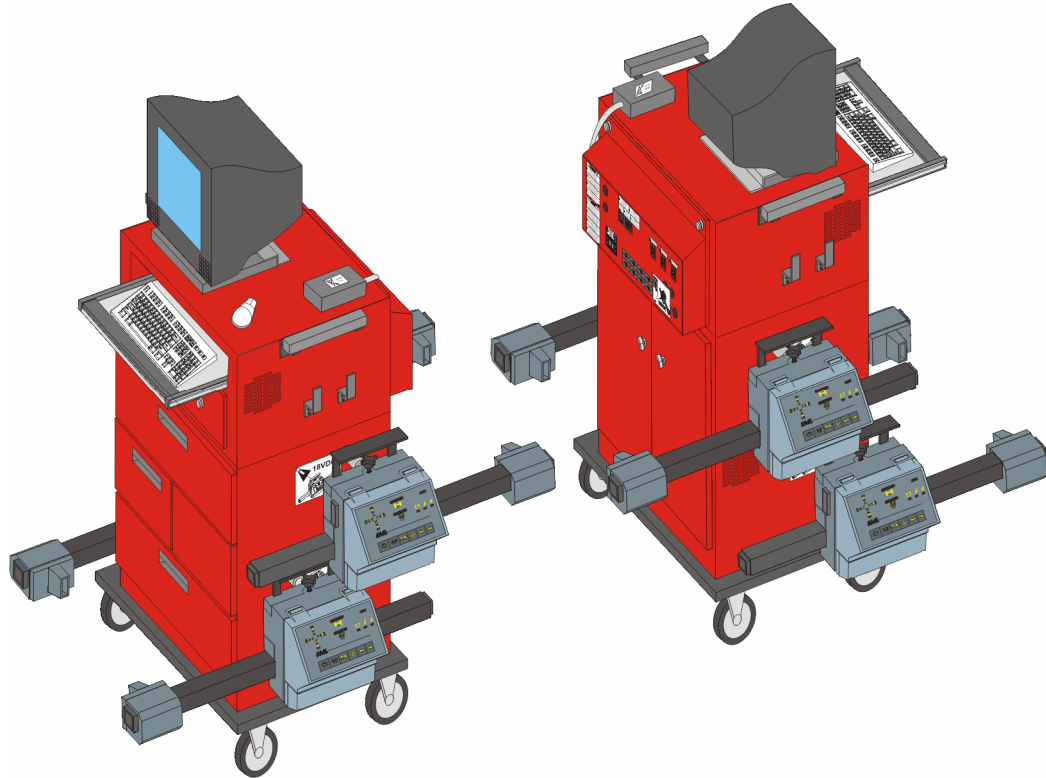


# ! IMPORTANT !

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## READ THESE



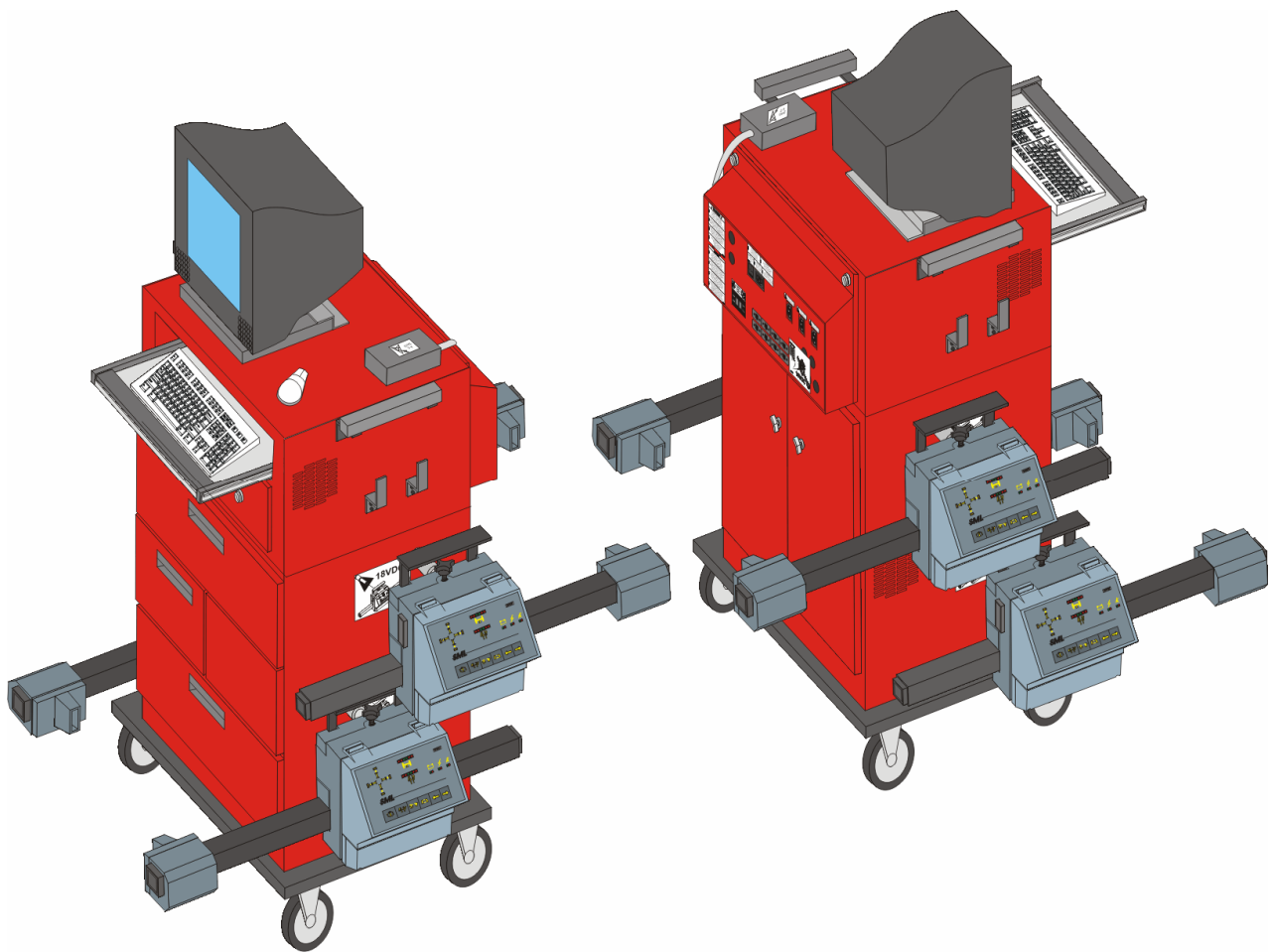
# INSTRUCTIONS FIRST

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- These instructions are to be reviewed by all operators/users, prior to operating this equipment.
- These instructions are to be saved and readily available, on or near the equipment, at all times.

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# Wheel Alignment System 4000 Series (SML)



## Equipment User's Guide

Manufactured By:  
Cartek International Group  
6950 East N. Ave.,  
Kalamazoo, MI 49048

# Electrical Safety Summary

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## Important Safety Instructions

All users/operators must review these safety instructions.

A good understanding of Personal and Equipment Safety helps to ensure that users/operators will have minimal potential for personal injury or damage to equipment. When using this system in a work environment, general shop practices and safety requirements apply. Other electrical safety requirements to be applied are as follows:

### CAUTION

**This unit is sensitive to Electro Static Discharge (ESD). All precautions should be taken to minimize or eliminate ESD. The use of rubber mats, ground straps and servicing the unit with power disconnected, should be strictly adhered too, to avoid an inadvertent discharge of ESD.**

- Read available instructions and supporting documentation.
- Always wear safety glasses. Normal eyeglasses are impact resistant, not safety glass. Ensure you're wearing the appropriate eye protection.
- When equipment quality is questionable, do not use the equipment. Only a qualified service technician or repair person(s), can determine the equipment's quality compliance and release the equipment as "Safe For Use".
- Care should be taken to properly arrange and store electrical cords/wires, to prevent making a pull or trip hazard.
- Always unplug electrical devices, when not in use, or while servicing (as needed).
- Never unplug a cord by pulling on the wire. Instead, unplug the cord by pulling directly on the electrical connector, to remove. Properly coil up and stow all wiring once it is removed from the outlet receptacle.
- To reduce the risk of fire,
  - When adding extension cords, only use the appropriately rated electrical cords. Do not operate equipment with a damaged or frayed electrical cord, or if the equipment appears to have been inadvertently damaged.
  - Never operate this equipment in a space that lacks the proper ventilation, where fuels and other flammable liquids are used.
  - Do not use this equipment on wet surfaces or while exposed to rain.
  - When servicing or making repairs to this unit, only approved items may be used to replace any defective or inoperable components/assemblies. Commercial products may be used, however, the intended design of the product must meet the existing products' design and specifications, and be approved by the manufacturer of this unit.

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## Section 1.

# Equipment Startup Preparation

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### 1.0 Unpacking and Equipment Preparation.

#### **NOTE**

*It is highly recommended that you keep the original shipping container(s) and dunnage, for future needs or storage purposes.*

The unit was pre-tested at the manufacturing facility for quality compliance then various items were removed and packaged, for shipping. To unpackage and restore the unit to full operation, proceed with the following steps of this Section.

### 1.1 Packaged Unit.

Processing a unit received from the manufacturer, starts as follows:

- 1.1.1 Examine the condition of the unit and individual shipping containers, used to transport this unit. Note any and all discrepancies.
- 1.1.2 Remove the external wrapping and restraints from the pallet and remove the individual shipping containers from the pallet.
- 1.1.3 Each shipping container is externally marked, identifying the contents inside the container. Locate and identify each shipping container, per the Invoice.
- 1.1.4 As you unpack containers and content lists, software and installation instructions are discovered, pull them out immediately and place in designated storage area, until ready for use.

#### **WARNING**

**The total assembled unit weighs approximately 275 lbs and a suitable lifting device will be required, to remove the unit base from the pallet.**

- 1.1.5 Using a suitable lifting device, remove the cabinet assembly, from the pallet. Place cabinet in a designated area, where setup can continue, immediately after balance of equipment and accessories are unpacked.

### 1.2 Shipping Container Processing.

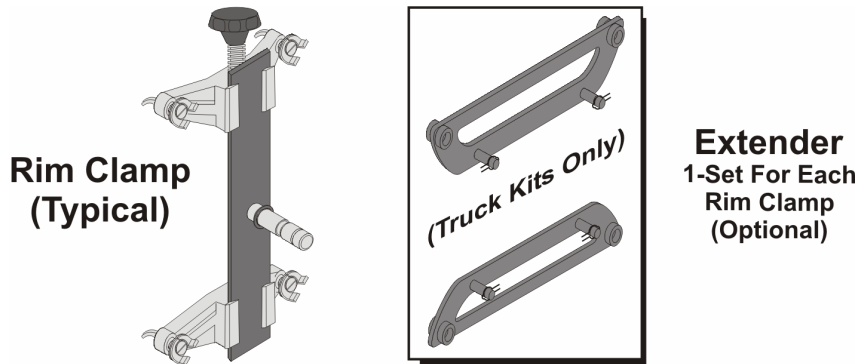
The order in which each container is unpacked is not as important as it is to ensure that all containers are unpacked, prior to setting up the main unit assembly. Completing each of the steps outlined below ensures that all equipment is completely unpacked and organized to ease the unit setup.

- 1.2.1 Rim Clamps.

#### **WARNING**

***Rim Clamps are heavy and bulky. During removal from the shipping container, use caution to avoid hands and/or fingers from getting pinched.***

- 1.2.1.1 Open the shipping container and carefully remove four rim clamps. The rim clamps are interlocked when packaged, so some careful maneuvering of first 2 rim clamps, may be required. Refer to Figure 1-1, as necessary.



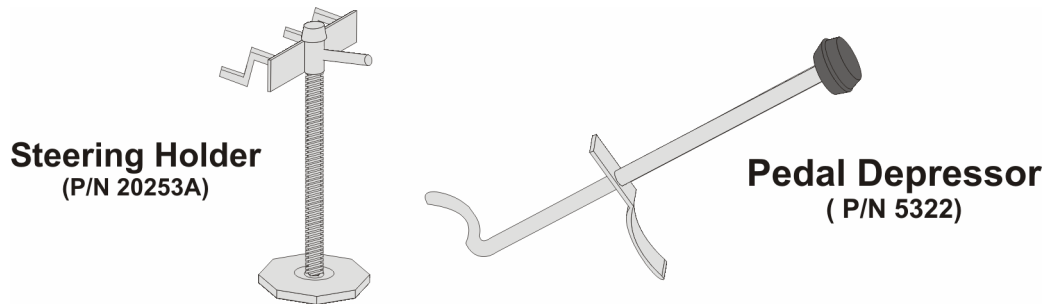
**Figure 1-1. Rim Clamps (W/Truck Option)**

1.2.1.2 Open the shipping container and remove the eight rim clamp extenders (Truck Kits Only)

1.2.1.3 Set the rim clamps aside, until ready for use or placement into storage.

1.2.2 Pedal Depressor and Steering Holder.

1.2.2.1 Open the shipping containers and remove the brake depressor and steering wheel holder. The pedal depressor's interlock device is packaged separately from the restraint arm. Ensure to account for all packaged item. Refer to Figure 1-2 as necessary.



**Figure 1-2. Pedal Depressor and Steering Holder**

1.2.2.2 Set both units aside, until ready for use or placement into storage.

1.2.3 Cords, Wires and Accessory Parts.

1.2.3.1 Open the shipping container(s), and identify and remove all the cord(s), wires and accessories.

1.2.3.2 Ensuring that the cords are not entangled, separate all items and set them aside until ready for use.

1.2.4 Printer.

1.2.4.1 Open the shipping container and remove the printer and accessories.

1.2.4.2 Place the printer on a bench for assembly.

1.2.4.3 Open the printer and check if the ink cartridges are installed. If not, locate and each ink cartridge packages and properly install into the printer.

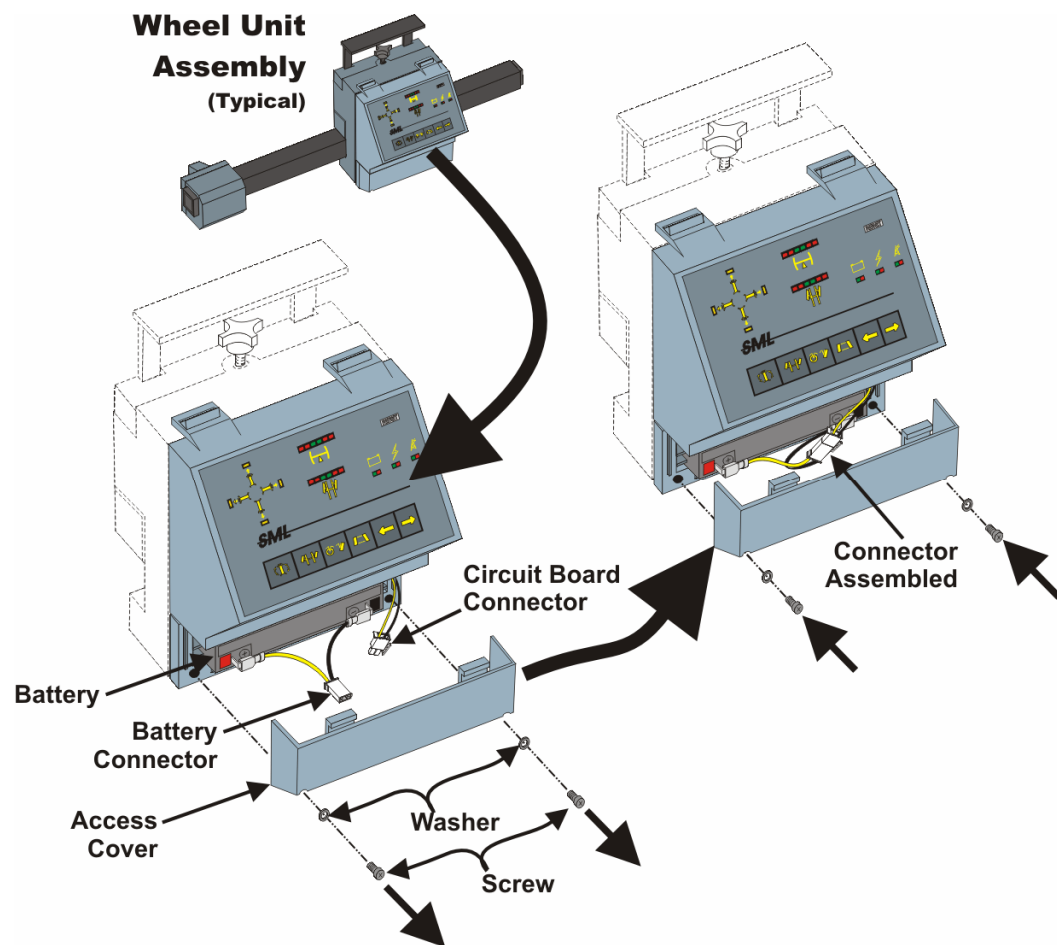
1.2.5 Monitor.

