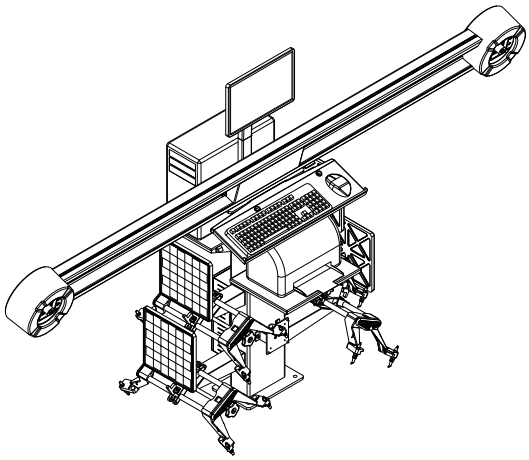
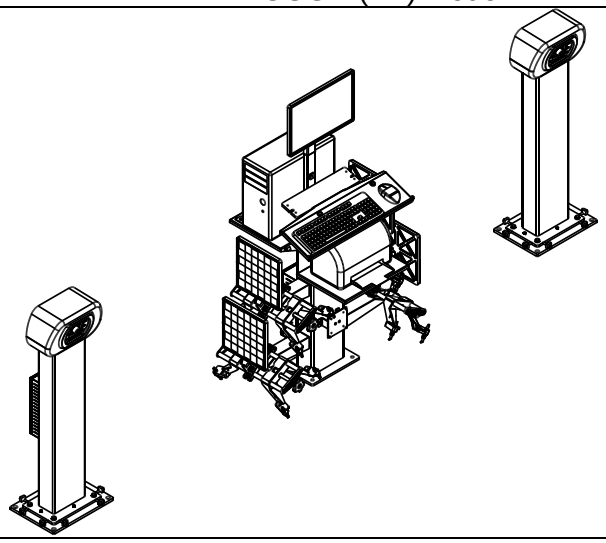
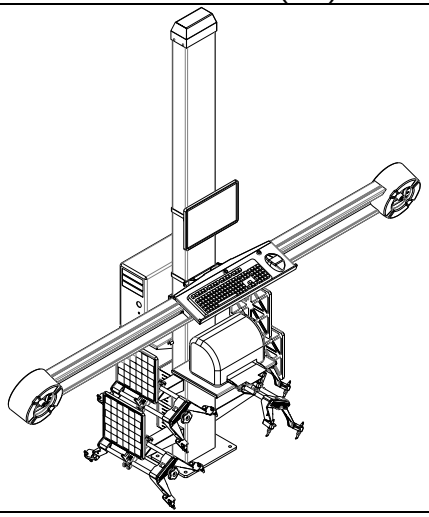
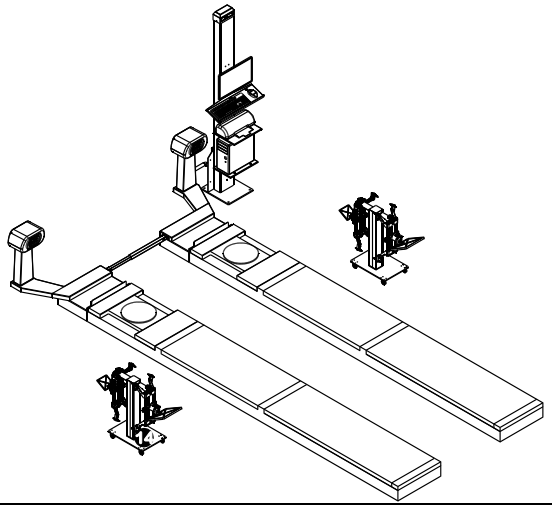
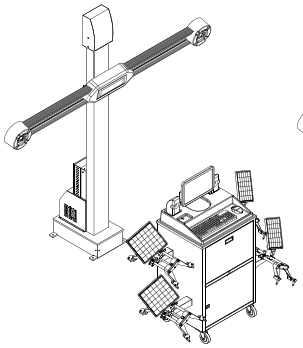
3D WHEEL ALIGNER

PIT (PT) model	**DRIVE THROUGH** (DT) model
	

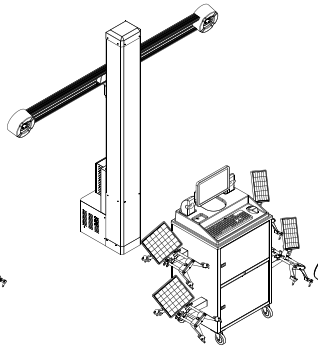
VARIABLE HEIGHT (VH) model	**IN-LIFT** model
	

AUTOMATIC VARIABLE HEIGHT (AutoBoom) model

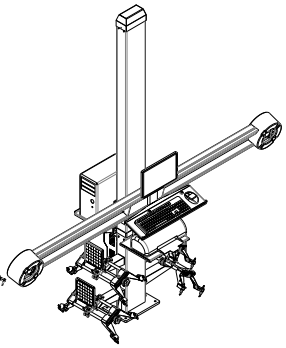
AutoBoom



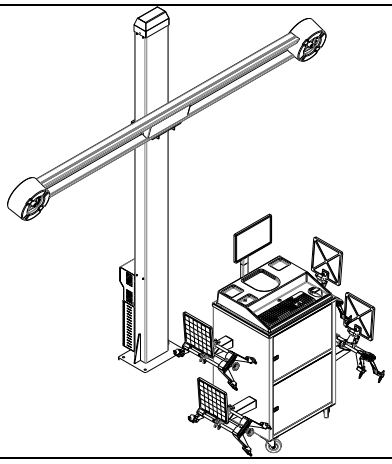
AutoBoom X



AutoBoom V4



With Cabinet



OPERATING MANUAL

(Ver.1.7)

Dear Customer,

Congratulations, for selecting **3D Wheel aligner** as your Wheel alignment computer. Our Wheel aligners are user friendly system which can be used effectively to correct all the alignment angles of four wheelers.

We take special care to ensure that every Wheel aligner leaving our Factory is in the best operating condition. This **OPERATING MANUAL** has been prepared to help you in getting the best performance out of the equipment. Still, if you have any doubt, please do not hesitate to contact us.

Read the Operating manual carefully before starting to use the equipment

Every attempt is made in this manual to guide the User on the effective use of the equipment. Any suggestion may please be sent to us for improvement.

INDEX

1. WARRANTY – STATUTORY CLAUSE

1. Ensure that proper power supply with protective Earthing is provided to equipment. Any high voltage may damage the components, leading to system failure or electrical hazards.
   Power supply:
   230V operation: Single Phase, 230V AC ± 10%, 50 Hz + N + PE (or)
   110V operation: Single Phase, 110V AC ± 10%, 60 Hz + N + PE
   (The Potential difference between N – Neutral & PE – Protective Earth should be below 3V)
   Laser printer should be connected in a separate power supply. Machine power socket should not be used for this purpose
   Warranty ceases if this condition is not satisfied
2. Power supply to the equipment should be connected only through a CVT of 1KVA capacity and then through an UPS of minimum 1KVA capacity with AVR (Automatic Voltage Regulator) circuit. The system must be shut down before the UPS power trip OFF. Failing to comply may lead to software corruption.
   Warranty ceases if this condition is not satisfied
3. Do not attempt to open or service the equipment under any circumstances. Risk of electric shock may happen. Only authorized / qualified service personnel should trouble shoot the equipment.

   Warranty ceases if the equipment is opened/tampered or serviced by un-authorised personnel
4. ***Warranty ceases if this equipment is used for any purpose other than intended use.***
5. The equipment must be installed Indoor away from Sunlight, rain / moist areas

   Warranty ceases if the equipment is exposed to Sunlight, Rain / Water
6. Do not attempt to load any other Application software (Audio, Video etc.) under any circumstances, other than the alignment program loaded in the Factory.

   Warranty ceases if the system is loaded with any other Application software
7. If transportation, lifting, unpacking, installation, assembly, start up, testing, repair and maintenance have been performed by un-authorised personnel, the manufacturer shall not be responsible for injury to personnel or damage to objects.
8. DO NOT remove or modify any parts of the equipment as this could compromise the equipment's intended use. For any modifications / repairs consult the Manufacturer.
9. The Vehicle specification data must be entered by End user only. **MANUFACTURER IS NOT RESPONSIBLE FOR ANY INCORRECT OR INCOMPLETE VEHICLE SPECIFICATIONS ENTERED INTO THE SYSTEM**. No claim is entertained for any damage or loss.
10. Follow the Alignment lift manufacturer's safety recommendations when lifting a vehicle.

    MANUFACTURER IS NOT LIABLE FOR ANY DAMAGES CAUSED due to non-compliance
11. Make the warranty registration by duly signing the counterfoil of the Warranty card sent along with the equipment.

Manufacturer does not warrant third party products / software added to our Wheel aligner through our Factory integration system. The below listed Third party products / peripherals / software are covered under the warranties provided by the respective OEM. Third party manufacturer's warranty may vary from product to product. Consult the respective product documentation for warranty information:

1. Desktop computer with Monitor
2. Printer
3. Keyboard
4. Mouse
5. Multimedia speakers
6. Operating system software

2. SAFETY

Thoroughly read all Safety labels and Manual instructions before installing, operating and maintaining the Wheel aligner. They are provided to remind the operator to exercise extreme care while performing wheel alignment with this product to prevent personal injury and property damage. Replace any label unreadable or missing on the Wheel aligner. Refer Part No. given for each Labels for ordering.

It is the Operator's responsibility to have sufficient knowledge on the vehicle to be aligned and to use proper service methods and perform wheel alignment in an appropriate and acceptable manner that does not endanger safety of the Operator / others in the work area or the equipment or vehicle being serviced.

Always keep the Manual in a prominent place for quick reference.

Injury to personnel and damage to property incurred due to non-compliance with these safety instructions are not covered by the product liability regulations.

SYMBOLS

	**Failure to comply with instructions could result in personal injury**
	**Failure to comply with instructions could result in property damage**
	**Important information**

2.1. INTENDED USE

- Use the Aligner as described in this Operating manual only.
- Use only the Accessories recommended by the manufacturer.
- Carryout alignment by positioning the vehicle to be aligned on the Alignment pit / Alignment lift only.

	**In-Lift model is meant for alignment using LIFT only**

2.2. SAFETY INSTRUCTIONS FOR COMMISSIONING

	**The Camera mounted Column/Beam is pre-assembled & factory calibrated which can be placed into service shortly after installation and setup**

1. Only Authorised service personnel are allowed to install and commission the Wheel aligner.
2. Aligner should not be installed outdoors or in moist rooms (near car washing).
3. To reduce the risk of fire, the equipment should not be installed at hazardous locations or in the vicinity of explosives or flammable liquids.
4. The Aligner should be installed with adequate ventilation in case of working on vehicles with internal combustion engines.
5. Keep the System away from high capacity Transformers, Electric motors and other strong magnetic fields.
6. Use proper handling tools while installation of Aligner for safety of equipment.
7. The electrical main supply to the Aligner must be connected through a CE certified Two pole, Type C, 6A MCB (Miniature Circuit Breaker). Proper Earthing must be provided.
8. If an Extension power cord is required, a cord with correct rating equal to or more than that of the equipment should be used.
9. Care should be taken to route the Power mains cord properly so that it is not tipped over or pulled.
10. In case of DT model, the Camera USB cable, FRC cable & IR LED board power cable from right side Vertical column should be routed through the concealed pipe (Ø1.5") for connecting with LED Driver & Hub board in the Hub board box fixed in left side Vertical column. Then the Camera USB cable & IR LED power cable from Hub board box in left side Vertical column should be routed through the concealed pipe (Ø1.5") that leads to Accessories mounting column for connecting with PC & Interface box. The floor surface at both the columns should be leveled & even.

11. In case of In-Lift model, ensure the PC accessories column is located at the vehicle steering side ie., for Right hand drive vehicles, the column should be fixed near right side Camera column and vice versa for Left hand drive vehicles. Also the Wire routing tube for routing Camera cable from Camera column to PC in Accessories column should be fixed to the respective Camera column accordingly.
12. During installation of Third party products (like Desktop computer, Monitor, Printer, Keyboard, Mouse, Speakers, Operating system software etc.) follow the safety instructions provided in the respective OEM's Installation document.
13. Ensure the disposal of ecologically harmful substances in accordance with the appropriate regulations.

2.3. SAFETY INSTRUCTIONS FOR OPERATION

1. Read the Operating manual thoroughly.
2. Only permit qualified personnel to operate, maintain or service the Aligner.
3. The operator should have thorough understanding of the vehicle systems being serviced & sufficient knowledge on the operation & safety features of alignment.
4. Always keep the Aligner and the surrounding work area clean and free of Tools, Parts, Debris, Grease etc.
5. Radiators / heat sources should not be kept near the Camera.
6. Do not operate, if the equipment has been dropped or damaged until it has been examined by qualified service personnel.
7. Do not operate the equipment with damaged / twisted power cord.
8. Do not operate the equipment under <u>direct sunlight</u>. Even reflected sunlight from Target plate reaching the camera will result in erratic readings and the system will display *Target error* indication.

9. Air blowing equipments like Pedestal Fan should not be in the close proximity of Camera assembly as it will disturb the settings & affect the reading stability.
10. Always unplug the equipment from electrical outlet when not is use. Do not pull on the cable, always pull the plug directly out of socket.
11. Handle the Target plates carefully. Rough handling / shocks may cause damage. Ensure the patterned surface of Target plates is always clean from dust & scratches. Use soft & dry cloth to clean the surface. Prevent deep scratches on the reflecting surface of the target plate.
12. Do not move or turn the equipment while the System is in power up condition.
13. Ensure the Rotary plates are locked with locking pins before parking the vehicle.
14. In case of PPR Rotary plate, ensure the Rubber pads are located on it before parking the vehicle.
15. Do not keep heavy objects over the equipment.
16. Do not hammer or hit any part of the equipment with Tools when the equipment is in ON condition.
17. Ensure that the Caster wheel of Main cabinet is locked while it is stationary. While moving the Cabinet, release the lock & then proceed. Do not lean over the Cabinet as it may disturb the assembly & cause damage to personnel / product.
18. Keep hair, loose clothing, fingers & all parts of body away from rotating / moving parts.
19. Always wear Eye Safety glasses while doing under chassis adjustments / corrections from the Alignment pit or Alignment lift to avoid oil drops / dust particles falling on to Eye. Use hand Gloves to avoid fire hazards from the hot surfaces of vehicle.
20. Always comply with the applicable accident prevention regulations.

2.4. SAFETY INSTRUCTIONS FOR SERVICING

1. Inspect the Wheel aligner on daily basis.
2. Only authorized personnel are allowed to service the Aligner.
3. Turn OFF MCB & unplug the Aligner before doing any maintenance or repair.
4. Only certified engineers are allowed to service the parts of the equipment.
5. Do not remove / disable / override any safety device / assemblies.
6. Third party products should be serviced only by the OEM's authorized service personnel. Refer the respective service policies provided.
7. The use of cleaning agents which attack coating or sealing materials could result in equipment damage.
8. Use Manufacturer spare parts only to guarantee the reliable function and to ensure safety of the equipment.

2.5. SAFETY FEATURES

2.5.1. POWER FAILURE DATA RECOVERY

During alignment, if the power goes off, the system has the facility to resume the previous job without redoing the entire alignment again.

When the power resumes after Power failure, the system will prompt the following message "*Resume previous Job ?*". If the previous job need to be continued, press **YES** button to continue with the old job or else, press **NO** to start a new job.

2.5.2. CONTROL FUSES

Control fuses are incorporated to protect the electronic components against high current. The Fuse holders are mounted on the Interface box (F1 & F2) & Distribution panel (F3) (applicable for AutoBoom with cabinet model) which can be easily accessed from outside for replacing the blown fuse. Always replace the Control fuse with same type and rating of CE marked Fuse.

2.5.3. HIGH VOLTAGE PROTECTION

High voltage cutoff MCB is provided to avoid Electronic boards & components against failure due to high Voltage & excess current.

2.5.4. MANUAL STOPPER / LOWERING (Applicable for AutoBoom model)

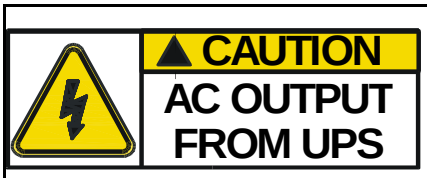
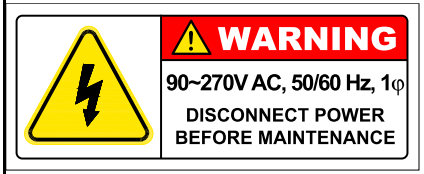
A mechanical stopper is also provided in the Vertical column for manual intervention to stop the movement of Camera beam in case of any Motor or Power or mechanism malfunction or losing control from software command

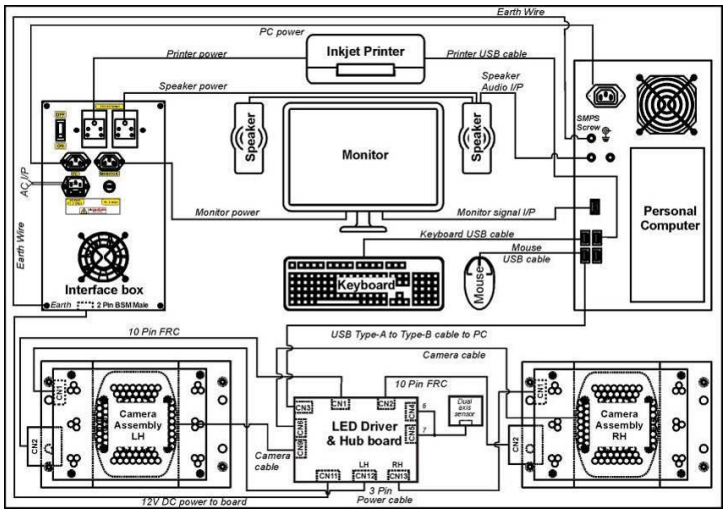
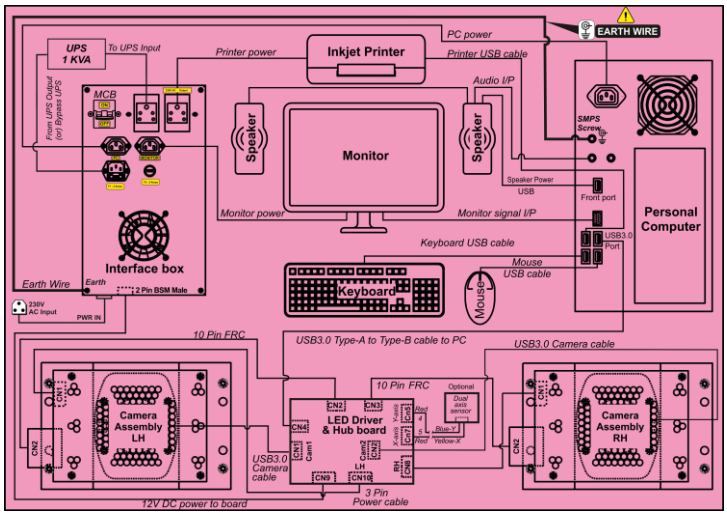
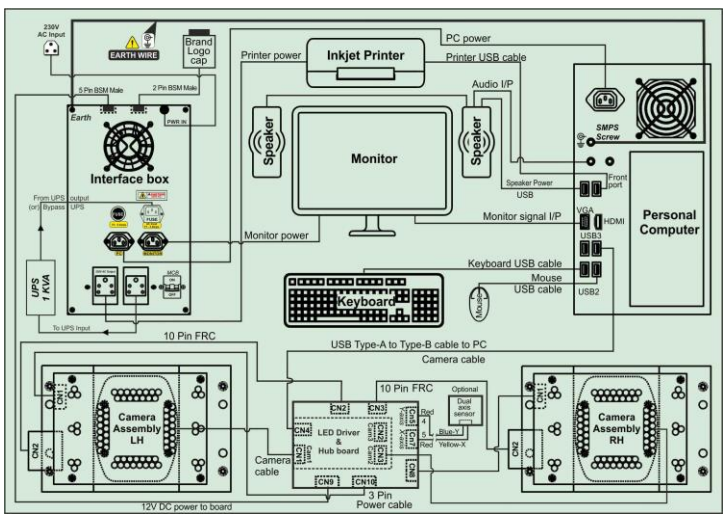
2.5.5. GUARD FOR MOVING PARTS (Applicable for AutoBoom model)

Protection covers are provided in the Vertical column for protection from rotating/moving parts.

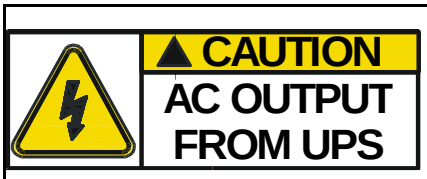
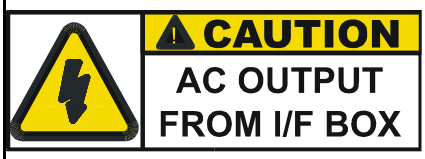
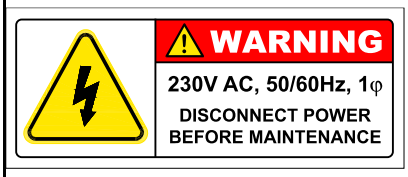
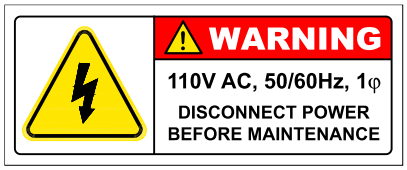
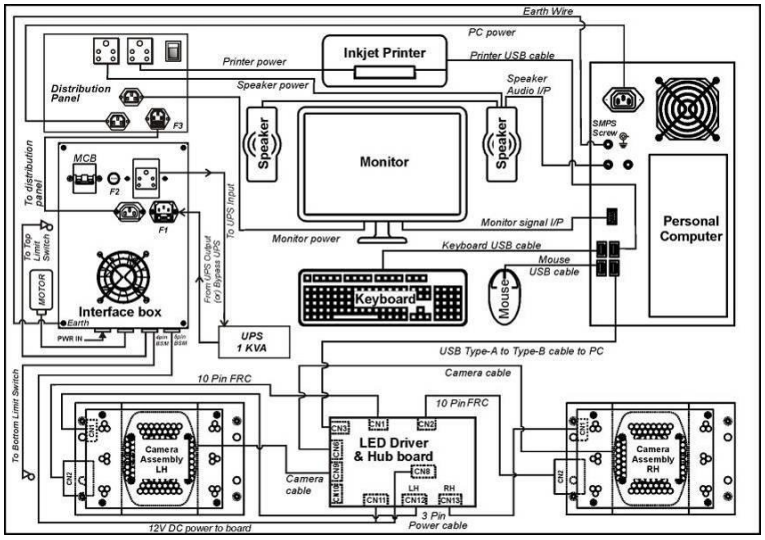
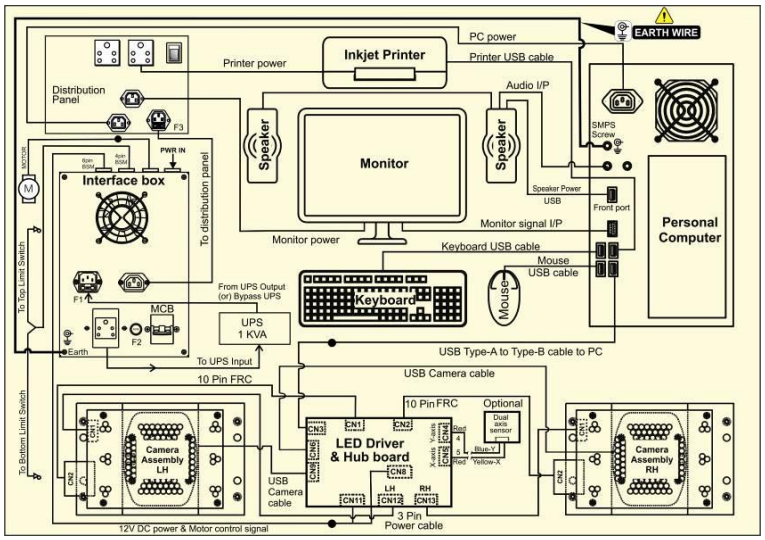
2.6. SAFETY LABEL INFORMATION

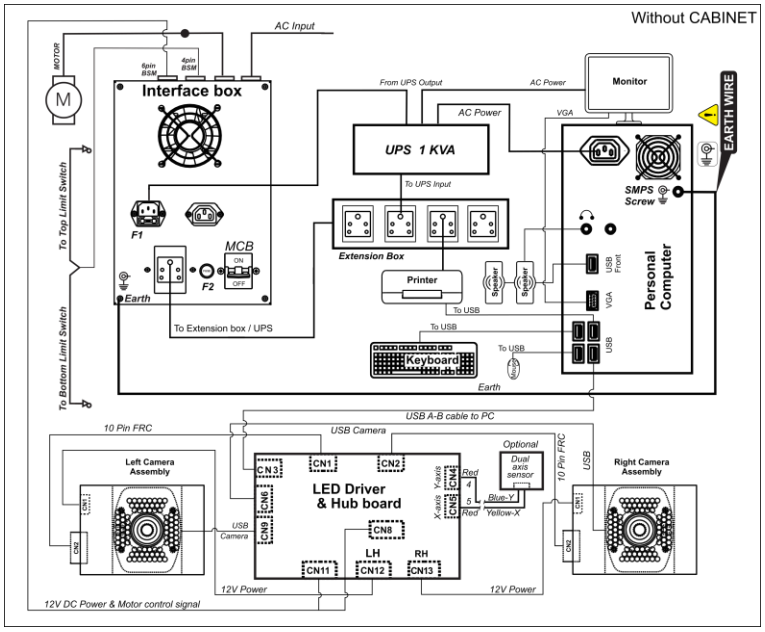
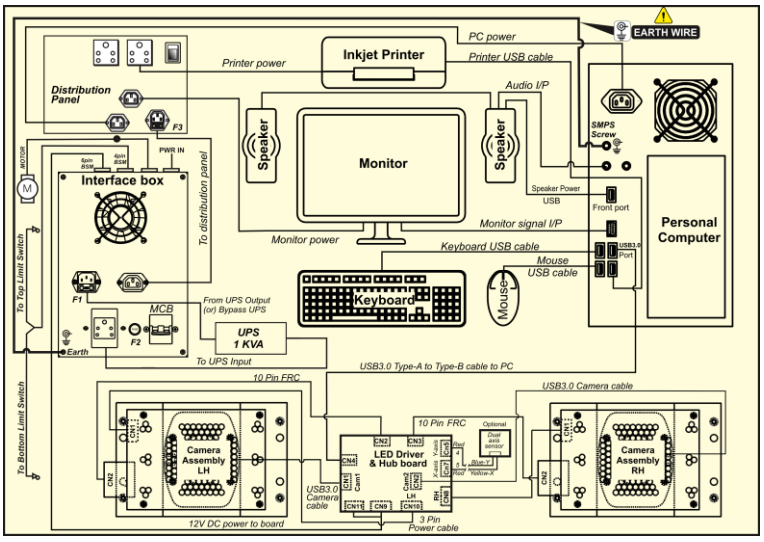
For PT / DT / VH / In-Lift models

	←	Sticker, "Caution-AC O/P From UPS" (Part No. H3594)
	←	Sticker, Sticker, Electrical safety, 90-270V (Part No.B8473)
	←	Sticker, "Power Output" (Part No. H3610)

	←	Sticker, Do not step, In-Lift model (Part No. B8453)
	←	Sticker, Do not disturb (for Mobile based plate) (Part No. B8454)
	←	Sticker, Connection details (USB2.0) (Part No. H3470)
	←	Sticker, Connection details (USB3.0) (Part No. H3824)
	←	Sticker, Connection details, In-Lift model (USB3.0) (Part No. B8433)

For AutoBoom model

	←	Sticker, “Caution- AC O/P From UPS” (Part No. H3594)
	←	Sticker, “Caution- AC O/P From I/F box” (Part No. H3613)
 	←	Sticker, Sticker, Electrical safety, 90-270V (Part No. B2945 / B2946)
	←	Sticker, Connection details (USB2.0) (Part No. H3489)
	←	Sticker, Connection details (V4 USB2.0) (Part No. H3744)

		←	Sticker, Connection details (V4 USB2.0 W/O Distribution panel) (Part No. H3864)
		←	Sticker, Connection details (USB3.0) (Part No. H3825)
		←	Sticker, Do not disturb (for Mobile based plate) (Part No. B8454)

3. FEATURES & SPECIFICATIONS

Sl. No.	Description	Pit (PT/ DT)	Variable Height (VH)	Automatic Variable Height (AutoBoom)	In-Lift
I	**Features**				
1	Compatible with Alignment Pits	✓	✓	✓	NA
2	Compatible with Alignment Pits / Lifts	NA	✓	✓	NA
3	Compatible with Alignment Lifts	NA	NA	NA	✓
4	Auto-adjustable Camera beam to suit various Wheel base vehicle resting platforms	NA	NA	✓	NA
5	Unique software to track the position of Vehicle & automatically adjust to respective height	NA	NA	✓	NA
6	TFT / LCD / LED Display	✓	✓	✓	✓
7	On-line correction facility for Camber, Caster, Toe & Thrust angle	✓	✓	✓	✓
8	Automatic tracking of Left & Right Turns for Caster / Kingpin measurement	✓	✓	✓	✓
9	Push-Pull Runout compensation (without jacking up vehicle)	✓	✓	✓	✓
10	Redo Runout option at the final stage of alignment	✓	✓	✓	✓
11	Display of Live Setback and Thrust angle reading	✓	✓	✓	✓
12	Measurement of Wheel Setback (Front & Rear)	✓	✓	✓	✓
13	Measurement of Toe Out on Turns	✓	✓	✓	✓
14	Measurement of Lock Angle	✓	✓	✓	NA
15	Thrust angle compensation	✓	✓	✓	✓
16	Excess Toe indication	✓	✓	✓	✓
17	Measurement of difference in Track width	✓	✓	✓	✓
18	Wheel base	✓	✓	✓	✓
19	Included angle in printout	✓	✓	✓	✓
20	Single Tie rod adjustments	✓	✓	✓	✓
21	Effortless Toe (Easy Toe) adjustment program	✓	✓	✓	✓
22	Camber measurement at zero Toe	✓	✓	✓	✓
23	Drag link adjustment	✓	✓	✓	✓
24	Vehicle geometry measurement	✓	✓	✓	✓
25	Display of all primary angle readings in a single screen	✓	✓	✓	✓
26	Manual input provision for Ride height measurement	✓	✓	✓	✓
27	Toggle option for Front & Rear alignment	✓	✓	✓	✓
28	Customer address in printout	✓	✓	✓	✓
29	Customer data edit option before taking printout	✓	✓	✓	✓
30	Provision for Backup / Restoration of factory calibration data	✓	✓	✓	✓
31	Calibration History & Certificate	✓	✓	✓	✓
32	Export option for Reports (PDF format)	✓	✓	✓	✓
33	Pre-inspection Checklist & Reports	✓	✓	✓	✓
34	Advanced alignment measurements with Readings/Specification and Cross value	✓	✓	✓	✓
35	Option for selection of Vehicle spec. during alignment	✓	✓	✓	✓
36	Multiple user Log-in	✓	✓	✓	✓
37	Power failure data protection	✓	✓	✓	✓
38	Save & proceed option(CTRL+S) during UPS power condition	✓	✓	✓	✓
39	Software upgradation through CD drive	✓	✓	✓	✓

Sl. No.	Description			Pit (PT/ DT)	Variable Height (VH)	Automatic Variable Ht. (AutoBoom)	In-Lift
II	**Special features**						
1	Camera beam level compensation program to avoid field calibration			NA	**	**	NA
2	Facility for enabling the vehicle data in the field itself			✓	✓	✓	✓
3	Data Manager software for storing alignment results			✓	✓	✓	✓
4	Two color bar display for adjustment of all angles (Red / Green)*			✓	✓	✓	✓
5	Two color printout for indicating alignment condition (Red/Green)*			✓	✓	✓	✓
6	Multiple print formats (Initial / Final)			✓	✓	✓	✓
7	Unlimited databank of Indian / International vehicle spec.			✓	✓	✓	✓
8	Custom (User defined) vehicle specifications			✓	✓	✓	✓
9	Voice align program (Voice prompts for Operator guidance)			✓	✓	✓	✓
10	User oriented 3D graphical representation of vehicle-specific adjustment information			✓	✓	✓	✓
11	Self diagnostic program for alignment system			✓	✓	✓	✓
12	Zoom-in option for Live parameters			✓	✓	✓	✓
13	**Selectable functions**						
	Two wheel alignment program with Two Target plates			✓	✓	✓	✓
	Quick wheel alignment program			✓	✓	✓	✓
	Customizable Quick wheel alignment settings			✓	✓	✓	✓
	Adjustment of Camber in Wheel raised position			✓	✓	✓	✓
	Alignment pit / Lift platform Level compensation program			✓	✓	✓	✓
	Display of Toe in “degree min" / “degree” / “mm" / “inch” and other angles in “degree” / “degree min”			✓	✓	✓	✓
	Measurement of Toe curve			✓	✓	✓	✓
	3D Pictorial printout of alignment angles			✓	✓	✓	✓
	Multi-lingual program			✓	✓	✓	✓
III	**Optional features (Standard for Exports)**						
1	International Vehicle data update			✓	✓	✓	✓
2	Remote operation (Tab / Air mouse)			✓	✓	✓	✓
IV	**Technical specification**						
1	Wheel rim size		305-610mm (12-24”)	✓	✓	✓	✓
2	Wheel Diameter		505-1015mm (20-40”)	✓	✓	✓	✓
3	Track width		1220-2435mm (48-96”)	✓	✓	✓	✓
4	Wheel base		1830-4000mm (72-158”) 1830-4600mm (72-181”)	✓ -	✓ -	✓ -	- ✓
5	Distance between Camera Tower and Rotary plate		2000mm (78.7”)	✓	✓	✓	✓
6	Push-Pull Runout movement		32°	✓	✓	✓	✓
7	Camera beam travel time (from Bottom to Top position)		60 sec. ±5 sec	NA	NA	✓	✓
	Measurement parameters	**Range**	**Accuracy**				
1	Camber (Front & Rear)	±15° 00'	± 00° 02'	✓	✓	✓	✓
2	Caster (Front)	±28° 00'	± 00° 05'	✓	✓	✓	✓
3	Kingpin	±25° 00'	± 00° 05'	✓	✓	✓	✓
4	Toe (Front / Rear)	±20° 00'	± 00° 02'	✓	✓	✓	✓
5	Total Toe	±40° 00'	± 00° 04'	✓	✓	✓	✓
6	Setback (Front / Rear)	±25mm	± 2mm	✓	✓	✓	✓
7	Thrust angle	±05° 00'	± 00° 02'	✓	✓	✓	✓
8	Included angle	±40° 00'	± 00° 05'	✓	✓	✓	✓
9	Track width difference	±300mm	± 5mm	✓	✓	✓	✓
10	Toe Out on Turns	±20° 00'	± 00° 02'	✓	✓	✓	✓
11	Lock Angle	±60° 00'	± 00° 05'	✓	✓	✓	NA

Sl. No.	Description	Pit (PT/DT)	Variable Height (VH)	Automatic Variable Height (AutoBoom)	In-Lift
V	**Electrical specification**				
1	Power supply : Stabilised CVT & UPS (AVR Built-in)(1kva) 230V AC ±10%, Single phase, 50Hz, + N + PE (or) 110V AC ±10%, Single Phase, 50/60Hz, + N + PE	✓	✓	✓	✓
2	Power consumption	200W	200W	400W	200W
3	Rated current	1A	1A	1A	1A
4	Motor speed For 230V operation For 110V operation	NA	NA	1440rpm 1728rpm	NA
VI	**General specification**				
1	Machine dimension (With Monitor) – Unpacked (WxDxH)				
	Vertical column (refer scope of supply) – NA for DT model	2670x380x 1490mm	2670x380x 2555mm	2670x404 x2588mm	NA
	Vertical column with Camera -2 Nos. (refer scope of supply) ***	375x275x 1098mm	NA	NA	920x946x 855mm
	Accessories mounting column (refer scope of supply) ***	960x760x 1500mm	NA	NA	650x505x 2240mm
	Main cabinet (refer scope of supply)	NA	780x695 x1170mm	780x695 x1170mm	NA
	Wall mount bracket (refer scope of supply) – NA for DT model	2670x205x 350mm	NA	NA	NA
2	Machine dimension (without Peripherals & Accessories) – Packed (WxDxH)				
	Camera beam – NA for DT model	2850x400 x450mm	2850x400 x450mm	2850x400 x450mm	NA
	Vertical column (refer scope of supply)	1350x430x 590mm	2700x450 x560mm	2680x380 x560mm	NA
	Vertical column with Camera – 2 Nos. (refer scope of supply) ***	1300x390x 545mm	NA	NA	1330x820x 850mm
	Main cabinet (refer scope of supply)	NA	780x695 x1170mm	780x695 x1170mm	NA
	Wall mount bracket (refer scope of supply)				NA
	Accessories (refer scope of supply)	NA	NA	1450x610 x805mm	2264x380x 450mm
3	Machine weight – Unpacked	PT: 125kg	141kg		
4	Machine weight – Packed	PT: 163kg	183kg		
5	Desktop computer console dimension max. (WxDxH)	200x500 x450 mm	200 500 x450 mm	200x500 x450 mm	200x500 x450 mm
6	Operating temperature : 0° to 50°C	✓	✓	✓	✓
7	IP rating	IP20	IP20	IP20	IP20
8	Storage temperature	-20 - 70°C	-20 - 70°C	-20 - 70°C	-20 - 70°C
9	Humidity : RH upto 90% Non condensing	✓	✓	✓	✓

NOTE :

* - Red - Out of specification range
Green - Within specification range

** - Applicable for Smart models

*** - Applicable for DT & In-Lift models only

4. INSTALLATION

4.1. INSTALLATION REQUIREMENTS

Wheel aligner installation should be done only by qualified Service personnel.

☞	**Provision of handling means such as Forklifts etc. is the owner's responsibility**

4.2. LOCATION

The Wheel aligner should not be installed outdoors, in moist rooms, at hazardous locations, or in the vicinity of explosives or flammable liquids.

The location should have adequate ventilation in case of working on vehicles with internal combustion engines.

☞	**Choice of a suitable location is the owner's responsibility**

4.3. SPACE REQUIREMENTS

- Installation area should have roof.
- Floor should be of good concrete flooring and should be leveled surface.

☞	**Proof of safe floor load capacity is the owner's responsibility**

☞	**For VH/Wall mount/Auto Boom/In-Lift models, ensure the Lift platform level & Vertical column base level are same while the lift is in closed condition**

- The clearances from side walls and roof should be adequate for the operator to move around and perform wheel alignment / maintenance.
- Alignment can be carried out either on Alignment pit or using Alignment lift.

☞	**Choice of suitable alignment platform is the owner's responsibility**

4.3.1. ALIGNMENT PIT DIMENSIONS (Applicable only for PT/DT/VH/Wall mount)

Pit for Rotary plates and Rear wheel sliders are necessary to carry out alignment. Both the pits should be in the same plane. However the main pit is intended only for the operator to go underneath the vehicle easily and carryout the required corrections. The length of the main pit can be made depending upon the availability of space. The Rotary plate / Slider plate locating pit can be finished with Granite or Marble purely by owner's choice.

☞	**Slider & its pit are not necessary for Heavy Commercial Vehicles (HCV). However alignment pit with provision for Slider placement can be used for alignment of Light Commercial Vehicle (LCV) using the same pit**

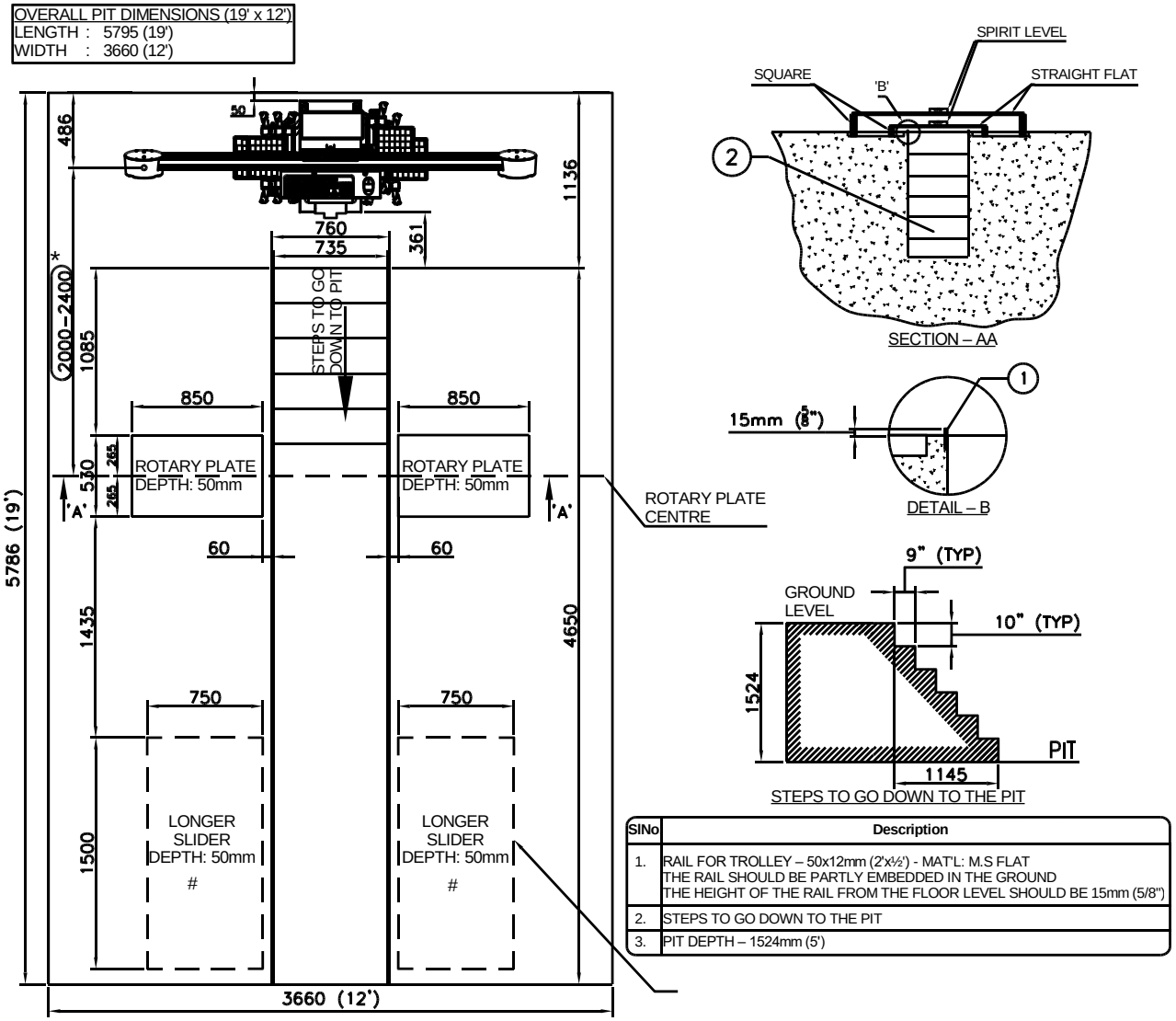
☞	**Choice of finish of pit is the owner's responsibility**

A Rail using MS flat (50 mm x12 mm) for Trolley should be partly embedded on the edge of main pit with 15mm height from floor level. This is required for placing the Jack over the moving trolley platform to lift the vehicle while carrying out Runout. A centralised single Hydraulic jack or Dual pneumatic jack is recommended**.**

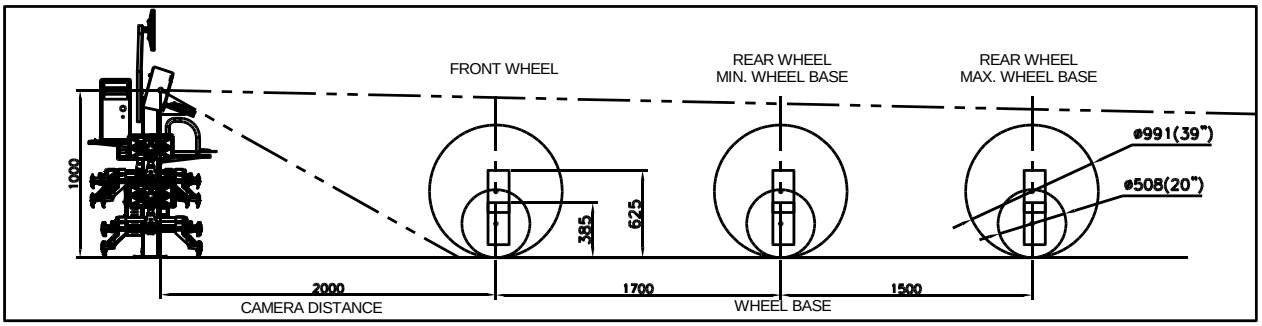
The floor level between the Left and Right rotary plate pits should be same. The area adjoining the Main pit (except Rotary plate & Slider pits) should be maintained at even level.

The surface over which Rotary plates are kept must be perfectly leveled using Spirit level. Also, perfect leveling must be ensured on both the sides of pit. Otherwise it will affect the alignment results.

