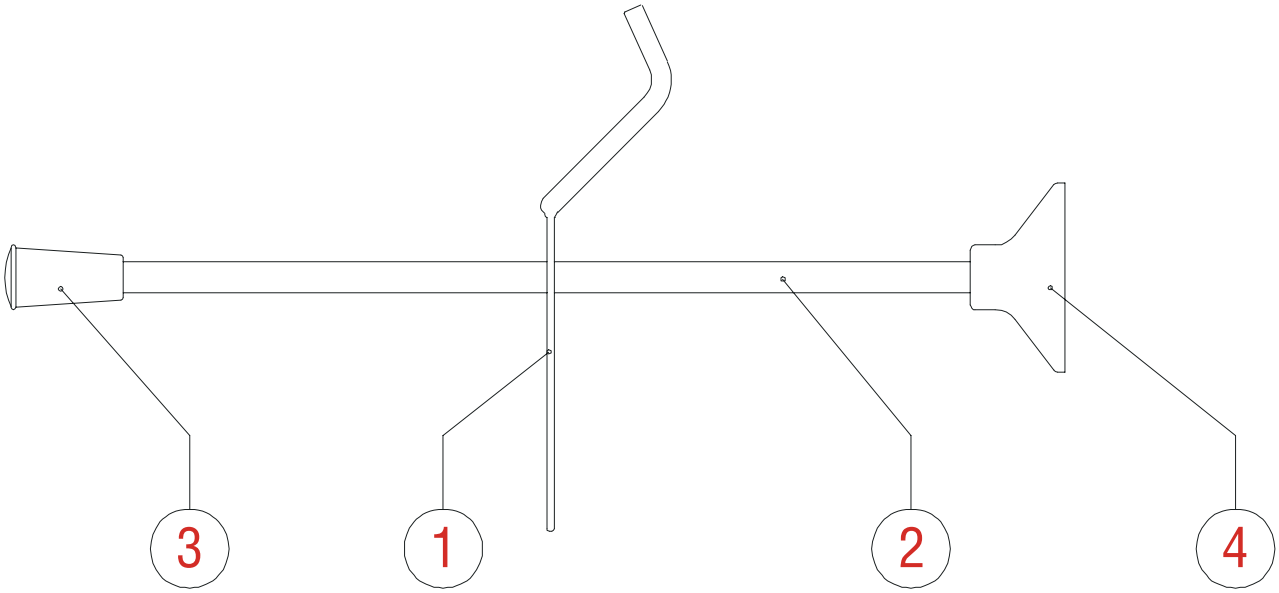
READ OUT ASS'Y



SENSOR ASS'Y

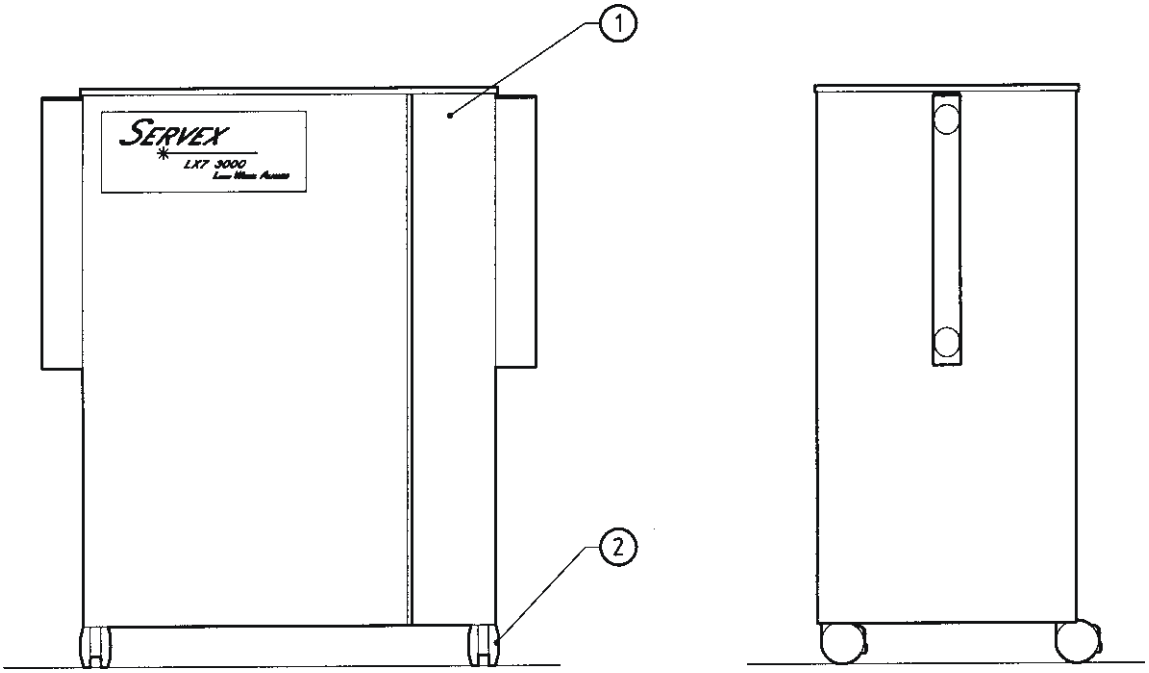


Parts List
STEERING CLAMP / BRAKE ACTUATOR HA 0205



ITEM	PART No.	DESCRIPTION	QTY.
1	HA 0206	FORK WELDMENT	1
2	HA 0093	ROD	1
3	HA 0298	RUBBER TIP to suit ø 1/2"ROD	1
4	HA 0212	SUCTION CUP	1

LX7-3000 MOBILE DISPLAY CABINET
HA 1070



ITEM	PART No.	DESCRIPTION	QTY.
1	HA 1027	MOBILE DISPLAY CABINET	1
2	HA 1019	CASTER WHEEL c/w NUT & WASHER	4

LX7-3000 TROUBLE SHOOTING CHECKLIST

Do not operate the equipment with damaged parts.
All bent or damaged parts must be replaced or where applicable, repaired *before* proceeding with further alignments.

Problem	Probable Causes	Possible Solutions
No Laser Beams	Flat Battery.	Charge The Laser Modules.
	Loose Plugs.	Slide Out Battery Pack And Check That The Plugs Are Secure.
	Switch Problem.	Contact Distributor.
	Beam Is Feint	Contact Distributor
	Battery Charger Connection Is Loose Inside The Laser Module When Charging.	Contact Distributor Loose Connections Can Cause 'Shorting Out' Of The Equipment.
One Beam Does Not Switch On	Loose Plug.	Slide Out Battery Holder and Check Plugs.
	Laser Module Faulty	Contact Distributor.
	Internal Damage Possibly Caused By Impact.	Contact Distributor.
Laser Module Not Charging	Batteries.	Correctly Conditioned Batteries Are Only Available From Servex Equipment.