1.2.5.1 Open the shipping container, remove the monitor and all of its accessories

1.2.5.2 Set components aside, until ready for installation.



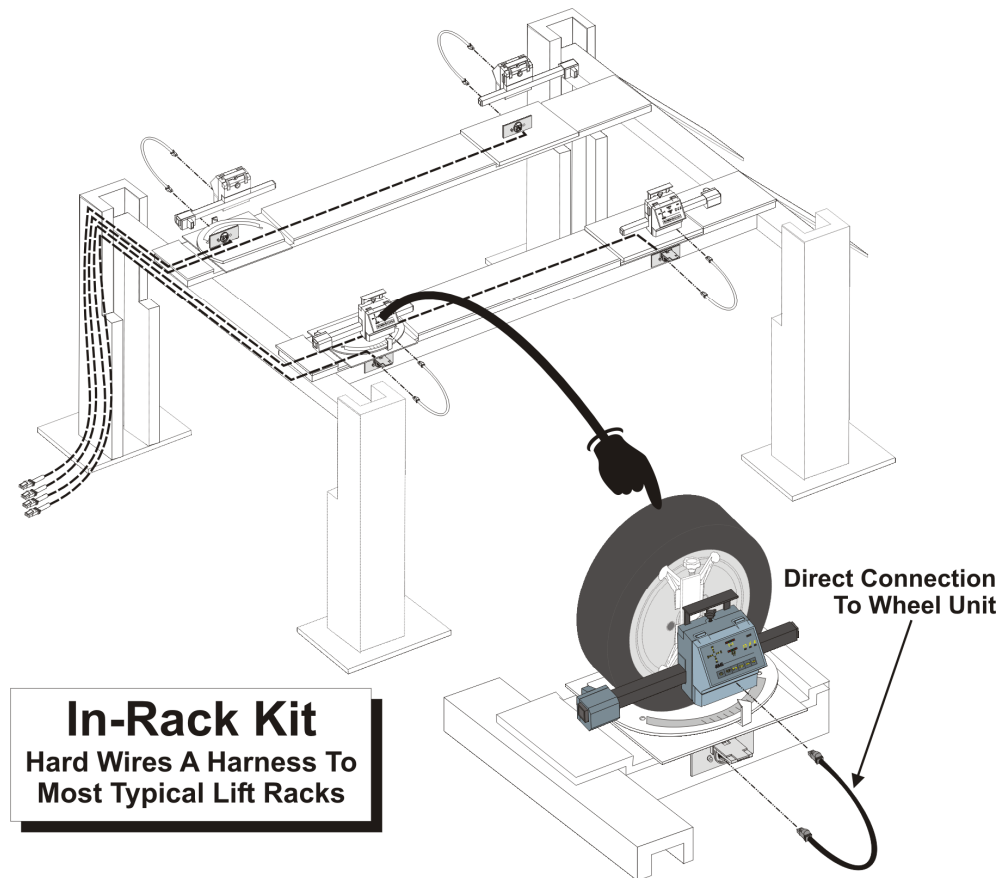
- 1.2.6 Web Camera and Headphones (Available To RSS Units Only).
  - 1.2.6.1 Open the shipping container, and remove the web cam and headphones
  - 1.2.6.2 Set components aside, until ready for installation.
- 1.2.7 Electrical Cords
  - 1.2.7.1 Open the shipping container, and remove all the cords.
  - 1.2.7.2 Ensuring that the cords are not entangled, separate and set aside cords until ready for use.
- 1.2.8 Wheel Units
  - 1.2.8.1 Open the shipping container and remove all the wheel units, setting each unit in a designated work area for battery connection. Use Figure 1-3 as a guide, as needed.



**Figure 1-3. Wheel Unit – Battery Connection.**

- 1.2.8.2 Locate battery access cover.
- 1.2.8.3 Remove two (2) screws, washers and the access cover from the front housing assembly.
- 1.2.8.4 Locate both ends of the electrical connector, for the battery.

- 1.2.8.5 Properly connect the two electrical connectors.
- 1.2.8.6 Ensuring that the battery wires are pushed back, align and install access cover back onto the front housing assembly.
- 1.2.8.7 Secure the access cover by installing two (2) screws and set the completed wheel unit aside.
- 1.2.8.8 Repeat above steps remaining three (3) wheel units.
- 1.2.8.9 When batteries on all four (4) wheel units are connect, relocate the wheel units close to the cabinet for mounting.
- 1.2.9 Perform a final check of all containers, ensuring all items are unpacked and ready for installation onto the cabinet.
- 1.2.10 In-Rack Kit (Optional Accessory).
  - 1.2.10.1 This kit consists of wires and accessory equipment to hardwire a harness into your lift rack. Therefore, this container can be opened, after the unit is assembled. Refer to Figure 1-4.
  - 1.2.10.2 Open the shipping container for the In Rack Kit, and remove the contents.



**Figure 1-4. In Rack Kit - Overview Diagram**

- 1.2.10.3 Obtain the In Rack Installation Instructions (Document 420-01113-001) and follow the instructions provided, to integrate this kit into a standard lift rack.

1.3 Equipment Setup

1.3.1 The equipment that was unpacked from each shipping container must now be installed or stored on the cabinet. Use Figures 1-5 as a guide, as needed.

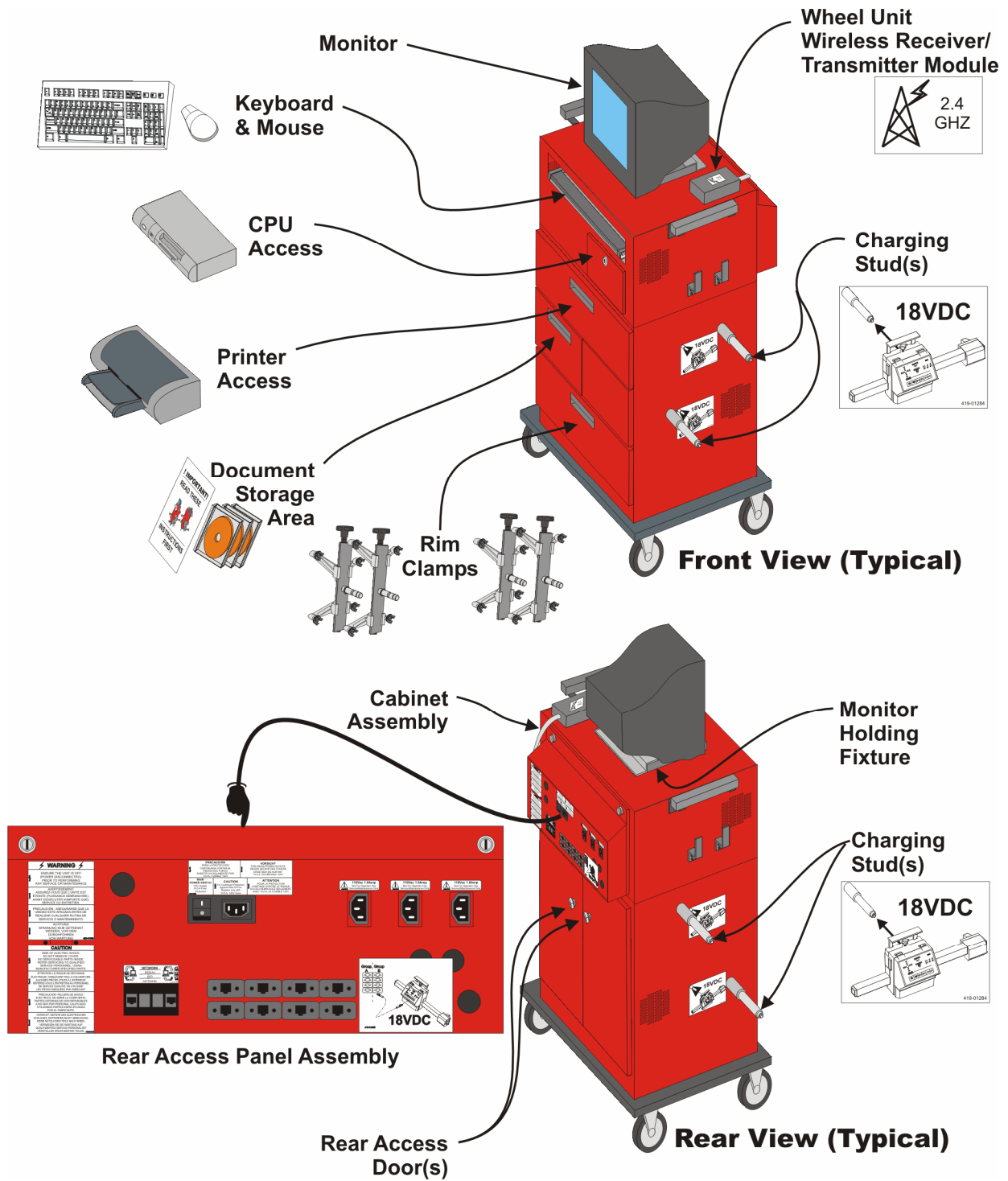


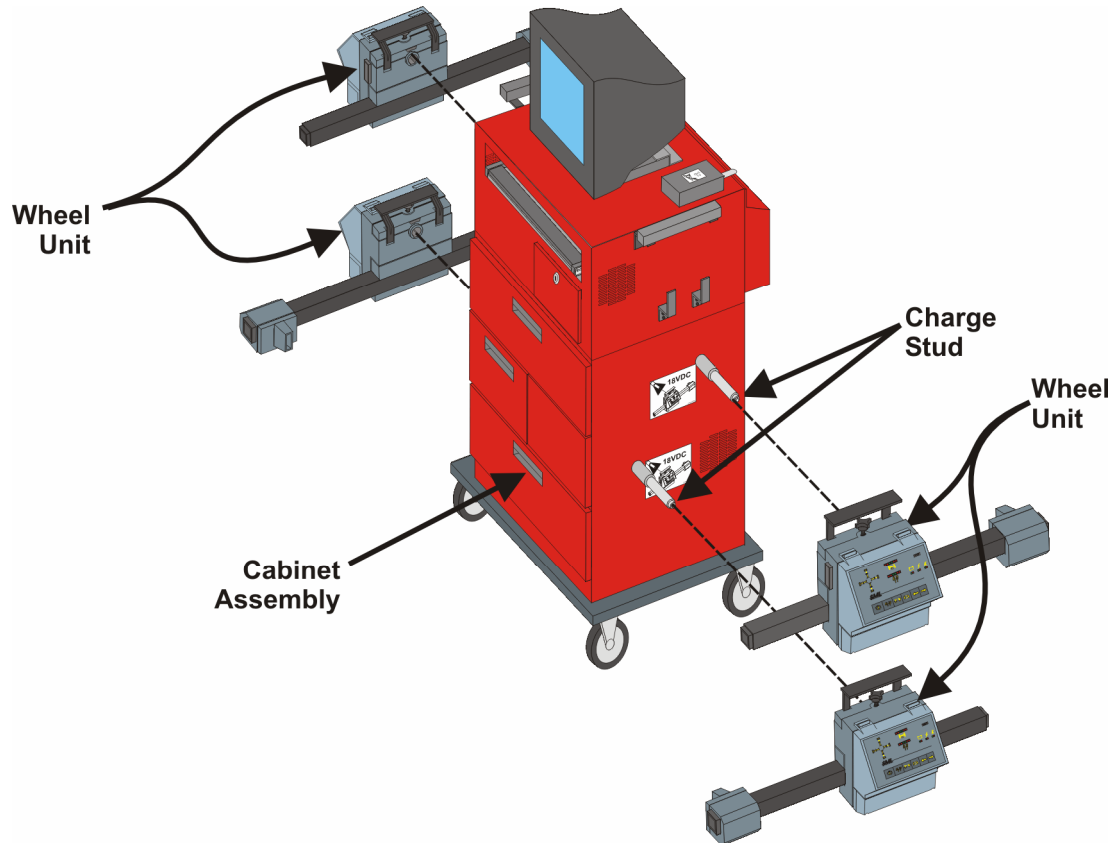
Figure 1-5. Cabinet Assembly – Component Storing.

- 1.3.2 Setup the Monitor as follows.
  - 1.3.2.1 Remove two screws from the monitor base, and remove the cover plate from the base.
  - 1.3.2.2 Slide the monitor into the monitor base, ensuring that the monitor is slide all the way, forward into the monitor base.
  - 1.3.2.3 Connect the 110 Vac power cord, video cable, and the 10mm balanced jack (for sound) to the back of the monitor base, as needed.
  - 1.3.2.4 Recheck all connections to the monitor. When properly connected, proceed with next step.
  - 1.3.2.5 Align and install the cover plate over the monitor base, and secure with two screws.
- 1.3.3 Setup the Printer as follows:
  - 1.3.3.1 Verify ink cartridges are installed properly, in the printer. If they are not installed, locate the cartridges and install them as needed.
  - 1.3.3.2 Open the cabinet drawer for the printer, and position to the center back of the drawer, with the paper tray facing towards you.
  - 1.3.3.3 Locate and connect the printer's 110V power supply and the USB cable to the printer.
  - 1.3.3.4 Make sure the attached wires are not pinched or interfering with any other internal components, or the cabinet drawers.
  - 1.3.3.5 Close the printer's drawer on the cabinet.
  - 1.3.3.6 Proceed with next step.
- 1.3.4 Setup the web cam, headphones and wheel unit transmitter/receiver module as follows:
  - 1.3.4.1 Using two keys, open the rear access panel, and carefully lower the rear access panel.
  - 1.3.4.2 Locate the USB cable for the web cam, place the web cam on top of the cabinet and connect the USB cable.
  - 1.3.4.3 Place the headphones on top of the cabinet and connect the audio and microphone jacks to the back of the computer, as needed.
  - 1.3.4.4 Remove the wheel unit's wireless receiver/transmitter module from inside the cabinet, and attach magnetic base of the module to the side of the cabinet (as shown in Figure 1-5). Ensure the cable for the module is properly routed through the grommet opening, on the panel to avoid being pinched or damaged.
  - 1.3.4.5 Raise the rear access panel to its closed position, and secure using two keys to lock the panel in the closed position. Proceed with the next step.
- 1.3.5 Place the rim clamps and brake pedal depressor in the cabinet for storage as follows:
  - 1.3.5.1 Open the bottom access door of the cabinet.
  - 1.3.5.2 Carefully lay each rim clamp into the bottom of the cabinet. Position them 2-deep, and each set of 2, positioned side-by-side.
  - 1.3.5.3 When the rim clamps are stored, place the brake pedal depressor along the right hand side of the cabinet, such that the palm grip on the depressor is held by the two hooks..

1.3.5.4 Close the bottom access door on the cabinet and proceed with next step.

1.3.6 Mount the wheel units as follows:

1.3.6.1 Arrange the wheel units next to the cabinet, as shown in Figure 1-6.



**Figure 1-6. Wheel Unit Mounting.**

1.3.6.2 Loosen thumbscrews on each wheel unit and mount the wheel unit on the lower charge stud(s), first.

1.3.6.3 Make sure each wheel unit is pushed flush (back) against the shoulder stop of the charge stud, to be properly mounted.