PIT DIMENSIONS – Max. Wheel base – 3.2 & 4metre (For PT model)

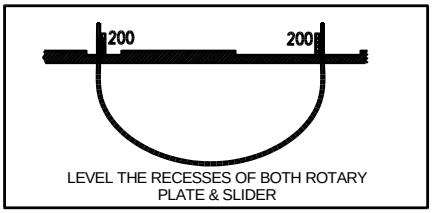


SINo	Description
1.	RAIL FOR TROLLEY – 50x12mm (2'x½') - MAT'L: M.S FLAT THE RAIL SHOULD BE PARTLY EMBEDDED IN THE GROUND THE HEIGHT OF THE RAIL FROM THE FLOOR LEVEL SHOULD BE 15mm (5/8")
2.	STEPS TO GO DOWN TO THE PIT
3.	PIT DEPTH – 1524mm (5')

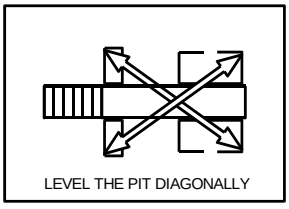


WHEEL BASE TABLE:

MAX. WHEEL BASE	SLIDER SIZE	OVERALL PIT DIMN. LENGTH	OVERALL PIT DIMN WIDTH
3200	1500x750	5795 (19')	3360 (12')
4000	2400x750	6710 (22')	3360 (12')



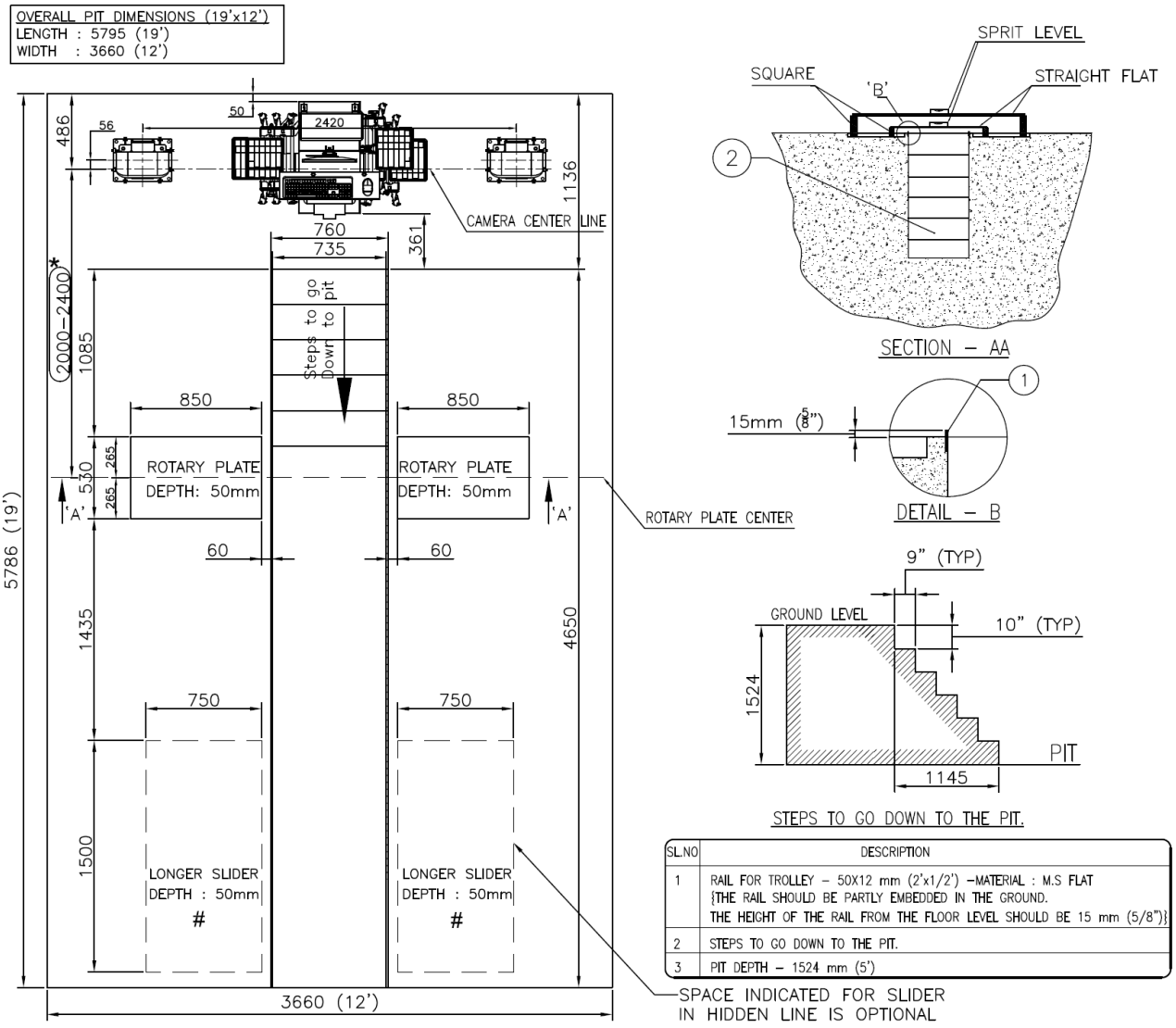
LEVEL THE RECESSES OF BOTH ROTARY PLATE & SLIDER


LEVEL THE PIT DIAGONALLY

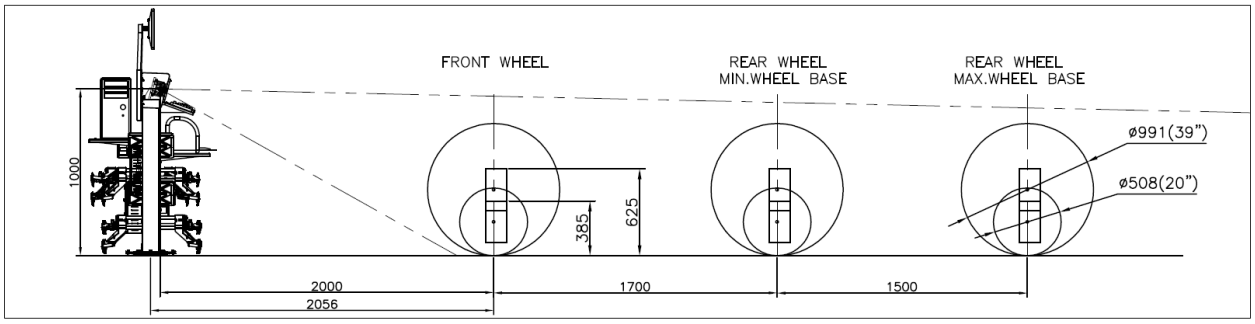
NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. 4m WHEEL BASE PIT DIMN REF. WHEEL BASE TABLE
4. AFTER PLACING THE LONGER SLIDER (1500mm LENGTH) IN THE # INDICATED 2400mm LENGTH RECESS, REMAINING 900mm LENGTH HAS TO BE FILLED BY METAL SPACER (875x600x50)
5. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE

Fig. 1

PIT DIMENSIONS – Max. Wheel base – 3.2 & 4metre (For DT model)

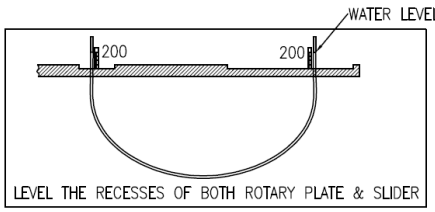


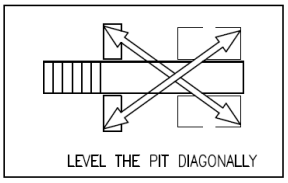
SL.NO	DESCRIPTION
1	RAIL FOR TROLLEY – 50X12 mm (2'x1/2') –MATERIAL : M.S FLAT {THE RAIL SHOULD BE PARTLY EMBEDDED IN THE GROUND. THE HEIGHT OF THE RAIL FROM THE FLOOR LEVEL SHOULD BE 15 mm (5/8")}
2	STEPS TO GO DOWN TO THE PIT.
3	PIT DEPTH – 1524 mm (5')



WHEEL BASE TABLE:

MAX. WHEEL BASE	SLIDER SIZE	OVERALL PIT DIM. LENGTH	OVERALL PIT DIM. WIDTH
3200	1500x750	5795 (19')	3360 (12')
4000	2400x750	6710 (22')	3360 (12')



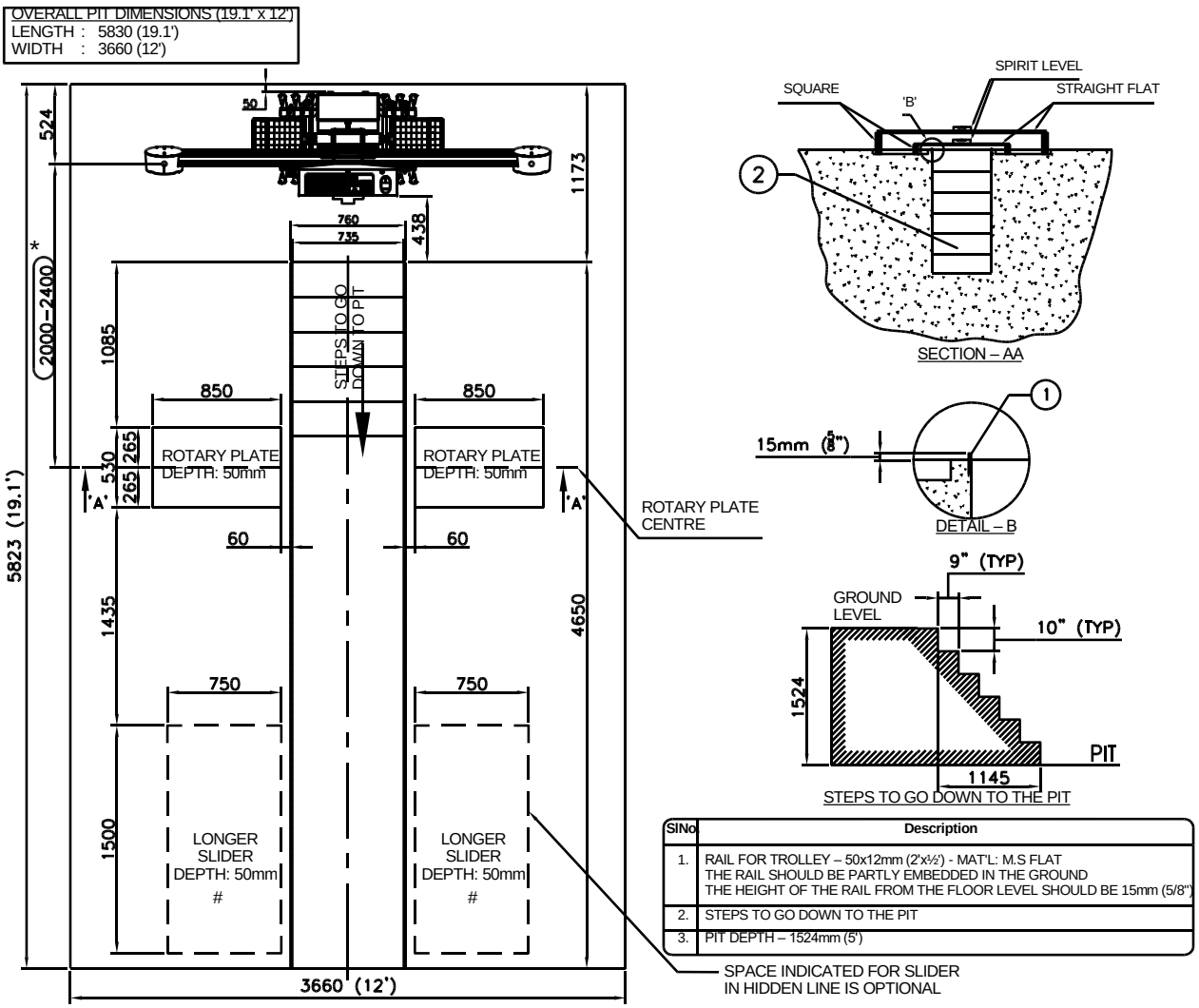


NOTE:
1. U.O.S. ALL DIMENSIONS ARE IN mm.
2. LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm.
3. 4METER WHEEL BASE PIT DIM REF. WHEEL BASE TABLE.
4. AFTER PLACING THE LONGER SLIDER (1500mm LENGTH) IN THE # INDICATED 2400mm LENGTH RECESS, THE REMAINING 900mm LENGTH HAS TO BE FILLED BY METAL SPACER (875x600x50).
5. * DISTANCE BETWEEN THE CAMERA AND TURN TABLE CAN BE ALTERED FROM 2000mm TO 2400mm BASED ON THE AVAILABILITY OF SPACE.

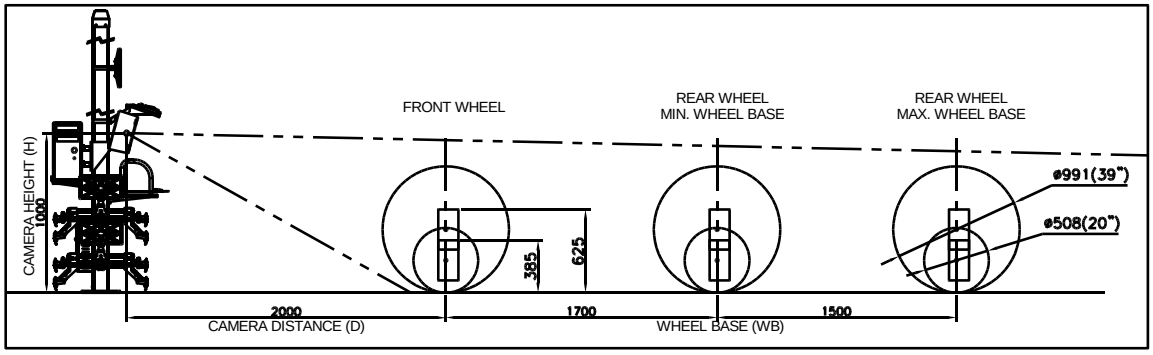
Fig. 2

Set the verticality of Camera mounted Vertical columns using Jack screws provided in the Master base plate

PIT DIMENSIONS – Max. Wheel base – 3.2 & 4metre (For VH model)

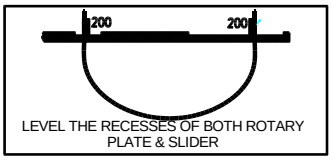


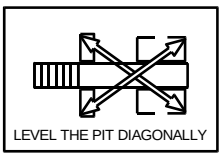
SINo	Description
1.	RAIL FOR TROLLEY – 50x12mm (2'x½') - MAT'L: M.S FLAT THE RAIL SHOULD BE PARTLY EMBEDDED IN THE GROUND THE HEIGHT OF THE RAIL FROM THE FLOOR LEVEL SHOULD BE 15mm (5/8")
2.	STEPS TO GO DOWN TO THE PIT
3.	PIT DEPTH – 1524mm (5')



WHEEL BASE TABLE:

MAX. WHEEL BASE	SLIDER SIZE	OVERALL PIT DIMN. LENGTH	OVERALL PIT DIMN WIDTH
3200	1500x750	5830 (19.1')	3360 (12')
4000	2400x750	6740 (22.1')	3360 (12')





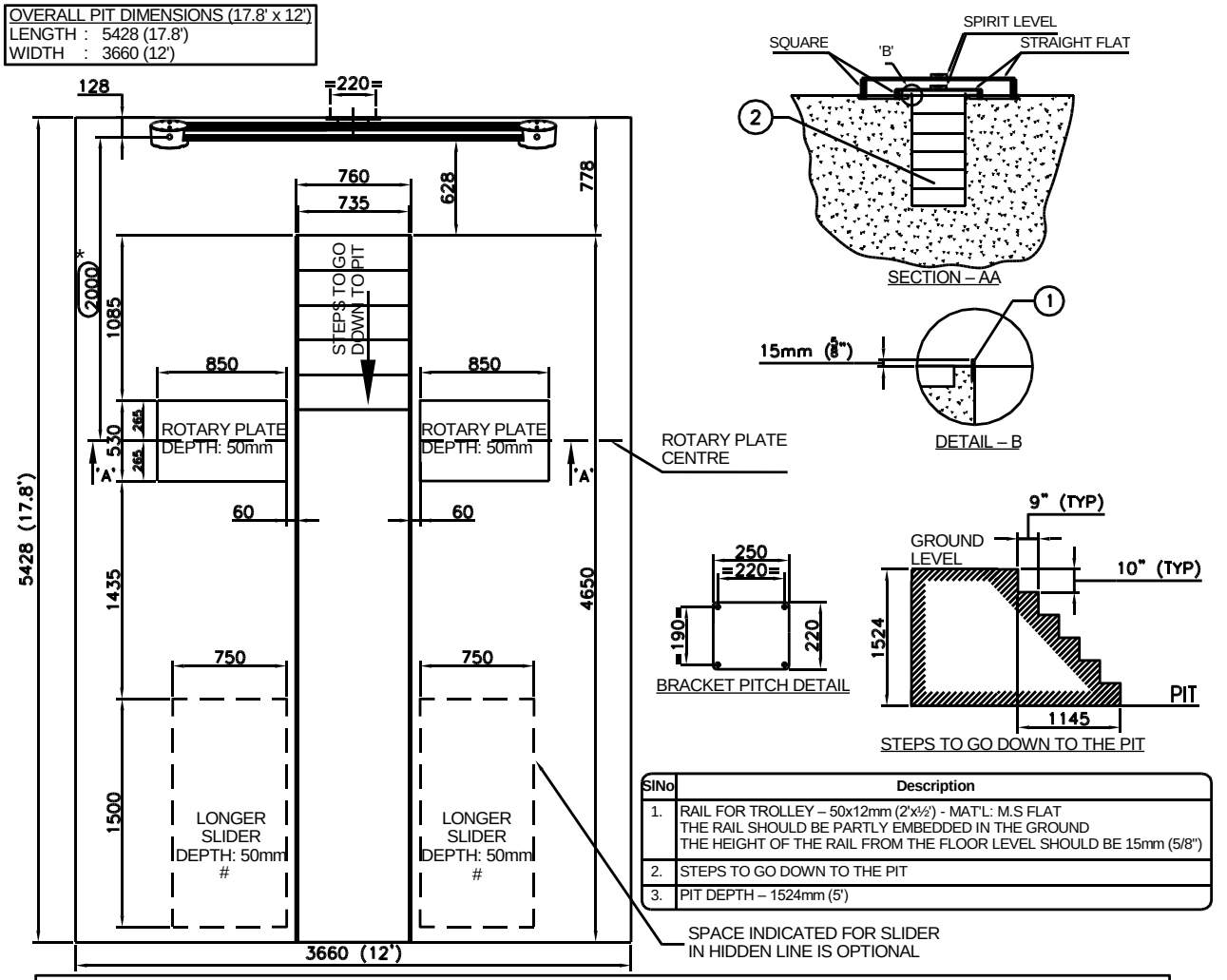
CAMERA VARIABLE HEIGHT FIXING & DISTANCE

CAMERA HEIGHT (H)	CAMERA TO ROTARY PLATE DISTNACE (D)	WHEEL BASE (WB)
1000	2000	4200
1100	2000	4200
1200	2200	4000
1300	2400	3800
1400	2600	3600
1500	2800	3400
1600	3000	3200
1700	3200	3000
1800	3400	2800

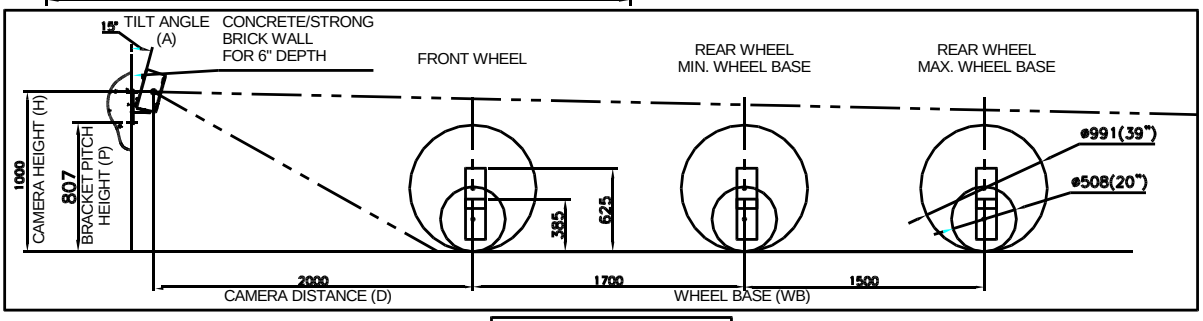
NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. 4m WHEEL BASE PIT DIMN REF. WHEEL BASE TABLE
4. AFTER PLACING THE LONGER SLIDER (1500mm LENGTH) IN THE # INDICATED 2400mm LENGTH RECESS, REMAINING 900mm LENGTH HAS TO BE FILLED BY METAL SPACER (875x600x50)
5. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE

Fig. 3

PIT DIMENSIONS – Max. Wheel base – 3.2 & 4metre (For Wall mount model)

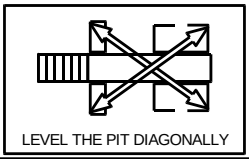


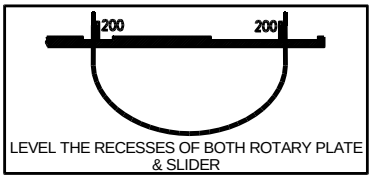
SINo	Description
1.	RAIL FOR TROLLEY – 50x12mm (2'x½') - MAT'L: M.S FLAT THE RAIL SHOULD BE PARTLY EMBEDDED IN THE GROUND THE HEIGHT OF THE RAIL FROM THE FLOOR LEVEL SHOULD BE 15mm (5/8")
2.	STEPS TO GO DOWN TO THE PIT
3.	PIT DEPTH – 1524mm (5')



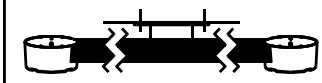
WHEEL BASE TABLE:

MAX. WHEEL BASE	SLIDER SIZE	OVERALL PIT DIMN. LENGTH	OVERALL PIT DIMN WIDTH
3200	1500x750	5428 (17.8')	3360 (12')
4000	2400x750	6328 (20.8')	3360 (12')


LEVEL THE PIT DIAGONALLY



LEVEL THE RECESSES OF BOTH ROTARY PLATE & SLIDER


LEVEL THE WALL MOUNTING BRACKET

CAMERA VARIABLE HEIGHT FIXING & DISTANCE

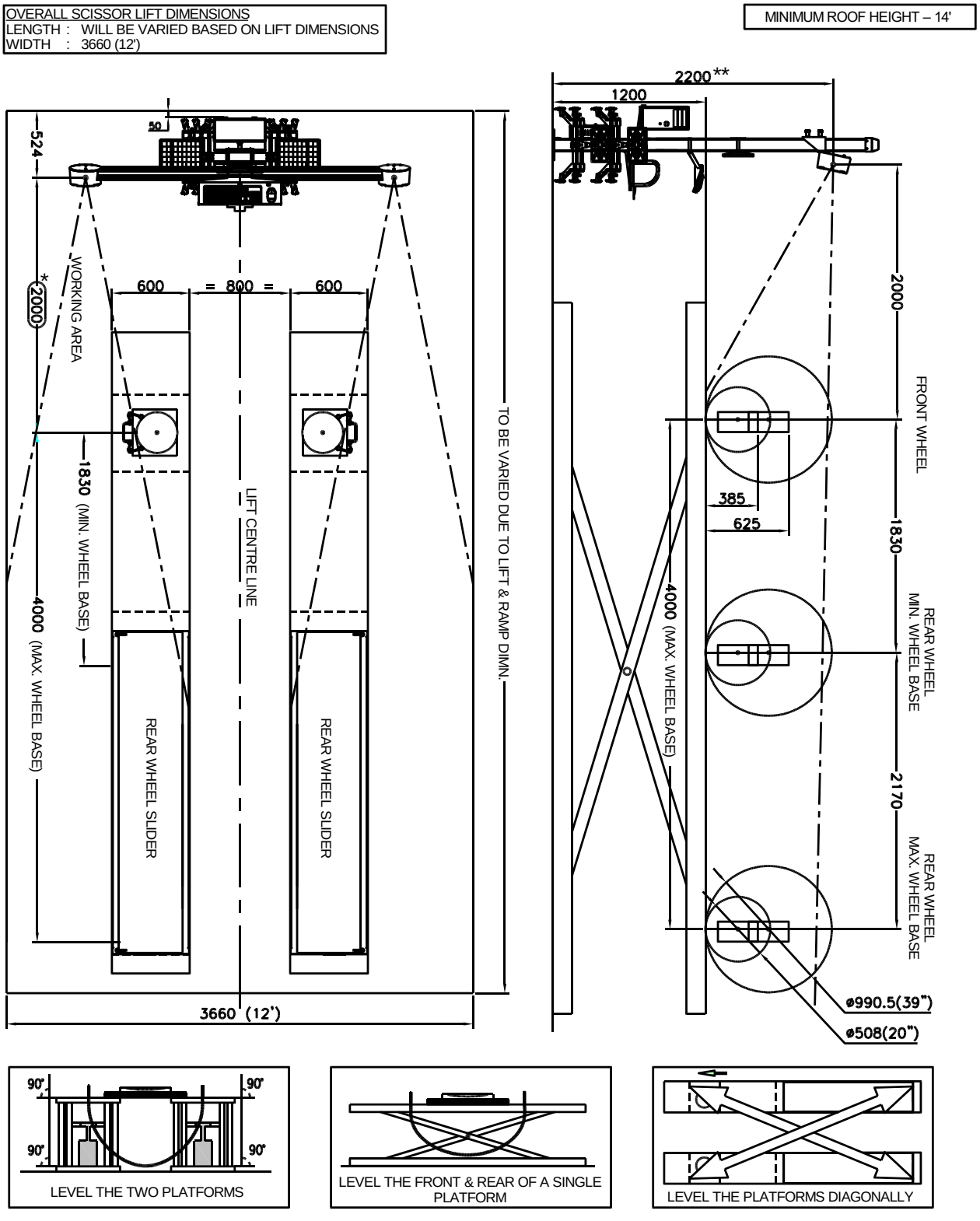
TITLE ANGLE (A)	CAMERA HEIGHT (H)	BRACKET PITCH HEIGHT (P)	CAMERA TO ROTARY PLATE DISTNACE (D)	WHEEL BASE (WB)
15	1000	807	2000	4000
	1100	907		
	1200	1007	2100	3900
19	1300	1107	2000	4000
	1400	1207	2200	3800
	1500	1307	2300	3700
22	1600	1407	2200	3800
	1700	1507	2300	3700
	1800	1607	2500	3500

NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. 4m WHEEL BASE PIT DIMN REF. WHEEL BASE TABLE
4. AFTER PLACING THE LONGER SLIDER (1500mm LENGTH) IN THE # INDICATED 2400mm LENGTH RECESS, REMAINING 900mm LENGTH HAS TO BE FILLED BY METAL SPACER (875x600x50)
5. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE

Fig. 4

4.3.2. **ALIGNMENT LIFT DIMENSIONS** (Applicable only for VH / Wall mount / Auto Boom / In-Lift models)

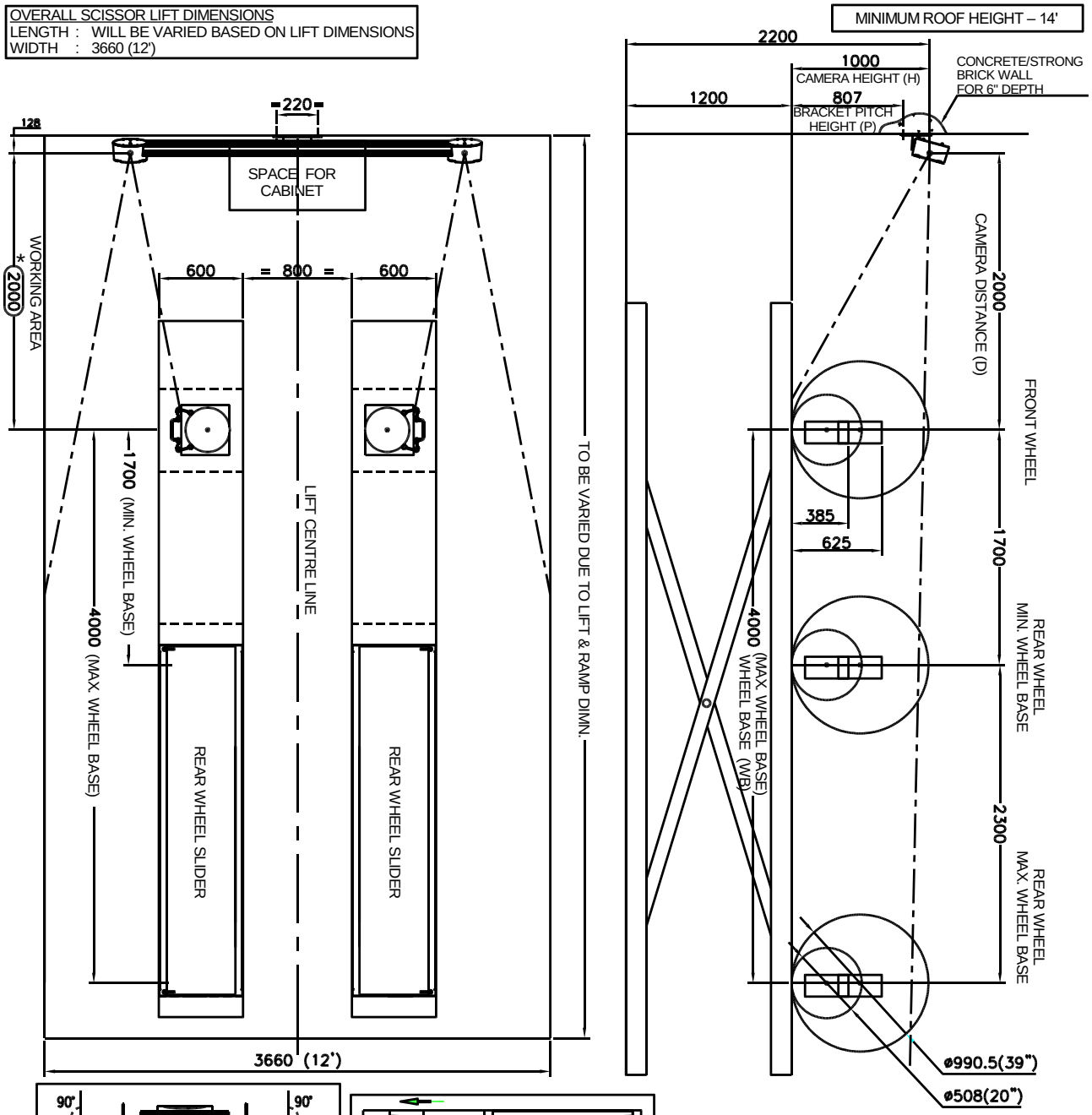
SCISSOR LIFT DIMENSIONS – Max. Wheel base – 4 metre (For VH model)

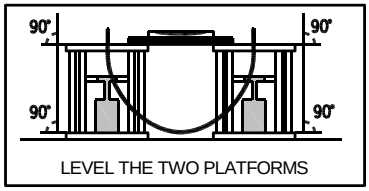


NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE
4. ** - HORIZONTAL BEAM CAN BE POSITIONED BETWEEN 1000 – 2500mm

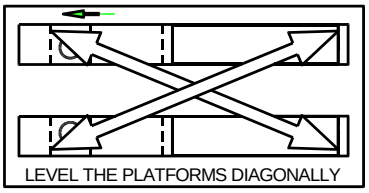
Fig. 5

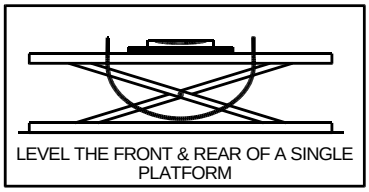
SCISSOR LIFT DIMENSIONS – Max. Wheel base – 4 metre (For Wall mount model)

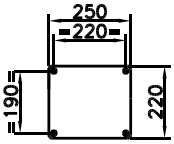




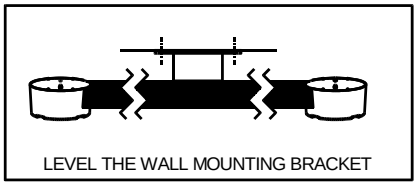
LEVEL THE TWO PLATFORMS


LEVEL THE PLATFORMS DIAGONALLY


LEVEL THE FRONT & REAR OF A SINGLE PLATFORM



BRACKET PITCH DETAIL


LEVEL THE WALL MOUNTING BRACKET

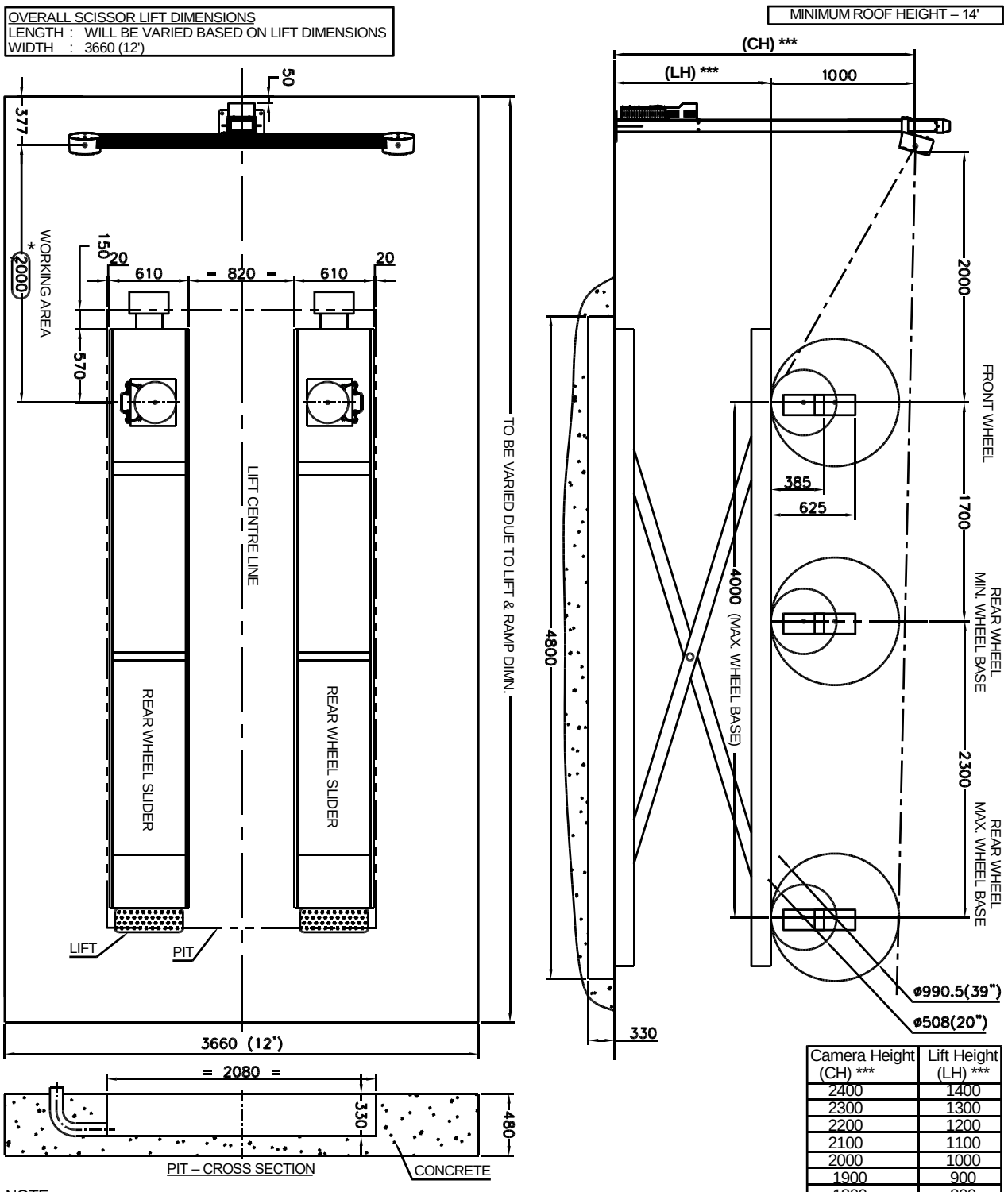
CAMERA VARIABLE HEIGHT FIXING & DISTANCE

TILT ANGLE (A)	CAMERA HEIGHT (H)	BRACKET PITCH HEIGHT(P)	CAMERA TO ROTARY PLATE DISTNCE (D)	WHEEL BASE (WB)
15	1000	807	2000	4000
	1100	907		
	1200	1007	2100	3900
19	1300	1107	2000	4000
	1400	1207	2200	3800
	1500	1307	2300	3700
22	1600	1407	2200	3800
	1700	1507	2300	3700
	1800	1607	2500	3500

NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE

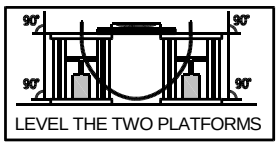
Fig. 6

SCISSOR LIFT DIMENSIONS – Max. Wheel base – 4 metre (For AutoBoom model)

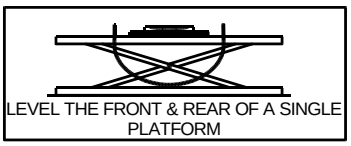


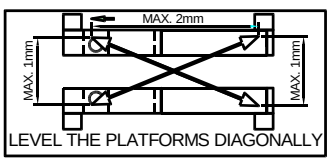
Camera Height (CH) ***	Lift Height (LH) ***
2400	1400
2300	1300
2200	1200
2100	1100
2000	1000
1900	900
1800	800
1700	700
1600	600
1500	500
1400	400
1300	300
1200	200
1100	100
1000	0

NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. PIT DIMENSIONS ARE SUITABLE FOR MANATEC LIFT ONLY. FOR OTHER LIFTS, DETAILS ARE TO BE OBTAINED FROM LIFT MANUFACTURER
4. CONCRETE MIXTURE – 1:2:4 (CEMENT:SAND:COARSE AGGREGATE (BLUE METAL-STONE)) CONCRETE THICKNESS – 150mm (MIN.)
5. LIFT TRAVEL TIME TO BE ADJUSTED AS 60sec. ±5sec. IN HYDRAULIC SYSTEM FOR LIFTING/LOWERING THE PLATFORM TO 1200mm
6. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE
7. A DISTANCE OF 1000mm SHOULD BE MAINTAINED BETWEEN CAMERA CENTRE & LIFT PLATFORM
8. HORIZONTAL BEAM CAN BE POSITIONED BETWEEN 900 – 2400mm



LEVEL THE TWO PLATFORMS


LEVEL THE FRONT & REAR OF A SINGLE PLATFORM

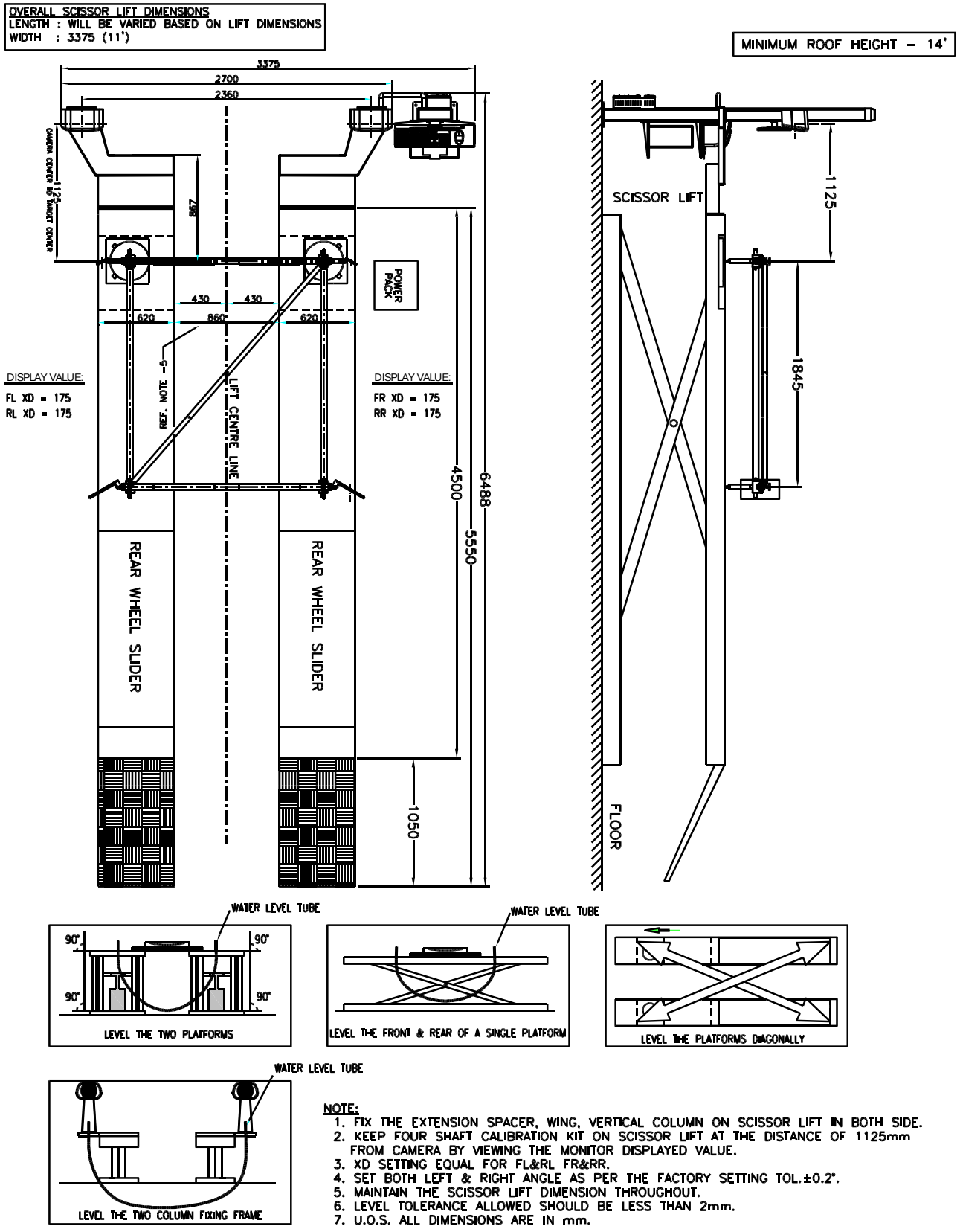


LEVEL THE PLATFORMS DIAGONALLY

Fig. 7

SCISSOR LIFT DIMENSIONS – Max. Wheel base – 4.6 metre (For In-Lift model)

FOR RIGHT HAND DRIVE VEHICLE



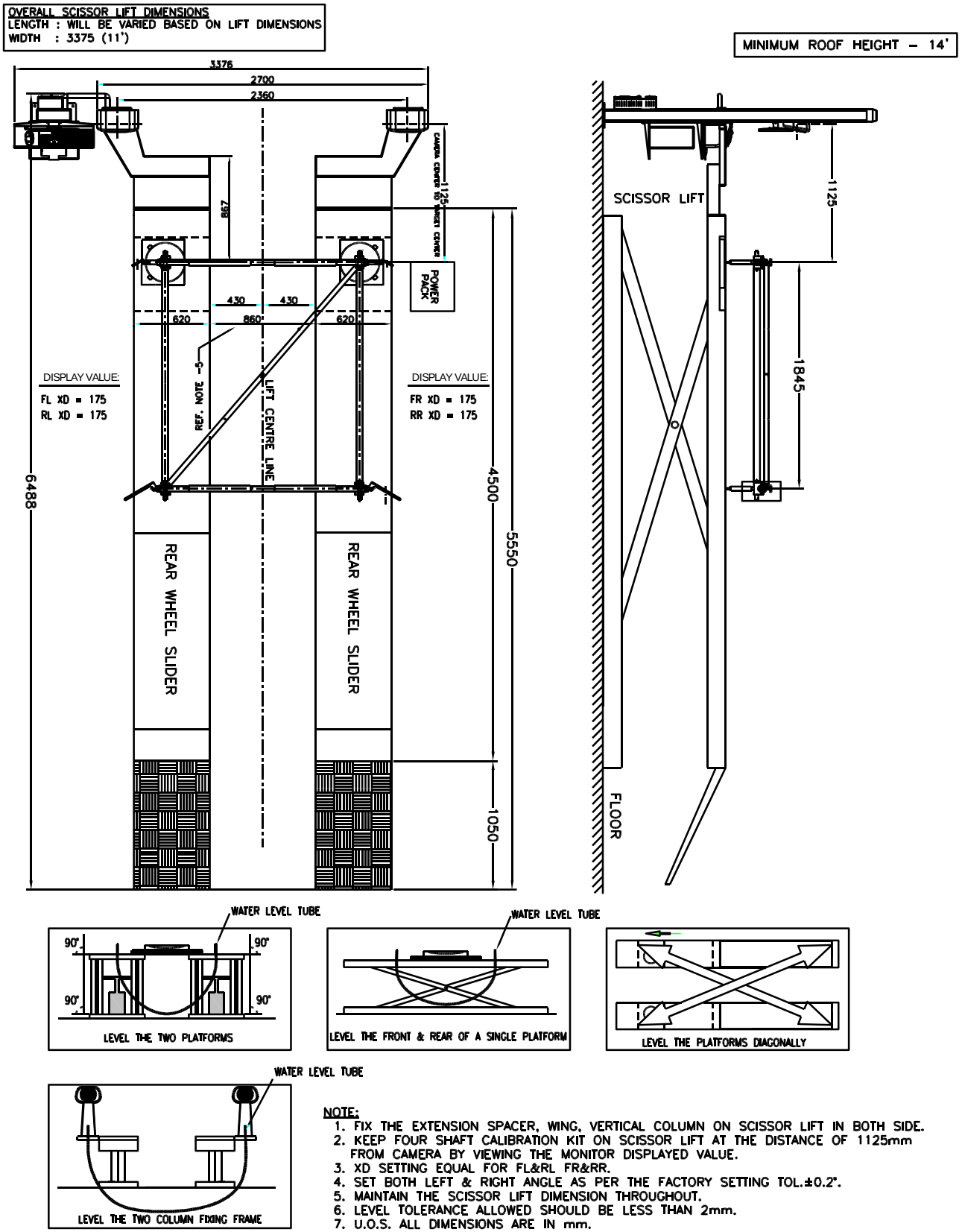
NOTE:

1. FIX THE EXTENSION SPACER, WING, VERTICAL COLUMN ON SCISSOR LIFT IN BOTH SIDE.
2. KEEP FOUR SHAFT CALIBRATION KIT ON SCISSOR LIFT AT THE DISTANCE OF 1125mm FROM CAMERA BY VIEWING THE MONITOR DISPLAYED VALUE.
3. XD SETTING EQUAL FOR FL&RL FR&RR.
4. SET BOTH LEFT & RIGHT ANGLE AS PER THE FACTORY SETTING TOL.±0.2°.
5. MAINTAIN THE SCISSOR LIFT DIMENSION THROUGHOUT.
6. LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm.
7. U.O.S. ALL DIMENSIONS ARE IN mm.

