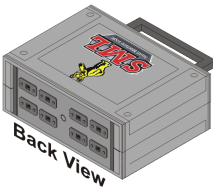
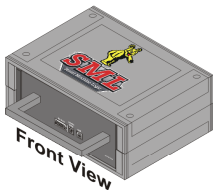


Vehicle Alignment System

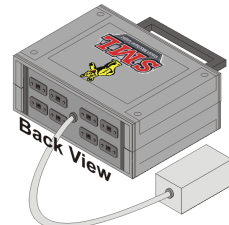
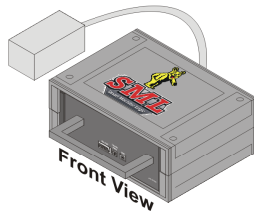
! IMPORTANT !

SML INTERFACE MODULE

Kit No. B60-1508
Wired
Wheel Unit System



Kit No. B60-1510
Wired Or Wireless
Wheel Unit System



**READ
THESE
INSTRUCTIONS
FIRST**

- 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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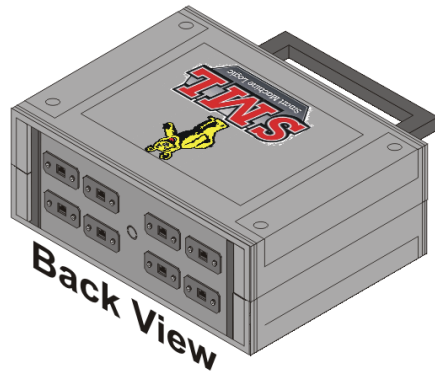
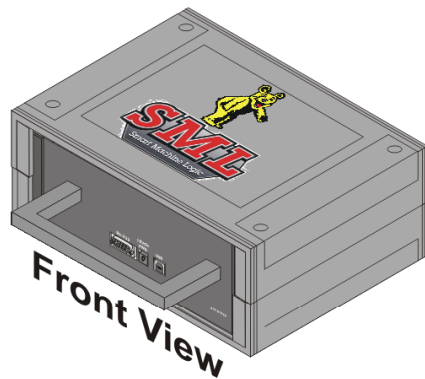
Title Page

Vehicle Alignment System

SML INTERFACE MODULE

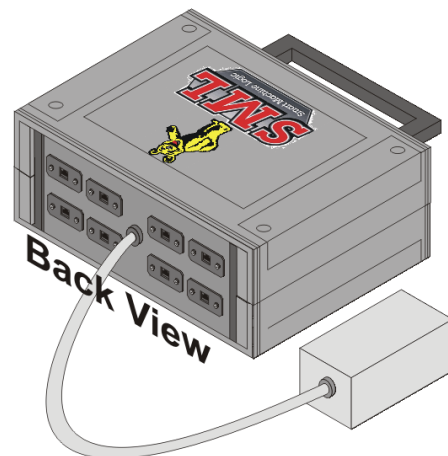
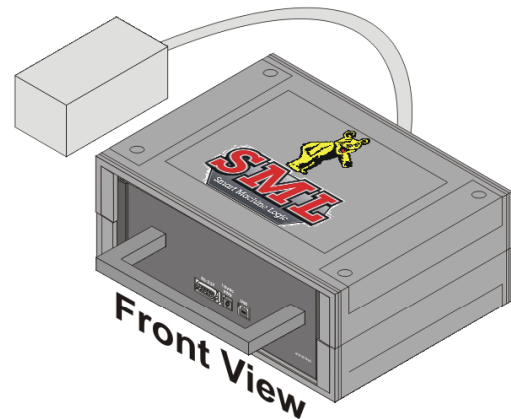
Kit No. B60-1508

**Wired
Wheel Unit System**



Kit No. B60-1510

**Wired Or Wireless
Wheel Unit System**



Equipment Setup & User's Guide

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

Vehicle Alignment System

Standard Equipment & Kit

Integration Requirements

Computer



Standard Monitor
Standard External Speakers
Standard Printer
Standard Computer - Suggested Minimum Requirements:

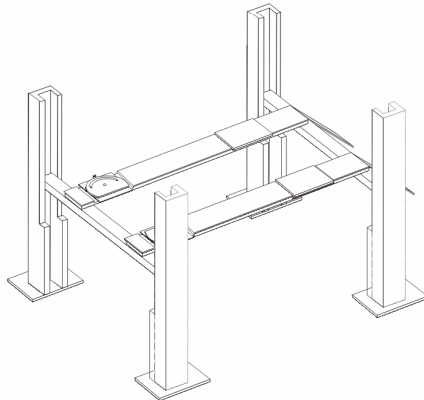
333 mHz CPU (Chipset)	Serial Port (1)
300 Watt Power Supply	Parallel Port (1)
128 Meg Ram	Standard 3-1/2 Floppy
12 Gig Hard Drive	DVD/CD Rom Drive
Standard Keyboard	Standard Mouse
Windows ME or XP	Sound Capable - Recommended
	Internet: Modem Or LAN - Recommended

Cabinet



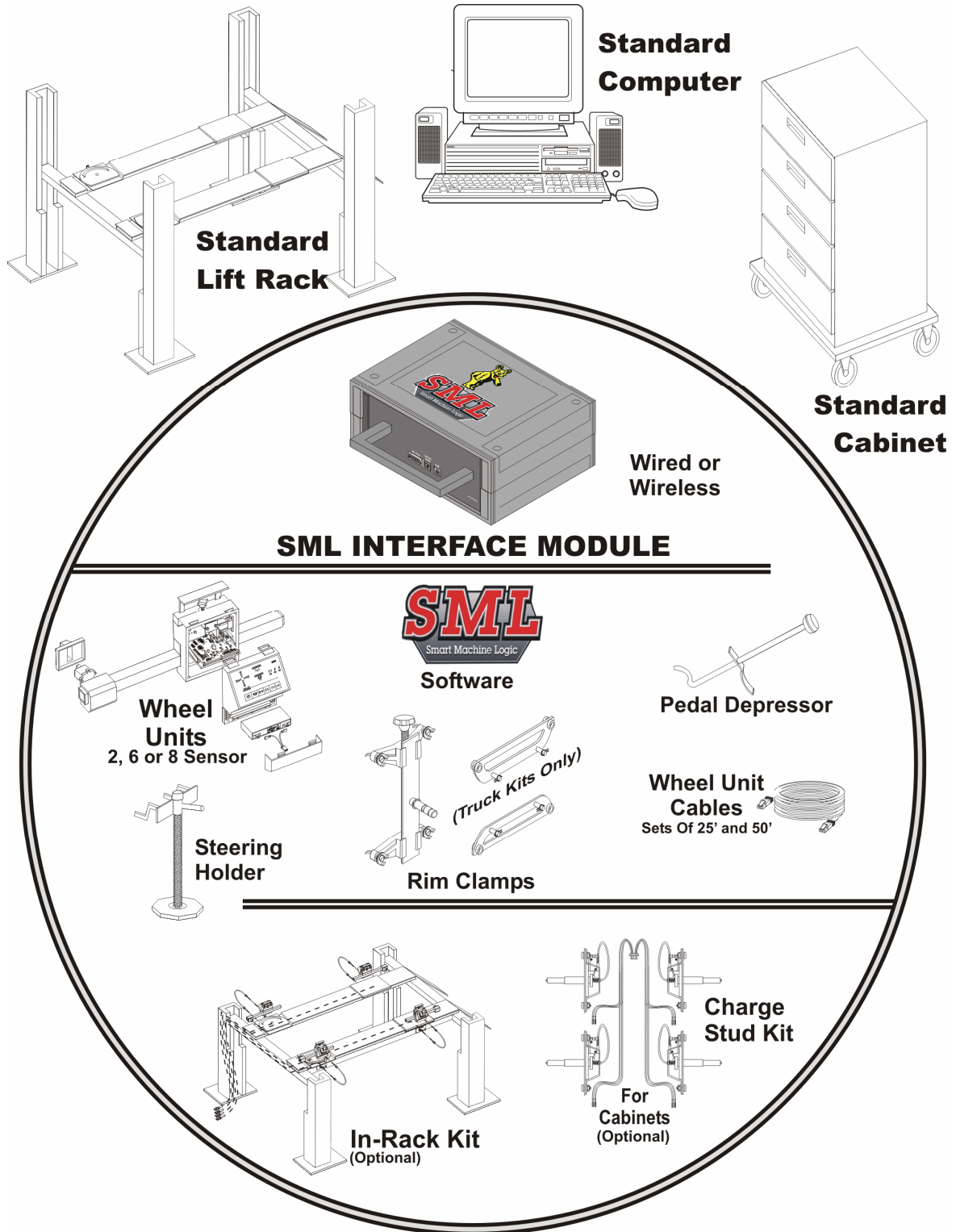
Moderately Heavy Sheet Metal Construction
Adequate clearance, for Kit Installation
Casters - Suggested for Portability
Minimum Height: 30-inches

Lift Rack



Steel Construction Post or Scissor Lift
Vehicle Ramp Design
Outfitted With Slip Plates
Outfitted With Turn Radius Plates

Vehicle Alignment System



Kit Equipment - Integration Options

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.

Table Of Contents

Section Number	Page Number
Front Matter	
Read Me First Page	1
Blank	2
Title Page	3
Standard Equipment & Kit Integration Requirements	4
Kit Equipment Integration Options	5
Electrical Safety Summary	6
Table Of Contents	7
Blank	8
Section 1. Equipment Startup Preparation.....	
1.0 Unpacking and Equipment Preparation For Use	9
1.1 Packaged Unit	9
1.2 Shipping Container Processing	9
1.3 Equipment Setup	13
Section 2. Principles Of Operation.....	
2.0 Principles of Operation	17
2.1 Primary Components	17
2.2 SML Software and PC Requirements	17
2.3 Rim Clamps (Truck Optional)	17
2.4 Pedal Depressor	18
2.5 Steering Wheel Holder	19
2.6 SML Interface Module	19
2.7 Wheel Units	20
2.8 Standard Cabinet Charge Studs and Charging System (Optional Accessory)	23
2.9 Equipment Technical Characteristics	24
Section 3. Operating Instructions.....	
3.0 Operating Instructions	25
3.1 Alignment Preparation	25
3.2 SML Interface Module Connections	27
3.3 SML Software	28
Section 4. Servicing & Maintenance.....	
4.1 Overview	29
4.2 Fault Isolation & Trouble-Shooting Wheel Units	29
Section 5. Illustrated Parts Listing.....	
5.1 Illustrated Parts Listing	35

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Section 1.

Equipment Startup Preparation

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.

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.

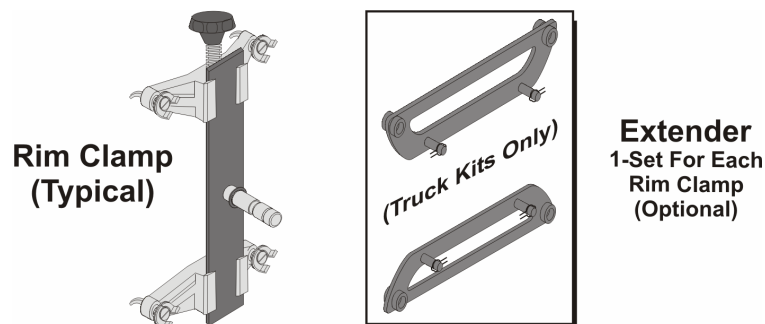


Figure 1-1. Rim Clamps (W/Truck Option)

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.

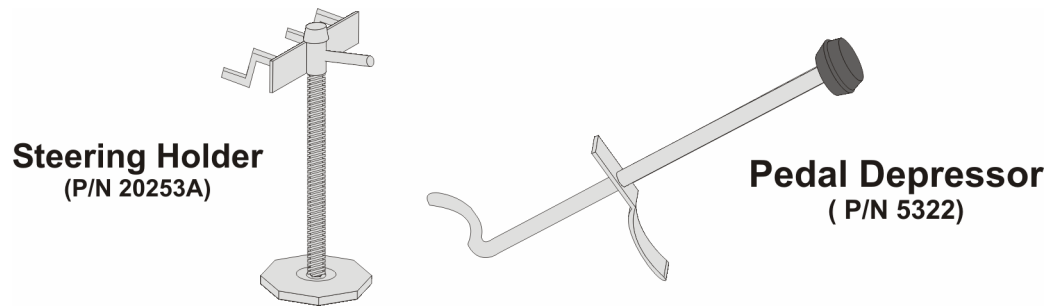


Figure 1-2. Pedal Depressor and Steering Holder

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 SML Interface Module.

1.2.4.1 Open the shipping container and remove the SML Interface Module and all other items. Refer to Figure 1-3 as necessary.

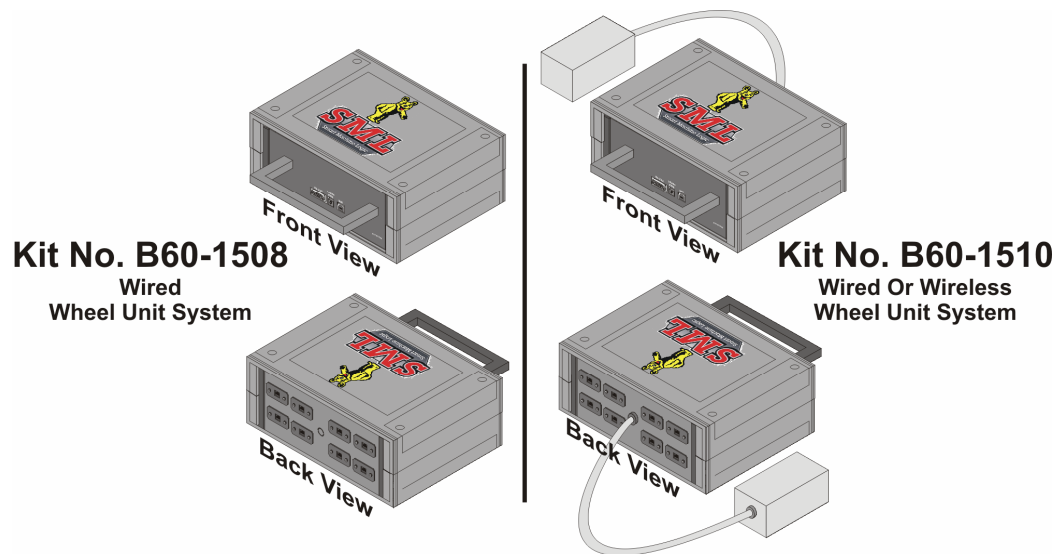


Figure 1-3. SML Interface Module

1.2.4.2 Separate and set aside the individual items until ready for use.

1.2.5 Wheel Units.

- 1.2.5.1 Open the shipping container and remove all the wheel units. Prior to shipping, the wheel unit's battery(s) were disconnected. Once unpackaged, each unit is to be moved to a designated work area for battery connection. Use Figure 1-4 as a guide, as needed.

