

TDX[®] SI/SI-HD

Wheelchair Base

DEALER: Keep this manual. The procedures in this manual **MUST** be performed by a qualified technician.

For more information regarding
Invacare products, parts, and services,
please visit www.invacare.com



Yes, you can.[®]

⚠ WARNING

Risk of Injury or Damage

Incorrect set up of this wheelchair performed by users/caregivers or unqualified technicians can result in injury or damage.

User/Caregivers- DO NOT attempt to set up this wheelchair.

Initial set up of this wheelchair MUST be performed by a qualified technician.

⚠ WARNING

DEALERS AND QUALIFIED TECHNICIANS: DO NOT SERVICE OR OPERATE THIS PRODUCT OR ANY AVAILABLE OPTIONAL EQUIPMENT WITHOUT FIRST COMPLETELY READING AND UNDERSTANDING THESE INSTRUCTIONS AND ANY ADDITIONAL INSTRUCTIONAL MATERIAL SUCH AS OWNER'S MANUALS, SERVICE MANUALS OR INSTRUCTION SHEETS SUPPLIED WITH THIS PRODUCT OR OPTIONAL EQUIPMENT. IF YOU ARE UNABLE TO UNDERSTAND THE WARNINGS, CAUTIONS OR INSTRUCTIONS, CONTACT INVACARE TECHNICAL SUPPORT BEFORE ATTEMPTING TO USE THIS EQUIPMENT - OTHERWISE, INJURY OR DAMAGE MAY OCCUR.

REFERENCE DOCUMENTS

Refer to the table below for part numbers of additional documents which are referenced in this manual.

MANUAL	PART NUMBER
MK6i™ Electronics Field Reference Guide	1141471
Adjustable ASBA Owner's Manual	1143196
Adjustable ASBA Service Manual	1143238
Van Seat Owner's Manual	1143195
G-Trac™ Owner's Manual	1160831

NOTE: Updated versions of this manual are available on www.invacare.com

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SPECIAL NOTES

Signal words are used in this manual and apply to hazards or unsafe practices which could result in personal injury or property damage. Refer to the table below for definitions of the signal words.

SIGNAL WORD	MEANING
DANGER	Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Caution indicates a potentially hazardous situation which, if not avoided, may result in property damage or minor injury or both.

NOTICE

THE INFORMATION CONTAINED IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.

WHEELCHAIR USER

As a manufacturer of wheelchairs, Invacare endeavors to supply a wide variety of wheelchairs to meet many needs of the end user. However, final selection of the type of wheelchair to be used by an individual rests solely with the user and his/her healthcare professional capable of making such a selection. Invacare highly recommends working with a certified rehab technology supplier and/or a member of NRRTS or RESNA.

WHEELCHAIR TIE-DOWN RESTRAINTS AND SEAT RESTRAINTS (TRRO OR TRBKTS)

TRRO includes four factory-installed transport brackets and a wheelchair anchored pelvic belt. TRRO has been crash-tested in accordance with ANSI/RESNA WC Vol I Section 19 Frontal Impact Test requirements for wheelchairs with a 130 lb crash test dummy, which corresponds to a person with a weight of 125 to 165 lbs for Junior seat sizes or a 168 lb crash dummy, which corresponds to a person with a weight of 168 to 300 lbs for Adult seat sizes.

TRBKTS includes four factory-installed wheelchair transport brackets. TRBKTS has not been crash-tested in accordance with WC 19. Use these transport brackets only to secure an unoccupied wheelchair during transport.

As of this date, the Department of Transportation has not approved any tie-down systems for transportation of a user while in a wheelchair, in a moving vehicle of any type. It is Invacare's position that users of wheelchairs should be transferred into appropriate seating in vehicles for transportation and use be made of the restraints made available by the auto industry. Invacare cannot and does not recommend any wheelchair transportation systems.

Refer to Transport Ready Package (TRRO) on page 85 for more information about transporting the wheelchair.

⚠ TRRO AND TRBKTS WARNINGS

Only use the transport brackets included with TRRO and TRBKTS for the purposes described in this manual.

Battery support brackets **MUST** be installed at all times. Otherwise, the wheelchair will not be WC/19 compliant. Refer to Removing/Installing the Batteries From/Into the Wheelchair on page 71.

⚠ DANGER

Risk of Death or Serious Injury

Not wearing your seat positioning strap could result in death or serious injury.

ALWAYS wear your seat positioning strap. Your seat positioning strap helps reduce the possibility of a fall from the wheelchair. The seat positioning strap is a positioning belt only. It is not designed for use as a safety device withstanding high stress loads such as auto or aircraft safety belts. If signs of wear appear, seat positioning strap **MUST** be replaced **IMMEDIATELY**.

⚠ WARNING

The drive behavior initially experienced by the user may be different from other wheelchairs previously used. This Power Wheelchair has Invacare's SureStep™ technology, a feature that provides the wheelchair with optimum traction and stability when driving forward over transitions and thresholds of up to 3-inches. The following warning applies specifically to the Sure Step feature:

- **TDX SI-HD ONLY - DO NOT** use on inclines greater than 6°.
- **TDX SI ONLY - DO NOT** use on inclines greater than 9°.

To determine and establish your particular safety limits, practice use of this product on various sloping surfaces in the presence of a qualified healthcare provider before attempting active use of this wheelchair. Other general warnings listed within this document also apply.

⚠ DANGER

Risk of Death, Serious Injury, or Damage

Corroded electrical components due to water, liquid exposure, or incontinent users can result in death, serious injury, or damage.

Minimize exposure of electrical components to water and/or liquids. Electrical components damaged by corrosion **MUST** be replaced immediately.

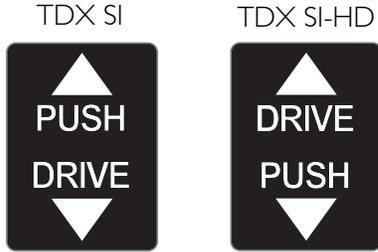
Wheelchairs that are used by incontinent users and/or are frequently exposed to water/liquids may require replacement of electrical components more frequently.

LABEL LOCATIONS

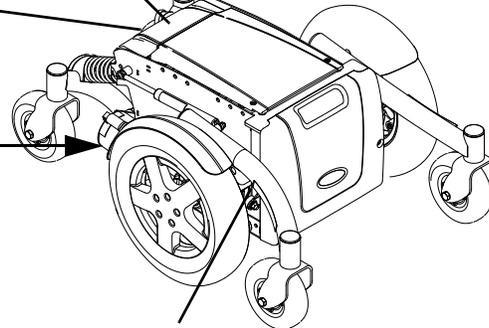
All Wheelchairs

Serial Number Label is located on the right side rear swingarm.

NO WHEELCHAIR HAS BEEN APPROVED FOR USE AS A SEATING SURFACE WITHIN A MOTOR VEHICLE. THIS LABEL IS FOR INFORMATIONAL PURPOSES ONLY. LIABILITY ISSUES WERE NOT CONSIDERED IN THE ATTACHMENT OF THIS LABEL.
 AUCUN FAUTEUIL ROULANT N'A ÉTÉ APPROUVÉ POUR ÊTRE UTILISÉ COMME SIÈGE À L'INTÉRIEUR D'UN VÉHICULE MOTORISÉ. CETTE ÉTIQUETTE NE PEUT ÊTRE UTILISÉE QU'À TITRE D'INFORMATION ET N'A PAS ÉTÉ AFFICHÉE ICI POUR DES RAISONS DE RESPONSABILITÉ LÉGALE



Located on each motor



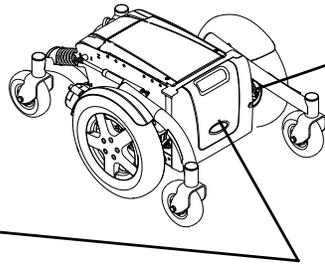
Weight Capacity Label located here (Base Only)

Wheelchairs with 22NF Batteries

WARNING
 Wiring Diagram and Battery Install/Remove for 22NF Batteries
DO NOT REMOVE THIS LABEL

The POSITIVE (+) RED Battery Cable MUST connect to the POSITIVE (+) Battery Terminal(s)/ Post(s). The NEGATIVE (-) BLACK Battery Cable MUST connect to the NEGATIVE (-) Battery Terminal(s)/Post(s). DO NOT allow Battery Cable(s) to contact the opposite Battery Terminal(s)/Post(s). Replace cable(s) immediately if cable(s) insulation becomes damaged. Install protective caps on POSITIVE (+) and NEGATIVE (-) battery terminals. Failure to observe these warnings may result in an electrical short with serious personal injury and/or damage to the electrical system. See Owner's Manual.

DO NOT remove fuse or mounting hardware from POSITIVE (+) RED battery cable mounting screw.



WARNING

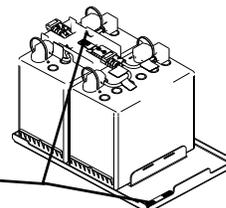
22NF batteries with terminal configuration (positive on the left and negative on the right) as shown MUST be used. 22NF batteries that have the reverse terminal configuration MUST not be used. Terminals MUST have a cross hole located as shown for proper battery connection. See Owner's Manual. These recommendations MUST be followed otherwise injury and/or damage may occur.

P/N 1114847 Rev B - 2/04

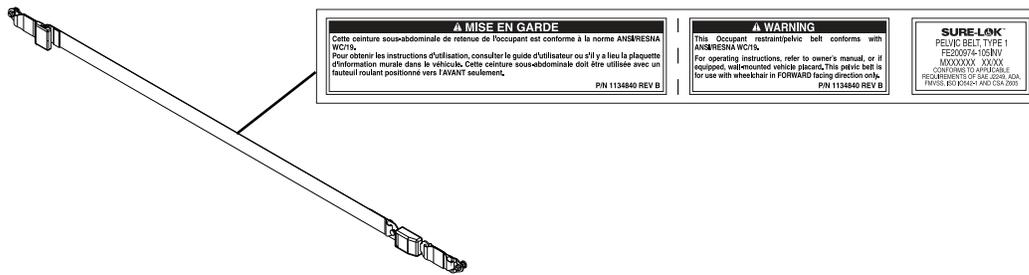
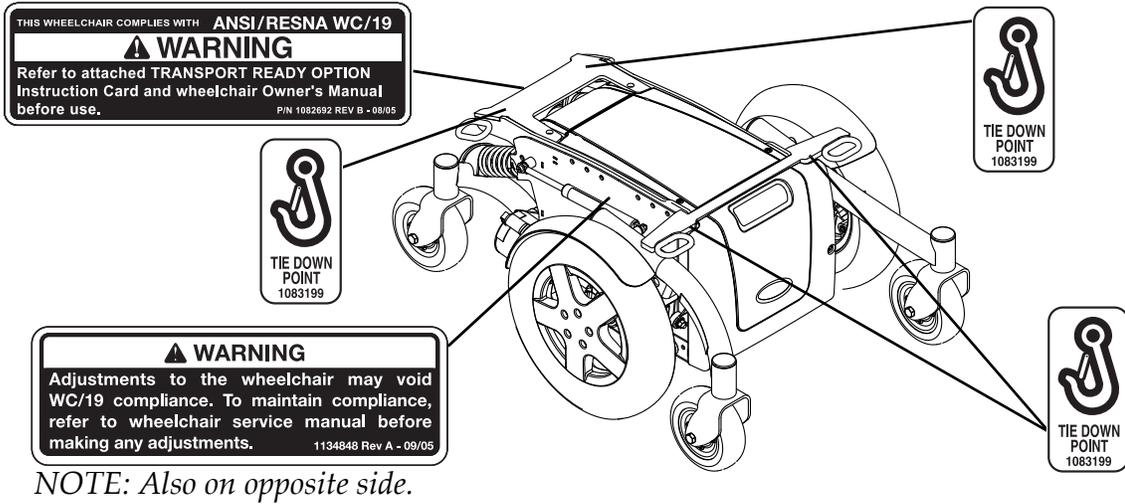
Use 22NF Batteries Only. See Owner's Manual.