	Battery Pack.	Slide Out Battery Pack And Check Batteries, Wiring And Plugs.

LX7-3000 TROUBLE SHOOTING CHECKLIST (Cont.)

Laser Module Is Loose On The Tube.	Adjustment Screws Loose.	Tighten Grub Screws As Per Instruction Manual. Page 12
Wheel Alignment Is Not Satisfactory	Incorrect Alignment Procedure.	Refer To Manual. Pages 25 & 26
	Laser Beam Is Out Of Alignment.	Calibrate Lasers. Refer To Manual. Page 12.
Unable To Get The Calibration To Specification	Check And Calibrate The Following Parts: Tubes Spindle Drop Arms Mirrors Wheel Clamps Thumb Screws.	Refer To Manual For Full Calibration Procedures. Pages 13 & 14.
Digital Gauge	Erratic Readings	Check Battery Output MUST Not Go Below 9V.
	Readings Slowly Go Up The Range.	Zero Button Must Be Pressed 2-3 Times To Settle The Inclinometer In The Sensor.
Battery Charger	Must Be Returned For Inspection.	Contact Distributor.
	Connection Plugs are loose or have broken wires.	Contact distributor.
CD	Message "Wrong Key Try Again"	Name, Phone No. Or Code Has Been Entered Incorrectly.
	Specific Vehicle Specifications Not Featured.	Contact 'Auto Tech'. PH: 1300300352
	Missing DLL Files	Contact Computer Technician
	CD Will Not Read	Test CD-ROM Drive With Another CD. Try CD In Another Computer. Contact Distributor.
Wheel Clamp	Will Not Fit Larger Rims	Adaptor Kit Is Available Through Distributors.