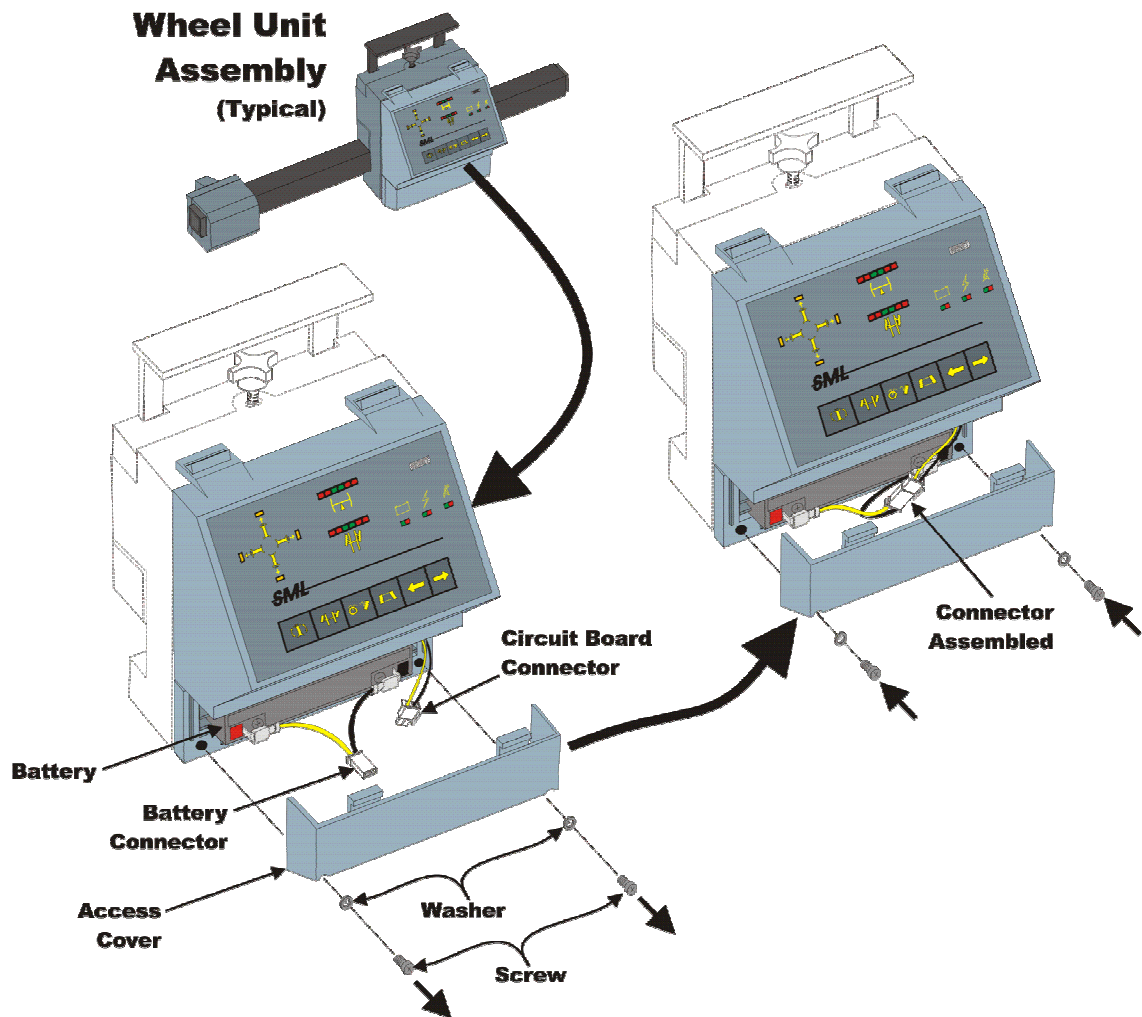


Figure 1-4. Wheel Unit – Battery Connection

- 1.2.5.2 Place the wheel unit, on its backside, with the operator panel facing upward, and locate battery access cover.
- 1.2.5.3 Remove two (2) screws, washers and the access cover from the front housing assembly. The access cover has two interlocking tabs at the top, and must be slid downward as it is removed.
- 1.2.5.4 Locate both connectors, one for the battery and the other for the circuit board, inside the wheel unit housing.
- 1.2.5.5 Connect the two electrical connectors. Upon connecting the electrical connectors, the wheel unit may power up, depending upon the available power in the battery.
- 1.2.5.5.1 If there is power, then expect to hear a beep and expect some of the LED's on the wheel unit's indicator panel, to activate.
- 1.2.5.5.2 If there is no power, then the battery may have been discharged during shipment and needs to be charged.

- 1.2.5.6 When the connection is complete, push the connector back into the front housing, then align and install access cover back onto the front housing assembly.
- 1.2.5.7 Secure the access cover by installing two (2) screws and washers.
- 1.2.5.8 Set the completed wheel unit aside, and repeat above steps for the remaining wheel units (as necessary).
- 1.2.5.9 When batteries on all wheel units are connected, move all the wheel units close to where the SML Interface Module is going to be setup.
- 1.2.6 In-Rack Kit (Optional Accessory).
 - 1.2.6.1 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 1-5.
 - 1.2.6.2 Open the shipping container for the In Rack Kit, and remove the contents.

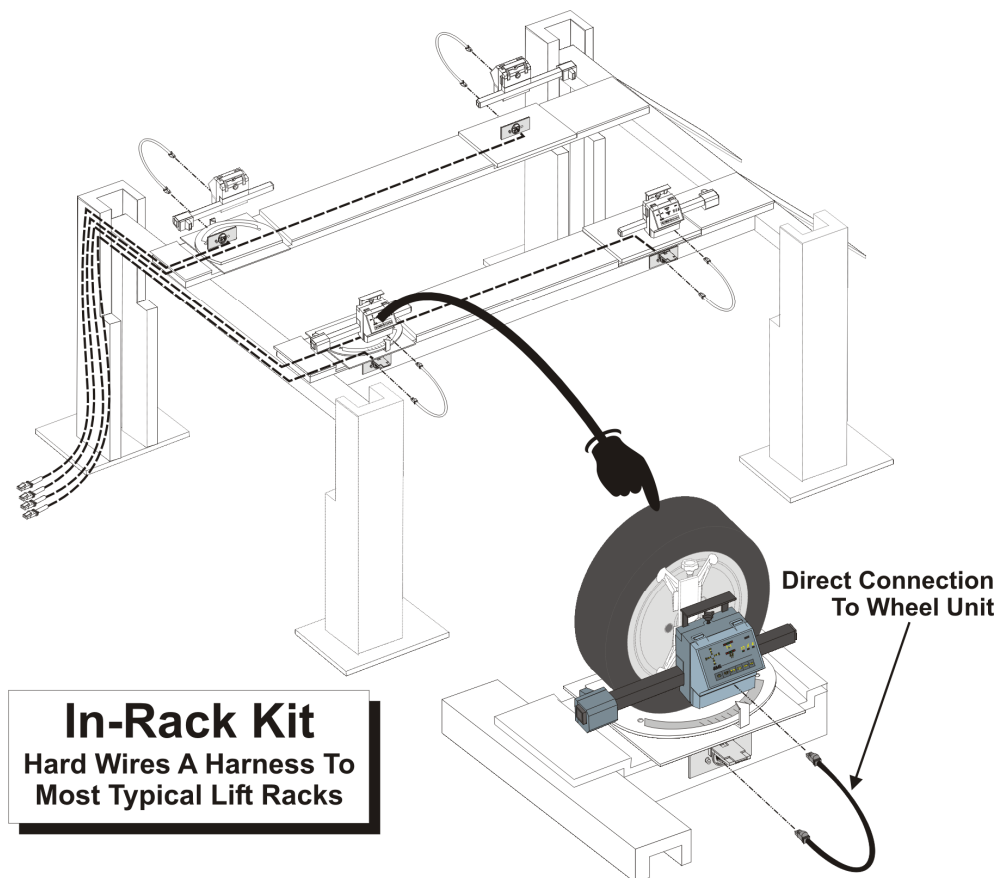


Figure 1-5. In Rack Kit - Overview Diagram

- 1.2.6.3 Obtain the In Rack Installation Instructions (Document 420-01113-001) and follow the instructions provided, to integrate this kit into a standard lift rack.
- 1.2.7 Standard Cabinet Charge Studs & Charging System (Optional Accessory)
 - 1.2.7.1 This kit consists of charge studs and a harness, enabling a standard cabinet to be outfitted with mounting posts and have an integrated 18Vdc wheel unit battery charging system. Therefore, this container can be opened, after the unit is assembled. Refer To Figure 1-6.

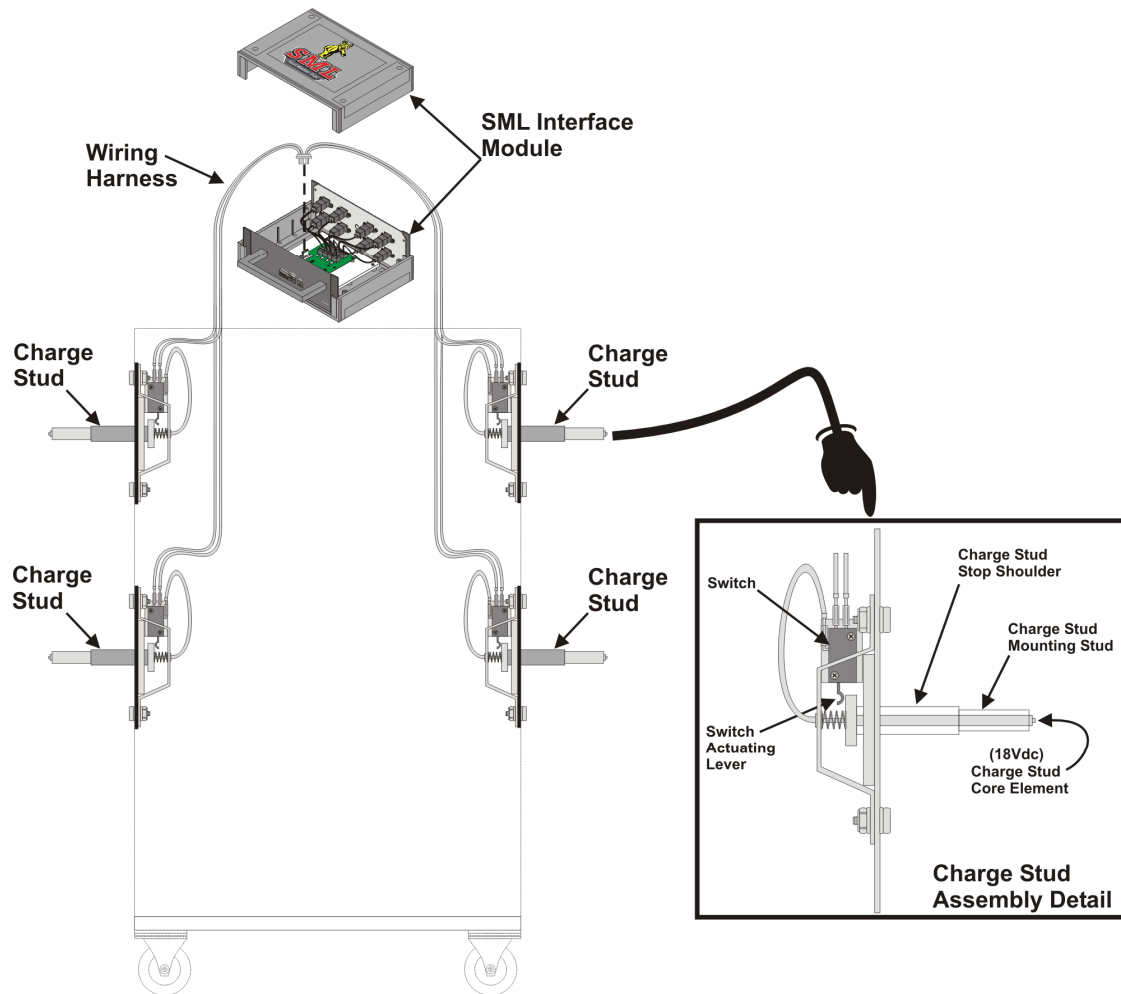


Figure 1-6. Charge Studs & Charging System - Overview Diagram

1.2.7.2 Open the shipping container and remove the contents.

1.2.7.3 Obtain the In Charge Studs & Charging System Installation Instructions (Document 420-01324) and follow the instructions provided, to integrate the kit into a standard cabinet.

1.2.8 Perform a final check of all containers, ensuring all items are unpacked and accounted for, then refer to Paragraph 1-3 and perform equipment setup.

1.3 Equipment Setup

1.3.1 The equipment that was unpacked from each shipping container must now be setup or stored. Use Figures 1-7 through 1-9 as guides, as needed.

1.3.2 Information to help determine location for the SML Interface Module to be setup.

1.3.2.1 Since both sides of a vehicle are work areas during an alignment procedure, it is recommended that the Computer, Monitor and Printer be portable. This allows the monitor to be moved and viewed from both sides of the vehicle, as needed during an alignment operations.