P/N 1118356
 P/N 1118356
 Rev. B 08/04/06

Utiliser les batteries 22NF seulement. Se référer au manuel de l'utilisateur.



Wheelchairs with TRRO



Wheelchairs without TRRO



NOTE: Auto style seat positioning strap shown. This label is also on the airline style seat positioning strap.

SPECIFICATIONS

	TDX SI	TDX SI HD
BASE LENGTH:	35 inches	
OVERALL WIDTH OF BASE (WITHOUT JOYSTICK):	24 inches	
OVERALL HEIGHT WITH ASBA SEAT: WITH VAN SEAT: WITH FORMULA CG TILT ONLY:	35.5 to 39.5 inches 38 inches (without head rest), 45 - 47 inches (with head rest) 36.5 to 40.5 inches	35.5 to 39.5 inches 38 inches (without head rest), 45 - 47 inches (with head rest) N/A
OVERALL LENGTH WITH CENTER MOUNT FRONT RIGGING: WITHOUT FRONT RIGGINGS:	38.5 inches @ 0° 35 inches	
WEIGHT (BASE ONLY) WITHOUT 22NF BATTERIES: WITH TWO 22NF BATTERIES: WITH TRANSPORT READY OPTION OR TRANSPORT READY BRACKETS:	178 lbs 254 lbs Add 10 lbs	
MOTOR:	2 Pole	4 Pole
DRIVE AXLE:	Non-adjustable	
DRIVE WHEELS/TIRES:	14 x 3 Foam Filled ONLY	
CASTERS:	6 x 2-inch, Semi-pneumatic with Precision Sealed Bearings	
CASTER FORKS:	Two side fork (Standard), One sided fork (Optional)	
BATTERY REQUIREMENTS:	Use MK p/n M22NFSLDG batteries only.	
FOOTRESTS:	Telescoping Front Rigging Supports, 2-inch and 4-inch long Pivot Slide Tube	
SEAT TILT ANGLE ADJUSTMENT:	Adjustable (0° to 10°)	
OPERATING TEMPERATURE	122 F (50 C) Maximum to -13 F (-25 C) Minimum	
STORAGE TEMPERATURE	149 F (65 C) Maximum to -58 F (-40 C) Minimum	
*WEIGHT LIMITATION WITH ASBA SEAT: WITH ASBA JR. SEAT WITH VAN SEAT: WITH FORMULA™ CG POWERED SEATING:	2 POLE Up to 300 lbs Up to 165 lbs Up to 300 lbs Up to 300 lbs	4 POLE Up to 450 lbs N/A Up to 450 lbs N/A
<i>NOTE: All dimensions are ± .50 inches unless otherwise indicated.</i>		
<i>*NOTE: Weight limitation is total weight (user weight plus any additional items that the user may require [back pack, etc.]). Example: If weight limitation of the wheelchair is 300 lbs and additional items equal 25 lbs, subtract 25 lbs from 300 lbs this means the maximum weight limitation of the user is 275 lbs.</i>		

SECTION I—GENERAL GUIDELINES

⚠ WARNING

SECTION I - GENERAL GUIDELINES contains important information for the safe operation and use of this product.

⚠ DANGER

Risk of Death, Serious Injury or Damage

Improper use of this product may cause injury or damage

If you are unable to understand the warnings, cautions or instructions, contact a health care professional or dealer before attempting to use this equipment.

DO NOT use this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as user manual, service manuals or instruction sheets supplied with this product or optional equipment.

Corroded electrical components due to water, liquid exposure, or incontinent users can result in death, serious injury, or damage.

Minimize exposure of electrical components to water and/or liquids. Electrical components damaged by corrosion **MUST be replaced immediately.**

Wheelchairs that are used by incontinent users and/or are frequently exposed to water/liquids may require replacement of electrical components more frequently.

Repair or Service Information

⚠ WARNING

Set-up of the Electronic Control Unit is to be performed **ONLY by qualified technicians. The final adjustments of the controller may affect other activities of the wheelchair. Damage to the equipment could occur under these circumstances. If non-certified individuals perform any work on these units, the warranty is void.**

⚠ DANGER

Risk of Death, Serious Injury, or Damage

Missing attaching hardware could cause instability resulting in death, serious injury or damage.

Ensure all attaching hardware is present and tightened securely.

Use of incorrect or improper replacement (service) parts may cause death, serious injury, or damage.

Replacement parts **MUST match original Invacare parts.**

****ALWAYS** provide the wheelchair serial number to assist in ordering the correct replacement parts.**

⚠ DANGER

Risk of Death, Serious Injury, or Damage

Incorrect repair and/or servicing of this wheelchair performed by users/caregivers or unqualified technicians can result in death, serious injury, or damage.

Users/Caregivers — **DO NOT** attempt to repair and/or service this wheelchair.

Repair and/or service of this wheelchair **MUST** be performed by a qualified technician. Contact a dealer or Invacare technician.

⚠ DANGER

Risk of Death or Serious Injury

Electric shock can cause death or serious injury

To avoid electric shock, inspect plug and cord for cuts and/or frayed wires. Replace cut cords or frayed wires immediately.

⚠ WARNING

Risk of Death, Serious Injury, or Damage

Improperly connected joystick could cause loss of power resulting in death, serious injury, or damage.

Ensure the joystick is securely connected to controller.

⚠ WARNING

Risk of Serious Injury or Damage

Attaching hardware that is loosely secured could cause loss of stability resulting in serious injury or damage

After **ANY** adjustments, repair or service and before use, make sure that all attaching hardware is tightened securely.

Improper mounting or maintenance of the Sip n' Puff control including the mouthpiece and breath tube may cause injury or damage.

Water inside the Sip n' Puff interface module may cause damage to the unit.

Excessive saliva residue in the mouthpiece/straw can reduce performance.

Blockages, a clogged saliva trap or air leaks in the system may cause Sip n' Puff not to function properly.

Ensure moving parts of the wheelchair, including the operation of powered seating, **DO NOT** pinch or damage the Sip n' Puff tubing.

Saliva trap **MUST** be installed to reduce risk of water or saliva entering the Sip n' Puff interface module.

Occasionally flush the mouthpiece to remove saliva residue.

The mouthpiece/straw **MUST** be completely dry before installation.

If Sip n' Puff does not to function properly, inspect system for blockages, clogged saliva trap or air leaks. As necessary, replace mouthpiece, breath tube and saliva trap.

Operating information

⚠ DANGER

Risk of Death or Serious Injury

Traveling on inclines with wet, slippery, icy or oily surfaces could cause loss of traction resulting in death or serious injury.

DO NOT use on inclines with wet, slippery, icy or oily surfaces. This may include certain painted or otherwise treated wood surfaces.

Braking hard and/or sudden stops while on inclines could cause loss of stability resulting in death or serious injury.

While on inclines, ALWAYS travel at a reduced, constant speed to maintain stability. Traveling down ramps at high speeds will reduce traction and increase stopping distance.

DO NOT brake hard and avoid sudden stops while traveling on an incline.

If stopping becomes necessary while on an incline, release the joystick and allow the wheelchair to come to a full stop. Then proceed at a slower speed.

⚠ DANGER

Risk of Death, Serious Injury, or Damage

Continued use of the wheelchair that is not set to the correct specifications may cause erratic behavior of the wheelchair resulting in death, serious injury, or damage.

Performance adjustments should only be made by professionals of the healthcare field or persons fully conversant with this process and the driver's capabilities.

After the wheelchair has been set up/adjusted, check to make sure that the wheelchair performs to the specifications entered during the set up procedure. If the wheelchair does not perform to specifications, turn the wheelchair **Off** immediately and reenter set up specifications. Contact Invacare, if wheelchair still does not perform to correct specifications.

⚠ WARNING

Risk of Serious Injury or Damage

Use of non-Invacare accessories may result in serious injury or damage.

Invacare products are specifically designed and manufactured for use in conjunction with Invacare accessories. Accessories designed by other manufacturers have not been tested by Invacare and are not recommended for use with Invacare products.

DO NOT use non-Invacare accessories.

To obtain Invacare accessories, contact Invacare by phone or at www.invacare.com.

⚠ WARNING

Risk of Serious Injury or Damage

Moving the seating system from the factory setting may reduce driver control, wheelchair stability, traction and increase caster wear resulting in serious injury or damage.

Move the seating system **ONLY** when necessary to fit the wheelchair to the user.

If the seating system must be moved, **ALWAYS** inspect the wheelchair to ensure the front rigging **DOES NOT** interfere with the front casters.

⚠ WARNING

Risk of Minor to Serious Injury

Pinch points can cause minor to serious injury.

Be mindful of potential pinch points and use caution when using this product.

⚠ WARNING

If the seating system must be moved, **ALWAYS** inspect to ensure the wheelchair **DOES NOT** easily tip forward or backward.

⚠ WARNING

Risk of Minor to Serious Injury

Pinch points can cause minor to serious injury.

Be mindful of potential pinch points and use caution when using this product.

G-Trac

⚠ WARNING

Risk of Serious Injury or Damage

Improperly connecting the motor leads to the controller may cause injury or damage.

WHEELCHAIRS WITH G-TRAC: Crossing the motor leads (for example: connecting the left motor lead into the right motor connector on the controller) may result in unintended movement.

DO NOT cross the motor leads when connecting the motors to the controller - otherwise injury or damage may occur.

Tire Pressure

⚠ WARNING

DO NOT release the wheelchair for use unless it has proper tire pressure (P.S.I.). **DO NOT** overinflate the tires. Failure to follow these recommendations may cause the tire to explode and cause bodily harm. The recommended tire pressure is listed on the side wall of the tire.

Electrical

⚠ WARNING

Grounding Instructions:

DO NOT, under any circumstances, cut or remove the round grounding prong from any plug used with or for Invacare products. Some devices are equipped with three-prong (grounding) plugs for protection against possible shock hazards and fire. Where a two prong wall receptacle is encountered, it is the personal responsibility and obligation of the customer to contact a qualified electrician and have the two prong receptacle replaced with a properly grounded three prong wall receptacle in accordance with the National Electrical Code. If you must use an extension cord, use **ONLY** a three-wire extension cord having the same or higher electrical rating as the device being connected. In addition, Invacare has placed **RED/ORANGE WARNING TAGS** on some equipment. **DO NOT** remove these tags.

Three prong to two prong adapters should not be used. Use of three prong adapters can result in improper grounding and present a shock hazard to the user.

Batteries

⚠ WARNING

The warranty and performance specifications contained in this manual are based on the use of deep cycle gel cell or sealed batteries. Invacare strongly recommends their use as the power source for this unit. Specific terminal configurations required. Refer to battery section.

Carefully read battery/battery charger information prior to installing or servicing the wheelchair.