Fig. 8

SCISSOR LIFT DIMENSIONS – Max. Wheel base – 4.6 metre (For In-Lift model)

FOR LEFT HAND DRIVE VEHICLE

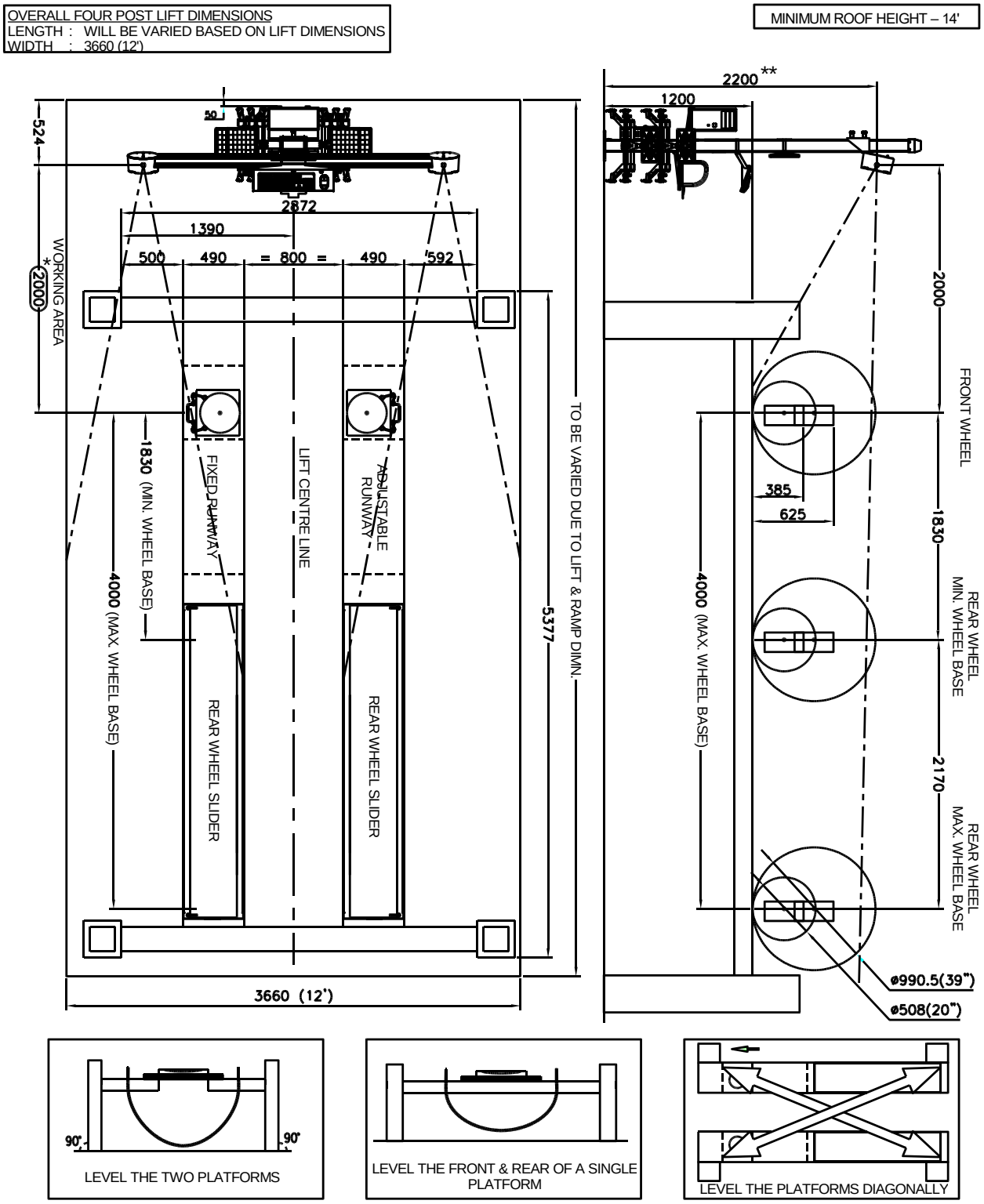


NOTE:

1. FIX THE EXTENSION SPACER, WING, VERTICAL COLUMN ON SCISSOR LIFT IN BOTH SIDE.
2. KEEP FOUR SHAFT CALIBRATION KIT ON SCISSOR LIFT AT THE DISTANCE OF 1125mm FROM CAMERA BY VIEWING THE MONITOR DISPLAYED VALUE.
3. XD SETTING EQUAL FOR FL&RL FR&RR.
4. SET BOTH LEFT & RIGHT ANGLE AS PER THE FACTORY SETTING TOL.±0.2°.
5. MAINTAIN THE SCISSOR LIFT DIMENSION THROUGHOUT.
6. LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm.
7. U.O.S. ALL DIMENSIONS ARE IN mm.

Fig. 9

FOUR POST LIFT DIMENSIONS – Max. Wheel base – 4 metre (For VH model)

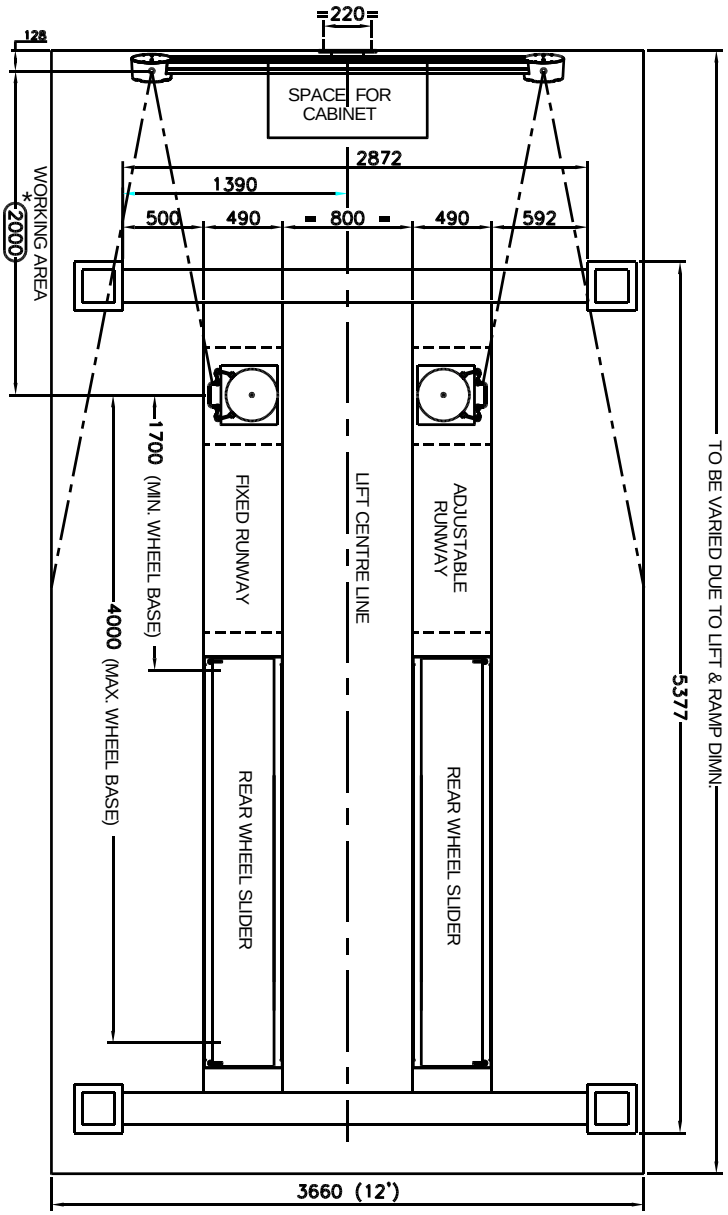


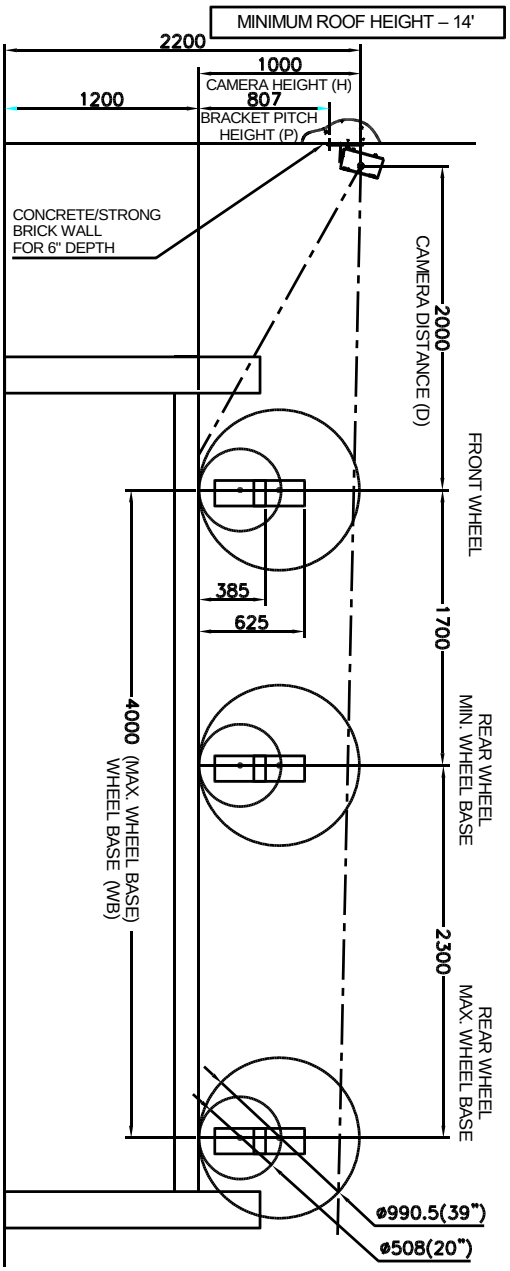
NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE
4. ** - HORIZONTAL BEAM CAN BE POSITIONED BETWEEN 1000 – 2500mm

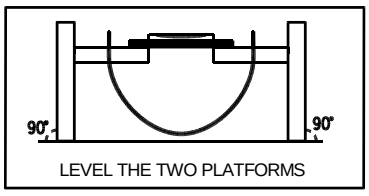
Fig. 10

FOUR POST LIFT DIMENSIONS – Max. Wheel base – 4 metre (For Wall mount model)

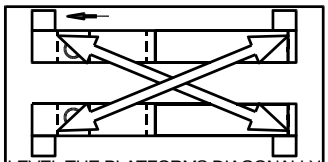
OVERALL FOUR POST LIFT DIMENSIONS
LENGTH : WILL BE VARIED BASED ON LIFT DIMENSIONS
WIDTH : 3660 (12')

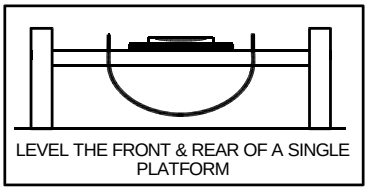


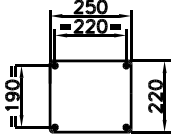




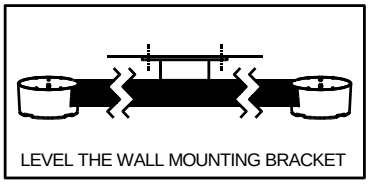
LEVEL THE TWO PLATFORMS


LEVEL THE PLATFORMS DIAGONALLY


LEVEL THE FRONT & REAR OF A SINGLE PLATFORM



BRACKET PITCH DETAIL


LEVEL THE WALL MOUNTING BRACKET

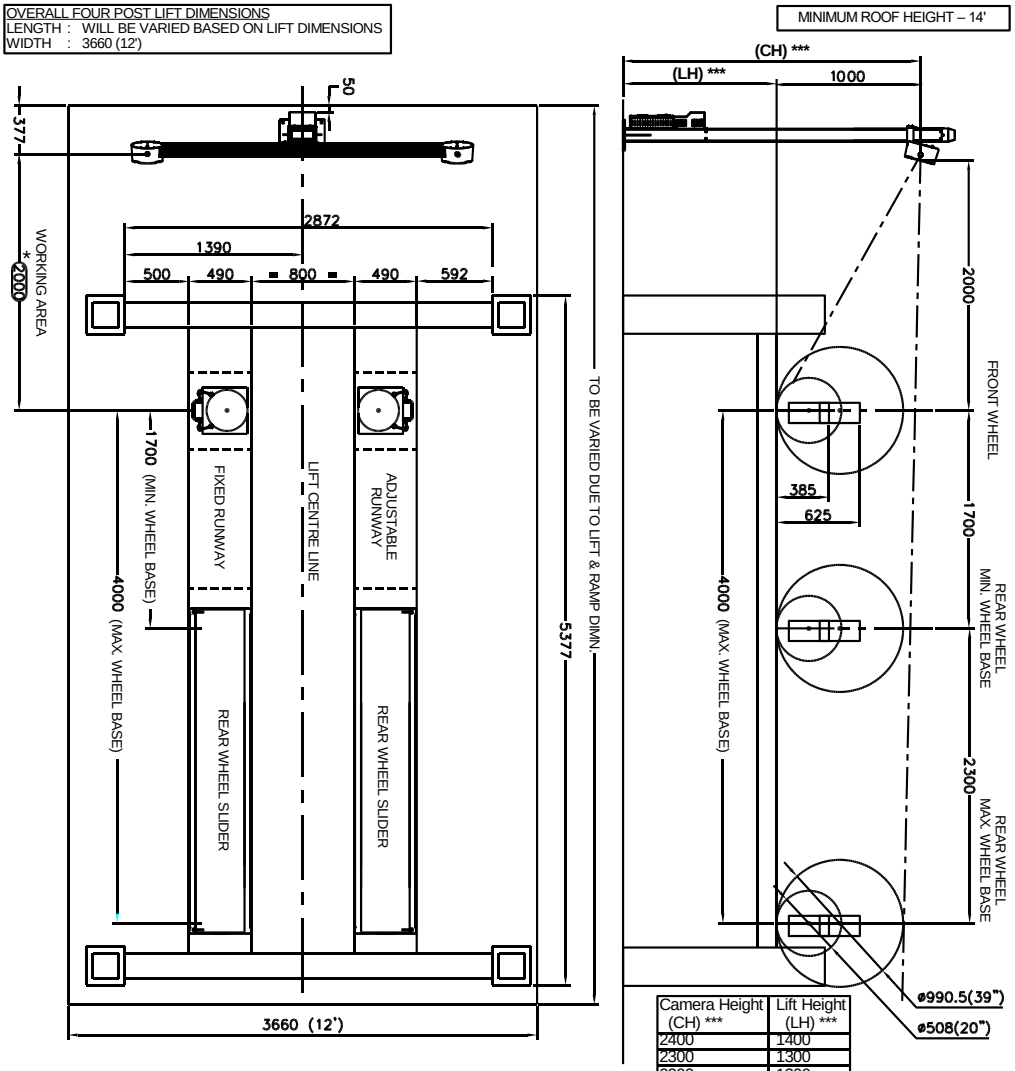
CAMERA VARIABLE HEIGHT FIXING & DISTANCE

TILT ANGLE (A)	CAMERA HEIGHT (H)	BRACKET PITCH HEIGHT(P)	CAMERA TO ROTARY PLATE DISTNCE (D)	WHEEL BASE (WB)
15	1000	807	2000	4000
	1100	907		
	1200	1007	2100	3900
19	1300	1107	2000	4000
	1400	1207	2200	3800
	1500	1307	2300	3700
22	1600	1407	2200	3800
	1700	1507	2300	3700
	1800	1607	2500	3500

NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE

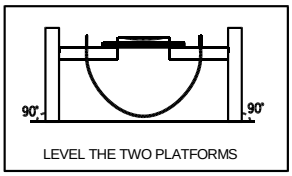
Fig. 11

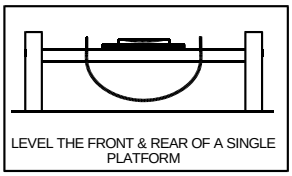
FOUR POST LIFT DIMENSIONS-Max. Wheel base–4metre (For AutoBoom)



Camera Height (CH) ***	Lift Height (LH) ***
2400	1400
2300	1300
2200	1200
2100	1100
2000	1000
1900	900
1800	800
1700	700
1600	600
1500	500
1400	400
1300	300
1200	200
1100	100
1000	0

NOTE:
1. U.O.S – ALL DIMENSIONS ARE IN mm
2. FLOOR/PLATFORM LEVEL TOLERANCE ALLOWED SHOULD BE LESS THAN 2mm
3. LIFT TRAVEL TIME TO BE ADJUSTED AS 60sec. ±5sec. IN HYDRAULIC SYSTEM FOR LIFTING/LOWERING THE PLATFORM TO 1200mm
4. * - DISTANCE BETWEEN CAMERA & TURN TABLE CAN BE ALTERED FROM 2000 – 2400mm BASED ON THE AVAILABILITY OF SPACE
5. A DISTANCE OF 1000mm SHOULD BE MAINTAINED BETWEEN CAMERA CENTRE & LIFT PLATFORM
6. HORIZONTAL BEAM CAN BE POSITIONED BETWEEN 900 – 2400mm





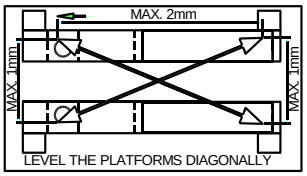


Fig. 12

4.4. POWER REQUIREMENT

Stabilized (AVR) UPS 230VAC ±10%, Single Phase, 50Hz +N +PE (or)

Stabilized (AVR) UPS 110VAC ±10%, Single Phase, 50/60Hz +N +PE

Supply should be connected only through a CVT of 1KVA capacity and then through an UPS of minimum 1KVA capacity with AVR (Automatic Voltage Regulator) circuit using a CE certified Two Pole, Type C, 6A MCB (For Auto Boom 110V model, Two pole, Type C, 10A MCB). Proper Earthing must be provided. Also ensure that live phase is on the right side point of the wall socket.

Neutral to Line Voltage should be 230V AC ±10% (or) 110V AC ±10%
Line to Earth voltage should be 230V AC ±10% (or) 110V AC ±10%
Neutral to Earth leakage should be less than 3V AC
It is strongly recommended to use CVT & UPS (with AVR) for the aligner. Printer should not be connected to UPS & separate power supply to be made.

5. WHEEL ALIGNMENT PARAMETERS

WHEEL ALIGNMENT refers to a set of wheel angles which are responsible to distribute the weight of the automobile over the suspension system and the four wheels uniformly when the vehicle is in motion. Proper distribution of the weight results in uniform tyre wear and effective steering control. Every vehicle manufacturer furnishes the Wheel Alignment specification for the vehicles manufactured by them.

The process of bringing and adjusting the vehicle's Geometric angles and common adjustable parameters such as Caster, Camber and Toe to its original position as per the vehicle manufacturer specification is called **Wheel alignment**.

WHEEL ALIGNMENT ANGLES

i) **CAMBER** — Wheel angles
ii) **TOE** — Wheel angles
iii) **CASTER** — Steering axis angles
iv) **KINGPIN INCLINATION** — Steering axis angles
v) **THRUST ANGLE** — These are unwanted angles which sometimes prevail in a vehicle
vi) **FRONT WHEEL SETBACK** — These are unwanted angles which sometimes prevail in a vehicle
vii) **REAR WHEEL SETBACK** — These are unwanted angles which sometimes prevail in a vehicle
viii) **WHEEL RUNOUT** — These are unwanted angles which sometimes prevail in a vehicle
ix) **INCLUDED ANGLE**
x) **TRACK WIDTH DIFFERENCE**
xi) **LOCK ANGLE**
xii) **TOE OUT ON TURNS**

Each wheel alignment angle has a specific purpose and function. If they are not set properly, the effects will be uneven tyre wear, loss of steering control, pulling to one side while driving, jerking on travel, etc.

It may not be possible to correct all the above angles in a vehicle. Depending upon the design of suspension, some angles are adjustable at workshop level and some are not adjustable (Set in Factory) which may require parts replacement to get the specified value.

☞	**The Parameters Wheel Runout, Set Back & Thrust Angle will affect the wheel angles ie., Camber & Toe. Therefore, it is very important to identify measure and correct or compensate these angles. Otherwise, proper Wheel alignment cannot be achieved. System takes all the above factors into consideration in its design and offers total solution by compensation in the respective parameters**

5.1. CAMBER

The **CAMBER** angle will affect the wear on the inner or outer edge of the tyre. Camber is the inclination of the centerline of the wheel from the vertical as viewed from the front of the vehicle. Camber angle is measured in positive or negative degrees.

POSITIVE CAMBER is the outward tilt of the top of the tyre.

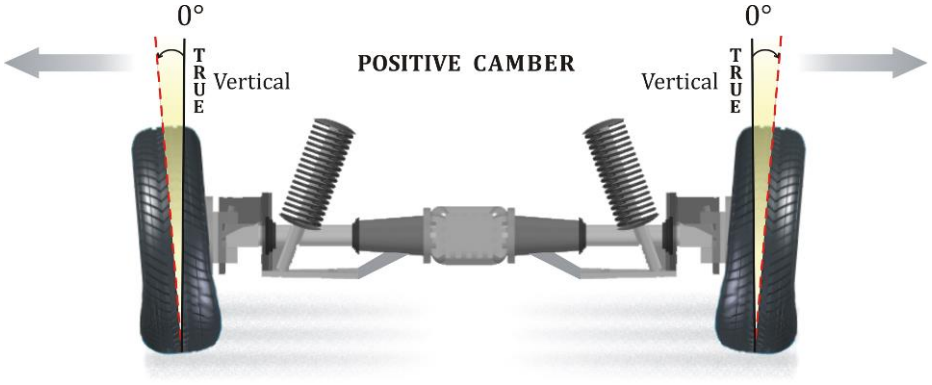


Fig. 13

NEGATIVE CAMBER is the inward tilt of the tyre at the top.

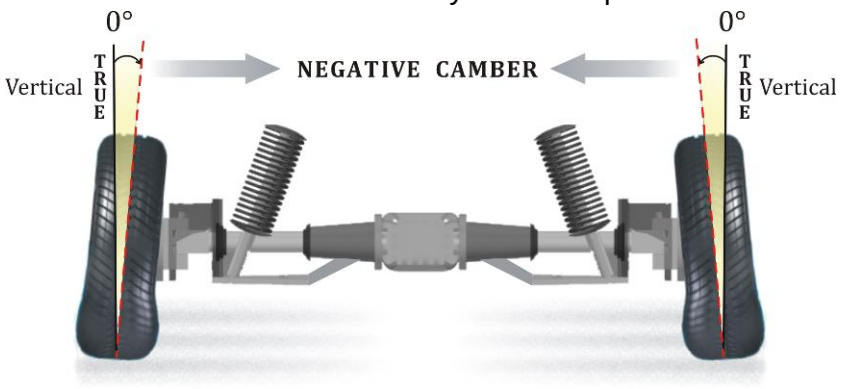


Fig. 14

If a tyre was absolutely vertical, the degree of camber would be zero. Unlike the Caster angle, Camber will change with vehicle load and ride height. With the weight of the driver in the vehicle, front left Camber will increase and front right Camber will decrease and vise versa for left hand steering vehicle. As rough road conditions are encountered, the downward thrust of the vehicle body will cause front Camber to go negative. As the vehicle body movement returns upward, front Camber will go positive. A tyre with Positive Camber can influence the vehicle with a directional pull. The vehicle will go towards the side that has the tyre with the most Positive Camber.

It is the normal tendency of the tyre to roll around the center of a circle when the top of the tyre is inclined towards the center of that circle. Positive Camber tends to place the tyre-to-road contact area nearer the point of load. This assists in easier steering and forces the thicker inner portion of the spindle to carry most of the load. Modern suspension design has reduced the need for considerable Positive Camber. Many manufacturers specify a slight amount of Negative Camber. Some manufacturers recommend an additional 1/4 to 1/2 degree Positive Camber on the right wheel to compensate for road crown. The car will then pull toward the side with greater Positive Camber. This will offset the pull effect of the road crown. Always set Camber within specifications.

Rear Camber Angle - Front Wheel Drive

Rear wheel Camber angle is being relied on for improved steering and general handling performance. In the past FWD vehicles and independent rear suspension vehicles were most likely to have adjustable rear Camber. On vehicles currently being produced, rear Camber adjustment capabilities are being found on all types of models (Note : Always use full-floating tables under wheels whenever alignment is being done. When alignment problems are reported on vehicles with fixed rear axles and no rear wheel Camber adjustment capabilities, a thorough inspection of the rear suspension should be made. Damaged or worn components can cause alignment and / or steering problems. Replacing or repairing the defective components should bring the rear wheel assemblies into specification.

On vehicles where rear wheel Camber is adjustable, all previous precautions apply. If Camber adjustment requirements are excessive, a thorough inspection must be performed. Replacing any defective components could bring the Camber into specification and adjustment may become unnecessary. As with the front suspension, DO NOT perform alignment on vehicles with damaged or worn components.

Rear Camber Angle - Rear Wheel Drive

On RWD vehicles, where rear Camber is usually not adjustable, Camber will normally be fixed at zero. Even though this angle cannot be changed through adjustment, if rear suspension abnormalities exist, a thorough inspection must be made. Not to be overlooked are the rear springs. Worn or weak rear springs will alter riding height and because of a reduction in tension, will bring the shock absorbers out of the optimum range of their dampening ability. The result will be excessive tire movement. This condition reduces operator control and contributes to abnormal tire wear. As in FWD vehicles, replacing worn or defective components may bring rear wheels within specification.

5.2. TOE

Unlike Caster and Camber, which are measured in degrees, Toe is most frequently measured in fractional Inches, Millimeters or Decimal degrees. An incorrect Toe setting is one of the main alignment factors that cause excessive tyre wear. Front and rear Toe are the same in definition, with the adjustment capabilities and procedures being the only actual difference. **TOE** is the difference between the leading edge (or front) and trailing edge (or rear) of the tyres.

TOE-IN is the measurement in fractions of an Inch, Millimeters or Decimal of degrees that the tyres are closer together in the front than they are in the back.

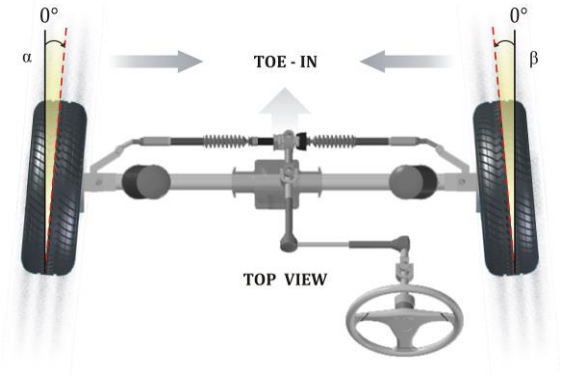


Fig. 15

TOE-OUT is the same measurement, except the tyres are further apart in the front than in the rear.

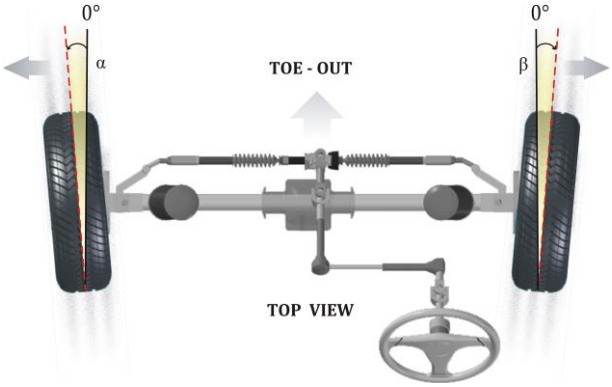


Fig. 16

Slight Toe-in is preferred to Toe-out on most vehicles because steering is aligned while vehicle is stationary. When the vehicle is moving, linkage components flex causing a change in alignment angles. This is classified as “Running Toe”. Running Toe should be zero to maximize tyre life and achieve least rolling resistance.

The usual tendency is for the tyres to turn outward while the vehicle is in motion, so most vehicles are designed with a static Toe-in setting. The static Toe-in setting will become zero as the linkage flexes when the vehicle is in motion. Always set Toe to the manufacturer’s specifications. On vehicles with Toe adjustment capability on the rear, an alignment specialist can go beyond manufacturer’s specifications according to vehicle usage and customer requirements. With the proper equipment, the rear axle can be adjusted to perform aggressively toward demanding load and road conditions.

Vehicles with FWD and independent rear suspensions are more likely to have adjustable rear Toe. As with rear Camber, properly adjusted rear Toe will contribute to improved steering & handling characteristics. Full floating tables (Rotary plates) must be used under rear tyres whenever Toe is to be adjusted. If rear Toe is out of spec a thorough inspection must be done, whether or not rear Toe is adjustable.

Components found to be defective must be replaced. On vehicles that do not have rear Toe adjustment capability and Toe is not within specifications, replacing defective components may bring Toe within specifications.

☞	**Normally TOE is specified in ‘mm’ or ‘inch’. That is by how much the front of the Wheel Rim is IN or OUT compared to the rear side of the Wheel Rim. But, System follows the unit of Degrees and Minutes. Even, if the TOE is entered in ‘mm’ or ‘inch’, it converts the same into corresponding Degrees and Minutes**

5.3. CASTER

CASTER is the angle between an imaginary line drawn through the upper and lower steering pivots and a line perpendicular to the road surface (viewed from side of vehicle). If the top of the line tilts rearward, the vehicle is said to have **POSITIVE CASTER**.

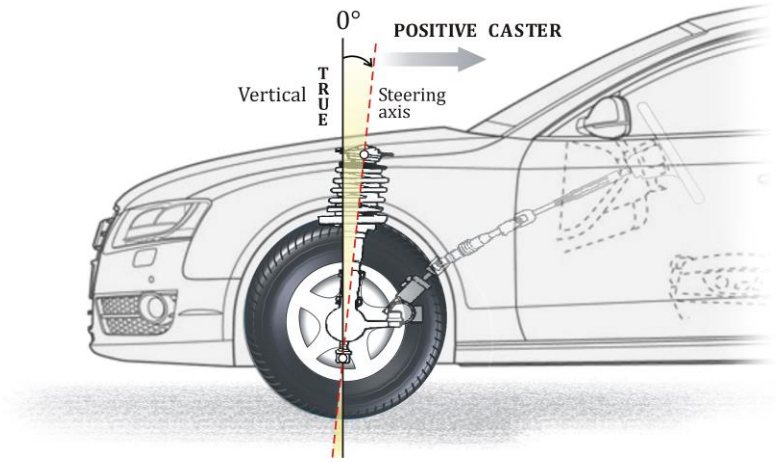


Fig. 17

If the top of the line tilts forward, the vehicle is said to have **NEGATIVE CASTER**.

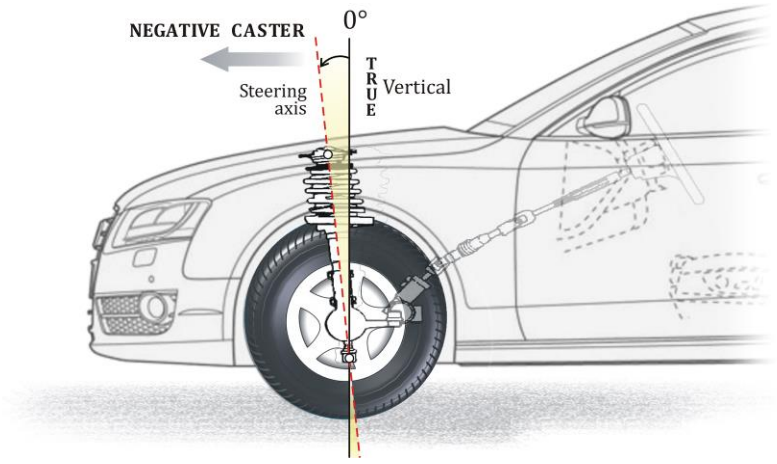


Fig. 18

Positive Caster can also be defined as when the spindle is tipped so that the pivot support centerline intersects the road surface at a point in front of the initial tire contact. Negative Caster would then be the center line intersection to the road surface behind the initial tire contact.

Most vehicles produced today do not have adjustable Caster angle. Many early model vehicles have adjustable Caster in which road crown is compensated for (along with Camber). By setting the Caster angle on the Driver's side 1/2 degree less than the passenger side for Positive Caster specifications or 1/2 degree more for Negative Caster specifications, the road crown should not cause vehicle pull in either direction. Vehicles equipped with manual Steering use very little Positive or Negative Caster. This helps reduce the Steering effort at the Steering wheel.

The advantage of Caster adjusted toward Negative is greater maneuverability. however, direction stability on open road driving is reduced. The advantage of Positive Caster is the strong directional stability and the ease of returning the steering to a straight ahead position. Caster will not cause tyre wear unless extreme mis-adjustment or worn parts are involved. Always set Caster (if adjustable) to specifications and within 1/2 degree from side to side. Keep road crown in mind and adjust as necessary if a pull is present after a proper alignment has been completed.

5.4. KINGPIN INCLINATION (Steering axis inclination)

Fig. 19

KINGPIN Inclination (also referred to as the ball joint angle or Steering Axis Inclination-SAI) can be a difficult angle to understand. The easiest way to understand Kingpin Inclination is to first define Steering axis. The steering axis is an imaginary line intersecting the spindle support. In a conventional steering system, the spindle supports are the upper and lower ball joints or the Kingpins. With Macpherson strut systems, Steering axis is the angle beginning at the ball joint and extended through the strut assembly. Viewed from the front of the vehicle, Kingpin Inclination is the angle between the Steering axis and a true vertical line established through the tyre. The Kingpin Inclination is a stability angle and is measured in degrees.

If these imaginary lines were extended to road surface, the area covered between them would be identified as the point of load or scrub radius. The vehicle body will be closest to the road surface when the wheels are pointed Straight Ahead as a result of Kingpin Inclination.

A spindle with Kingpin Inclination will have the outer end of that spindle at the highest point when the wheels are pointed Straight Ahead. Therefore, as the weight of the vehicle pushes downward, the spindle will always attempt to move upward to return the wheels to a Straight Ahead position. After a turn, the Kingpin Inclination helps to return the tyres to Straight Ahead position. Kingpin Inclination also aids in vehicle directional stability by resisting road irregularities that attempt to turn the wheels away from the Straight-ahead position. This angle produces many of the same benefits that improve steering stability as Positive Caster. Correct engineering of Kingpin Inclination can reduce the need for high Positive Camber. The effect of Kingpin Inclination on directional stability is usually greater then that of Caster. Some vehicles with Power steering require a greater amount of steering wheel returning force than those with manual steering. Kingpin Inclination is often used with Positive Caster on power steering equipped vehicles to assist in steering wheel returnability.

5.5. THRUST ANGLE

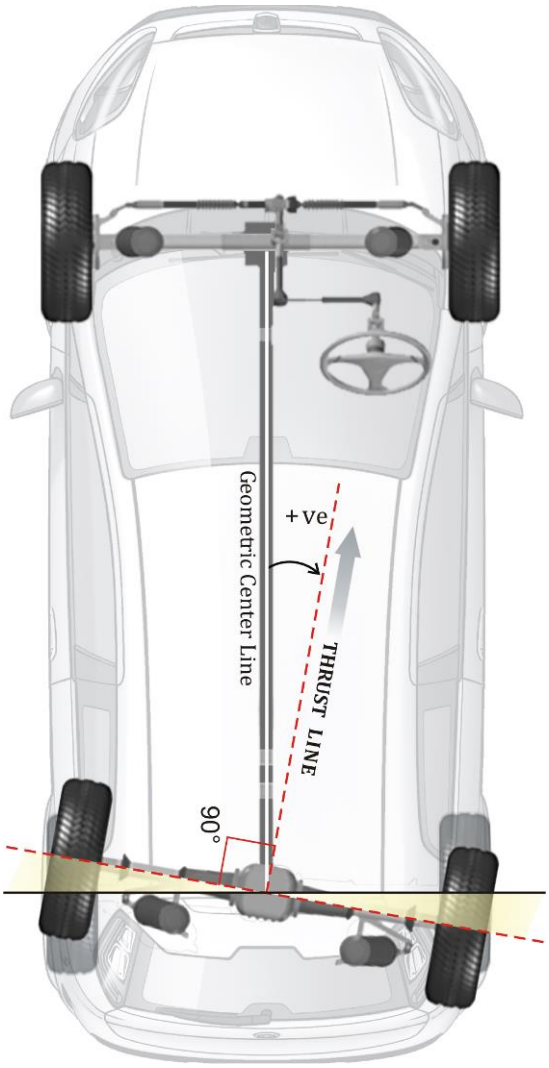


Fig. 20

THRUST ANGLE is the line that divides the total angle of the rear wheels. The rear tyres are not just following the front tyres, they are actually establishing direction of the vehicle. In doing so, a direction of thrust is developed. The Thrust angle created by the rear wheels is used as a reference for aligning the front wheels. Ideally, the Thrust angle should be identical to the geometric centerline of the vehicle. If Thrust angle and geometric centerline are identical, the position of the tires would then form an absolute rectangle and the front tyres could be aligned to the rear tyres, resulting in a perfectly centered steering wheel. Because of unitized construction, factory tolerances and a varying degree of damage and / or wear, it is increasingly unlikely that the axles will be parallel. When the rear axle projects a different angle than the front axle, the driver will need to turn the steering wheel to compensate in order to drive in a straight line.

On situations where the thrust line and geometric centerline are not identical, a thorough inspection of the rear axle and suspension system must be done. Replacing defective components should aid in positioning Thrust angle close to the geometric centerline. If the Thrust angle is not identical to the geometric centerline and there are no defective components, align the vehicle using the Thrust angle instead of the geometric centerline. Aligning the front wheels to the Thrust angle is preferred to aligning to the geometric centerline. The ability to do this is a significant advantage of four wheel alignment. The result should be a straight steering wheel as the vehicle moves straight-ahead.

5.6. FRONT WHEEL SETBACK

FRONT WHEEL SETBACK or front end squareness is a condition in which one wheel is rearward of the other. If Setback is present the turning radius will not be correct when the vehicle turns. With this condition, the tyres will wear very much in the same manner as if they were under inflated. Generally, Setback is the result of collision damage. It is preferable to have the front tyres square with each other before alignment is done. The most accurate way of checking is with four wheel alignment equipment.

The measured angle will be displayed as Negative Front wheel Setback, if the Right Front wheel leads the Left Front wheel.

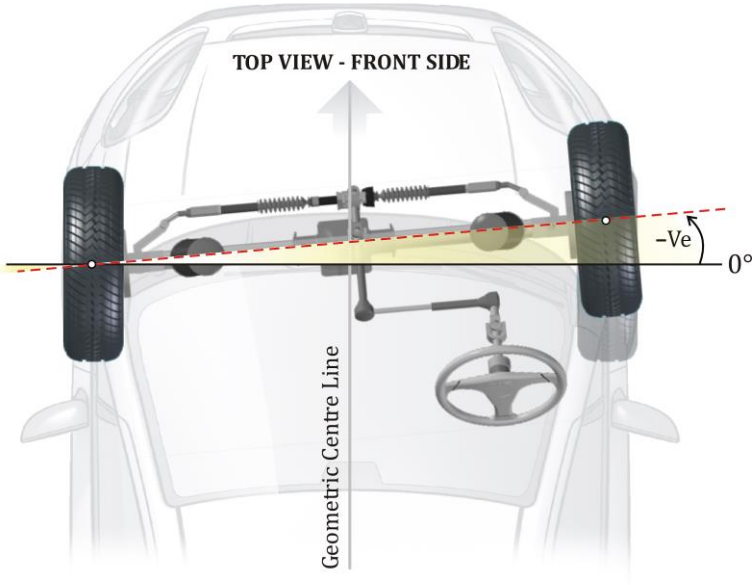


Fig. 21

The measured angle will be displayed as Positive Front wheel Setback, if the Right Front wheel is behind with respect to the Left Front wheel.

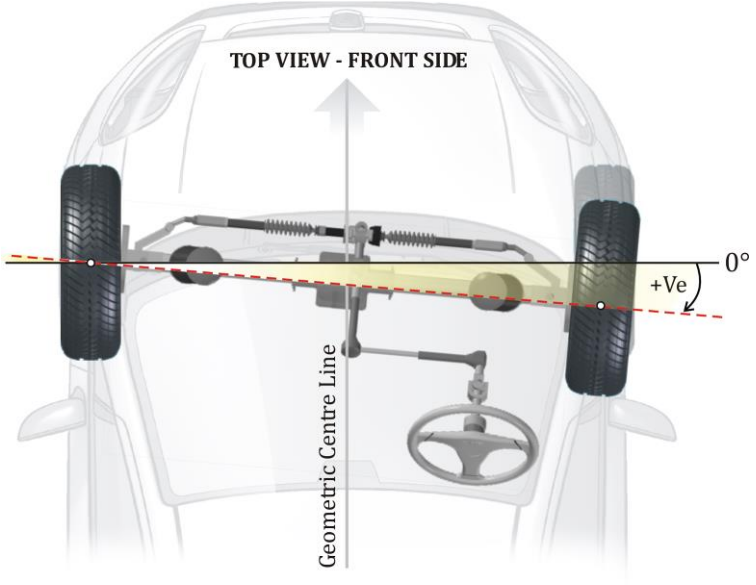


Fig. 22

5.7. REAR WHEEL SETBACK

It is the condition of Rear axle with respect to the Geometric centre line ie., one of the Rear wheel is rearward or forward with respect to the other wheel. The Rear Wheel Setback is the angle between a line drawn through both the wheel resting points. A line perpendicular to the vehicle geometrical line (thrust line) will be measured in angles.

The measured angle will be displayed as Negative Rear wheel Setback, if the Right Rear wheel leads the Left Rear wheel.

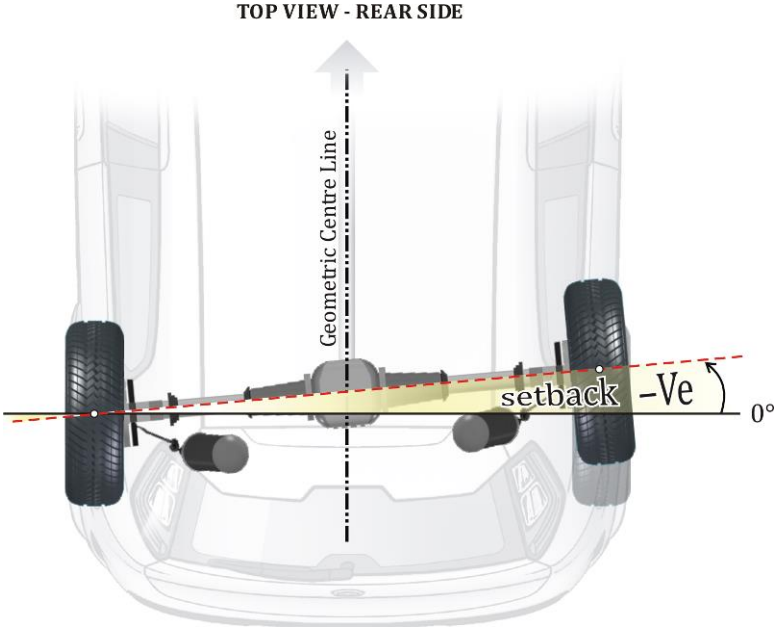


Fig. 23

The measured angle will be displayed as Positive Rear wheel Setback, if the Right Rear wheel is behind with respect to the Left Rear wheel.

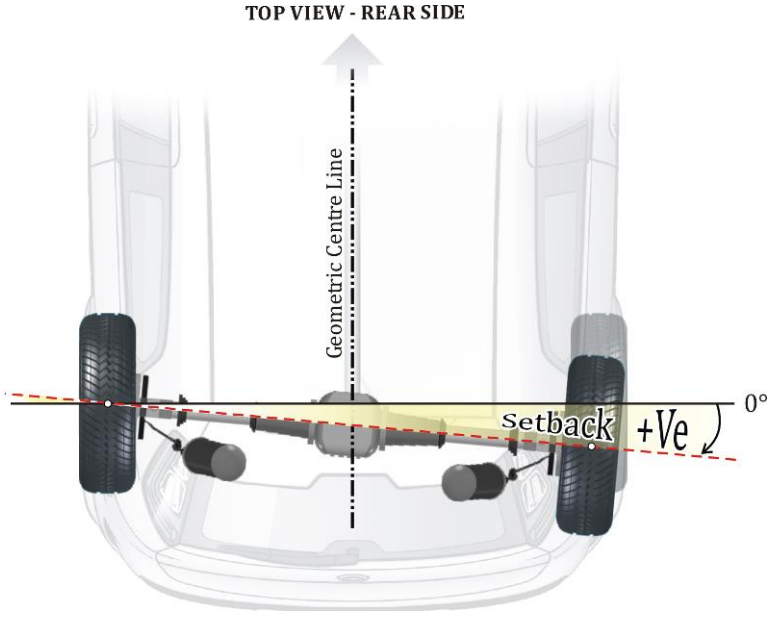


Fig. 24

5.8. WHEEL RUNOUT

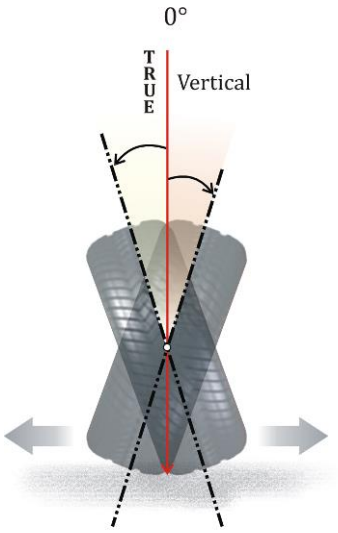


Fig. 25

RUNOUT is one of the important factor which affects a good wheel alignment. Hence Runout compensation is a critical parameter in wheel alignment.

Runout is the wobbling of wheel with respect to neutral axis ie., vertical axis of Camber and the axis parallel to Geometric centre line in case of Toe. This wobbling affects the Camber and Toe parameters. Runout exists even in new vehicles. But it will be more in old vehicles due to wear and tear. Now let us see how Runout affects the Camber:

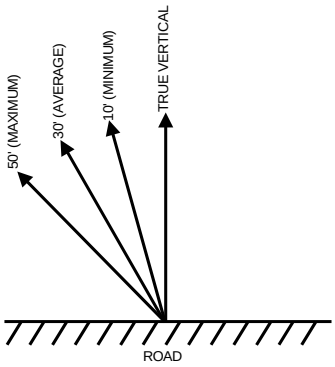


Fig. 26

Assume that there is a wobbling of 10' to 50' in a wheel and Runout is 40' (max. – min. reading). This means, when the vehicle is in motion, the wheel will have a varying Camber of 10' to 50' during every rotation. This is inevitable. Logically the average point has to be taken as the real Camber (ie., 30' in this case).

If the specified Camber for a vehicle is 55', then adjustments must be made in the shims / Cam mechanism suitably to affect a wobbling movement of 25' to achieve the average Camber of 55' (ie., 30' + 25' = 55').

After the adjustment, Average Camber = 55' (required)
Minimum Camber = 35'
Maximum Camber = 75'

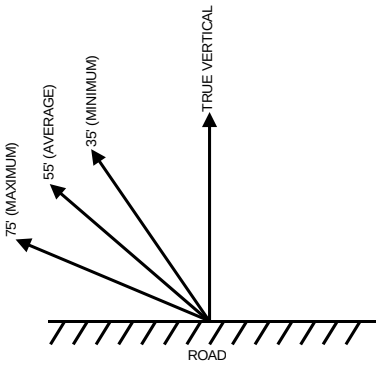


Fig. 27

Due to the above adjustments, Camber variations will be equally distributed in the vehicle (in motion) at any point of time. The process of bringing the Camber to average Runout position is called Runout compensation.

The equipment does the Runout compensation automatically without the knowledge of technician.

In Jacked up Runout method, the Technician has to simply rotate the wheel as guided by equipment for 90°and drop the wheel on Rotary plate.

