IDEAL

A Division of TUXEDO Distributors, LLC.

3D iPRO
IMAGE WHEEL ALIGNER
Installation & Maintenance Manual

IWA-60-2000T-K

By **Techno Vector**
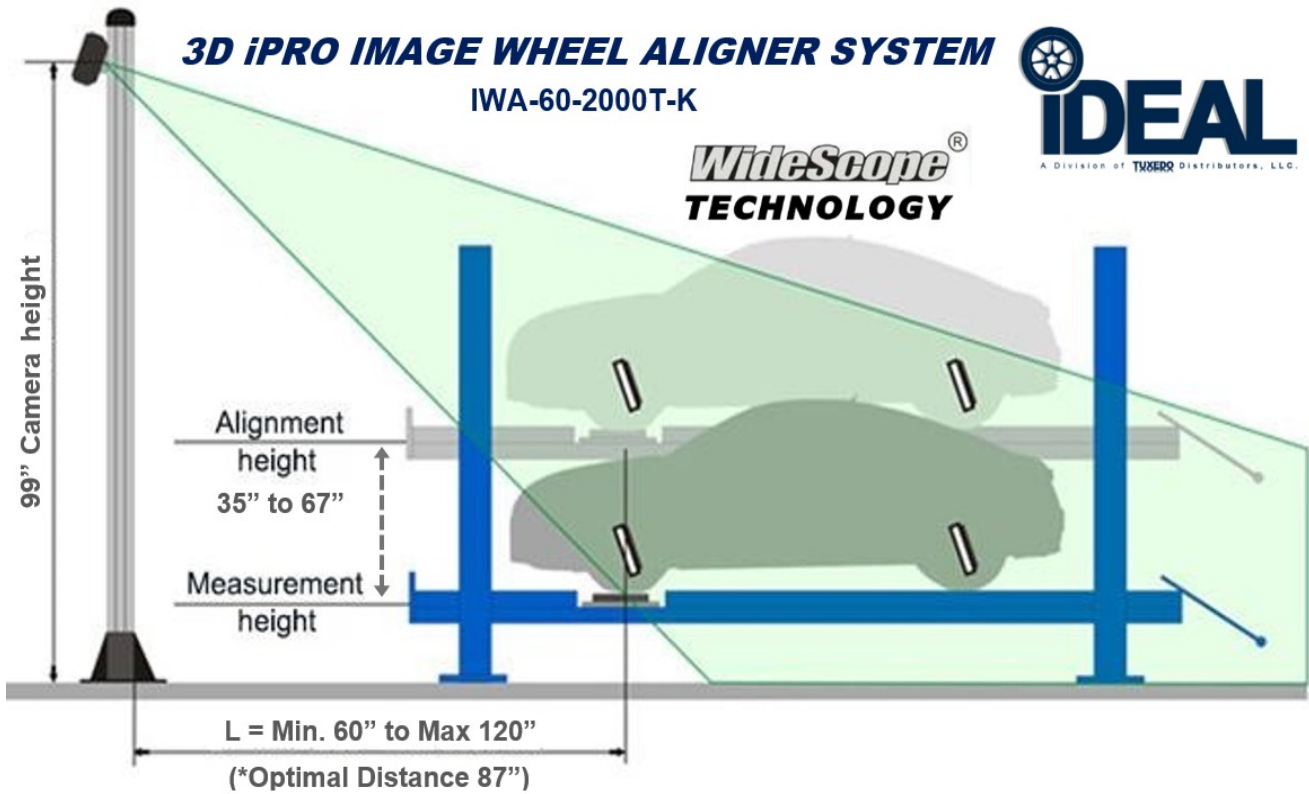
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1   General

1.1   Introduction

This manual provides information required to install and maintain iDEAL wheel aligners. The operation of the wheel aligners is based on measurements of angle parameters that determine positions of vehicle axes and wheels by video cameras and high-precision image targets.

Wheel aligners include a machine vision system that consists of video cameras, computer cabinet with a PC, remote control, high-precision image targets, and a set of accessories.

This manual applies to the iDEAL wheel aligner software version **1.11.23.3**. If you have an earlier version of the software, some features that this manual describes may not be available. We recommend that you update the software to the latest version available.

1.2   Operating Principle

iDEAL 3D wheel aligners are based on the machine vision system.

The software processes images from cameras, detects targets in the image and calculates their position in 3D space.

High speed of software operation is provided by shooting in the region, when only the part of the image that contains the target is received from the camera.

Wheel aligner calibration and accuracy testing can be carried out with a calibration device – a shaft rotating around its own axis equipped with fasteners for targets at its ends.

iDEAL HD Truck modifications are structurally similar to iDEAL iPRO modifications for motor cars, but heavily extended: they include extended software version, cameras with a bigger focal distance, heavy-duty front turn tables and a special probe target to measure the vehicle's frame.

1.3   Software Structure

The iDEAL software works with Microsoft Windows.

The software allows taking measurements with the machine vision system. It can be split into several sections:

Order management	Allows you to register orders, perform client search and automobile model search, select required models, and see specifications and images on selected automobile models
Measurement	Allows measuring wheel alignment angles
Report management	Allows you to see measurement results and print them out
Adjustment	Allows perform the wheel alignment on the vehicle
Settings	Allows to edit settings, to perform calibrations, to manage users, to run diagnostics, etc.

1.4 Wheel Aligner Equipment Overview

1.4.1 Video Cameras

The main element of the machine vision system is a set of video cameras equipped with LED backlighting and infrared filters.

Video cameras are controlled by the computer's software. Exposure time is automatically set and depends on lighting conditions and target position in the 3D space.

Not all cameras are interchangeable. There can be the following structural differences between cameras:

- Focal distance and lens type;
- Sensor type and resolution;
- LED backlight type;
- Data Transfer mode (Wi-Fi, LAN cable);

The differences mentioned above changes the camera's working range and other miscellaneous parameters but do not have a fundamental impact on the principle of its operation. From the user's and software's point of view all cameras work in the same way.

You can turn on and off cameras by pressing a dedicated key on the power supply unit.

1.4.2 Measurement Targets and Reference Targets

Measurement targets are high precision flat metal panels with a special pattern recognized by the software. Targets should be mounted onto wheels using wheel clamps. In the target housing, there is a pivot pin that is used to fasten the target to a clamp or a calibration device.

Table 1.1 - Targets for iDEAL wheel aligners (full table)

Target	Square Size	IDEAL Aligners			
		2 cameras	**Truck**		
9×8	29 mm	-	Probe		
8×7	24 mm	Front	Front		
7×6	37 mm	Rear	Rear		
11×8	16 mm	-	-		

1.4.3 Clamps

Clamps are special tools that are used to fasten targets to wheel discs. Clamps are mounted onto four vehicle wheels. Targets are mounted onto the wheel that corresponds to the label on the target.

1.5 Safety Precautions

1.5.1 Electric Safety

- Do not touch any electronic elements, as static electricity can make them disabled. The materials that can cause the accumulation of considerable static charge include: nylon, silk, rubber, plastic and other synthetic materials.
- Always turn off all the wheel aligner's components when replacing electronic elements;
- Use antistatic materials to pack electronic components;
- The device must be grounded. Make sure that the grounding mat is connected correctly and that the grounding is done properly: check that it is not using a neutral wire as a ground;

1.5.2 Fire Safety

Do not store highly inflammable liquids and the wheel aligner in the same room.

1.5.3   Eyesight Protection

When installing and maintaining the wheel aligner, do not look at LEDs for camera backlighting at a short distance (closer than arm's length) if the camera is on (shooting).

1.6   Wheel Aligner Maintenance

− Wipe camera filters regularly with a dry microfiber cloth. Do not use paper napkins, as they can scratch filter plastics. Do not press while wiping filters.

− Wipe targets regularly with a clean damp cloth. Use mild cleaning solutions if there is oil on targets. Do not leave any water or cleaning solutions on targets after wiping them.

2 Equipment Configuration

Equipment included with the computer cabinet.
Cabinet
Power supply unit
PC system unit (with necessary peripheral equipment[1])
Remote control

Other equipment
Measurement targets
Clamps
Steering wheel holder
Brake lock
Other accessories

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[1] The manufacturer may change this due to improvements introduced into the device for commercial or technical reasons.

3   Equipment Installation and Initial Setup

3.1   Computer Cabinet Assembly

1.   Unpack the cabinet.
2.   If equipped with a mobile cabinet:
a.   Locate a key fastened with adhesive tape to the top of the mobile cabinet. Use it to open the door of the cabinet.
b.   Mount wheels onto the mobile cabinet.

3.   Mount brackets which are used for storing clamps.
4.   Mount upright post onto cabinet slot. Secure with 8 bolts.
5.   Using 2 people, bolt the camera boom to studs at the top of the post. plug in power and camera wires.
6.   Install the monitor bracket. Unpack the monitor. Remove any mounting elements from the monitor. Fasten the monitor to the monitor bracket with the screws, included with the shipment. Connect the power and HDMI cable into the monitor.
7.   Install steering wheel holder and brake lock hangers on back side of cabinet.
8.   Unpack the keyboard and the mouse. Set on cabinet. USB receivers are already plugged into the computer

Please call or Email Northwest Equipment for further instruction once aligner is assembled. Aligner must be connected to wifi. Aligner setup must be completed through remote connection by Northwest Equipment.

Northwest Equipment Sales

406-755-0805

4info@nwequipmentsales.com

4   Software Installation

4.1   System requirements

Typically, the wheel aligners are supplied with a PC that already have all the required software installed.

However, if for some reasons, you want to install the iDEAL software on a custom PC and use it as a wheel aligner PC, it must meet the following requirements[1]:

Processor	Intel® Celeron® N5095 or Intel® Pentium® Gold G6405 or AMD Athlon™ 3000G Desktop processors are recommended.
GPU	Intel HD Graphics 610
RAM	4 GB
Storage	120 GB For the Techno Vector software and for Windows and its updates.
Network	Network Card with a 100 Mbit LAN slot
Operating system	Windows 10

⚠ **These are the minimal system requirements. For a better performance, we recommend that you use a PC that exceeds the specified requirements.**

4.2   Setup files

PCs, which are supplied with the wheel aligners, already have the installation files. They are located either in C:\Distr\, or the C:\Distrib\ folder.

To install the software on a custom PC, get the installation package from iDEAL support.

To start the installation, launch the installer file and follow the installation wizard instructions. During the installation, the following components will be installed:

- Microsoft .NET Framework version 4.7.2 – program library;
- Microsoft PowerShell;
- Licensing system driver;
- K-Lite Codec Pack – codec pack to decode video and audio, used in the software;
- Microsoft Visual C++ Redistributable 8.0, 9.0, 10.0 – program libraries;
- Remote Control software to work with the remote control;
- Vehicle database;
- software.
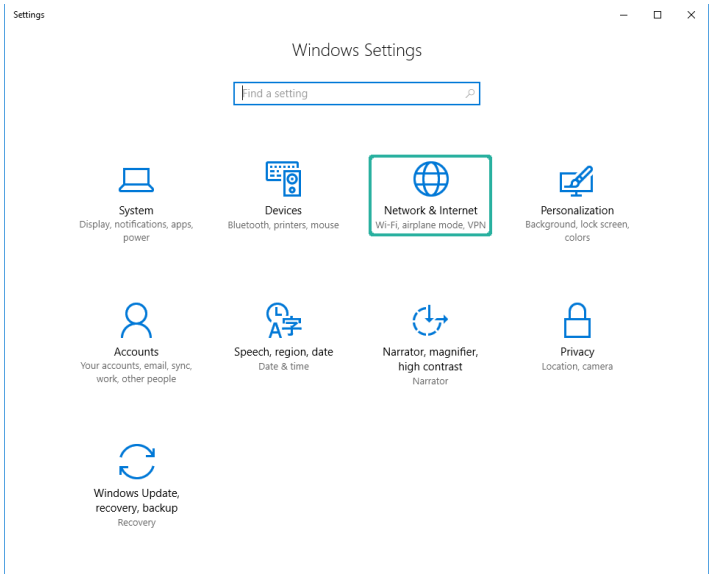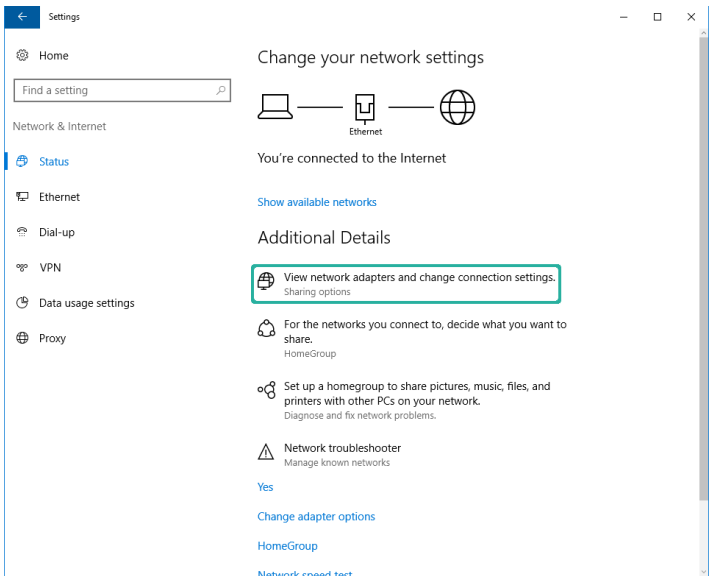
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1 The manufacturer may change this due to improvements introduced into the device for commercial or technical reasons.