SECTION 2—EMI INFORMATION

⚠ WARNING

CAUTION: IT IS VERY IMPORTANT THAT YOU READ THIS INFORMATION REGARDING THE POSSIBLE EFFECTS OF ELECTROMAGNETIC INTERFERENCE ON YOUR POWERED WHEELCHAIR.

Electromagnetic Interference (EMI) From Radio Wave Sources

Powered wheelchairs and motorized scooters (in this text, both will be referred to as powered wheelchairs) may be susceptible to electromagnetic interference (EMI), which is interfering electromagnetic energy (EM) emitted from sources such as radio stations, TV stations, amateur radio (HAM) transmitters, two way radios, and cellular phones. The interference (from radio wave sources) can cause the powered wheelchair to release its brakes, move by itself, or move in unintended directions. It can also permanently damage the powered wheelchair's control system. The intensity of the interfering EM energy can be measured in volts per metre (V/m). Each powered wheelchair can resist EMI up to a certain intensity. This is called its "immunity level." The higher the immunity level, the greater the protection. At this time, current technology is capable of achieving at least a 20 V/m immunity level, which would provide useful protection from the more common sources of radiated EMI.

There are a number of sources of relatively intense electromagnetic fields in the everyday environment. Some of these sources are obvious and easy to avoid. Others are not apparent and exposure is unavoidable. However, we believe that by following the warnings listed below, your risk to EMI will be minimized.

The sources of radiated EMI can be broadly classified into three types:

- 1) Hand-held Portable transceivers (transmitters-receivers with the antenna mounted directly on the transmitting unit. Examples include: citizens band (CB) radios, "walkie talkie", security, fire and police transceivers, cellular telephones, and other personal communication devices).

NOTE: Some cellular telephones and similar devices transmit signals while they are ON, even when not being used.

- 2) Medium-range mobile transceivers, such as those used in police cars, fire trucks, ambulances and taxis. These usually have the antenna mounted on the outside of the vehicle; and
- 3) Long-range transmitters and transceivers, such as commercial broadcast transmitters (radio and TV broadcast antenna towers) and amateur (HAM) radios.

NOTE: Other types of hand-held devices, such as cordless phones, laptop computers, AM/FM radios, TV sets, CD players, cassette players, and small appliances, such as electric shavers and hair dryers, so far as we know, are not likely to cause EMI problems to your powered wheelchair.

⚠ WARNING**Powered Wheelchair Electromagnetic Interference (EMI)**

Because EM energy rapidly becomes more intense as one moves closer to the transmitting antenna (source), the EM fields from hand-held radio wave sources (transceivers) are of special concern. It is possible to unintentionally bring high levels of EM energy very close to the powered wheelchair's control system while using these devices. This can affect powered wheelchair movement and braking. Therefore, the warnings listed below are recommended to prevent possible interference with the control system of the powered wheelchair.

Electromagnetic interference (EMI) from sources such as radio and TV stations, amateur radio (HAM) transmitters, two-way radios, and cellular phones can affect powered wheelchairs and motorized scooters. Also, the electronics used in our powered wheelchair can generate a low level of electromagnetic interference, which however will remain within the tolerances permitted by law.

FOLLOWING THE WARNINGS LISTED BELOW SHOULD REDUCE THE CHANCE OF UNINTENDED BRAKE RELEASE OR POWERED WHEELCHAIR MOVEMENT WHICH COULD RESULT IN SERIOUS INJURY.

- 1) Do not operate hand-held transceivers (transmitters receivers), such as citizens band (CB) radios, or turn ON personal communication devices, such as cellular phones, while the powered wheelchair is turned ON;
- 2) Be aware of nearby transmitters, such as radio or TV stations, and try to avoid coming close to them;
- 3) If unintended movement or brake release occurs, turn the powered wheelchair OFF as soon as it is safe;
- 4) Be aware that adding accessories or components, or modifying the powered wheelchair, may make it more susceptible to EMI (NOTE: There is no easy way to evaluate their effect on the overall immunity of the powered wheelchair); and
- 5) Report all incidents of unintended movement or brake release to the powered wheelchair manufacturer, and note whether there is a source of EMI nearby.

Important Information

- 1) 20 volts per metre (V/m) is a generally achievable and useful immunity level against EMI (as of May 1994) (the higher the level, the greater the protection);
- 2) This device has been tested to a radiated immunity level of 20 volts per meter.
- 3) The immunity level of the product is unknown.

Modification of any kind to the electronics of this wheelchair as manufactured by Invacare may adversely affect the EMI immunity levels.

SECTION 3—SAFETY INSPECTION/ TROUBLESHOOTING

⚠ DANGER

Risk of Death or Serious Injury

Failure to complete the inspection of the critical components listed below could result in death or serious injury.

Inspect stability control components which could include anti-dive spring, anti-dive cylinder, ratcheting gears, or end stops to ensure proper operation.

Inspect drive axle nut, locking tab, wheel fasteners or quick release to ensure drive wheel is secure.

NOTE: Initial adjustments should be made to suit the end user's personal body structure needs and preference. After initial setup, perform these procedures every time the wheelchair is serviced.

Safety Inspection Checklists

Inspect/Adjust Initially

CAUTION

As with any vehicle, the wheels and tires should be checked periodically for cracks and wear, and should be replaced.

- Ensure wheelchair rolls straight (no excessive drag or pull to one side).
- Inspect all fasteners.
- Inspect TRRO/TRBKTS fasteners and hardware.
- Ensure clothing guards are secure.
- Arms are secure but easy to release and adjustment levers engage properly.
- Adjustable height arms operate and lock securely.
- Upholstery has no rips.
- Armrest pad sits flush against arm tube.
- Axle nut and wheel mounting nuts are secure on drive wheels.
- No excessive side movement or binding when drive wheels are lifted and spun when disengaged (free-wheeling).
- Ensure that casters are free of debris.
- Wheels/casters have proper tension when wheels/casters are spun (when free-wheeling). Wheels/casters should come to a gradual stop.

- Loosen/tighten caster locknut if wheel wobbles noticeably or binds to a stop.
- Ensure all caster/wheel/fork/headtube fasteners are secure and not damaged/missing.
- Wheel locks DO NOT interfere with tires when rolling.
- Wheel lock pivot point are free of wear and looseness.
- Wheel locks are easy to engage.
- Inspect tires for flat spots and wear.
- Check pneumatic tires for proper inflation.
- Check center mount front riggings for worn/frayed belts and/or loose fasteners. If found, replace these items.
- Check that all labels are present and legible. Replace if necessary.
- Inspect locking gas cylinders.
- Clean upholstery and armrests.
- Clean dirt and lint from axles.
- Clean dirt and lint from bearings.
- Inspect mechanical anti-dive for function.
- Inspect seat positioning strap for any signs of wear. Ensure buckle latches. Verify hardware that attaches strap to frame is secure and undamaged. Replace if necessary.
- Inspect foam handgrips for damage. If damaged, have them replaced by a qualified technician.
- Inspect motor brushes and gearbox coupling.
- Inspect electrical components for signs of corrosion. Replace if corroded or damaged.
- For optimum performance, replace stability assist cylinders every two years.
- Ensure swingarm bumper stops are in place and not deteriorated or damaged (recommended every 6 months). Replace if necessary.

Troubleshooting - Mechanical

WHEELCHAIR VEERS LEFT/RIGHT	SLUGGISH TURN/ PERFORMANCE	CASTERS FLUTTER	SQUEAKS AND RATTLES	LOOSENESS IN WHEELCHAIR	WHEELCHAIR 3 WHEELS	SOLUTIONS
X	X	X				If pneumatic, check tires for correct and equal pressure.
X	X	X	X			Check for loose stem nuts/bolts.
X		X				Check that casters contact ground at the same time.
				X	X	If pneumatic, check tires for correct and equal pressure.

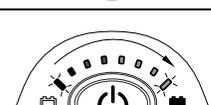
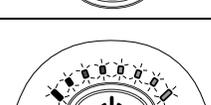
Troubleshooting - Electrical

NOTE: For additional troubleshooting information and explanation of error codes, refer to the individual Electronics Manual supplied with each wheelchair.

SPJ+™ , SPJ+ w/PSS or SPJ+ w/ACC Joysticks

The joystick information gauge and the service indicator give indications of the type of fault or error detected by the control module. When a fault is detected, the wheelchair may stop and not drive. The LEDs on the information gauge may flash in a particular pattern or the service indicator light will flash. The number or type of flashes indicates the nature of the error. If multiple errors are found, only the first error encountered by the control module will be displayed.

Information Gauge Display Diagnostics

DISPLAY	DESCRIPTION	DEFINITION	COMMENTS
 <p>Information Gauge Display</p>			
	All LEDs are off.	Power is off.	
	All LEDs are on.	Power is on.	Fewer than three LEDs on implies reduced battery charge.
	Left RED LED is flashing.	Battery charge is low.	The batteries should be charged as soon as possible.
	Left to Right "chase" alternating with steady display.	Joystick is in programming, inhibit and/or charging mode.	The steady LEDs indicate the current state of the battery charge.
	All LEDs are flashing slowly.	Joystick has detected Out-of-Neutral-at-Power-Up mode.	Release the joystick back to Neutral.

Service Indicator Light Diagnostics

NUMBER OF FLASHES	DIAGNOSTICS CODE	ERROR CODE DESCRIPTION	SUB CODE*	DETAILS OF ERROR CODE	POSSIBLE SOLUTION
1	E 01	User Fault	00	Stall Timeout or user error.	Release joystick to neutral and try again.
2	E02	Battery Fault	00	Recharge batteries or replace.	Check the batteries and cable. Try charging the batteries. Batteries may require replacing.
3	E03	Left Motor Fault	00	Left Motor Short Circuit	Check the left motor, connections and motor cable.
			01	Left Motor Open Circuit	
			02	Left Motor Connection Fault B-	
			03	Motor Terminal Connected to B+	
			04	Left Motor Voltage Fault	
			05	Left Motor Bridge Fault	
			06	Too Many Hardware Current Limit Events	
			07	Current Offset Out of Range	
			08	Hardware Current Limit Fault	
4	E04	Right Motor Fault	00	Right Motor Short Circuit	Check the right motor, connections and motor cable.
			01	Right Motor Open Circuit	
			02	Right Motor Connection Fault B-	
			03	Motor Terminal Connected to B+	
			04	Right Motor Voltage Fault	
			05	Right Motor Bridge Fault	
			06	Too Many Hardware Current Limit Events	
			07	Current Offset Out of Range	
			08	Hardware Current Limit Fault	

NUMBER OF FLASHES	DIAGNOSTICS CODE	ERROR CODE DESCRIPTION	SUB CODE*	DETAILS OF ERROR CODE	POSSIBLE SOLUTION
5	E05	Left Park Brake Fault	00	Left Park Brake Drive-Time Test Failed	Check the left park brake connections and cable.
			01	Left Park Brake Output Enabled When Wheelchair Idle	
			02	Left Park Brake Output Did not Enable When Entering Drive Mode	
			03	Left Park Brake fault during power-up testing	
			04	Left park brake feedback low during drive (park brake short)	
6	E06	Right Park Brake Fault	00	Right Park Brake Drive-Time Test Failed	Check the right park brake connections and cable.
			01	Right Park Brake Output Enabled When Wheelchair Idle	
			02	Right Park Brake Output Did not Enable When Entering Drive Mode	
			03	Right Park Brake fault during power-up testing	
			04	Right park brake feedback low during drive (park brake short)	
7	E07	Remote Fault	00	Local SR Fault (CPU, EEPROM, etc.)	Check the communications bus, connections and wiring. Replace the remote.
			01	Joystick fault at the remote	
			02	Speed pot fault at the remote	

NUMBER OF FLASHES	DIAGNOSTICS CODE	ERROR CODE DESCRIPTION	SUB CODE*	DETAILS OF ERROR CODE	POSSIBLE SOLUTION
8	E08	Controller Fault	00	Controller fault	Check connections and wiring. Replace power module.
			01	RAM fault	
			02	ROM fault	
			03	CPU fault	
			04	EEPROM fault	
			05	Watchdog fault	
			06	Stack fault	
			07	Software fault	
			08	Power-up testing fault	
			09	Relay fault or precharge fault	
			10	Bridge fault or disable all fault	
			11	Electronics fault: Thermistor	
			12	Calibration setting fault	
9	E09	Communications Fault	00	Remote connection lost	Check connections and wiring. Replace Bus cable.
			01	Low communication mode	
10	E10	General Fault	00	General fault	Check all connections and wiring. Contact Invacare Technical Service.
11	E11	Incompatible/incorrect Remote	00	Incompatible/incorrect Remote	Wrong type of remote connected. Ensure the branding of the joystick matches that of controller unit.