1.3.2.2 The 25' and 50' cable allows the user a 10-15 foot perimeter at the front of the lift rack. This distance enables viewing of the PC's monitor, from each of the four (4) wheel units, during an alignment process.

1.3.3 SML Interface Module Connections.

1.3.3.1 Using Figure 1-7 as a guide, position the SML Interface Module on a flat surface and connect cables to the front panel of the module, as follows:

1.3.3.1.1 Connect the serial cable to the front of the SML Interface Module. Connect the other end to an available serial port on the PC.

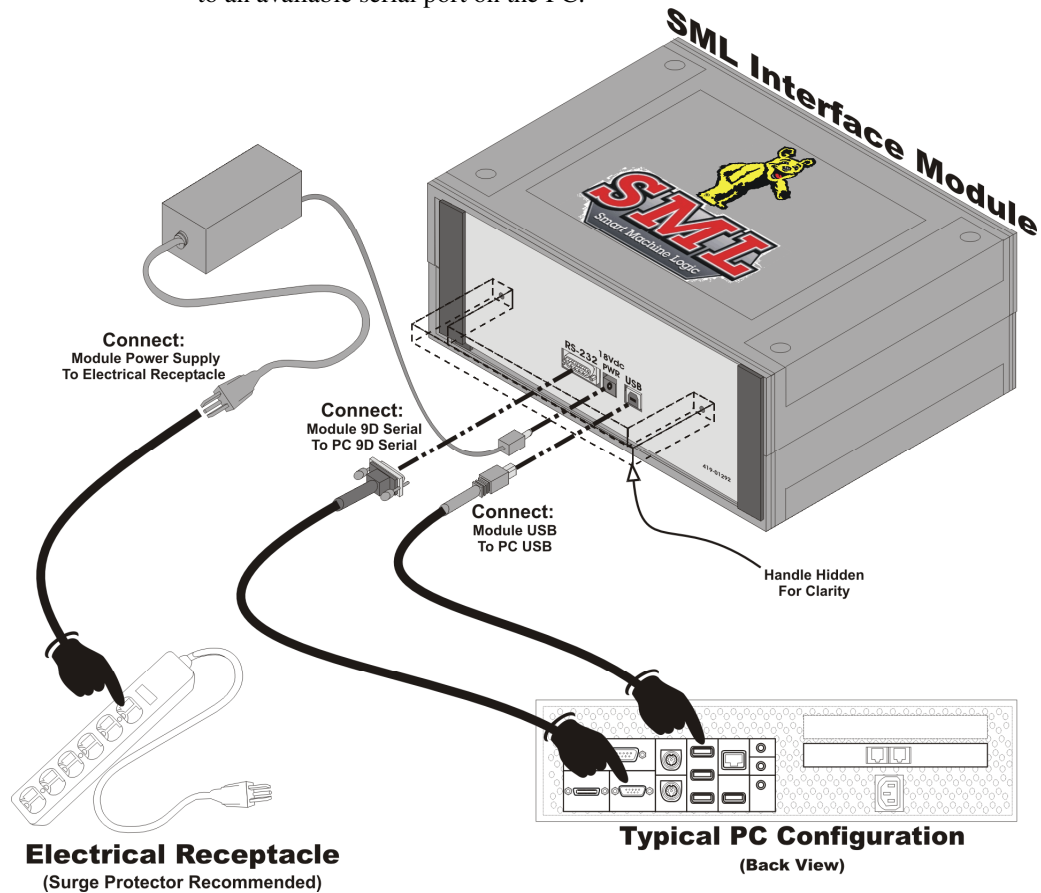


Figure 1-7. Module Connections - Front Panel

1.3.3.1.2 Connect the USB cable to the front of the SML Interface Module. Connect the other end to an available USB port on the PC.

1.3.3.1.3 Connect the 18Vdc power supply power tip to the front of the SML Interface Module. Plug the other end of the 18Vdc power supply into an available electrical receptacle.

1.3.3.2 Using Figure 1-8 as a guide, connect cables to the rear panel of the SML Interface Module, as follows:

1.3.3.2.1 Locate two (2) 25-foot wheel unit cables, and two (2) 50-foot wheel unit cables. Make sure each cable is separated from the rest of the cables.

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).

1.3.3.2.2 Connect one end of each of the 4 cables (2x25' and 2x50') to Connector Group-A, or to Connector Group-B, on the back of the SML interface Module.

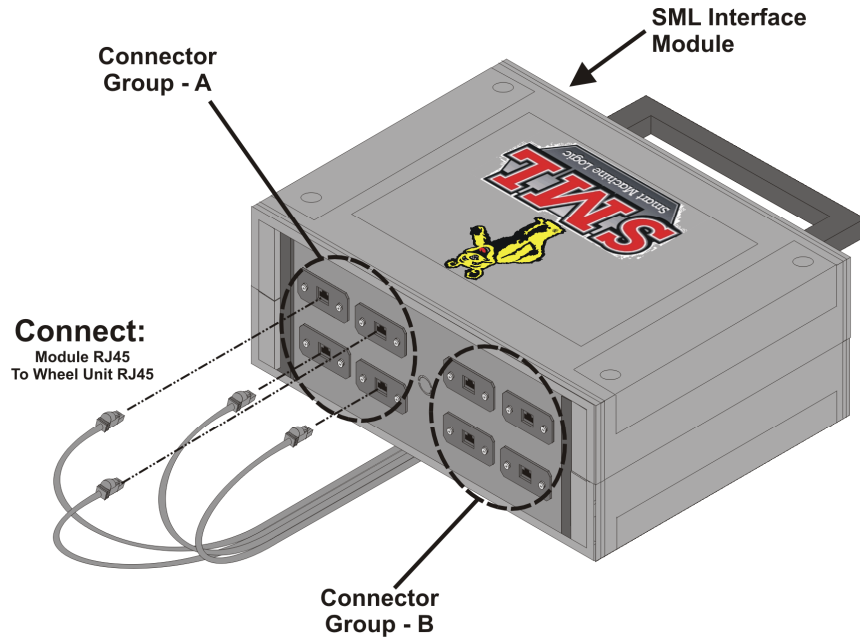


Figure 1-8. Module Connections - Rear Panel

1.3.3.3 Using Figure 1-9 as a guide, position the wheel units in a rectangular pattern on the floor. This aligns the wheel unit's sensors, an arrangement needed when starting up SML Software for the first time.

NOTE:

It is recommended that you review the following paragraphs, prior to connecting the wheel units. Then, when a wheel unit powers up, you'll understand what is being displayed on the wheel unit operator panel.

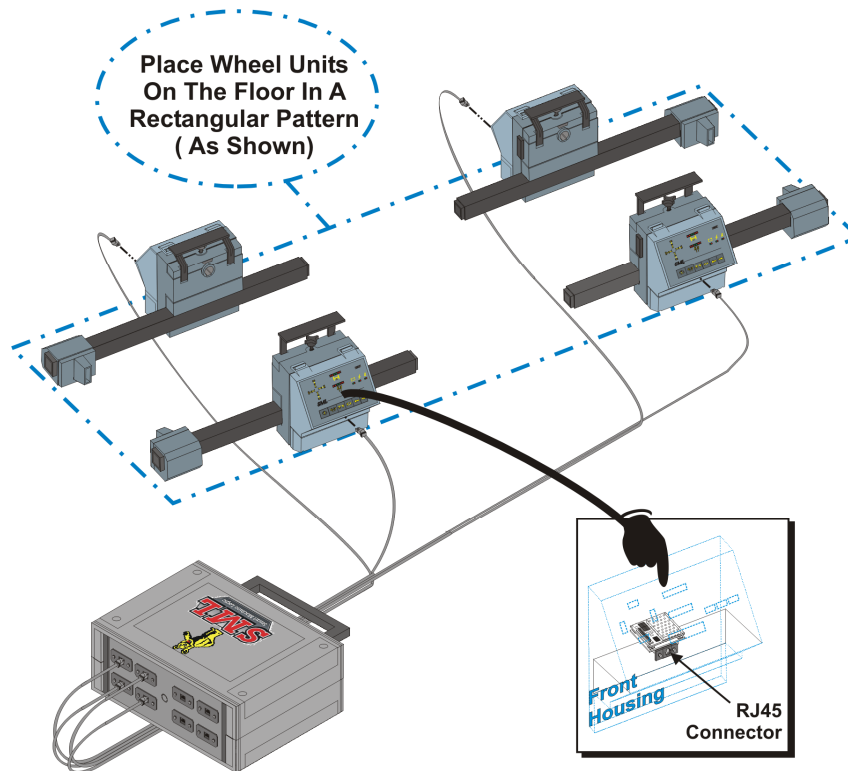


Figure 1-9. Module Connections – Wheel Units

1.3.3.4 Connect each of the SML Interface Module cables, to the wheel units. As the wheel units are powered, communication between the SML Interface Module and wheel units is established. Review the operator panel indicator lights (Refer to Figure 1-10), for each wheel unit. These indicators help to identify the status of each wheel unit.

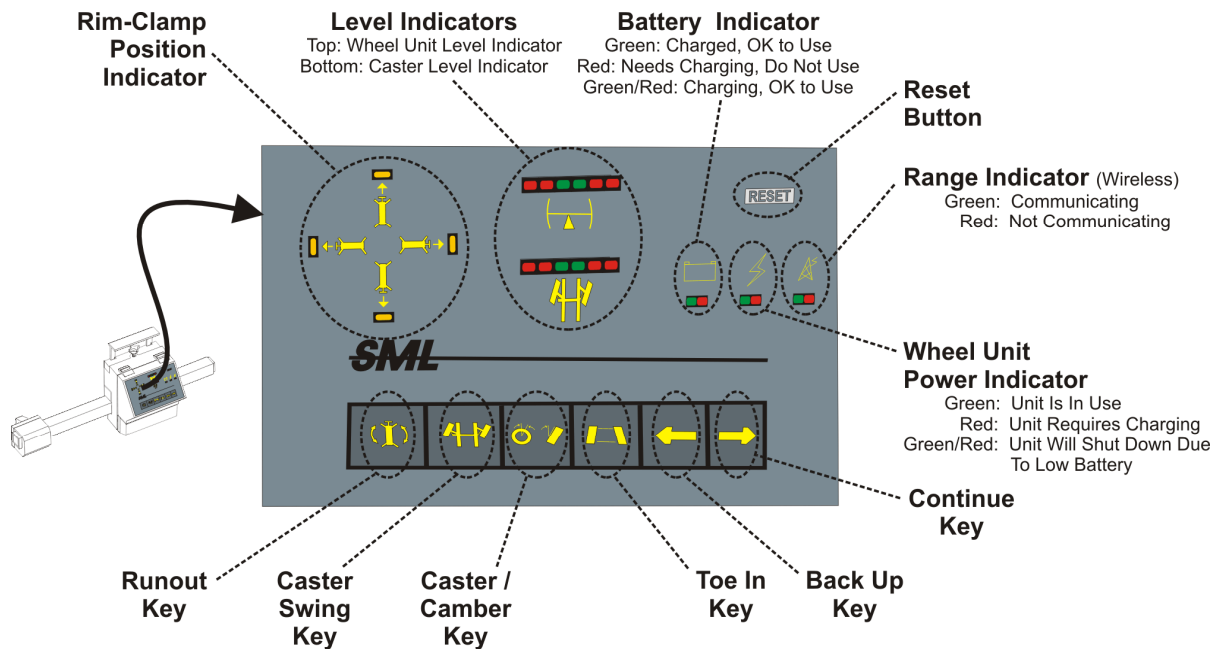


Figure 1-10. Wheel Unit – Operator Panel

1.3.3.5 Check the wheel units for power and communication, as follows:

- 1.3.3.5.1 Upon connecting to each wheel unit, each wheel unit should beep due to power being applied, directly to the wheel unit.
- 1.3.3.5.2 Review Figure 1-10 and check the indicated status of each wheel unit.
- 1.3.3.5.3 Ensure that the wheel unit's sensors RED LED's are flashing, attempting to communicate with its apposing sensor (cross talk).

1.3.3.6 The overall Alignment System hardware is powered, ready to access the SML alignment software.

1.3.4 Determine best location to store the rim clamps, steering wheel holder and brake pedal depressor until ready for use, during a typical alignment process.

1.3.5 This kit consists of software and setup instructions, to install the Alignment Systems SML Software onto a standard Computer. Obtain the SML Software Installation Instructions (Document 420-01324), follow the instructions provided and install the kit's software to a standard computer.

1.3.6 It is highly recommended that all users read Section 2 (Principles of Operation), to better understand all of the components, equipment and features of this system.

1.3.7 Refer to Section 3, for operating instructions.

Section 2.

Principles of Operation

2.0 Principles Of Operation

The (SML) Wheel Alignment System uses tailored software to interact with wired or wireless wheel units consisting of 2, 6 or 8 sensors. 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 components involved, are described in the paragraphs that follow. A listing of equipment technical characteristics is provided, at the end of this section.

2.1 Primary Components

The primary components for this unit are the SML Software, wheel units, steering holder, pedal depressor, rim clamps, SML Interface Module, and other accessory/optional equipment and are explained in the paragraphs that follow.

2.2 SML Software and PC Requirements.

2.2.1 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.

2.2.2 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.

2.2.3 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 1/100th of a degree (0.01°).

2.2.4 Further information, regarding the SML Software and its use, can be found in Document 420-01157.

2.3 Rim Clamps (Truck Optional).

2.3.1 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 2-1, as necessary.