4.3   Before the installation

‒   To install the software on any operating system, you must have **administrator privileges**.

‒   Reboot the PC.

‒   Plug the security dongle into any PC's USB port.

4.4   Configuring the network connection

For your wheel aligner PC to be able to connect to wheel aligner's cameras, configure its network settings:

Operation	Image
Enter **Windows Settings**. Select **Network & Internet**.	
Click **Change adapter options**. If you have an active Wi-Fi connection, click **Ethernet,** and then click **Change adapter options**.	

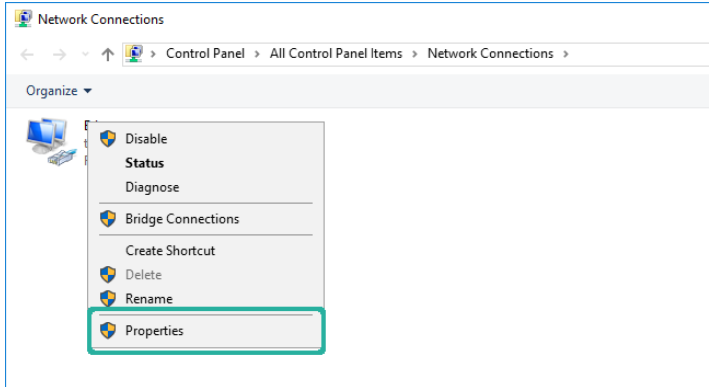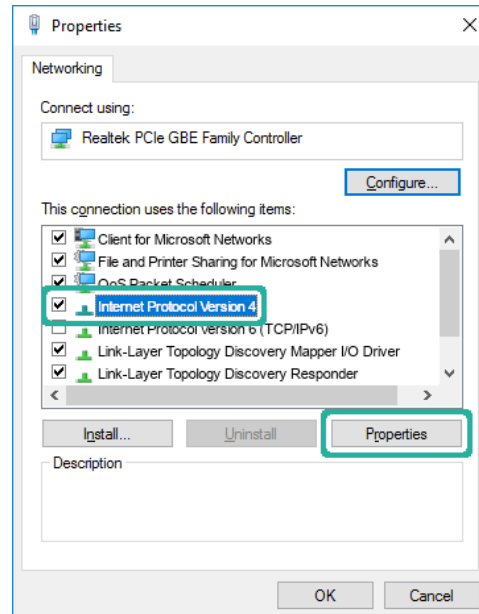|	
Right-click the network connection to configure and then click **Properties**. If no network connection is available, install the network drivers.	Network Connections ← → ↑ > Control Panel > All Control Panel Items > Network Connections > Organize ▼ Disable **Status** Diagnose Bridge Connections Create Shortcut Delete Rename Properties
In the resulting window, select the **Internet Protocol Version 4 (TCP/IPv4)** item and click **Properties**.	Properties × Networking Connect using: Realtek PCIe GBE Family Controller Configure... This connection uses the following items: ☑ Client for Microsoft Networks ☑ File and Printer Sharing for Microsoft Networks ☑ QoS Packet Scheduler ☑ Internet Protocol Version 4 ☐ Internet Protocol Version 6 (TCP/IPv6) ☑ Link-Layer Topology Discovery Mapper I/O Driver ☑ Link-Layer Topology Discovery Responder Install... Uninstall Properties Description OK Cancel
Select the **Use the following IP address** check box and enter the IP address and the subnet mask to use. **Manufacture year:** To use another IP address or subnet: 1. Consult your system administrator to learn which IP address or subnet to use. 2. Configure the network connection on your PC to use the specified IP address or subnet as described above.	IP 4 (TCP/IPv4) Properties × General You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings. ○ Obtain an IP address automatically ● Use the following IP address: IP address: 192 . 168 . 0 . 1 Subnet mask: 255 . 255 . 255 . 0 Default gateway: . . . ○ Obtain DNS server address automatically ● Use the following DNS server addresses: Preferred DNS server: . . . Alternate DNS server: . . . ☐ Validate settings upon exit Advanced... OK Cancel

Manufacture year:	
2022 and later	192.168.**20**.1 – or – 192.168.**20**.2
Before 2022	192.168.**0**.1
Subnet mask: 255.255.255.0	

3. Update the wheel aligner's cameras' firmware to use the specified IP address. To learn how to do it, please see the Camera DSP Board Replacement manual. 4. Configure the wheel aligner software to use the specified IP addresses to access its cameras. To learn how to do it, see Settings > Service > Cameras.	

4.5 Software Installation

	When you launch the installation, it will check the installation package for the integrity. If the file is damaged, the "Failed integrity check" error will occur. Get the original setup file and start installation again. After checking integrity, the installation wizard will appear.
	Follow the installation wizard instructions. It will unpack the Techno Vector software components to the C:\ Distrib\ folder.

Techno Vector 7 Setup
 	
✓ System Requirements
  Installing Microsoft Powershell
  Installing Microsoft Visual C++ Runtime
  Installing K-Lite Codec Pack
  Installing 7-Zip
  Installing HASP Key Driver
  Installing Remote Control
  Installing Windows Media Player 11
  Installing Techno Vector 7
 	
Welcome to the Techno Vector 7 Setup. To make sure that current PC is compatible with Techno Vector 7, the setup has performed the system requirements scan of your computer. The results are displayed below
 	
Operating System   Windows Vista / Windows 7
✓ OS Version   Microsoft Windows NT 6.2.9200.0
✓ CPU Cores count   12
✓ CPU Frequency (MHz) 3593
✓ Videocard   NVIDIA GeForce GT 730
 	
Please choose the installation language
 	
Language   English
 	
Before the installation starts, insert the HASP HL key into computer. Connect the network cable and make sure the cameras are turned on.
 	
Settings   Next   Cancel
	The iDEAL software installation will start.
	
	It will check if the PC meets the system requirements.

Techno Vector 7 Setup
 	
✓ System Requirements
✓ Installing Microsoft Powershell
Installing Microsoft Visual C++ Runtime
  Installing K-Lite Codec Pack
  Installing 7-Zip
  Installing HASP Key Driver
  Installing Remote Control
  Installing Windows Media Player 11
  Installing Techno Vector 7
 	
Installing Microsoft Visual C++ Runtime v8.0, v9.0 and v10.0
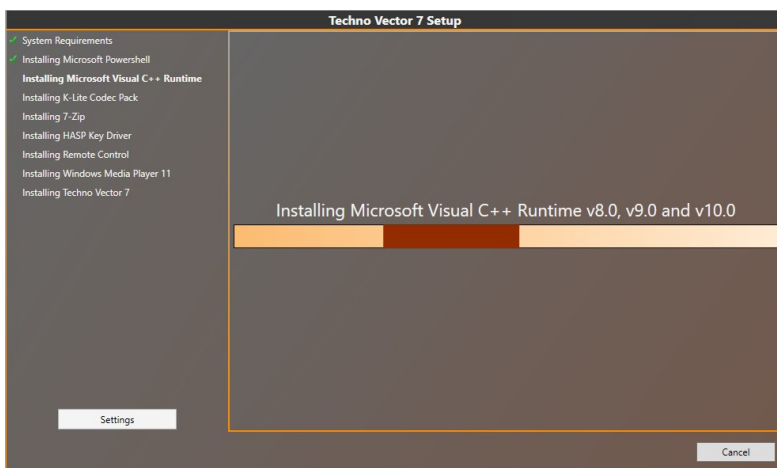 	
Settings   Cancel
	Press **Next** to proceed with the installation.
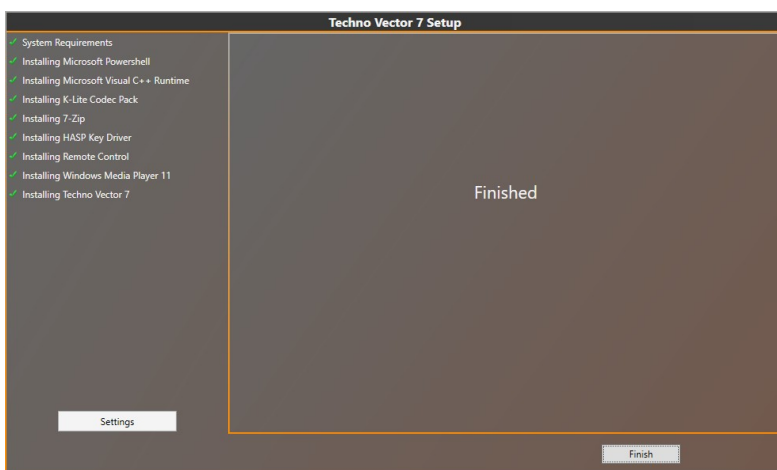
Techno Vector 7 Setup ✓ System Requirements ✓ Installing Microsoft Powershell ✓ Installing Microsoft Visual C++ Runtime ✓ Installing K-Lite Codec Pack ✓ Installing 7-Zip ✓ Installing HASP Key Driver ✓ Installing Remote Control ✓ Installing Windows Media Player 11 ✓ Installing Techno Vector 7 Finished Settings Finish	Wait until the installation is complete.

5   Initial Software Setup
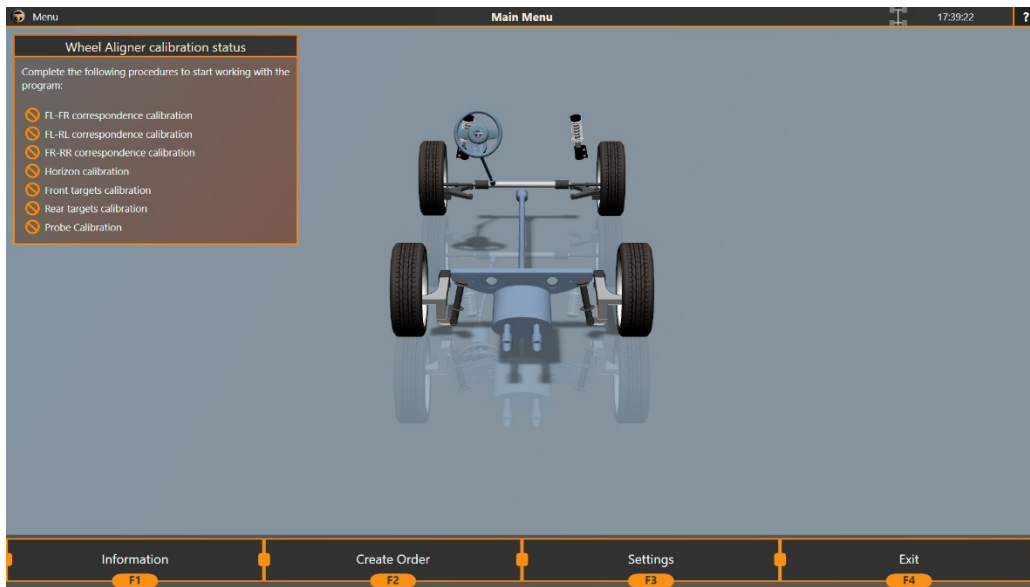
5.1   Computer Start-up

Turn on the computer. Wait until the operating system loads up.

Start the iDEAL software using the iDEAL shortcut on the Windows desktop. After the software is loaded, the main menu is displayed.


Figure 5.1 – Main Menu

Notice the panel in the upper left-hand part of the screen. It displays the list of calibrations that have to be performed before using the wheel aligner.

5.2   Restoring from the Backup calibration data

iDEAL aligners are supplied pre-calibrated. If you have a USB flash-drive containing backup calibration data, you can also restore all the calibrations from it instead of performing them yourself. If calibration is needed due to damage that may have incurred during transportation or if a target is broken and replaced, the aligner will need to be calibrated. This procedure is done with a calibration bar. Call iDEAL aligner support to get a calibration bar.