1.3.6.4 Tighten the thumbscrew on the mounted wheel units.

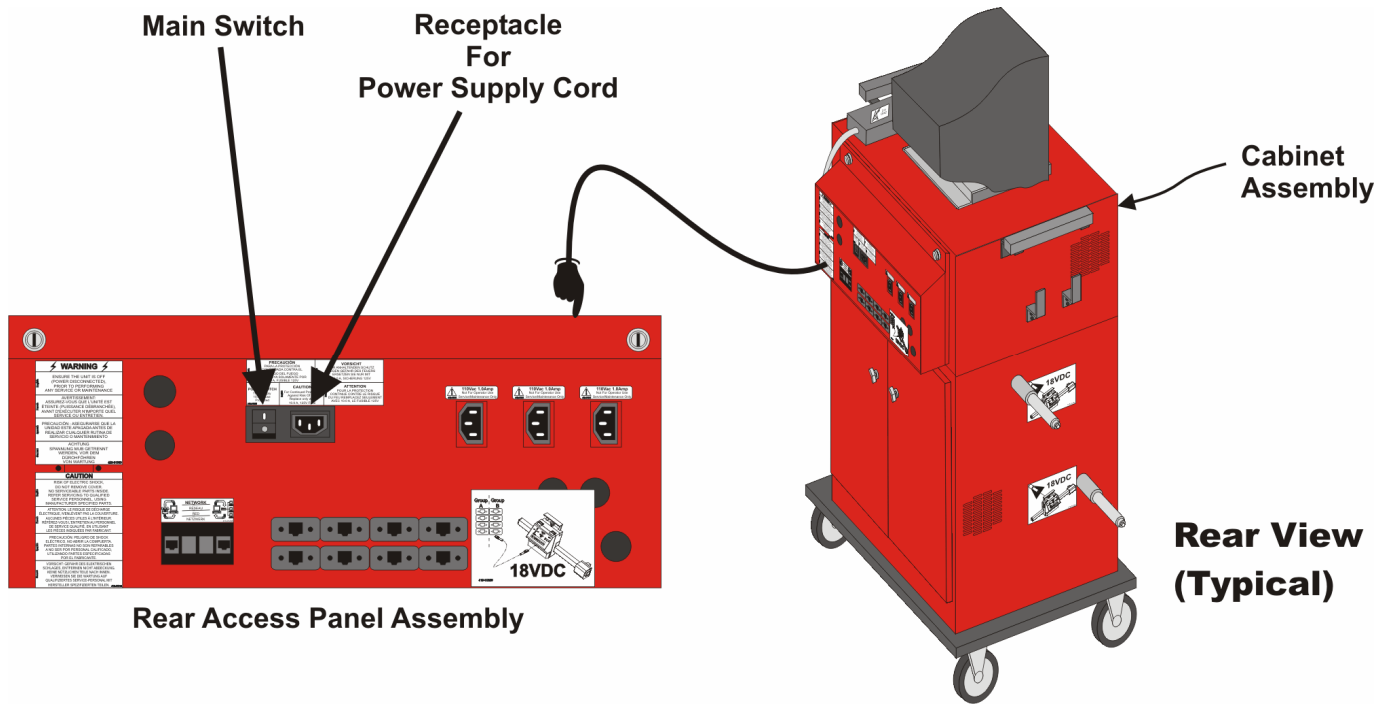
1.3.6.5 Repeat these steps for the two (2) wheel units and mount them on the top charge studs.

1.3.7 Store the steering wheel holder onto the storage brackets, on the back of the unit.

1.3.8 Using Figure 1-7 as a guide, locate the main switch on the rear access panel, and verify that it is in the OFF position.

**NOTE:**

It is highly recommended that a power strip, with built in surge protection, be used to help protect this unit from inadvertent power surges or spikes.



**Figure 1-7. Rear Access Panel - Power Switch & Connection.**

- 1.3.9 Locate the power cord (50 feet long) and connect it to the plug on the rear access panel, then to the facility's outlet to power.
- 1.3.10 The accessory component setup and storage is complete and the unit is ready to be powered up for use.
- 1.3.11 It is highly recommended that all users read section 2 of this document, to better understand all of the components, equipment and features of this system.
- 1.3.12 Refer to Section 3, for operating instructions.

## Section 2.

## Principles of Operation

### 2.0 Principles Of Operation

The 4000 Series (SML) Wheel Alignment System uses tailored software to interact with wireless wheel units. This interaction processes digital sensor measurements taken, during a vehicle wheel alignment. Those measurements are compared to Manufacturer's Alignments Standards, then identifies to the user as to which measurement(s) comply and which areas will need physical adjustment(s).

The principle elements involved in this operation are defined in the paragraphs that follow, with an electrical summary at the end of this section.

### 2.1 Primary Components

The primary components for this unit are the cabinet assembly, wheel units and accessory equipment. Each of these primary components, have sub components or assemblies that, are explained in the paragraphs that follow.

### 2.2 Cabinet Assembly

The cabinet assembly provides mounting and containment for various electrical and computer accessories, wheel units and accessory tools this unit is equipped with.

2.2.1 Base Cabinet. A heavy-duty sheet metal cabinet, mounted on casters for portability, with front and rear access panels and doors. Refer to Figure 2-1.

2.2.1.1 Cabinet Compartments. There are several compartments built into the cabinet for storage, mounting and protection of internal devices.

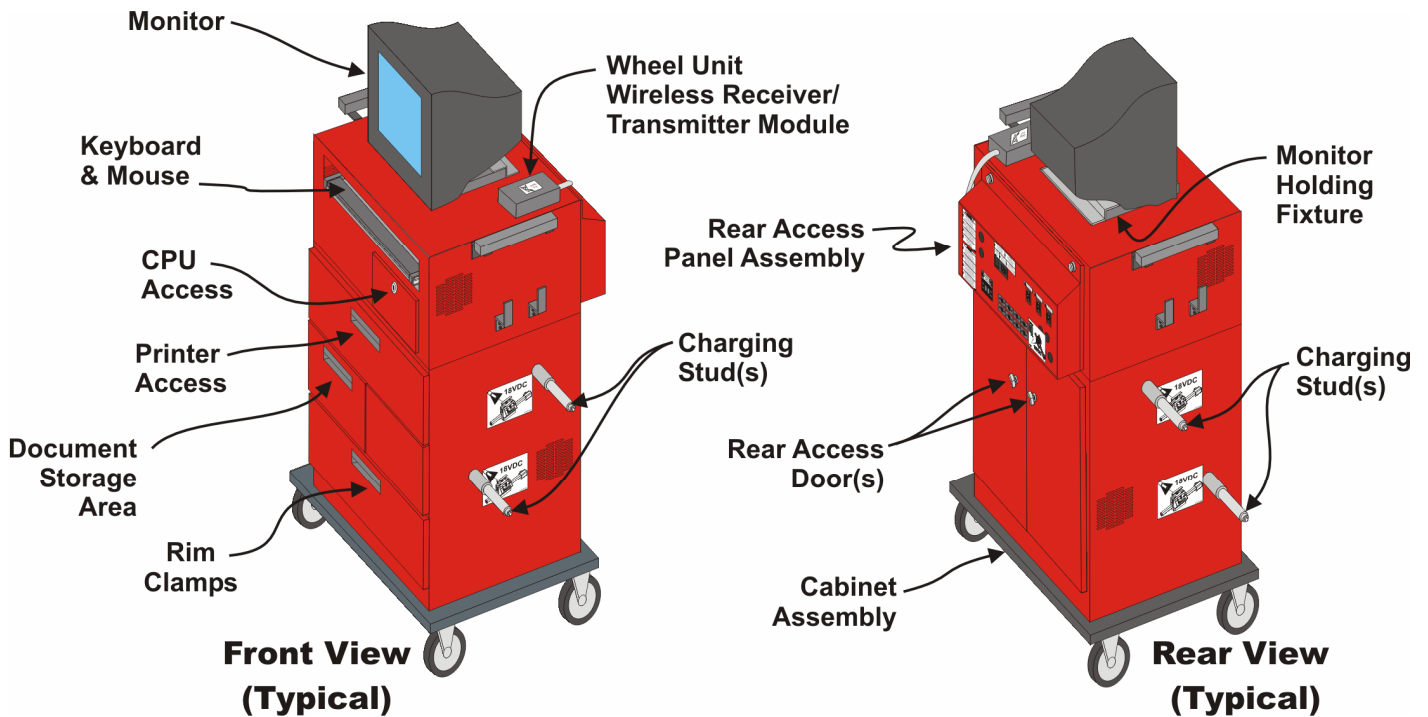


Figure 2-1. Cabinet Compartments and Accessories.

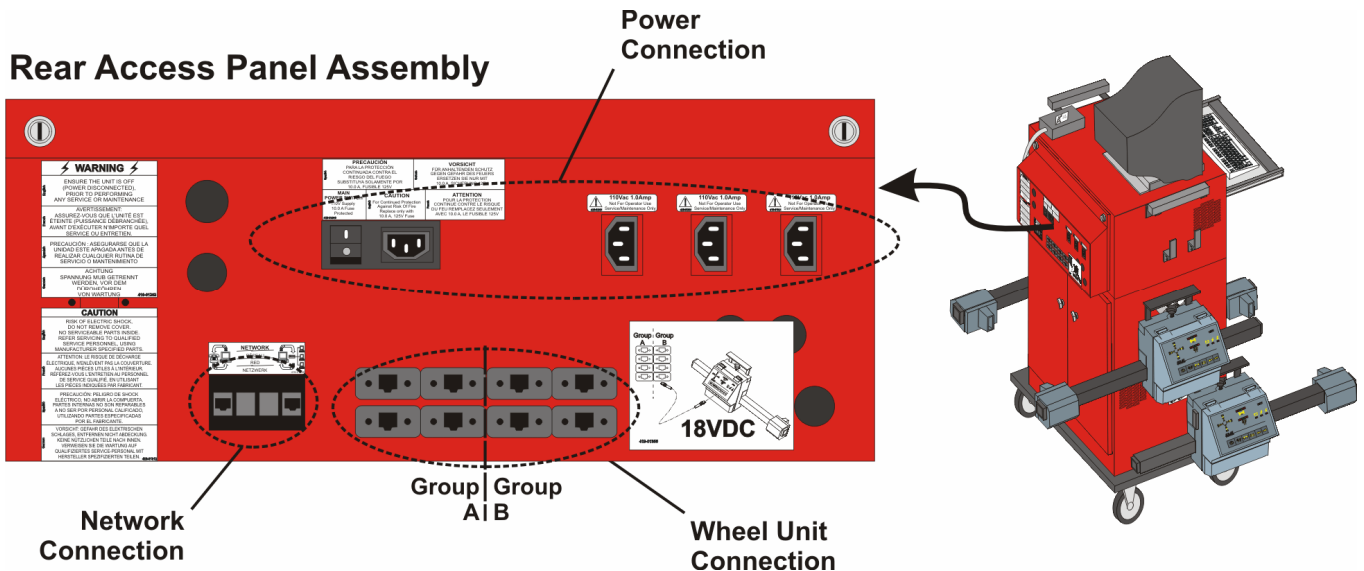
- 2.2.1.1.1 The top of the cabinet is used to mount the Computer's monitor and a monitor holding fixture. The wires that attach to the computers monitor, is usually routed through and protected by the holding fixture.
- 2.2.1.1.2 A drawer, locate near the top-front is used to store the computer's keyboard and mouse. When needed the drawer can be pulled out for use, and closed when not in use.
- 2.2.1.1.3 Beneath the drawer, an access panel with two (2) thumbscrews is hinge on the bottom and opens to gain access the computer's desktop style case. The computer's main power switch, floppy drive and CD/DVD Rom Drive are accessible through this panel.
- 2.2.1.1.4 The second access door up from the bottom, has a hinge on the left-hand side and opens to gain access to the computer's printer.
- 2.2.1.1.5 The bottom access door, also hinged on the left-hand side, opens to allow storage of rim clamps and other alignment system accessories.

2.2.2 Rear Access Panel Assembly. On the backside of the cabinet is the rear access panel assembly. This panel serves as a mounting panel for internally and externally connected devices and is an access to the internal electrical components. Refer to Figure 2-2.

2.2.2.1 Rear Panel connections contain eight (8) RJ-45 connectors, designated as Group-A and Group-B. These connectors are used to provide direct communication between the cabinet's PC and each wheel unit.

**NOTE:**

*Any wheel unit can be plugged into any connector in Group A, or into any connector in Group B. However, it is recommended that you do not mix connections between Group A and Group B (i.e.: some in Group A and some in Group B, simultaneously).*



**Figure 2-2. Rear Access Panel – Typical View.**

- 2.2.2.2 The connectors are universal, within each group. Meaning, you can connect any wheel unit into any of the plugs within a group.
- 2.2.2.3 When direct connected to wheel units, 18 Vdc power is applied through each of the wheel unit cables, providing a voltage of 18Vdc power, to recharge each wheel unit's battery.



- 2.2.2.4 The wireless transmitter and wheel units, transmit data in the 2.4 Mhz frequency band, and has a wireless range of approximately 150–200 feet. Wheel Unit Connection. There are eight (8) RJ45 connectors on the rear access panel that are used to direct connect to the wheel units. These connectors are used to provide direct communication between the cabinet's PC and each wheel unit.
- 2.2.2.4.1 These connectors are universal to the point where any wheel unit can be connected to any of the eight wheel unit connectors, on the panel.
- 2.2.2.4.2 When direct connected to wheel units, 18 Vdc power is applied through the cable for battery charging purposes.
- 2.2.2.5 Network Connection. Both a phone modem and RJ45 LAN connection are provided, to connect the unit to the internet or local area network.
- 2.2.2.5.1 Networking connection is recommended, as software updates become available for download, from the software manufacturer's website.
- 2.2.2.5.2 Units equipped with RSS, require a networking connection either by a phone modem or available high-speed networking connection.
- 2.2.2.6 Power Connections. A power strip, integrated into the rear access cover, provides power to the unit and its electrical accessories. This power strip contains a main switch assembly, voltage relay and six (6) 110Vac electrical receptacles.
- 2.2.2.6.1 Main switch assembly has a rocker-type switch, for Power ON/OFF for the entire unit, an EMI filter and a 10A fuse, to protect electrical components of the cabinet. Power is applied to the unit by connecting a cord, from the switch assembly
- 2.2.2.6.2 The switch has an electrical connector, with is used to connect the unit to a standard 110V electrical receptacle, providing power to the entire unit.
- 2.2.2.6.3 There are six (6) 110Vac electrical receptacles in the power strip, two (2) that are powered and four (4) that are power controlled by the computer. The computer has an interface module installed, enabling the computer to properly shut down the entire unit, versus having to turn off the unit at the main supply switch.
- 2.2.3 Charging Stud(s). The cabinet comes equipped with four (4) charging studs, used to mount the wheel units to the cabinet and provide an 18Vdc charging circuit, for each wheel unit's battery. A charge conductor applies 18Vdc to the charge interface module, inside each wheel unit, and the charge stud its self, serves as ground connection. Refer to figure 2.3.

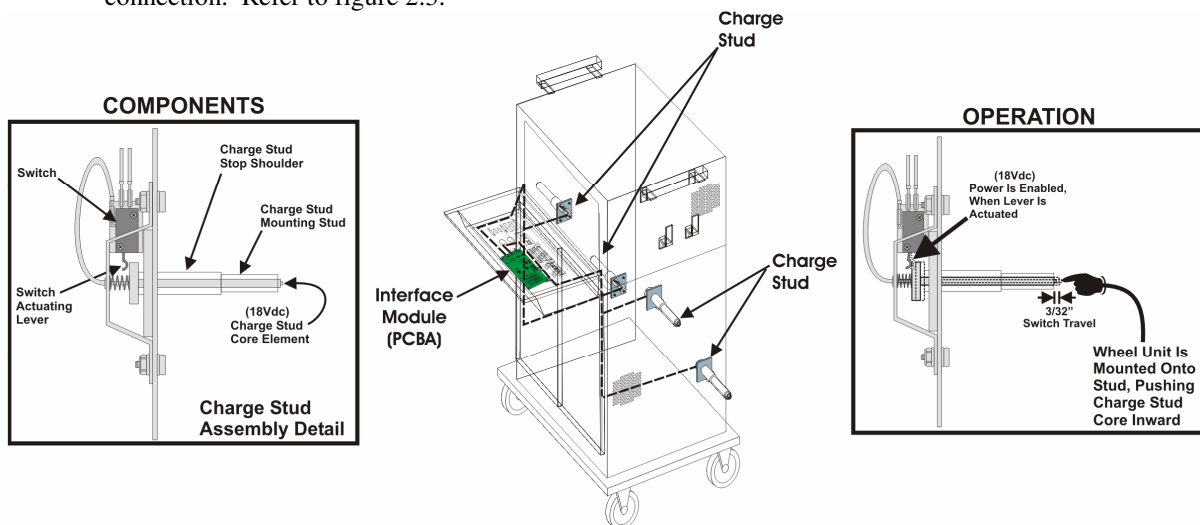


Figure 2-3. Charging Studs.