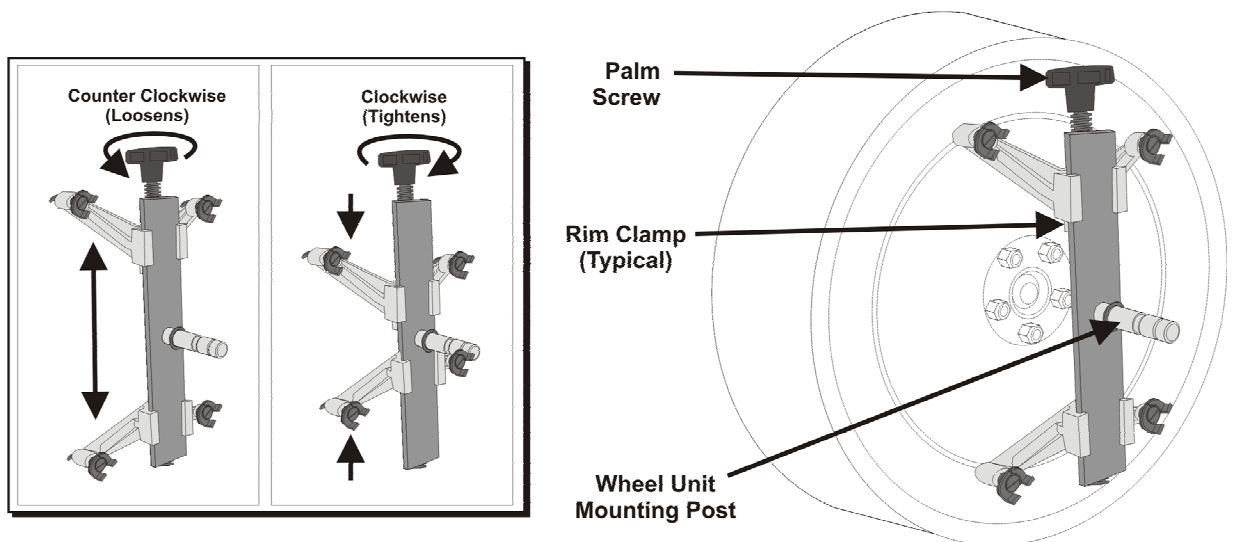


Figure 2-1. Rim Clamp - Typical

- 2.3.1.1 Rim clamps are expandable and retractable and fit vehicle rims, ranging from 11-inch to 19-inch.
- 2.3.1.2 Truck kits include extension(s), giving the same rim clamps a working range from 19-inch to 27 inch rim.
- 2.3.2 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.
- 2.3.3 Operating the palm screw adjusts the rim clamp to fit the various sizes and types of rims on typical vehicles.
 - 2.3.3.1 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.
 - 2.3.3.2 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.
 - 2.3.3.3 When not in use, rim clamps are normally stored in the lower storage area of the cabinet, behind the bottom access door.
- 2.4 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 2-2 as necessary. If the brake holder isn't used, the caster and SAI readings will not be accurate.

Pedal Depressor - P/N 5322

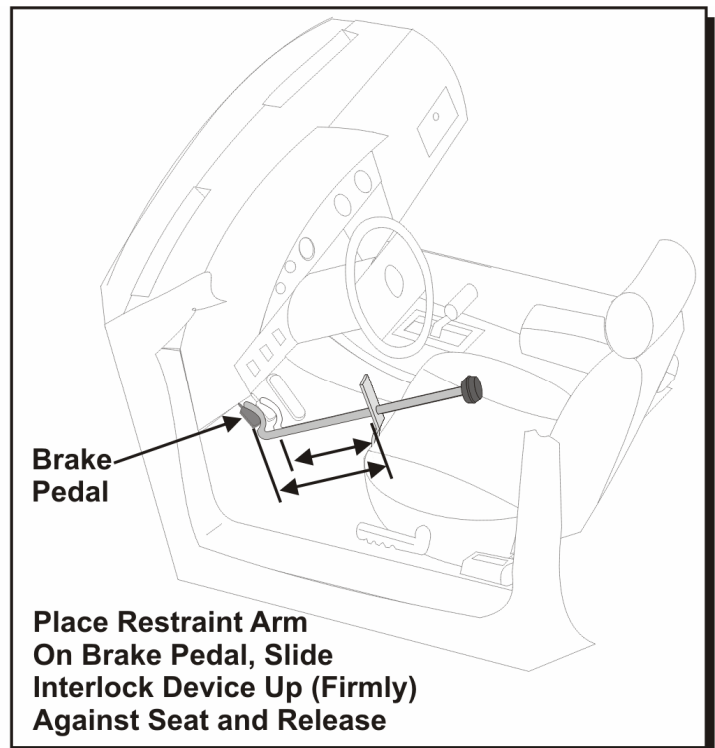
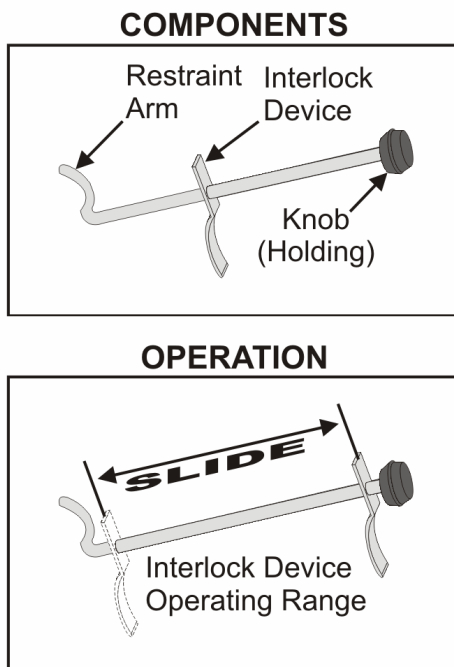


Figure 2-2. Pedal Depressor

2.5 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 2-3 as necessary. Interlocking the steering wheel holder, when adjusting the front toe of the vehicle, realigns and corrects the steering wheel position.

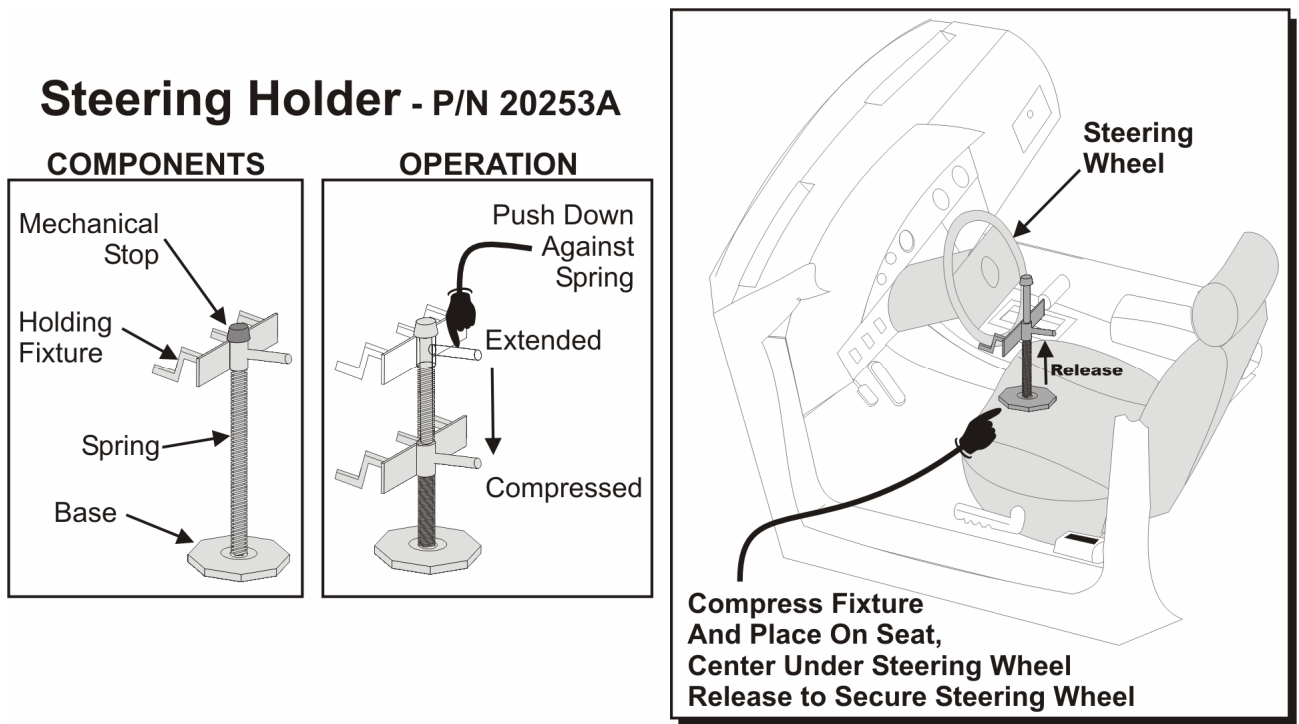


Figure 2-3. Steering Holder

2.6 SML Interface Module.

2.6.1 The SML Interface Module is a self-contained unit, containing a circuit card and various connections to interconnect the SML Wheel Units to SML Software, installed on a standard computer. Refer to Figure 2-4, as necessary.

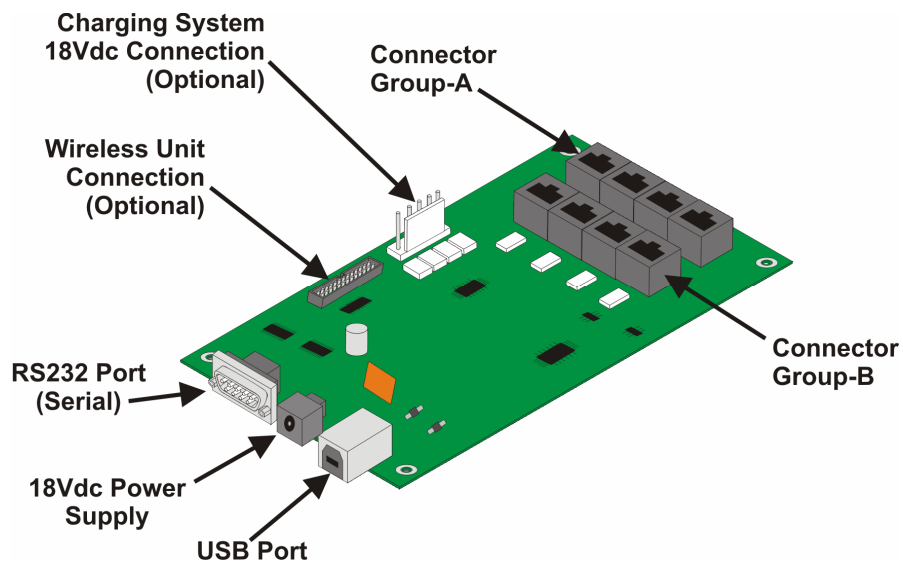


Figure 2-4. SML Interface Module – Printed Circuit Board Assembly (PCBA)

- 2.6.2 Front Panel connections 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.
 - 2.6.2.1 The power supply is an 18Vdc power supply for the circuit card.
 - 2.6.2.2 This power is transmitted to the wheel units, for battery charging purposes, through both Group-A and Group-B connections on the back of the module.
 - 2.6.2.3 The optional “Cabinet Charging Circuit” utilizes this power at each of the cabinet charge studs, through a harness that connects to the modules circuit card. Each charge stud is switch controlled, and provides 18Vdc power to each of the wheel unit’s through the harness.
- 2.6.3 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).

- 2.6.3.1 The connectors are universal, within each group. Meaning, you can connect any wheel unit into any of the plugs within a group.
- 2.6.3.2 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.
- 2.6.3.3 The optional “Wireless” module connects’ a cable from the PCBA, through a grommet/restraint on the rear panel, to the wireless transmitter module.
 - 2.6.3.3.1 The wireless transmitter is used to transmit live data from the each of the wheel unit to the SML Software.
 - 2.6.3.3.2 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.

2.7 Wheel Units.

- 2.7.1 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 computer/SML program, to indicate actual and measured readings.
 - 2.7.1.1 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/cablings. Refer To Figure 2-5.
 - 2.7.1.2 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).
 - 2.7.1.2.1 The operator panel displays the wheel unit’s current status, as well as interacts with the software.
 - 2.7.1.2.2 All information from each of the wheel units are, processed by the SML Software and displayed on the screen (live readings).

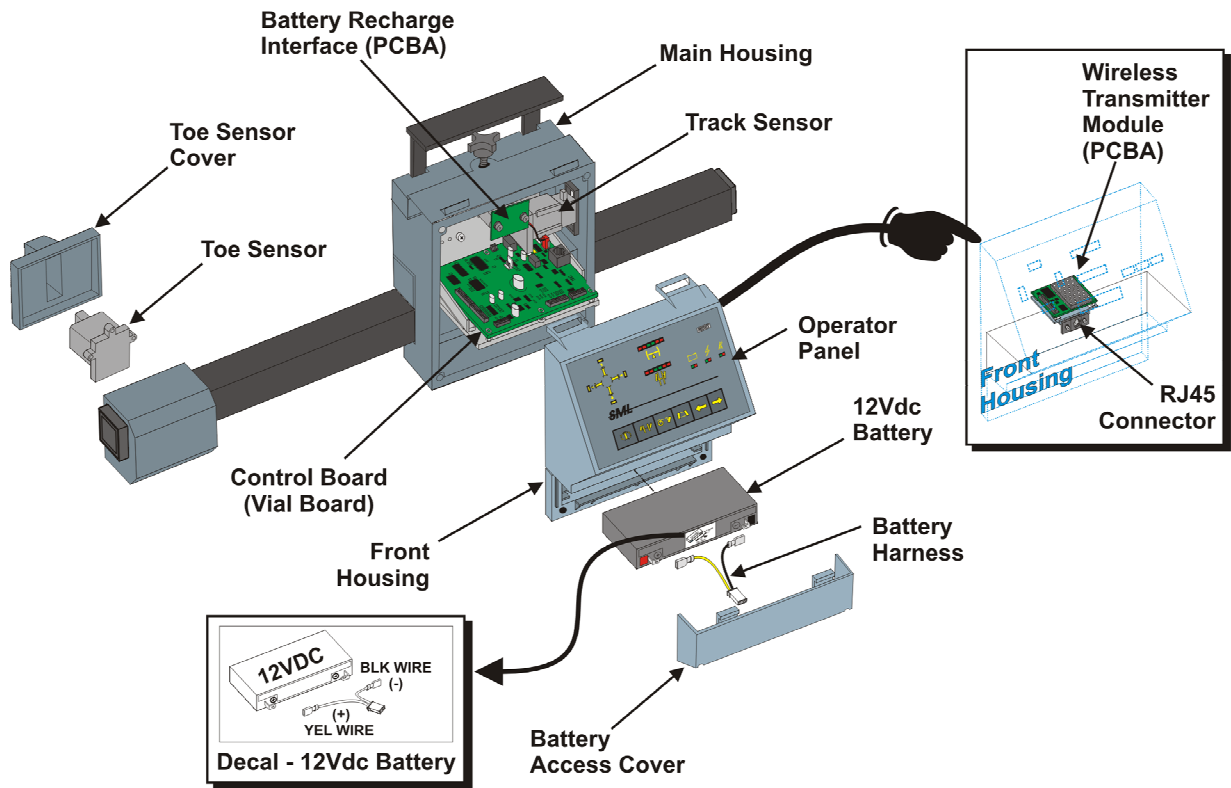


Figure 2-5. Wheel Unit – Typical Components

2.7.1.3 During normal use, rim clamps are installed onto each of the vehicles wheels. Then, wheel units are 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 interface module and used, while the battery(s) are being recharged.