MPJ+™ , PSR+, PSF+ Joysticks or Displays

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
<p>⚠ SPM L Park Brake Fault or ⚠ SPM R Park Brake Fault displays and wheelchair does not drive.</p>	Motor lock levers disengaged (Error code E9 or E10).	Engage motor lock levers. Refer to owner's manual shipped with wheelchair.
CHARGER PLUGGED IN displays.	Battery charger connected (Error code E28).	Unplug battery charger from the wheelchair. Refer to Charging Batteries on page 77.
⚠ SPM Battery Fault displays and the wheelchair does not drive.	Batteries need to be charged (Error code E14).	Charge batteries. Refer to Charging Batteries on page 77. If batteries fail to charge properly, check battery charger or replace batteries. Refer to Replacing Batteries on page 69.
⊘ JOYSTICK TIMEOUT displays and the wheelchair does not drive.	Joystick or input device is disconnected (Error code 32).	Turn off power, reconnect the joystick of input device and turn power on.
<p>⊘ JS REV TOO LARGE ⊘ JS FWD TOO LARGE ⊘ JS LFT TOO LARGE or ⊘ JS RGT TOO LARGE</p> <p>displays and the wheelchair does not drive.</p>	The joystick or input device is sending a value outside of the reverse, forward, left or right limits (Error codes E01, E02, E03 or E04).	Replace joystick or input device.
NEUTRAL TESTING displays.	The joystick neutral test has failed (Error code E18).	Release the joystick and try to get the joystick back into the center-most position.
⊘ BAD JOYSTICK CAL VALUES displays and the wheelchair does not drive.	The joystick calibration values are outside of the expected range (Error code E19).	Recalibrate the joystick (joystick throw procedure).
⚠ SPM NOT CONNECTED	The MPJ or Display module is not communicating with the control module (Error code E200).	Check the connections between the joystick or display and the controller. Turn the power off and then back on. Replace the controller if necessary.
⚠ SPM Communications Fault displays and the wheelchair drives slowly.	The controller has determined a fault during a previous turn-off process (Error code E41).	Turn the wheelchair off and back on.
ATTENDANT ACTIVE and  displays.	The Proportional or Digital Attendant control is active and can be used to drive the chair (Error code W05).	This is normal behavior.
Batteries draw excessive current when charging.	Battery failure.	Have batteries checked for shorted cell. Replace if necessary. Refer to Replacing Batteries on page 69
	Electrical malfunction.	Contact Invacare for service.

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Battery indicator flashes the charge level is low - immediately after recharge.	Battery failure.	Check batteries for shorted cell. Replace if necessary.
	Malfunctioning battery charger.	Replace charger.
	Electrical malfunction.	Contact Invacare for service.
Battery indicator flashes the charge level is low - too soon after being recharged.	Batteries not charged.	Have charger checked.
	Weak batteries.	Replace batteries if necessary. Refer to <u>Replacing Batteries</u> on page 69.
Motor “chatters” or runs irregular.	Electrical malfunction.	Contact Invacare for service.
Joystick erratic or does not respond as desired.	Damaged motor coupling.	Inspect motor coupling. Refer to <u>Removing/Installing the Gearbox Coupling</u> on page 44.
	Electrical malfunction.	Contact Invacare for service.
	Controller programmed improperly.	Check programming. See electronics manual.
Wheelchair does not respond to commands.	Poor battery terminal connection.	Have terminals cleaned.
Power indicator off - even after recharging.	Electrical malfunction.	Contact Invacare for service.

Troubleshooting - Motor/Gearbox/Brake

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Motor makes a clicking noise.	Bad coupler between motor and gearbox or bad bearings.	Replace coupler. If bearings are bad, replace motor.
	Raised commutator plate inside of motor.	Ohm out motor and replace motor if high reading is present. Normal reading is .5-5 Ohms.
Grinding noise or motor is locking up.	Bad gearbox. Bad coupler between motor and gearbox or bad bearings. Bad Gears.	Replace gearbox. Replace coupler. If bearings are bad, replace motor.
Motors stall and starts up again.	Current Rollback.	Stop driving and let electronics cool.
Wheelchair will not drive with power on (E09 or E10).	Check motor locks.	Engage motor locks to drive wheelchair.
Motor chatters or runs erratically, or only one motor turns.	Damaged connector or worn brushes.	Ohm out motors. Check brushes and replace brushes if necessary. Replace motor if high reading is present. Normal reading is .5-5 Ohms. 4 Pole ONLY.
	Bad motor or gear box	
	Controller malfunction.	Check for error codes with programmer. Refer to the MK6i Electronics Programming Guide, part number 1141471.
Wheelchair veers to the left or right when driving on level surface.	Uneven tire pressure. Motors out of balance.	Inflate tires. Replace tires if worn. Use programmer to balance motors.
E09/E10 error code will not go away.	Bad motor connection. Bad brake coil.	Check all connections. Ohm out each brake coil. Normal reading is 48-80 Ohms.
Gearbox is leaking Fluid.	Bad seal around drive shaft	If seal is bad, replace gearbox. Remove motor brushes and inspect for grease contamination. Replace motor if contamination is found. If loose hardware is found retighten hardware.
	Loose hardware.	
Excessive clicking coming from motor/gearbox.	Bad bearing in motor or gearbox.	Replace motor or gearbox.
	Loose wheel hardware.	Tighten hardware, (use removable Loctite® on hardware). Follow torque settings in this manual.
Gearbox shaft movement or bent shaft.	Rough driving.	Replace gearbox.
Motor Stutters.	Poor connection or worn brushes.	Check Anderson connectors. Check brushes and replace if necessary.
Motor Fails to start after initial installation.	Battery voltage is too low. Bad Connection. Brake Disengaged.	Check batteries and recharge if necessary. Check connector. Engage brake.

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Motor is running then fails to restart when stopped.	Heavy load on the motors forcing controller into the current rollback mode.	Leave power On and allow controller to count down, and recharge the wheelchair overnight with power On.
	Blown fuse in battery wiring harness.	Replace battery wiring harness.
	Damaged Motor.	Replace brushes if necessary, or replace motor if internal damage is determined.
		Ohm out motor to check for possible internal damage (worn out brushes may be possible).
	Controller power stage board or relays may be damaged.	Replace controller or send to Invacare for repair.
Motor runs but loses power.	Controller senses heavy load and has entered the current rollback mode.	Stop driving and let electronics cool.
Wheelchair loses all power while driving.	Bad Connection on wheelchair.	Turn power “Off”, wait 10 seconds and turn power back “On”. Check joystick connection Check battery connection and fuses

Troubleshooting - Battery

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Batteries won't charge.	Blown battery fuse or damaged cables/connectors. Batteries sat discharged too long.	Check cables and connectors for damage or replace battery wiring harness. Replace batteries.
Short Charge Time	One or both batteries may be bad (if batteries charge up to soon).	Check each battery and replace if needed.
No power to wheelchair motors.	Bad connection or blown fuse. Check Joystick connection.	Check all connections and housings for damage. If you have blown fuse a new battery wiring harness must be purchased.
	Batteries are dead.	Check battery voltage and replace if necessary.
	Loose battery connections	Check battery cable connections, may have vibrated loose when driving on rough terrain.
Corroded battery wiring connections.	Possible water, salt, or urine damage.	Replace battery wiring harness.
E14 Error code.	Low voltage	Recharge or replace batteries.

Troubleshooting - Battery Charger

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
No LED's on Charger	Charger not plugged into outlet, or disconnected from wiring harness on wheelchair.	Make sure the charger is plugged into the outlet and check the wiring on the wheelchair.
	No AC power at outlet.	Check for AC power with digital volt meter.
	Damaged power cord.	Check for damage on the power cord, replace if damaged or send in for repair.
	Charger LED's burnt out.	Send charger to Invacare for repair.
	Charger may have internal fuse that is blown.	Send charger to Invacare for repair.
Batteries won't charge.	Blown battery fuse in wiring harness.	Check battery wiring harness fuse on the wheelchair.
	Charger not plugged into outlet.	Make sure charger is plugged into the outlet.
	No AC power at the outlet.	Check for AC power with a digital volt meter.
	Charger Power cord may be damaged, or the connector may be damaged.	Check for damage and replace if necessary, or send in for repair.
	Charger may have internal damage.	Charge batteries with known good charger.
	Battery voltage too low for charger to start charging cycle.	Replace batteries.

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Batteries have short driving range during a single charge. Battery Gauge falls off faster than normal.	Consumer not charging batteries long enough.	Instruct consumer to charge for 8-10 hours minimum.
	Batteries may be weak.	Perform load test or check “Battery Quality Menu” with the programmer. Electronics Field Reference Guide, part number 1141471.
	Check programming settings.	Torque setting and power level setting may be too high. Refer to MK6i Electronics Field Reference Guide, part number 1141471.
	Heavy load on motors.	Chairs weight distribution may be offset (wheelchair may be front loaded).
E28 Error code.	Charger still plugged in when user tries to drive the wheelchair.	Unplug charger to drive wheelchair.

Checking Battery Charge Level

The following “Do’s” and “Don’ts” are provided for your convenience and safety.

DO	DON'T
Read and understand this manual and any service information that accompanies a battery and charger before operating the wheelchair.	Don't perform any installation or maintenance without first reading this manual.
Move the wheelchair to a work area before opening battery box or installing service batteries.	Don't perform installation or maintenance of batteries in an area that could be damaged by battery spills.
Recharge as frequently as possible to maintain a high charge level and extend battery life.	Don't make it a habit to discharge batteries to the lowest level.
Follow recommendations in this manual when selecting a battery or charger.	Don't use randomly chosen batteries or chargers.
Fully charge new batteries before using.	Don't put new batteries into service before charging.
Use a carrying strap to remove, move or install a battery.	Don't tip or tilt batteries.
Push battery clamps on the terminals. Spread clamps wider if necessary.	Don't tap on clamps and terminals with tools.
Use ONLY a GEL charger for a GEL battery or “Sealed” battery.	Don't mismatch your battery and chargers.

Field Load Test

NOTE: For this procedure, refer to FIGURE 3.1 on page 31.