In Roll-on Runout method, the wheel has to be rotated only at 90° backward from the parked position.

Rest of the calculations is automatic and average Runout compensation is achieved.

Above theory is also applicable for achieving the average Runout compensation in Toe setting.

Once Camber & Toe Runout are compensated, best results can be expected in terms of wheel alignment.

5.9. INCLUDED ANGLE

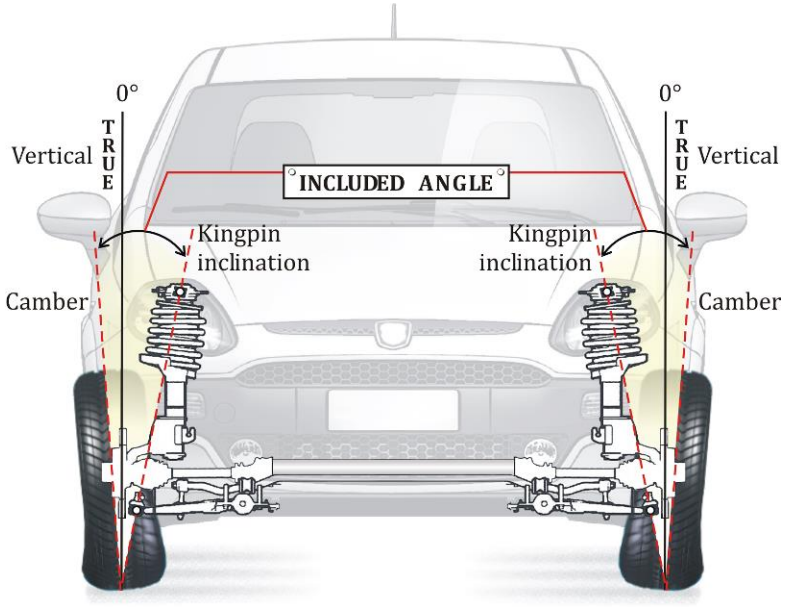


Fig. 28

INCLUDED ANGLE is the angle formed between the Kingpin inclination and the Camber. Included angle is not directly measurable. To determine the Included angle, Kingpin Inclination is added to the Camber. If the Camber is negative, then the Included angle will be less than the Kingpin Inclination. If the Camber is positive, it will be greater. The Included angle must be the same from side to side even if the Camber is different. If it is not the same, then something is bent, most likely the steering knuckles.

5.10. TRACK WIDTH DIFFERENCE

Track width difference is the angle between Front Left wheel resting point to Rear Left wheel resting point & Front Right wheel resting point to Rear Right wheel resting point.

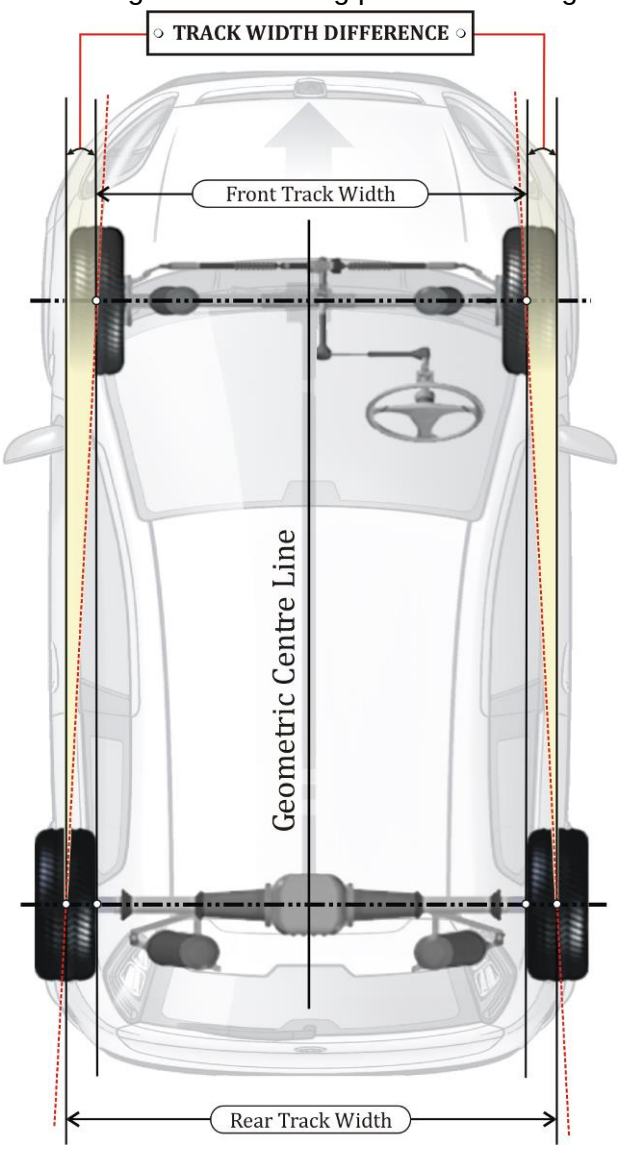


Fig. 29

The measured angle will be displayed as Positive angle, if the Rear Track width is more than the Front Track width.

The measured angle will be displayed as Negative angle, if the Front Track width is more than the Rear Track width.

5.11. LOCK ANGLE

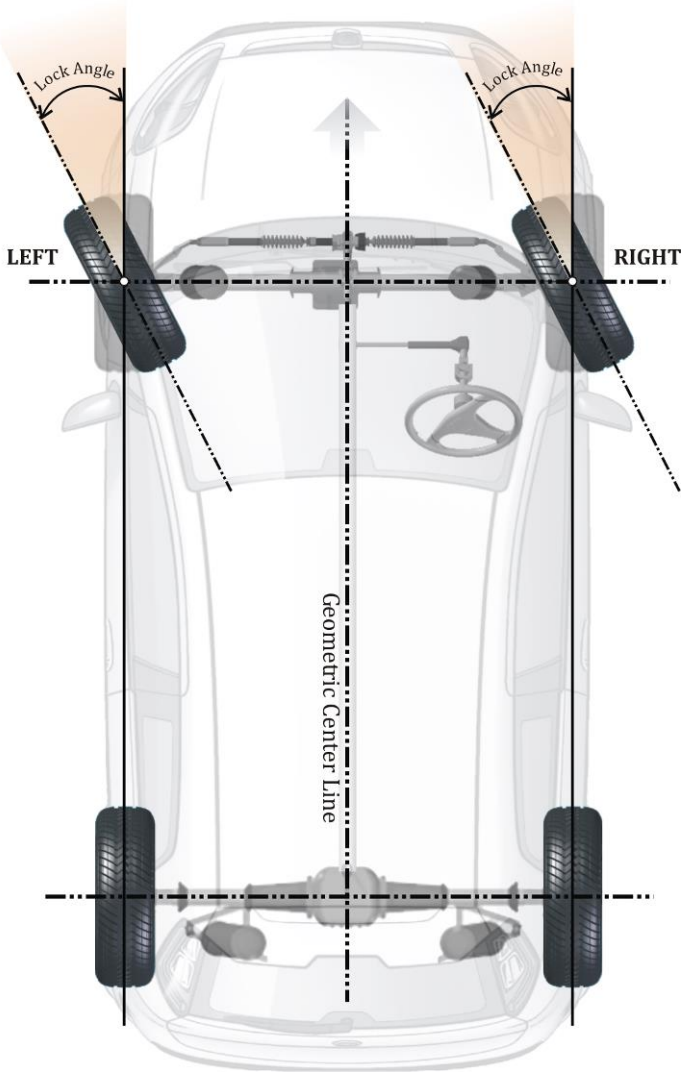


Fig. 30

LOCK ANGLE is the angle measured in degrees by which the front wheels of a vehicle move to the extreme left or right from the straight ahead position when steered.

Left wheel Lock Angle (Internal)	:	The maximum degrees to which the left front wheel can turn when the wheels are steered to the left side.
Left wheel Lock Angle (External)	:	The angle turned by left wheel when the right wheel is steered to max. right is called Lock Angle External (Left).
Right wheel Lock Angle : (Internal)		The maximum degrees to which the right front wheels can turn when the wheels are steered to the right side.
Right wheel Lock Angle : (External)		The angle turned by right wheel when the left wheel is steered to max. left is called Lock Angle External (Right).

Lock angles for the right and left side are controlled by stoppers provided on both sides. Lock angle also determines the minimum turning radius of a vehicle.

The Lock angle varies from 35º to 42º depending upon the make of the vehicle. The Lock angles may get disturbed due to the following factors:

i. When Steering linkages are bent due to the vehicle meeting with any accident.

ii. Improper adjustments of stoppers.

Iii. Incorrect setting of steering rack, pitman arm and tie rod lengths.

Lock angles are measured to ensure that the front wheels turn equally on both sides (right & left) as per manufacturer's specification.

5.12. TOE OUT ON TURNS

When the front wheels of a vehicle are steered to left or right, the angle turned by each wheel at any instant is not equal. When the left wheel is turned towards left side by 20° from the Straight ahead position the right side wheel would have turned lesser than 20°. If the Toe is measured at this instant, it will always be in 'Toe-out' condition.

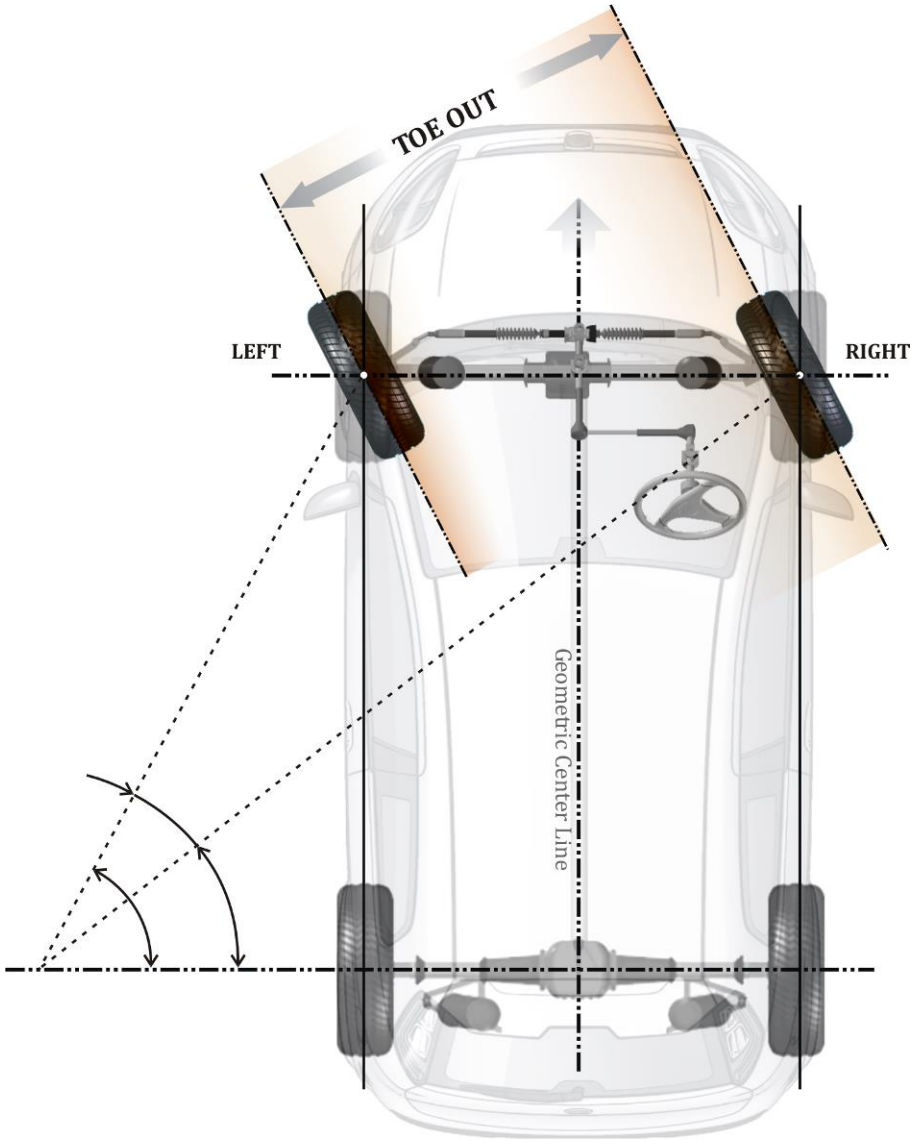


Fig. 31

The difference between the angle turned by left and right wheel is responsible for the Toe-out condition.

Let a = the angle turned by left wheel. i.e., the angle made by the rear axle centre line produced and a line drawn perpendicular to the plane of the left wheel from its centre.

Let b = the angle turned by right wheel. i.e., the angle made by the rear axle centre line produced and a line drawn perpendicular to the plane of the right wheel from its centre.

(a - b) = r_L is the difference in angle turned by left and right wheels.

Similarly when the right front wheel is turned 20° towards right side, the left side wheel would have turned less than 20° because of the Ackerman principle employed in the steering system.

The difference in angle turned by the front wheels during left turns (r_L) and right turns (r_R) should be equal or within allowable tolerance.

If r_L & r_R are not equal or not within limits, then it indicates

i. Bent Steering link

ii. Wrong positioning of pitman arm in the Steering box

iii. Not centralizing the rack in the steering box in the straight ahead position

6. DESCRIPTION OF MAIN PARTS

The equipment consists of Camera systems, Interface box & Target plates. Horizontal beam / Vertical column / Main cabinet / Wall mounting bracket are provided for holding the Camera, Computer & Peripherals (refer scope of supply).

For Standard accessories & Computer/Peripherals, refer scope of supply. The Optional accessories indicated will be supplied only against order.

PT model

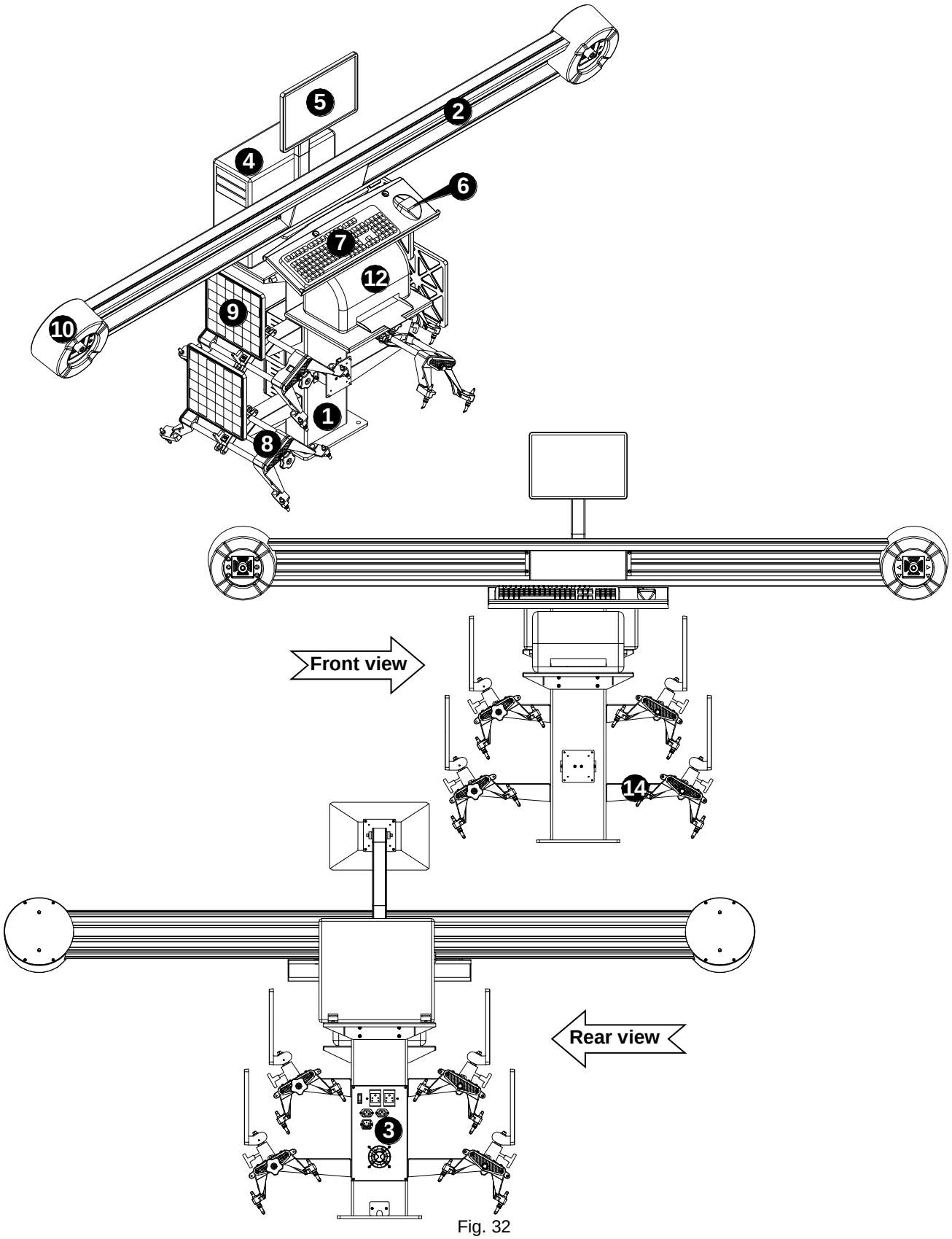


Fig. 32

DT model

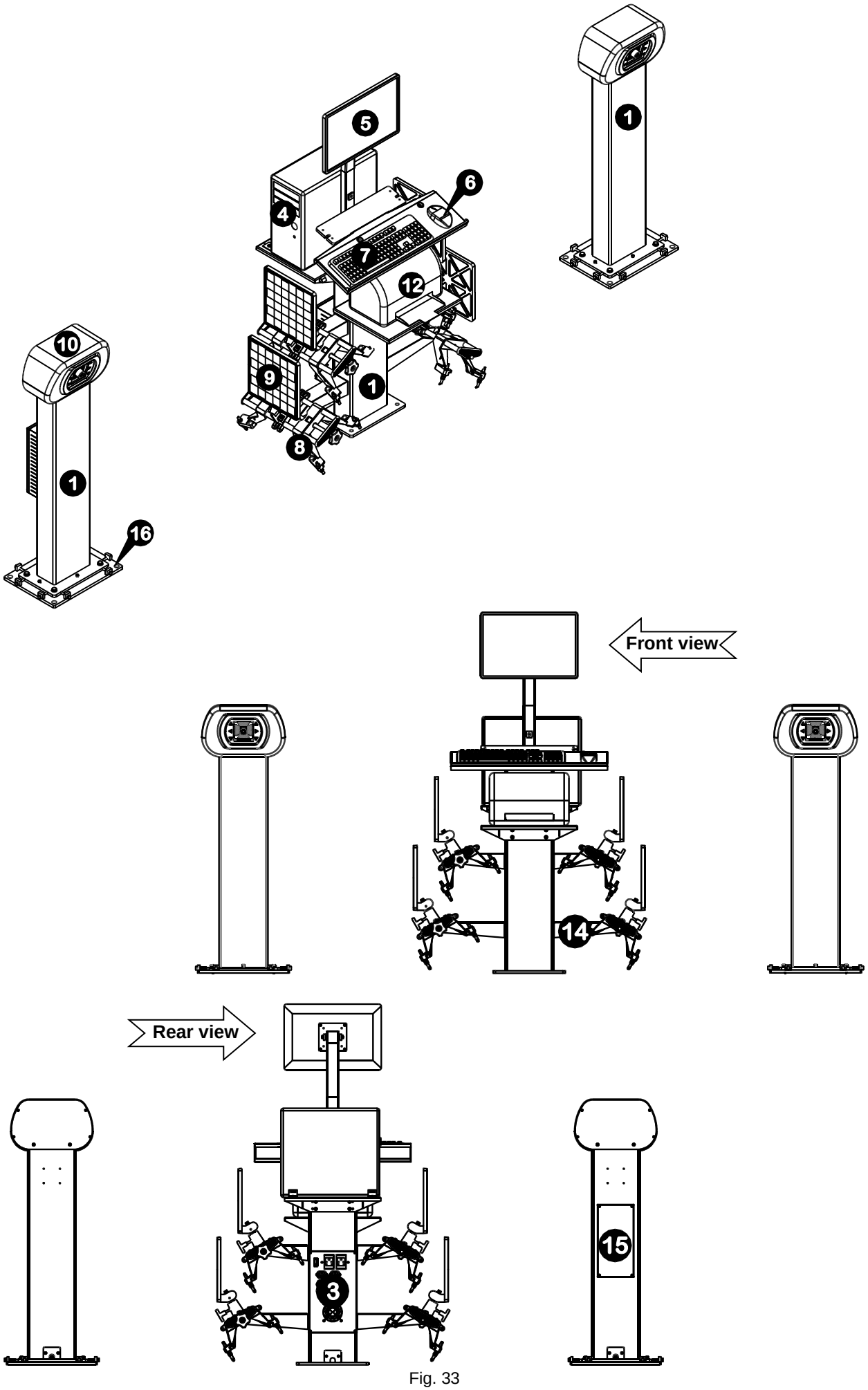


Fig. 33

VH model

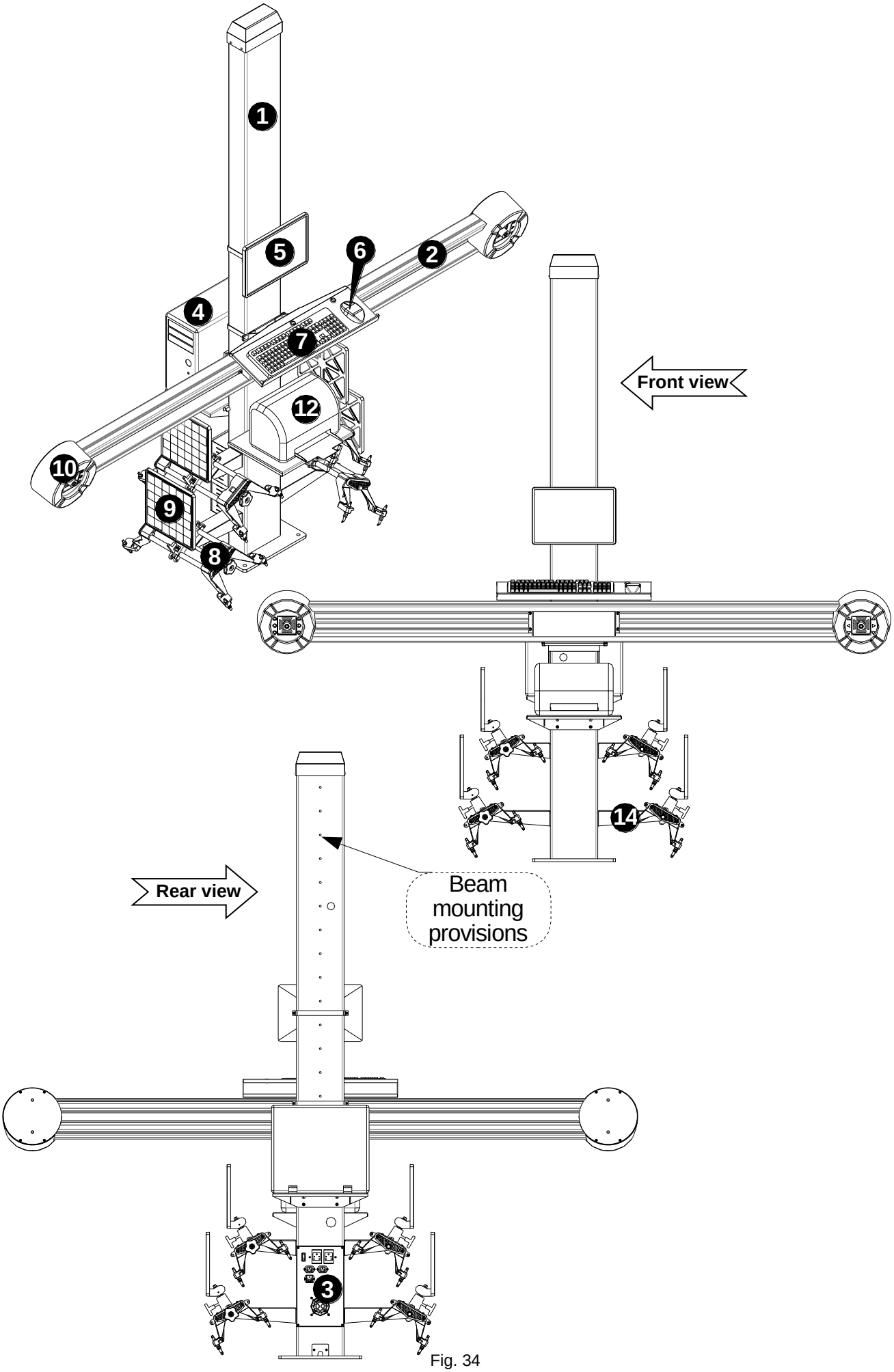


Fig. 34

AutoBoom V4 model

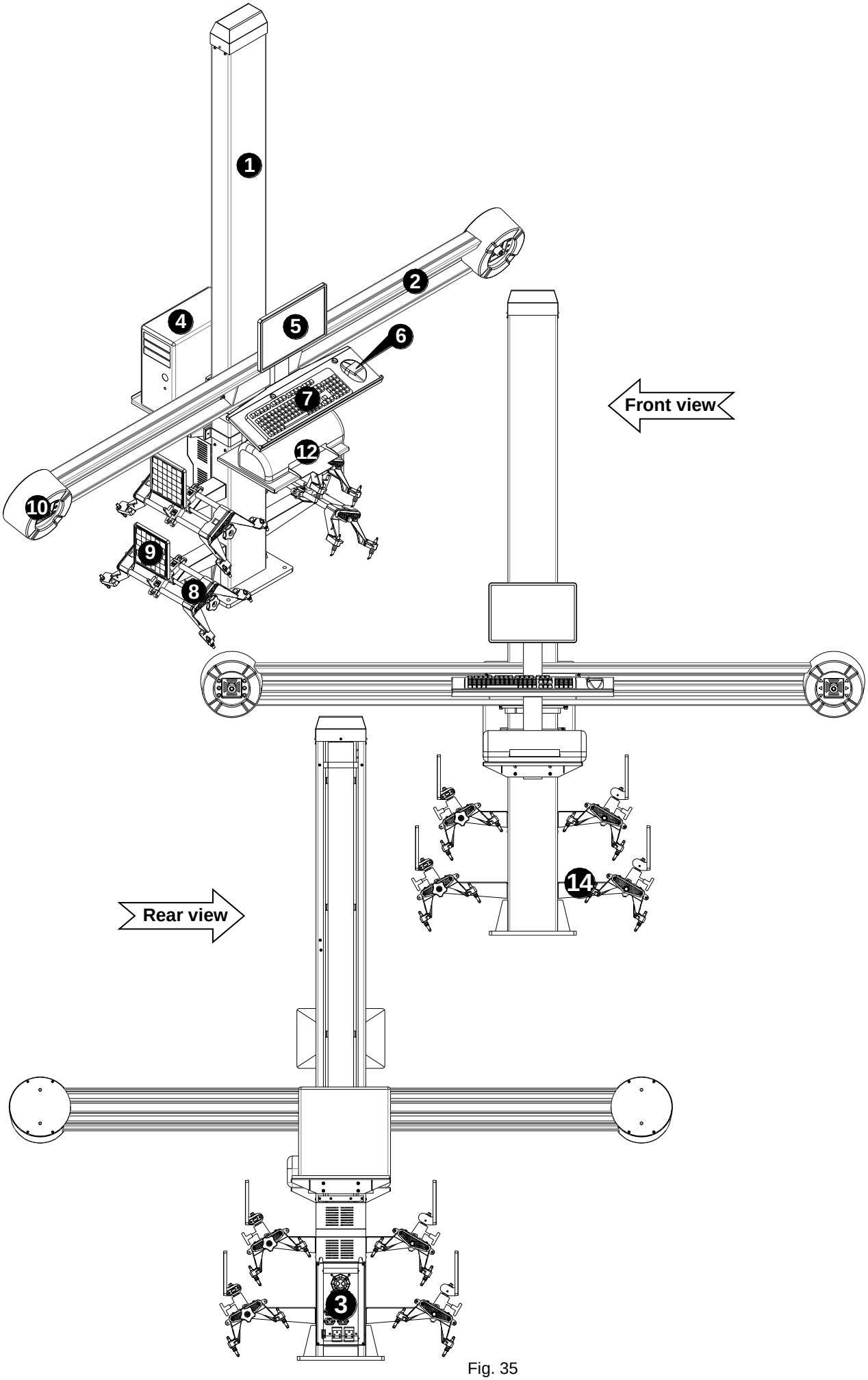


Fig. 35

AutoBoom X model

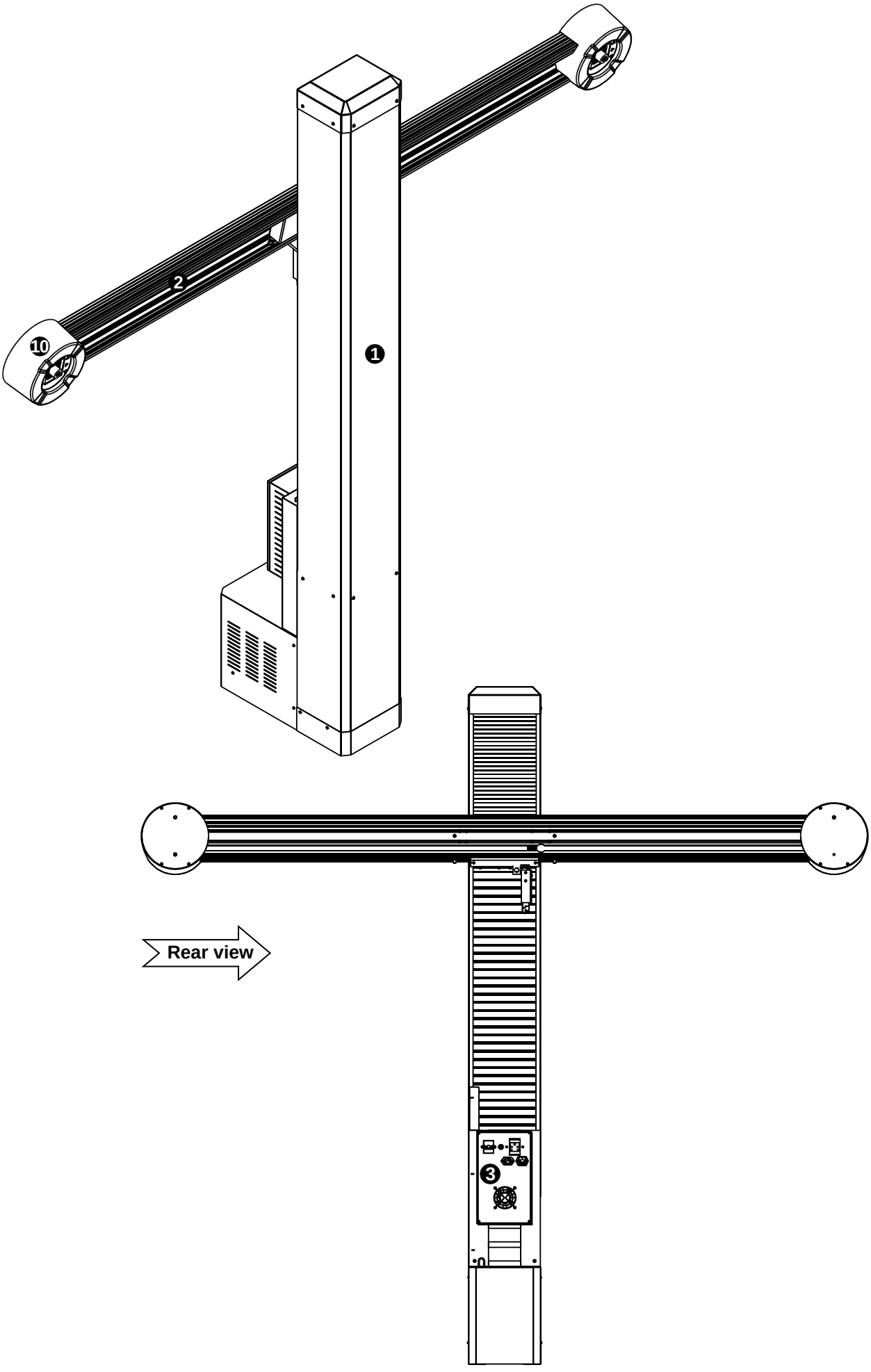


Fig. 36

In-Lift model

For Right hand drive vehicles

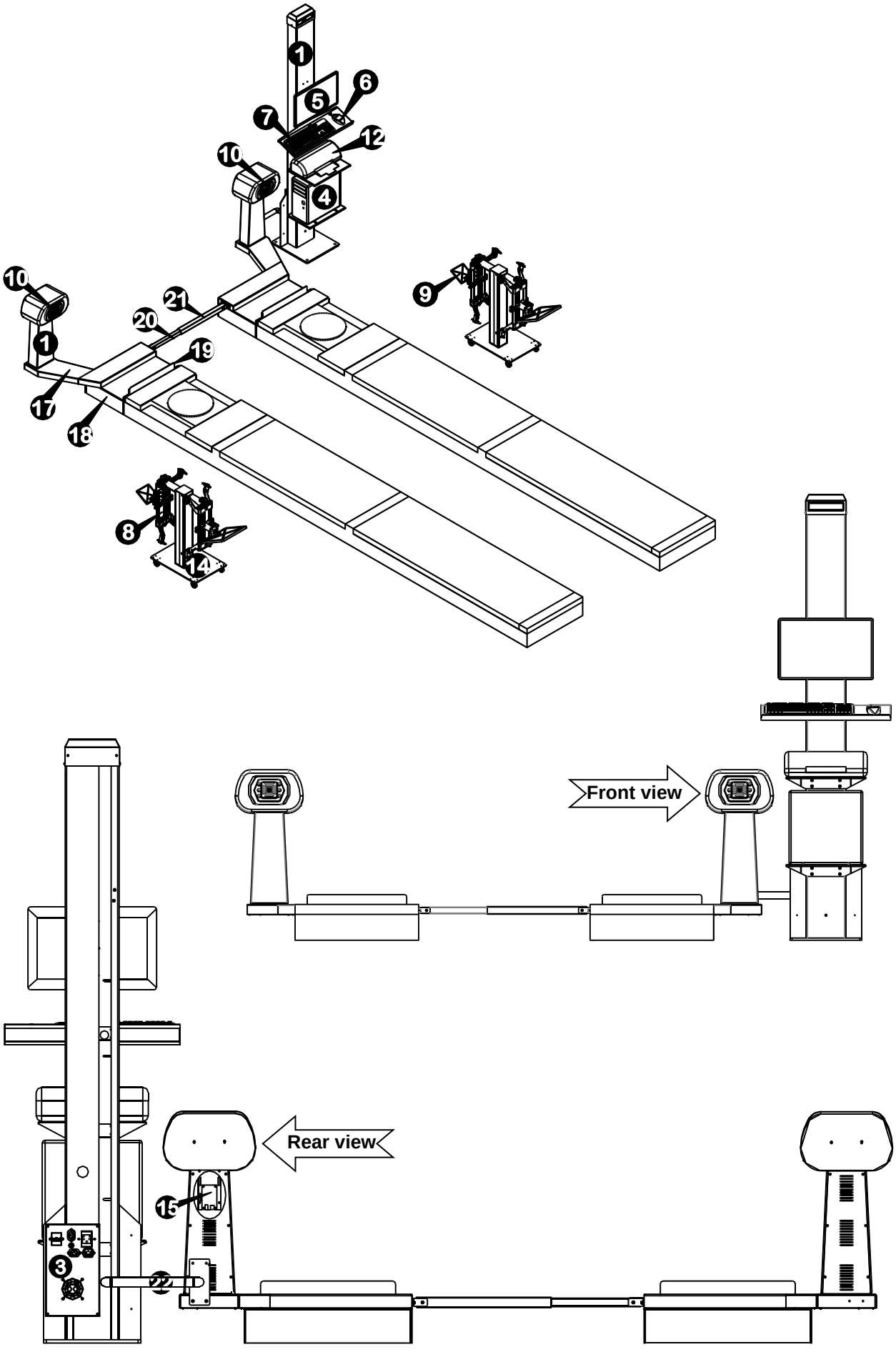


Fig. 37

For Left hand drive vehicles

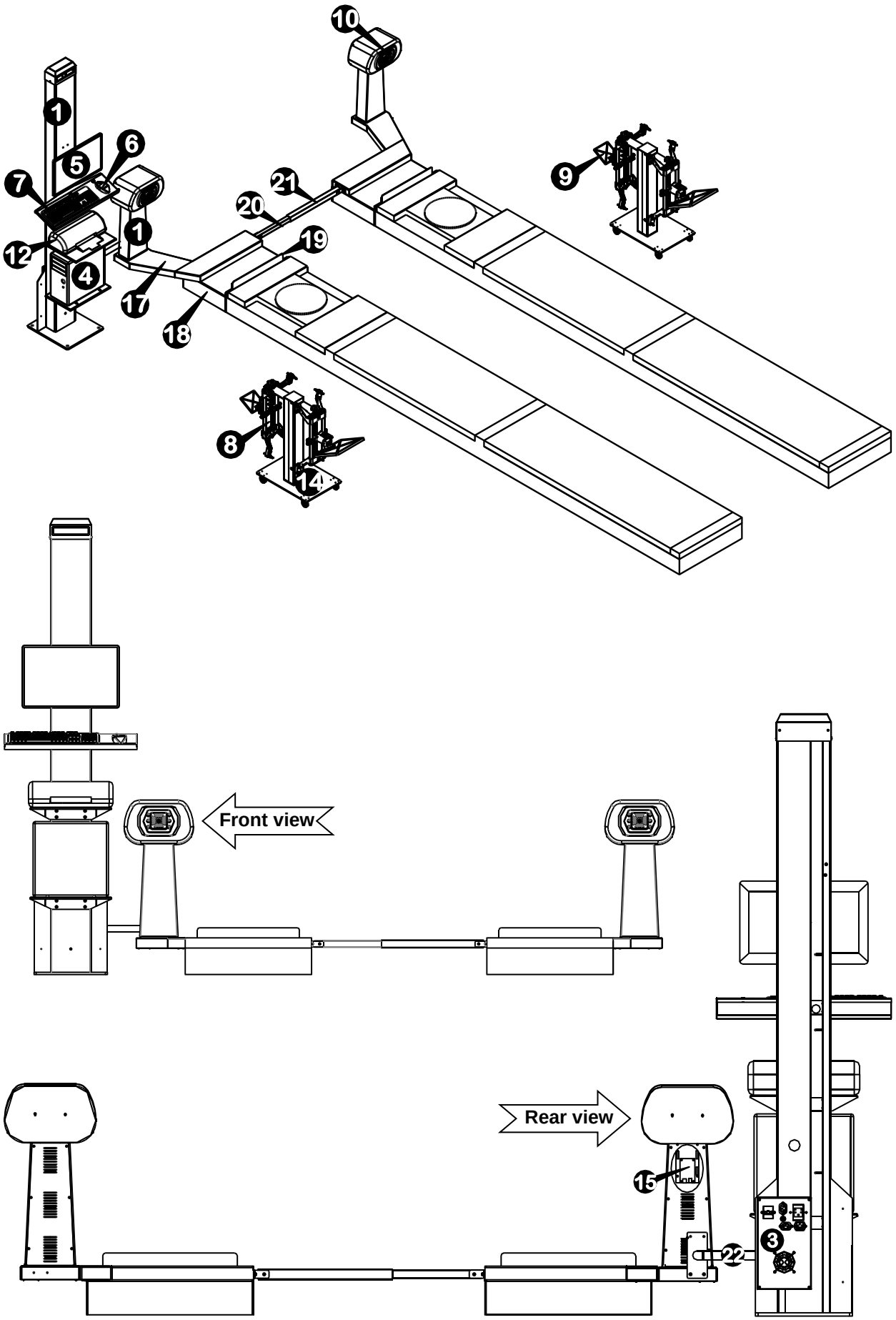


Fig. 38

Accessories mounting column

DT model

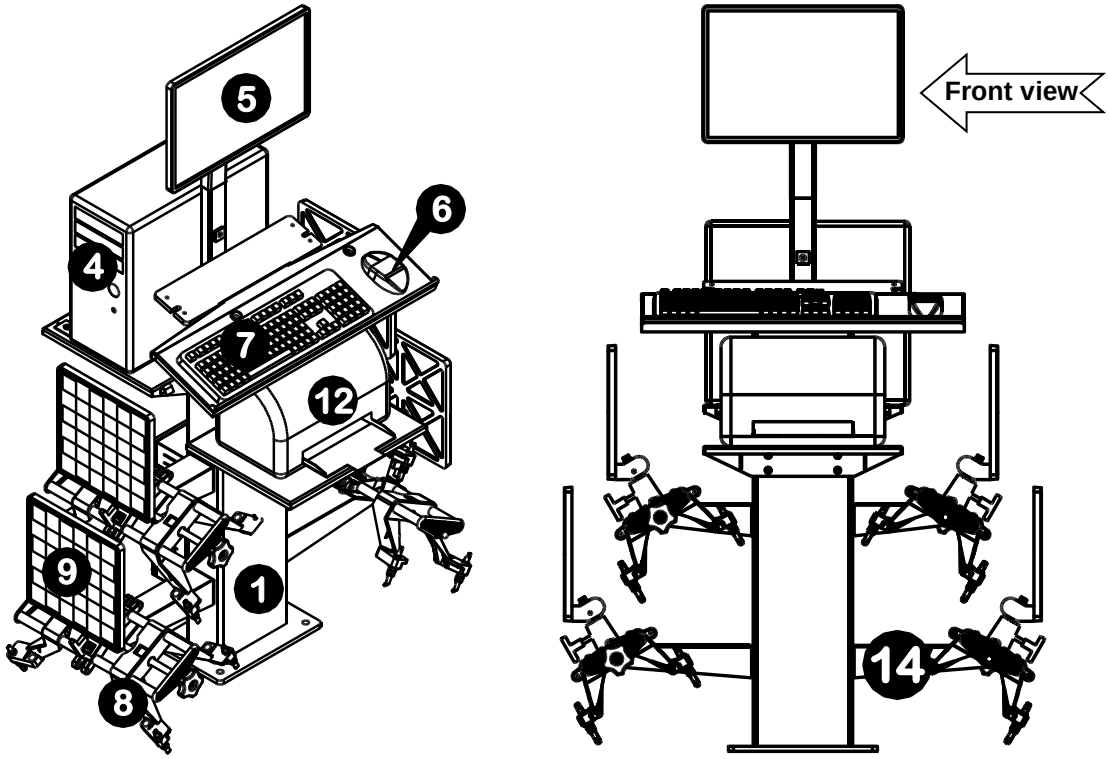


Fig. 39

In-Lift model

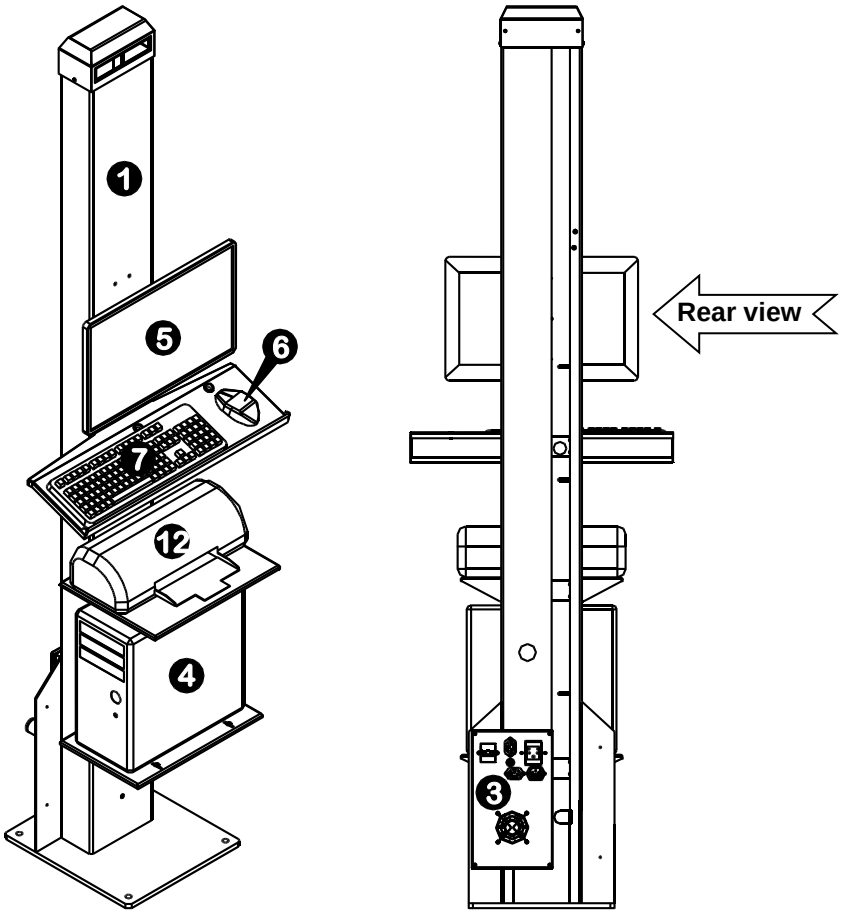


Fig. 40

Main cabinet (refer scope of supply)

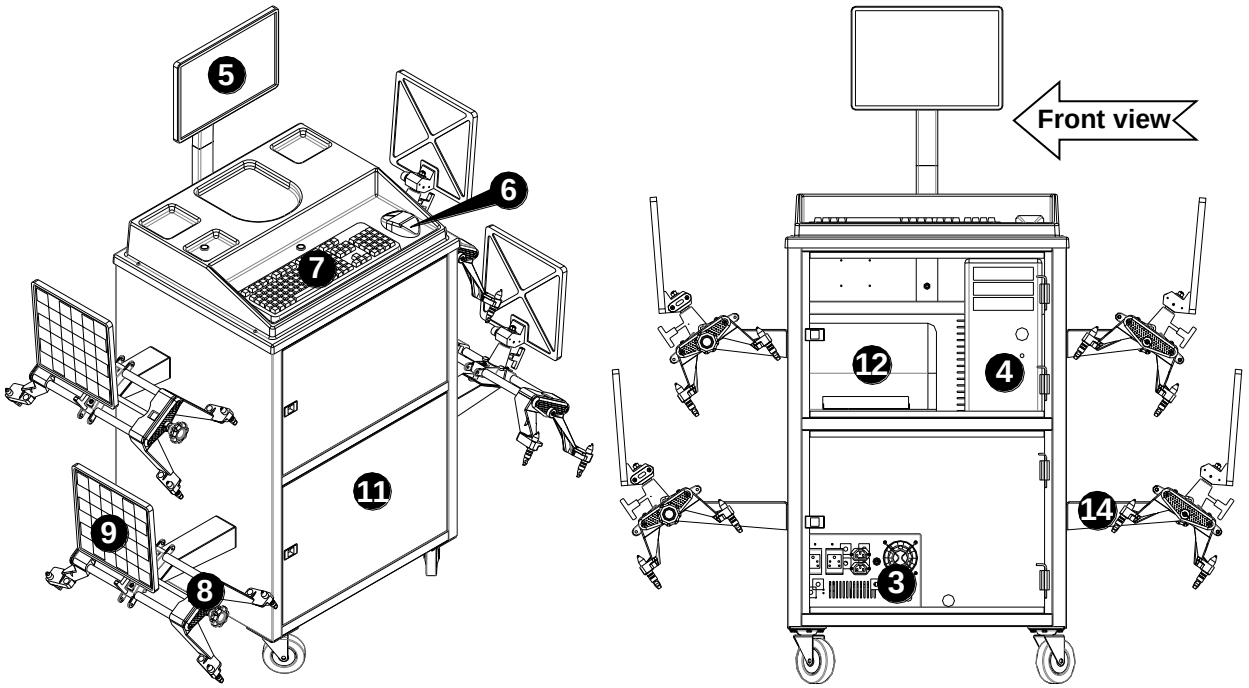


Fig. 41

Wall mount bracket (refer scope of supply)

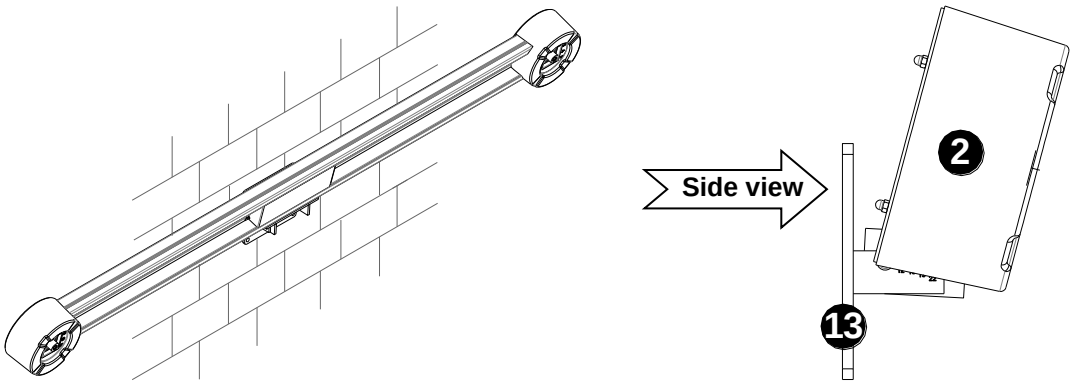


Fig. 42

Sl. No.	*Description*
1	Vertical Column (refer scope of supply)
2	Camera Beam (NA for DT / In-Lift model)
3	Interface box
4	Desktop computer (refer scope of supply)
5	Display unit (refer scope of supply)
6	Mouse (refer scope of supply)
7	Keyboard (refer scope of supply)
8	Wheel bracket (refer scope of supply)
9	Target plates
10	Camera assembly
11	Main cabinet (refer scope of supply)

Sl. No.	*Description*
12	Printer (refer scope of supply)
13	Wall mount bracket (refer scope of supply)
14	Wheel bracket holders
15	Hub board box / Panel (for DT / In-Lift models)
16	Master base plate (for DT model)
17	Wing frame (for In-Lift model)
18	Spacer (for In-Lift model)
19	Front wheel stopper (for In-Lift model)
20	Inner routing tube, Lift side (for In-Lift model)
21	Outer routing tube, Lift side (for In-Lift model)
22	Wire routing tube, PC side (for In-Lift model)

6.1. CAMERA

It is a pair of High performance SI (Scientific Imaging) Camera assembly positioned to illuminate the respective patterned Targets mounted on the Wheels and capture the reflected incident rays

A LED Driver & Hub board is associated with the Camera assemblies for control and transmission of data between Camera and Desktop computer.