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

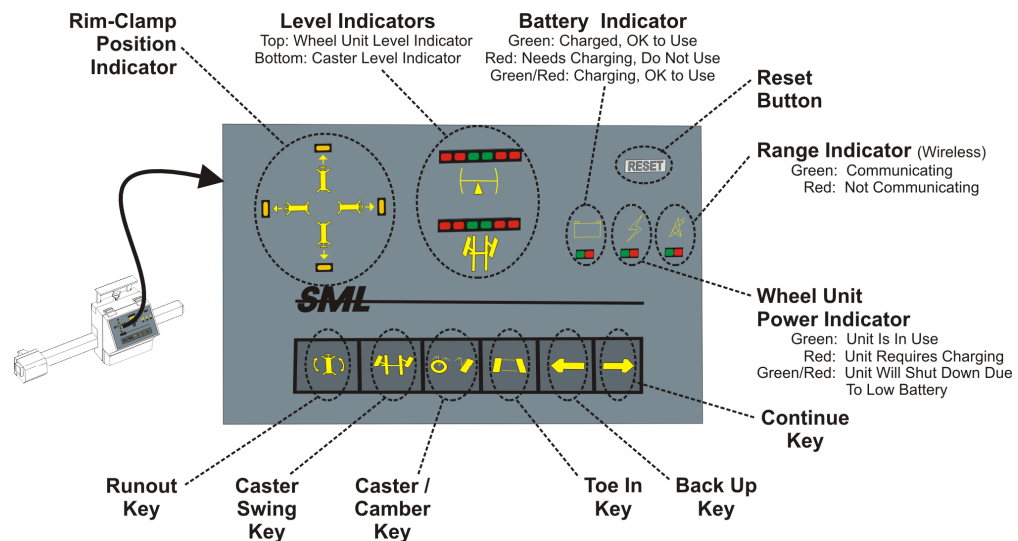


Figure 2-6. Wheel Unit – Operator Panel

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

- 2.7.3.1 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.
- 2.7.3.2 All electrical/electronic components, within the wheel unit are connect to the control board (PCBA).
- 2.7.3.3 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.
- 2.7.4 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.
 - 2.7.4.1 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.
 - 2.7.4.2 Sensors are mounted in a way that they appose each other, and each sensor mounts an LED, which serves as the targeting source, for the apposing sensor unit.
 - 2.7.4.3 Eight sensor systems allow for the following readings to be taken/measured:

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

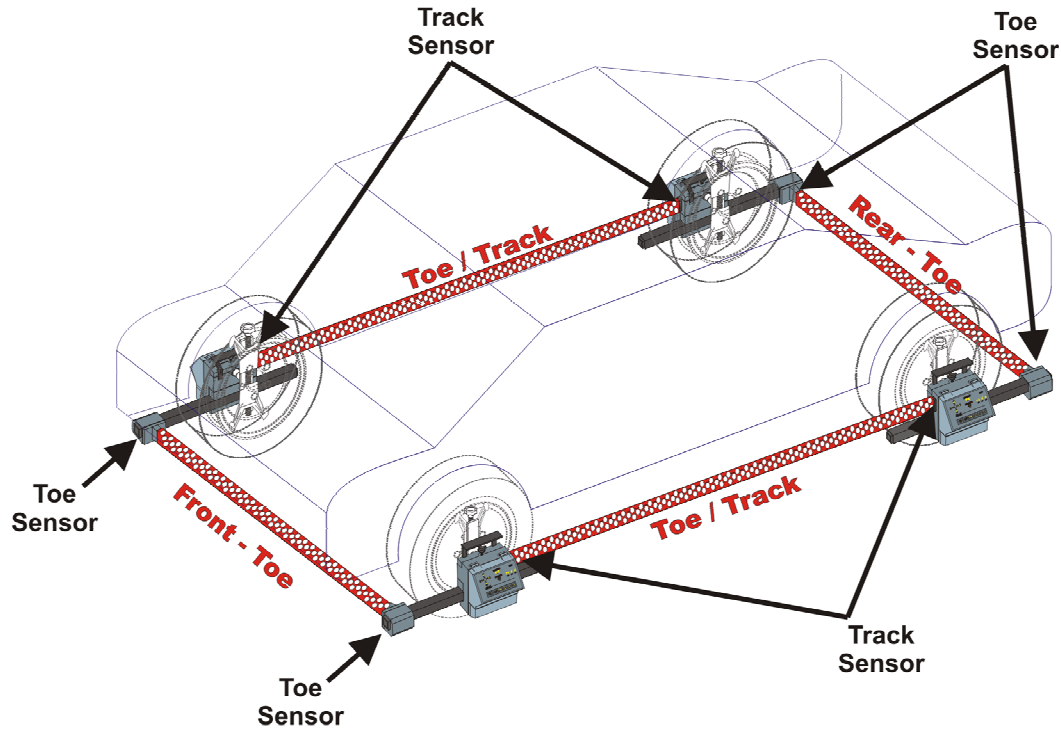


Figure 2-7. Wheel Units – On Vehicle Sensor Positions

- 2.7.5 Wheel Unit Battery. A rechargeable 12Vdc battery is enclosed in the bottom of each wheel unit and provides power to the wheel unit, while operating in the wireless mode.
- 2.7.5.1 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).
- 2.7.5.2 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.
- 2.7.5.3 Battery Charging. Each battery can be recharged by direct connection to SML Interface module, or by mounting the wheel units onto a charge stud (if equipped).
- 2.7.5.4 Wheel units can be operated (normally) while recharging from a direct connection to the SML Interface Module. When operating with cables attached, caution must be applied to prevent accidental disconnects or cable breakages.

2.8 Standard Cabinet Charge Studs & Charging System (Optional Accessory).

Standard cabinet assemblies can be outfitted with a wheel unit charging system and charge studs.

- 2.8.1 Charging Stud(s). Four (4) charging studs used to mount the wheel units to a cabinet, 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 2.8.

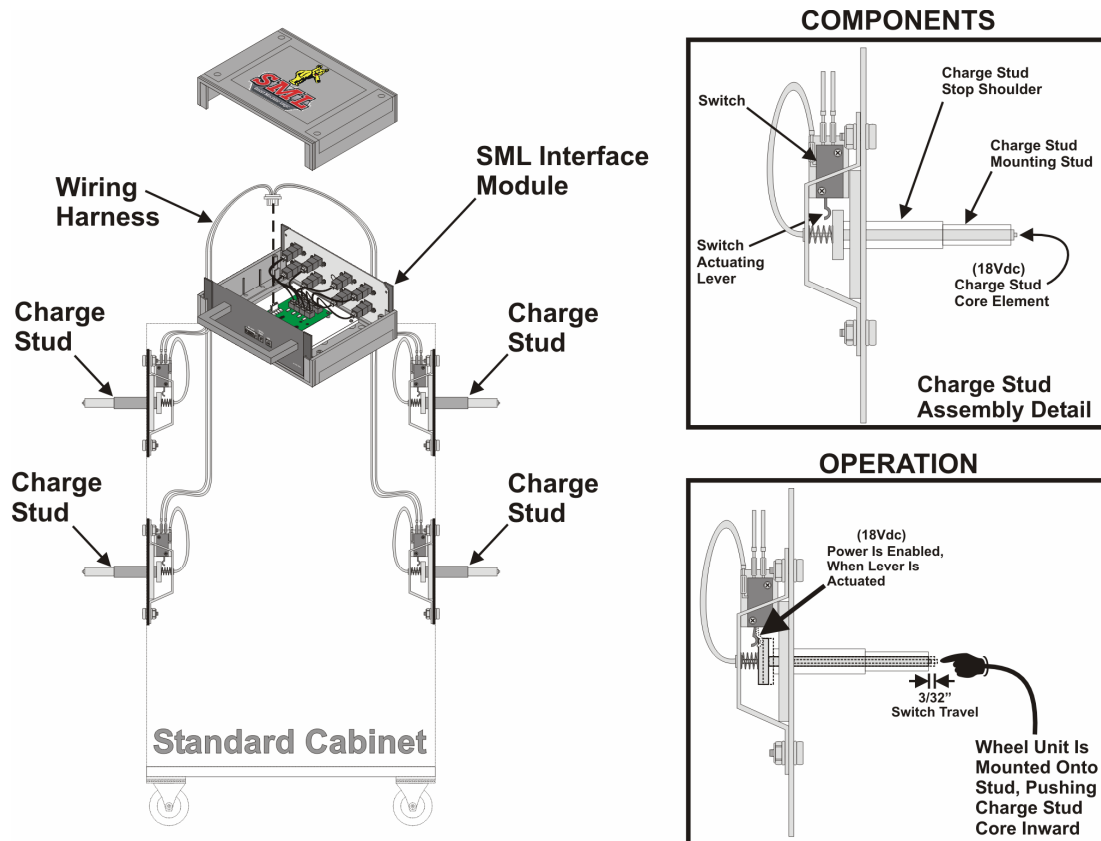


Figure 2-8. Charging Circuit and Charge Studs (Optional)

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

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

SML Interface Module

System Voltage	110 or 220 Vac
Cycle	50 or 60
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
PC Connection	CAT-3, phone and CAT-5 (RJ45) LAN Connections
Wheel Unit Connectors	Quantity-8, RJ45 Connectors. Provides a direct communication connection from the computer to wheel unit(s) and an 18Vdc charge for wheel unit battery charging.

Accessories

Rim Clamps	Quantity of 4, approximately 10 lbs each
Steering Wheel Holder	1
Brake Pedal Depressor	1

Wheel Units

Quantity	4
Sensors	2, 6 or 8
Battery	12Vdc
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	150-200 Feet

Software

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

Section 3.

Operating Instructions

3.0 Operating Instructions.

The SML Interface Module is simply an interface module and has no operation. This module interfaces the technology in the wheel units, to the SML software on a computer. The accessory equipment that is used in conjunction with an alignment system, does have minor operations and are included in the paragraphs in this section.

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.

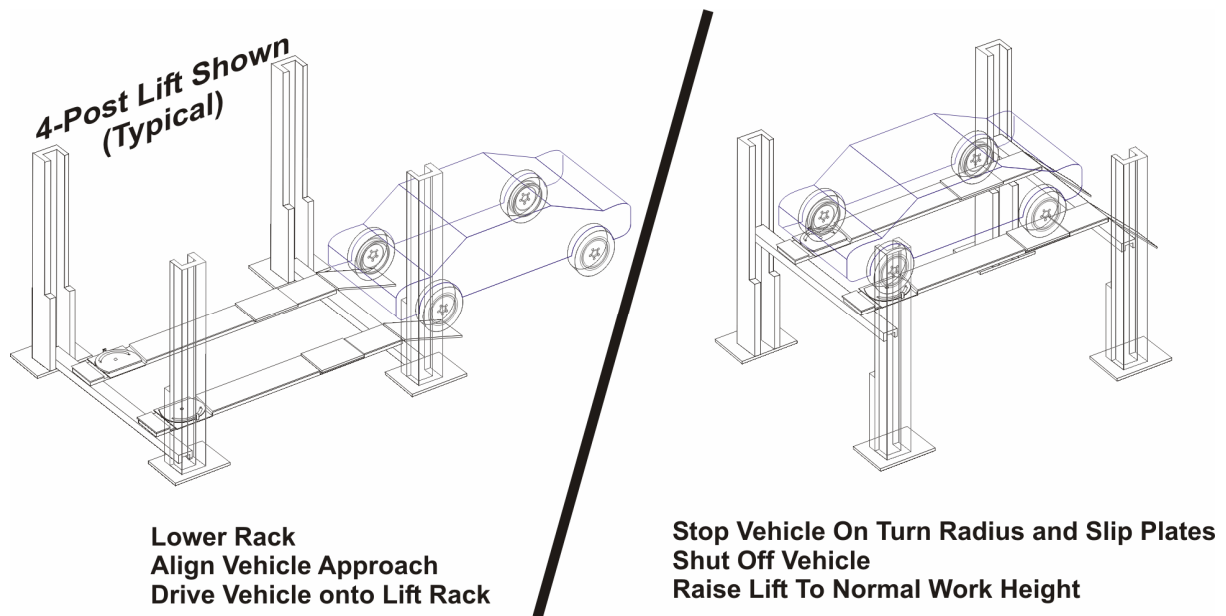


Figure 3-1. Vehicle Lift Preparation

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.