NOTE: The following test can also be performed through the controller of the wheelchair along with a remote programmer. Refer to the electronics programming guide, part number 1141471 supplied with each wheelchair.

Old batteries lose their ability to store and release power, due to increased internal resistance. This means that as you try to take power from the battery, some of that power is used up in the process of passing through the battery, resulting in less voltage at the posts. The more power drawn, the lower the voltage available. When this lost voltage drops the output 1.25 volts under load (2.5 for a pair), replace the batteries.

To spot this problem, test batteries under load.

Use a digital voltmeter to check battery charge level at the charger connector. It is located on the joystick. If reading is 2.5 volts or less for a pair, the batteries must be charged.

NOTE: Read these instructions carefully and the manufacturer's instructions on the digital voltmeter before using the digital voltmeter.

NOTE: Invacare recommends that only a qualified technician perform this test.

1. Ensure that power is Off.
2. Make sure battery is fully charged. An extremely discharged battery will exhibit the same symptoms as a bad one.
3. Remove the footrests from the wheelchair. Refer to owner's manual shipped with wheelchair.
4. Connect the voltmeter leads to the charger port on the wheelchair as shown in FIGURE 3.1.

NOTE: Most digital voltmeters are not affected by polarity, however, analog meters (meters with swinging needles) can be and should be used carefully. A good meter reading should be 25.0 to 26 VDC.

⚠ WARNING

When performing STEPS 5 and 6 ensure feet are clear from casters and stationary object - otherwise injury may result

5. Sit in wheelchair and place feet against a door jam, workbench or other stationary object.
6. Turn the power On and carefully push the joystick forward, trying to drive the wheelchair through the stationary object.

NOTE: This puts a heavy load on the batteries as they try to push through the stationary object. If the wheels spin, have two individuals (one on each arm) apply as much downward pressure as possible on the arms of the wheelchair.

7. Read the meter while the motors are straining, no longer than 3-4 seconds, to determine the voltage under load.

NOTE: If the voltage drops more than 2.5 volts from a pair of fully charged batteries while under load, they should be replaced regardless of the unloaded voltages. Refer to Replacing Batteries on page 69.

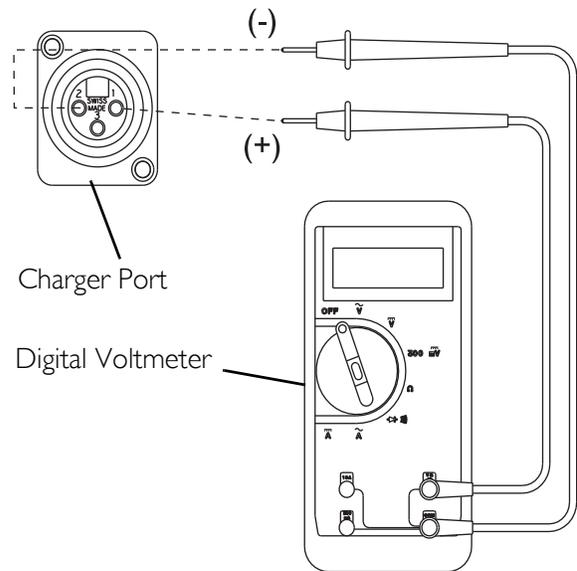


FIGURE 3.1 Field Load Test

Motor Testing

NOTE: For this procedure, refer to FIGURE 3.2.

1. On the 4-pin motor connector, locate the two contacts in the red and black housings.
2. Set the digital multimeter to measure resistance in ohms (Ω).
3. Measure the resistance between the two motor contacts.

NOTE: A normal reading is between .5 to 5 ohms. A reading of O.L. (open line) or in excess of 15 ohms indicates a problem. High readings are generally caused by bad connections and/or damaged brushes. Contact Invacare.

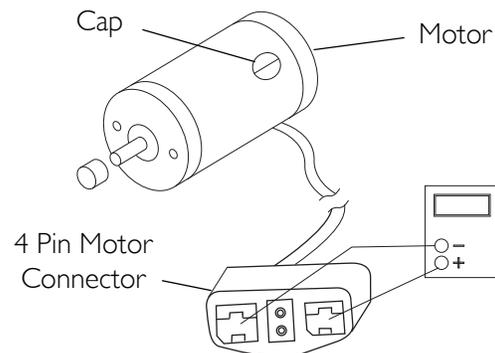


FIGURE 3.2 Motor Testing

Motor Brush Inspection and/or Replacement

NOTE: For this procedure, refer to FIGURE 3.3 on page 33.

NOTE: There is one contact brush under each brush cap on the motor housing. There are four motor brushes on a 4 pole motor and two motor brushes on a 2 pole motor.

NOTE: If the brush caps are hard to remove they are either overtightened or the motor has become very hot. Allow 30 minutes for motors to cool. If brush caps still cannot be removed, it is recommended that the motor be sent to Invacare Technical Services for inspection/repair at the address located on the back cover of this manual.

1. Turn the power off.
2. Disengage the motors.
3. Locate a brush cap on the motor. See Detail “A” in FIGURE 3.3.
4. Remove the brush cap with a flat head screwdriver.
5. Pull the motor brush partially out of the brush holder. See Detail “B” in FIGURE 3.3.

NOTE: If not installing a new motor brush, it is very important to note which way the existing motor brush comes out of the motor. The existing motor brush MUST be placed into the motor exactly the same way to ensure good contact with the commutator.

6. Place a temporary mark on the motor casting and on the top of the motor brush to indicate the orientation.
7. Remove the motor brush from the brush holder.
8. Inspect the motor brush thoroughly for excessive wear or chips in the brush and any discoloration in the shunt wire.
9. Perform one of the following:
 - If motor brush is in good condition, (i.e., the end of the brushes are smooth and shiny, the spring is not damaged or discolored, and shunt wire is not discolored) perform the following:
 - i. Install existing motor brush into brush holder exactly the same way it was pulled out using the marks as reference points.
 - ii. Install motor brush cap.

NOTE: Tighten and loosen motor brush cap a couple times to ensure proper seating of the motor brush.

- If motor brush is in bad condition (brush is worn or damaged) replace immediately by performing the following:
 - i. Install new motor brush into brush holder.
 - ii. Install motor brush cap.

NOTE: This process, also called Brush Burn-in or Finger Printing Process, is necessary to seat the brush to the commutator plates inside the motor for optimum performance of the motor.

⚠ WARNING

DO NOT leave the wheelchair unattended while performing this procedure - otherwise damage to wheelchair and/or property may occur.

NOTE: This procedure MUST be performed with little or no load on the motor.

iii. Put the wheelchair on blocks so that the drive wheels do not contact the ground.

NOTE: For STEPS iv and vi, use a rubber band to hold the driver control in the direction needed or program the chair for latched driving. Refer to the electronics manual for latched programming instructions.

iv. Run the motors forward for one hour.

v. Turn motors off and allow 30 minutes for motors to cool off.

vi. Run the motors in reverse for one hour.

vii. When process is complete, remove wheelchair from blocks and test drive the wheelchair.

NOTE: If wheelchair still does not perform properly, call Invacare Technical Service at 1-800-832-4707.

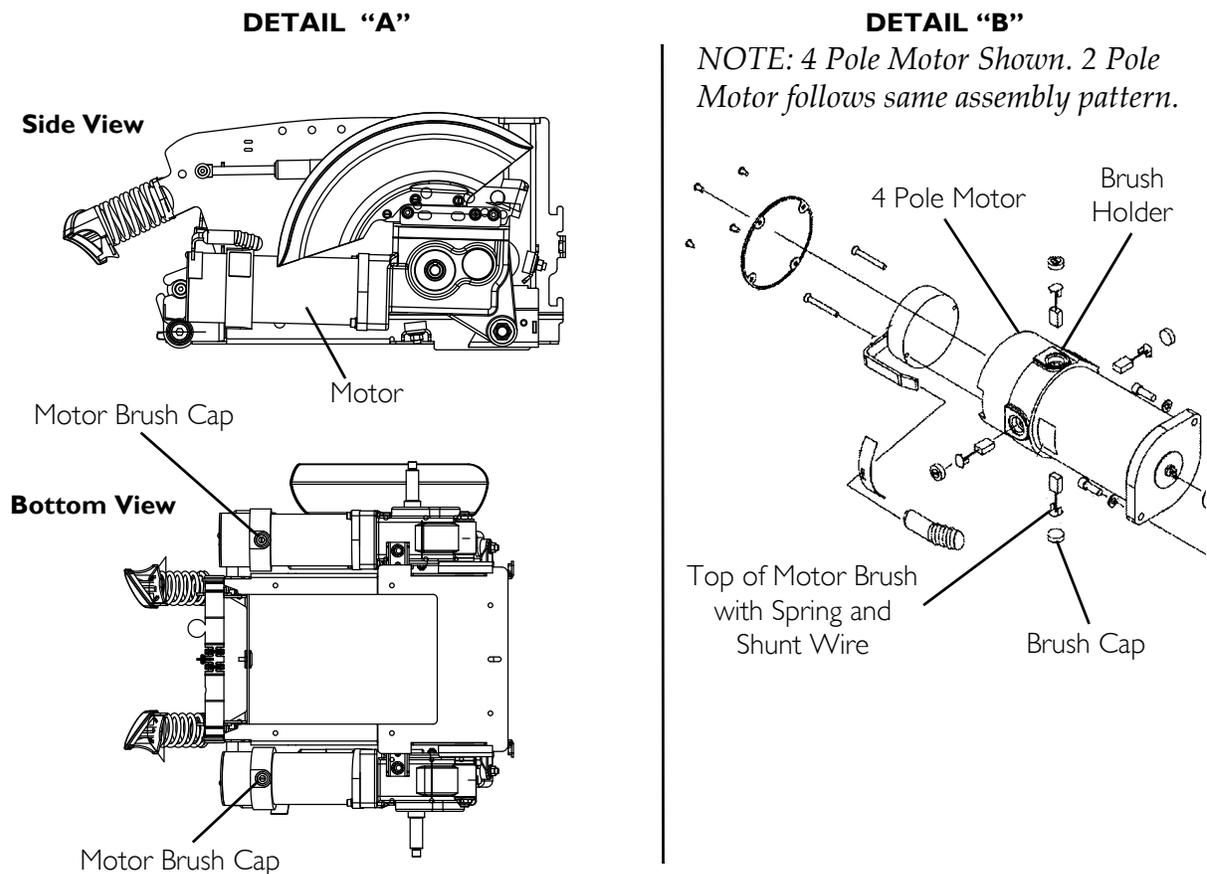


FIGURE 3.3 Motor Brush Inspection and/or Replacement

Electro-Mechanical Parking Brake Testing

NOTE: For this procedure, refer to FIGURE 3.4.

NOTE: This procedure should only be performed on wheelchairs with conventional motor/gearbox assembly.

1. On the four-pin motor connector, locate the side by side connectors in the black housings.
2. Set the digital multimeter to read ohms.
3. Measure the resistance between the two brake contacts. A normal reading is between 40-80 ohms depending on the motor.

NOTE: A reading of 0 ohms (Ω) or a very high reading; i.e., mohms or O.L. (Open Line) indicates a shorted brake or an open connection respectively. If either condition exists, send the motor to Invacare Technical Service for inspection/repair.

⚠ WARNING

A shorted electro-mechanical brake will damage the brake output section in the controller. DO NOT connect a shorted electro-mechanical brake to a good controller module. A shorted brake MUST be replaced.