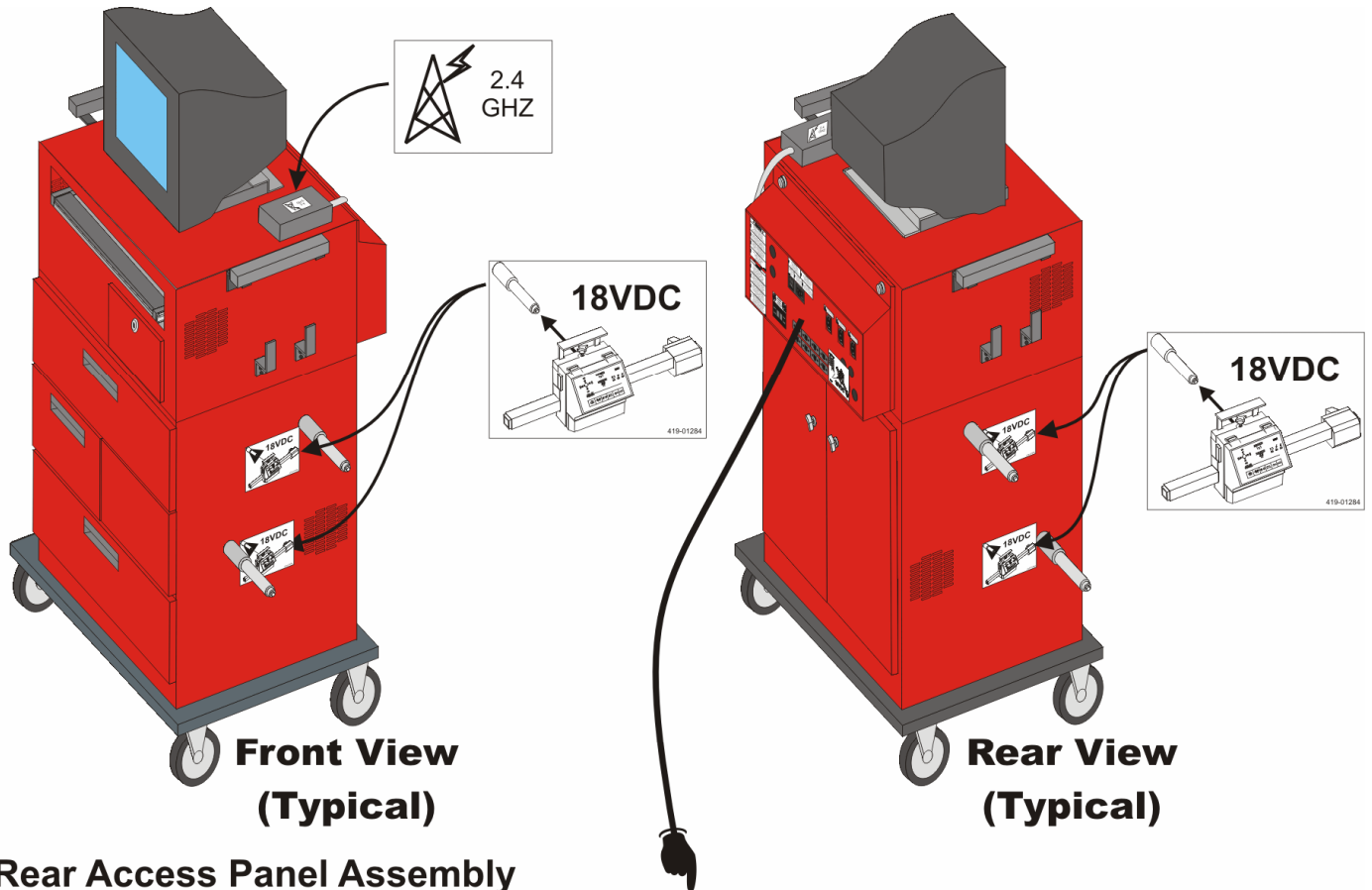
- 2.2.3.1 The charging studs receive their power, from the interface module mounted inside of the rear access panel.
- 2.2.3.2 Wheel unit mounted onto the charge stud, and pushed flush against the shoulder stop of the charge stud.
- 2.2.3.3 When the main power switch is turned off, all power is removed from the unit, including wheel unit battery charging power.

2.2.4 Computer Accessories

- 2.2.4.1 Monitor. The monitor style is a conventional Flat Panel and is mounted to the top of the cabinet, in a holding fixture.
- 2.2.4.2 Computer. A desktop style (horizontal) case is mounted in the cabinet assembly, controls the primary power to the unit and runs the alignment program. The cabinet provides access to both the front and rear of the computer.
  - 2.2.4.2.1 The computer is connected to the power strip, and controls four (4) of the (6) electrical receptacles on the power strip.
  - 2.2.4.2.2 Computer control is applied when the computer goes into stand-by mode. In stand-by mode, only the computer and the 18Vdc power to the Interface Module PCBA (for wheel unit battery charging) have power applied to their circuits.
  - 2.2.4.2.3 The computers typical components includes (not limited to) the following:

Pentium-4 Style Motherboard	Celeron Chip 1.7 - 2.4 Ghz Processor
Celeron CPU Cooling Fan	256Mb Non-ECC DDR 333mHz Ram
210W Internal Power Supply	40Gb EIDE Drive ATA100 7200 RPM
Integrated LAN 10/100 NIC	Integrated Sound – AC '97
USB or PS2 Keyboard	USB or PS2 Optical Mouse
USB Ports (6 – 8)	Parallel Port
PCI Modem/Fax/Data	DVD-Rom (16 Speed)
Serial Port	3-1/2 Inch Floppy Drive
RSS Software (If Equipped)	SML Alignment Software
Windows XP Operating System	Web Cam (if RSS Equipped)

- 2.2.4.3 Printer. A conventional color inkjet printer is installed in the cabinet assembly and is used to print the many documents and forms, related to the alignment software and program. The printer uses both a black ink cartridge and a color ink cartridge for printing. Access to the printer is by opening the cabinet drawer, on the front of the unit, the third opening up from the bottom.
- 2.2.4.4 Data Plates and Decals. The data plate for this unit is located on the back left-hand side of the cabinet. There are numerous decals applied to this unit, identifying components and their intended use. Figure 2-4 depicts the exterior decals and the data plate, users can expect to encounter when using this system.



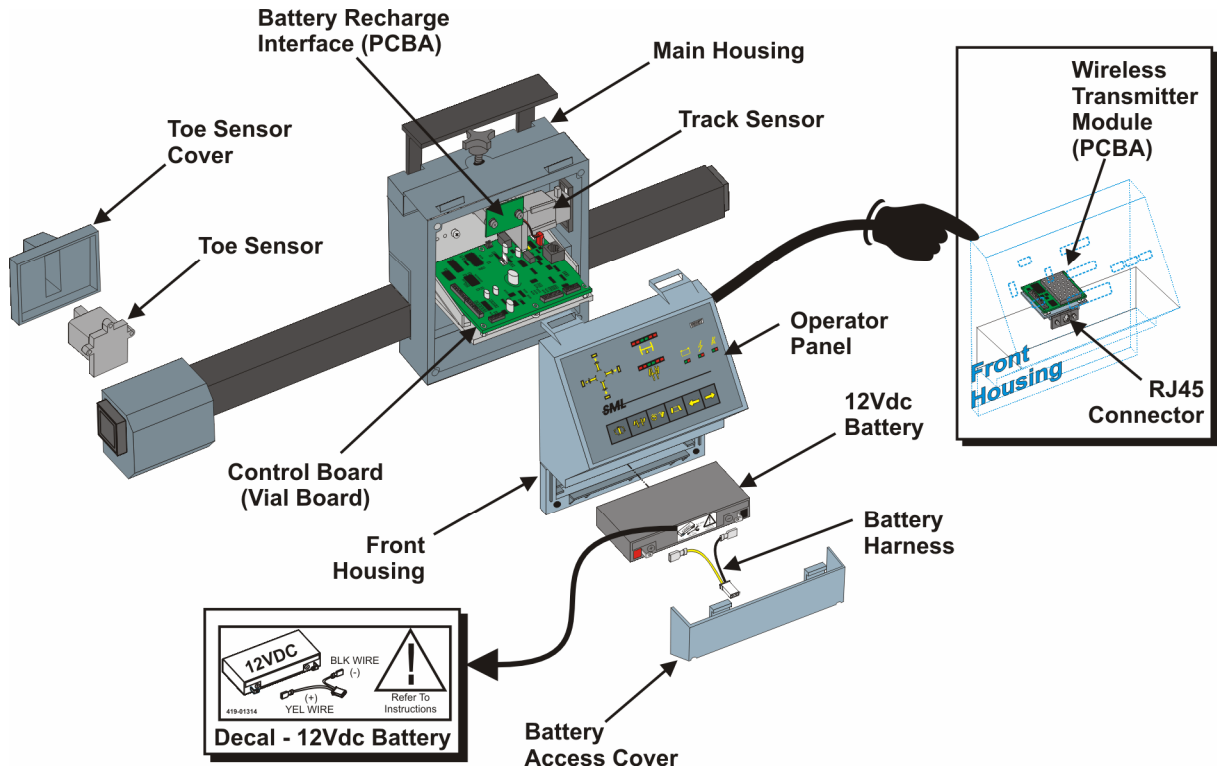
**Rear Access Panel Assembly**

<p><b>WARNING</b></p> <p>ENSURE THE UNIT IS OFF (POWER DISCONNECTED), PRIOR TO PERFORMING ANY SERVICE OR MAINTENANCE.</p> <p>AVERTISSEMENT: ASSUREZ-VOUS QUE L'UNITÉ EST ÉTEINT (PUISSANCE DÉBRANCHÉE), AVANT D'EXÉCUTER N'IMPORTE QUEL SERVICE OU MAINTIEN.</p> <p>PRECAUCIÓN: ASEGURARSE QUE LA UNIDAD ESTE APAGADA ANTES DE REALIZAR CUALQUIER RUTINA DE SERVICIO O MANTENIMIENTO.</p> <p>ACHTUNG: SPANNUNG MÜS GETRENNT WERDEN, VOR DEM DURCHFÜHREN VON WARTUNG.</p> <p>419-01380</p>	<p>PRECAUCIÓN PARA LA PROTECCIÓN CONTINUA CONTRA EL RIESGO DEL FUEGO. SUSTITUIR SOLAMENTE POR 10.0 A, FUSIBLE 125V.</p> <p>VORSICHT: FÜR ANHALTENDES SCHUTZ GEGEN GERHHR DES FEUEERS ERSETZEN SIE NUR MIT 10.0 A, SICHERUNG 125V.</p> <p>MAN POWER SWITCH 110V Supply 10.0 A Fuse Protected</p> <p>CAUTION For Continued Protection Against Risk Of Fire Replace only with 10.0 A, 125V Fuse</p> <p>ATTENTION POUR LA PROTECTION CONTINUE CONTRE LE RISQUE DU FEU REMPLACEZ SEULEMENT AVEC 10.0 A, LE FUSIBLE 125V</p>	<p>110Vac 1.0Amp Not For Operator Use Service/Maintenance Only</p> <p>110Vac 1.0Amp Not For Operator Use Service/Maintenance Only</p> <p>110Vac 1.0Amp Not For Operator Use Service/Maintenance Only</p>
<p><b>CAUTION</b></p> <p>RISK OF ELECTRIC SHOCK. DO NOT REMOVE COVER. NO SERVICEABLE PARTS INSIDE. REFER SERVICES TO QUALIFIED SERVICE PERSONNEL, USING MANUFACTURER SPECIFIED PARTS.</p> <p>ATTENTION: LE RISQUE DE DÉCHARGE ÉLECTRIQUE. N'ENLEVEZ PAS LA COUVERTURE. AUCUNES PIÈCES UTILISER EN L'INTERIEUR. RÉFÉREZ-VOUS L'ENTRETIEN AU PERSONNEL DE SERVICE QUALIFIÉ, EN UTILISANT LES PIÈCES INDQUÉES PAR FABRICANT.</p> <p>PRECAUCIÓN: PELIGRO DE SHOCK ELÉCTRICO. NO ARRIR LA CUBIERTA. PARTES INTERNAS NO SON REPARABLES A NO SER POR PERSONAL CALIFICADO. UTILIZANDO PARTES ESPECIFICADAS POR EL FABRICANTE.</p> <p>VORSICHT: GEFAHR DES ELEKTRISCHEN SCHLAGES. ENTFERNEN NICHT ABDECKUNG. KEINE NÖTZLICHEN TEILE NACH INNEN VERWESEN SIE DIE WARTUNG AUF QUALIFIZIERTES SERVICE PERSONAL MIT HERSTELLER SPEZIFIZIERTEN TEILEN.</p> <p>419-01380</p>	<p>NETWORK</p> <p>BESEAL RED NETWORK</p>	<p>Group A Group B</p> <p><b>18VDC</b></p> <p>419-01380</p>

**Figure 2-4. Locations - Informational Data Plates and Decals**

## 2.3 Wheel Units.

- 2.3.1 **Wheel Unit Overview.** Wheel units are the measuring device(s) that physically gets attached to the vehicle wheels, for alignment measurement and analysis. Since technology (now) allows wheel alignment to be software driven, wheel units interface with the cabinet's computer/program, to indicate actual and measured readings.
- 2.3.1.1 A typical wheel unit includes an operator panel, control board (PCBA), one or two sensor unit(s), a battery charge interface module, a power transistor, a wireless transmitter module, a 12 Vdc battery, a built in speaker, mounting hardware and wiring/cabbling. Refer To Figure 2-5.



**Figure 2-5. Wheel Unit – Typical Components.**

- 2.3.1.2 The wheel unit is powered by the internal battery, which powers the control board (PCBA) enabling the wireless transmitter to transmit position information from the sensor units and vial (on the PCBA). The operator panel displays the wheel unit's current status, as well as interacts with the software. All information from each of the wheel units are, processed by the software and displayed on the screen (live readings).
- 2.3.1.3 During normal use, rim clamps are installed onto each of the vehicles wheels, then a wheel unit is mounted onto each of the rim clamps. While in use, the wheel units can be operated in the wireless mode, or directly connected to the cabinet and used while the battery(s) are being recharged.

2.3.2 Wheel Unit Operator Panel. A flat panel, with built in touch pads and LED's, is illustrated and defined in Figure 2-6.

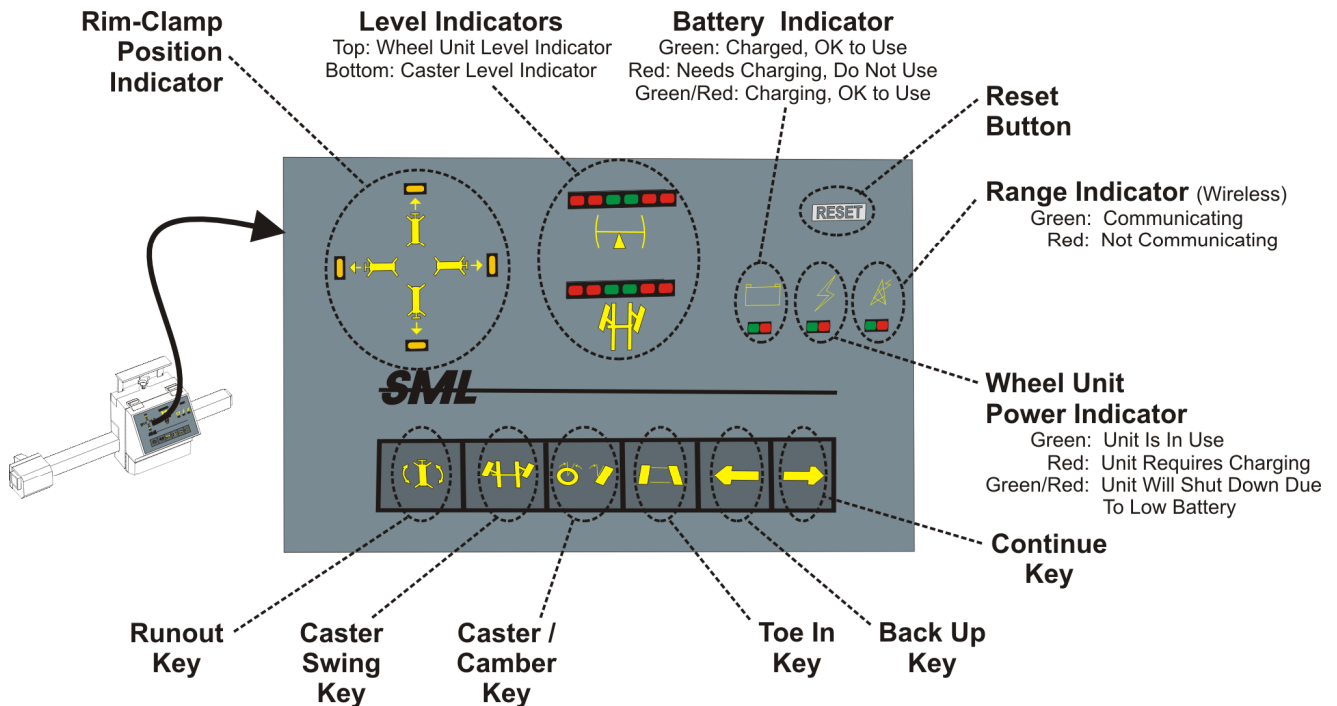


Figure 2-6. Wheel Unit – Operator Panel.

2.3.3 Wheel Unit Control Board (PCBA). Inside the wheel unit housings, is a Printed Circuit Board Assembly (PCBA), which serves as the main controlling device for the unit.

2.3.3.1 The PCBA contains an electronic leveling vial that transmits data to the computer, as to the wheel unit's position, with respect to levelness. At points during the alignment process, a user can check/adjust levelness of the wheel unit, according to the level indicators on the wheel unit's operator panel.