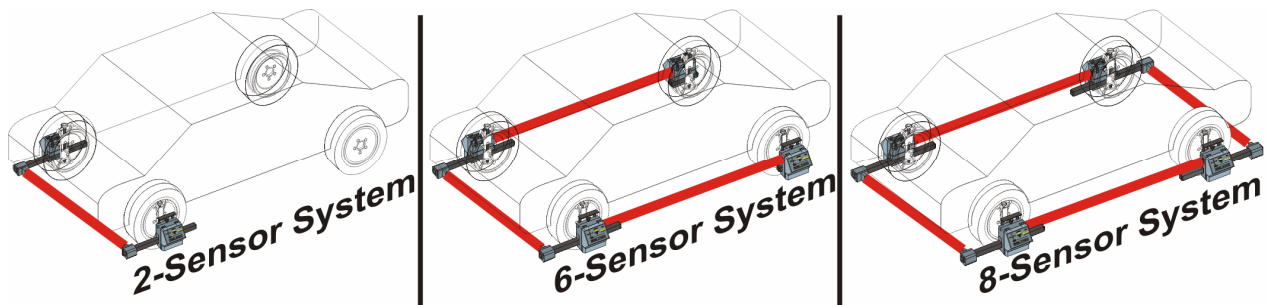


Figure 3-2. Determining Wheel Unit Location – By Sensor Quantity

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

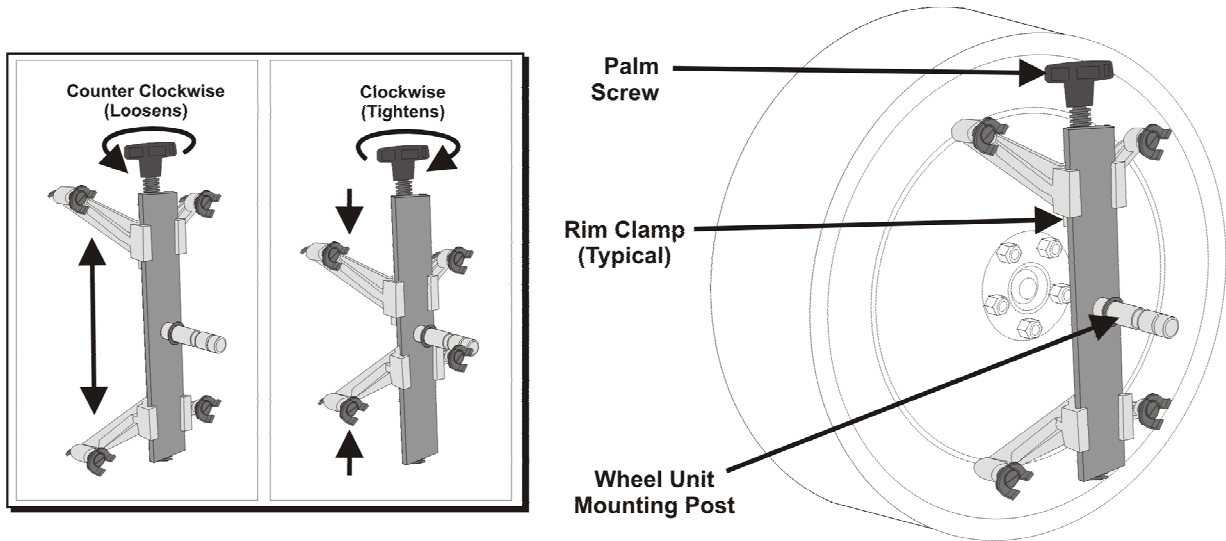


Figure 3-3. Applying Rim Clamps to Vehicle Wheel

- 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.

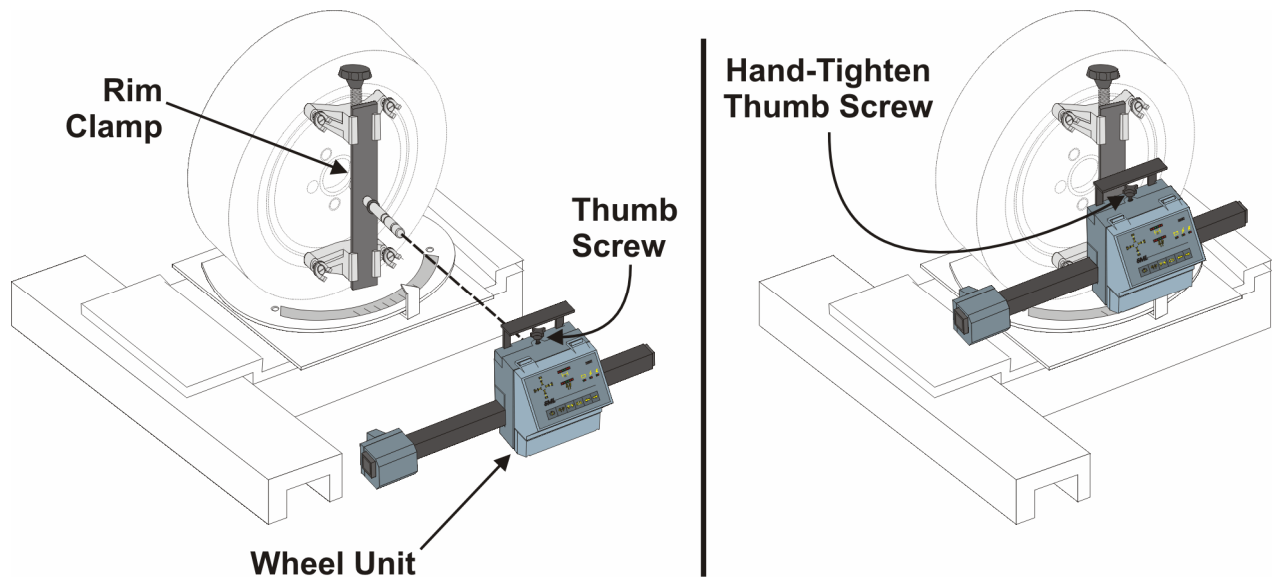


Figure 3-4. Applying Rim Clamps to Vehicle Wheel

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 SML Interface Module Connections

3.2.1 Using Figure 3-5 as a guide, use a Serial cable to connect the SML Interface Module to an RS232 (Serial) port on the back of the computer.

3.2.2 Using a USB cable, connect the SML Interface Module to an available USB port on the PC.

3.2.3 Connect the module power supply to the interface module and to an available receptacle for power.

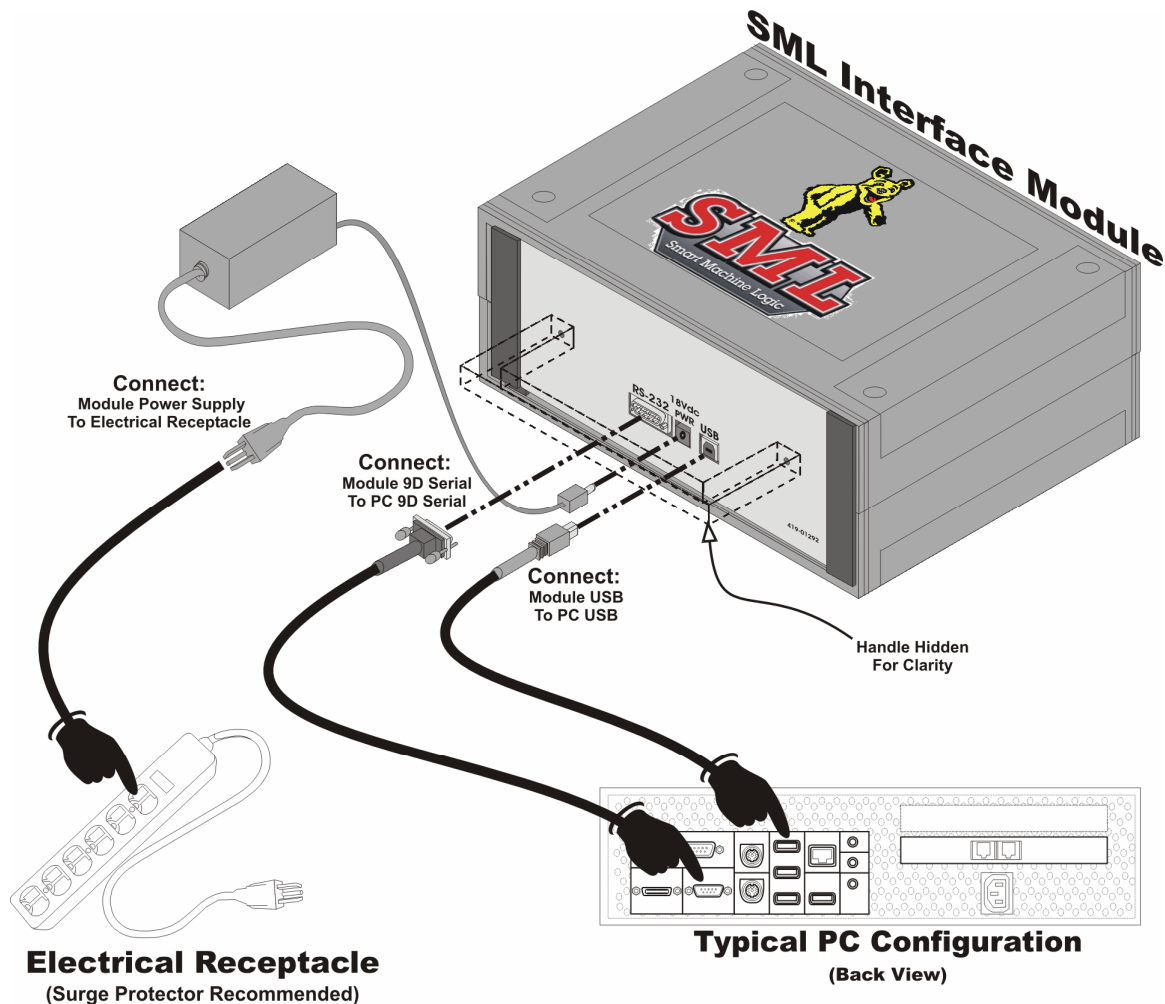


Figure 3-5. Interface Module Connections To A Standard PC

3.2.4 Connecting the SML Interface Module to the wheel units, depending upon integrated options can be accomplished by one of the following:

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

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

- 3.2.4.2.1 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.
- 3.2.4.2.2 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.

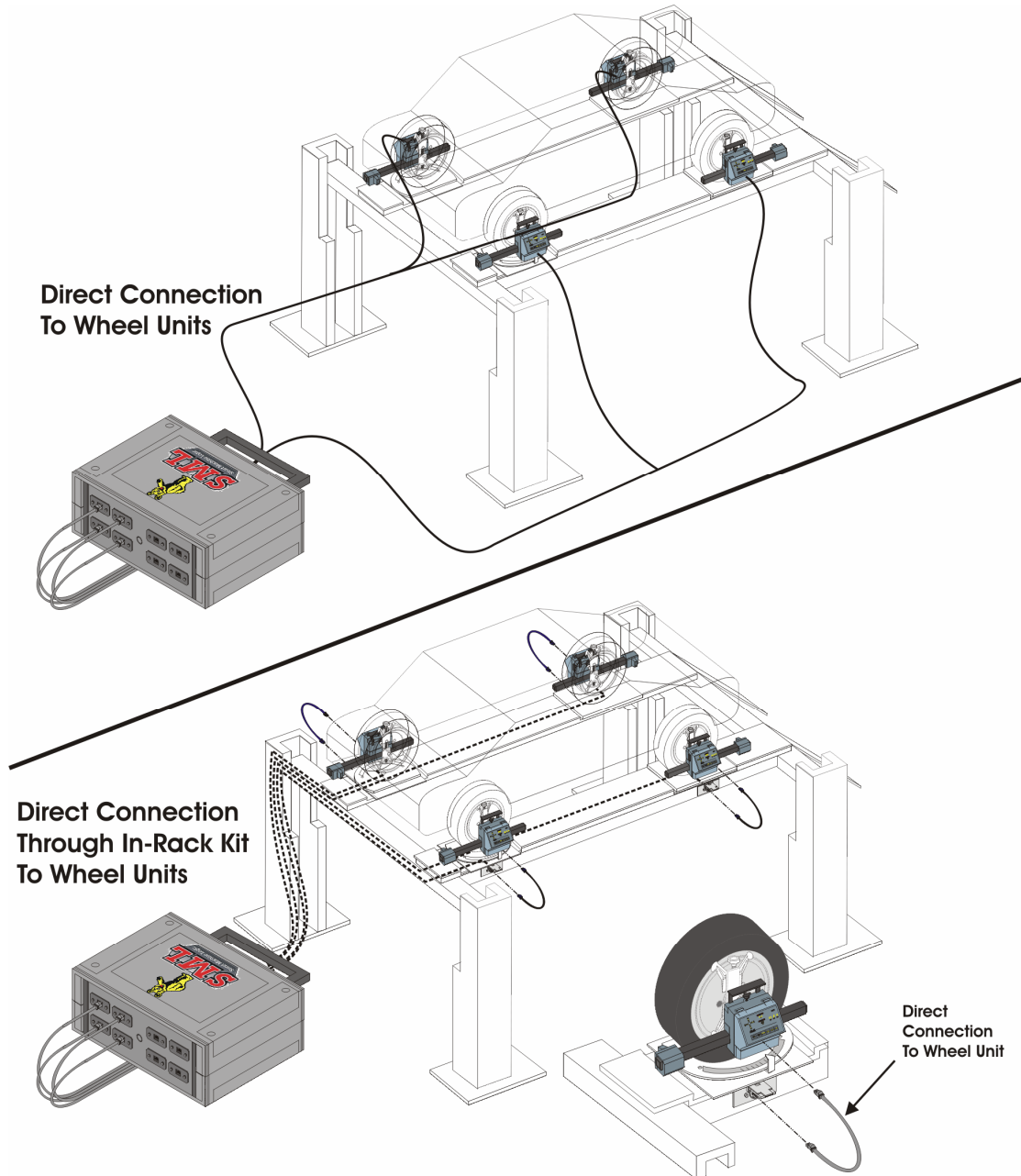


Figure 3-6. Interface Module Connections Wheel Units

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.