NOTE: A bad motor can damage the controller module but a bad controller will NOT damage a motor.

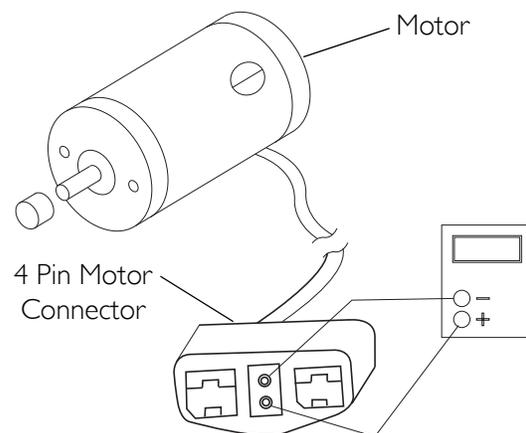


FIGURE 3.4 Electro-Mechanical Parking Brake Testing

SECTION 4—WHEELS AND WHEEL LOCKS

Removing/Installing the Drive Wheel

NOTE: For this procedure, refer to FIGURE 4.1 on page 36.

Removing

1. Remove the batteries. Refer to Removing/Installing the Batteries From/Into the Wheelchair on page 71.
2. Place two 5-inch blocks under battery frame to lift frame off the ground for ease in performing this procedure.
3. Perform one of the following:
 - To Remove the Drive Wheel Only -
 - i. Remove the five 5/16-18 x .88-inch cap screws securing the drive wheel to the wheel hub.
 - ii. Remove the drive wheel from the motor/gearbox assembly.
 - To Remove the Drive Wheel and Wheel Hub -
 - i. Remove the five 5/16-18 x .88-inch cap screws securing the drive wheel to the wheel hub.
 - ii. Remove the drive wheel from the motor/gearbox assembly.
 - iii. Remove the 1/2-20 locknut and .511/.501 x 1.290 x .12 flat washer securing the wheel hub to the motor/gearbox assembly.
 - iv. Remove the wheel hub from the motor/gearbox assembly.
 - v. Remove the 3/16 x 1-1/4-inch key from the drive shaft.

Installing

1. Perform one of the following:
 - To Install the Drive Wheel Only -
 - i. Secure the drive wheel to the wheel hub with the five 5/16-18 x .88-inch cap screws. Torque to 160 in-lbs.
 - To Install the Drive Wheel and Wheel Hub -
 - i. Insert the 3/16 x 1-1/4-inch key into the keyway of the drive shaft.

CAUTION

DO NOT apply more than a 1-inch (in length) thin film of anti-seize compound to the drive shaft. Applying more than 1-inch (in length) can cause the anti-seize compound to leak resulting in damage to flooring (carpet, tile, etc.).

- ii. Apply a thin film of anti-seize compound one inch in length to the end of the drive shaft.
- iii. Place the wheel hub onto the drive shaft.

NOTE: Align the slot in the wheel hub with the key on the drive shaft.

NOTE: While installing the wheel hub onto the drive shaft, spin the wheel hub to evenly distribute the anti-seize compound over the entire drive shaft.

- iv. Using the 1/2-20 locknut and .511/.501 x 1.290 x .12 flat washer, secure the wheel hub to the drive shaft.
 - v. Secure the drive wheel to the wheel hub with the five 5/16-18 x .88-inch cap screws. Torque to 160 in-lbs.
2. Remove the 5-inch blocks from under the wheelchair frame.
 3. Install the batteries. Refer to [Removing/Installing the Batteries From/Into the Wheelchair](#) on page 71.
 4. If wheelchair is equipped with pneumatic tires, inflate tire to proper tire pressure located on the side wall of the tire.

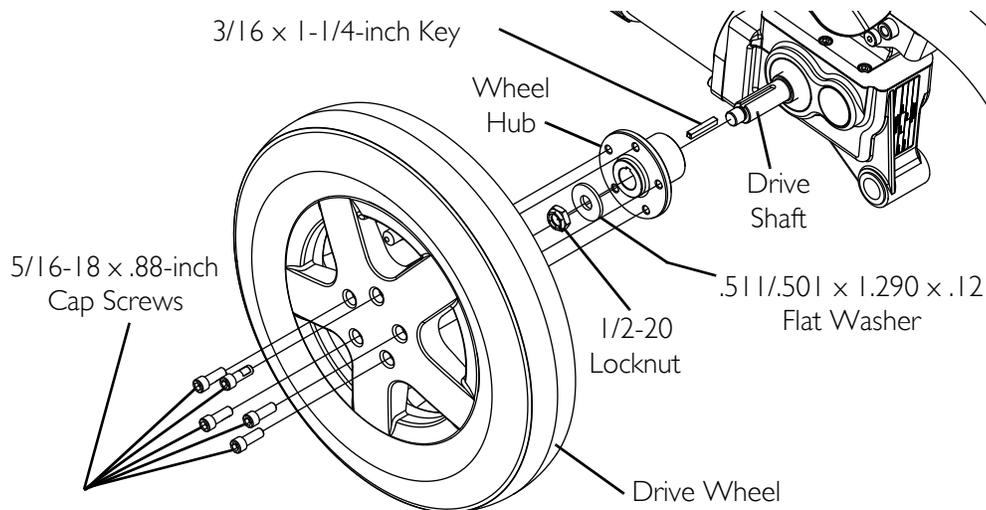


FIGURE 4.1 Removing/Installing the Drive Wheel

Removing/Installing the Rim and Tire

NOTE: For this procedure, refer to FIGURE 4.2 on page 37.

Removing

1. Remove the 14 x 3-inch drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.

⚠ DANGER

If wheelchair is equipped with pneumatic tires, deflate the tire before removing rim. Otherwise, the rim and hardware will become projectiles and cause serious personal injury and/or damage to surrounding property.

2. Remove the five 5/16-18 x 7/8-inch hex head cap screw with patch that secure the inside rim to the outside rim.
3. Remove the inside rim and tire.

Installing

1. Place the outside rim against one side of the tire.
2. Place the inside rim against the other side of the tire.

NOTE: Align the mounting holes in the inside rim with the mounting holes in the outside rim.

3. Secure the inside rim and the outside rim to the tire with the five 5/16-18 x 7/8-inch hex head cap screw with patch. Torque to 13 ft-lbs \pm 20%.
4. Install the 14 x 3-inch drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.

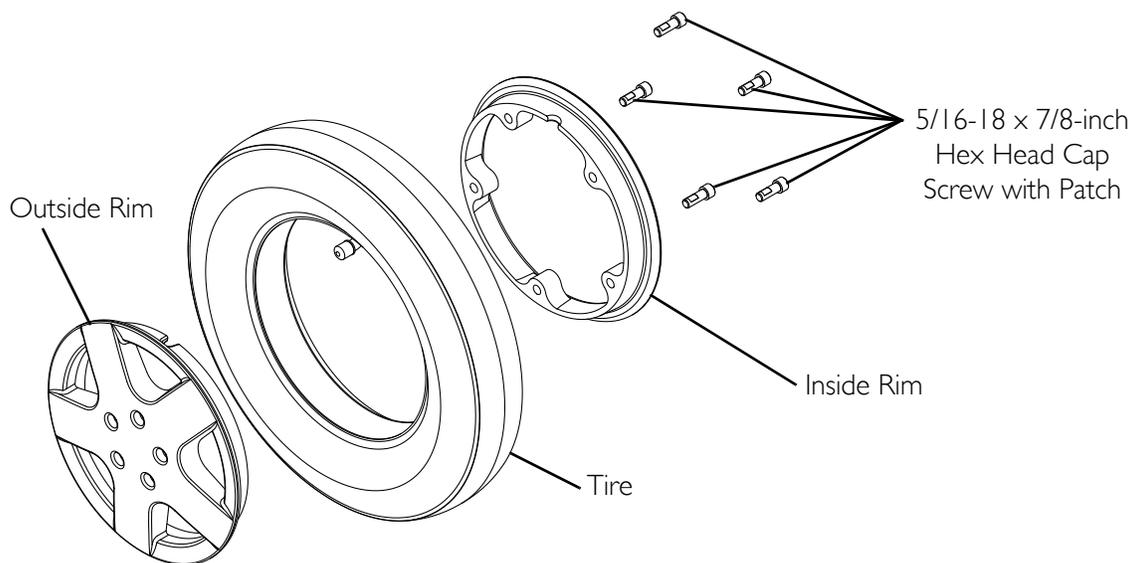


FIGURE 4.2 Removing/Installing the Rim and Tire

Replacing the Front/Rear Casters

Two Sided Fork

NOTE: For this procedure, refer to FIGURE 4.3.

NOTE: Front and rear casters are replaced in the same manner.

NOTE: When replacing the front/rear caster assemblies, it is necessary to brace the caster assemblies to prevent the wheel from spinning.

1. Remove the 7/16-20 x 3-1/4-inch hex head screw, two 15/32 x 5/8 x 3/64-inch washers and 7/16-20 locknut that secure the existing caster to the fork.
2. Remove the existing caster and discard.
3. Using the 7/16-20 x 3-1/4-inch hex head screw, two 15/32 x 5/8 x 3/64-inch washers and 7/16-20 locknut, secure the new caster to the fork. Torque to 13 ft-lbs \pm 20%.

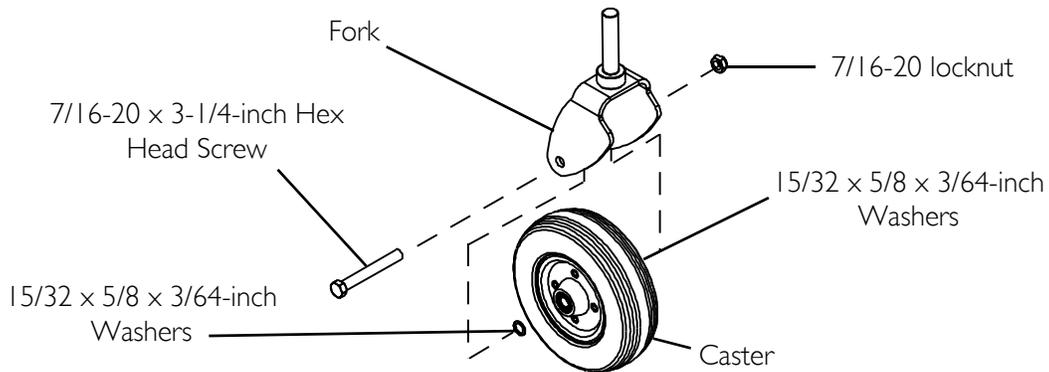


FIGURE 4.3 Replacing the Front/Rear Casters - Two Sided Fork

Single Sided Fork

NOTE: For this procedure, refer to FIGURE 4.4.

NOTE: Front and rear casters are replaced in the same manner.

NOTE: When replacing the front/rear caster assemblies, it is necessary to brace the caster assemblies to prevent the wheel from spinning.

1. Remove the two M6 x 1 x 45MM Phillips® counter sunk screws and M6 x 1 locknuts securing the hub cap to the caster.
2. Remove the cotter pin, 7/16-20 hex slotted nut the 15/32 x 5/8 x 3/64-inch washer, and 5/8 x 7/8 x 1/8-inch washer securing the existing caster to the single sided fork.
3. Remove the existing caster and discard.
4. Place new caster onto the single sided fork.
5. Using the cotter pin, 7/16-20 hex slotted nut, the 15/32 x 5/8 x 3/64-inch washer, and 5/8 x 7/8 x 1/8-inch washer, secure the new caster to the fork.
6. Using the two M6 x 1 x 45MM Phillips counter sunk screws, and M6 x 1 locknuts, secure the hub cap to the caster. Torque to 40 in-lbs ± 20%.