In PT / VH models, the Camera assemblies (LH & RH) are mounted on a Horizontal beam and the beam is in turn fixed to a static Bracket in Vertical column.

In AutoBoom model, the Camera beam is fixed to a movable Bracket driven by Motor in Vertical column. The Software facilitates in tracking the position of target wheel and automatically adjusts the Beam to respective height.

In Wall mounting bracket, the Camera beam is fixed to the bracket.

In DT & In-Lift models, the Camera assemblies (LH & RH) are fixed to the respective Left & Right side Vertical columns.

In PT/VH/AutoBoom models, the LED Driver board & Hub board is fixed at the centre of the Camera beam with protective enclosure.

In DT model, the boards are fixed inside a Hub board box and the same is mounted on the Left side Vertical column.

In In-Lift model, the boards are fixed directly inside the Right side Vertical column for Right hand drive vehicles and Left side Vertical column for Left hand drive vehicles.

	**Radiators / heat sources should not be kept near the Camera**
	**DO NOT apply any external pressure or load on the Camera mounted beam / column which may affect the calibration settings & results in alignment errors**
	**DO NOT rest or lean on the Camera mounted beam / column while doing alignment which will disturb the settings**
	**DO NOT adjust or open the Camera assembly which may affect the overall calibration**
	**Critical electronic assemblies are housed in Camera beam and hence necessary precautions should be followed**

6.2. INTERFACE BOX

It is used for distributing & regulating power supply required for the Aligner. Power outlets are provided in the panel for Desktop computer and peripherals like Monitor, Printer & Speakers.

A High voltage cutoff MCB is also provided to protect the electronic assemblies from high voltage. It can be used to switch OFF complete power to the system after shutdown of the PC.

The Interface box is located at the rear side of Vertical column/Accessories mounting column.

In VH / AutoBoom model with Cabinet, Interface box is located inside Main cabinet. In AutoBoom with cabinet, power is distributed from the Interface box to Desktop computer and peripherals through a Distribution panel located in Main cabinet (refer scope of supply).

Following Control fuses are available in the Interface box as described below:

Control fuse - F1 is provided for protection of all electronic components in PC unit

Specifications – 3A, Dia 5mm x 20mm, Slow blow type Glass fuse

The Fuse will blow in 5 seconds (max.) for maximum current of 3A

Control fuse - F2 is provided for protection of

Monitor, Printer & Speaker (for PT/DT/VH/In-Lift models)

Specifications – 5A, Dia 5mm x 20mm, Slow blow type Glass fuse

The Fuse will blow in 5 seconds (max.) for maximum current of 5A

Motor (for AutoBoom model)

Specifications – 3A, Dia 5mm x 20mm, Slow blow type Glass fuse

The Fuse will blow in 5 seconds (max.) for maximum current of 3A

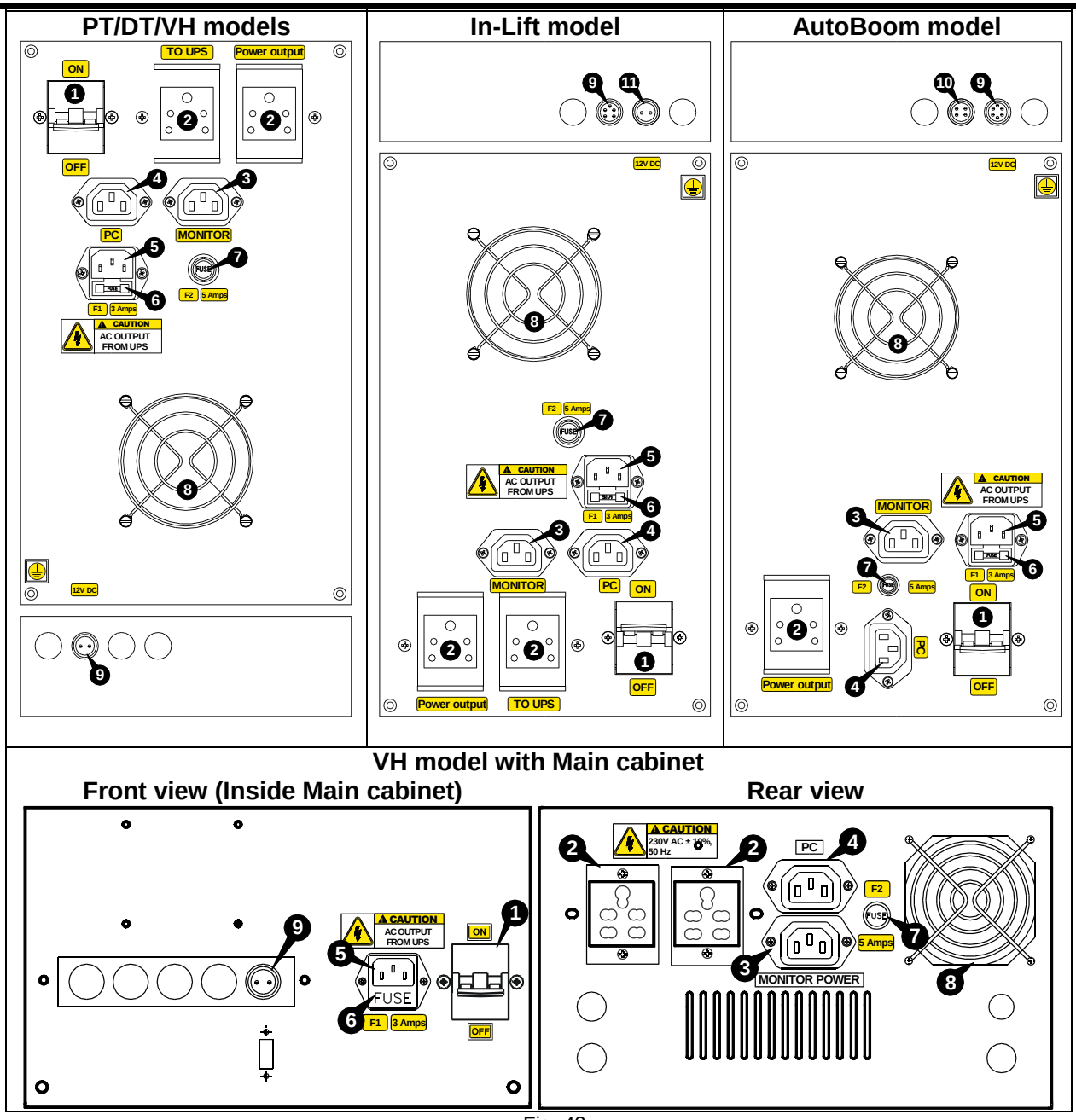


Fig. 43

Sl.No.	Description
1	MCB
2	AC output To Printer & Speaker *(for PT/DT/VH/In-Lift models)* To UPS *(for AutoBoom model)*
3	AC output To Monitor *(for PT/DT/VH/In-Lift models)* To Distribution panel *(for AutoBoom model)*
4	AC output for PC
5	AC input for Interface box

Sl.No.	Description
6	Fuse (F1) For Interface box *(for PT/DT/VH/In-Lift models)* For PC unit *(for AutoBoom model)*
7	Fuse (F2) For Monitor, Printer & Speaker *(for PT/DT/VH/In-Lift models)* For Motor *(for AutoBoom model)*
8	SMPS FAN
9	DC power to LED Driver board
10	DC power to Micro switch (AutoBoom)
11	DC power to Top cover LED (In-Lift)

6.3. TARGET PLATE

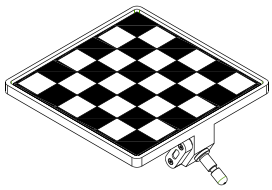


Fig. 44

Target plates contain patterned IR reflecting media to reflect incident rays from Camera assembly. A Spirit level is provided in each Target plates to ensure its horizontality.

	Handle the Target plates carefully. Rough handling / shocks may cause damage to the Target plates
	Dropping / rough handling may cause deviation in calibration. User should take utmost care to handle and maintain the Targets in good condition
	Ensure the patterned surface of Target plates is always clean from dust & scratches. Use soft & dry cloth to clean the surface. Do not use any chemicals for cleaning the surface.
	For In-Lift model, Front Target plates will of miniature type (98x98 Sq.mm). This Miniature Target plates should be used along with an Extender

Target plates are integrated with Wheel bracket as a single unit to reduce preparation time. The Target plate with Wheel bracket unit should be rested over the Wheel bracket holding clamps provided on both sides of Vertical column when it is not in use.

6.4. VERTICAL COLUMN (refer scope of supply)

	DO NOT apply any external pressure or load on the Vertical column which may affect the calibration settings and results in alignment errors
	Do not allow anyone to climb on the column

Vertical column acts as a main Tower to hold the Camera beam.

Holders & Trays are provided in the Vertical column to hold the Wheel brackets/Target plates, Computer & peripherals like Desktop computer, Display unit, Keyboard, Mouse and Printer. Interface box is fixed at the rear side of the column.

In DT model, both the Vertical columns that are positioned at the left & right sides of pit holds a Camera assembly each. Hub board box is fixed to the left side column. A separate column is placed in between the two Camera mounted columns to hold the above mentioned accessories.

In In-Lift model, both the camera mounted columns are fixed to the front face of respective Alignment lift platforms using Wing frame, Spacer and Front wheel stopper.

In VH model, the Vertical column has multiple mounting provisions to hold the Camera beam at desired height.

In AutoBoom model, the Vertical column is a Motor driven tower with Camera beam mounted on a bracket for positioning/adjusting the Beam automatically for various heights of Alignment lifts. The Motor housed at rear side of column drives the Bracket via Screw rod & Power nut.

A mechanical stopper is also provided in the Vertical column for manual intervention to stop the movement of Beam in case of any system failure.

	Manual lowering should be done by authorised personnel by rotating the Screw rod pulley only during any system failure. Do not restart the system unless the error is corrected

In case of VH/AutoBoom models with Main cabinet, the Vertical column will not have Trays or holders. Instead the Computer/peripherals & Wheel bracket/Target plates have to be placed in the Main cabinet. In VH with Cabinet model, also the Interface box will be fixed inside the Main cabinet.

This Vertical column when fixed over the Mobile base plate, can be moved to desired location among various bays and then be locked using the Caster wheel lock. While placing the Vertical column before the Alignment Pit / Lift, make sure the Camera beam is parallel to the front face of Lift.

6.5. MAIN CABINET (refer scope of supply)

Main cabinet is the housing for Desktop computer & peripherals. The Display unit is mounted on a Monitor column over the top of Main cabinet. Keyboard, Mouse & Multimedia speakers (Optional) are located on the respective cavities in Top cover.

Wheel bracket holders are provided on the sides of Main cabinet for placing the integrated Wheel bracket & Target plates when not in use.

In case of VH model with Main cabinet, Interface box will be located in the bottom of Main cabinet

6.5.1. DISTRIBUTION PANEL (Applicable only for AutoBoom model with Cabinet)

A Distribution panel is located at the rear side of cabinet for distributing the Power from Interface box to Desktop computer and peripherals

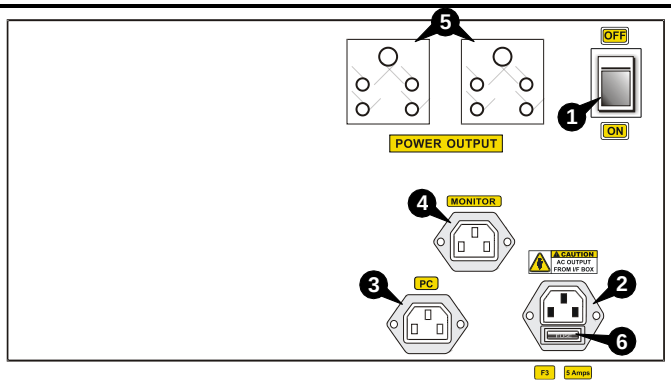


Fig. 45

Sl. No.	Description	Sl. No.	Description
1	ON/OFF DPST switch	4	AC output for Monitor
2	AC input for Distribution panel	5	AC output for Printer & Speaker
3	AC output for PC	6	Fuse (F3) for PC & Peripherals

The ON/OFF switch provided in the Panel can be used to switch OFF complete power to the system after shutdown of the PC.

Following Control fuse is available in Distribution panel as described below:

Control fuse - F3 is provided for protection of PC peripherals

Specifications – 5A, ½", Slow blow type Glass fuse

Fuse will blow in 5 seconds (max.) for maximum current of 5A

6.6. WALL MOUNTING BRACKET (refer scope of supply)

Wall mounting bracket is provided for holding the Camera beam on a garage wall

!	**DO NOT apply any external pressure or load on the Wall mounting bracket which may affect the calibration settings and results in alignment errors**

6.7. DESKTOP COMPUTER (refer scope of supply)

The Desktop computer is a Commercial branded computer used for processing the images acquired from Camera assembly to execute the alignment program and data storage.

The location of Desktop devices and peripherals connection ports may vary depending upon the manufacturer. However the following user end devices and connection ports available commonly in all models are used for our application:

Device / connection ports	Location	Purpose
Optical drive	*Front side*	*For loading / upgrading software*
3 Pin AC socket (Male)	*Rear side*	*AC input to Desktop*
VGA out	*Rear side*	*For Monitor*
USB ports	*Front / Rear side*	*For communication with USB Hub, Keyboard, Mouse, Printer, Speakers*
Audio output	*Front / Rear side*	*For Multimedia Speaker*

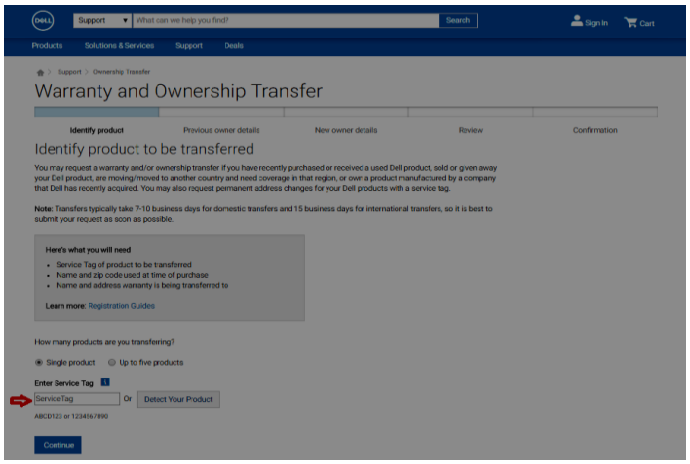
	Keep the Desktop away from radiators and heat sources
	Desktop contains Optical drives which have built-in laser devices. To prevent any risk of exposure to laser radiation, do not open the desktop / drives
	Ensure that none of the system air vents are blocked. Blocking them would cause serious thermal problems
	Clean the Desktop with a soft & clean cloth using water and then remove moisture from the surface quickly. Long term exposure to moisture may damage the surface
	The location / functions of Desktop devices / connections may vary depending upon the make of Desktop supplied. Refer Desktop manual / Soft media

Follow the procedure given below to transfer the Warranty & Ownership of Dell PC in case if supplied along with our Wheel aligner for claiming global Warranty:

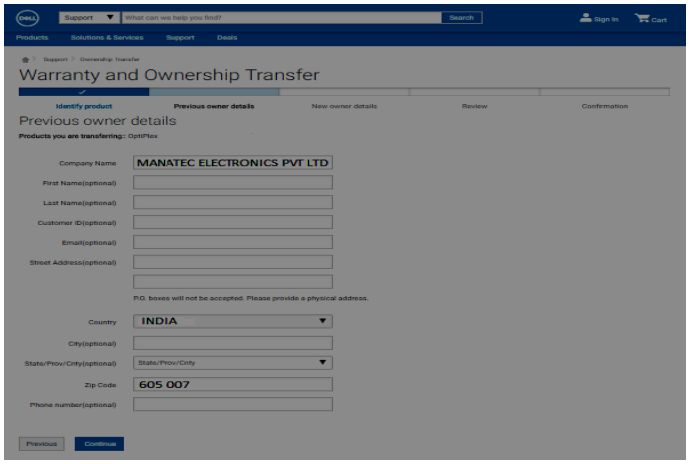
Ensure Internet is established in the PC.

Note the information provided in the Service tag affixed on top the PC cabinet and feed the same in respective field by accessing the below link as shown below:

https://www.dell.com/support/assets-transfer/in/en/inbsd1/Transfer/Index#/Identify



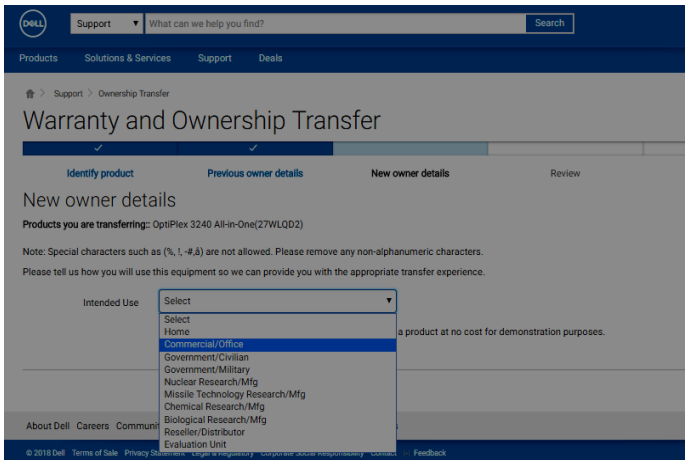
NOTE: Press “Detect Your Product” for obtaining the Service tag details automatically Press “**Continue**” button. Following screen will appear prompting the user to enter the previous Owner details:



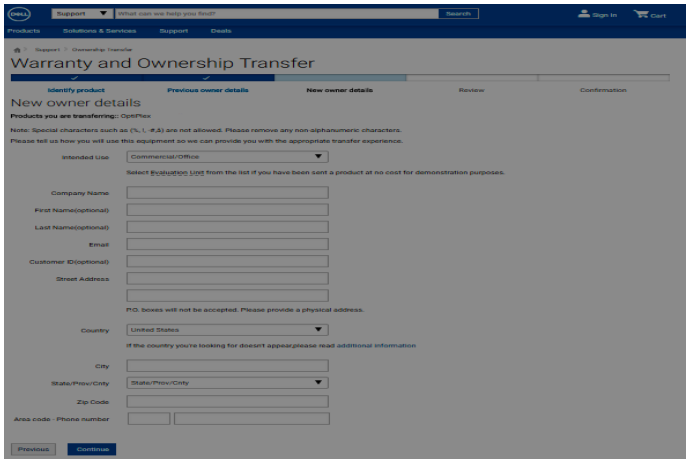
Key-in the below details and press “**Continue**” button:

Company Name: MANATEC ELECTRONICS PVT LTD
Country : India
Pin Code : 605007

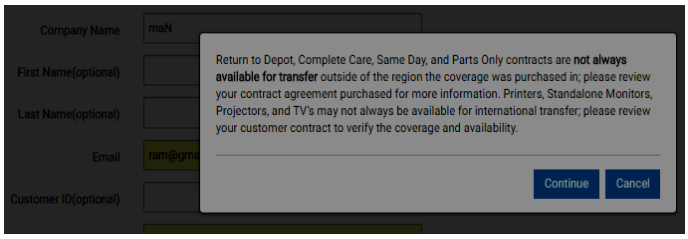
Select “**Commercial/Office**” option from the Drop down menu of “**Intended use**” as shown below and press “**Continue**” button:



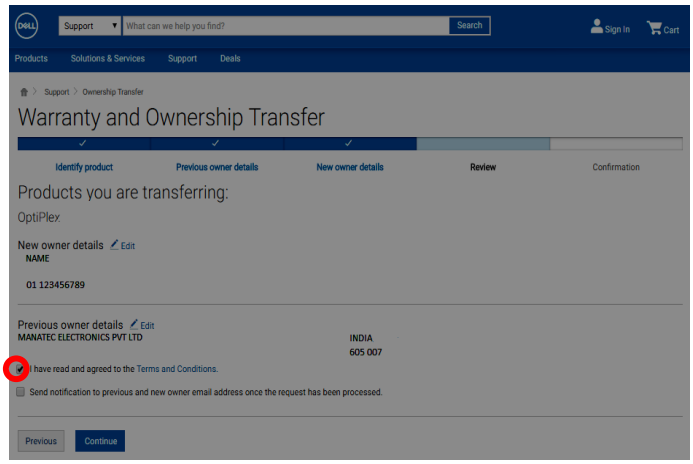
Now enter the user’s Owner details and press “**Continue**” button:



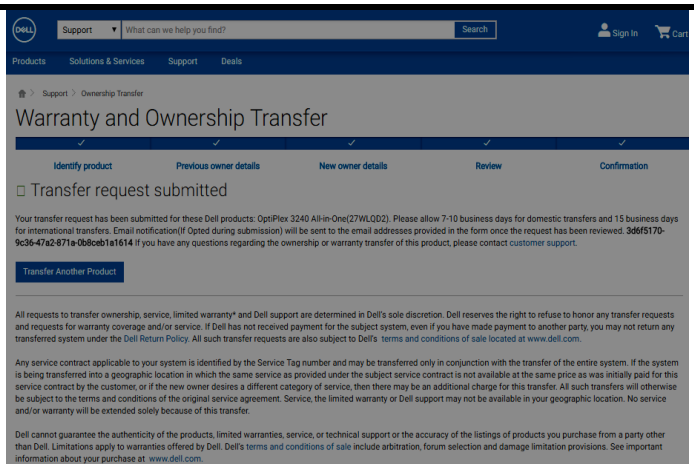
Go through the instructions displayed and click “**Continue**” button.



Review the informations provided so far before agreeing to the Terms & Conditions. Use “**Previous**” button to make changes if any.



Finally tick mark to Agree to the Terms & Conditions and press “**Continue**” button for submitting the Owner Transfer request.



NOTE: Typically Dell will take 15 business days for international transfers. Hence is advisable to convert the details at the time of installation itself.

6.8. **DISPLAY UNIT** (refer scope of supply)

The Display unit is a High resolution Color Monitor to display the alignment screens and functions. It contains a Power indicator LED, Power ON/OFF switch and various adjustments. Refer the Monitor manual / Soft media provided along with the equipment for adjustments.

	Ensure that none of the Monitor air vents are blocked. Blocking them would cause serious thermal problems
	Clean the Monitor with a soft & clean cloth using water. Remove moisture from the display quickly and keep the display dry. Long term exposure to moisture may damage the display
	The location of Monitor power indicator and controls may change depending upon the make of the Monitor supplied. Refer the Monitor manual / Soft media

6.9. **KEYBOARD** (refer scope of supply)

A standard USB or PS/2 Keyboard is connected to Desktop computer and placed over the Keyboard tray. The Keyboard is provided for operating / navigating and giving inputs during the alignment program.

	The location of Indicators and functions of Keys may change depending upon the make of the Keyboard supplied. Refer Keyboard manual / Soft media

6.10. **MOUSE** (refer scope of supply)

A standard Optical Mouse is connected to Desktop computer and placed over the keyboard tray itself. The Mouse is provided for operating / navigating and giving inputs during the alignment program.

	The location / functions of Keys may change depending upon the make of the Mouse supplied. Refer Mouse manual / Soft media

6.11. STANDARD ACCESSORIES (refer scope of supply)

⚠	**Use only the Accessories recommended by the manufacturer and handle it carefully. Failure to comply may cause injury to Operator**
❗	**Frequently inspect the accessories and clean and lubricate**

6.11.1. WHEEL BRACKET (LCV)

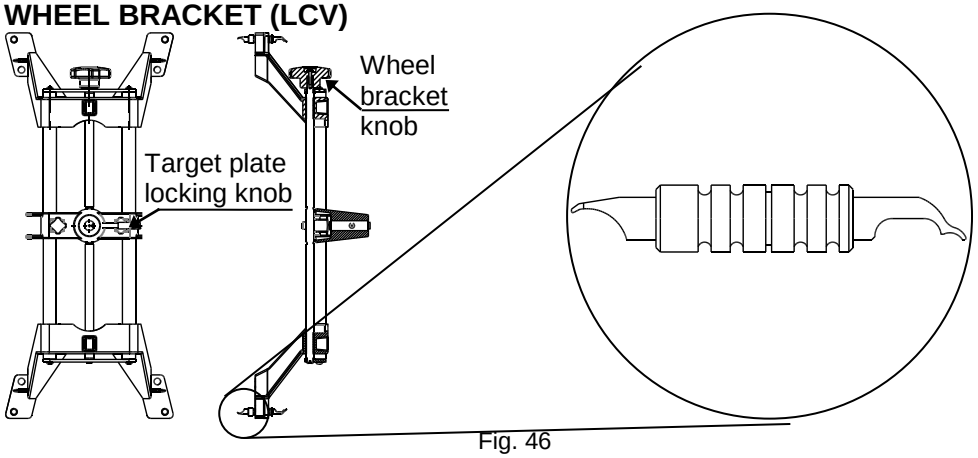


Fig. 46

This is a Self centering type Wheel bracket with quick clamping feature for mounting the Target plates to Wheel rims The Wheel bracket is a versatile design to accommodate LCV Wheel rims ranging from 12" to 24" of diameter.

The Inner PCD holes will cover from 12” to 20” sizes of rim & Outer PCD holes will cover from 20” to 24” sizes of rim.

⚠	**Handle the Wheel bracket with care. The Locating pins may have sharp edges**

Clamping of Alloy wheels

1. Outer clamping is advised for Alloy wheel. Extend the clamp outward to a size larger than the rim by turning the Wheel bracket knob in Anti-clockwise direction.
2. Place the upper Locking pins on the outside of the top of the rim. Push the Locking pin in between the Tyre bead and the rim. It may be necessary to "pop" the upper portion of the Wheel bracket with the palm of your hand to seat well. Note that it is not necessary for the Wheel bracket to be mounted perfectly vertical on the wheel.
3. Push lower Locking pins into place. Again, it may be necessary to pop them in further for security. Continue tightening knob until it is secured.
4. Tighten the Wheel bracket by turning the knob in clockwise direction until the lower Locking pins engage the rim.
5. Ensure the mounting by pulling the Wheel bracket outwards. If it comes off easily, re-mount the Wheel bracket properly.

Clamping of ordinary steel rim wheels

To clamp the wheel from the inside out using the outer lip of the rim, use the following steps:

1. Extend the Wheel bracket inwards to a size smaller than the rim by turning the Wheel bracket knob in clockwise direction.
2. Place the lower locking pins on the wheel lip at the bottom of the wheel. It is not necessary to be perfectly vertical.
3. Tighten the Bracket by turning the knob in anti-clockwise direction until the upper Locking pins engage the rim. Continue to tighten until the Wheel bracket is secure.
4. Test the security by pulling the Wheel bracket outwards. If it comes off easily, re-mount the Wheel bracket.

6.11.2. FRONT TARGET PLATE EXTENDER, 105mm Lg. (for In-Lift model only)

These spacers are provided to extend the Target plates for vehicles with smaller track width to bring it within the Camera line of sight.

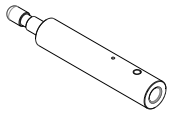


Fig. 47

6.11.3. LCV ROTARY PLATE, PPR (2 ton)

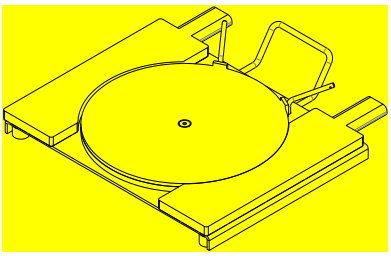


Fig. 48

The Rotary plate consists of a freely rotating plate with load capacity of 2 ton in each Rotary plate suitable for LCVs. The front wheels of the vehicle being aligned should rest on these plates. The Rotary plate helps to free up the wheel from the friction and relaxing the ball joint to its original condition. Lock pins are provided to arrest the movement of rotation while parking the vehicle over the plate for alignment. The Locking pins must be removed while taking measurements. Rubber pads to be removed while doing Caster swing alone.

The Rotary plates will be having Independent identity as Left & Right. However, to interchange these plates, provision is given to relocate the handle on either side.

The bottom plate has longer wheel rolling area at its rear side in order to avoid the wheel from rolling out during Push-Pull runout at 30°.

(a) The Rotary plates enable Left turn and Right turn movement required for measuring Caster & Kingpin angles.

(b) Measures the Toe out On Turns and Lock Angle for Front wheels

⚠	**Ensure the Top plate of Rotary plates are locked with Locking pins before parking the vehicle and Rubber pads are in its location**
❗	**The Rotary plate must be maintained properly by user free from dust**

6.11.4. LCV BRAKE PEDAL LOCK

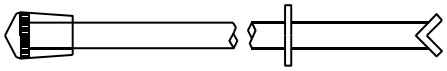


Fig. 49

Brake pedal lock is used to keep the Vehicle Brake in pressed condition (applied), so that the vehicle will not move during the Turn Left and Turn Right programs, which is very important to measure the Caster and Kingpin.

⚠	**Ensure the Brake pedal lock is pressed against the vehicle brake**
☞	**Ensure the Brake pedal lock is pressed against the vehicle brake during Caster & Kingpin swing to acquire readings**

6.11.5. STEERING LOCK

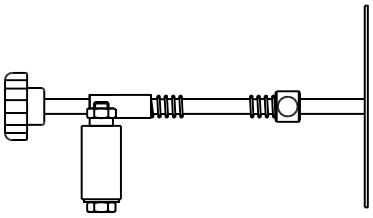


Fig. 50

Steering lock is used to arrest the movement of Steering wheel, while performing the Toe adjustment.

⚠	**Do not keep your head nearer to the Steering while locking with Steering lock to avoid get hit due to the spring tension**

6.11.6. WHEEL STOPPER

Fig. 51

Wheel stoppers are provided to arrest the movement of Wheel beyond required location during alignment process.

6.11.7. WHEEL BRACKET HOLDING POST, 2 HOLDER (For In-Lift model only)

A pair of movable Post provided to hold each 2 Nos. of Integrated Wheel bracket & Target plate units near the respective left & right side Wheels under alignment, when not in use and for quick access during alignment.

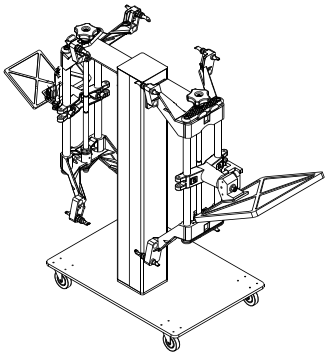


Fig. 52

6.11.8. DATA MANAGER SOFTWARE

Data manager is a smart customised software package available with alignment program for monitoring the condition of various vehicles aligned by the equipment and the performance of Wheel alignment centre on the whole. Reminder letters are automatically generated for existing customer base periodically, which helps in increasing the revenue for the garage.

6.12. OPTIONAL ACCESSORIES

6.12.1. MECHANICAL ROTARY PLATE WITH ANGLE INDICATOR (For manual measurement of Toe Out on Turns and Lock Angle)

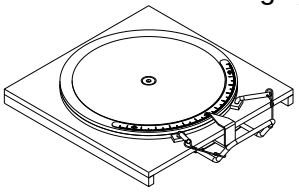


Fig. 53

Rotary plate consists of a freely rotating plate, an Angular scale and a Pointer fixed to its centre axis of rotation. While carrying out alignment, the front wheels of the vehicle being aligned will rest on these plates.

The functions of the Rotary plates are the following:

(a) Enables easy rotation of front wheels during Left turn and Right turn movement required for measuring Caster and Kingpin angles.

(b) Measures the Toe out On Turns and Lock Angle for Front wheels.

The known angle is noted manually and given as input to the Main processing unit for measurement

LCV Rotary Plate load capacity = 2 ton (each)

During Rear wheel alignment, the rear wheels are to be rested on the Rear wheel slider to accommodate the minor wheel movements.

	Ensure the Top plate of Rotary plates are locked with Locking pins before parking the vehicle
	The Rotary plate must be maintained properly by user free from dust

6.12.2. WHEEL BRACKET EXTENSION ADAPTER

This Adapter is very useful for clamping wheel rims of 10” to 26” dia., while using along with Wheel bracket (whose clamping range is 12”-24” dia). This adapter eliminates requirement of a separate Wheel bracket for HCV wheels.

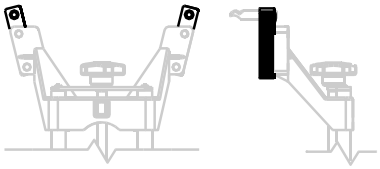


Fig. 54

6.12.3. RIM LOCKING PIN (LCV) (Double end, suitable for Steel Rim & Flat rim)

This Rim locking pin is developed for clamping different kind of Steel rims & Flat rims, compatible with 24" Wheel bracket.

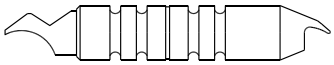


Fig. 55

6.12.4. FOUR SHAFT CALIBRATION KIT

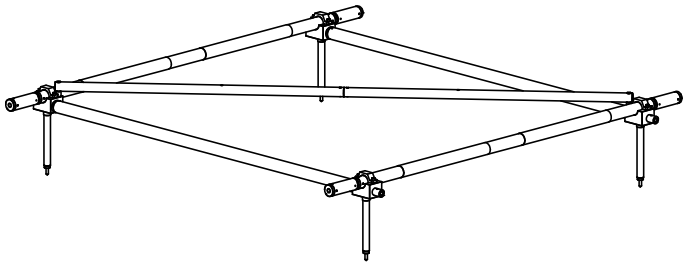


Fig. 56

Calibration kit is a simplified tool meant for calibrating the all the Target plates simultaneously and if necessary to correct it.

	Calibration is a very important function. During this process, the Calibration stand should not be jerked or moved

6.12.5. LONGER REAR WHEEL SLIDER

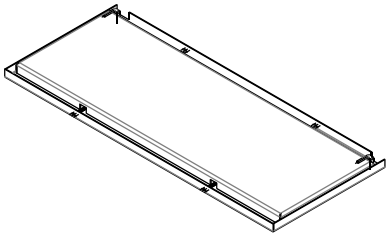


Fig. 57

This Rear wheel slider is used to accommodate wide range of wheel base (1800 to 2600mm) during Four wheel alignment. The Rear wheels will rest on the Sliding top plate with Rollers underneath to facilitate carrying out the push pull Runout & sliding movements in all the directions for easy adjustment of Rear wheel Camber / Toe. Lock pins are provided to arrest the movement while parking the vehicle over the Slider for alignment. The Locking pins must be removed while taking measurements

	The Rear wheel slider must be maintained properly by user free from dust

6.12.6. SPACER, 300 / 200mm HEIGHT (Applicable for VH & AutoBoom models)

These Spacers can be used to level the Vertical column base and alignment Lift platform surface even, in case if the Lift platform is above the ground level.

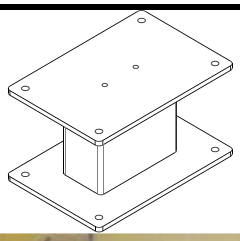


Fig. 58

6.12.7. MOBILE BASE PLATE (Applicable for VH & AutoBoom models only)
The Vertical column when fixed over this Mobile base plate can be moved to desired location among various bays and then be locked using the Caster wheel lock.

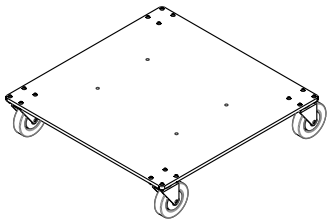


Fig. 59

6.12.8. PRINTER
A Printer option is provided with the equipment for printing the alignment reports in ISO A4 size paper. The User is provided with options for printing the alignment reports in Ordinary or in 3D Graphical format as per the requirement.

!	**Use only original ink cartridge, by indicating the respective Cartridge Model No., Printer Make and Model No. to the supplier. Failing to comply may lead to Printer head damage / improper printout**
!	**Use only standard ISO A4 size papers (210 x 297 mm) recommended by the Printer manufacturer and always ensure sufficient quantities of paper is loaded in the Printer tray. Failing to comply may lead to Improper printing / Paper jam / Printer head damage**
!	**Clean the Printer with a soft & clean cloth using water and then remove moisture from the surface quickly. Long term exposure to moisture may damage the surface**
☞	**Location of Indicators and Control buttons may change depending upon the make of Printer supplied. Refer Printer manual / Soft media**

6.12.9. MULTIMEDIA SPEAKER
Multimedia speakers (2 Nos.) are used for providing voice prompts to guide the operator throughout the alignment program.

☞	**Location of Indicators and Control buttons may change depending upon the make of Speaker supplied. Refer Printer manual / Soft media**

6.12.10. INTERNATIONAL VEHICLE DATA (refer scope of supply)

This is an Optional feature to be activated via Built-in Hardware lock by purchasing at extra cost. The readily available vehicle specifications that are compiled and released by Third parties with License can be directly uploaded in our system. These vehicle specifications are updated & released twice every year at extra cost

6.12.11. AIR MOUSE

This Air mouse can be used for operating the Wheel alignment program from the Pit itself with a distance of up to 8mtr from Display unit.

This Battery powered Air mouse operating in 2.4GHz Band width is compatible with Windows OS. A Dongle is provided along with Mouse which has to be connected with USB port of PC. Keys are provided for Navigation, Selection & Power ON/OFF. Refer the Operating instructions sent along with Air Mouse.

7. OPERATION

	**Only permit qualified personnel to operate, maintain or repair the Aligner**
	**Ensure the Top plate of Rotary plates are locked with Locking pins before parking the vehicle and Rubber pads are in its location (in case of PPR Rotary plate)**
	**Always comply with the applicable accident prevention regulations**
	**Do not hammer or hit any part of the equipment with service Tools.**
	**In AutoBoom model, manual lowering should be done by authorised personnel by rotating the Screw rod pulley only during any system failure. Do not restart the system unless the error is corrected**
	**Do not operate the equipment under direct sunlight. Even reflected sunlight reaching the camera will result in errors**
	**Air blowing equipments like Pedastal Fan should not be in the close proximity of Camera assembly as it will disturb the settings & affect the reading stability**
	**Handle the Target plate carefully. Rough handling / shocks may cause damage to the Target plates**

7.1. DEFECTS / MALFUNCTIONS

	**In case of defects or malfunctions such as etc., turn OFF the mains and contact qualified Service personnel**

7.2. PRELIMINARY ALIGNMENT PREPARATION

1. It is vital to collect required information / complaint on the vehicle being aligned from the vehicle owner prior to diagnosis for conducting a perfect alignment.
2. Perform a test drive to verify owner's complaint.
3. Ensure that Top plate of Rotary plates & Rear wheel sliders are locked with Locking pins. In case of PPR Rotary plate, ensure the Rubber pads are located on it.
4. Position the vehicle on Alignment pit / Alignment lift

   For conducting alignment on Alignment pit, refer Chapter 7.2.1.

   For conducting alignment on alignment lift, refer Chapter 7.2.2.
5. Inspect the Vehicle tyres for correct size and for any signs of abnormal wear & tear.
6. Always check for correct tyre pressure in all the four wheels. The tyre pressure must be uniform for both front wheels and for both rear wheels as per the specification.

	**Unequal Tyre pressure may lead to improper alignment**
7. Inspect the vehicle parts like Front & Rear suspensions, Bearings, Steering, Ball joints, Tie rod etc., thoroughly for any play / looseness / wear & tear. Replace the defective parts if any.
8. Ensure that there is no excessive free play in steering mechanism and linkage.
9. Adjust the Wheel bearings if required.
10. Ensure that there is no excessive Runout in the wheels.
11. Place the Test loads in vehicle (if specified in Vehicle manual).
12. Mount the four Target plates on the wheels appropriately using Wheel brackets. Wind the Safety rope around Wheel bracket & hook both the ends to Wheel rim.
13. Ensure all four Target plates are visible in screen by pressing **CAMERA** button.
14. Re-center the Steering wheel & re-adjust Front Toe if needed – crooked Steering wheels are the leading cause of customer dissatisfaction with wheel alignments.
15. Take a printout for comparing the results before and after alignment
16. Balancing of the wheels is also recommended before alignment.

7.2.1. ALIGNMENT USING ALIGNMENT PIT (Applicable only for PT/DT/VH/Wall mount models)

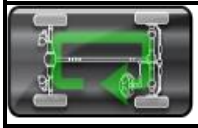
Park the Vehicle in the Alignment bay so that both the Front wheels rest on exact centre of Rotary plates and the Rear wheels rest on Rear wheel sliders.

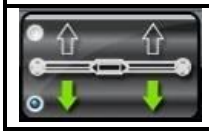
7.2.2. ALIGNMENT USING ALIGNMENT LIFT (Applicable only for VH/Wall mount/ AutoBoom / In-Lift models)

	**Secure the vehicle with the Alignment lift properly as instructed by the Lift manufacturer. Failure to comply may lead to risk of crushing or serious injury, if vehicle rolls off the lift**
	**Leave Automatic transmission in park or Manual transmission in gear unless equipment operation steps require vehicle in Neutral**
	**Apply Parking brake unless equipment operation steps require wheel movement**
	**Use Wheel stopper whenever vehicle is positioned on the Alignment lift**
	**Follow the Alignment lift manufacturer's safety recommendations while lifting a vehicle. MANUFACTURER IS NOT LIABLE FOR ANY DAMAGES CAUSED due to non-compliance**

1. Drive the vehicle over the Alignment lift and stop just before the Rotary plates. Ensure the vehicle is centered on the bay.
2. Place the Vehicle in Park and turn OFF the Ignition system. Pull the hand brake.
3. Place Wheel stopper behind the tyres to prevent the vehicle from rolling off the lift.
4. Position the Rotary plates as needed to insure the wheels are centered.
5. Bring the vehicle to Neutral condition and release Brake pedal lock and move the vehicle forward to place over the Rotary plates Now reposition the Wheel stopper and change the vehicle transmission to Park and then apply Brake pedal lock.
6. Raise the Lift to a solid, level lock position.
7. Place the Transmission in Neutral and release the parking brake just before beginning the Vehicle positioning process.
8. If vehicle calls for adjustment, raise the Lift to a solid level & lock the position.

SCREEN BUTTONS & ITS FUNCTIONS

	To go to previous screen
	To go to next screen
	To skip the current operation
	To go to ***Welcome*** screen
	To save the data
	To print Data / Report
	To view the Report
	To export as PDF document
	Help
	Camera view
	To select the Vehicle
	To enter the Vehicle data
	To view / edit Vehicle Inspection
	To redo alignment
	To perform Runout

	To redo Caster
	To view additional parameter of Rear wheels
	To view additional parameter of Front wheels
	To view Vehicle specifications
	To view vehicle data
	To add new Vehicle data
	To edit existing vehicle data
	To export vehicle data
	To save Vehicle data
	To delete existing vehicle data
	To add User name & password
	To edit User name & password
	To save User name & password
	To delete User name & password
	Lift compensation program
	Camera beam Home position (for AutoBoom V4 only)

7.3. MAIN MENU

Welcome screen will be displayed with following options if Alignment is selected:

Fig. 60

START

To conduct Four wheel alignment. First, existing condition of Rear wheels will be measured and displayed. Then Rear wheel parameters are corrected & Thrust angle is compensated in Front Toe during Front wheel alignment. It reduces Tyre wear & improves vehicle performance.