2.3.3.2 All electrical/electronic components, within the wheel unit, connect to the control board (PCBA).

2.3.3.3 The control board enables the wheel unit to operate wireless, using battery power, or by direct connect to the wheel unit connections on the rear access panel of the cabinet.

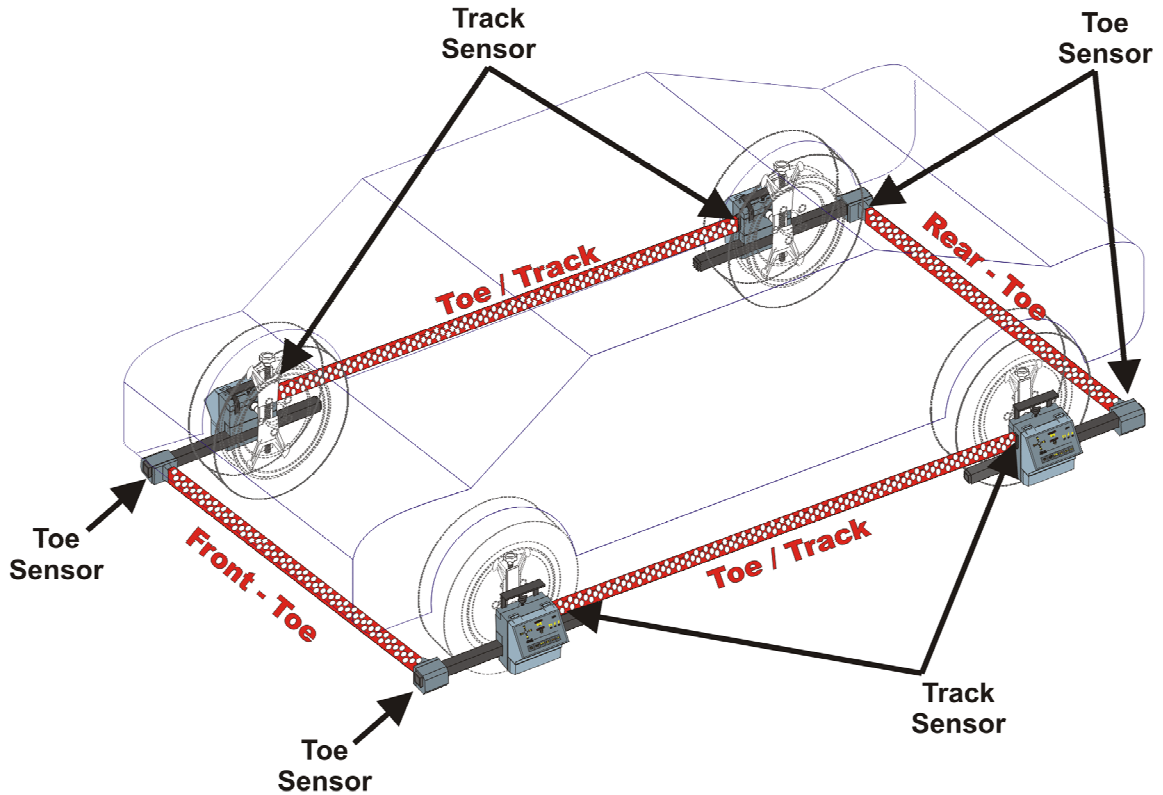
2.3.4 Sensor Units. Wheel alignment systems come paired in 2, 6 or 8 sensors, with the lower numbers limiting the number of suspension angles that can be measured. This unit is an 8-sensor system that measures completely around the vehicle. Refer to Figure 2-7.

2.3.4.1 A sensor unit (camera) is a charged coupled device (CCD) that uses filtered light, measured from a targeted source, to translate position and angle back to the PC for live readings/measurements.

2.3.4.2 Sensors are mounted in a way that they oppose each other, and each sensor mounts an LED, which serves as the targeting source, for the opposing sensor unit.

2.3.4.3 Eight sensor systems allow for the following readings to be taken/measured:

<b>Vehicle - Front</b>	Caster	Camber	Set Back	Individual and Total Toe	SAI
<b>Vehicle - Rear</b>	Thrust Angle	Camber	Set Back	Individual and Total Toe	
<b>Toe Division</b>	Individual Rear Toe (Thrust Line)				



**Figure 2-7. Wheel Units – On Vehicle Sensor Positions.**

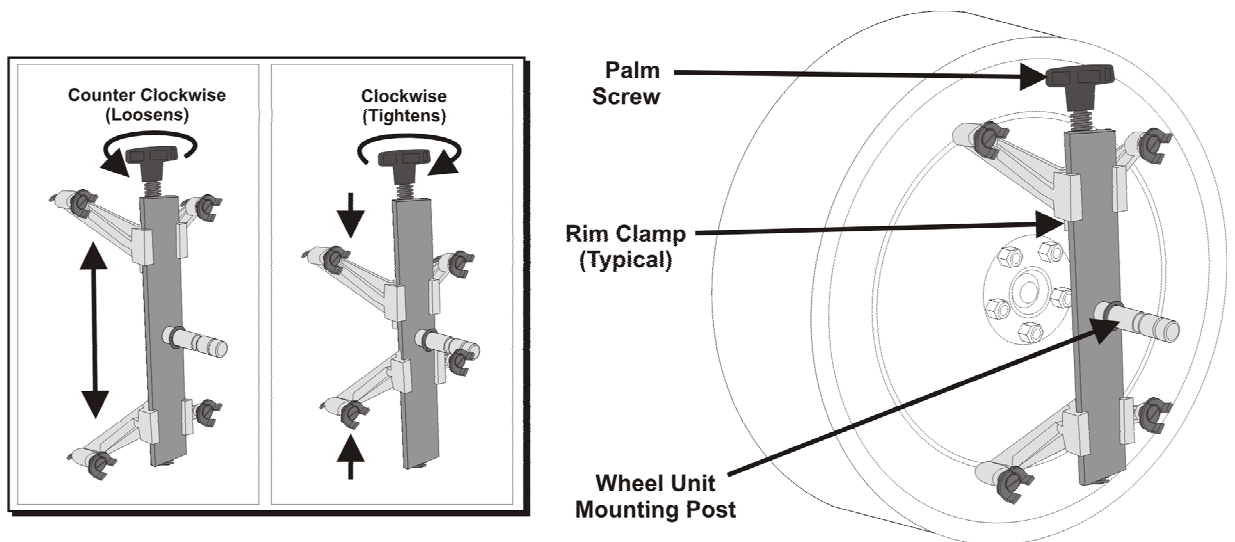
- 2.3.5 **Battery.** A 12Vdc battery is enclosed in the bottom of each wheel unit and provides power to the wheel unit, while operating in the wireless mode.
- 2.3.5.1 On the wheel unit’s operator panel, there is a RED/GREEN LED display for the battery. These indicators are used to display the battery’s status/health (Refer to Figure 2-6).
- 2.3.5.2 In wireless mode use the operator panel (Fig. 2-6) on the wheel unit and check for the following:
- If the battery indicator is GREEN, then the battery is charged and ready for use.
  - If the battery indicator is RED, then the battery is in need of recharge.
  - If the battery indicator is GREEN/RED, then unit will shut down due to lower battery, needs to recharge.
- 2.3.5.3 **Battery Charging.** Each battery can be recharged by direct connection to the back of the cabinet or by mounting the wheel unit onto one of the cabinet’s charging studs.
- 2.3.5.4 Wheel units can be operated (normally) while recharging from a direct connection to the cabinet. When operating with cables attached, caution must be applied to prevent accidental disconnects or cable breakages.

## 2.4 SML Software and PC Requirements.

- 2.4.1 The SML (Smart Machine Logic) Software is proprietary software, designed specifically for vehicle alignment applications. This software requires an authorization code and, because of the continuously expanding database for new vehicles, is updated annually.
- 2.4.2 The SML Software is a user-friendly, menu driven, windows based program that interacts with several integrated relationship databases, and is the primary program for performing alignments.
- 2.4.3 The SML Software enables live readings, during alignments by processing raw data sent by each individual wheel alignment. The overall system's resolution (accuracy) of the alignment measurements taken/read, is to the 1/100<sup>th</sup> of a degree (0.01°).
- 2.4.4 Further information, regarding the SML Software and its use, can be found in Document 420-01157.

## 2.5 Rim Clamps (Truck Optional).

- 2.5.1 A Rim Clamp is a mechanical device, used to grip the rim of a vehicle wheel and provide a mounting stud for a wheel unit. Refer To Figure 2-8, as necessary.



**Figure 2-8. Rim Clamp - Typical**

- 2.5.1.1 Rim clamps are expandable and retractable and fit vehicle rims, ranging from 11-inch to 19-inch.
- 2.5.1.2 Truck kits include extension(s), giving the same rim clamps a working range from 19-inch to 27-inch rim.
- 2.5.2 To perform a vehicle alignment, a two (2) sensor system uses two (2) rim clamps, and six (6) or eight (8) sensor system uses four (4) rim clamps.
- 2.5.3 Operating the palm screw adjusts the rim clamp to fit the various sizes and types of rims on typical vehicles.
  - 2.5.3.1 When positioning a rim clamp on a wheel, caution must be used as to not disturb any wheel weights or over-tightening a rim clamp causing damage or marks to be applied to the rim. It is important to properly secure the rim clamp onto the wheel, but it is not necessary to over tighten.
  - 2.5.3.2 Rim clamp tightness can be checked by physically grabbing the rim clamp, then trying to move it. If it moves, tighten it again, and recheck.



2.5.3.3 When not in use, rim clamps are normally stored in the lower storage area of the cabinet, behind the bottom access door.

2.6 **Pedal Depressor.** A brake pedal holding device (provided) is used when measuring caster swing, and when making adjustments to Caster. The brake pedal depressor is positioned in front of the drivers seat and brake pedal, then actuated to depress the pedal and engage the vehicle’s brakes, refer to Figure 2-9 as necessary. If the brake holder isn’t used, the caster and SAI readings will not be accurate.

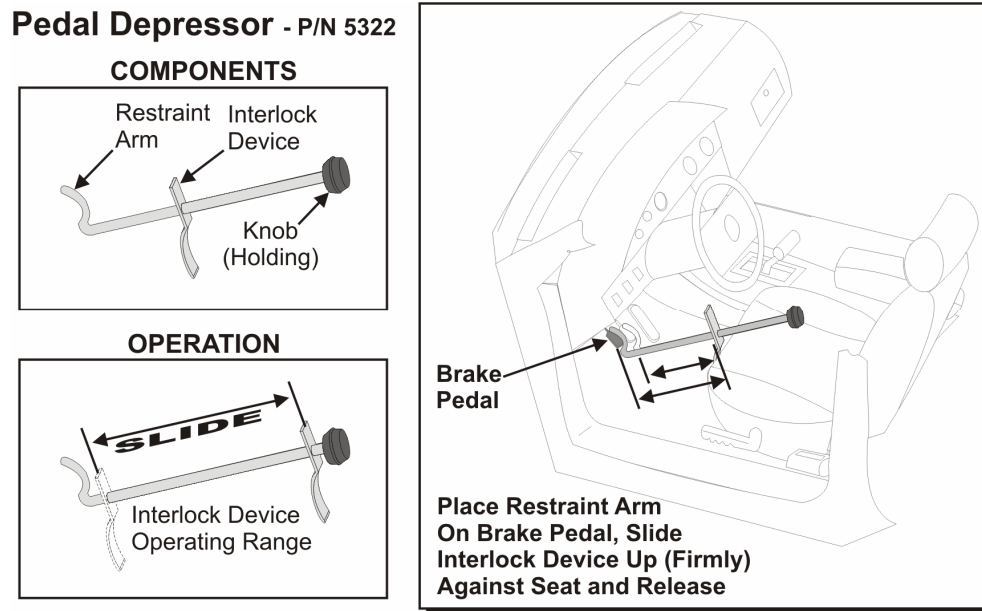


Figure 2-9. Pedal Depressor

2.7 **Steering Holder.** A steering wheel holder (provided) is used to properly hold the steering wheel in a “straight steering” position. Often when a vehicle is out of alignment, an indicator is driving straight with the steering wheel slightly to extremely off-center, refer to Figure 2-10 as necessary. Interlocking the steering wheel holder, when adjusting the front toe of the vehicle, realigns and corrects the steering wheel position.

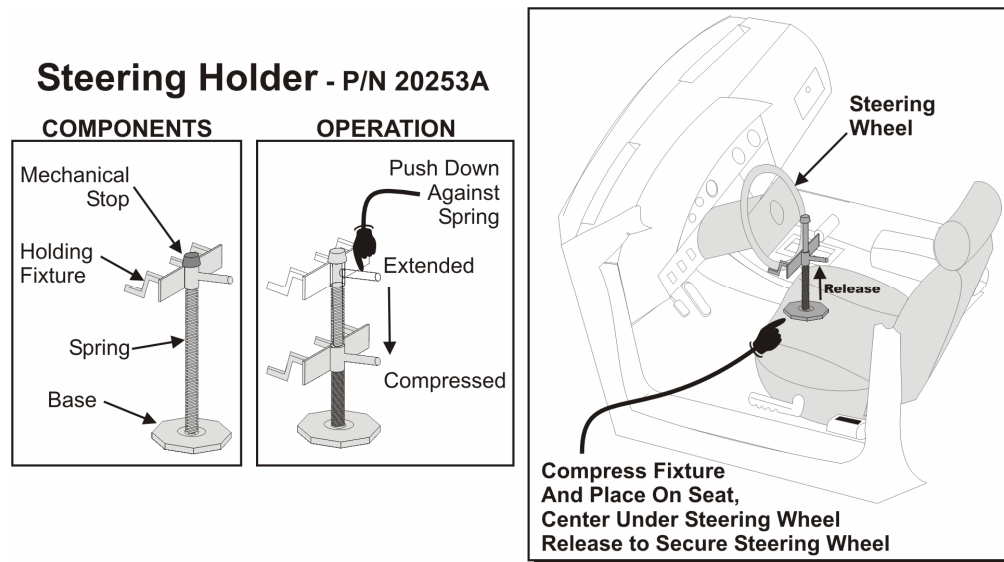
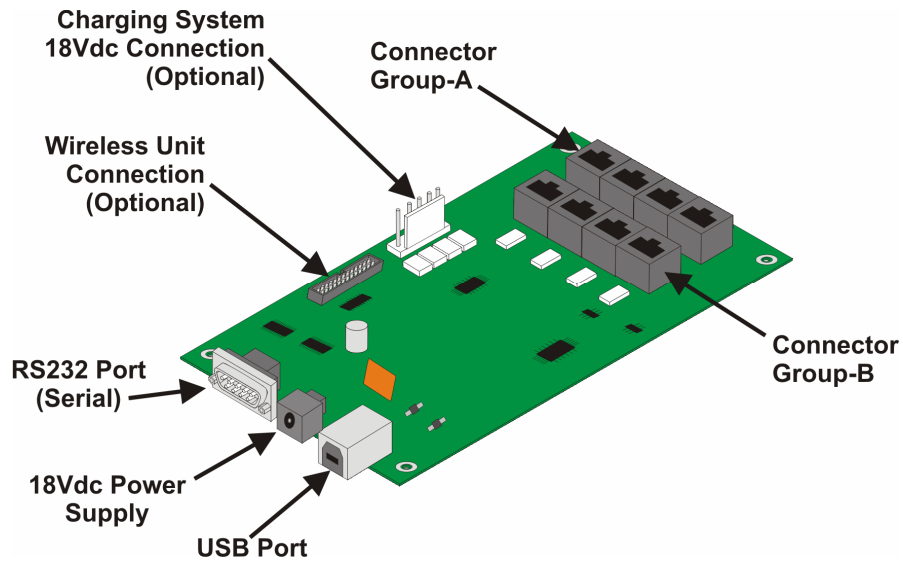


Figure 2-10. Steering Holder



2.8 SML Interface Module PCBA.

2.8.1 The SML Interface Module PCBA is a circuit card connecting the inter-connect the SML Wheel Units to SML Software, installed on a computer. Refer to Figure 2-11, as necessary.



**Figure 2-11. SML Interface Module – Printed Circuit Board Assembly (PCBA)**

2.8.2 Connections to the PCBA are an RS232 Serial Port, a power supply connection, and a USB port. The RS232 and USB ports both connect to the PC, and communicate data.

2.8.2.1 The power supply is an 18Vdc power supply for the circuit card.

2.8.2.2 This power is transmitted to the wheel units, for battery charging purposes, through both Group-A and Group-B connections on rear access panel..

2.9 Equipment Technical Characteristics. In addition to the technical information provided in this section, Table 2-1 give more detailed information about the unit and accessories. Refer to Table 2-1.