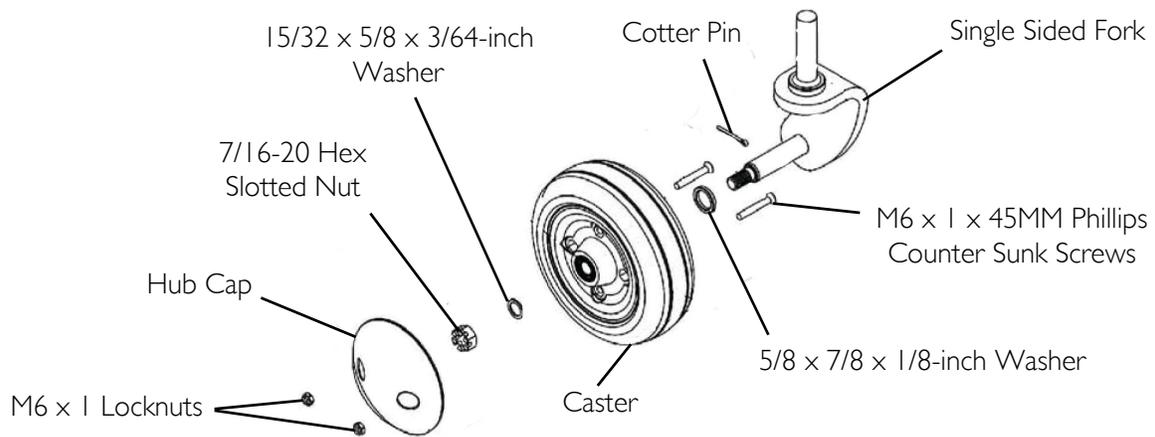


FIGURE 4.4 Replacing the Front/Rear Casters - Single Sided Fork

Adjusting Caster Assembly

NOTE: For this procedure, refer to FIGURE 4.5.

NOTE: Front and rear caster assemblies are adjusted in the same manner.

1. Remove the head tube cover from the head tube.
2. To properly tighten caster assembly and guard against flutter, perform the following check:

NOTE: Two people are recommended to perform this STEP - one to tip wheelchair back and one to inspect/adjust the caster assembly.

- A. Tip back the wheelchair.
 - B. Pivot both caster assemblies to top of their arc simultaneously.
 - C. Let casters drop to bottom of arc (casters should swing once to one-side, then immediately rest in a straight downward position).
 - D. Adjust 5/8-1/8-inch locknuts according to freedom of caster swing.
3. Test wheelchair for maneuverability.
 4. Readjust 5/8-1/8-inch locknuts if necessary, and repeat STEPS 2-3 until correct.
 5. Snap head tube cover into the caster head tube, ensuring that the head tube cover fits securely.

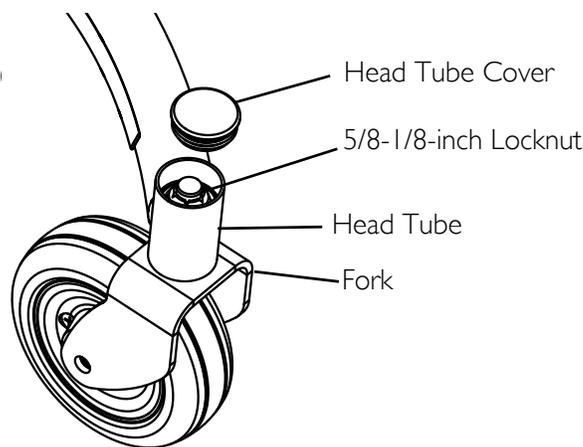


FIGURE 4.5 Adjusting Caster Assembly

Removing/Installing the Caster Assemblies

NOTE: For this procedure, refer to FIGURE 4.6.

NOTE: Front and rear caster assemblies are replaced in the same manner.

Removing

1. Remove the head tube cover from the head tube.
2. Remove the 5/8-1/8 locknut, 5/8 x 1-5/16 x 1/8-inch washer and 5/8 x 1-1/8 x 3/16-inch stem spacer from the threaded post securing the caster assembly to the headtube.
3. If necessary, remove the two bearings and tolerance bearings from the head tube.

Installing

1. If necessary, insert the two bearings and tolerance bearings into the head tube.
2. Insert the threaded post of the caster assembly into the head tube.
3. Using the 5/8-1/8 locknut, 5/8 x 1-5/16 x 1/8-inch washer and 5/8 x 1-1/8 x 3/16-inch stem spacer, secure the caster assembly to the headtube.
4. Adjust the caster assembly. Refer to [Adjusting Caster Assembly](#) on page 40.
5. Insert the head tube cover into the head tube.

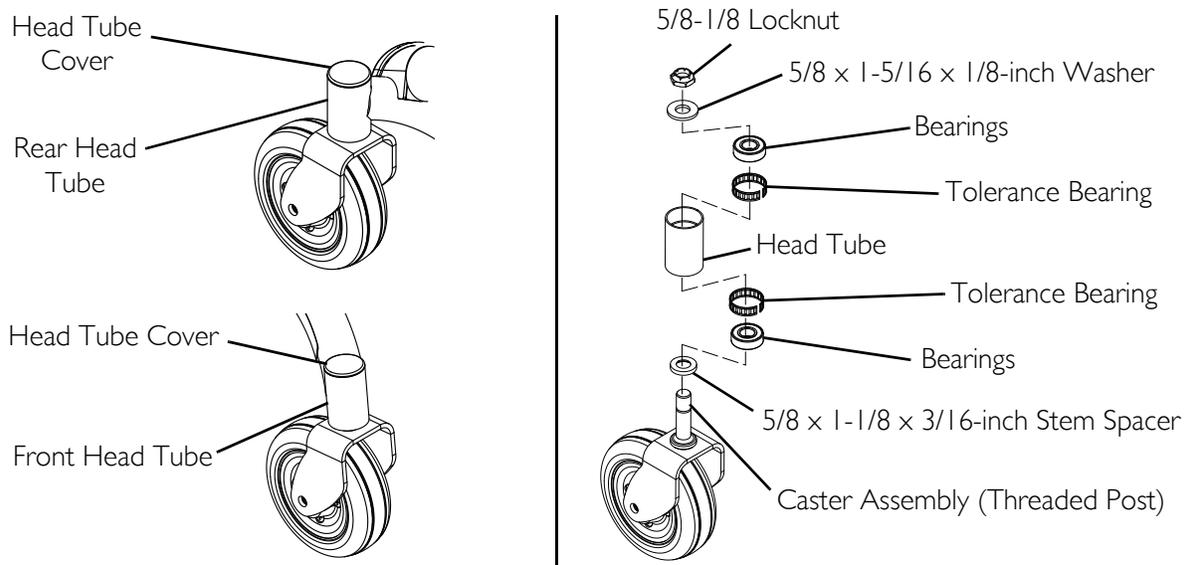


FIGURE 4.6 Removing/Installing the Caster Assemblies

Removing/Installing the Wheel Lock

NOTE: For this procedure, refer to FIGURE 4.7.

Removing

1. Remove the drive wheel. Refer to Removing/Installing the Drive Wheel on page 35.
2. Remove the two 5/16-18 x .88-inch hex head cap screws, .330 x .625 x .050-inch flat washers and 5/16-18 locknuts that secure the wheel lock to the wheel lock bracket.
3. Remove the wheel lock from the wheel lock bracket.
4. If necessary, remove the wheel lock bracket. Refer to Removing/Installing the Wheel Lock Bracket on page 43.

Installing

1. If necessary, install the wheel lock bracket. Refer to Removing/Installing the Wheel Lock Bracket on page 43.
2. Position the wheel lock onto the wheel lock bracket.
3. Secure the wheel lock to the wheel lock bracket using the two 5/16-18 x .88-inch hex head cap screws, .330 x .625 x .050-inch flat washers and 5/16-18 locknuts. Torque to 13 ft-lbs \pm 20%.
4. Install the drive wheel. Refer to Removing/Installing the Drive Wheel on page 35.

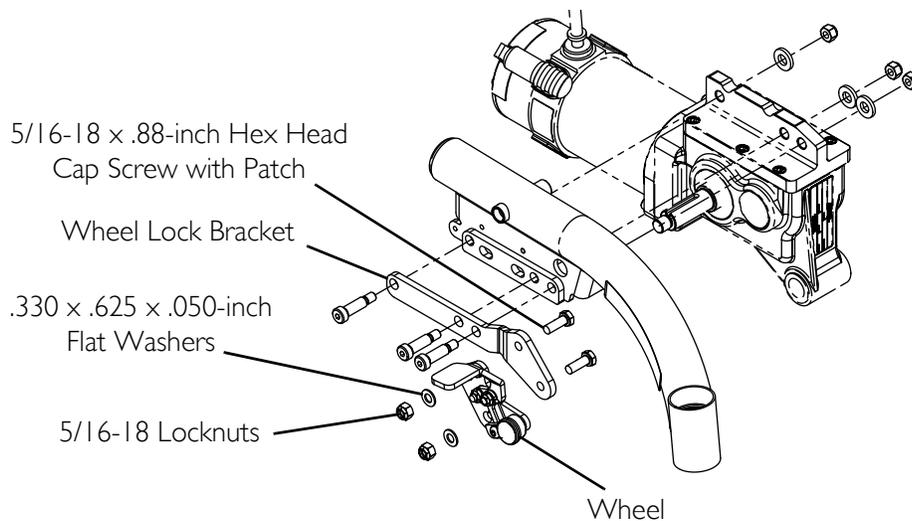


FIGURE 4.7 Removing/Installing the Wheel Lock

Removing/Installing the Wheel Lock Bracket

NOTE: For this procedure, refer to FIGURE 4.8.

NOTE: If replacing the wheel lock bracket only, remove the wheel lock from the wheel lock bracket before performing this procedure. Refer to Removing/Installing the Wheel Lock on page 42.

Removing

1. Remove the walking beam assembly. Refer to Removing/Installing the Walking Beam Assembly on page 51.
2. Remove the three 3/8 x 1.25-inch shoulder screws, 7/16 x 13/16 x 1/8-inch washers and 5/16-18 locknuts securing the wheel lock bracket and motor to the walking beam.
3. Remove the wheel lock bracket from the walking beam.

Installing

NOTE: Follow STEPS 1-6 if wheel lock and wheel lock bracket was not previously installed. If the wheel lock bracket has already been removed, proceed to STEP 3.

1. Remove the walking beam assembly. Refer to Removing/Installing the Walking Beam Assembly on page 51.
2. Remove the three 3/8 x 1.00-inch shoulder screws, 7/16 x 13/16 x 1/8-inch washers and 5/16-18 locknuts securing the wheel lock bracket and walking beam to the motor.
3. Align the replacement wheel lock bracket with the three mounting holes of the walking beam and motor.

NOTE: If wheel lock and wheel lock bracket was not previously installed you will need to replace the three 3/8 x 1.00-inch shoulder screws with three 3/8 x 1.25-inch shoulder screws.