Refer Chapter 7.4

SETTINGS

To go to ***Special options***. Special Options is to perform all system related activities, such as Vehicle specification entry etc. Since this a critical function dealing with alignment specifications, etc., a Password (Default password: supervisor) is given to the customer to access Special options. Normally this Password must be kept as a secret by a responsible person, say the Owner of the Shop. If by chance the Password has come to other's knowledge, a Password modification provision is also given, using which the owner can change Password.

Refer Chapter 7.7

HELP

On-line help. This option can also be selected by pressing **F1** key

	Online help can be accessed from all the screens by pressing F1 key to guide the user while performing alignment and to know about the active keys available in that particular screen

LANGUAGE SETTINGS

To enter into Language settings

User can select the preferred language out of available options so as to display alignment screens & Voice prompts in their regional languages

Refer Chapter 7.8

DATA MANAGER

To enter into Data Manager Program

Data manager is smart customised software for monitoring condition of various vehicles aligned by the equipment and the performance of the Wheel alignment centre on the whole.

Refer Chapter 7.6

QWA

This program can be selected in order to avoid the elaborate alignment procedure and to save alignment time.

Refer Chapter 7.5

SHUT DOWN

To Shut down the program

	To avoid damaging important files, it is necessary to shut down Windows properly before turning OFF or restarting the aligner

7.4. ALIGNMENT

If **START ALIGNMENT** button is pressed in the ***Welcome*** screen, ***User Login*** screen will be displayed as shown below:

Fig. 61

Select required User and key-in the Password and then press **NEXT SCREEN** button.

Fig. 62

7.4.1. VEHICLE SELECTION

Select the Vehicle databank from the following options in the screen:

On selection of Vehicle databank, following screen will be displayed:

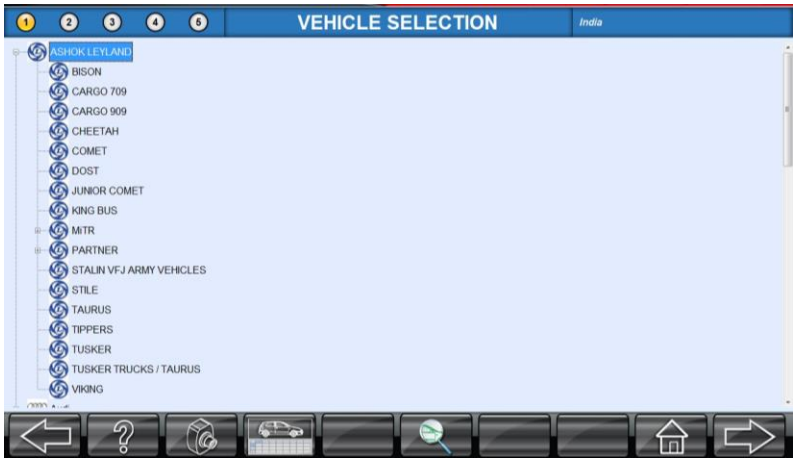
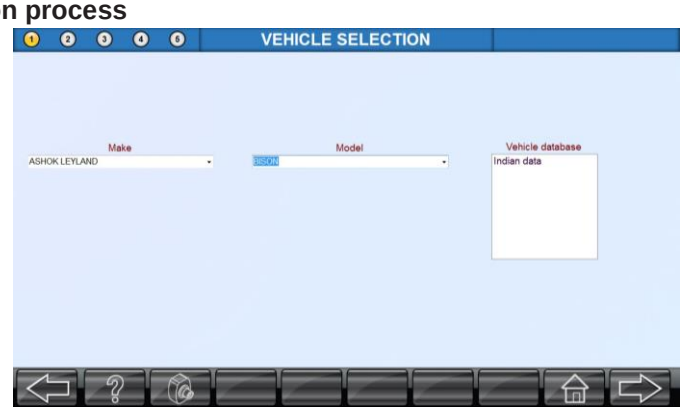


Fig. 63

User can also search & select the required vehicle quickly by pressing VEHICLE SEARCH button by providing the Vehicle Make, Model & Database as input, instead of going through standard selection process



7.4.1.1 NORMAL VEHICLE SELECTION (Without Ride height spec.)

For normal vehicles without Ride height specifications, click alignment specification button to see the vehicle specifications.

Vehicle parameters are grouped as

(i) Primary angles as shown below:

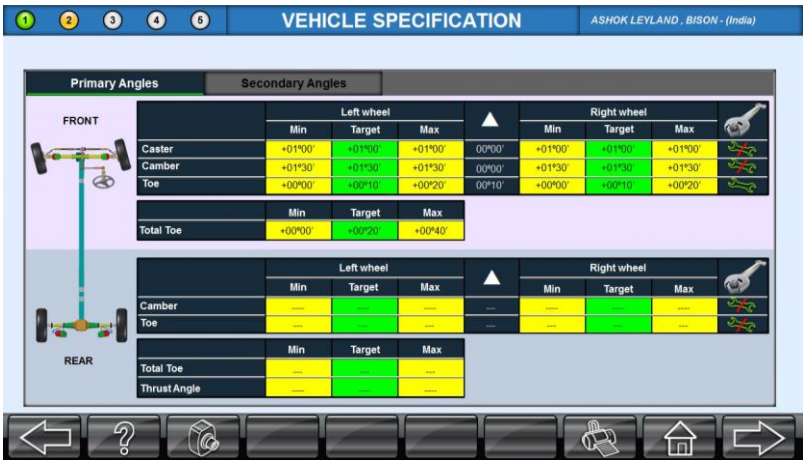


Fig. 64

(ii) Secondary angles as shown below:

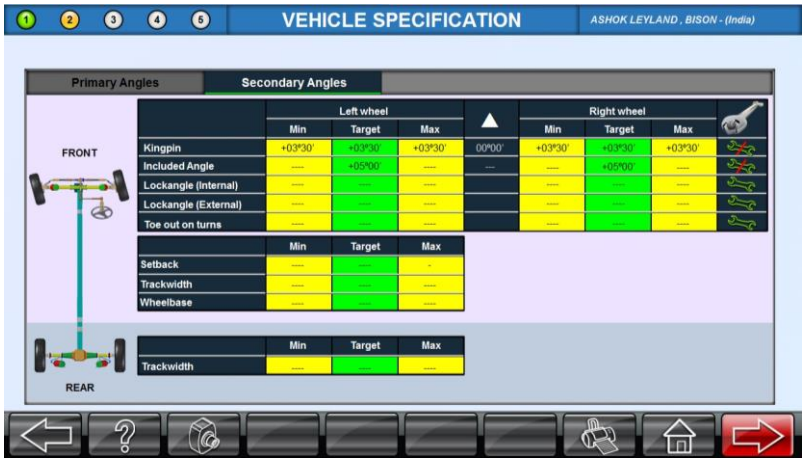


Fig. 65

Required specifications for the particular model can be viewed by selecting respective options.

7.4.1.2 RIDE HEIGHT BASED VEHICLE SELECTION

Most of the International vehicle specifications prescribed by the Manufacturers are dependent on Ride height measurement. Variations in ride height may alter required specifications.

For vehicles with Ride height specifications, following Ride height input screen will be displayed:

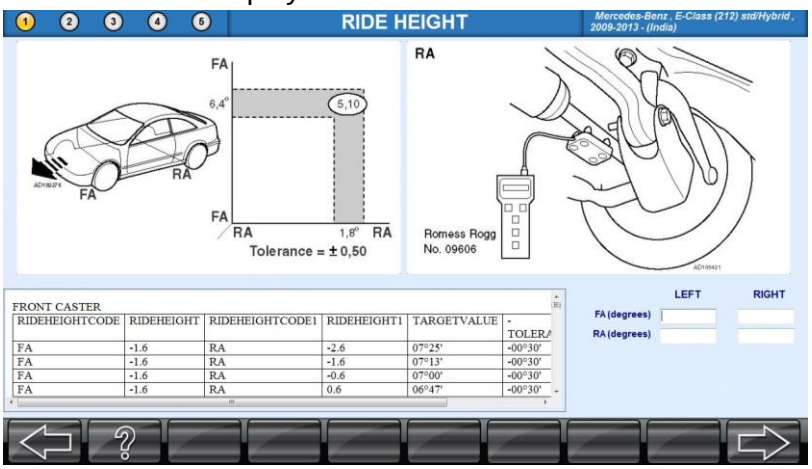


Fig. 66

Measure the points shown in the Car illustration and enter the height in the respective boxes.

If the ride height values are not entered or not within manufacturer's specified range, the following message screen will be displayed:

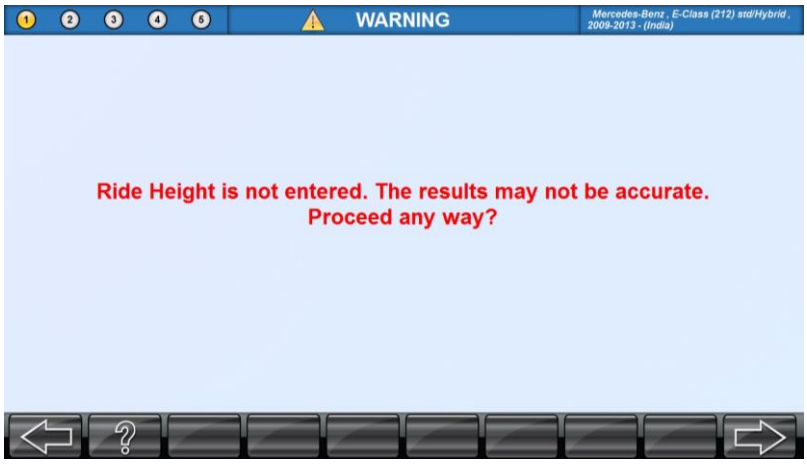


Fig. 67

Note: Ride height based input is very important. If the input is skiped, the entire alignment specification will go wrong.

Press **NEXT SCREEN** to go to ***Customer data input*** screen.

7.4.1.3 CUSTOMER DATA INPUT

After Vehicle selection, following ***Attention*** screen will be displayed:

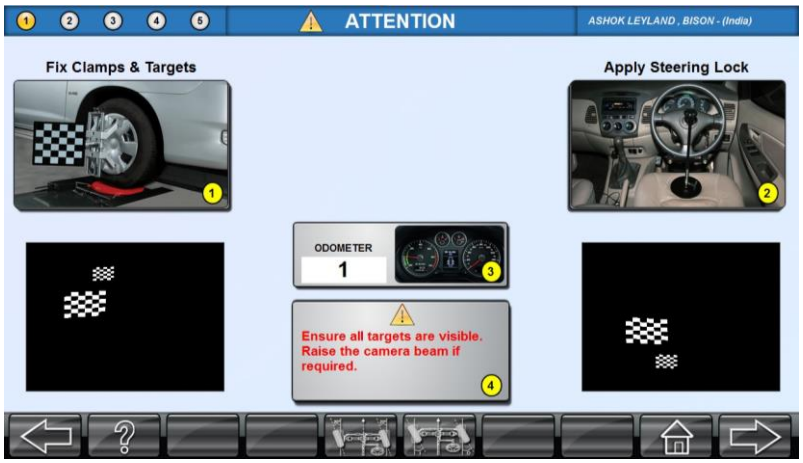


Fig. 68

	If lift is used, adjust the Lift position to required height to ensure the target images are visible

	If Odometer input setting is enabled in *Settings*, User can key-in the Odometer reading in the *Attention* screen itself

	Select TOE OUT ON TURNS / LOCK ANGLE buttons in *Attention* screen if the parameters need to be measured. If LOCK ANGLE is selected, both Toe Out on Turns & Lock angle will be measured simultaneously 

Follow the On-screen instruction and press **NEXT SCREEN**.

Following screen will be displayed:

Fig. 69

Enter required input. All the above data will be recorded in Alignment report which can be printed after completing the alignment.

Press **NEXT SCREEN** after entering all the data to go to ***Vehicle Inspection*** screen.

7.4.2. VEHICLE INSPECTION

	Vehicle inspection is not a mandatory process during alignment. However this is a selectable feature to give value added service

The different parameters for *Pre-alignment, Tyre*, *Brake*, *Under hood*, *Under car & General* conditions for the Vehicle will be displayed in this window.

Fig. 70

Fig. 71

Fig. 72

Fig. 73

Fig. 74

Fig. 75

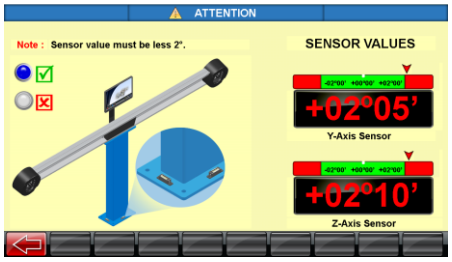
Check the condition of each parameter for the Vehicle and select the required data to record in Alignment report. Press **NEXT SCREEN** button to ***Attention*** screen. Press **PREVIOUS SCREEN** button to go back to previous screen.

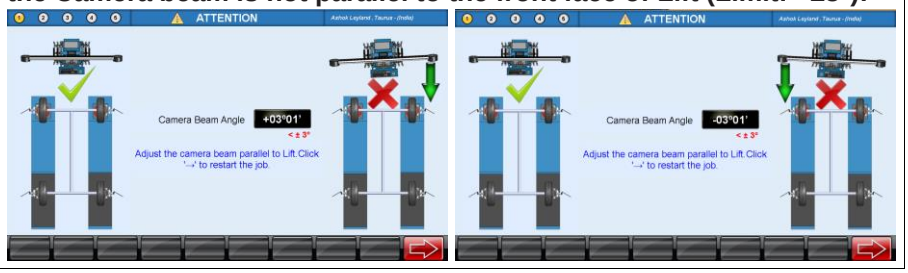
7.4.3. WHEEL RUNOUT

⚠	**For VH/AutoBoom/In-Lift models, recommended roof height is 4300mm. DO NOT lift the vehicle beyond recommendation. Violating the above requirement may result in damage to Vehicle or human injury. MANUFACTURER is not liable for any damages caused**

☞	**While doing Runout using VH model, the Lift has to be raised to 1100 to 1400mm to ensure the line of sight for Camera**

The purpose of this program is to find out the Wheel Runout (wobbling) and effect the "Runout compensation" automatically in the subsequent programs while Camber and Toe are measured / adjusted.

☞	**In VH/AutoBoom Smart models, following screen will be displayed if the Y & Z axis of Camera beam are more than 2°:** 

☞	**In VH/AutoBoom smart models, following screen will be displayed if the Camera beam is not parallel to the front face of Lift (Limit: <±3°):** 

☞	**Following screen will be displayed if the Vehicle requires pre-loading as specified in the Alignment specification. Load the amount of weight at indicated locations as displayed in the screen:** 

Park the vehicle over the centre of the Rotary plate.

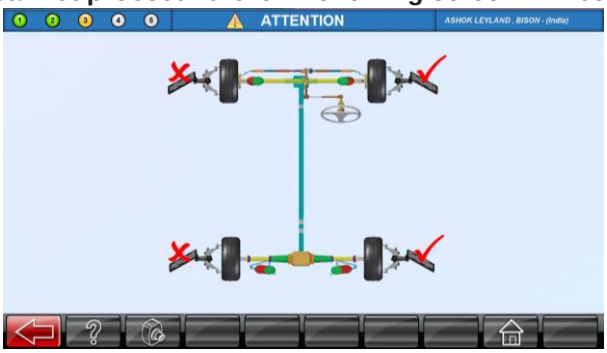
Mount the Wheel braket along with Target plates. Ensure that the respective Target plates are mounted in respective Wheel. Ensure the level of Target plates by checking the individual spirit bubbles.

☞	**DO NOT interchange the Target plates between wheels which may lead to error in alignment results**

⚠	**Keep hands & other body parts away from jacking surfaces. Follow jack manufacturer's safety recommendations. Failure to comply may lead to injury**

Press **NEXT SCREEN** button to proceed to next screen. The system will identify the Target plates mounted on the wheel as shown below :

Fig. 76

☞	**During Runout, if any obstruction exists in front of two Camera, the above screen will appear until the obstruction removed. Otherwise alignment cannot proceed further. Following screen will be displayed:** 

☞	**While doing Runout, DO NOT jerk the Vehicle or the Target plates which may cause abnormal Runout**

⚠	**Lock the Rotary plates & Rear wheel sliders with Locking pins before parking the Vehicle over the Rotary plate. In case of PPR Rotary plate, locate the Rubber pads on the Rotary plates**

⚠	**Ensure the Vehicle is in Neutral position with Hand brake released**

⚠	**Place Wheel stopper before the Front wheels and 0.5metre behind the Rear wheels to arrest excessive movement of vehicle while carrying out the Push Pull Runout**

⚠	**While moving the Vehicle in Forward / Backward direction as guided by the screen, DO NOT move the vehicle beyond the target region to avoid from rolling off. Manufacturer is not responsible for any damage or loss due to non-compliance**

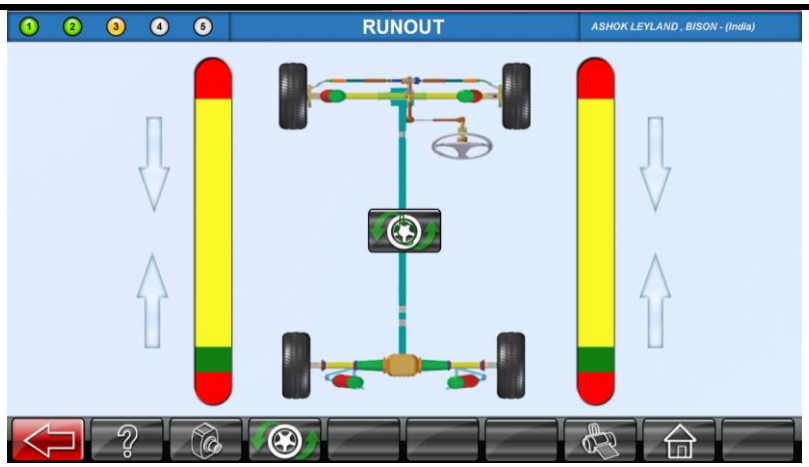


Fig. 77

Press **RUNOUT** button to start the Push Pull Runout measurement. Carryout Push Pull operation as guided in the system screen. Pull the Vehicle backward until the ball matches with the Target region. Following screen will be displayed:

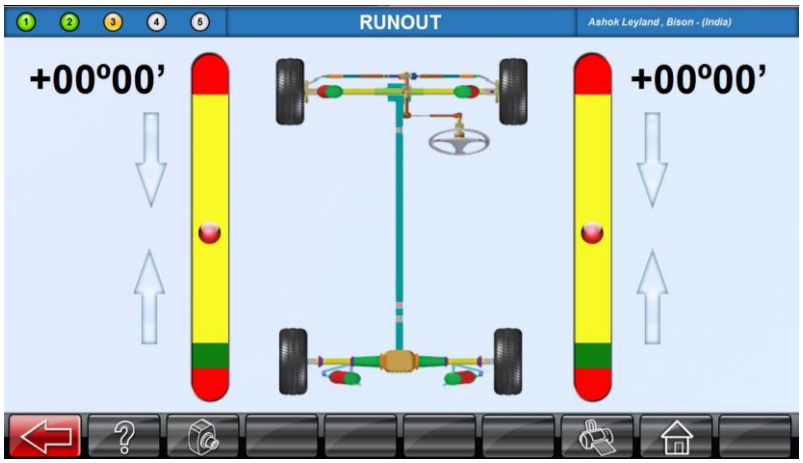


Fig. 78

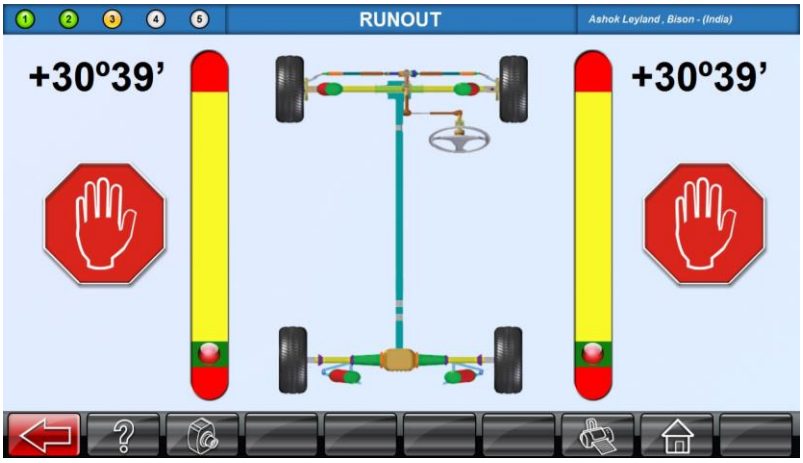


Fig. 79

Once the data is acquired, push the Vehicle forward until the ball matches with the Target region. Then the following screen will be displayed:

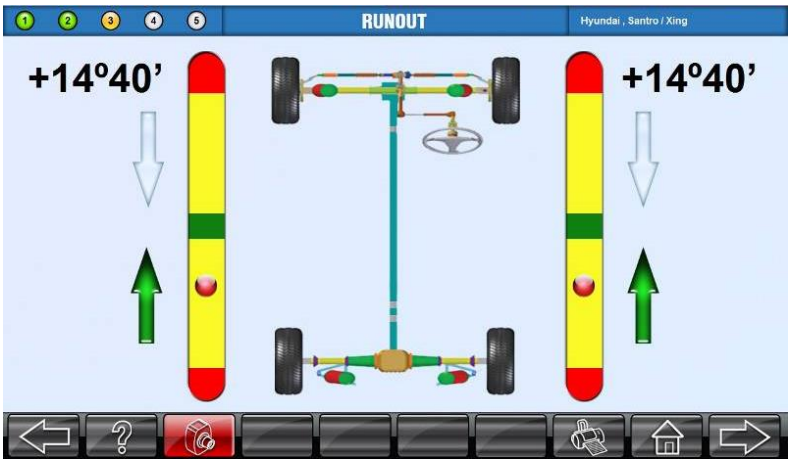


Fig. 80

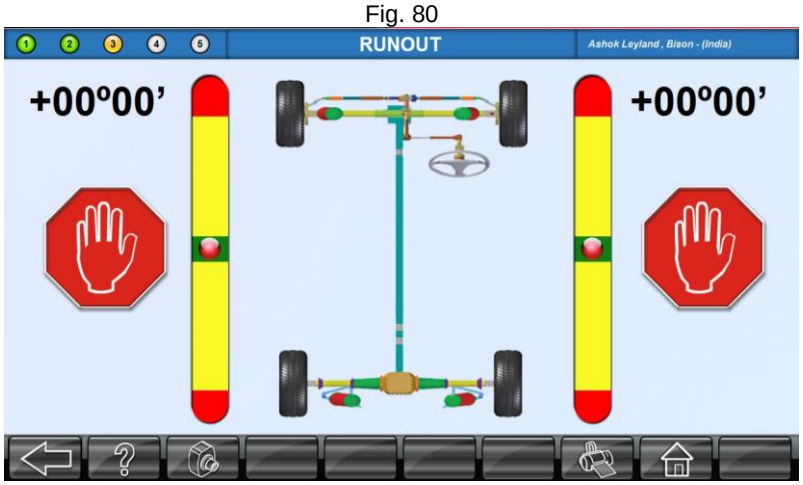


Fig. 81

After the data is acquired, bring back the Vehicle to the centre of the Rotary plate and follow the on-screen instructions.

Fig. 82

Apply Brake pedal lock and remove the Rotary plate & Slider locking pins and then jounce the vehicle. Ensure the level of Target plates using spirit bubble.

Press **REPORTS** button to view the Alignment results

Press **HELP** button to get Help

Press **PREVIOUS SCREEN** to go back to previous screen

Press **WELCOME SCREEN** button to go to Home screen

Press **NEXT SCREEN** to go to next program.

☞	**Remove the Locking pins from Rotary plate & Rear wheel slider once the Runout measurement is completed**

7.4.4. CASTER SWING

The Caster and Kingpin angles are differential angles and cannot be measured directly. Hence a sequence of procedure is required to measure the parameters.

☞	**Ensure that the Brake pedal lock has been fixed properly**
☞	**In case of PPR Rotary plate, remove the Rubbers pads while doing Caster swing**
☞	**Do not jerk or shake the Steering wheel during data acquisition**
☞	**Hold the Steering wheel at the end of each move to acquire stable measurement of Caster / Kingpin. Do not rush into turns**

7.4.4.1 TURN LEFT

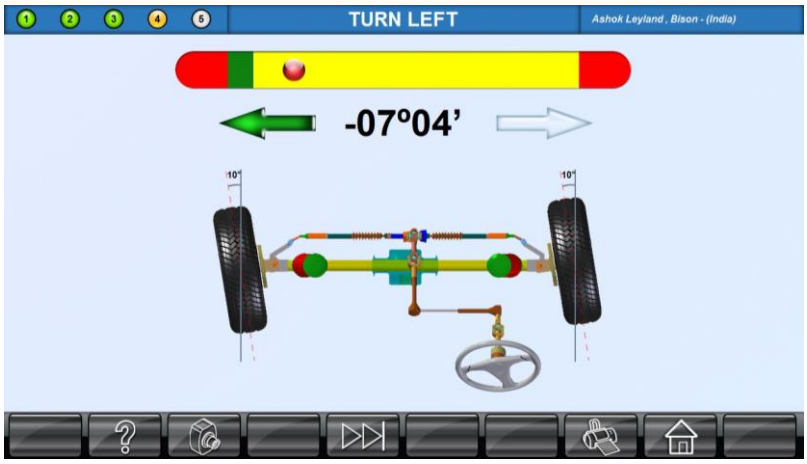
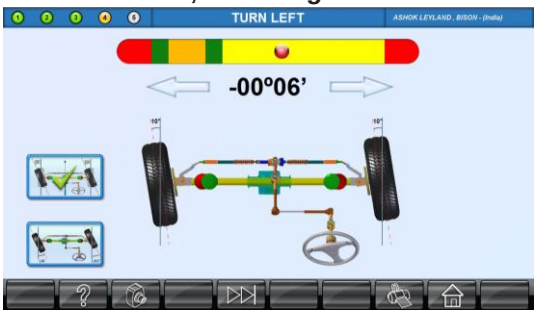


Fig. 83

In this screen, a Steering diagram can be seen and a Flashing arrow will indicate the direction in which the Steering wheel is to be turned. Steer the wheels to left until the moving BALL fully matches with left GREEN region. The system will display "***Stop***" icon and measures the parameters.

☞	**If TOE OUT ON TURNS button is selected in *Wheel runout* screen for measurement, following screen will be displayed:**  **Steer the wheels to left until the moving BALL fully matches with 1st left GREEN region (set for 10°). The system will display "Stop" icon and measures the parameter at 10°. Again steer the wheel to left further until the moving BALL fully matches with 2nd left GREEN region (set for 20°). The system will display "Stop" icon and measures the parameter at 20°**

If LOCK ANGLE button is selected for measurement (Not applicable for In-Lift model), both Toe Out on Turns & Lock angle will be measured simultaneously as shown below:

Steer the wheels to left until the moving BALL fully matches with 1st left GREEN region (set for 10°). The system will display "Stop" icon & measures Toe Out On Turns parameter at 10°. Again steer the wheel to left further until the moving BALL fully matches with 2nd left GREEN region (set for 20°). The system will display "Stop" icon and measures Toe Out on Turns parameter at 20°. Finally steer the wheel to extreme left and hold for few seconds until "Stop" icon appear on the screen & the system measures Lock Angle parameter

After data acquisition, system will automatically change to ***Turn Right*** screen.

7.4.4.2 TURN RIGHT

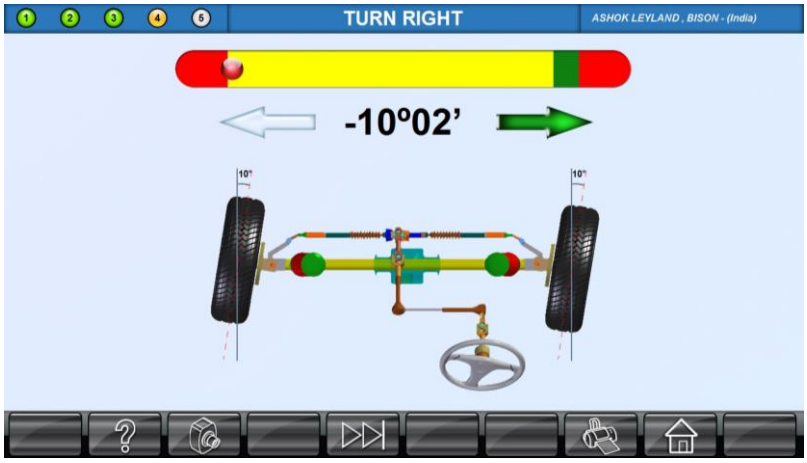
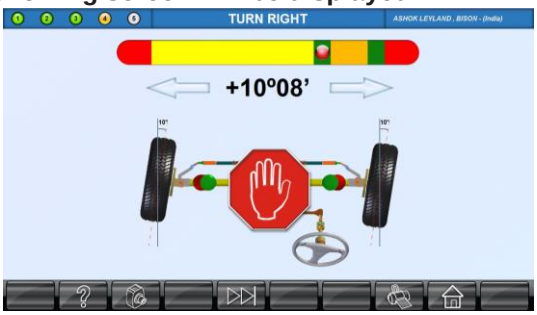


Fig. 84

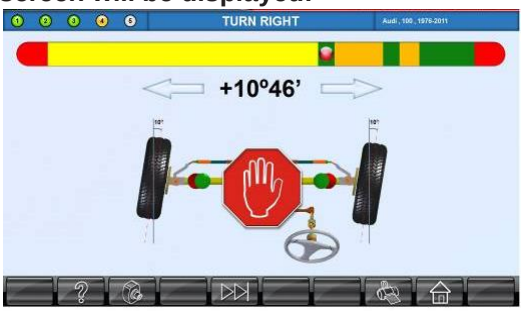
Steer the wheels to right until the moving BALL fully matches the right GREEN region. After reaching the Right Green region, the system will display "***Stop*** " message and measures the parameters.

If TOE OUT ON TURNS button is selected in *Wheel runout* screen, following screen will be displayed:



Steer the wheels to right until the moving BALL fully matches with 1st right GREEN region (set for 10°). The system will display "Stop" icon and measures the parameter at 10°. Again steer the wheel to right further until the moving BALL fully matches with 2nd right GREEN region (set for 20°). The system will display "Stop" icon and measures the parameter at 20°

If LOCK ANGLE button is selected in *Wheel runout* screen, following screen will be displayed:



Steer the wheels to Right until moving BALL fully matches with 1st right GREEN region (set for 10°). The system will display "Stop" icon & measures Toe Out on Turns parameter at 10°. Again steer the wheel to right further until the moving BALL fully matches with 2nd right GREEN region (set for 20°). System will display "Stop" icon & measures Toe Out on Turns parameter at 20°. Finally steer the wheel to extreme right and hold for few seconds until "Stop" icon appear on the screen & the system measures Lock Angle parameter

7.4.4.3 STRAIGHT AHEAD POSITION

Fig. 85

This screen is to instruct the User to bring the Front wheels to Straight ahead position. Steer the wheels until the moving BALL fully matches the centre GREEN region.

When Straight ahead position is achieved, system will automatically displays "***Stop!***" icon and stop turning the Steering wheel. If the Straight ahead is disturbed, the icon will vanish and the arrows will blink and guides to indicate in which direction to turn the Steering wheel to get back the Straight ahead position.

Now adjust the Steering wheel straight manually for fine adjustment till the Red ball in the Green region reaches the centre white region, followed by a "***Stop!***" icon and then goes to next screen.

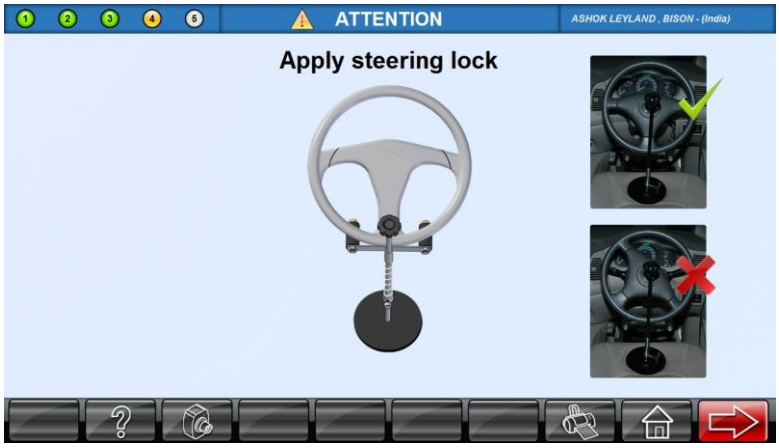


Fig. 86

Lock the Steering wheel in straight position visually and then press **NEXT SCREEN** button to view the Alignment results of existing condition of the vehicle in Live mode. Here printout of the Initial measurement results can be taken.

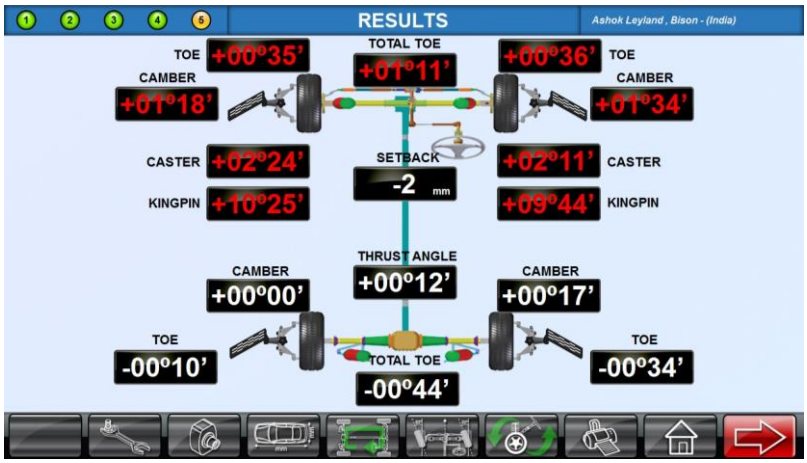


Fig. 87

Press **NEXT SCREEN** button to proceed for the adjustment operation.

To view the Vehicle dimensions, press **VEHICLE DIMENSION** and following screen will be displayed:

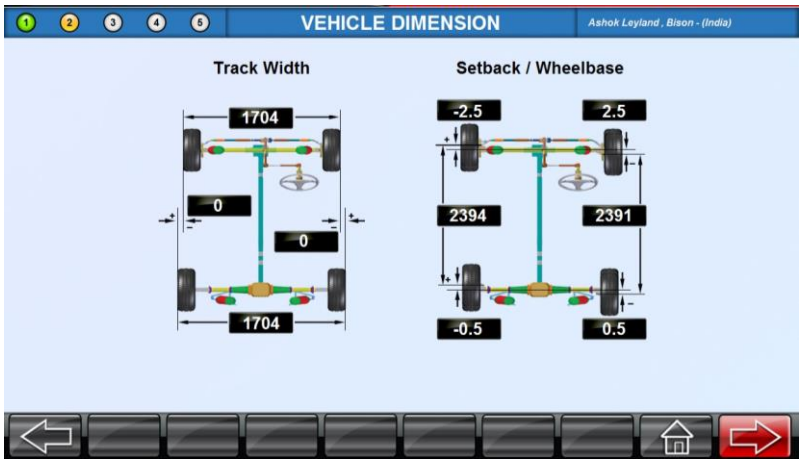


Fig. 88

To view the Toe Out on Turns readings, press **TOE OUT ON TURNS** button**:**

Fig. 89

To view the Lock Angle readings, press **LOCK ANGLE** button**:**

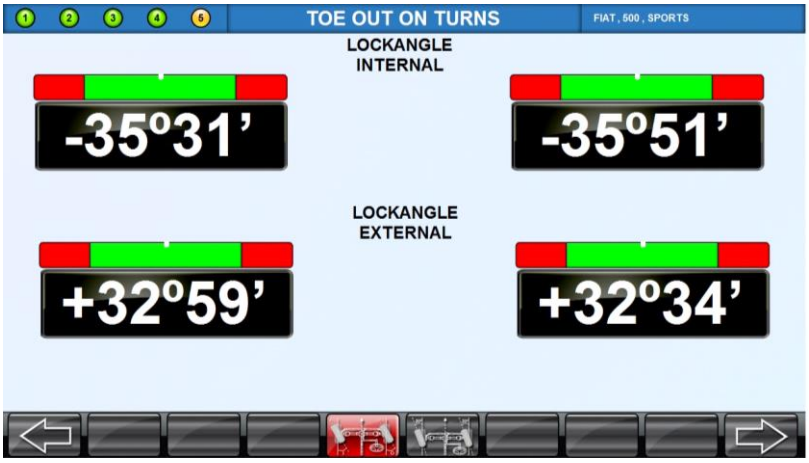


Fig. 90

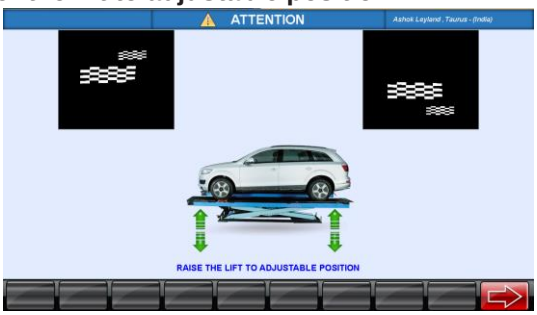
7.4.5. ALIGNMENT PARAMETERS

Following procedure needs to be carried out for the adjustments as per Manufacturer's specification

7.4.5.1 REAR WHEEL PARAMETERS

Fig. 91

In this screen, Live readings of Rear wheel Camber and Toe will be displayed. Effect the corrections in the Rear wheel until the GREEN color at the Horizontal bar with the Arrow point to that region.

☞	**In VH/In-Lift model, while performing alignment in Lift, uneven level in the lift platform can be compensated using *Level compensation program.* System will prompt user to raise/lower the lift to adjustable position:**  **Once the Target plate images are visible in the screen, press NEXT SCREEN button to return to Rear wheel parameters. Then proceed with *Front wheel parameters* adjustment procedure and finally lower the lift.** **Result printout can be taken during the *Level compensation program* or even after lowering the Lift platform.**

In AutoBoom, while performing alignment in Lift, uneven level in lift platform can be compensated using *Level compensation program*, either by selecting AUTOMATIC / MANUAL method. If AUTOMATIC (Toggle) button is selected (Default), system will prompt user to raise/lower the lift to adjustable position:

Once the Target plate images are visible in the screen, press NEXT SCREEN button to return to Rear wheel parameters. Then proceed with *Front wheel parameters* adjustment procedure and finally lower the lift.

Result printout can be taken during the *Level compensation program* or even after lowering the Lift platform.

To compensate the level manually, press the Toggle button to switch over to MANUAL method. Raise/Lower the Lift to adjustable position and then press "UP HORIZONTAL BEAM" button to raise the Horizontal beam. Once the Beam starts rising and the respective Target plate images are displayed properly in the window, press PAUSE button.

Press NEXT SCREEN button to return to Rear wheel parameters adjustment. Then proceed with *Front wheel parameters* adjustment procedure & finally press the Toggle button to switch over to MANUAL. Bring down Lift to home position and press "DOWN HORIZONTAL BEAM" button to lower the Horizontal beam. Use PAUSE button to stop the beam movement once the Target plate images are displayed correctly in the window

In case of any specific adjustments needs to be done, press **ADJUSTMENT TYPES** button for On-screen guidance for Camber and Toe in Wheel raised condition (refer chapter 7.4.5.3).

First perform Camber correction and then do Toe correction

Camber & Toe correction in Vehicle raised position

Keep hands & other body parts away from jacking surfaces. Follow jack manufacturer's safety recommendations. Failure to comply may lead to human injury

In certain vehicles, the Left and Right wheels cannot be jacked up simultaneously due to their construction. In such vehicles, the Left and Right wheels have to be jacked up individually and the Camber correction should be performed for both wheels separately as described above

While jacking up the vehicle, the vehicle should be stable and do not apply any external force which may shake the vehicle and subsequently the readings will be affected

Tighten the Lock nuts. By clicking the Camber / Toe image in the centre of screen, a zoomed image of the respective reading will be displayed in a separate screen as shown below:

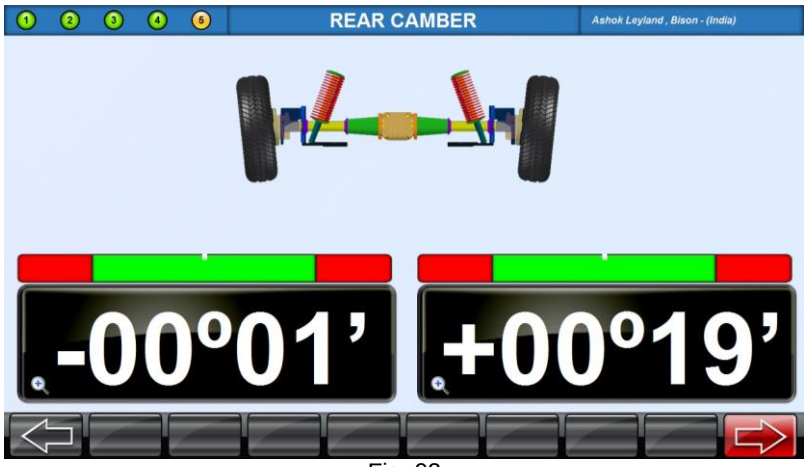


Fig. 92

Fig. 93

User can also choose the specific Left / Right window of a zoomed parameter to magnify the window further.

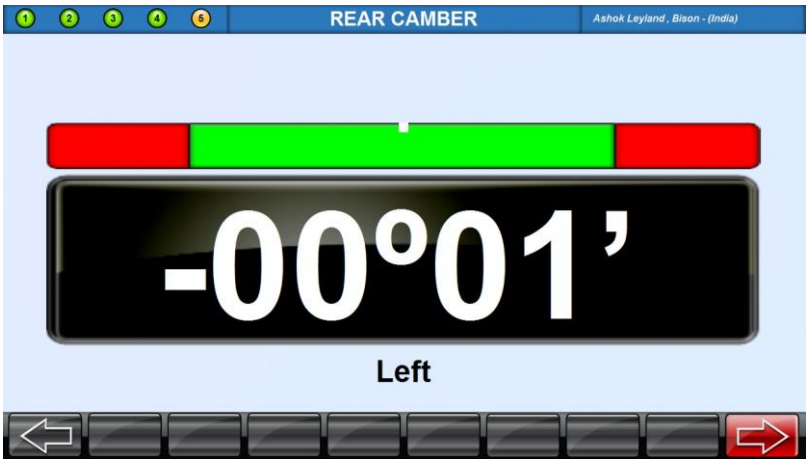


Fig. 94

Press **ADDITIONAL PARAMETER** button to view Rear wheel Total Toe & Thrust angle as shown in the Rear wheel parameters screen

Press **PREVIOUS SCREEN** to return to the Rear Wheel correction screen.

After adjustment of Camber & Toe, press **NEXT SCREEN** button to go to ***Front wheel parameters*** screen.

7.4.5.2 FRONT WHEEL PARAMETERS

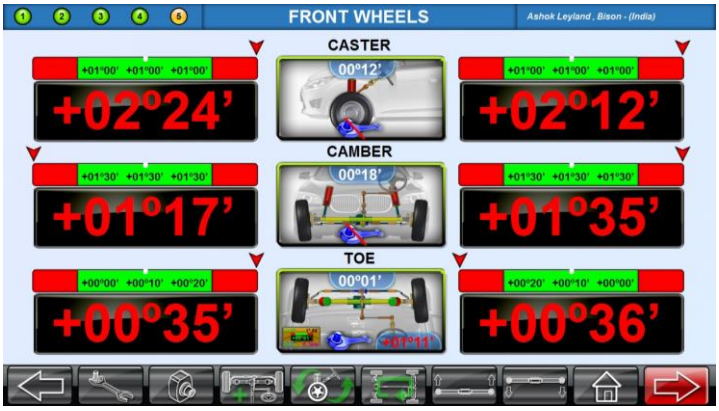


Fig. 95

This screen displays Live readings of Camber & Toe for Front wheels. By clicking the Camber / Toe image in the centre of screen, a zoomed image of the respective reading will be displayed in a separate screen as shown below. However for viewing the Caster readings Live, user needs to click the Caster image to make it as alive for adjustment in the Front wheels parameters screen. Once the caster is made alive, it will be live all the time up to the completion of this job.

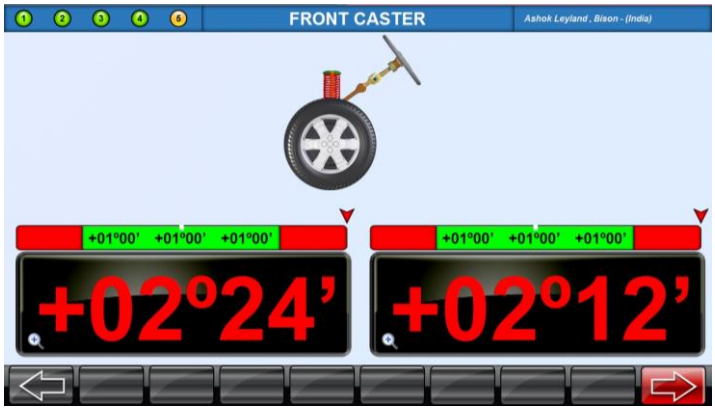


Fig. 96

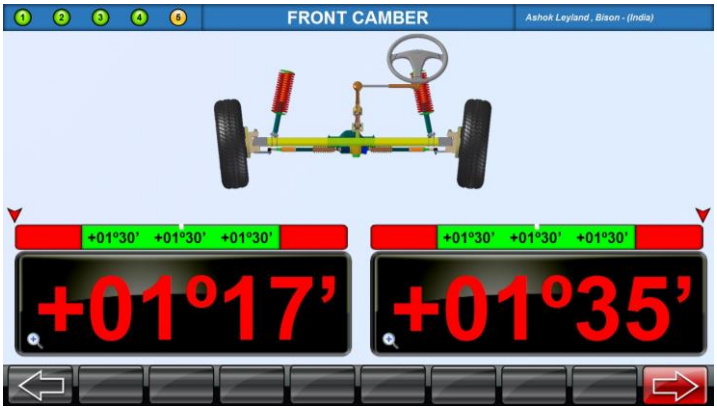


Fig. 97

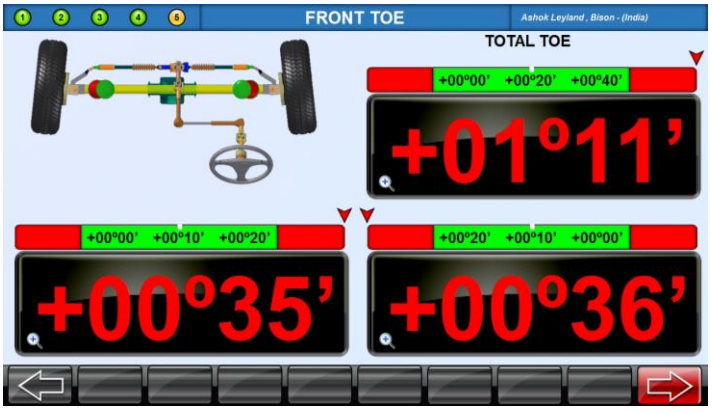


Fig. 98

TWO COLOR REPRESENTATION

While doing Caster, Camber & Toe correction, the pointing Arrow sliding over the Horizontal bar indicates specification range using different colors as indicated below:

Color	Indication
Red	***Reading is not within the required specification***
Green	***Reading is within specification & preferred value***
White	***Specification is not available/required for parameter***

CASTER CORRECTION

The Caster values displayed in the ***Front wheel parameters*** screen are Live values.