- To restore the backup calibration data:
  1. Insert the USB flash drive into the computer's USB slot.
  2. Go to **Settings > Service > Backup**.
  3. Click **Restore**, select a backup entry from the list and press **F2 (Restore)**.
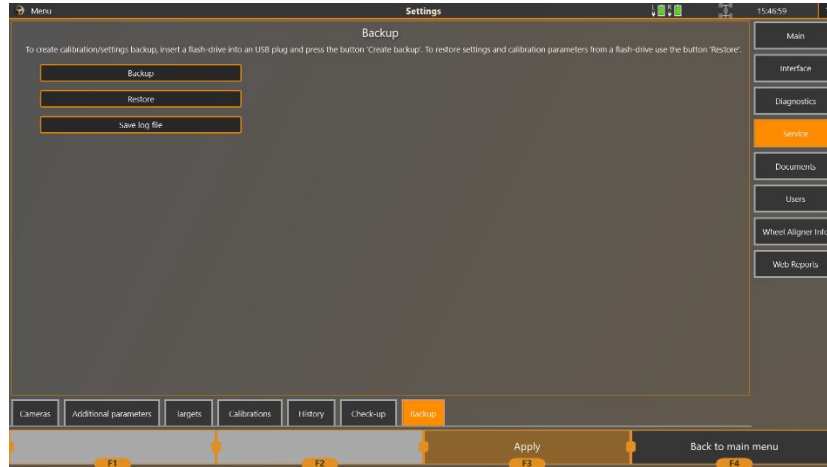
Figure 5.2 – Restoring wheel aligner data from a backup

You can also restore from an arbitrary location (not a USB flash drive). To do so, click **Select File**, and browse to the folder where the backup was made.

After restoring from the backup, the software will have to be restarted.

5.3   Initial Camera Diagnostics

Before starting any calibrations, it is necessary to make sure that cameras work properly. To do this, press F3 (Settings) in the main menu. Select Diagnostics on the right. Each camera is diagnosed individually. In order to select a camera, press FL, FR, RL, RR.

The camera diagnostic parameters are displayed on the left. Camera controls are displayed on the right. The image received from the camera is displayed in the center. If you left-click on the image, you can magnify it. To zoom out, right-click on the image. You can increase the area the image takes by pressing F1 (Zoom) to hide camera diagnostic data. In order to display the diagnostic data, press F1 (Zoom) again.

Figure 5.3 – Camera diagnostics screen

To perform initial camera diagnostics:
  1. Turn on the camera by selecting the On check box.
  2. The live image should appear on the screen. The image should be dark, as the cameras are equipped with IR filters.
  3. Place the target in the camera vision range.
  4. Select the Analyze frame check box and make sure that the software recognizes the target in the frame.

You can find the detailed description of all camera diagnostics options in section *Settings > Diagnostics*. In addition, for each camera you can check the following diagnostics data:

Table 5.1 - Diagnostic parameters in the Camera Diagnostics mode

Parameter	Description
IP address	The IP address of the selected camera.
Camera angle	Angle between the perpendicular (normal) to the target plane and the line that connects the target center with the camera lens.
Horizon angle	It displays the angle between the perpendicular to the target and the horizontal

	plane (only when horizon is calibrated).
Exposure	Controls the exposure of the selected camera. It is automatically chosen based on a target's brightness in the frame. The bigger is the exposure time, the brighter the image will be.
Gain	Controls gain of the selected camera. The higher the value, the brighter the image will be. This value can be adjusted during diagnostics, but the software will try to adjust brightness automatically and reduce the exposure time. As a result, the image brightness will not change.
Region	Coordinates and sizes of a current Auto Region. The value 100:100 (200×200) means that the camera is requested to show a region beginning with the coordinates (100:100) and the size of 200×200 pixels.
Shudder	The maximum difference (in pixels) of target points 2D image position compared with their position at the previous frame. The software uses this value to ascertain whether the target is moving or not.
Back projection (maximum/average)	The maximum or average deviation (in pixels) of the target image points from the points computed using all the points of the target.
Frame receiving time	The time required to transfer the image from camera to the PC.
Frame shooting time	The time required to shoot the frame by the camera.
Frame processing time	The time taken by the target recognition algorithm.
Total time	The time to perform the whole cycle: shooting – transmitting – processing.
Frames done	Number of frames shot since the program was started.
Calibration data	Shows if there is a factory and correspondence calibration for the camera.
Camera errors	Displays data on camera errors as follows: Number_of_Connections / Connection_attempts; Camera_Errors The first two parameters can increase if the camera was switched off and/or was not connected to the PC. The third parameter indicates actual camera errors.
Firmware version	Displays the camera firmware version.
Distance	Displays the distance from the target to the camera.
Target Rotation	Displays a diagnostic code for target rotation. Used by software support.
Focus Quality	Displays the result of 'focus quality computation'. This value will appear only when Compute Focus Quality is enabled.

Note the chassis icon in the upper right-hand corner of the screen.

Chassis Icon for 2 and 4 camera aligners.

When the software is shooting frames, the corresponding wheel will change its color.

State	Description
Red, not blinking	Camera is not responding to requests or is not connected.
Red, blinking	Camera is shooting, but target is not recognized in the frame.
Yellow, blinking	Target is recognized, but its position is not stable.
Green, blinking	Target is recognized and stable.
Gray, not blinking	Camera is connected but is not used.

Clicking on the chassis icon in any mode will display the camera diagnostics window:
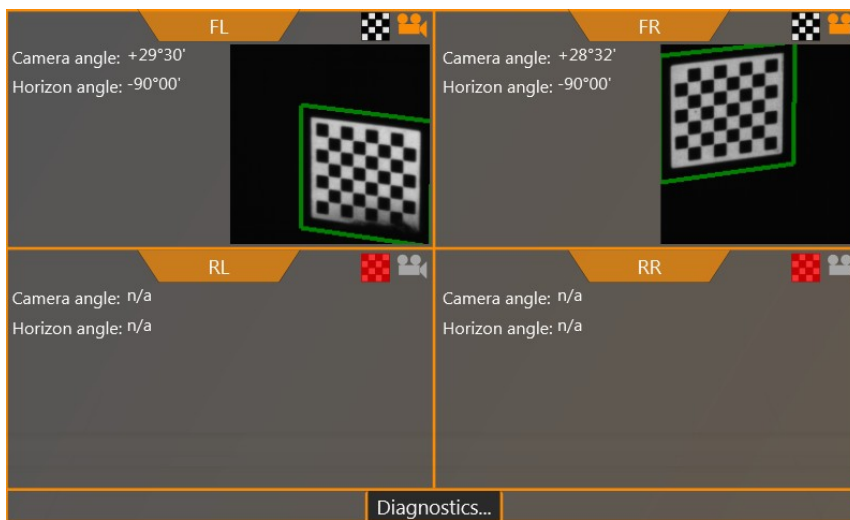

Figure 5.4 – Camera diagnostics window

6   Calibration

6.1   General information

To make it possible to detect the position of any point of targets within the wheel aligner's cameras' field of view, the **calibration** is performed.

If you have purchased your wheel aligner's PC with the iDEAL software already pre-installed, more likely, it already has all required calibration data.

Otherwise, if you have installed the software on a custom PC, the wheel aligner calibration data required for it to work correctly will be missing from that PC. In this case, you will have either to get the factory calibration data or calibrate the wheel aligner manually.

There can also occur situations when wheel aligner cameras have been subdued to some physical damage or shifted their position during the maintenance. In that case, appropriate calibrations must be performed again, manually.

6.2   Restoring factory calibration data

To use the calibration data provided by the wheel aligner manufacturer:

1.   Navigate to the **F3 (Settings) > Service> Cloud backup** screen.

2.   Select the factory calibration backup data, if any is available for your wheel aligner, and press **Restore**.

3.   The wheel aligner software will restart for the change to come into effect.

⚠ **Factory calibrations are not applicable to wheel aligners with mobile camera posts, for targets, including probe targets, and for horizon calibrations. Such calibration must be performed manually.**

6.3   Calibration procedure

For wheel aligners that are not pre-calibrated, the following calibrations have to be performed.

Table 6.1 - Calibrations for the iDEAL IWA-60-2000T-K wheel aligner

6.4   Factory Camera Calibration

Factory camera calibration includes information on the focal distance and image distortions of the camera's optical system. This information is stored in the camera.

The camera calibration data is copied to the PC hard drive every time the software starts. Previously saved data is compared with the data received from cameras. If they do not match, there will be a warning message displayed. This message usually indicates that some change has been made to the camera set (i.e., a camera replacement was made). **Any camera replacement requires a complete recalibration of the aligner**.

⚠ **Unauthorized camera disassembling is PROHIBITED.**

6.5   Correspondence Calibration

Correspondence calibration is used to determine the relative position of cameras or targets after their setup.

⚠ **After any action that alters camera's positions relative to each other, recalibration is required!**

The **FL-FR** correspondence calibration should be performed **at the measurement height**.

In most cases, **FL-RL** and **FR-RR** calibrations are also performed **at the measurement height**.

When you enter the correspondence calibration mode, the scales on the left and on the right of the screen will show the target range of angle-to-camera values for each target. If the targets are beyond the camera vision range or cannot be detected, question marks will be shown on the screen.

6.5.1   FL-FR Correspondence Calibration

To start the calibration, enter Settings-Service-Calibration mode. Then select FL-FR correspondence calibration and press Calibrate.

1.   Place the calibration device behind or in the front of the turn tables. Mount two front targets onto the calibration device. Turn the targets to the cameras, adjust the targets so that their angles are approximately the same. Fasten the targets.

Figure 6.1 – Correspondence calibration. Step 2

⚠ **This is the only one calibration mode when it is necessary to rotate the targets for the calibration (not the calibration device).**

2.   Rotate the targets upwards in the direction that the arrows show. The angle between the targets and the cameras should fit the 45–50° range.

3.   Fasten the targets and press F2 (Next Step).

4.   Rotate the targets on the calibration device downwards. The angle between the cameras and the targets should fit the 45–50° range.

5.   Fasten the targets and press F2 (Next Step).

6.   Press F2 (Save) and then F3 (Apply).

6.6   Horizon Measurement

To perform the wheel alignment measurement and adjustment, the information on the camera inclination angle to horizon is required. To get the angle, the plane of the pit or lift is calculated in the camera coordinate system. The software receives the normal vector, that is, a vertical vector perpendicular to the working surface plane and directed upwards.

Before starting this procedure, make sure that the horizontality of the workplace complies with the requirements.

⚠ **The difference in level of front turn tables and rear platforms must not exceed the tolerances specified in the picture.**
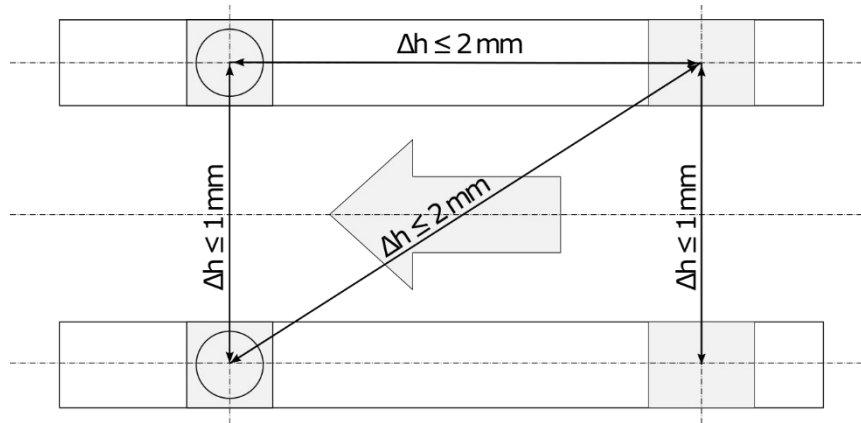
Figure 6.2 – Maximum permissible difference in level of front turn tables and rear platforms

Control points are the points for taking horizon measurement. The recommended points are platforms for wheels. We recommend choosing front control points on front turn tables, rear control points either on rear turn tables, or – if there are no rear turn tables – at a distance of 2.5 meters from front turn tables.