**Table 2-1. Equipment Technical Characteristics**

**Cabinet**

Size	42" Height (with out monitor), 24" Width, 32" Depth	
Weight	195 lbs – Stripped, 275 lbs – Loaded	
System Voltage	110 Vac	
System Amperage	10A Fused	
Cycle	50 or 60	
Power Relay	110Vac, 12A (integrated into power strip)	
Interface Module Power Supply	110Vac Input, 1.5A 18Vdc Output	
Wireless Frequency	2.4 Ghz (Channel Data Is Proprietary)	
Charge Studs	18Vdc Output, supplied from Interface Module PCBA	
Networking Connection	CAT-3, phone and CAT-5 (RJ45) LAN Connections	
Wheel Unit Connectors	Quantity-8, RJ45 Connectors. Provides a direct communication connection to wheel unit(s) and 18Vdc charge for wheel unit battery charging. Connectors are universal to any/all wheel units.	
Power Strip	110Vac, 10A Fused with integrated EMI Filter 6 – 110Vac Receptacles. Other than Installed equipment, only service equipment may be used on this system. Externally connected service equipment must not exceed 110Vac, 1.0A each.	

**Accessories**

CPU	110Vac, 2.1 Amp	
Printer	110Vac 1.0 Amp	
Monitor	CRT or Flat Screen	*Flat Panel
	110Vac, 2.3 Amp	*110Vac, 1.5 Amp
Rim Clamps	Quantity of 4, approximately 10 lbs each	
Steering Wheel Holder	1	
Brake Pedal Depressor	1	
Web Cam	*USB Connected (if RSS equipped)	

**Wheel Units**

Quantity	4	
Total Sensors	8	
Battery	12Vdc, Lead Acid, Rechargeable. Use OEM batteries Only.	
Weight	12.5 Lbs	
Charge Circuit	Integrated into control board, accepts 18Vdc from charge studs, or direct connect to the wheel unit connections, on the rear access panel (RJ45s)	
Wireless Range	300 Feet	

**Software**

Operating System	Windows XP	
Alignment Program	SML	
Service Program	*RSS (if equipped)	

\* Denotes: Optional Accessory

## Section 3.

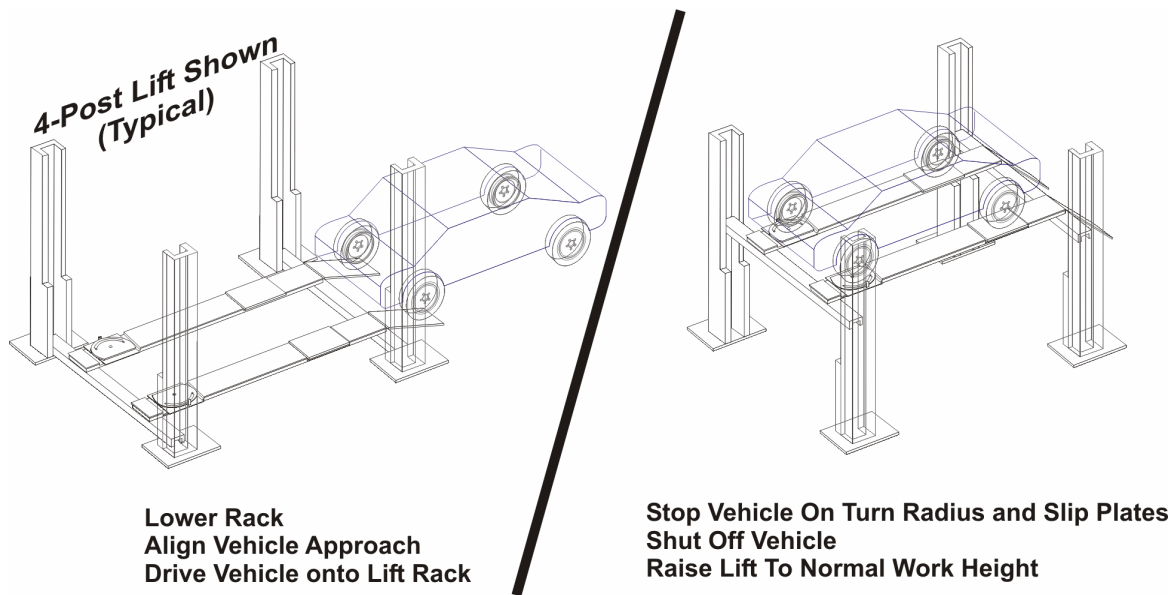
# Operating Instructions

### 3.0 Operating Instructions.

This document emphasizes the use of the equipment, in response to SLM program. The SML program information, details and use is available in a separate document, and is included with this system. The SML program is the primary function of this system, and the hardware serves as interactive measuring equipment/devices for the program. This document provides instructions for proper system start-up, accessing the SML software for wheel unit update / synchronization, proper system shut down, equipment storage and wheel unit calibration.

### 3.1 Alignment Preparation.

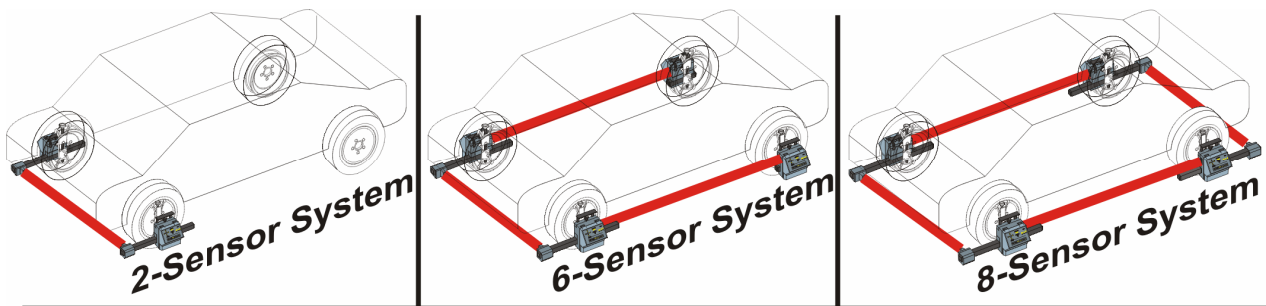
3.1.1 Using Figure 3-1 as a guide, lower the lift rack. Align the vehicle with the ramps and drive the vehicle onto the lift.



**Figure 3-1. Vehicle Lift Preparation**

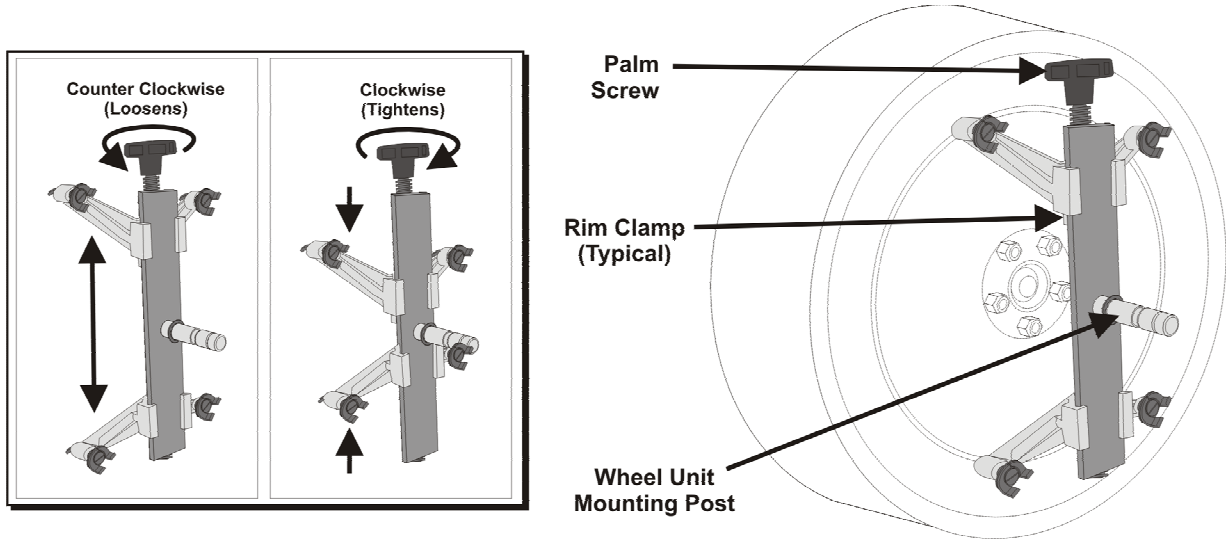
3.1.2 When properly positioned over the turn radius plates and rear slip plates, shut off the vehicle and raise the lift to an adequate work height, for the person performing the alignment.

3.1.3 Using Figure 3-2 as a guide, determine the positioning of the wheel units and place wheel units and rim clamps on the ground, under or near each of the tires on the vehicle.



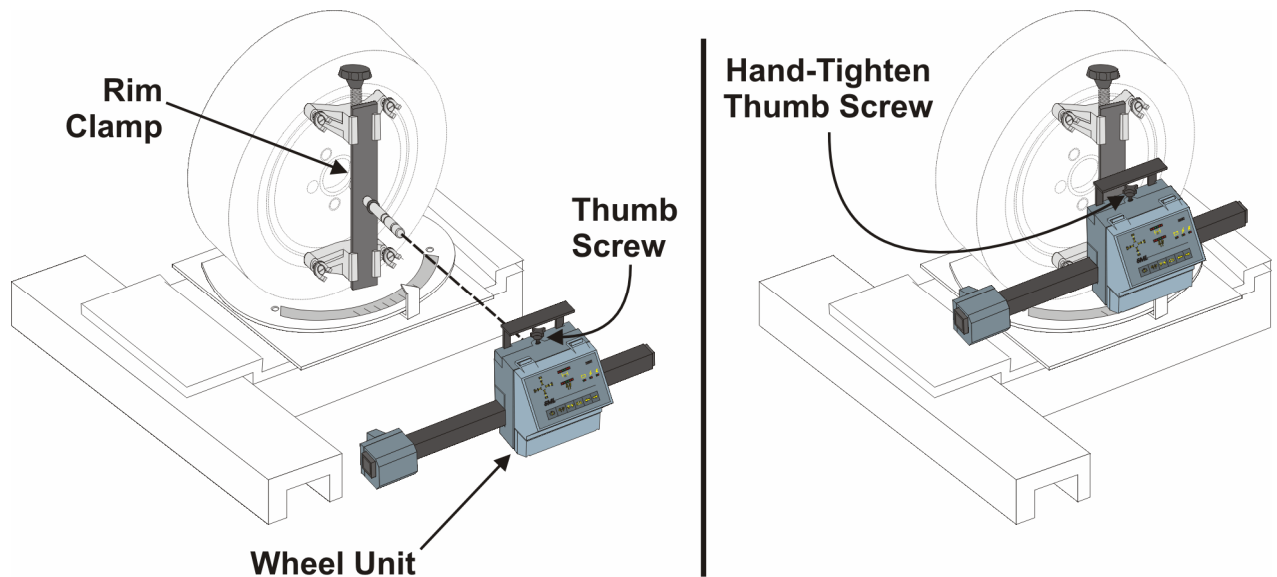
**Figure 3-2. Determining Wheel Unit Location – By Sensor Quantity**

3.1.4 Using Figure 3-3 as a guide, align the first rim clamp with the front left tire, and place onto rim.



**Figure 3-3. Applying Rim Clamps to Vehicle Wheel**

- 3.1.5 Secure the first rim clamp, by tightening the palm screw to compress the rim clamp onto the bead edge of the rim. Once the rim clamp is on the rim, grip and attempt to move the rim clamp while mounted onto the rim. The rim clamp should not move. If it moves, then adjust and re-tighten the palms crew, as needed.
- 3.1.6 Repeat rim clamp installation, on the remaining vehicle rims, for the type system you have (i.e. 2-sensor, 6-sensor or 8-sensor).
- 3.1.7 Using Figure 3-4 as a guide, loosen the thumb screw on the wheel unit, such that the wheel unit can be installed onto the shaft on the rim clamp.
- 3.1.8 Align the left-front (LF) Wheel Unit with the shaft of the Rim Clamp, on the left-front wheel of the vehicle and install onto shaft. Push the wheel unit towards the wheel, until flush against the shoulder stop, on the shaft.



**Figure 3-4. Applying Rim Clamps to Vehicle Wheel**

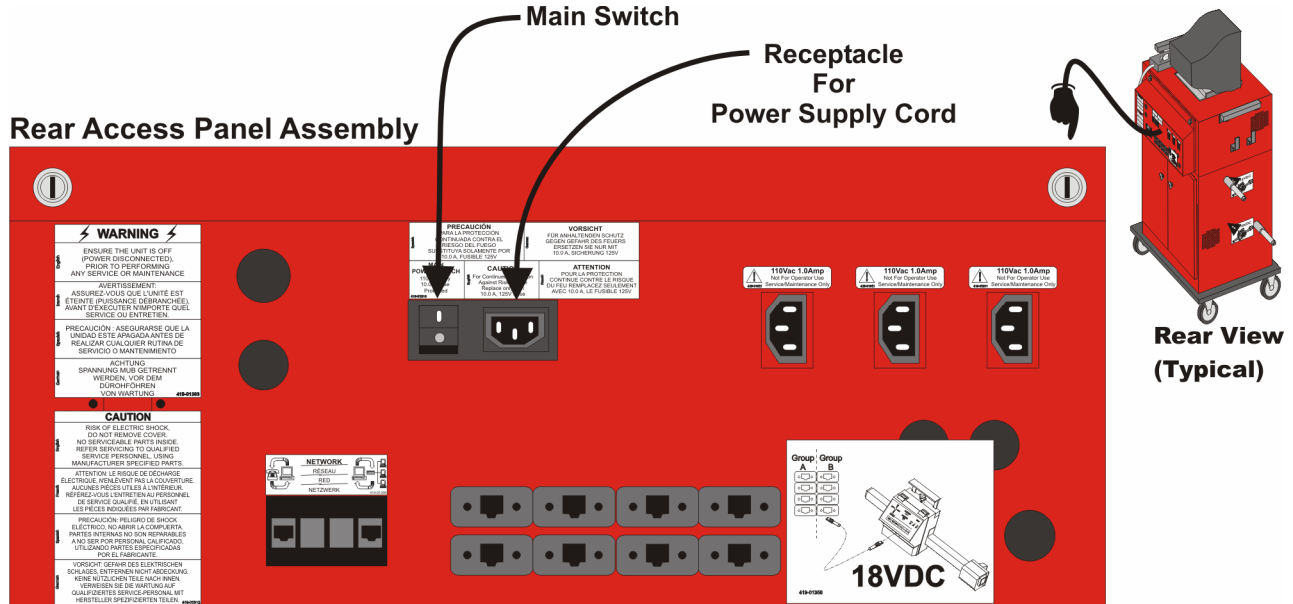
- 3.1.9 Tighten the wheel unit's thumb screw only hand tight, such that the wheel unit can still rotate on the shaft.
- 3.1.10 Using this technique, align and install the remaining wheel units onto the rim clamps, as needed.

3.2 Proper System Startup.

**NOTE:**

*During power up, if any problems or issues with the equipment occur, then refer to Section 4 of this document, for trouble shooting and fault isolation information.*

- 3.2.1 Locate the main power cord for the unit, and if it is not already plugged in, plug it in. Refer to Figure 3-5.



**Figure 3-5. Main Power Connection**

- 3.2.2 Locate the main power switch for the unit, and turn it ON.
- 3.2.3 At the front of the cabinet, locate and turn ON the following items
  - Computer or PC. The switch is located approximately in the front-center of the desktop case.
  - Monitor. The power switch for the monitor is located on the monitor base.
  - Printer. The power switch for the printer is located on the upper-front right-hand side.
- 3.2.4 Allow the computer to load the main operating system's default desktop.
- 3.2.5 Check the wheel units for power and communication, as follows:
  - 3.2.5.1 As the system is powered and communication between the computer and wheel units are established, review the operator panel indicator lights, for each wheel unit. These indicators help to identify the status of each wheel unit.
  - 3.2.5.2 Ensure both toe and track sensors, on each wheel unit, are flashing.
  - 3.2.5.3 Check the battery condition for each (all) wheel unit(s), as follows:
    - 3.2.5.3.1 If the battery is charged and ready for use, then re-mount the wheel unit on the charge stud, until ready for use in an alignment process.

3.2.5.3.2 If the battery is low or indicating a shut down, then the wheel unit can be mounted back onto the charge stud, and recharged until ready for use.

3.2.5.3.3 If the battery is low or indicating a shut down, the wheel unit can be direct connected to the rear access panel, and be used immediately for an alignment process.

3.2.6 The overall system is powered and ready to access the SML alignment software.

3.2.7 If a wireless configuration is to be used, the system will interact with the PC, when the SML Software is open and run.

3.2.7.1 If not wireless, then use Figure 3-6 as a guide, and connect the SML interface module, to the wheel units, on the vehicle.