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, excluding wheel unit calibration, 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 SML Interface Module. 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	If equipped, attempt to recharge on Charging Posts on unit, or by direction connection to the SML Interface Module. 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 RJ45 connectors on the SML interface module. 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 module. 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

Symptom or Fault	Check Or Inspect	Remedial Action
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 SML Interface Module, 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

Symptom or Fault	Check Or Inspect	Remedial Action
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	Check the status for the wheel unit's battery, power and range indicators. If the range indicator is not green, then it means that the wheel unit is not communicating with the SML Interface Module.
	Recheck wheel unit Firmware versions	Restart the SML program, check and update wheel unit firmware, as needed. Code: B 03 indicates that an attempt to program has failed and unit has reset to default (backup) settings.
	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	Check connection. At the PCBA and at the Wireless Module. The PCBA ribbon cable connector is keyed, to prevent improper installation. 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
	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 SML Interface Module, to the connector on the PCBA. Once connected, check the wheel unit's indicator lights for status, or indication of activity. If communication is established from a direct connection, and all other checks or inspection pass, the wireless module is bad, remove/replace as necessary.

Section 5.

Illustrated Parts Breakdown

5.0 Overview. This section provides graphical illustrations depicting components used to make an SML Interface Module. Each of the various illustrations, identify components with a description, corresponding part number and quantity.

5.1 Only authorized replacement parts may be used when servicing this system.

5.2 Only qualified (trained) technicians and service personnel, are authorized to service or maintain these units.

5.3 Listing of Illustrations:

- IPL-1 SML Interface Module – Front Panel
- IPL-2 SML Interface Module – Rear Panel
- IPL-3 SML Interface Module – Base Cover & PCBA
- IPL-4 SML Interface Module – Internal RJ45 Connections
- IPL-5 SML Interface Module – Wireless Components
- IPL-6 SML Interface Module – Top Cover
- IPL-7 SML Wheel Unit Assembly (1400 Series)