For Caster correction, adjust the Caster by the method specified by manufacturer

While adjusting, the pointing Arrow can be seen sliding over Horizontal bar. Carryout the correction until the color changes to GREEN ie., the required Caster is achieved.

Live Caster is measured by detecting forward and backward rotation of wheel. For that, it is important Target plates are not disturbed by any external force other than adjustment changes. If any mistake is done during this activity, wrong Caster values will be acquired. Redo caster measurement provision is given if large amount of cater is adjusted

CAMBER CORRECTION

The Camber values displayed in the ***Front wheel parameters*** screen are Live values. If the values are not correct, adjust by adding or removing shims or by the method specified by the Vehicle Manufacturer. While doing correction, the pointing Arrow can be seen sliding over the Horizontal bar. Carryout the correction until the color changes to GREEN ie., the required Camber is achieved.

In case of any specific adjustments needs to be done, press **ADJUSTMENT TYPES** button for On-screen guidance for Camber in Wheel raised condition (Refer Chapter 7.4.5.3)

TOE CORRECTION

The Toe values displayed in the ***Front wheel parameters*** screen are Live values. Adjust the Tie rod. While adjusting, the pointing Arrow can be seen sliding over the Horizontal bar. Carryout the correction until the color changes to GREEN ie., the required Toe is achieved. When the required Toe is achieved, stop adjusting Tie rod. Tighten the Lock nuts of the Tie rods. In case of any specific adjustments needs to be done, press **ADJUSTMENT TYPES** button for On-screen guidance for Toe in Wheel raised condition (refer chapter 7.4.5.3).

On cars with Rack & Pinion steering, a bump steer condition is usually created by worn rack mounting bushings that allow entire rack to shift when bumps are hit. Some vehicles have slotted Idler arm mounts to allow correction of Toe curve change problems

NOTE: While adjusting Caster, the Toe may get slightly affected. Similarly, while doing Camber and Toe, since both are Wheel angles, one may get affected while adjusting the other. Therefore, ensure all angles are 'OK' before locking the Lock nuts and completing the alignment. Otherwise, do some finer adjustments to get everything 'OK'.

When working on Power steering vehicles, switch ON the engine before fixing Steering wheel lock in Straight ahead position (ensure that Gear is in neutral position). Engine may be switched "OFF" after Straight ahead is completed. In certain Cars where suspension work is done, Front wheels may have excessive Toe setting. This may lead to problems in achieving Straight ahead position.

Operator is alerted about such conditions by displaying "***Attention***" message as shown below:

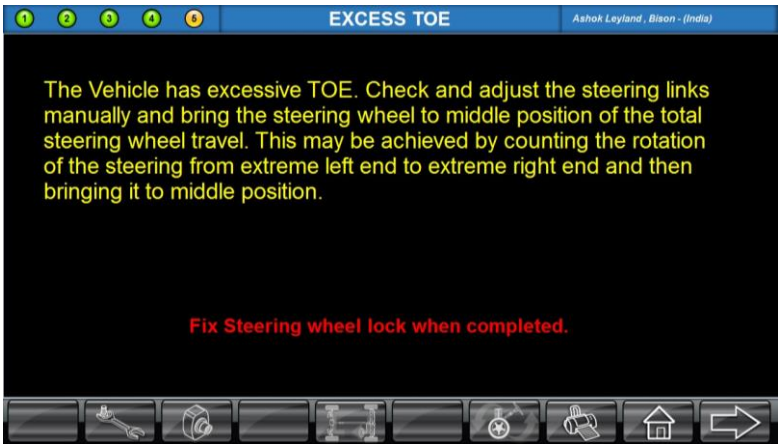


Fig. 99

The procedure to be adopted in such a situation is to first bring the Steering wheel to Straight ahead position and lock it in that position using Steering wheel lock. Then proceed to adjustment screen & set the required Toe in a single operation. In cases where there is no excessive Toe, there is no change in the procedure.

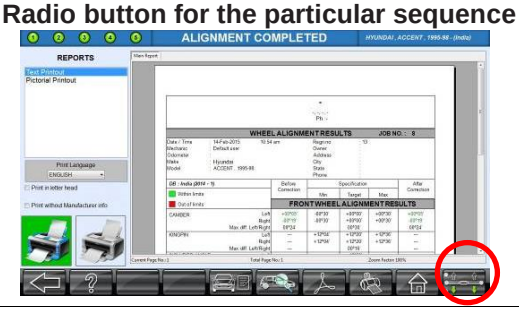
Press **ADDITIONAL PARAMETER** button to view Front wheel Kingpin & Setback values as shown in the ***Front wheel parameters*** screen. Out of these two, Runout & Setback are having compensation with Camber and Toe respectively. This screen can be viewed on the user's desire by pressing **ADDITIONAL PARAMETER** button.

Press **PREVIOUS SCREEN** to return to the Front Wheel correction screen. After viewing Kingpin & Setback values, press **NEXT SCREEN** button to go to ***Results*** screen.

Printout of the Alignment result can be viewed or printed by pressing **PRINT** button. PDF file can be created and stored in the system using the **SAVE TO PDF** icon.

The following Reports are provided to print the alignment results:

1. **Standard parameters -** Results of Camber, Caster, Kingpin, Toe, Thrust angle & Setback
2. **3D printout -** Pictorial representation of Camber, Caster, Kingpin, Toe, Thrust angle & Setback
3. **Pre-alignment -** Present condition of Vehicles recorded & stored
4. **Tyre -** Present condition of Tyre recorded and stored
5. **Brake -** Present condition of Bake & related parts recorded & stored
6. **Under hood -** Present condition of Vehicle Under hood components recorded and stored
7. **Under car** Present condition of Vehicle under car parts recorded & stored
8. **General** Present condition of Vehicle lighting & fittings recorded & stored

☞	**In case of AutoBoom model, once alignment is completed, Camera beam will go to its pre-defined home position (Ref. Chapter 7.7.2). However user can change its home position by pressing the respective Top or Bottom BEAM HOME POSITION Radio button for the particular sequence** 

Press **HOME** button to start a new job. This completes the Four wheel alignment.

7.4.5.3 ADJUSTMENT TYPES

The adjustment of vehicle parameters may vary depending upon the vehicle construction. Following adjustment types are provided:

Fig. 100

1. SINGLE TIE ROD ADJUSTMENT

Some of the earlier design of trucks and 80's generation of vehicle have a single tie adjuster for Total Toe with no provision for adjusting steering direction. For these type of vehicles, select **SINGLE TIE ROD ADJUSTMENT** button and follow the procedure given below:

Steer the Front wheels to bring the Toe reading to zero. Lock the Steering wheel at this position. Once zero reading is achieved, Total Toe readings will appear on top window.

Fig. 101

Adjust the Single tie rod to Total toe specifications displayed.

If Steering straight ahead is still not achieved, remove Steering wheel from the steering column (see Vehicle recommended procedures prior to removal) and re-fix it properly.

2. TOE CURVE ADJUSTMENT

To measure the changes occur in individual Toe due to jounce/ rebound of suspension. An excessive amount of change in individual Toe may cause early Tyre wear. Excessive change on one side alone may cause the vehicle to rapidly change directions when bumps are encountered.

There are no specifications prescribed by the Manufacturer for the amount of change. The Toe changes should be fairly minimum, and a comparison of Left and Right wheels will assist in diagnosing the defective Steering system components.

Follow the on-screen instructions carefully to raise the suspension to 60mm by pushing down / lifting up the Suspension using a Scale or Measuring tape to observe the proper amount of frame movement :

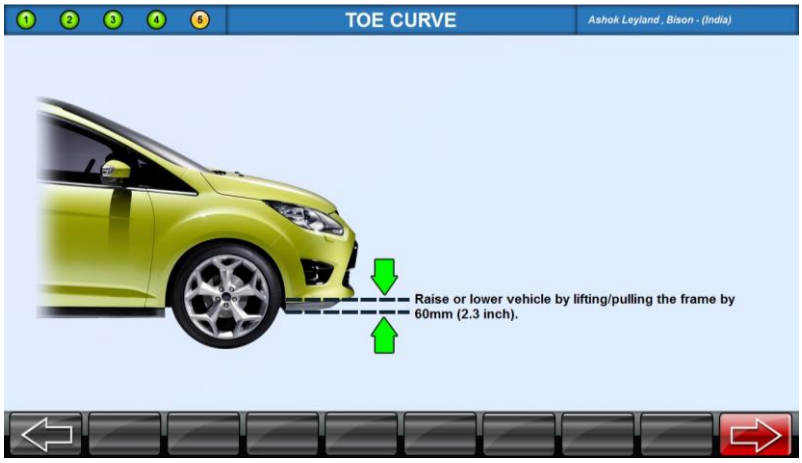


Fig. 102

The difference in individual Toe will be displayed as shown below:

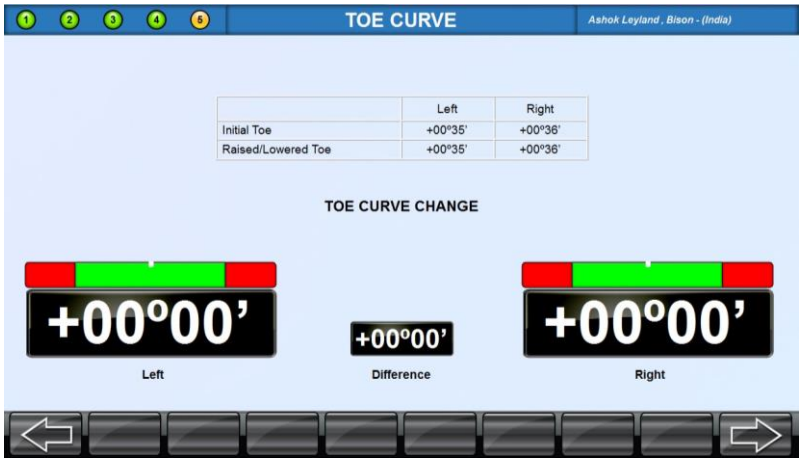


Fig. 103

Make the required adjustments / changes to bring down the difference to fairly minimum and then bring the vehicle to normal position.

3. ELEVATED FRONT & REAR CAMBER/TOE

Following screen will be displayed to jack up the vehicle:

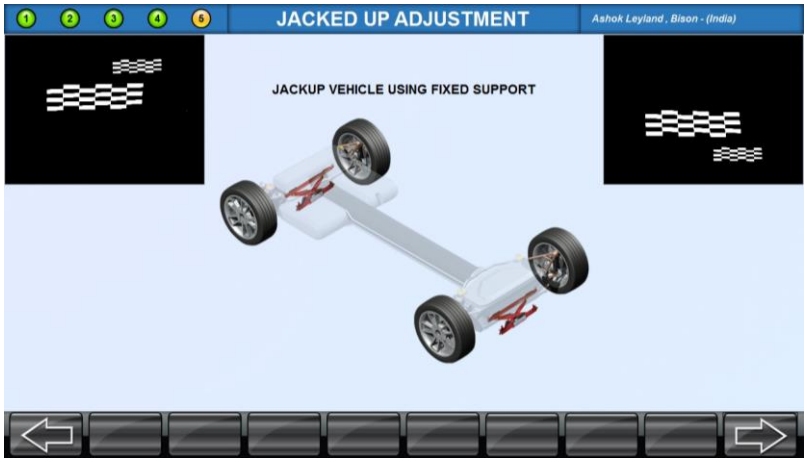


Fig. 104

Press **NEXT** button. Live values of wheel parameters will be displayed in the screen. The values will automatically be set to the initial values shown when the wheels were resting on the Rotary plates or floor.

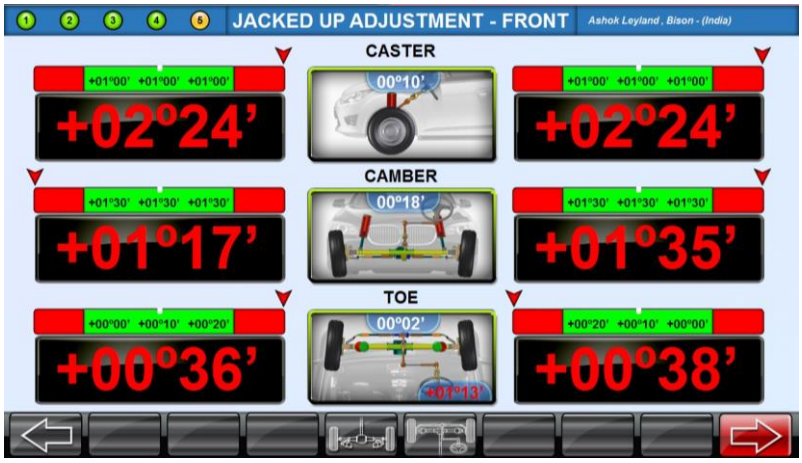


Fig. 105

Now, adjust the parameters to achieve the specified value and press **NEXT** button:

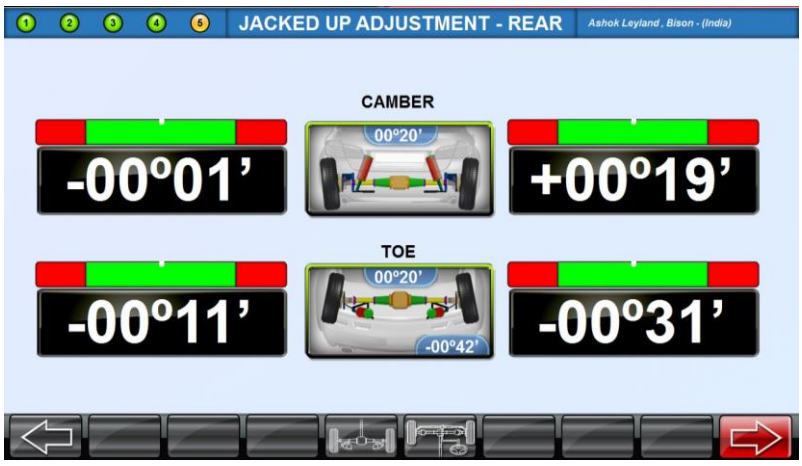


Fig. 106

Then "**Jack down and jounce the vehicle**" message will be displayed.

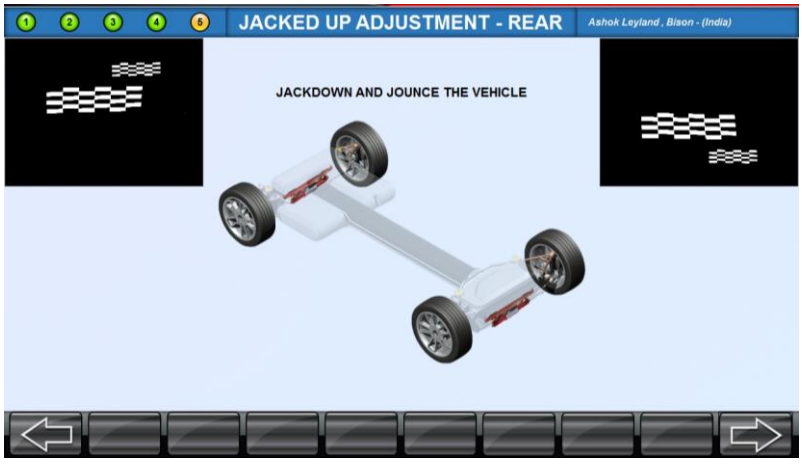


Fig. 107

Values that are adjusted during raised position will be restored.

4. ELEVATED FRONT CAMBER

Following screen will be displayed to jack up the vehicle:

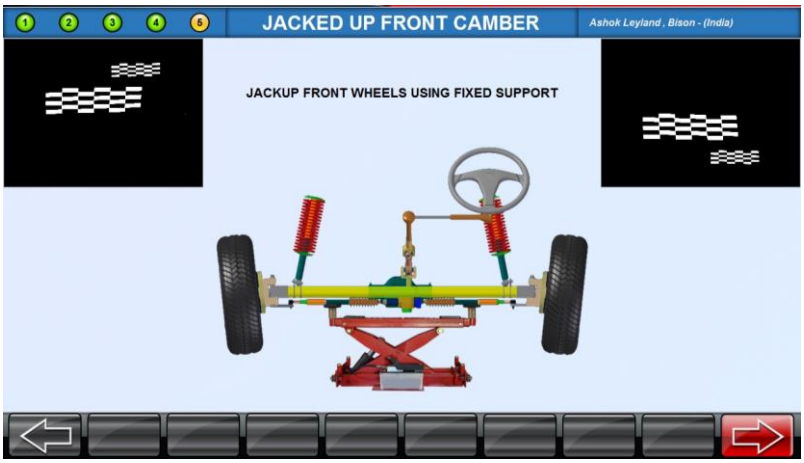


Fig. 108

Press **NEXT** button. Live Front Camber values will be displayed in the screen. The values will automatically be set to the initial values shown when the wheels were resting on the Rotary plates or floor.

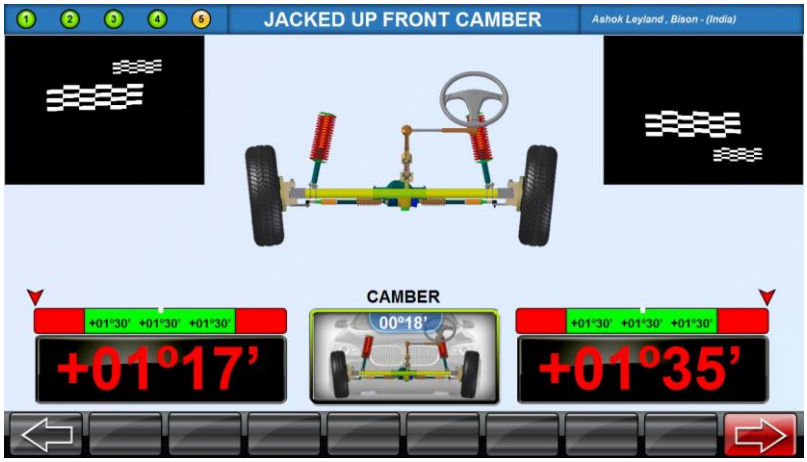


Fig. 109

Now, adjust the Front Camber to achieve the specified value and press **NEXT** button. Then "**Jack down and jounce the vehicle**" message will be displayed:

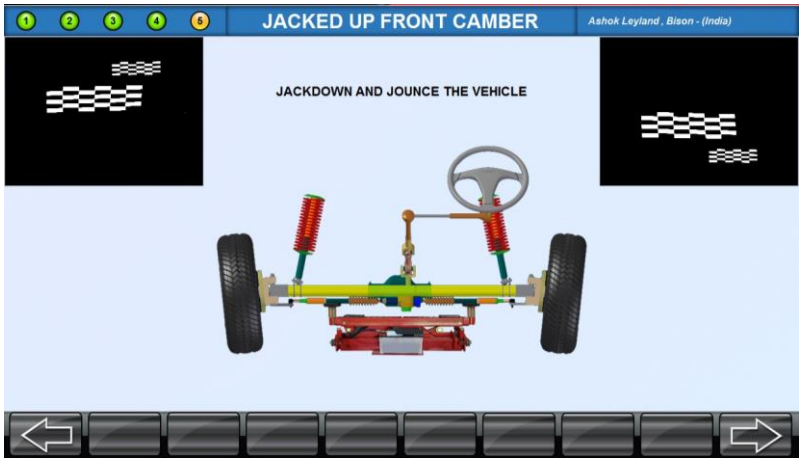


Fig. 110

Values that are adjusted during raised position will be restored.

5. ELEVATED REAR CAMBER

Following screen will be displayed to jack up the vehicle:

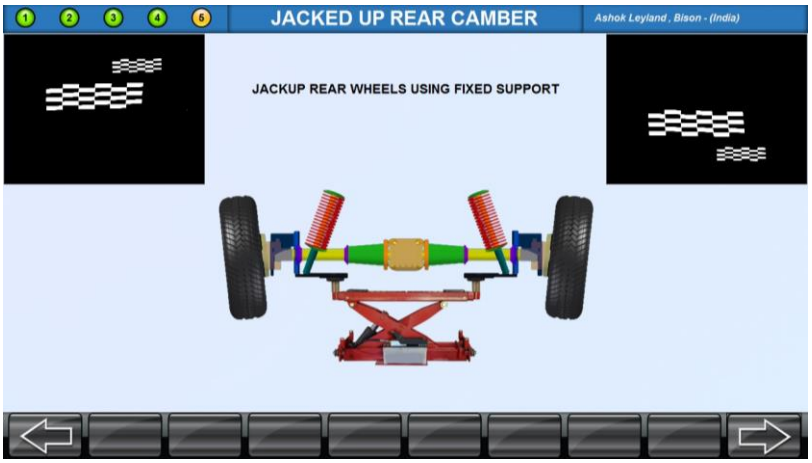


Fig. 111

Press **NEXT** button. Live Rear Camber values will be displayed in the screen. The values will automatically be set to the initial values shown when the wheels were resting on the Rotary plates or floor.

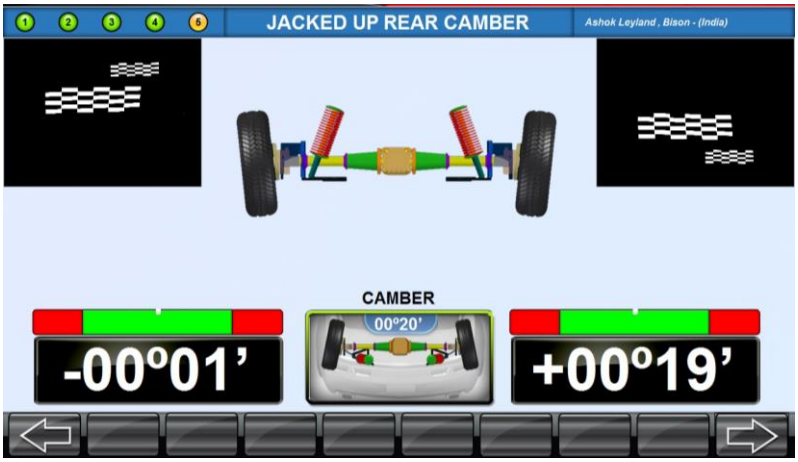


Fig. 112

Now, adjust the Rear Camber to achieve the specified value and press **NEXT** button. Then "**Jack down and jounce the vehicle**" message will be displayed:

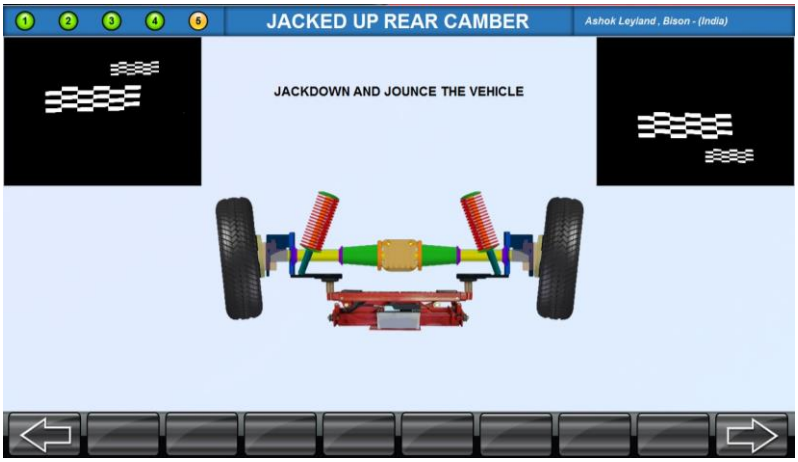


Fig. 113

Values that are adjusted during raised position will be restored.

6. EFFORTLESS TOE ADJUSTMNET

Make the Steering wheel straight and press **NEXT SCREEN** button on the screen as instructed below:

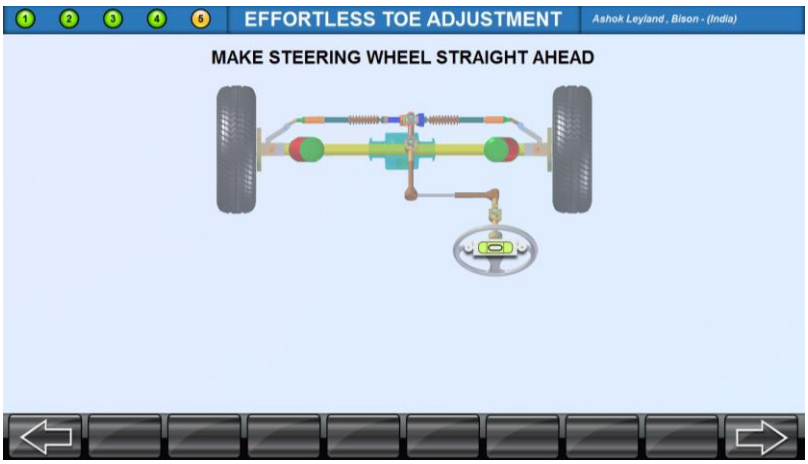


Fig. 114

Steer the wheel to left until the adjustable position is reached and then apply Steering lock as instructed below:

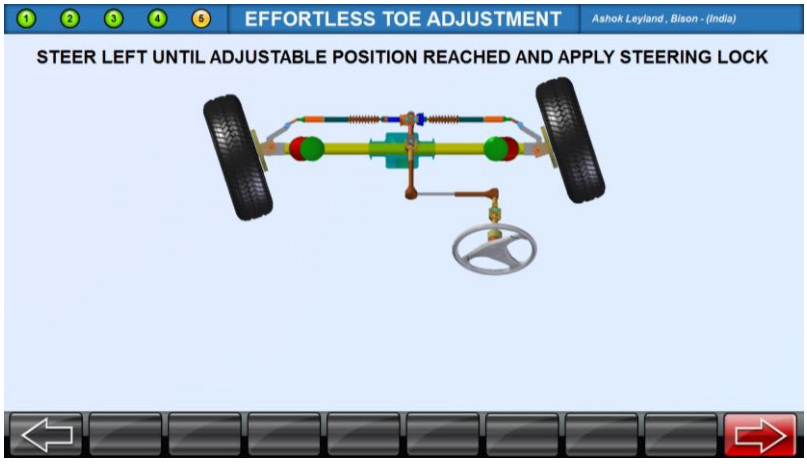


Fig. 115

Adjust the Left Toe to required specification.

Fig. 116

Steer the wheel to right until the adjustable position is reached and then apply Steering lock as instructed below:

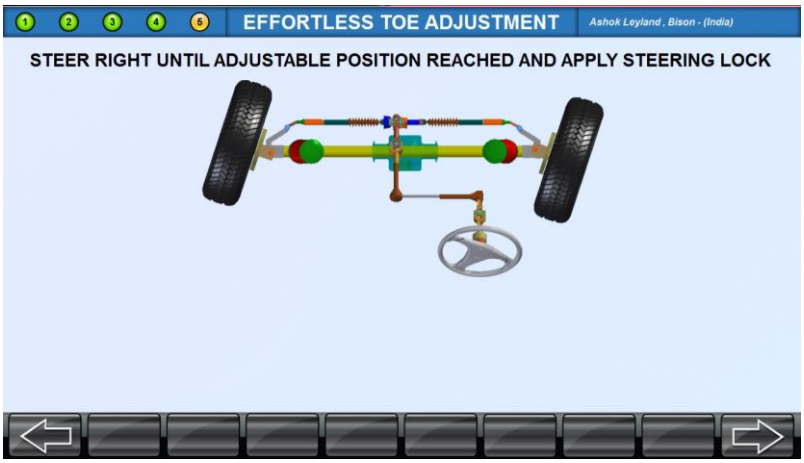


Fig. 117

Adjust the Right Toe to the required specification.

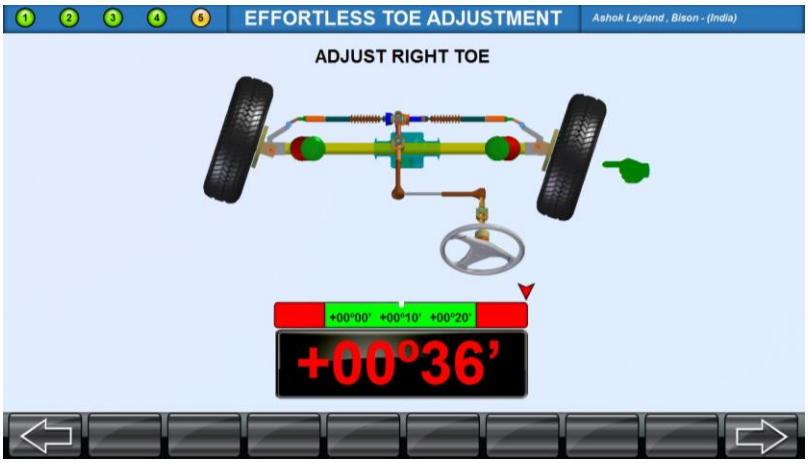


Fig. 118

7. DRAG LINK ADJUSTMENT

Steering linkage in some of the 4 Wheel drive trucks will have a single total toe adjuster along with a drag link adjuster to correct the steering direction and straighten the Steering wheel. For adjusting such vehicles, follow the procedure given below.

Steer the Front wheels to equalize & then click **NEXT SCREEN**.

Fig. 119

Apply Steering lock and press **NEXT SCREEN** button as instructed below:

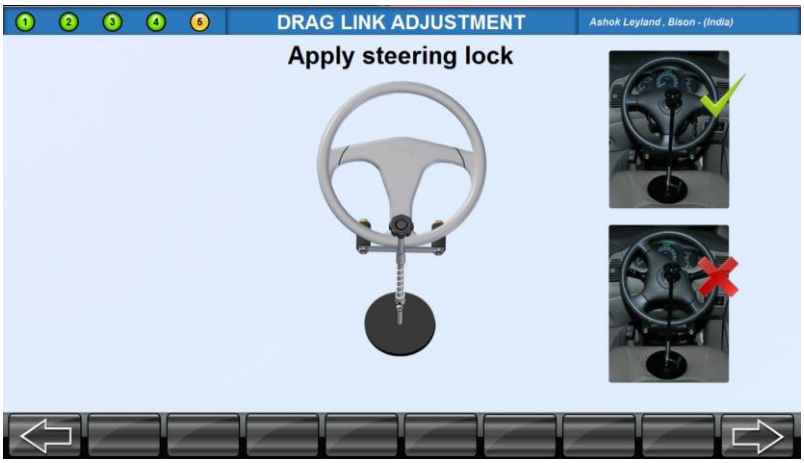


Fig. 120

Adjust the drag link until steering is in straight ahead position.

Fig. 121

8. CRADLE ADJUSTMENT

Cradle adjustment is necessary for Vehicles with Front wheel drive. Certain vehicles are designed with engine cradle also serving as an attachment point for lower pivot of the suspension system. This assembly is fastened to the sub-frame as an unit from the bottom of the vehicle. Hence this assembly must be adjusted properly to maintain front alignment.

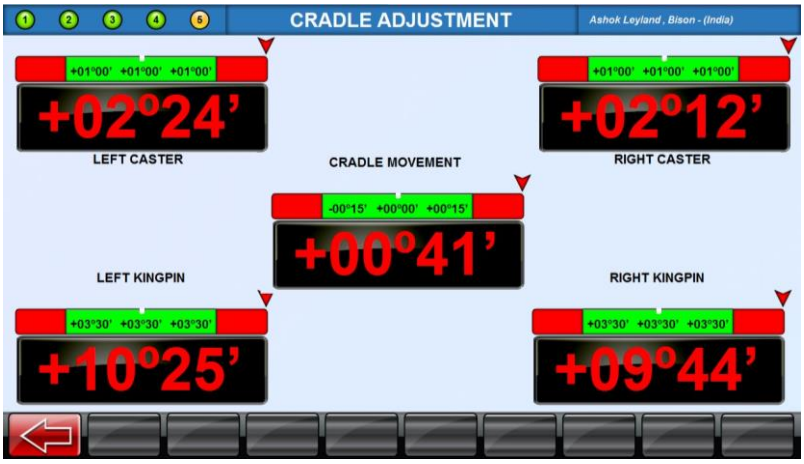


Fig. 122

9. CAMBER AT 0º TOE

This is used to measure Left & Right front wheel Camber individually at zero Toe. This procedure is recommended for vehicles with high caster specifications.

Fig. 123

Steer the wheel to right until the pointing arrow over the reading comes to center of Green region.

Fig. 124

Left & Camber values at zero Toe will be displayed as below:

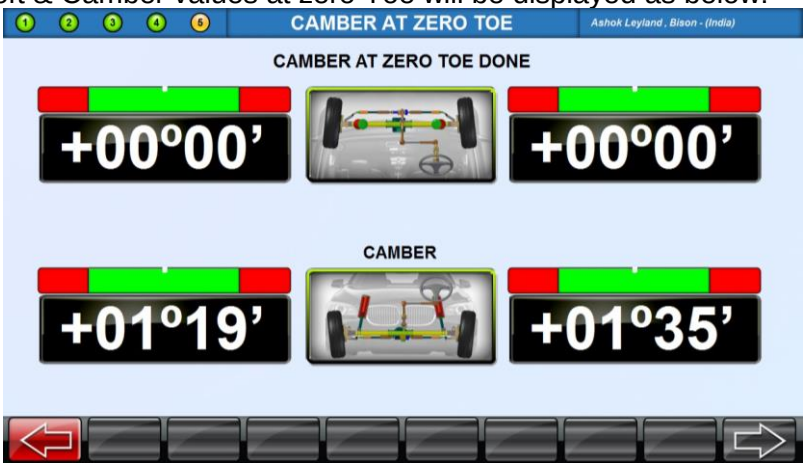


Fig. 125

10. LOCK ANGLE

Following screen will be displayed:

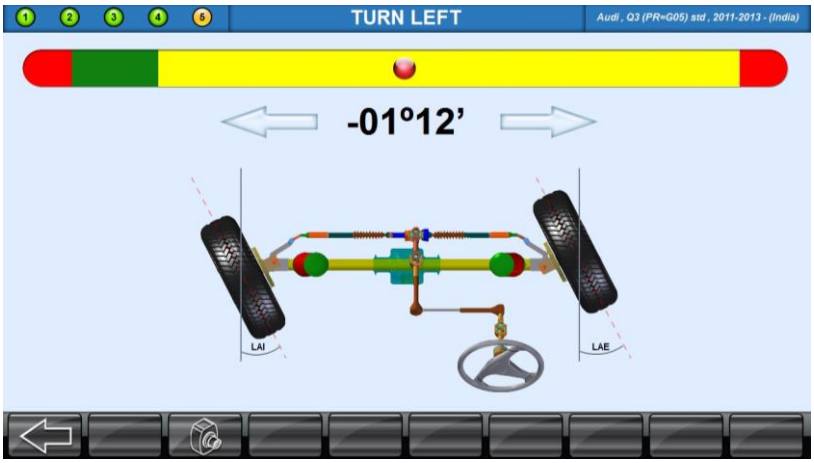


Fig. 126

Steer the wheel to extreme left and hold it until "***Stop***" icon appears to measure the parameters.

System will display live Lock Angle internal values for left wheel and Lock Angle external values for right wheel as shown below:

Fig. 127

Carryout the adjustment and then press **NEXT SCREEN**.

System will go to ***Turn Right*** screen:

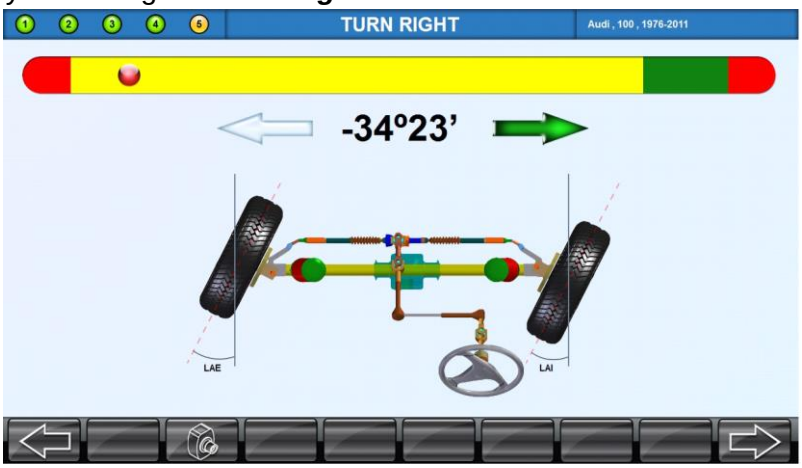


Fig. 128

Steer the wheel to extreme right and hold it until "***Stop***" icon appears to measure the parameters. System will display live Lock Angle internal values for right wheel and Lock Angle external values for left wheel as shown below:

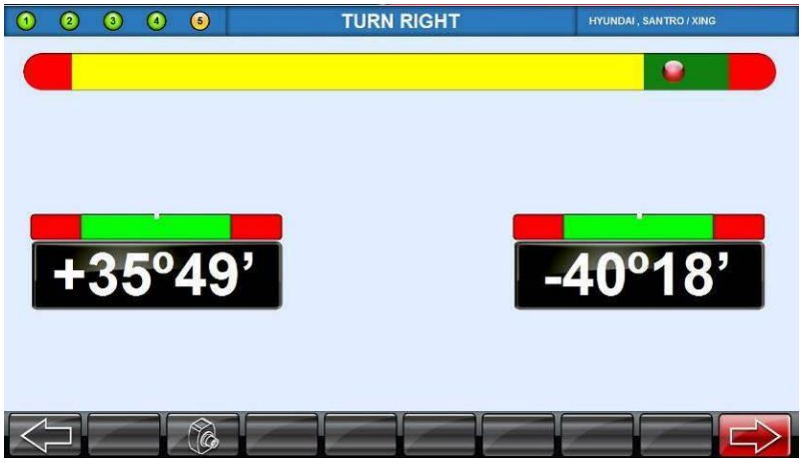


Fig. 129

Carryout the adjustment and then press **NEXT SCREEN**. System will go to ***Straight Ahead*** screen:

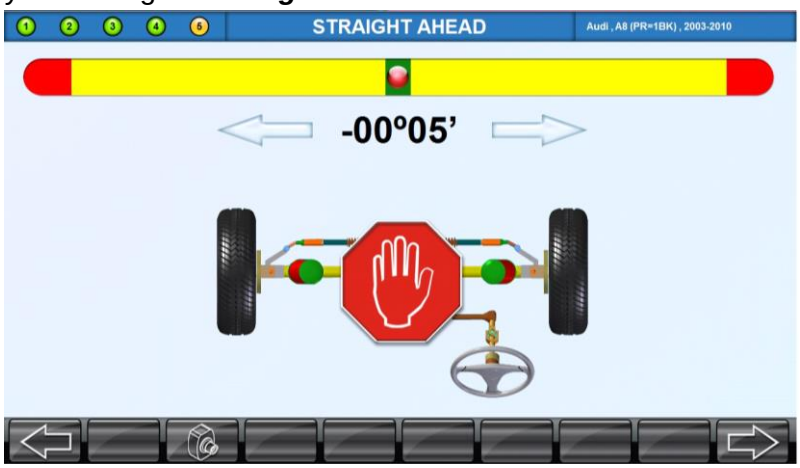


Fig. 130

This screen is to instruct the User to bring the Front wheels to Straight ahead position. Steer the wheels until the moving BALL fully matches the centre GREEN region.

When Straight ahead position is achieved, system will displays "Stop!" icon & stop turning the Steering wheel.

7.5. QUICK WHEEL ALIGNMENT

Quick wheel alignment refers to alignment of a vehicle in the shortest possible time. The normal alignment sequence is shortened by skipping some of the steps and Attention screens in the alignment process and keeping only the required process. In this alignment method only the following sequence is used.

7.5.1. VEHICLE SELECTION - Refer Chapter 7.4.1

7.5.2. WHEEL RUNOUT - Refer Chapter 7.4.3

7.5.3. CASTER SWING - Refer Chapter 7.4.4

7.5.4. ALIGNMENT PARAMETERS - Refer Chapter 7.4.5

User can also customize the program sequence to their preference as explained in Chapter 7.7.6 (OEM Wizard). Later, based on the requirement user can choose the particular customised alignment program sequence from the list before proceeding with Quick wheel alignment.

7.6. DATA MANAGER

☞	**This software will work only on Wheel aligner machine**
☞	**Data from alignment results are forwarded to the Wheel aligner Data Manager only at the end of wheel alignment in the *Results* screen**

Data Manager is smart software developed for the purpose of managing alignment results which are generated by Wheel aligner. This software runs under Windows platform and provides menu driven, user friendly Graphical User Interface.

This software is designed to retrieve the stored alignment results and to generate reports. The following screen is the Opening screen of this software.

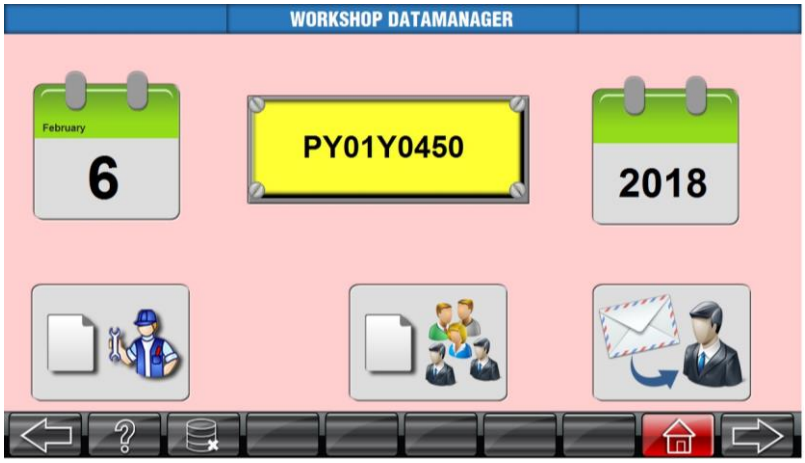


Fig. 131

Four options will be displayed:

1. Date based Alignment report
2. Registration Number based Alignment report
3. Year based Alignment report
4. Technician based Alignment report
5. Customer database
6. Reminder to Customer

7.6.1. DATE BASED ALIGNMENT REPORT

Upon selection of **Date based Alignment report** icon, a Date window will be displayed. Select the required “From” and “To” date between which Alignment results have to be viewed and press **NEXT SCREEN** button. Following screen will be displayed:

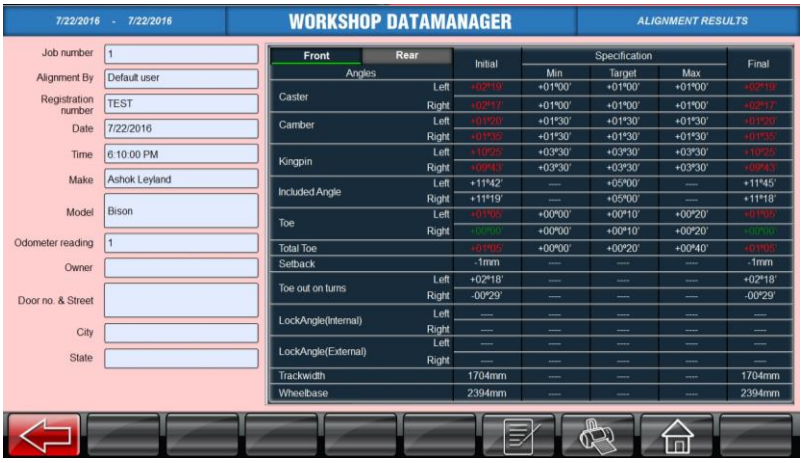


Fig. 132

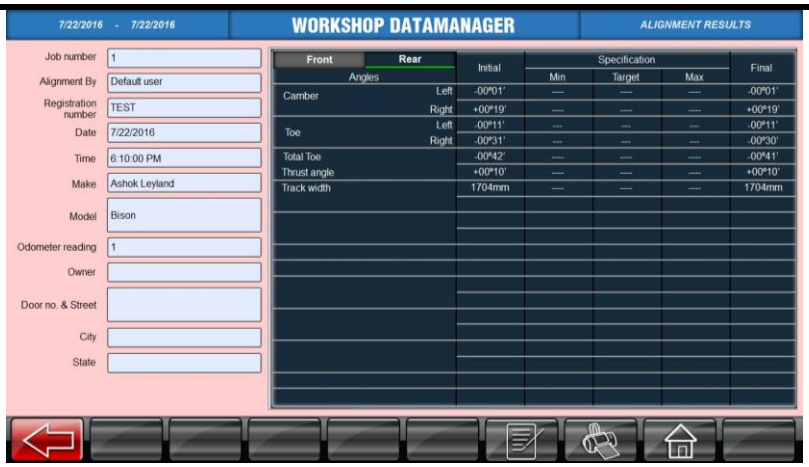


Fig. 133

The list of alignments conducted within the provided date will be displayed Job number wise. By selecting "**Front**" / "**Rear**" in the screen, results of respective wheel parameters can be viewed.

Press **VIEW** button to view the Date based reports as shown below:

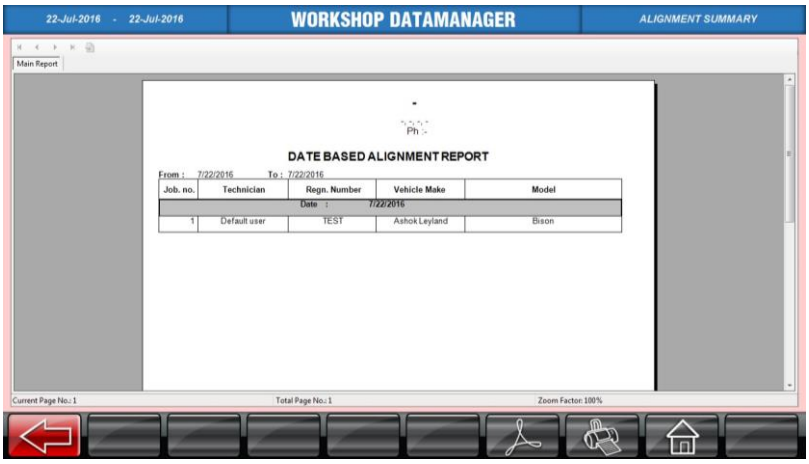


Fig. 134

Press **PRINT** button to print the report.