Recommended to use a laser level or similar tools to calculate the deviation of the control points from the horizontal plane.
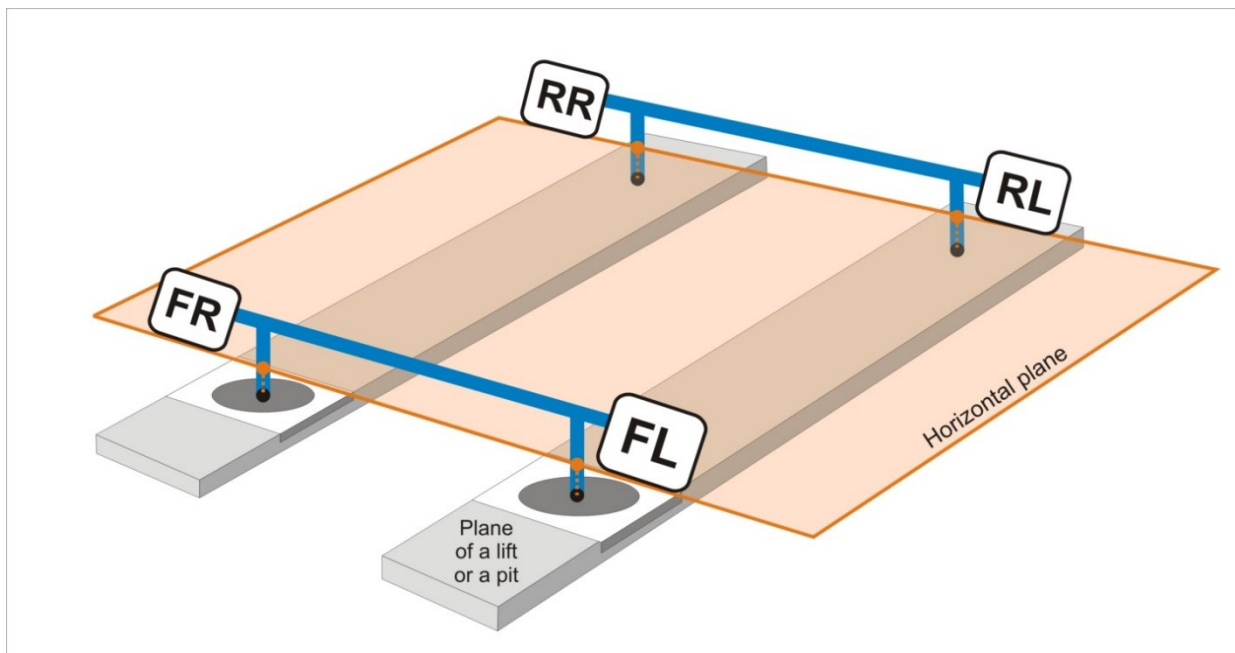
Figure 6.3 – The difference of the lift or pit plane from the horizontal plane

Write down the deviations of the control points from the horizontal plane. Thereafter, mount the calibration device using these control points when taking horizon measurement.

We recommend taking horizon measurement of the lift at the measurement height.

The horizontal measurement of the lift resembles correspondence calibration. It consists of 4 stages; each stage includes 2 steps. The software receives axes of target rotation in each stage.

Figure 6.4 – Diagram of the calibration device installation during horizon measurement

You should rotate the calibration device in each position; the rear targets must be firmly fixed to the calibration device. The software receives axes of rotation, required for receiving the horizon.

The procedure should be repeated in stage 3 and 4, but the calibration device should be rotated 180 degrees around the vertical axis in order to exclude the effect of the non-horizontal position of the calibration device.

⚠ **When you perform the horizon measurement different targets can be used in different wheel aligner configurations. On 4-camera wheel aligners front targets are always used. On 2-camera wheel aligners front targets are used only if the size of a square is 29mm. In all other cases rear targets are used. If you are uncertain use the texts on the screen as a guide.**

To take horizon measurement, enter the **Settings > Service > Calibration** mode. Select **Horizon measurement** and press **Calibrate**.

7 Software Description

7.1 Software Settings

Software settings allow you to control the software work, calibrate the wheel aligner, check calibration, backup and restore data. To access settings, press F3 (Settings) on the main menu. The software will proceed to the Settings screen where the Main page is open by default.

7.1.1 Settings > Main

This screen includes the main software settings. At the top right-hand corner, you can see the software version and vehicle database version that is used by the software.

Figure 7.1 – Settings > Main

7.1.2 Settings > Interface

On the **Settings > Interface** screen, you can configure the software interface and graphic settings of the 3D model displayed in the adjustment, measurement, and compensation modes.

Figure 7.2 – Settings > Interface

Table 7.2 - Settings > Interface

Parameter	Description

Sound mode	The following options are available:
	
	  − Full – sound effects and voice support are included
	  − Sound and No Voice – only sound effects are included
	  − No Sound – no sounds are included

Display animated help	If this option is enabled, the compensation and adjustment screen will show dynamic tips and hint.
Use shaders	If this option is enabled, the software will use shader effects on the loading screen. If you use an embedded graphic adapter, we recommend that you disable this option.

Draw reflections	Specifies if the software renders reflections of 3D models on the "floor". If you use an embedded graphic adapter, we recommend that you disable this option.
Dynamic shadows	Specifies if the software renders dynamic wheel shadows of 3D models on the "floor". If you use an embedded graphic adapter, we recommend that you disable this option.
Floor shadows	Specifies if the software renders shadows of 3D models on the "floor". If you use an embedded graphic adapter, we recommend that you disable this option.
User Interface target FPS	Specifies the framerate per second of the interface update. The lower the value, the lower resources the user interface rendering consumes.
3D Model smoothing	Specifies the value used by the antialiasing to smooth the edges of 3D models.
Require correct data when registering an order	If this option is enabled, an order will require a proper client name (containing more than two letters) and the license plate number.
Require login and password	If this option is enabled, the software will support multiple user profiles and will prompt for a username and a password upon startup. You can create, delete, and manage users on the Settings > Users screen.
Main menu appearance	Specifies the look of the main menu. The following options are available: − Video − Chassis image − Web camera feed
Language	Specifies the language that the software uses. This will not affect the database language[1].
Reminder to wipe cameras and targets	Specifies whether the software shows a reminder to clean cameras and targets. You can specify the number of hours or the number of adjustments in which the reminder will be shown.
Use Web-Services	This option is obsolete and will be removed in one of the future software updates.
Input ride height instead of a table selection	Some vehicle models may require that you specify their ride height to select a proper specification table. To get their ride height, you may have to measure various parameters, typically, the front transverse link and the rear drive shaft. If this option is enabled, you can specify those parameters manually. Otherwise, you will have to select one of predefined values from a table.

1 The database includes only one language. To change the database's language, a corresponding distribution package is required.

7.1.3   Settings > Diagnostics

The diagnostics mode is used to check the cameras video feed and their recognition capabilities.

Figure 7.3 – Settings > Diagnostics

Select a camera by pressing the corresponding button.

Table 7.3 – Settings > Diagnostics

Parameter	Description
On	Specifies whether the selected camera is on.
Auto region	If this option is enabled, the camera will send only the region of interest – the region where the target is located. To examine the target positioning in a full frame, disable this option. Has an effect only if the **Analyse frame** option is enabled.
Analyse frame	Specifies whether the software searches for a target in the frame.
Display markup	Specifies whether extra markup is added to the camera feed for diagnostics.
Display borders	Specifies whether borders are rendered around the frame. This can be useful when setting up the camera to adjust its position.
Compute Focus Quality	Enables the camera maintenance mode that measures the Focus quality value of the camera feed. The mode can be enabled for a single camera at a time. The mode can cause significant performance issues. We recommend that you enable it only when diagnosing camera focus issues.

7.1.4 Settings > Service

7.1.5 Settings > Service > Cameras

You can use these settings to view and configure the wheel aligner camera connection parameters.
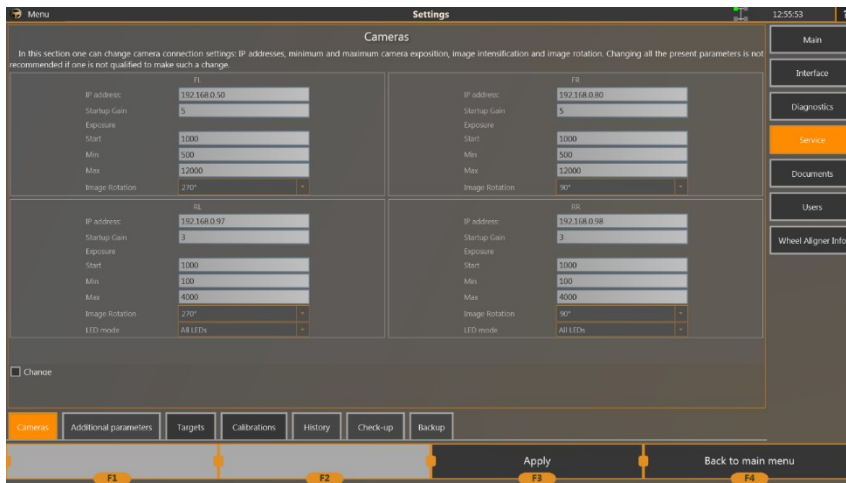
Figure 7.4 – Settings > Service > Cameras

By default, the camera connection parameters are set automatically depending on the wheel aligner version. However, there can be situations when you have to configure those parameters manually.

To modify these options, select the **Edit** check box.

Table 7.4 – Settings > Service > Cameras

Parameter	Description
IP address	Network address of the camera.
Startup gain	The initial gain value that the software sets for the camera when it starts. You can change the gain value on the **Settings > Camera diagnostics** page, but it will be reset to the initial value upon the restart.
Start exposure	Initial exposure value that the software assigns to a camera when it starts. Usually, this value corresponds to exposure required to detect a target residing at a maximum possible distance from a camera and in a blackout frame.
Minimum exposure	The minimum exposure value that the software uses when it is searching for a target in a frame. Usually, this value corresponds to exposure required to detect a target residing next to the camera.
Maximum exposure	The maximum exposure value that the software uses when it is searching for a target in a frame.
Image rotation	Rotation of the camera frame. You may have to configure this parameter depending on your wheel aligner version.
LED mode	Applicable for 5 Mpix cameras only. Allows enabling extra backlight LEDs of the camera to increase the camera feed contrast.

To edit the parameters for each camera, check Change.

The exposure parameters affect automatic time selection for exposure.

7.1.6   Settings > Service > Additional Parameters

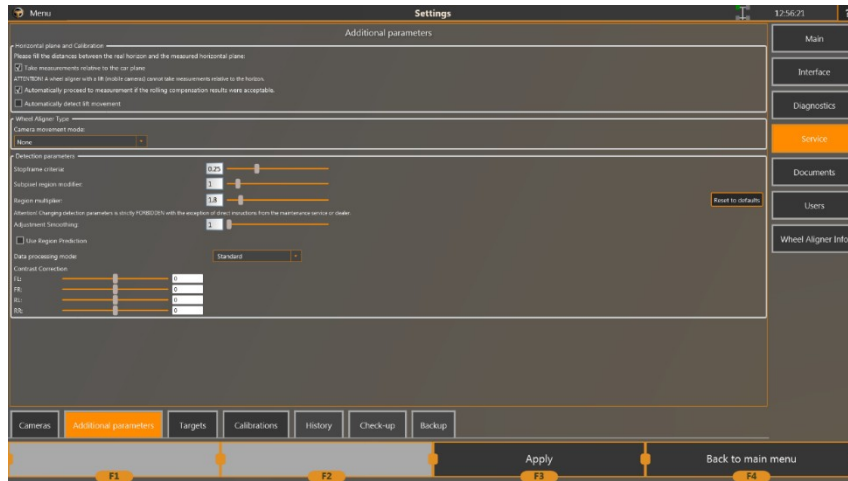On this screen, you can set additional parameters that affect the software and its functions.

Figure 7.5 – Settings > Service > Additional parameters

Table 7.5 – Settings > Service > Additional parameters

| Parameter	Description
Measure relative to the car plane	Is this option is enabled, the measurements will be performed relative to the vehicle plane rather than to the horizontal plane received during the horizon calibration. This option cannot be disabled for wheel aligners equipped with a rotatable camera beam or with mobile measurement units.
Automatically proceed to measurement if the rolling compensation results were acceptable	If this option is enabled and the rolling compensation results for all four wheels do not exceed 3 arcminutes (3'), the software will proceed to the measurement mode automatically.
Automatically detect lift movement	If this option is enabled, the software will automatically track lift movements. This allows adjusting errors caused by the lift being skewed. We recommend that you enable this option if you face an issue with measurements results in the lowermost position of the lift being different from the ones obtained in the higher position. This option is not applicable to the modification 7212 because this modification includes a rotatable camera beam.
Use an extended mode of Fl-FR correspondence calibration	If this option is enabled, the FL-FR correspondence calibration procedure will include several extra steps to increase its accuracy.
Camera movement mode	This option is applicable only to the older versions of the 7212

	modification. If you are using an older version of this modification and have a camera lift rather than a rotatable camera beam, use this option to specify how the cameras are moved. If the cameras are moved automatically, select the **Automatic** check box as well.
Stop frame criterion	Specifies the threshold shudder value used for determining whether the target is stable. You can check the current shudder value on the **Settings > Diagnostics** screen. Recommended value is 0.5. If you are facing an issue with a vibrating target — its icon on the chassis indicator is highlighted yellow — increase the criterion value.
Subpixel region modifier	Specifies the size of the regions that the camera frame will be divided into when searching the target position within the frame. Default value is 1. ⚠ **Do not modify this option unless a service technician asks for this explicitly.**
Region multiplier	Sets the region of interest size. The larger the region, the slower and more precise the search is. The smaller the region, the faster the search is. However, this increases the chances to lose the target if it has been moved. Recommended value is 2.5.
Adjustment Smoothing	This option is obsolete and will be removed in one of the future software updates.
Use region prediction	Use this option to make searching for targets faster. In this case the software will get the camera feed only from the areas where the targets are to be located. This can be useful if the camera vision areas are often obstructed by moving objects or persons.
Data processing mode	Specifies the camera data transmission protocol. If the safe mode is enabled, transferring data from cameras will be paused while the cameras are shooting. ⚠ **In the safe mode, the software performance may decrease significantly.** We recommend that you enable the safe mode only if you are facing an issue with corrupted camera feed.