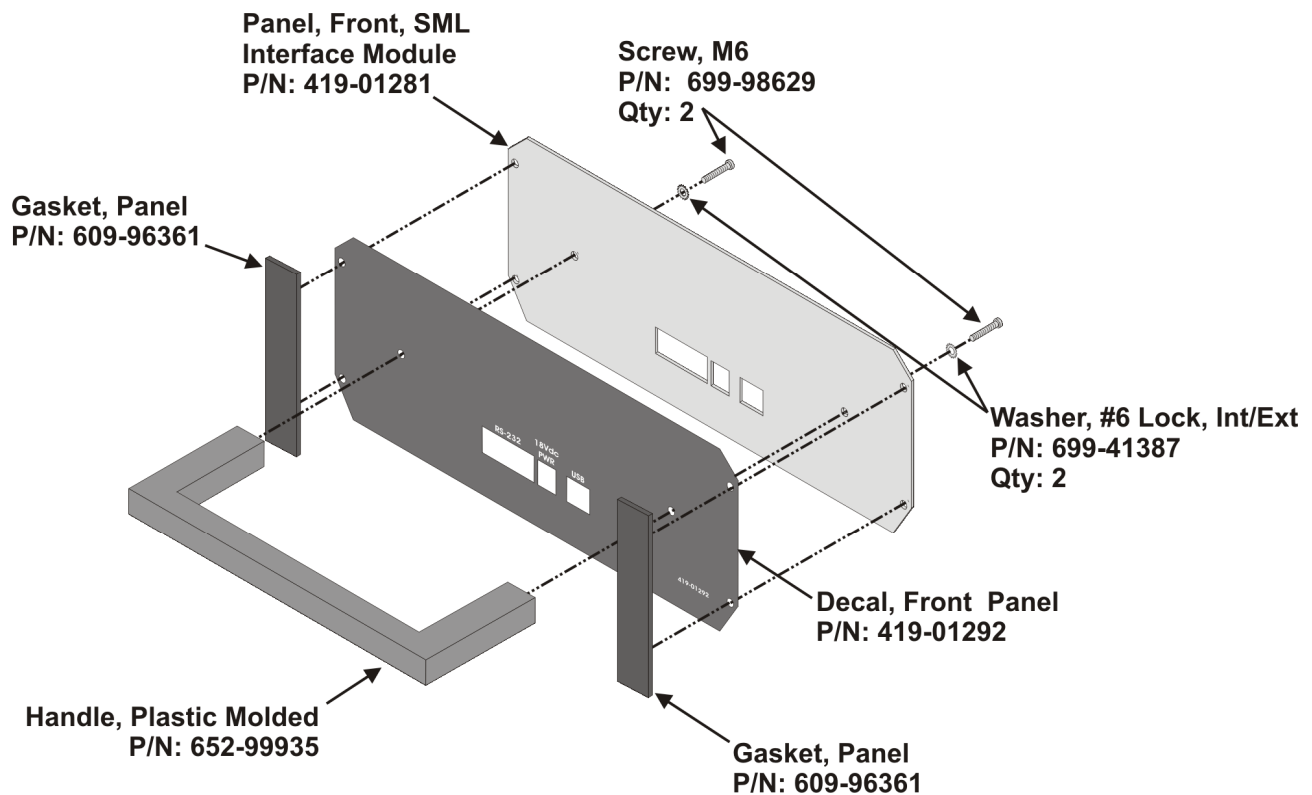


Figure IPL-1. SML Interface Module – Front Panel

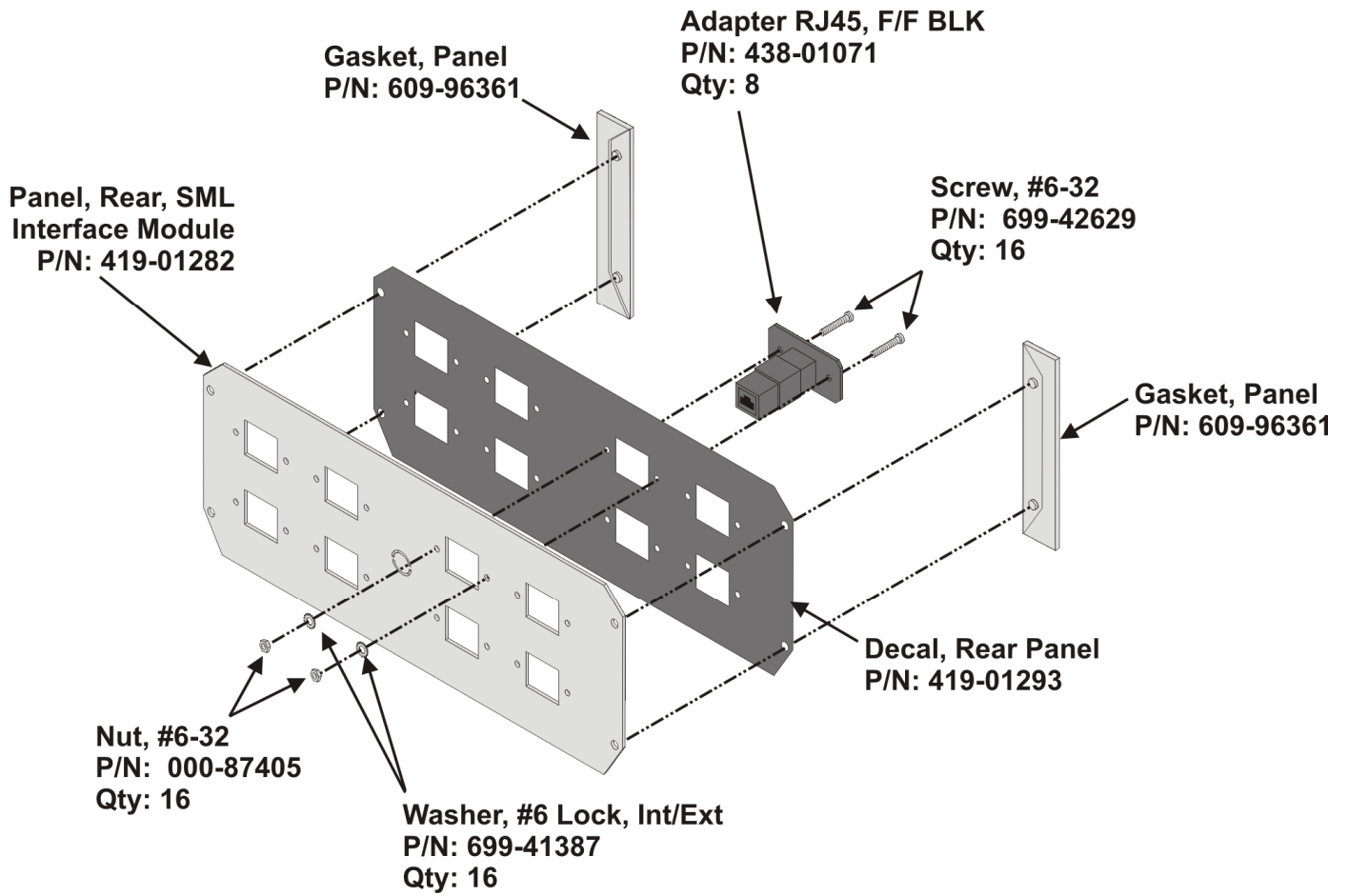


Figure IPL-2. SML Interface Module – Rear Panel

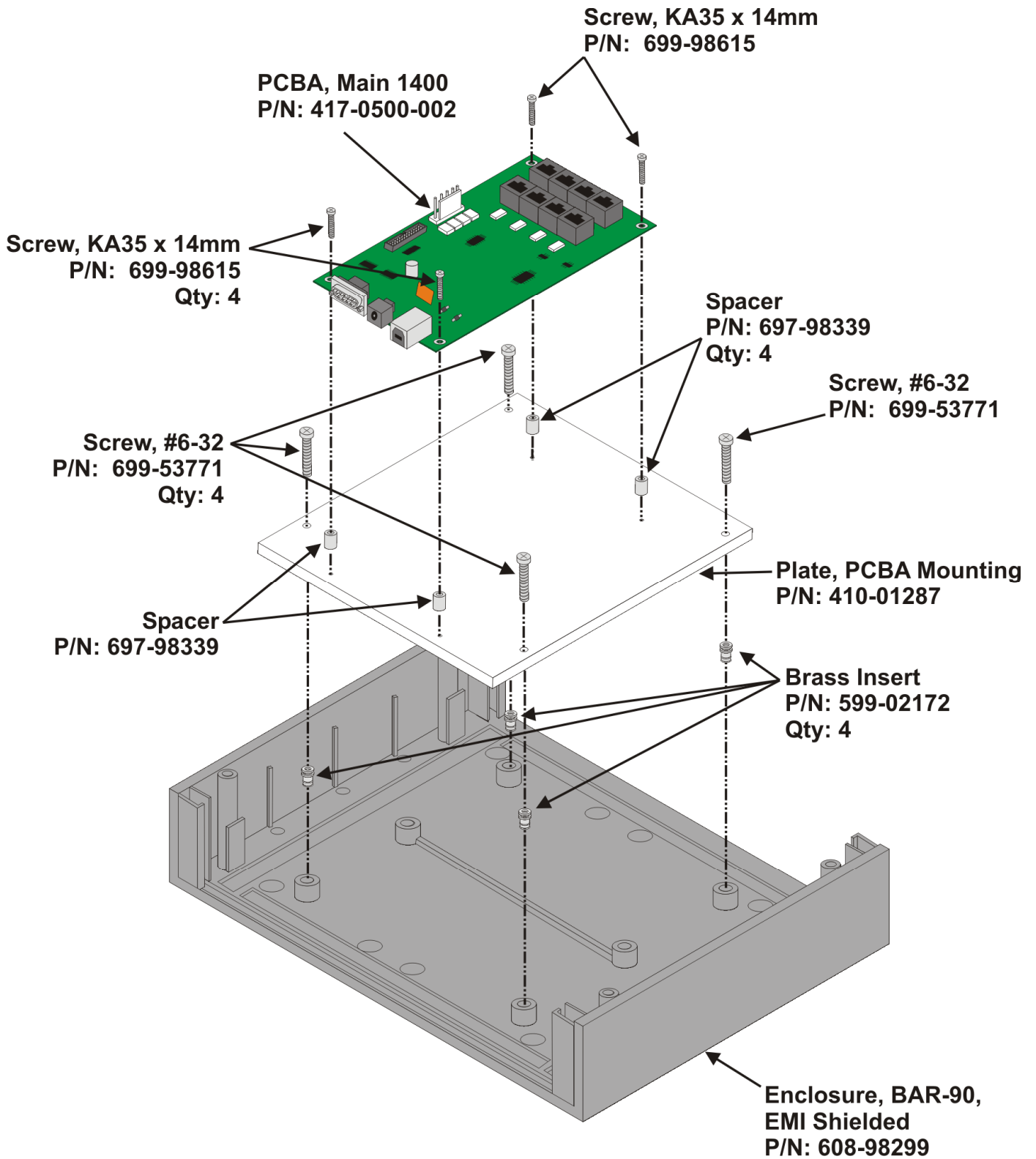


Figure IPL-3. SML Interface Module – Base Cover & PCBA

Cable, RJ45 M / M, 12-Inch
P/N: 434-01055
Qty: 8

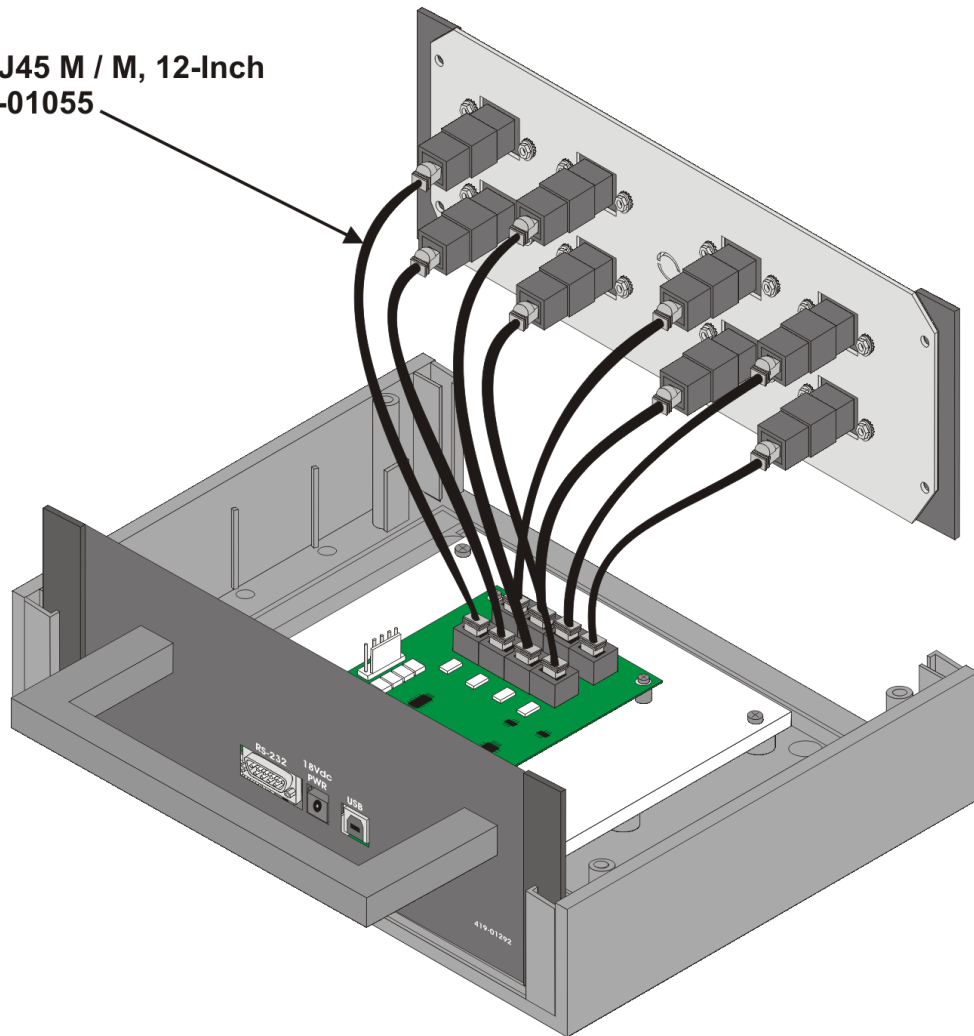


Figure IPL-4. SML Interface Module – Internal RJ45 Connections

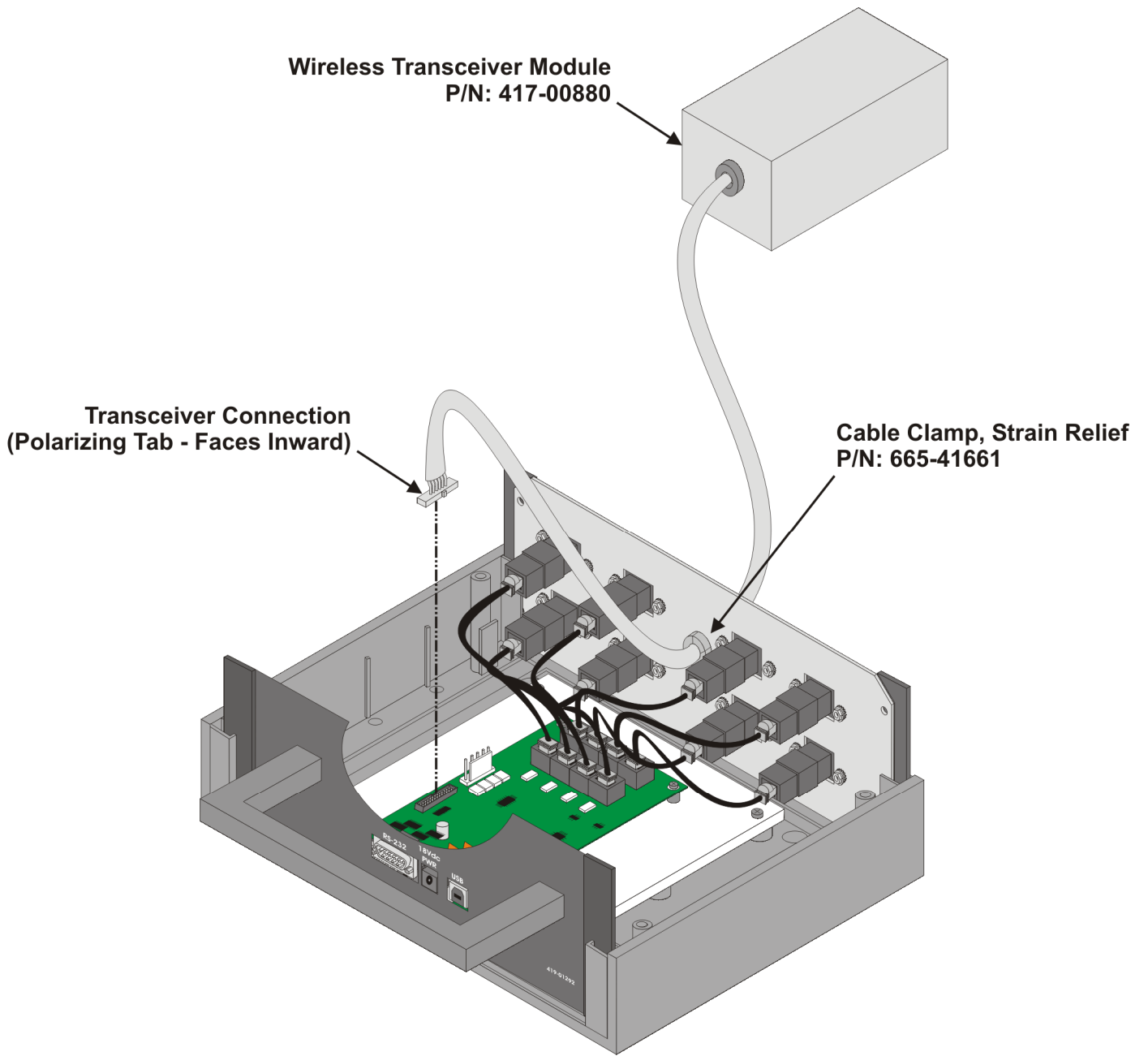


Figure IPL-5. SML Interface Module – Wireless Components

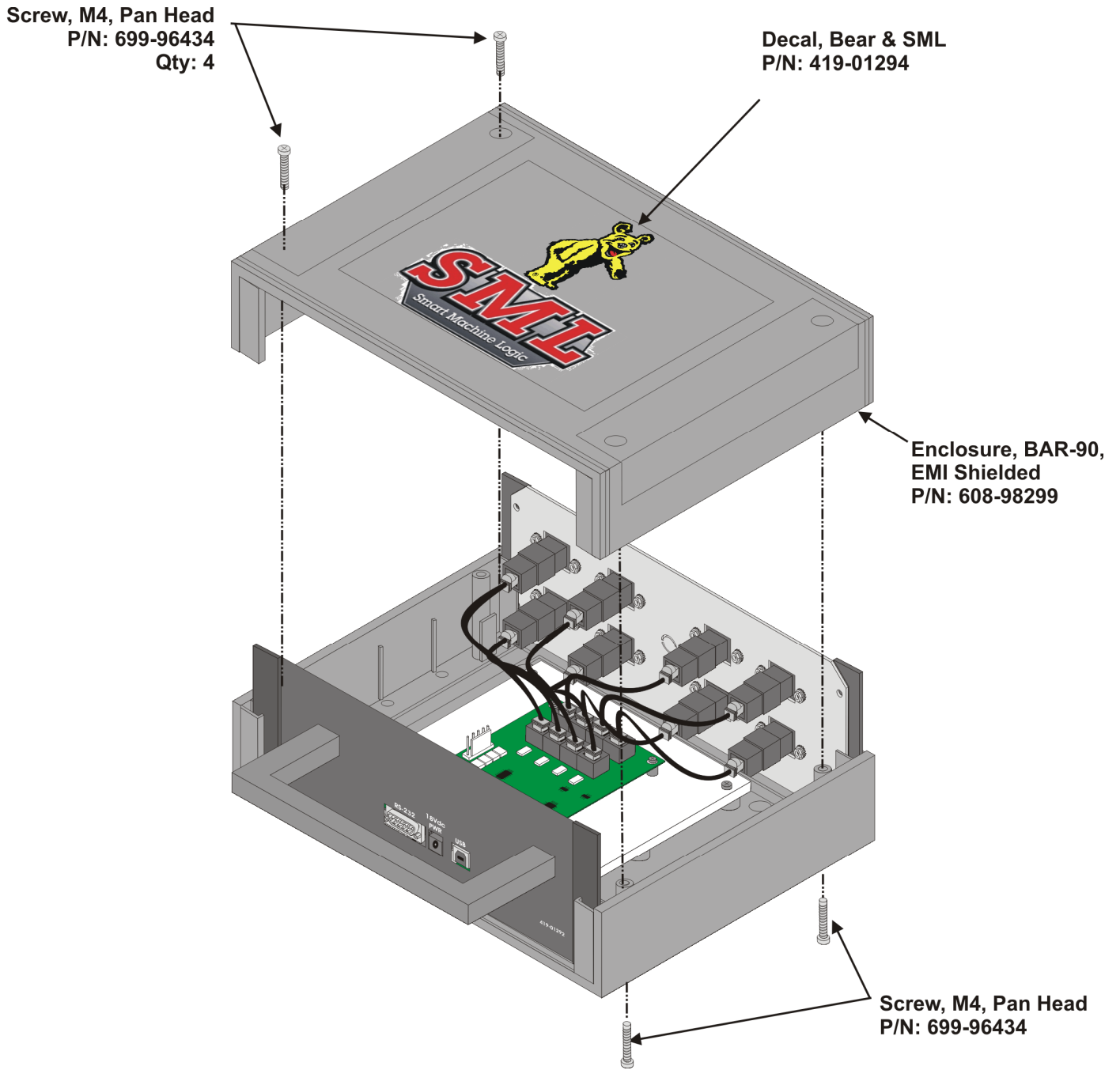


Figure IPL-6. SML Interface Module – Top Cover

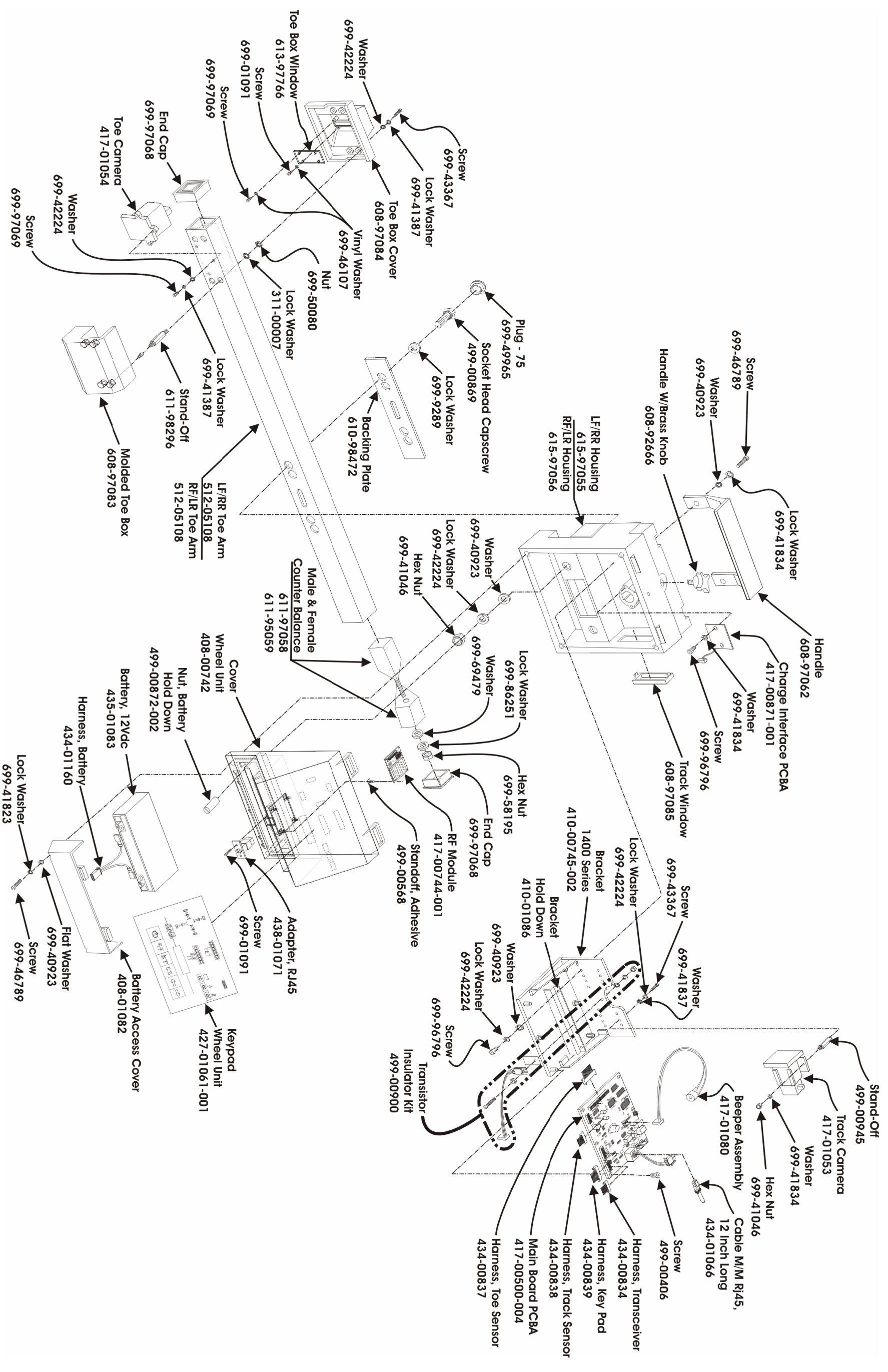


Figure IPL-7. SML Wheel Unit Assembly (1400 Series)