7.6.2. REGISTRATION NUMBER BASED ALIGNMENT REPORT

This report helps the user in deciding the frequency of the alignment made for the selected vehicle.

Upon selection of **Registration number based Alignment report** icon, a Pull down list of Vehicle Registration Numbers for which alignment carried out so far will be displayed as shown below:

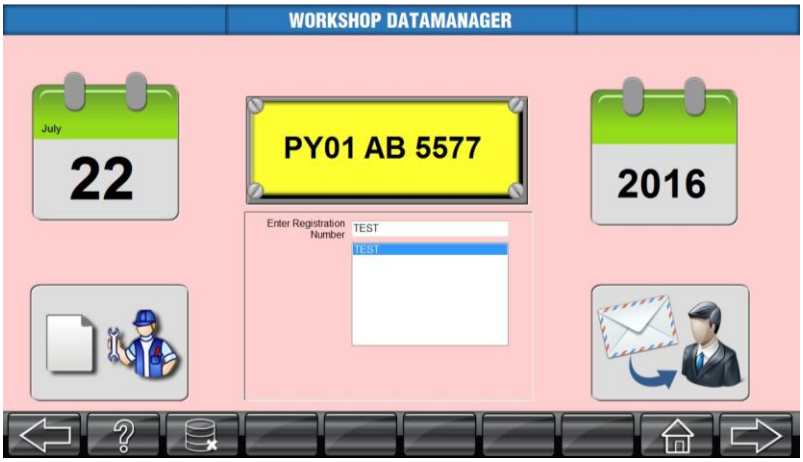


Fig. 135

Select the required Vehicle Registration number and press **NEXT SCREEN** button.

Press **VIEW** button to view Registration No. based reports as shown below:

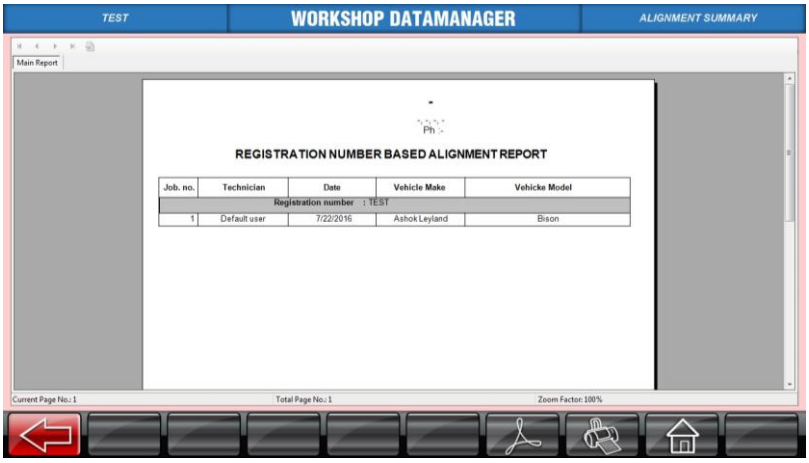


Fig. 136

Press **PRINT** button to print the report.

7.6.3. YEAR BASED ALIGNMENT REPORT

On selecting this option, a Yearly report will be generated. This report helps the user in getting the No. of alignments achieved in a year (Month wise) as shown below:

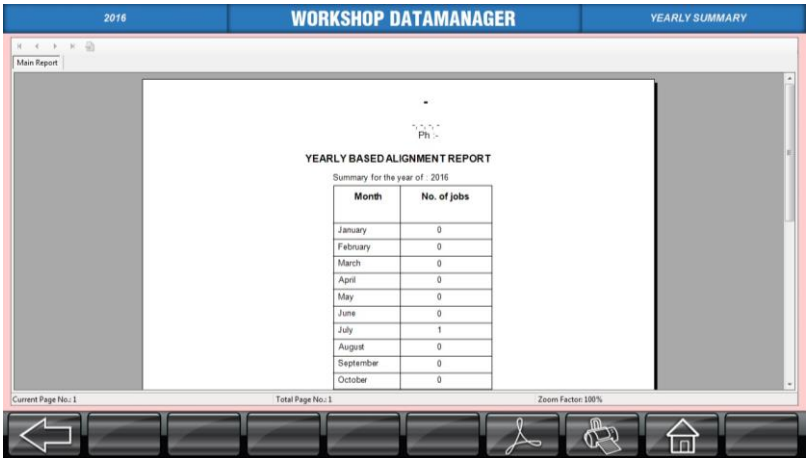


Fig. 137

7.6.4. TECHNICIAN BASED ALIGNMENT REPORT

Upon selection of **Technician based alignment report** icon, the available User's list will be displayed. Select the required User and press **NEXT SCREEN** button. Then press **VIEW** button to view the number of alignments (consolidated) conducted by the selected User as shown below:

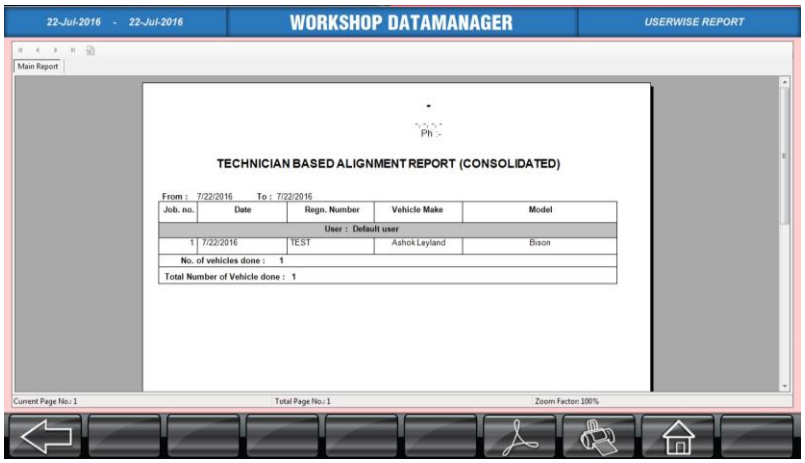


Fig. 138

☞	**Operator can also choose ALL USER to view the number of alignments (consolidate) conducted by each user**

Press **PRINT** button to print the report.

7.6.5. CUSTOMER DATABASE

Upon selection of **Customer database** icon, a Date window will be displayed. Select the required “From” and “To” date and press **NEXT SCREEN** button. Press **VIEW** button to view the Customer details date wise as shown below:

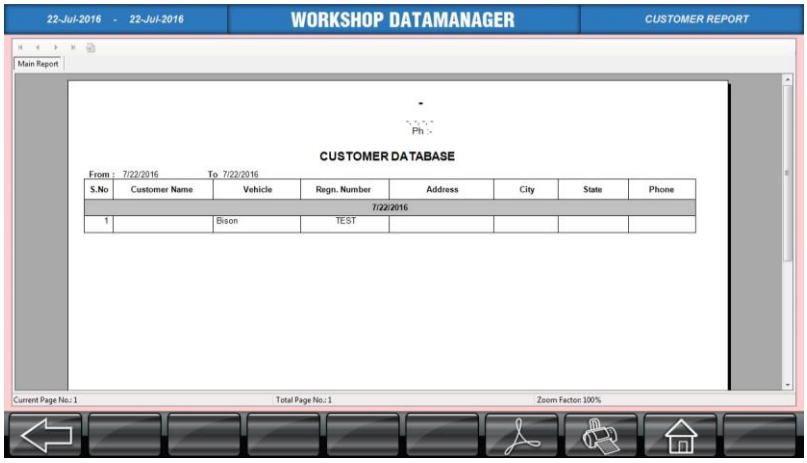


Fig. 139

Press **PRINT** button to print the report.

7.6.6. REMINDER TO CUSTOMER

This option is provided to the user to generate Reminder letters to his customers on daily basis. The system followed is, when he runs this option on a particular date, the system will automatically generate Reminder letter for the vehicles aligned exactly 90 days back.

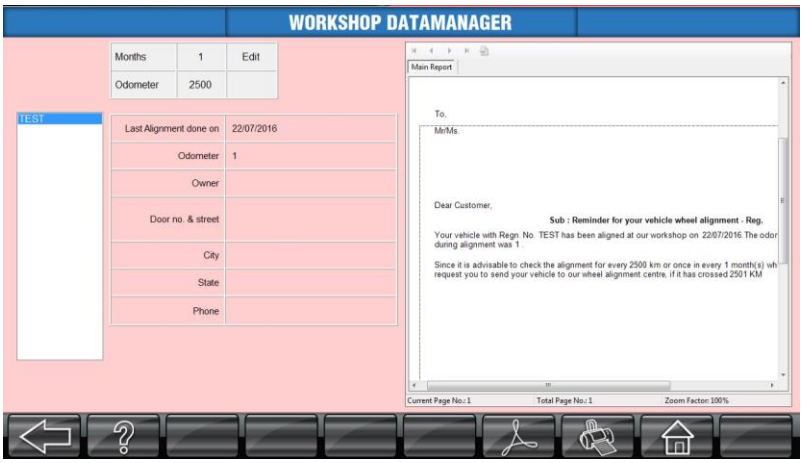


Fig. 140

DELETE DATA button is provided in the Data Manager program to delete the data with following options:

Within a period **or** **Job number wise** **or** **All the data**

7.7. SETTINGS

You can enter into this Option by clicking **SETTINGS** in the ***Welcome*** Screen and by providing the Password.

Fig. 141

The following Menu will be displayed:

Vehicle specifications Ref. chapter 7.7.1	Measurement units Ref. chapter 7.7.2	Alignment data Ref. chapter 7.7.3	Calibration Refer chapter 7.1 of Service manual	Calibration certificate Refer chapter 7.6 of Service manual
Workshop information Ref. chapter 7.7.4	Calibration history Ref. chapter 7.7.5	OEM wizard Ref. chapter 7.7.6	Calibration check Refer chapter 7.5 of Service manual	Distributor information Refer chapter 8.5 of Service manual
Multi-user Ref. chapter 7.7.7	Backup & Restore factory calibration Ref. chapter 7.7.8	Camera testing Refer chapter 8.1 of Service manual	Left/Right Steering wheel setting Refer chapter 8.4 of Service manual	
Reset Job number Ref. chapter 7.7.9	Settings password Ref. chapter 7.7.10	Camera vision setting Refer chapter 8.3 of Service manual	Camera configuration Refer chapter 8.2 of Service manual	

7.7.1. VEHICLE SPECIFICATIONS

The Vehicle specification data must be entered by End user only. MANUFACTURER IS NOT RESPONSIBLE FOR ANY INCORRECT OR INCOMPLETE VEHICLE SPECIFICATIONS ENTERED / AVAILABLE IN THE SYSTEM. No claim is entertained for any damage or loss

After selecting the Vehicle specifications, following screen will be displayed:

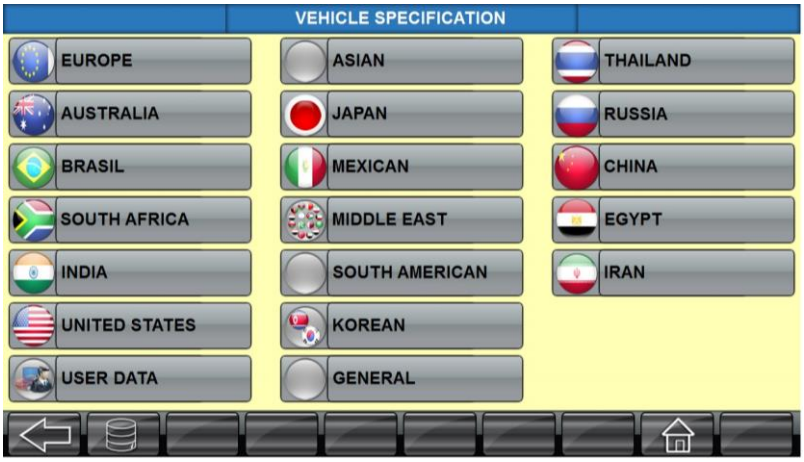


Fig. 142

7.7.1.1 EUROPEAN / AUSTRALIAN / BRAZILIAN / SOUTH AFRICAN / UNITED STATES / ASIAN / JAPANESE / MEXICAN / MIDDLE EAST / SOUTH AMERICAN / KOREAN / THAILAND / RUSSIAN / CHINESE VEHICLE DATA

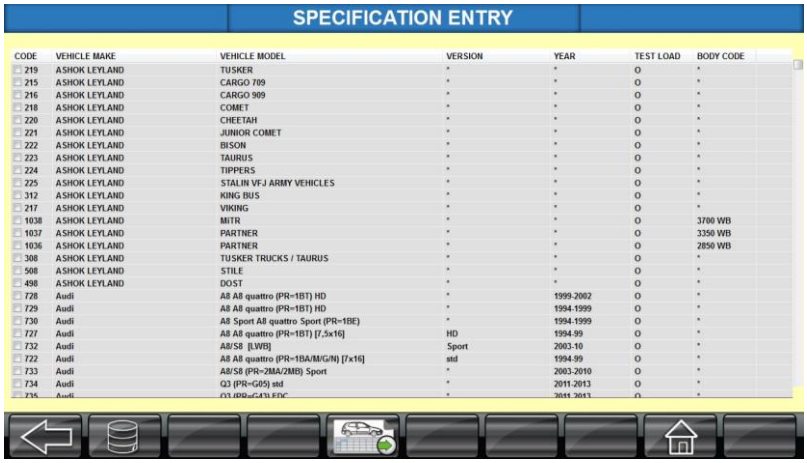


Fig. 143

The readily available vehicle specifications that are compiled and released by Third parties with License can be directly uploaded in our system. These vehicle specifications are updated & released twice every year at extra cost.

The User can select the required vehicles from the list & export it by pressing **EXPORT TO USER DATA** button to User data for edit and customizing the specification.

7.7.1.2 INDIAN VEHICLE DATA

The Indian data contains specifications of known vehicles collected by Manufacturer with update available at the time of despatch. However Manufacturer is not responsible for any incorrect or incomplete vehicle specifications available in the India data.

7.7.1.3 USER DEFINED VEHICLE DATA

The vehicle specifications collected by the User can be added / modified / viewed using this option as given below:

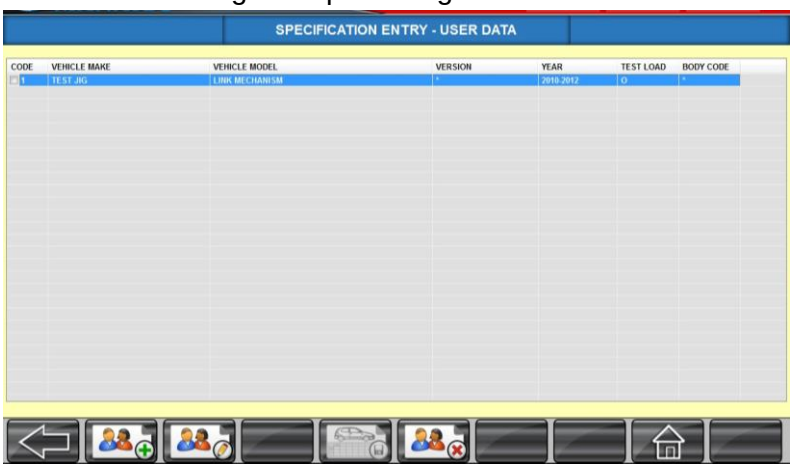


Fig. 144

Following options are provided:

Add specification - To add new Vehicle specifications

Edit specification - To modify the existing vehicle specifications

Delete specification- To delete the existing vehicle specifications

COMMON SPECIFICATIONS (LEFT / RIGHT)

By selecting this option, screen displays the following Data sheet in which the details of specifications are to be filled:

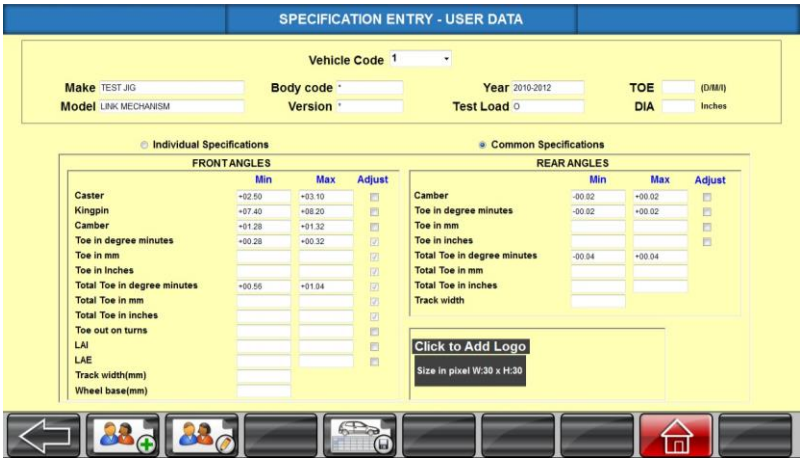


Fig. 145

The user has to keep ready all these information before starting to add any Vehicle specifications.

1. **VEHICLE MAKE**
   Type Vehicle make and press **ENTER** to go to the next window.
2. **VEHICLE MODEL**
   Type Vehicle model and press **ENTER** to go to next window.
3. **TOE IN DEGREES / MM / INCHES (D,M,I) ?**
   The TOE values of the vehicle can be entered in “degree” (or) “mm” (or) “inch”. To intimate the system about the TOE input unit, enter "**D**" for Degrees, "**M**" for mm and "**I**" for inches. Press **ENTER** to move to next window. This window cannot be left blank. A beep sound will be heard it attempted.
4. **RIM DIAMETER**
   If the Toe unit is entered as “mm” or “inch”, then the Rim Diameter of the vehicle has to be entered. If this window is not filled, the system will not allow you to proceed further.

Alignment specifications

Each and every angle has been provided with four data entry windows. First two for the Front` wheels and other two for Rear wheels. Two windows are given for each wheel to enter the Maximum and the Minimum permissible reading.

5. CASTER

Enter the Minimum allowable Caster for that vehicle in first data window. Enter the Maximum allowable Caster in second window. As Caster is not applicable for Rear wheels, system will prompt "N/A" in the other two Rear wheel windows, so you can't enter any data in these windows.

6. KINGPIN

Follow the same procedure as done in Caster. Kingpin is also not applicable for Rear wheels, so "N/A" will be displayed in the Rear wheel windows.

7. CAMBER

Enter Camber readings as per procedure for both Front & Rear wheels.

8. TOE

There are three options for entering Toe readings. Any one of the options can be chosen according to the requirement. i.e., if '**D**' is entered in "Toe in degree/mm/inch (D,M,I) ?", then Cursor will be taken to Toe in Degrees Data window.

If "**M**" is entered, then the cursor will be placed in the Toe in MM data window and for "**I**", it will be Toe in Inches data window. The windows other than the selected will have "----".

9. TOTAL TOE

For some vehicles only Total Toe values are only known. In that case, enter the readings in these windows. Here also three options are provided as in the case of Toe.

☞	**If the Toe / Total Toe values are entered in "mm" "Inches", the system will convert it to "degree & minutes"**

☞	**If Toe values are entered first, then Total Toe will be calculated by the system itself from the entered Toe value & displayed in Total Toe window and vice versa if Total Toe value is entered first**

INDIVIDUAL SPECIFICATIONS (Left / Right)

To add new specifications, select "Add Make/Parameter" as below:

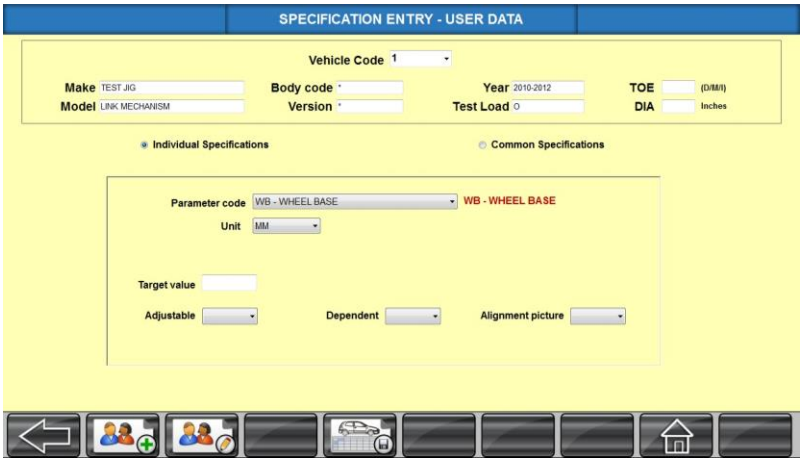


Fig. 146

The screen displays the above Data sheet in which the details of specifications are to be filled. The user has to keep ready all these information before starting to add any Vehicle specifications.

7.7.2. MEASUREMENT UNITS

This option is used to change the measurement units like “degree min" / “degree” / “mm" / “inch” and other angles in “degree” / “degree min”, “kg” “lb”.

PT / DT / VH / In-Lift models	AutoBoom model

Fig. 147

Setting is provided in this screen whether to print the Vehicle manufactured year in the report or not.

Option is provided for enabling / disabling the Live Caster adjustment.

Angle resolution can be set in the steps of 0.01’ to 0.05’. In the case of mm, the resolution can be set either 0.1mm or 0.2mm.

In AutuBoom model, the Home position for Camera beam can be defined & set in the above screen.

7.7.3. ALIGNMENT DATA

This option is provided to view the results of a particular job to analyse / trouble shoot.

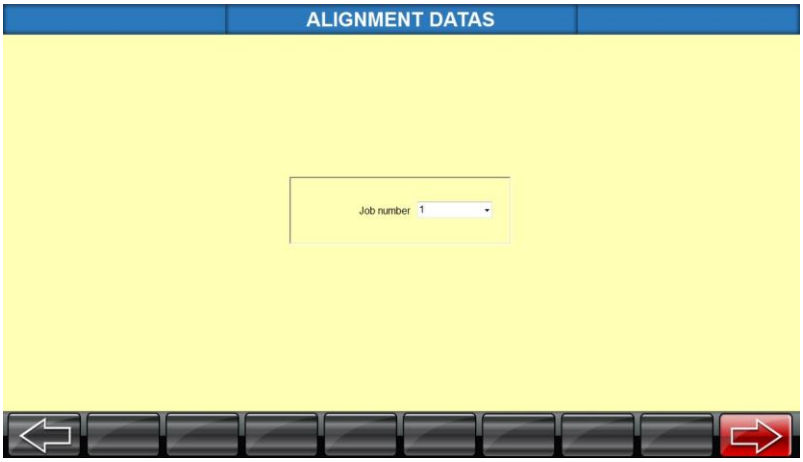


Fig. 148

7.7.4. WORKSHOP INFORMATION

This Option is used to enter the Customer Name and address of the Alignment Centre and password settings. Customer can also add Logo of their Service centre to appear on the top left corner of the printout.

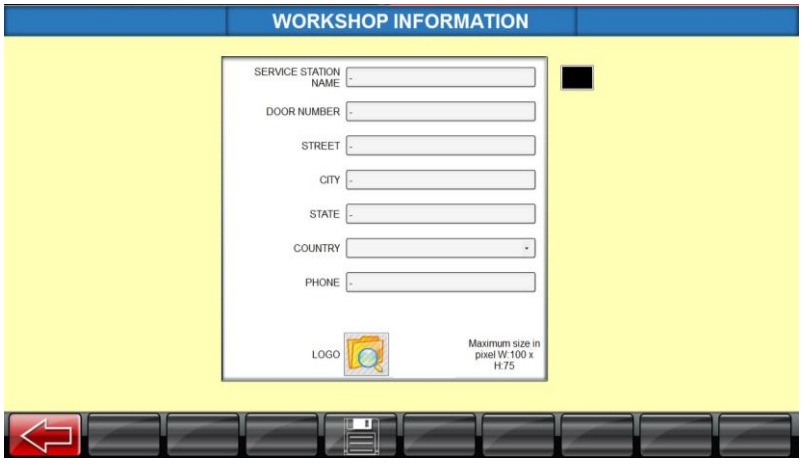


Fig. 149

7.7.5. CALIBRATION HISTORY

The details of Target plate calibration done so far can be viewed in Calibration history. To take a printout, press **PRINT** button or to save it in the system, press **SAVE TO PDF** icon in the screen.

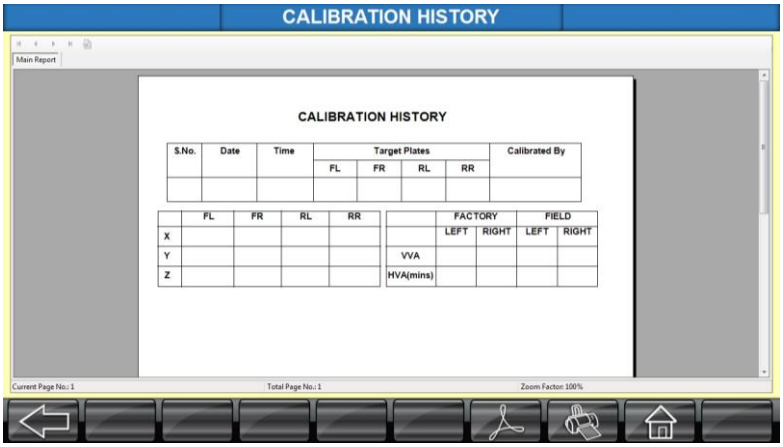


Fig. 150

7.7.6. OEM WIZARD

In this option, user can customize and create their own alignment sequence for various requirements by considering & retaining the mandatory or preferred steps alone to facilitate alignment in shortest possible time.

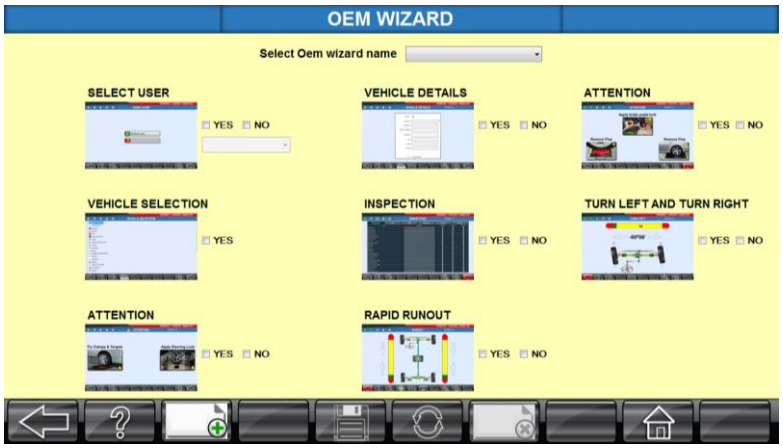


Fig. 151

Press **ADD** button to create/add a new program sequence and user will be prompted to assign a name for the program. Enter a name and then choose the preferred program modules from the available list and press **SAVE** button.

To edit an existing custom alignment sequence, select that program from OEM wizard name menu and press **EDIT** button to make required changes before pressing **SAVE** button. Press **DELETE** button to delete a custom alignment sequence by selecting that particular program name. User can also customize Vehicle database by selecting any one of required country from list box & choose the desired Vehicle make that alone needs to be listed.

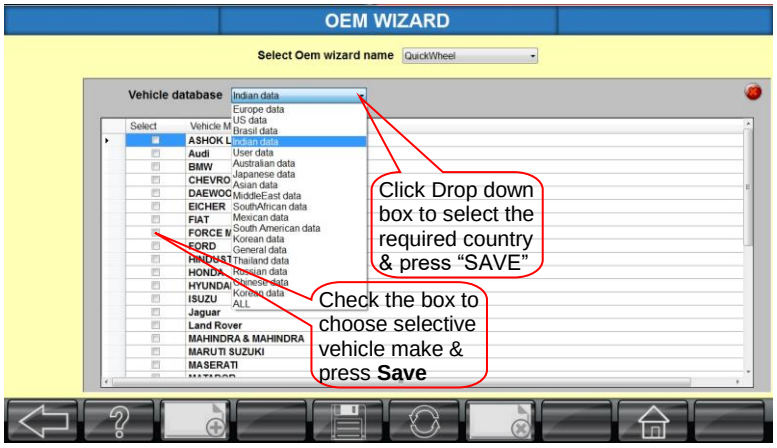


Fig. 152

7.7.7. MULTI-USER

This option is used to create User accounts to operate the system. In this we can also edit or delete the existing accounts.

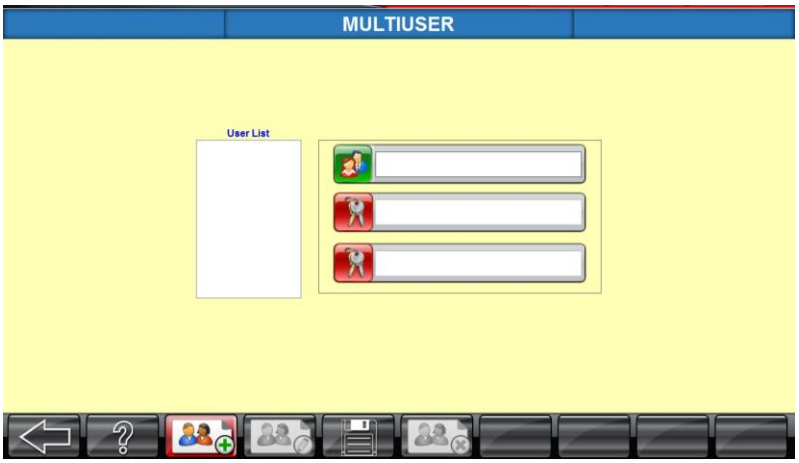


Fig. 153

7.7.8. BACKUP & RESTORE FACTORY CALIBRATION

This option is provided to backup/restore the Calibration & User defined vehicle data between alignment units, if the existing files are modified or corrupted or during re-installation.

Following are the options provided:

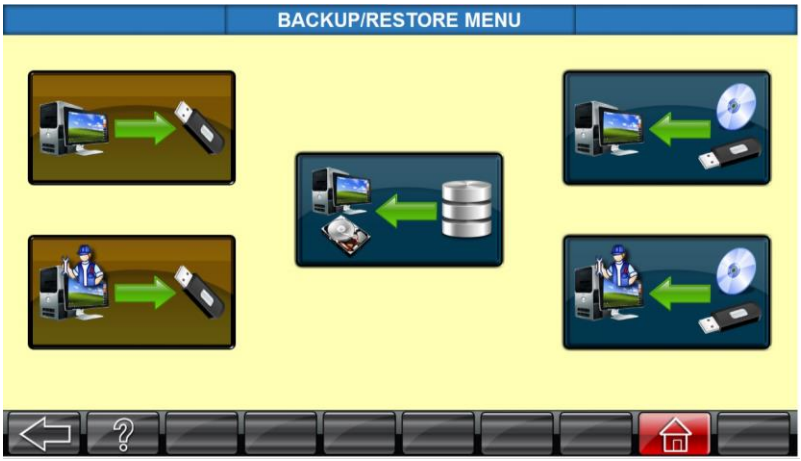


Fig. 154

7.7.8.1. BACKUP CALIB DATA FROM PC TO OTHER LOCATION

This option is used to backup the Calibration data from Desktop Computer to other locations. Also a backup is stored in local HDD of Personal computer.

Choose the location in which the data is to be saved and click **SAVE** button.

7.7.8.2. RESTORE CALIB DATA FROM OTHER LOCATION TO PC

This option is used to restore the Calibration data in Desktop computer.

The system will prompt to locate the source of calibration files for restoration. The files are provided along with the Aligner in Optical media format. Also a backup is stored in local HDD of Personal computer.

Once the data are restored, values will be displayed as below:

Fig. 155

7.7.8.3. BACKUP USER DATA FROM PC TO OTHER LOCATION

This option is used to backup the User defined vehicle data from Desktop computer to other locations.

Choose the location in which the data is to be saved and click **SAVE** button.

7.7.8.4. RESTORE USER DATA FROM OTHER LOCATION TO PC

This option is used to restore the User defined vehicle data in Desktop computer.

The system will prompt to locate the source for restoration, where the backup was previously stored.

7.7.8.5. RESTORE CAMERA DATA FROM CAMERA TO PC

This option is used to restore the Camera data stores in the Camera into the Desktop computer.

7.7.9. RESET JOB NUMBER

The Job Number is a Serial number which is automatically generated by the system for each alignment job. This option is useful to reset the Job number to 0001. If this option is selected, confirmation will be requested to reset the Job Number. If **YES** is selected, the Job number will be reset. Press **NO** to skip the current operation.

7.7.10. SETTINGS PASSWORD

This option is provided to activate the optional features from field and to reset the User password:

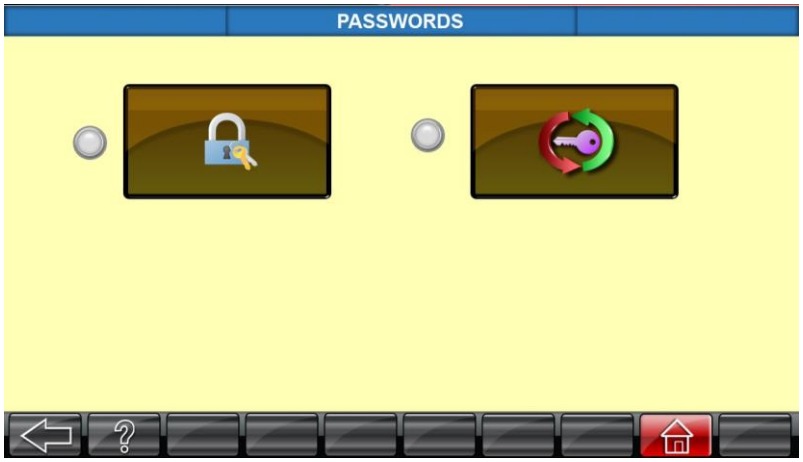


Fig. 156

7.7.10.1. LOCK DETAILS

The Optional features available in the alignment programs are controlled using built-in hardware lock. The user himself can activate the required Optional feature by paying additional cost and sending the Hardware lock number along with Machine Serial Number. Upon receiving the Serial key code from Manufacturer, select the respective feature in the screen and enter the Serial key code and then press **SAVE** button.

Fig. 157

7.7.10.2. RESET PASSWORD

On selecting this option, the operator will be prompted to enter the current password. If entered password is not correct "*Invalid Password*" message will be displayed. If the entered password is correct, the operator will be prompted to enter the New password. Then re-enter the new password once again to confirm.

If the re-entered password is not correct, "*Re-enter password again*" message will be displayed.

After re-entering the new password correctly, click **SAVE** to save the password (Factory set default password is "supervisor").

Fig. 158

7.8. LANGUAGE SETTINGS

The User can select the preferred language out of the available options so as to display the alignment screens and Voice prompts in their regional languages. Press **LANGUAGE** button in the ***Welcome*** screen and select the language as shown below:

Fig. 159

After setting the language, press **SAVE** button

8. MAINTENANCE

The equipment requires only minor maintenance to keep the equipment operating properly. We recommend attention to the following points for getting maximum benefit out of the equipment.

1. Keep the area around the Aligner clean. Remove any tools or other items that are leaning against the Aligner.

2. Use only recommended Accessories / Spares. Accessories from other manufacturer may not fit or function properly and may damage the equipment.

3. For continuous protection against fire hazard replace the Control fuses only with same type and rating of CE marked Fuse.
   Control fuse F1 – *3A, Dia 5 mm x 20 mm, Slow blow type Glass fuse*

   Control fuse F2
   For PT/DT/VH/In-lift– *5A, Dia 5 mm x 20 mm, Slow blow type Glass fuse*
   For AutoBoom – *3A, Dia 5 mm x 20 mm, Slow blow type Glass fuse*

   Control fuse F3
   For AutoBoom – *5A, Dia 5 mm x 20 mm, Slow blow type Glass fuse*

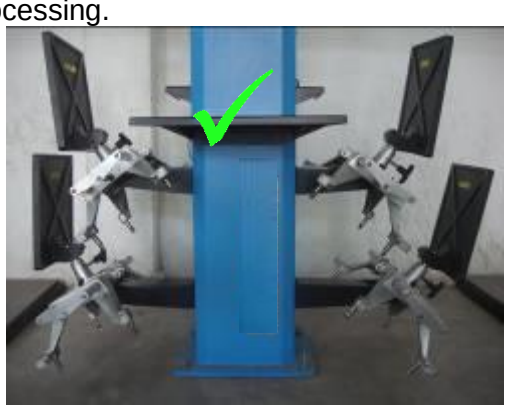
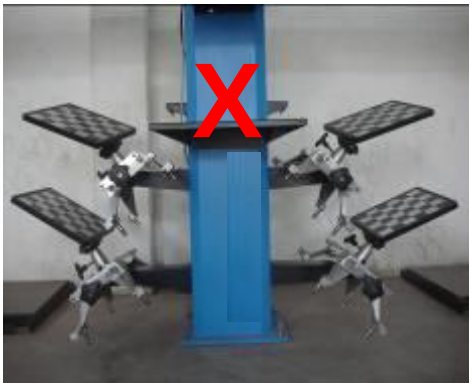
4. Protect the System from direct sunlight.

5. Do not attempt to open the System cabinet or Interface box for any reason as you may spoil the Electronic circuit and components. In case of any fault, please call Service Engineer.

6. Protect the Rotary plates from dust. Foreign particles / dust may affect the rotation, leading to wrong Caster / Kingpin readings. Service the Rotary plates once in 3 months.

7. Clean the Wheel Brackets periodically and lubricate for smooth functioning. Also Clean the Screw rod and guide shafts with oil.

8. Target plate is a sensitive reflecting surface to reflect the IR light to the Camera received from the IR source. Therefore, it is the responsibility of User to keep the Target plate clean and free from dust & scratches.
   The following tips will help the end user to maintain the Target plates in good condition. Improper usage will damage the target plate permanently.
   - Keep & store the Target plates in vertical position to avoid dust particle settling over the reflecting surface. The white reflecting square area is very critical for image processing.

   - DO NOT touch the reflecting surface of the Target plate with dirty (Oil /Grease) hands.
   - Handle the Target plates along with the Wheel brackets only. DO NOT detach the plates from the Wheel bracket.
   - Hold only the outer frame of Target plate while leveling the spirit bubble.

- Clean the Target plates using compressed air to remove dust particles and then wipe the surface of the plate with soft cloth. Clean the reflecting surface with the help of cleaning agent (Glass cleaner/ Colin) weekly once, using micro fiber cloth (soft cloth).
  Caution: *Never use Acid / Thinner / Detergent based cleaning agent.*

- Cover the Target plates using dust cover when not in use to prevent foreign particles settling on it.
- DO NOT drop the Target plates.
- DO NOT make any identification mark (Shop name, bay name etc.) on the reflecting surface.
- Store the Target plates in closed area (DO NOT expose it to sunlight) when not in use.
- To increase the life of Target plate, a scratch guard (used in Mobile phones / Laptops) can be pasted on the front surface.
- DO NOT soak the Plate in rain / snow.
- DO NOT store the Target plates near any heat emitting equipments.
- Do not interchange the Target plate from front to rear or vice versa.

9. Keep the System covered when not in use to avoid dust.

10. Keep the System away from Moisture.

11. Maintenance activity & schedule for Vertical column (Applicable only for AutoBoom model):

Periodicity	***Maintenance activity to be performed***	
Every week	*Lubrication*	*Check & lubricate the Screw rod with Molykote grease (G-4500) and Bearing housing with Multipurpose grease*
Every month	*Earthing*	*Check & ensure proper Earthing*
Every 6 Months	*Power nut & Safety nut*	*Check for wear*
	"V" belt	*Check for belt wear & correct tension*
	Foundation bolts	*Check all the nuts for correct torque and re-tighten them as required*

9. TROUBLE SHOOTING

The common troubles and error messages which can be attended by the users are listed in the table given below.

For Troubles and Error messages other than that are listed in the table contact the Service Engineer for Trouble shooting.

☞	**The Service Engineer may ask for information to help in diagnosing the service concern. Conveying this information to the Service Engineer prior to servicing can help to expedite service to your equipment**

9.1. ALIGNMENT

Sl. No.	*Trouble*	*Causes*	*Remedies*
1	*Car pulling towards one side*	*Misaligned Rear axle (ie., unequal Rear Toe). Rear axle is not perpendicular to Geometric Centre Line*	*Check the Rear suspension for worn out control arm bushings or sagged springs*
		Setback	*Check the position of the Front wheels are in line*
		Improper Camber setting. Car pulls sideway with more positive Camber	*Check for worn out ball joints or control arm bushings and sagged or broken springs*
		Uneven tyre pressure. Car pulls sideway with low inflation	*Check both tyres are with same pressure*
		Mismatched tyre sizes. Steering pull due to mixing of Radial & Normal tyres and cross ply	*Both Front tyres must be of same size, same design & should have approx. same amount of thread wear*
		Incorrect Caster setting	*Caster must be same on Front wheels Check for worn out Control arm worn strut rod bushings*
		Dragging brakes and car pulls sideway	*Check for corroded brake caliper piston and misadjusted emergency brake cable*
		Power steering problem	*Check for uneven Steering balance of Front wheels in jacked up condition and run the engine. The steering should not turn one side due to leak in Control valve. The steering effort should also be equal in both directions*
		Steering problem with tyre	*Check for faulty tyre construction*
2	*Car wanders*	*Loose steering parts*	*Inspect Tie rod ends, Idler arm and steering gear mountings*
		Worn out steering gear	*Adjust if possible. Else replace it*
		Vehicle skids while applying brake	*Check for worn out strut or Control arm bushings*
		Loose Wheel bearings	*Remove the loose bearing and inspect for damages. If so, replace it*
3	*Steering wheel not centered*	*Toe not adjusted equally*	*Make the length of Tie rods equal*
		Misaligned Rear axle	*Check the rear axle alignment, worn out Rear axle mountings, Sagging springs or collision damage*
		1. If "Runout Compensation" skipped. *2. If "Ride Height" Value skipped.* *3. After Caster adjustment, Redo process not carried out*	*1. Runout compensation to be done compulsorily* *2. "Ride Height" Value should be entered* *3. After Caster adjustment Redo process should be carried out compulsorily*

Sl. No.	Trouble	Causes	Remedies
4	Tilt in Steering wheel even after alignment	Wheel bracket not fixed properly	1. Ensure wheel bracket rim locking pins are clamped properly 2. All the Wheel brackets should be clamped uniformly either at inner or outer side of Rim
			Ensure the wheel bracket is fixed on the rim at 12 o clock position (While the wheel bracket center block is slide down).
		Wheel bracket may be defective	1. If Screw rod is found to be bent, replace the Wheel bracket 2. Fix all the Wheel brackets one by one in another Wheel rim and ensure the bracket motion is proper. If not, replace the particular Wheel bracket 3. Fix all the Wheel brackets in a particular wheel one by one and ensure the readings are similar
		Uneven pit level	1. Pit must be leveled properly within the tolerance of ±2mm 2. Zero level should be ensured diagonally (ie., between Front Left & Rear Right and Front Right & Rear Left) without deviation
5	Other symptoms	Tyre wear on outside shoulder due to excessive positive Camber	Inflate the tyre to recommended pressure and adjust the Camber as per the specifications
		Tyre wear on inside shoulder due to excessive negative Camber	Inflate the tyre to recommended pressure and adjust the Camber as per the specifications
		Tyre wear on both shoulders due to under inflated tyres	Check the tyre pressure is as per recommended specifications
		Saw tooth tyre wear due to too much of Toe-in or Toe-out	Adjust the Toe as per specifications
		Abnormal tyre wear due to loose Steering system, misaligned Front or Rear wheels, defective suspension system or car is overloaded	Correct the Steering system, align Front & Rear wheels and correct the suspension system. If necessary replace the parts
		Hard steering due to low or uneven Tyre pressure, more positive Caster or tight Steering system or defective Power steering	Check & inflate the tyre as per recommended pressure and adjust the Steering system or replace the Power steering
		Tyre squeal on turns due to wrong Toe Out on Turn angle from misaligned Tie rod, or bent Steering arm. Low or uneven tyre inflation	Align the Tie rod and adjust the Lock angle and check the tyre pressure
		Unstable at high Speed due to incorrect Front or Rear Toe or worn out steering components	Adjust the Toe or replace the worn out steering components

9.2. DESKTOP COMPUTER & PERIPHERALS

Sl. No.	Trouble	Causes	Remedies
1	When System is switched ON, no beep sound and No display	Power socket problem or loose connection in the Power socket plug point	Insert the equipment's Power cord to another Plug point's power socket & check it
	Still problem persists	UPS may be defective. i.e, No output from the UPS	Connect a Test lamp at the output socket of UPS and ensure whether UPS is OK. If not replace the UPS
		Loose connection in Fuse / Fuse may be blown off.	Check the status of Fuse and replace it
	All the external parameters have been checked. But the display problem remains as it is	ON/OFF Switch or Power supply board may be faulty	Get the problem solved through Service Engineer
2	When equipment is switched ON, only Audio sound is noticed. But no display in Monitor	Monitor may be switched OFF or Power supply to Monitor may got disconnected.	Switch ON the Monitor and Check the Power LED is ON. If not, replace the Power cord.
	Monitor Power LED blinking in Standby mode. But no display	Loose connection in the Monitor data cable	Switch OFF the system, remove the 15 Pin data cable and reconnect it to the system with correct polarity
	No loose connection in Data cable. Still the display problem persists	Monitor may be defective	Replace a monitor from other computer and check for it
		Computer's Internal system may be defective	Get the problem solved through Service Engineer
3	Electrical Shock observed in the system	No Earthing or loose contact in the Earthing point of switch board	Get the problem solved through Qualified personnel
		Earthing terminal in Power cord with intermediate cut	Replace the Power cord
4	Keyboard error message displayed when system is switched ON	Any keys in the Keyboard may be in pressed condition	Switch OFF the system and release the struck keys and again switch it ON
		Keyboard may be defective	Replace with any other PS/2 type keyboard or get the problem solved by Service Engineer
5	Multimedia speaker not working	Input supply to speaker may be disconnected	Remove the plug point and re-fix it properly and ensure that the Green light in the Speaker is switched ON
		Speaker defective	Replace the Speaker
6	Demo mode message displayed in Alignment screen	USB cable from the Camera beam may be disconnected Camera is not detected	Re-connect it properly. USB port in the Motherboard may be defective. Connect to other available USB port and check. USB cable may got damaged.

9.3. VERTICAL COLUMN (Applicable only for AutoBoom model)

Sl. No.	Trouble	Causes	Remedies
1	Abnormal noise during operation	Insufficient lubrication	Check Lubrication points & apply lubricants as required.
2	Lift stops in between	Motor driving belts loose	Tighten the driving belt

Manufactured by