Contrast correction	Allows adjusting target recognition if the target is much darker than its background (for example, if the background is overexposed by direct sunlight).
	⚠ **Does not affect the wheel aligner accuracy. It only affects the target recognition.**
	Recommended values are:
	– For front cameras – 0–5
	– For rear cameras – 0–15

7.1.7   Settings > Service > Calibration

On the **Settings > Service > Calibration** screen you can calibrate the wheel aligner. The list of calibration procedures depends on your wheel aligner modification. For each calibration procedure, you can view the date when it was performed last and its quality score.
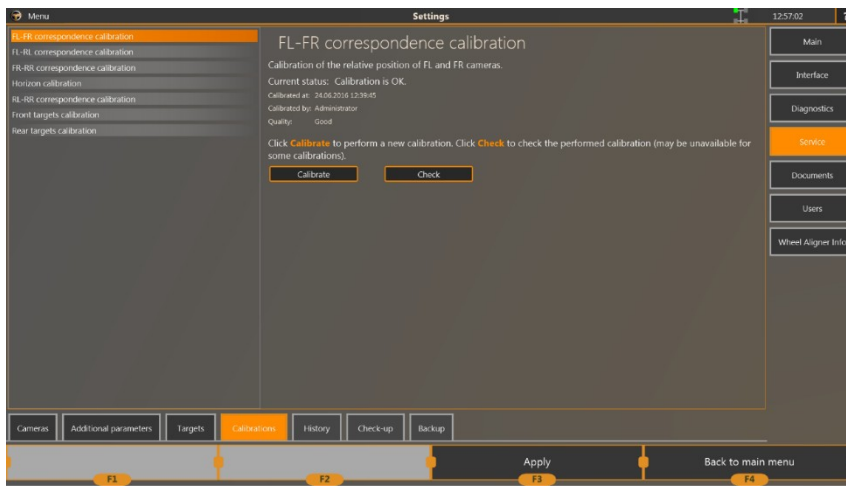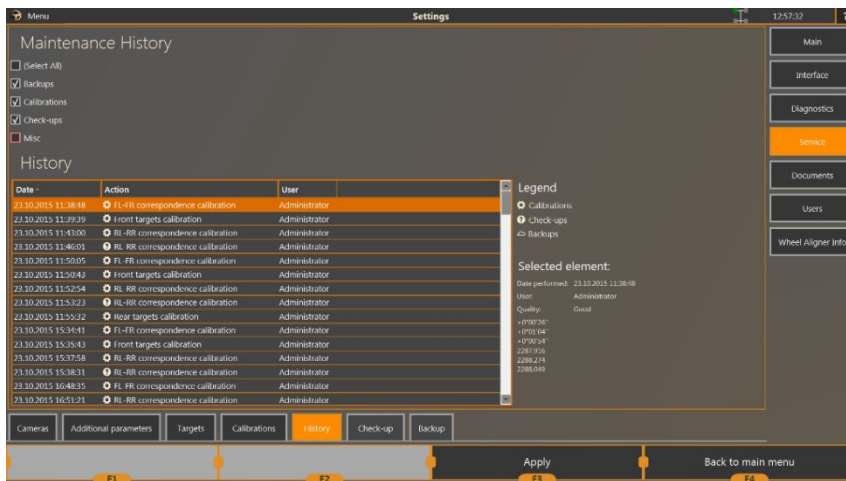

Figure 7.6 – Settings > Service > Calibration

For detailed information on the wheel aligner calibration, see the *6 Calibration* section.

7.1.8   Settings > Service > History

On the **Settings > Service > History** screen, you can view the history of all calibrations, check-ups, and backups of your wheel aligner.

Figure 7.7 – Settings > Service > History

Use check boxes at the top of the screen to filter the data that the screen shows. For example, you can view only the backups.

7.1.9   Settings > Service > Backup

On the **Settings > Service > Backup** screen, you can back up your wheel aligner configuration and information on completed orders and restore them from the backup data. In addition, you can also store all log files generated by the wheel aligner software to a separate folder, for example, to send them to the technical service.
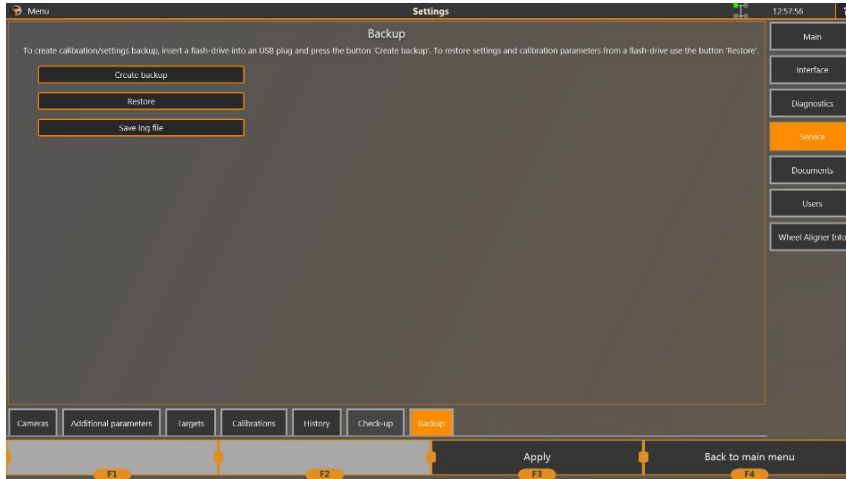

Figure 7.8 – Settings > Service > Backup

To create a backup, click **Create backup** and select a storage where the backup data will be placed. You can store the backup data on the wheel aligner's PC hard-drive, or on an external data storage, for example, a Flash-drive.

To restore backup data, click **Restore** and specify the backup data location.

To save the log files, click **Save log file** and specify the folder to which the log will be saved.

7.1.10   Settings > Service > Cloud Backup

On the **Settings > Service > Cloud Backup** screen, you can manage backup calibration data kept in an online storage.
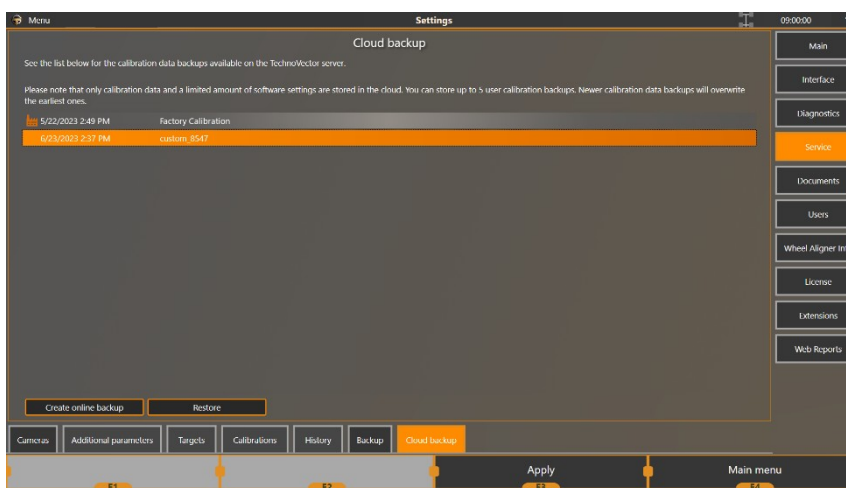

Figure 7.9 – Settings > Service >Cloud Backup

The storage can include:
−   Factory calibration data.
−   Custom calibration data. You can create up to 5 backups for your wheel aligner calibrations to store them in the online storage.

7.1.10.1 Requirements

To access the online storage, the following requirements must be met:

− Your wheel aligner PC must have access to the Internet.

− Your wheel aligner PC must have a security dongle plugged in and its security key and its serial number must be valid.

7.1.10.2 Data optimization

− Online backup data includes only the calibration data and a limited number of software settings.

− Online backup data does not include some specific software settings, for example, the workshop logo, the order history, and reports. To store such data, create a backup in a local storage, for example, on a Flash drive. See section *Settings > Service > Backup* above.

− You can store only up to 5 calibration backups in the online storage. All further backups will overwrite the ones created earlier.

7.1.10.3 To create a backup

1. Click **Create online backup**.

2. Provide a short description for the backup file. It will be useful to distinguish it among other backup files.

3. Click **Submit**.

7.1.10.4 To restore the calibration data from an online backup

1. Select the required calibration in the list of available backups and click **Restore**.

2. The calibration data will be obtained from the online storage and applied to your wheel aligner. The wheel aligner software will restart for the changed to take into effect.

7.1.11   Settings > Documents

On the **Settings > Documents** screen, you can specify the data on the car workshop where the wheel aligner resides. These data will be added to printed reports.
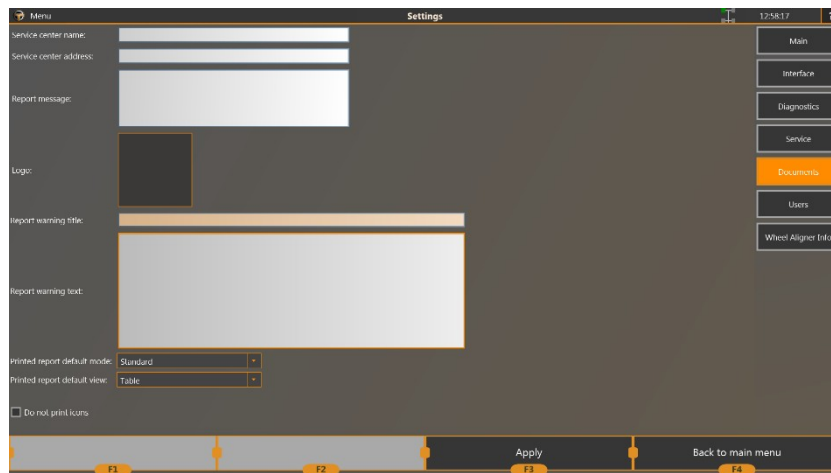

Figure 7.10 – Settings > Documents

Parameter	Description
Workshop name	Car workshop name to show in a printed report.
Workshop address	Car workshop address to show in a printed report.
Report message	Message at the bottom of the report.

Logo	Logo image shown in the upper right-hand corner of the document in the printed report. We recommend using images in the *.png* format with transparency or images in other supported graphical formats (*.jpg*, *.jpeg*, *.tiff*, *.bmp*, *.gif*) with white background.
Report additional message title	Title of the additional message added to the end of the printed report.
Report additional message text	Text of the additional message added to the end of the printed report.
Print-out default mode	Print report type: − Standard – shows only the wheel alignment angles. − Extended – includes a standard report and suspension geometry report.
Printed report default view	Specifies the print report view: − **Table** – Print report as a plain table. − 3D – The printed report will include 3D model of a suspension before and after the adjustment.
Do not print colour indicators	Do not include colour indicators next to parameters into the report.[1].
Do not show total order timespan in the report	Do not include time it has taken to complete the order into the report.
Print out information about the wheel aligner in the report	Include the wheel aligner information into the print report.

7.1.11 Settings > Users

On the **Settings > Users** screen you can add, edit and delete software users.

To enable the multi-user support in the software, select the **Require username and password** check box on the **Settings > Main** screen.

By default, the software has a single user, Administrator. By default, its password is 1234. This user cannot be deleted or has its Administrator privileges removed.

Users that do not have Administrator privileges have no access to the wheel aligner calibration and some of its settings.

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1 Indicators are displayed only for the parameters with specifications in the database.