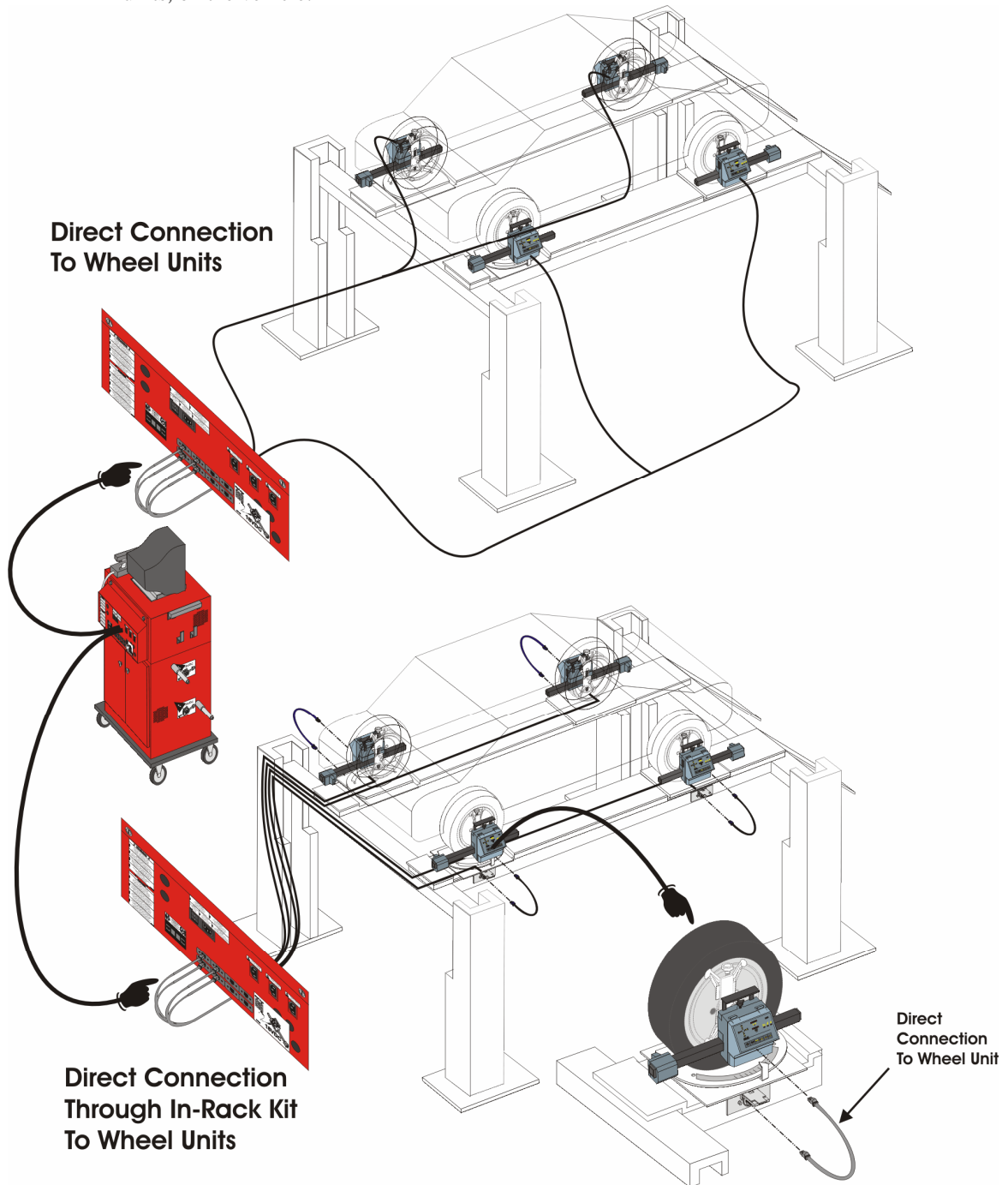


Figure 3-6. Connection To Wheel Units

- 3.2.7.1.1 If direct connect to the wheel units, then allow the cables to hang onto the floor, and connect to either Group-A or Group-B on the SML Interface Module.
- 3.2.7.1.2 If connecting through an In-Rack Harness, connect the harness to either Group-A or Group-B on the SML Interface Module. Then direct connect the harness to each of the wheel units as shown. Repeat for all wheel units being used.

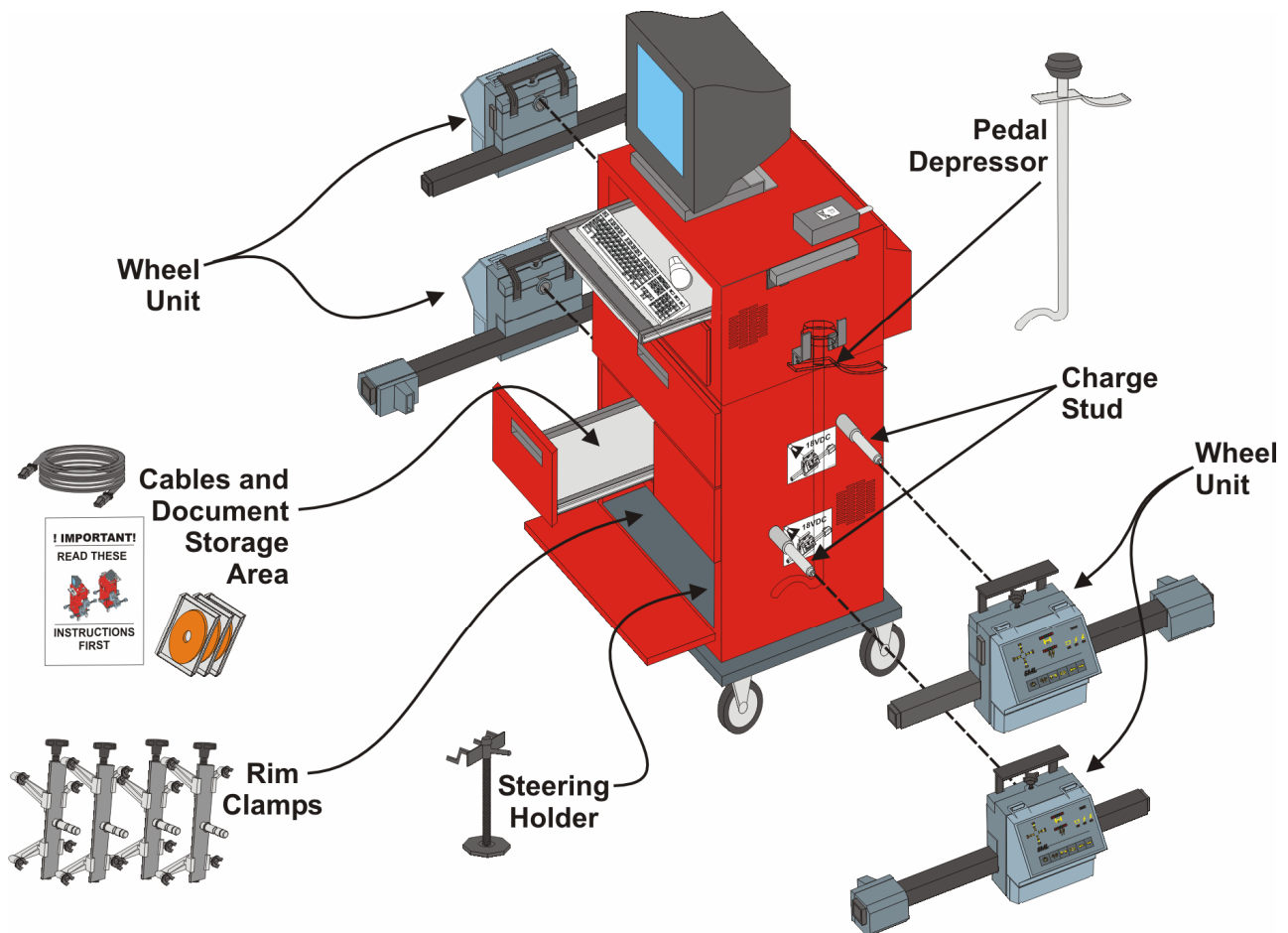
### 3.3 SML Software

The SML Interface Module is powered and inter-connected between the standard computer and the wheel units. Now the operators will need to run the SML software, from the computer's desktop. Refer to 420-01155 for instructions on using the SML Software to perform alignments.

### 3.4 Stowing Equipment.

Using Figure 3-4 as a guide, place equipment back onto the Main Unit, as follows:

- 3.4.1 Using the computers operating system (Windows<sup>®</sup>), shut down the PC.
- 3.4.2 Wheel Unit Cable(s). Located each wheel unit direct connection cable, disconnect if connected, and properly coil it up.
- 3.4.3 Stow all cables into the front bottom storage area of cabinet. Place them flat onto the bottom surface of the cabinet, side-by-side, not stacked together.



**Figure 3-7. Stowing Equipment**

3.4.4 Place each wheel unit, onto the charging studs on the cabinet.

3.4.4.1 Verify the wheel unit is pushed all the way back onto each charging stud.

**NOTE:**

When the wheel unit(s) are mounted onto charge studs, the battery indicator lights will come on, as the battery inside the wheel unit is being recharged. Once the wheel unit reaches peak charge, a trickle charge is then applied to maintain the peak charge.

3.4.4.2 Verify that the Battery Indicators on the wheel unit operator panel, have both the Green and Red indicators, lit. If not, adjust as necessary until they are both lit.

3.4.4.3 Secure each wheel unit in place by tightening the thumbscrew on the unit.

3.4.5 Place or verify that the mouse is resting on the keyboard tray, and push in the keyboard tray inward, for storing.

3.4.6 Open the access door for the printer, and turn off the printer. Close and latch the cabinet door.

3.4.7 Close or verify that all cabinet access doors and covers are closed and latched (secured).

3.4.8 Equipment is properly stored and ready to be used, or ready to have the power turned off (powered down).

3.5 Power-Down the Unit.

There are two power-down modes for these units, and they are PC power down and a main switch shut-off.

**NOTE:**

When in the PC power-down mode, the main unit is off, but the wheel units still receive power from the charging studs, for charging batteries.

3.5.1 PC power-down is simply shutting the PC off, using the computer's normal operating system (Windows®). This powers down the PC, printer, monitor and electrical outlets on the rear access panel of the unit.

3.5.2 A complete power-down is accomplished as follows:

3.5.2.1 Power-down the PC using the computer's normal operating system (Windows®).

3.5.2.2 Turn off the main switch, on the rear access panel of the unit. If necessary, unplug the main power cord and properly coil up and stow the cable.

3.5.2.3 If long-term storage is anticipated, then it is highly recommended that the batteries for the wireless wheel units be disconnected.



## Section 4.

## Servicing and Maintenance

4.0 Overview. Service and maintenance on this system is to be performed, only by authorized service technicians. The information provided in this section, is for reference information purposes only. Only authorized replacement parts may be used when servicing this system, refer to Section 5.

4.1 Fault Isolating and Trouble-Shooting Wheel Units.

4.1.1 Primary faults of wheel units are summarized below and common fault has a corresponding table reference. Each table identified below provides typical faults or symptoms, a description of a check or inspection to be performed and (recommended) remedial actions.

- Table 4-1. No Power
- Table 4-2. Battery & Battery Charging
- Table 4-3. No Indicator Lamps or Touch Panel
- Table 4-4. No Sound
- Table 4-5. No Direct Cable Connection/Communication
- Table 4-6. No Toe/Track Sensor
- Table 4-7. No Wireless Communication

**Table 4-1. No Power**

Symptom or Fault	Check Or Inspect	Remedial Action	
No Power To The Wheel Unit	Is Battery Connected	Properly connect the battery connector to the PCBA connector.	
	Battery / PCBA Harness OK	Check that wires, terminal lugs, connector and connector pins are in good shape, and properly connected. If not, replace harness.	
	Battery Harness Properly Connected to Battery	Ensure that yellow wire is connected to battery's (+) post, and the black wire is connected to the battery's (-) post.	
	Is Battery Discharged		Once properly connected, check that the wheel unit's battery indicators are lit. Green – Battery is OK Red – Battery is discharged Green/Red – Battery is charging, but wheel unit is ready for use.
			Bypass the battery by connecting a wire between the wheel unit, directly to the designated RJ45 connection(s) on the back side of the cabinet. Check the wheel unit's battery indicators for status.
			If the battery is considered to be defective, replace with proper battery, reconnect it to the wheel unit, and re-evaluate power situation.
Is the PCBA indicating that power is being applied to the board.	Remove the battery access cover, battery, and two retainer screws securing the front cover to the wheel unit. Connect the RJ45 Cable directly to the connection on the PCBA, and check that the PCBA's indicator light, is lit (or not).		

**Table 4-2. Battery & Battery Charging**

Symptom or Fault	Check Or Inspect	Remedial Action
Battery & Battery Charging	Battery Needs Charging	Attempt to recharge on Charging Posts on unit, or by direction connection to the back of the unit. Once connected for charging, a battery that is functional will have both battery indicator lamps (Green/Red) on the wheel unit, will light signifying a charge is being applied.
	No Voltage or Low Voltage Readings	Attempt to recharge and if after normal charging process, the voltage does not reach 12Vdc, then replace battery.
	No Voltage, Dead Battery	Using a electrical meter, measure the voltage of the battery, at the poles.  The standing voltage should be 12Vdc.  Attempt to recharge and if normal voltage does not reach 12Vdc, then replace battery.

**Table 4-3. No Indicator Lamps or Touch Panel**

Symptom or Fault	Check Or Inspect	Remedial Action
No Indicator Lamps or Touch Panel	Is the wheel unit, powered	Refer to Table 4-1, and check for proper power to the unit.
	Are any indicator lights, being lit or touch panel responding, when touched	The operator panel, may not be connected to the PCBA. Access the internal of the Wheel unit, and verify connection.
		The ribbon cable that connects the operator panel to the wheel units PCBA, may not be correctly installed or is defective. Recheck connections and remove/replace ribbon cable as needed.
		The operator panel may be defective, remove/replace as needed.
	The wheel unit's PCBA may be defective, remove/replace as needed.	

**Table 4-4. No Sound**

Symptom or Fault	Check Or Inspect	Remedial Action
No Sound	Check that it “Beeps”, when it is supposed to	Remove the battery access cover to the wheel unit, then disconnect the battery connection. When you reconnect the battery, a Beep should be heard.
	Speaker is Plugged into PCBA	Remove the front housing of the wheel unit, and verify that the speaker is properly connected into J1 on the PCBA
	Speaker is Defective	Using an ohm meter, measure the resistance of the speaker, at the connector.  Acceptable measurements should be 15.4 – 16.3 ohms.  If not, remove and replace speaker.

**Table 4-5. No Direct Cable Connection/Communication**

Symptom or Fault	Check Or Inspect	Remedial Action
No Direct Cable Connection / Communication	Wheel unit is properly connected to Main Unit	Direct connect the wheel unit, to the receptacle at the back of the Unit. If necessary, try an alternate port to connect to, to verify connection.
	Direct connect cable may be defective	Use a similar cable to direct connect the wheel unit to the main unit. If a connection is made, the original cable is defective and needs to be replaced.
	Check that wheel unit is powered	Once properly connected, check that the wheel unit’s power indicator(s) are lit.  Green – Power applied, ready for use.  Red – Battery requires charging  Green/Red – Battery requires charging, and unit is preparing to shut down.
	Recheck wheel unit Firmware versions	Restart the SML program, check and update wheel unit firmware, as needed.
	If equipped, check if wireless communication is available	Remove the direct connect cable from the wheel unit. On the main unit’s keyboard, press (Ctrl D) to enable a pop up screen containing wheel unit information / status.

**Table 4-5. No Direct Cable Connection/Communication - Continued**

<b>Symptom or Fault</b>	<b>Check Or Inspect</b>	<b>Remedial Action</b>
No Direct Cable Connection / Communication	Data screen (Ctrl D) displays a value of 69, in its listing	This indicates, a beam block for the wheel unit. Check if something is blocking the beam, or that there is no wheel unit, in alignment, to cross talk with.
	Data screen (Ctrl D) displays a value of 70, in its listing	This indicates, no communication to the wheel unit.
	Data screen (Ctrl D) displays a value of 77, in its listing	A Sensor for that wheel unit is light saturated. The excess amount of light must be reduced or blocked, at the unit's sensor.
	Direct connect to PCBA, inside wheel unit.	Remove front housing from wheel unit, and unplug the RJ45 connection from the PCBA. Direct connect the wire from the back of the Main Unit, to the connector on the PCBA.  Once connected, check the operator panel indicator lights for status, or indication of activity.
	Is the PCBA indicating that power is being applied to the board	Check that the PCBA's indicator light, is lit (or not).
	Check that all accessory components are properly connected to the wheel unit's PCBA	Properly connect or verify that the Sensor units, keypad, battery connection, wireless module (if equipped), speaker, RJ45 cable, and the power transducer are all properly connected to the PCBA.
	PCBA may be defective	If all checks and inspections fail, then remove/replace PCBA for the wheel unit, as necessary.