7.1.12 Settings > Wheel Aligner Info

On the **Settings > Wheel aligner info** you can specify the information on your wheel aligner and its equipment.
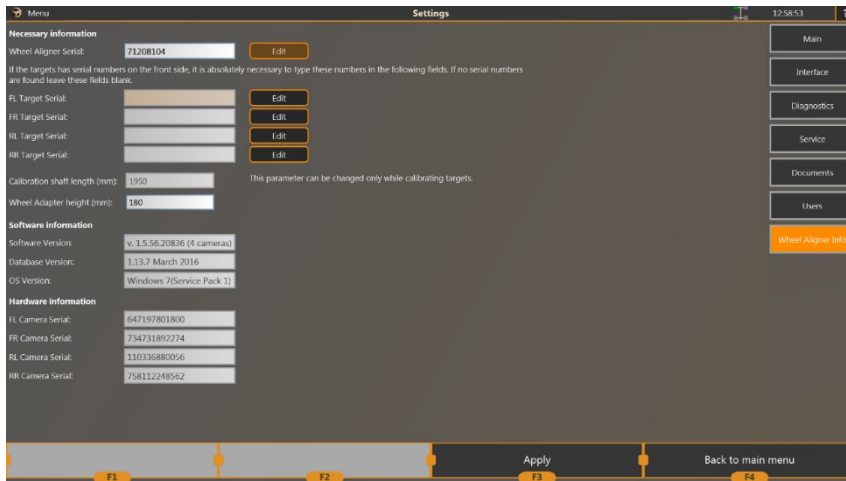

Figure 7.11 – Settings > Wheel aligner Info

Table 7.6 - Settings > Wheel Aligner Info

7.1.13 Settings > License

To protect the wheel aligner software, HASP licensing system is used. Wheel aligners are shipped with a USB dongle that enables using the device and its software.

7.1.13.1 Activating software

Before you launch the software for the first time, insert the USB dongle into an any free USB slot of the wheel aligner PC.

⚠️ **Do not remove the dongle from the slot while the software is running as it can cause the software data corruption.**

7.1.12 In addition, to use the iDEAL software, activate it:

1.   Call Northwest Equipment Sales at 406-755-0805 for the activation code if software has not already been activated.

2.   On the **Settings > Activation** screen, press **Activate** and enter the code.
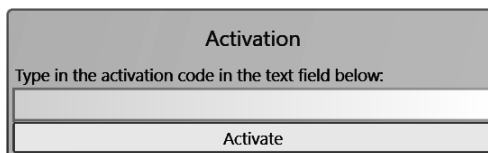
Then, you can use the software.

7.1.13.2 Attaching a missing aligner

By default, when you activate the wheel aligner software, the appropriate aligner is assigned to your technovector.com account automatically. If, for some reason, the aligner is not attached, you can do it manually:

1.   In a web browser, navigate to technovector.com and login using your credentials.

2.   Click **All Aligners** and then click **Attach a missing aligner**.

3.   In the resulting form, enter your aligner license key or its serial number. You can view the license key on the **Settings > Wheel Aligner Info** screen. You can find the wheel aligner serial number in its certificate or on its identification plate.

4.   Click **Attach** and copy the generated code.
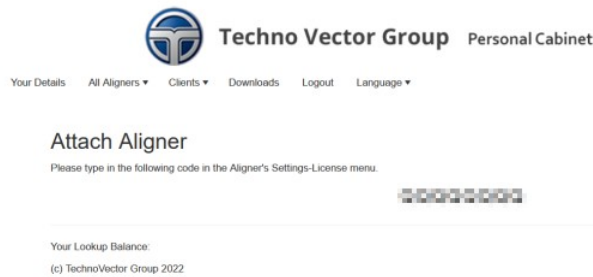
5.   In the wheel aligner software, on the **Settings > License** screen, in the **Code to attach to a Representative** text box, enter the generated attach code and press **Attach**.

7.1.13   7.1.14   Settings > Extensions

On this screen you can view the extensions enabled in your wheel aligner versions and configure them, if needed. Which extensions are available depends on your wheel aligner modification and on your license type.

7.1.14.1 Extensions > General extension settings

On this screen, you can configure settings common to several extensions.

Table 7.7 Settings > Extensions > General settings

Parameter	Description
Report photos	Select check boxes corresponding to extensions that you want to allow adding photos to orders: − Companion Application − Web camera
Order Data Completion	When registering a new order, the software can get data on a vehicle by its license number from existing orders and copy that data to the new

	order.
	Specify the search sources priority. By default, only the **Local order database** search option is available. The Web Service Hub option is reserved for future use.
License plate recognition	Select the camera that you will use for license plate recognition. Select the **Take a photo and look for license plates upon creating a new order** check box to have a license plate scanned and recognized automatically when a new order is created. In addition, if the software is able to get the vehicle data from the order history, it will fill all appropriate fields of the order automatically.

7.1.14.2   Extensions > Companion Application

This extension enables you to connect to your wheel aligner from mobile devices and control the measurements and adjustments from there.

⚠ Your mobile device must have the Techno Vector Remote Assistant application installed and the mobile device and the wheel aligner must be connected to the same network.

Press **Generate QR Code** and scan the generated code by using the Remote Assistant application to connect to the wheel aligner from your mobile device.

You can find the details on controlling the wheel aligner from a mobile device in *Techno Vector™ wheel aligners operating manual.*

7.1.14.3   Extensions > Camera

This extension allows connecting a web or an IP camera to your wheel aligner to use it for license plate recognition, adding camera feed images to orders, and monitoring vehicles while positioning them in front of the wheel aligner.

Table 7.8 – Connecting a camera to a wheel aligner

Property	Description
Web Camera Enabled	Enables the extension.
Stream mode	Select the camera type. It can be either a web camera or an ONVIF-compatible IP-camera.
Mirror video stream in the Main menu	Enable to use the camera to monitor vehicles while positioning them in front of the wheel aligner.
Stretch video	Enable to discard the video's original aspect ratio and stretch it to fill the entire screen.
Connection settings	
For web cameras	
Web Camera Name	Select the web camera you want to use.
Web camera format	Select the aspect ratio to apply to the camera feed.
For IP-cameras	

IP address	The IP address to access the camera.
User Name, Password	If needed, specify the user name and the password to access the camera.
IP camera video engine	Select a video codec that you want to use to process the video stream. The extension supports the LAV and VLC codecs.

Depending on how you are planning to use the connected camera, configure the following extensions as well.

To add photos to orders	Enable the appropriate option of the General extension settings. See section *Extensions > General extension settings* above.
To add vehicle license plate numbers to new orders	Enable the appropriate option of the General extension settings. See section *Extensions > General extension settings* above.
To scan license plate numbers and add them to new orders automatically	Enable the appropriate option of the Plate recognition extension. See section *Extensions > Online License Plate recognition* below.

7.1.14.4 Extensions > Web camera (Legacy)

⚠ **This extension is obsolete. We do not recommend that you use it. We recommend that you use the Camera extension instead (see above).**

This extension allows connecting a web camera to your wheel aligner to use it for license plate recognition, adding camera feed images to orders, and monitoring the vehicle while positioning it in front of the wheel aligner.

Table 7.9 – Connecting a camera to a wheel aligner

Property	Description
Web camera enabled	Enables the extension.
Web camera name	Select the camera to use.
Mirror view in the main menu	Enable to use the camera to monitor the vehicles while positioning them for measuring

Depending on how you are planning to use the connected camera, configure the following extensions as well.

To add photos to orders	Enable the appropriate option of the General extension settings. See section *Extensions > General extension settings* above.
To add vehicle license plate numbers to new orders	Enable the appropriate option of the General extension settings. See section *Extensions > General extension settings* above.
To scan license plate numbers and add them to new orders automatically	Enable the appropriate option of the Plate recognition extension. See section *Extensions > Online License Plate recognition*Extensions > Online License Plate recognition below.

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7.1.14.5   Extensions > Techno Vector web service

</div>

⚠️ **This extension is reserved for future use.**

<div style="text-align:center">

7.1.14.6   Extensions > Online License Plate recognition

</div>

⚠️ **To use this extension, your wheel aligner must be attached to a license that has this feature enabled.**

⚠️ **To use the license plate recognition, the Internet connection is required, and the wheel aligner's PC must have access to web.technovector.com.**

The extension enables the wheel aligner to detect and recognize license plate numbers automatically. When creating a new order, it will scan the vehicle for the license plate number and add it to the order automatically. You can also command it to scan the license plate number manually by pressing an appropriate button on the order form.

<div style="text-align:center">

7.1.14.7   Extensions > VIN Scanner (standard)

</div>

This extension allows connecting a VIN scanner to your wheel aligner:

1.   Connect the VIN scanner to the wheel aligner's PC.

2.   On the **Extensions > VIN Scanner** screen, press **Learn**.

3.   Scan any VIN code with the scanner. The extension will automatically detect the scanner activity and connect the scanner to the wheel aligner. The **VID** and **PID** text boxes will show the appropriate identifiers of the connected scanner.

4.   If you already know the VID and PID of your scanner, you can enter them manually and press **Learn**. The wheel aligner will connect to the scanner with the specified identifier.

5.   Press **F3 (Apply)** to save the changes and bind the wheel aligner to the scanner.

6.   To configure the wheel aligner to create new orders when a new VIN code is scanned, select the **Create new order when necessary,** check box.

<div style="text-align:center">

7.1.14.8   Extensions > Export reports

</div>

This extension exports reports to an external file and stores them in the specified folder on your wheel aligner PC. This way, you can view reports outside of the wheel aligner software or send them to a customer or to your manager.

Reports can be exported to:

-     *. json*
-     *.pdf*

Table 7.10 – Exporting reports

Property	Description
Enabled	Enables the extension. The reports will be exported automatically upon completing an order.
Path	Specifies the folder on your wheel aligner PC in which exported reports will be stored. If the specified path does not exist, it will be created.
Save PDF	Select to export the reports to .pdf files. Otherwise, they will be exported to .json only.

7.1.15 Settings > Web reports

On the **Settings > Web reports** screen you can enable and configure sending online reports to clients.

Table 7.11 Settings > Web reports

Parameter	Description
SMS provider	Select a service to use to send messages.
Sender ID	Specify the phone number that will be used to send messages.
Balance	Shows the amount of money that your SMS service account has. To refresh the data, press .
Test phone number	Specify the telephone number that will be used to send a test message.
Allow to send report link via e-mail	Enables sending online reports via email.
Allow to send report link using SMS	Enables sending online reports via SMS.
Send a report link using SMS automatically when the order is finished	If this option is enabled, after an order is complete, the software will send an online version of the report to the client's phone number that the order specifies.
Send a report link via e-mail automatically when the order is finished	If this option is enabled, after the order is complete, the software will send an online version of the report to the client's e-mail that the order specifies.
E-mail template	Specifies the template of the e-mail that will be sent to a client along with the online report.

8 Troubleshooting

8.1 Installation issues

Issue	Troubleshooting

The "Integrity check failed" error occurs during the installation	The installation file is damaged. This may happen, for example, if the installation file has not been downloaded completely.
	
	    − Re-download the file and start the installation again;
	    − Make sure that there are no viruses on the wheel aligner PC.

During the .NET Framework installation step, the installer stops responding	Wait for 5–10 minutes. If the installer still is not responding, reboot the wheel aligner PC, and start the software installation again.

8.2 Security issues

Failure	Solution
The "Program security key was not found" error occurs when you start the Techno Vector software	− Make sure that the security dongle is plugged into a USB slot of the wheel aligner PC; − Try plugging the dongle into another USB slot; − Make sure that the appropriate security driver is available in Windows Device Manager; − If the driver is not available, reinstall it. You can find the installation files in the `C:\Distrib\Installation` folder; − Try using another security dongle, if you have any available, or check the current dongle with another computer; − Reinstall the software.

8.3 Critical issues

You may encounter the following critical issues:

− The software stops responding or exits unexpectedly.
− System errors occurs on the wheel aligner PC.
− The wheel aligner PC shuts down or reboots unexpectedly.

To diagnose critical errors, use the Techno Vector log and Windows event log.

If you face a critical issue, you can send a request to our Technical Service.

Include the following to the request:

− Description of the error and how it had occurred.
− Techno Vector log file. By default, the log file resides in the `<TechnoVector>\Log\` folder.
− Windows event log. To learn how to get the Windows event log, see below.
− Specify whether the software or the operating system had stopped responding when the error occurred. For example, whether it had not been responding pressing keyboard keys, including NumLock, CapsLock, Alt+Tab, Ctrl+Alt+Del.

8.3.1   Viewing the Windows event log

1.   In Windows 11 and Windows 10: Right-click the **Start** button and then click **Computer management**.

2.   In earlier Windows versions: Open the **Windows Control Panel**, then, click **System and security > Administrative tools**.

3.   In the resulting window, in the tree on the left, select **Computer Management > System tools > Event Viewer > Windows Logs > Application**. It will show the list of events occurred in applications running in the system. Error messages are marked as   :
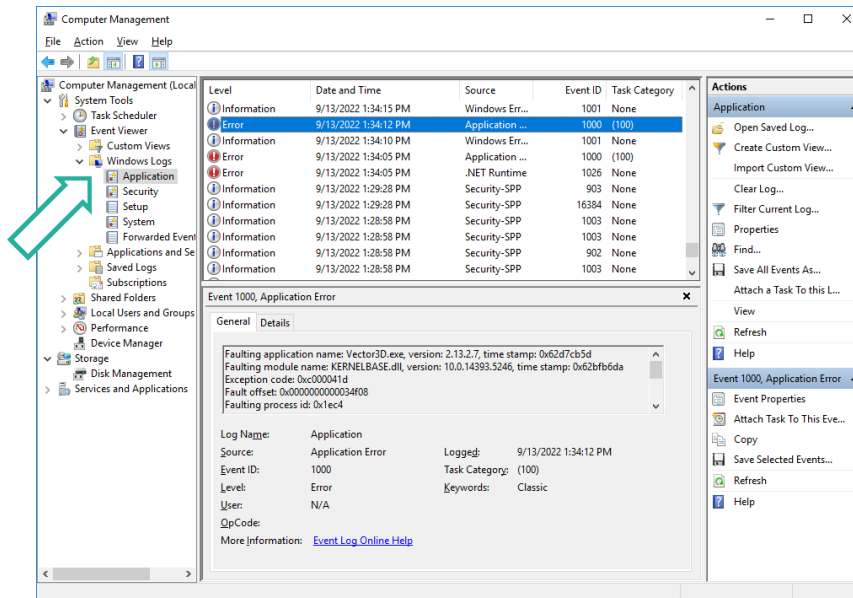

Figure 8.1 – Windows Event Viewer

4.   Select the events you want to save, right-click them and then click **Save selected events**:
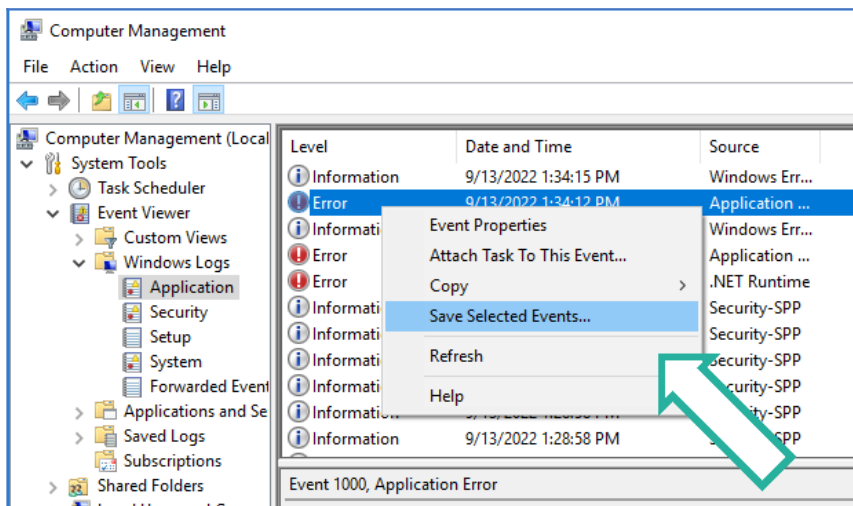

Figure 8.2 – Saving events

8.3.2   Troubleshooting critical issues

Table 8.1 - Potential critical errors and solutions

Failure	Solution
An Access Violation error occurs and the TechnoVector software exits unexpectedly	− Update the software; − If your wheel aligner is supplied with the legacy targets with unrounded edges, switch the wheel aligner's target detection mode (**Settings > Service > Targets**); − See the item below.

The TechnoVector software stops responding or exit unexpectedly or the Windows operating system stops responding or reboots unexpectedly	− Make sure that there are no viruses or other malware on the wheel aligner PC;
	− Access the wheel aligner PC's BIOS and check:
	  o CPU temperature
	  o If system fans are functioning properly
	− Scan your wheel aligner PC's RAM for memory failures
	− Scan its hard drive for failures;
	− If the issue persists, please contact the wheel aligner manufacturer for advanced diagnostics.

8.4   Camera unit issues

Failure	Solution
The software "does not see" the target, that is, the camera provides the feed and the target is present in the frame, but there is no border around the target in the frame	− Update the TechnoVector software. − On the **F3 (Settings) > Diagnostics** screen, make sure that the **Analyze image** check box is selected; − Measure the distance from the camera to the target and make sure that the distance corresponds to the range that the **Settings > Service > Targets** settings specify; − Make sure that the camera lenses and the targets are clean. Wipe them, if needed; − Make sure that the correct type of targets is used. For instance, the front camera will not detect the rear targets; − Make sure that the target and the camera lenses are not exposed to bright light; − Make sure there are no glares, dark spots and other visual artifacts in the frame. − Try adjusting the CPU cost slider for recognition; − On the **F3 (Settings) > Service > Additional parameters** screen, try increasing the **Contrast Correction** value for the problematic camera to 10, then to 20 and then to 25 respectively. − Check image brightness. If the image is too dark, check the LED backlighting. If the image is too bright or too dark, try to adjust the exposure and gain parameters. − If you use legacy targets with unrounded angles, on the **F3 (Settings) > Service > Targets** screen, enable the **Legacy targets** detection mode.
There is no camera feed, camera connection failure	− Check camera network connection. All router indicators that show the connection status must be on and the camera must respond to the ping command; − Check the camera power supply: − Check if the computer IP address is set correctly:

	− Check if the camera is stuck in an infinite reboot loop: − This may happen if your wheel aligner router uses the 10 Mbps speed and duplex mode. To check the router mode: 1. Open the **Windows Control Panel** and then click **Network and Sharing Centre**. 2. Click **Change adapter settings**. 3. Right-click the router and then click **Status**. 4. In the resulting dialog, view the **Speed** value. Try switching the router to the 100 Mbps mode or the Auto negotiate mode. Configuring the router's speed and duplex mode depends on the router type and vendor. Please see the documentation supplied with your router for detailed instructions. If the issue persists, try using another router.
The camera feed is an empty black frame	− Check if the protective cover is removed from the lens; − Place the target in the camera vision range; − Make sure that the camera LED backlight works properly; − Check if the camera IR LEDs are on. You can check for their red tint when the camera is shooting or you can detect them blinking by using a camera embedded into any mobile device; − Examine the camera error status in the diagnostics mode. If the number of errors is growing, most likely the camera malfunctions.
The target is recognized, but the frame around it remains yellow	− Most likely, the major reason for this is vibration, caused, for example, by a compressor or any other garage equipment. Check the cameras and targets for vibration. − Check if the lenses and targets are clean. Wipe them if needed. − Check the camera feed for artifacts and glares. If there are artifacts, turn the camera off and then turn it on again. If there are glares, change the target position and remove the cause of glare (lamp, window, etc.). − Adjust the Gain and Exposure camera settings. − On the **F3 (Settings) > Service > Additional parameters** screen, make sure that the **Subpixel region multiplier** value is **less then 2**. − Verify that the camera is grounded properly. − Make sure that target is not exposed to bright light. − Make sure that the target is in the camera vision range.
The camera feed is blurry	− Check if camera lenses and targets are clean. Wipe them if needed. − If the feed is still blurry, most likely, the lens focus has to be adjusted. To learn how to do this, consult your wheel aligner supplier or manufacturer.
The camera feed is too dark	− Make sure that the camera LED backlight works properly; − Check if the camera IR LEDs are on. You can check for their red tint when the camera is shooting or you can detect them blinking by using a camera embedded into any mobile device; − Enable the camera's both LED groups: 1. On the **F3 (Settings) > Service > Camera** screen, select the **Enable editing** check box. 2. In the **LED mode group** drop-down list of the problematic camera, select **All LEDs**. − Adjust the Gain and Exposure camera settings.

The camera feed is overexposed	Adjust the Gain and Exposure camera settings.
Back projection values and/or shudder values exceed the standards	– Update the TechnoVector software; – On the **F3 (Settings) > Service > Additional parameters** screen, make sure that the **Subpixel region multiplier** value is **less than 2**. – If the issue persists, please contact your wheel aligner supplier or manufacturer.

8.5   Measurement Errors

| Failure	Solution
After the adjustments, the software does not fill the **After** column	This is an expected behavior. During the adjustment, the alignment values are calculated approximately and are not included into the report. To fill the **After** column, press **F3 (Repeat measurement)** on the Report screen and perform another measurement.
There are no specifications for a selected vehicle or part of the specifications is missing	For some vehicles (typically, Mercedes-Benzes, BMW, etc.), their specifications depend on various parameters measured manually. Check if the Image View includes tables requiring additional parameter input. Measure the required parameters to select appropriate specification tables.
Caster and SAI/KPI values measured before and after the adjustment differ drastically	A wheel or target has been rotated. When adjusting caster, it is necessary to attach a brake lock and not to rotate wheels.
Incorrect vehicle measurements	– When measuring caster, make sure that the brake lock is mounted correctly and locks the wheels firmly. Make sure that the vehicle brake system is in order; – When working on the lift, make sure that the inspection lanes are locked; – Make sure there are no loose parts in the vehicle's suspension; – During the compensation, check the compensation difference values. If they exceed 3', repeat the compensation; – If the vehicle has suspension and/or wheel alignment defects, perform a jacking compensation; – Measure the wheel alignment of the same vehicle twice: with rolling compensation and with jacking compensation. If their results do not match: o Verify that the targets are not swapped and are placed correctly: FL on the front left wheel, FR – on the front right wheel, etc; o Perform target calibration; o Verify the horizontal position of the lift or pit. Eliminate any deviations at the horizontal plane, if necessary. – Try to take measurements in vehicle plane. To do this, select the **Settings > Service > Additional parameters > Measure relative to car plane** check box. If it gives valid results, perform the vertical calibration; – Validate camera correspondence calibration. If the results exceed 3´, repeat the calibration;

	− Perform the full wheel aligner re-calibration; − Contact out technical service.
If the lift is used, the wheel alignment values estimated in its lower and upper positions differ drastically	− On the **F3 (Settings) > Service > Additional parameters** screen, make sure that the Automatically detect lift movement check box is selected.

8.6   Camera Diagnostics

8.6.1   Camera Performance Diagnostics

After cameras are switched on, a green LED must be on for each camera. This means that the camera is powered, and the program is running. Note: that the cameras do not shoot continually, they shoot only when they receive a command to shoot frames. The mode specifies how many cameras are used – 2 or 4.

To perform individual camera diagnostics, go to Settings-Diagnostics.
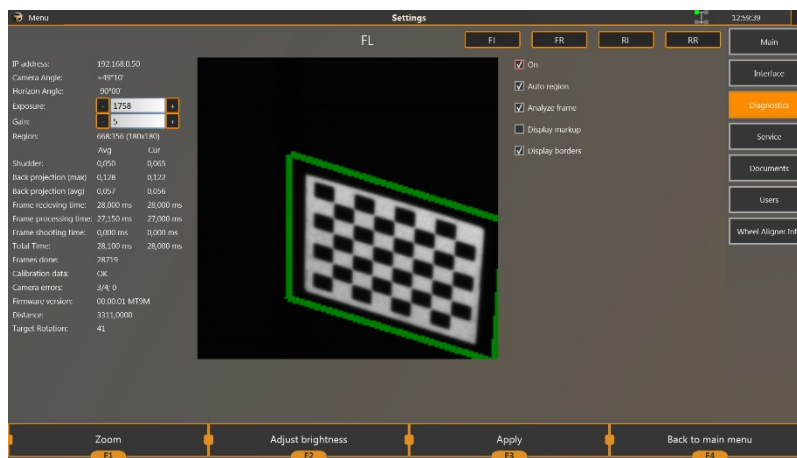
Select the On checkbox. The image from the camera must appear on the screen. If Analyze Frame is not checked, check it. In order to see the full frame, turn off Auto-region. To receive only a part of the image with the target from the camera, turn it on. There must be an automatic image refresh. The second LED on the selected camera must flicker when shooting frames.

In cameras equipped with the new LED board (with red LED- camera power supply indicator), there is no second LED, you should be guided by LED flickering.

Figure 8.3 – LED board

8.6.2   Factory Camera Calibration Diagnostics

When you start your computer, the software is connected to all the cameras and requests factory calibration parameters. If one or more cameras do not respond and deliver errors, the software informs you about that immediately after start-up. Besides, the diagnostic screen displays the text No factory calibration in the field Calibration data. If there is no factory calibration, even for one camera, the wheel aligner will not work.

Factory camera calibration is required to calculate the target position in the coordinate system of the camera. If calibration data do not correspond to the real parameters of the camera due to non-authorized

disassembling of cameras, unscrewing lenses, or other reasons, you can check this using the following statistic parameters:

Parameter	Result
Back projection (average)	This value must not exceed 0.12. The optimal value is 0.03 to 0.06.
Back projection (maximum)	This value must not exceed 0.20 with clean target and lens and the angle to camera 45±2° degrees.