**Table 4-6. No Toe/Track Sensor or Toe/Track LED**

<b>Symptom or Fault</b>	<b>Check Or Inspect</b>	<b>Remedial Action</b>
No Toe or Track Sensor	Verify power to the Wheel Unit	Make sure the battery is properly connected and has sufficient charge, to function properly.
	Recheck wheel unit Firmware versions	Restart the SML program, check and update wheel unit firmware, as needed.
	Data screen (Ctrl D) displays a value of 69, in its listing	This indicates, a beam block for the wheel unit. Check if something is blocking the beam, or that there is no wheel unit, in alignment, to cross talk with.
	Data screen (Ctrl D) displays a value of 70, in its listing	This indicates, no communication to the wheel unit.
	Data screen (Ctrl D) displays a value of 77, in its listing	A Sensor for that wheel unit is light saturated. The excess amount of light must be reduced or blocked, at the unit's sensor.
	Check that all accessory components are properly connected to the wheel unit's PCBA	Properly connect or verify that the Sensor units, keypad, battery connection, wireless module (if equipped), speaker, RJ45 cable, and the power transducer are all properly connected to the PCBA.
	Check that ribbon cables, are defective	Remove each sensor's ribbon cable. Plug each one, in the other position, and (Ctrl D) to check.  If a cable is bad, replace it
	Check that Toe or Track Sensor is defective	Direct connect a ribbon cable to each of the Toe and Track sensors.  Sensors that begin working, replace the ribbon cable.  Sensors that still don't work, replace.
	PCBA may be defective	If all checks or inspections fail, then remove/replace PCBA for the wheel unit, as necessary.

**Table 4-7. No Wireless Communication**

Symptom or Fault	Check Or Inspect	Remedial Action
No Wireless Communication	Verify power to the Wheel Unit	Make sure the battery is properly connected and has sufficient charge, to function properly.
	Check the wheel unit operator panel indicator lights, for status	<p>Check the status for the wheel unit's battery, power and range indicators.</p> <p>If the range indicator is not green, then it means that the wheel unit is not communicating with the Main Unit.</p>
	Recheck wheel unit Firmware versions	<p>Restart the SML program, check and update wheel unit firmware, as needed.</p> <p>Code: B 03 indicates that an attempt to program has failed and unit has reset to default (backup) settings.</p>
	Data screen (Ctrl D) displays a value of 70, in its listing	This indicates, no communication to the wheel unit.
	Check that all accessory components are properly connected to the wheel unit's PCBA	Properly connect or verify that the Sensor units, keypad, battery connection, wireless module (if equipped), speaker, RJ45 cable, and the power transducer are all properly connected to the PCBA.
	Check that ribbon cables, for the Wireless module in the wheel unit, are defective	<p>Check connection. At the PCBA and at the Wireless Module. The PCBA ribbon cable connector is keyed, to prevent improper installation.</p> <p>The wireless module should have the keyed end of the ribbon cable, facing outward, away from the module to be installed correctly. If a cable is bad, replace it</p>
	Direct connect to PCBA, inside wheel unit.	<p>Remove front housing from wheel unit, and unplug the RJ45 connection from the PCBA. Direct connect the wire from the back of the Unit, to the connector on the PCBA.</p> <p>Once connected, check the wheel unit's indicator lights for status, or indication of activity.</p> <p>If communication is established from a direct connection, and all other checks or inspection pass, the wireless module is bad, remove/replace as necessary.</p>

4.2 Fault Isolating and Trouble-Shooting The Cabinet Assembly.

4.2.1 Primary faults of the cabinet assembly are limited to:

4.2.1.1 Replacement of standard parts specified in Table 5-1 Unit Parts List, (i.e.: PC, Monitor, and Printer.)

4.2.1.2 All other fault isolation is to be accomplished by authorized (trained) technicians.

## Section 5.

## Unit - Parts Listing

- 5.0 This section provides a fundamental listing (refer to Table 5-1) of the components that make up a wheel alignment system.
- 5.1 The listing is in Part Number Order, and identifies the unique equipment installed.
- 5.2 Note that; since the majority of expendable or durable products are re-useable, all non-essential expendable/durable parts have been removed from this listing (i.e: packaging, dunnage, screws, washers, electrical tie-wraps, heat shrink tubing, etc., etc.).
- 5.3 Only qualified (trained) technicians and service personnel, are authorized to service or maintain these units. The following list is primarily used to identify each component with a description, a corresponding part number, and quantity.

**Table 5-1, Parts List**

<b>PART No</b>	<b>DESCRIPTION</b>	<b>QTY</b>
0003-151	ROD PEDAL DEPRESSOR	1
000-46510-002	CONN. PLUG 2 PIN MATE-N-LOCK	2
000-47690-009	CONN 9 PIN D-SUB MALE PLUG IND	1
0060-941	KNOB	1
0063-134	WHEEL CLAMP HOOK	16
0063-212	HAND KNOB	4
0064-182	BAR PEDAL DEPRESSOR	1
408-00469	MODEM BEZEL	1
408-00470	BLANK MODULE	3
408-00742	COVER WHEEL UNIT 1400 SERIES	4
408-01058-001	ENCL W/COVER & 5/8IN. HOLES	1
408-01082	COVER, BATTERY COMPARTMENT	4
409-00861	RUBBER GROMMET (3731-0)	1
409-01112	PROTECTOR, 5' FLOOR CABLE	2
410-00745-002	BRACKET 1400 SERIES WHEEL UNIT	4
410-00847	EXTENDER RIM CLAMP 20-24IN.	8
410-00942	BACK COVER PLATE MONITOR BRACK	1
410-00943	TOP COVER BRACKET MONITOR BLAC	1
410-00944	BASE PLATE MONITOR BRACKET BLA	1
410-00944-001	BASE PLATE LCD/MONITOR W/HOLE	1
410-00947	ENCLOSURE POWER STRIP BLACL 50	1
410-01086	BRACKET CPU HOLD DOWN 1400 SER	4
410-01108	PLATE, CHARGE SW. SCREW BASE	1
410-01134	BRACKET FOR AIR PANEL - LCD	1
410-01140	REAR MONITOR STOP BACK PLATE	1
411-00683	SPINDLE 3/4 -7 CLAMP ADJUSTIN	4

**Table 5-1, Parts List - Continued**

<b>PART No</b>	<b>DESCRIPTION</b>	<b>QTY</b>
411-00843	BODY OPTIC TRACK BENCH (USES 6	1
411-00941	SLEEVE RIM CLAMP KNOB SUPPORT	4
416-00789-001	CABINET ECONOMY GRAY FOR EMISS	1
416-01119	CABINET UNIVERSAY - TUBULAR	1
417-00150-005	PCBA TOE/TRACK CCD 1400 SERIES	1
417-00439	WHEEL UNIT MOUNT WELD	1
417-00500-003	PCBA MAIN 1400 SERIES	4
417-00744-001	PCBA AEROCOM RF MODULE 2.4GHZ	1
417-00780-002	ASSY,CHARGE STUD 1400 SERIES	1
417-00870	ASSY TIP32C TRANSISTOR AND HAR	4
417-00871-001	PCBA CHARGE INTERFACE	4
417-00878-001	PCBA CONSOLE INTERFACE 1400 WI	1
417-00880	ASSY WIRELESS TRANSCEIVER MODU	1
417-01007	KIT ACCESSORIES 1400 SERIES CA	1
417-01053	ASSY TRACK CAMERA CCD 1400 SER	4
417-01054	ASSY TOE CAMERA CCD 1400 SERIE	2
417-01080	ASSY, WHEEL UNIT BEEPER 1400	4
417-01111	WELDMENT, CHARGE STUD SWITCH	1
417-01127	SUB-ASSY, CHARGE STUD SPINDLE	4
419-00408	DECAL, COMPUTER ONLY	1
419-00873	DECAL BEAR 1400 SERIES WHEEL U	4
419-01190	1" X 1" MADE IN USA LABEL	1
419-01192	BEAR DECAL WITH SML DOOR CAB.	1
419-01193	SPLIT BEAR DECAL W/O SML	1
419-01194	SML DECAL	1
419-01303	DECAL, POWER/SERVICE WARNING (DISCONNECT)	1
419-01312	DECAL, NO SERICEABLE PARTS	1
419-01310	DECAL, MAIN SWITCH (FUSE) CAUTION	1
419-01311	DECAL, REAR ACCESS PANEL, ELECTRICAL RECEPACLE	1
419-01313	DECAL, ELECTRICAL ACCESS WARNING	1
419-01314	DECAL, WHEEL UNIT BATTERY CONNECTION	4
420-01155	MANUAL, BEAR AML OP & MAINT	1
420-01379	USERS GUIDE, 4000 SERIES WHEEL ALIGNMENT	1
424-01158	FUSE, 8 AMP 110 VAC	2
425-00340	RELAY SOLID STATE POWER	1
427-01061-001	KEYPAD, 1400 SERIES WHEEL UNIT	4
427-01128	SWITCH, MINI SNAP ACTING	1
433-00434	CORD IEC EXTENSION JUMPER	1



**Table 5-1, Parts List - Continued**

<b>PART No</b>	<b>DESCRIPTION</b>	<b>QTY</b>
434-00341	HARN BLUE INLET TO PWR STRIP 5	1
434-00342	HARN GRN/YLW INLET TO POWER ST	1
434-00397	HARNESS MODEM EXTERNAL 5500	1
434-00409-001	HARNESS REAR PANEL MAIN 5500	1
434-00411	HARNESS BROWN RELAY TO PWR STR	2
434-00412	HARNESS GRN/YLW CHASSIS GND 55	1
434-00521	USB POWER HARNESS	1
434-00783	HARNESS USB PRINTER CABLE 6 FT	1
434-00834	HARN AEROCOM TRANSCIEVER TO CP	4
434-00837	HARN TOE CAMERA 30IN. 1400 SER	2
434-00838	HARN TRACK CAMERA 6IN" 1400	4
434-00966	HARN 52" CONSOL XCVR MOD. 1400	1
434-01066	CABLE RJ45 MALE/MALE 1'BLK	8
434-01067	CABLE RJ45 MALE/MALE 3'BLK	4
434-01068	CABLE RJ45 MALE/MALE 25'BLK	2
434-01069	CABLE RJ45 MALE/MALE 50'BLK	2
434-01077	HARN, DB9F TO DB9F PC TO INTER	1
434-01139	HARN KEYPAD-CPU 26PIN 2MM 7IN	4
434-01150	BROWN 18GA 7"LONG	1
434-01151	BLUE 18GAUGE 7"LONG WIRE	1
434-01152	GREEN W/YELLOW STRIPE 18GAUGE	1
434-01160	HARNESS, WU BATTERY 1400	4
434-01220	HARNESS, 15PIN HD VIDEO CABLE	1
434-01224	POWER CORD FOR 18 VOLT POWER	1
434-01267	CHARGING STUD HARNESS	1
435-01083	BATTERY 12V 2.3AH LEAD ACID	4
438-01267	POWER INLET FILTER	1
438-00334	TERMINAL MATE-N-LOK MALE	2
438-00471	TELCO 6 PIN CONN. MODEM CONNEC	1
438-00522	CONN. MTA. 6PIN .156 SP 18	1
438-00531	CONNECTOR TELEPHONE MODULAR PL	1
438-01071	ADAPTER RJ45 FEMALE/FEMALE BLK	8
438-01266	CONNECTOR 20 POS 2MM	2
454-00887	TRANSISTOR TIP32C PNP CHARGE	1
457-00529	USB CABLE	1
458-00860	SPRING, 1.25 X .360	1
465-00358	CABLE CLAMP NYLON .50IN. DIA	3
465-00359	WIRE PROTECTOR SPIRALITE .385I	0.5
465-01255	WIRE PROTECTOR SPIRALITE .50ID	5
494-01063-002	CD SOFTWARE SML BEAR VER.	1

**Table 5-1, Parts List - Continued**

<b>PART No</b>	<b>DESCRIPTION</b>	<b>QTY</b>
494-01079-001	FLOPPY, INTER.USB DRIVER V1.0	1
496-00879	POWER SUPPLY 18V 3.3A 1400 INT	1
496-01024	HEADPHONE WITH MICROPHONE (RSS ONLY)	1
496-01234	DELL COMPUTER BASE UNIT	1
496-01236	DELL PS/2 KEYBOARD GRAY	1
496-01237	DELL USB OPTICAL MOUSE	1
496-01238	17" FLAT PANEL MONITOR	1
496-01239	POWER BACKUP ES 350	1
499-00356	KNURLED THUMBSCREW # 8-32X5/8	1
499-00528	CONN. MINI MATE-N-LOK 2PIN PL	2
499-00900	KIT TRANSISTOR INSULATOR	4
499-01023	PLUG DOME 7/8IN. PLASTIC	4
508-04903	BLACK PLASTIC BOX	1
512-05107	LF/RR TOE ARM	1
512-05108	RF/LR TOE ARM	1
519-04482	DECAL, 8 SENSOR CAR	2
519-04483	DECAL, 8 SENSOR TEXT	2
534-03266	HARNESS BLUE POWER STRIP	5
534-03267	HARNESS GRN/YEL POWER STRIP	5
534-04155	HARNESS BROWN POWER STRIP	5
597-01895	FILTER BANDPASS 76%	1
597-04702	SNAP-IN MOUNT CONNECTOR IEC 32	7
599-01736	WIRE STUFFER CAP TERM.	2
599-02157	PUSH RIVET - 122 DIA	10
608-92666	PHENOLIC KNOB W/BRASS STUD	4
608-97062	HANDLE CCD WHEEL UNIT	4
608-97075	CAP -OPTIC BENCH	1
608-97083	MOLDED TOE BOX	4
608-97084	TOE BOX COVER	2
608-97085	WINDOW WU TRACK CCD	4
609-97079	OPTIC BENCH GASKET	2
610-97066	MTG RECEPT. CONN. PLATE	4
610-98472	BACKING PLATE	4
611-92690	RIM FINGER HOOK	16
611-92883	STUD FINGER	16
611-97058	MALE COUNTERBALANCE WEIGHT	2
611-97059	FEMALE COUNTERBALANCE WEIGHT	2
611-99473	OPTIC TOE BENCH BODY- MACHINE	1

**Table 5-1, Parts List - Continued**

<b>PART No</b>	<b>DESCRIPTION</b>	<b>QTY</b>
612-97064	TUBE COVER MTG HOLES	2
613-97766	TOE BOX WINDOW	2
615-92852	WHEEL CLAMP ARM- RH THREAD	4
615-92853	WHEEL CLAMP ARM- LH THREAD	4
615-97055	LF/RR WHEEL UNIT CAST (NON-CE)	2
615-97056	RF/LR WHEEL UNIT CAST (NON-CE)	2
617-90306	SLIDE BAR WELDMENT	4
617-97644	PCBA- LED (TRACK AND TOE)	1
619-34871	18IN. ABOVE FLOOR WARNING DECA	4
619-64190	PATENT DECAL	4
619-98295	BEAR TOE BOX DECAL	2
619-99085	FREE STANDING BEAR DECAL	1
633-96153	25FT POWER CORD 110V	1
633-99163	ADAP. PRINT POWER CORD2500	2
638-86364	CONN 12 POS MTA .156 18 GA	1
638-88678	CONN 3 POS MTA .100 W/ TABS	1
638-89111	JUMPER	8
638-89682	CONN 5 POS MTA .156 C/L	1
665-41661	STRAIN RELIEF CLAMP	1
665-54168	5/8IN. SNAP BUSHING	1
665-59164	RUBBER GROMMET .75 ID	1
665-83107	.25IN. CABLE CLAMP	11
665-83109	.50IN. CABLE CLAMP	16
665-98756	GROMMET GROOVE 2.50IDX .06	1
665-99520	U-SHAPED GROMMET 7/16 CHANNEL	1
669-40992	.156 RUBBER BUMPER	4
669-84372	O-RING .364 ID X .50 OD X .070	16
697-92933	BUZZER, 2.3KHZ 5V WHEEL UNIT	1
697-99537	KIT -MALE SCREWLOCK 4-40/CLIPS	1
699-01039	ROLL PIN (NEW STYLE) 1-1/4 R	4
699-46789	WHEEL UNIT SCREW	24
699-49961	HOLE PLUG 500	4
699-49965	PLUG 75.	8
699-88542	FEMALE SCREWLOCK KIT	3
699-92898	HAIRPIN CLIP 3/8 DIA GROOVE	16
699-97063	SPRING PLUNGER	4
699-97068	TUBE END CAP	8

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