If there are doubts about factory camera calibration, note that the dirty sensor surface can cause the exclusion of the points in the same area of the frame; if the target is shifted, the excluded points will remain in this part of the frame. Therefore, you can try to change the target position in the frame and check the back projection parameters. Besides, if the target position is changed, you can monitor the excluded target points in the Diagnostics mode when the Display Markup is checked. If the excluded point is constantly located in the same part of the frame, this means that there is some dust in the sensor, or the lens is defective. This check-up is correct only after wiping lenses and targets.

8.6.3   Camera Stability Diagnostics

The Camera Errors parameter displays None if there are no errors, and $xx/yy, zz$, if there were errors.

xx – number of camera connection errors
yy – number of attempts to connect to the camera
zz – number of command transfer errors

If the camera is not powered when the wheel aligner is switched on, the xx and yy indicators will increase. If there are camera errors, the zz indicator will increase.

8.6.4   Target Diagnostics

When the working area of a target is dirty or scratched, the accuracy of the target image recognition is low. The calculation algorithm is protected from accidental local dirt. If the position of the recognized target is very different from the forecast of its position according to other target points, these points will be excluded from the analysis of the target position. This allows preventing calculation inaccuracy if the target is accidentally dirty.

Besides, dirty target areas can cause software failure to recognize the stopped frame, as the target position will be determined with an error.

To start the target diagnostics, enter Settings-Diagnostics, switch on a selected camera, mount the target onto the vehicle wheel or the calibration device, press Ctrl+Alt+F1. Select Display unstable points. Press Ctrl+Alt+F1 once again to hide the window.
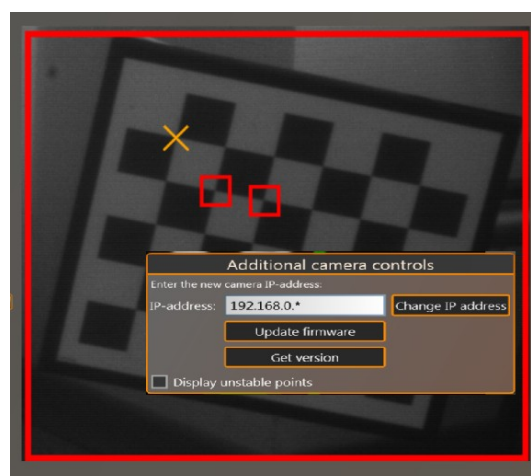
Figure 8.4 – Unstable points

There will be service marking displayed in the image received from the camera. The points that are recognized from one frame to another with a shift (they are moving) are shown in red squares. The points

that are excluded from the target position analysis are shown in orange crosses. Note, that the reason can be not only the dirty surface of a target, but also sun glares or glares caused by portable light sources, and dirt on the lens filter surface and on the objective lens. If glares are caused by light sources, shifting the target somewhere is recommended, if there is dirt, wipe filters and/or targets.

8.6.5   Camera Connection Diagnostics

Cameras are connected to the software over TCP/IP. Using the ping.exe Microsoft Windows embedded program, you can check if the camera responds to requests with a certain IP address.

⚠ **The check-up must be carried out when the software is off, because if there is a connection, the camera ignores other requests.**

In order to check camera connection, start ping.exe with the parameters:

`ping -n 100 192.168.0.50` to check FL camera.

To check another camera, change the IP address shown at the end of the line. If the camera responds constantly with 2-3-second intervals every 30 seconds, the camera operates normally. The intervals are stipulated by the fact that there were no requests to the camera from the software, and the firmware restarts the camera automatically in order to eliminate probable camera and/or software hang-ups.

8.6.6   Updating camera's firmware and changing camera's IP address

For detailed instructions on how to update the camera's firmware or to change its IP address, see Service utility manual.
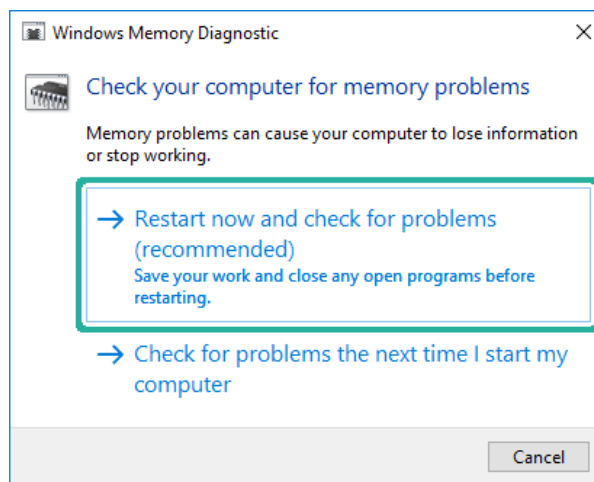
9   Additional Maintenance Operations

9.1   Performing a System Memory Test in Windows 7, 8 and 10

1.   To test memory, open **Windows Settings**. In the search field, enter *Memory*. Then click **Diagnose your computer's memory problems**:
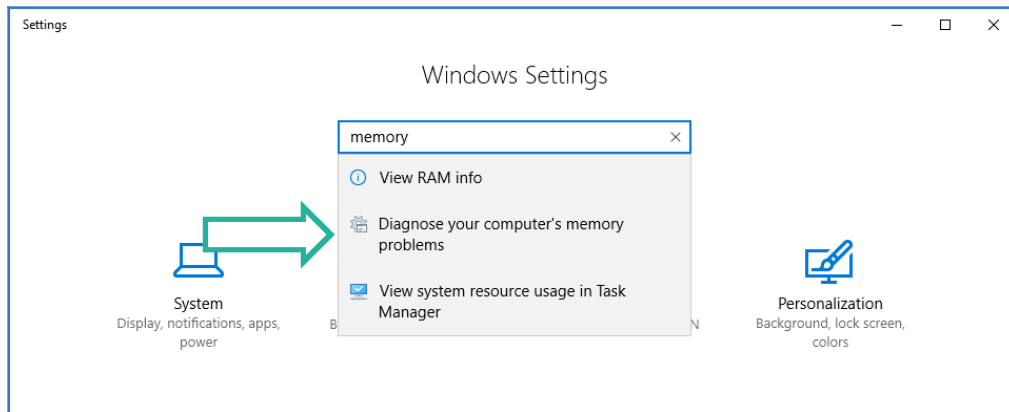
Figure 9.1 – Control panel – RAM troubleshooting

2.   In the resulting window, click Restart now. Your PC will reboot and memory test will start.

Figure 9.2 – Memory test request

     First, a quick memory testing is recommended. If the quick testing does not reveal any errors, a maximum set of tests is recommended. Leave your PC for several hours or for a night and then check the results.

9.2 Checking Hard Drive in Windows

To check data integrity on the hard drive, press Start and open the Computer[1]. You will see a list of drives in the system. Right-click on Local Drive C and select Properties.

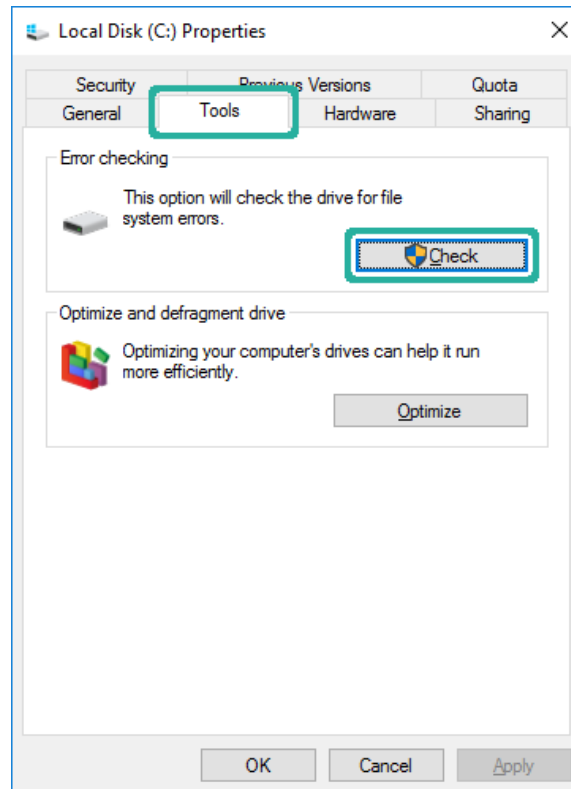In the resulting window, open the **Tools** tab and click Check.

Figure 9.3 – Disk check

9.3 Camera Gain and Exposure Adjustment

For some cases when the target is often lost, we recommend changing exposure and/or gain parameters for cameras. Usually, it's enough to change one of these parameters slightly and the software starts working correctly.

In non-standard and complicated situations adjustment is required. E.g., if the wheel aligner is installed at a big distance from the front turn tables, or when there is a bright background.

You should determine the required exposure values for each camera by means of experiments doing the following:

Mount the target at the minimal distance from the camera: for front cameras - mount the target on the front turn table, for rear cameras - mount the target at the place of FL-RL, FR-RR correspondence calibration.
Rotate the target so that it is 30 degrees or less to the camera. If the target is not recognized, make it recognizable by increasing or decreasing exposure. After the target is recognized, write down the exposure value that will be automatically given by the software. This value is the minimum exposure value for this camera.
Mount the target at the maximum distance from the camera: for front cameras mount the target at a distance of 1-2 meters (3-6.5') from front turn tables, for rear cameras – at the maximum distance that can be required to take measurements. For wheel aligners for motor cars, it is about 5 meters (17') from

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1 For Microsoft Windows XP this is My Computer, for Microsoft Windows 8 start Explorer, for Microsoft Windows 10 start File Manager.

front turn tables, for wheel aligners for trucks it is 15-16meters (49-52').

Rotate the target so that it is 50 degrees or more to the camera. If the target is not recognized, make it recognizable by increasing or decreasing exposure. After the target is recognized, write down the exposure value that will be automatically given by the software. This value is the maximum exposure value for this camera[2].

Mount the target at an ordinary operating position. For front cameras – it is a position on front turn tables, for rear cameras – it is a position where rear wheels are usually located. Rotate the target at a big angle to the camera (more than 50 degrees). This value is the initial exposure value.

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2 If maximum exposure value exceeds 10000 for 1 Mpix cameras and 4000 for 5 Mpix cameras, it means that gain value should be increased.

iDEAL 3D wheel alignment systems are supported by Northwest Equipment Sales. Please Contact Northwest Equipment Sales for training, setup, and support.

NORTHWEST EQUIPMENT SALES

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LIMITED WARRANTY

Structural Warranty:
The following parts and structural components carry a five-year warranty:

Columns	Arms	Uprights	Swivel Pins
Legs	Carriages	Overhead Beam	
Tracks	Cross Rails	Top Rail Beam	

Limited One-Year Warranty:
Tuxedo Distributors, LLC (iDEAL) offers a limited one-year warranty to the original purchaser of Lifts and Wheel Service equipment in the United States and Canada. Tuxedo will replace, without charge, any part found defective in materials or workmanship under normal use, for a period of one year after purchase. The purchaser is responsible for all shipping charges. This warranty does not apply to equipment that has been improperly installed or altered or that has not been operated or maintained according to specifications.

8   Other Limitations:
This warranty does not cover:

1. Parts needed for normal maintenance
2. Wear parts, including but not limited to cables, slider blocks, chains, rubber pads and pulleys
3. Replacement of lift and tire changer cylinders after the first 30 days. A seal kit and installation instructions will be sent for repairs thereafter.
4. On-site labor

Upon receipt, the customer must visually inspect the equipment for any potential freight damage before signing clear on the shipping receipt. Freight damage is not considered a warranty issue and therefore must be noted for any potential recovery with the shipping company.

The customer is required to notify Tuxedo of any missing parts within 72 hours. Timely notification must be received to be covered under warranty.

Tuxedo will replace any defective part under warranty at no charge as soon as such parts become available from the manufacturer. No guarantee is given as to the immediate availability of replacement parts.

Tuxedo reserves the right to make improvements and/or design changes to its lifts without any obligation to previously sold, assembled, or fabricated equipment.

There is no other express warranty on the Tuxedo lifts and this warranty is exclusive of and in lieu of all other warranties, expressed or implied, including all warranties of merchantability and fitness for a particular purpose.

To the fullest extent allowed by law, Tuxedo shall not be liable for loss of use, cost of cover, lost profits, inconvenience, lost time, commercial loss or other incidental or consequential damages.

This Limited Warranty is granted to the original purchaser only and is not transferable or assignable.

Some states do not allow exclusion or limitation of consequential damages or how long an implied warranty lasts, so the above limitations and exclusions may not apply. This warranty gives you specific legal rights and you may have other rights, which may vary from state to state.

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