4. Using the three 3/8 x 1.25-inch shoulder screws, 7/16 x 13/16 x 1/8-inch washers and 5/16-18 locknuts, secure the wheel lock bracket and motor to the walking beam. Torque to 13 ft-lbs ± 20%.
5. Install the wheel lock. Refer to Removing/Installing the Wheel Lock on page 42.
6. Install the walking beam assembly. Refer to Removing/Installing the Walking Beam Assembly on page 51.

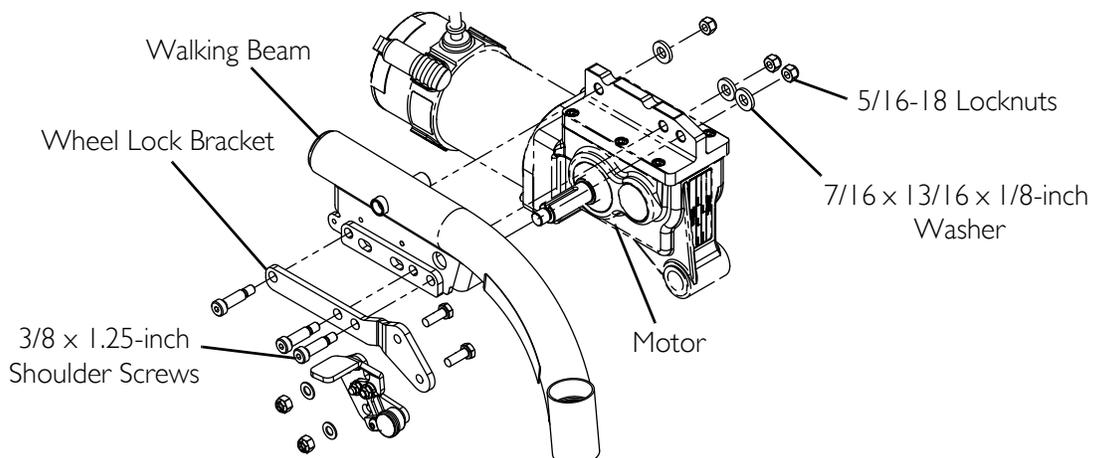


FIGURE 4.8 Removing/Installing the Wheel Lock Bracket

SECTION 5—MOTORS

Removing/Installing the Motor

NOTE: For this procedure, refer to FIGURE 5.1.

NOTE: Reverse this procedure to install the motor.

1. Remove the motor and walking beam assembly from the wheelchair base frame. Refer to Removing/Installing the Walking Beam Assembly on page 51.
2. Remove the fender assembly from the walking beam. Refer to Removing/Installing the Fender Assembly on page 54.

NOTE: If the wheel lock support bracket is installed, then three 3/8 x 1.25-inch shoulder screws secure the wheel lock and motor to the walking beam. If wheel lock support bracket is not installed, then three 3/8 x 1.00-inch shoulder screws are used.

3. Remove the three shoulder screws, 7/16 x 13/16 x 1/8-inch washers and 5/16-18 locknuts securing the motor (and the wheel lock support bracket if installed) to the walking beam.
4. Remove the motor from the walking beam.

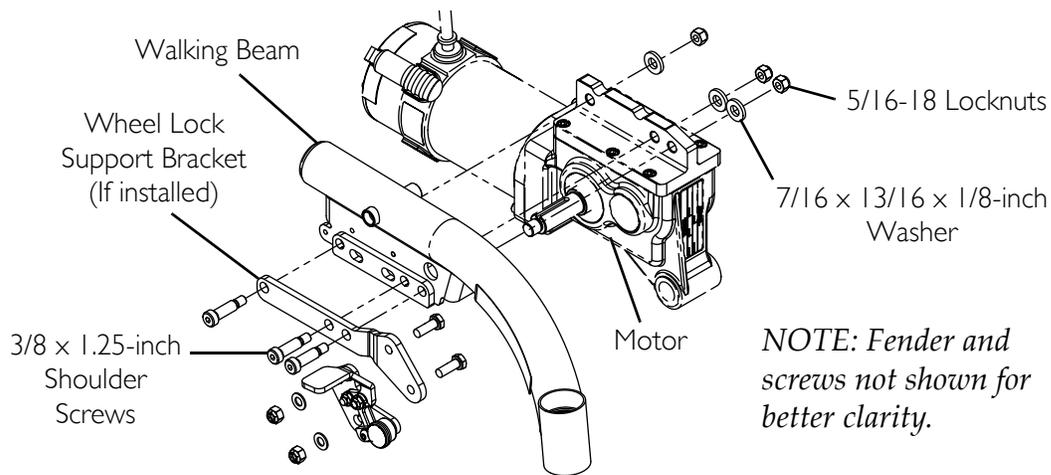


FIGURE 5.1 Removing/Installing the Motor

Removing/Installing the Gearbox Coupling

NOTE: For this procedure, refer to FIGURE 5.2 on page 45.

Removing

1. Remove the drive motor. Refer to Removing/Installing the Motor on page 44.
2. Disconnect the motor connector from the controller (not shown).
3. Cut tie-wraps that secure the motor cable to the battery box.

4. Remove the fender. Refer to [Removing/Installing the Fender Assembly](#) on page 54.
5. Remove the two M6 x 1 x 20-mm socket head cap screws and 1/4-inch lock washers that secure the motor to the gearbox.

CAUTION

DO NOT damage the motor/gearbox coupling.

6. Carefully pull the motor away from the gearbox.
7. Remove the existing gearbox coupling from the gearbox input shaft.

Installing

1. Install new gearbox coupling onto gearbox input shaft, inserting gearbox coupling drive plate onto slot in shaft. Torque to 75 in-lbs.

NOTE: The slots on the motor, gearbox coupling and gearbox MUST be aligned for proper installation.

2. Carefully align the motor with the gearbox coupling and place the motor against the gearbox. Torque to 75 in-lbs.
3. Turn gearbox drive shaft until the gearbox coupling seats into the gearbox. Torque to 280 in-lbs
4. Install two M6 x 1 x 20-mm socket head cap screws and 1/4-inch lock washers. Torque to 75 in-lbs.
5. To install the motor assembly. Refer to [Removing/Installing the Motor](#) on page 44.
6. Route and secure the motor cables. Refer to [Routing/Securing Motor Cables](#) on page 82.
7. Connect the motor connector to the controller.
8. Install the drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.

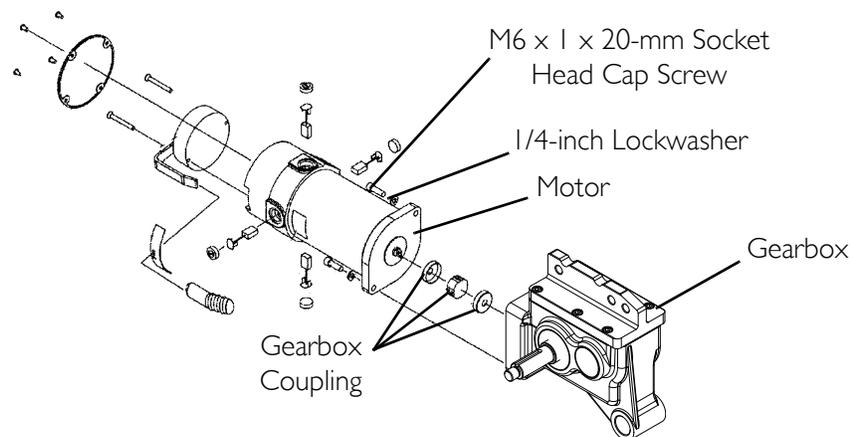


FIGURE 5.2 Removing/Installing the Gearbox Coupling

Removing/Installing the SSD Motor/Gearbox Assembly

NOTE: For this procedure, refer to FIGURE 5.3 on page 47.

Removing the SSD Motor/Gearbox Assembly

1. Place the wheelchair in a well ventilated area where work can be performed without risking damage to carpeting or floor covering.
2. Verify the joystick On/Off switch is in the Off position.
3. Place two 5-inch blocks under battery frame to lift frame off the ground for ease in performing this procedure.
4. Remove the rear shroud. Refer to Removing/Installing the Wheelchair Shrouds on page 63.
5. Remove the drive wheel. Refer to Removing/Installing the SSD Motor Drive Wheel/Wheel Hub on page 47.

NOTE: Take note of position and orientation of tie-wraps securing wiring to the wheelchair before cutting tie-wraps that secure the motor wiring to the wheelchair base frame. Wiring must be reinstalled and secured in the same position and orientation as it was removed from.

6. Cut and remove any tie-wrap securing the motor cable to the wheelchair base frame and other cables.
7. Disconnect the motor cable from the controller.
8. Remove the four hex head screws securing the motor/gearbox assembly to the suspension arm.
9. Remove the motor/gearbox from the suspension arm.
10. If necessary. Repeat STEPS 5-9 to remove the remaining motor/gearbox.

Installing the SSD Motor/Gearbox Assembly

1. Perform one of the following -
 - If replacing the entire motor/gearbox assembly perform the following:
 - i. Ensure the new motor is properly indexed to gearbox. Refer to Aligning the SSD Motor to the Gearbox on page 49.
 - ii. Install the brake lever. Refer to Installing the SSD Brake Lever on page 50.
 - iii. Install the brake lever push/drive label. Refer to Installing the SSD Motor Push/Drive Label on page 50.
 - iv. Reverse STEPS 3-9 to reinstall motor/gearbox of Removing the SSD Motor/Gearbox Assembly on page 46.
 - If replacing the motor or gearbox perform the following:
 - i. Replace the motor or gear box. Refer to Replacing the SSD Motor or Gearbox Only on page 47.

- ii. Reverse STEPS 3-9 to reinstall motor/gearbox of Removing the SSD Motor/Gearbox Assembly on page 46.

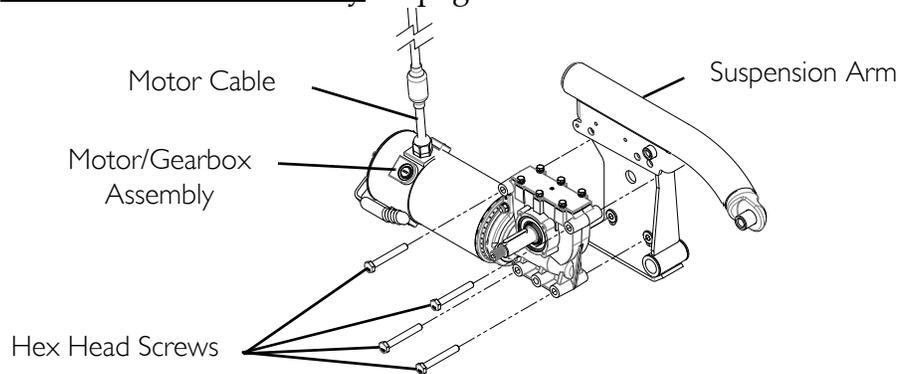


FIGURE 5.3 Removing/Installing the SSD Motor/Gearbox Assembly

Removing/Installing the SSD Motor Drive Wheel/Wheel Hub

NOTE: For this procedure, refer to FIGURE 5.4

NOTE: Reverse this procedure to install the drive wheels.

1. Place two 5-inch blocks under battery frame to lift frame off the ground for ease in performing this procedure.
2. Remove the five mounting screws securing the drive wheel to the wheel hub.
3. Remove the drive wheel from the wheel hub.
4. If necessary, remove the locknut, washer, wave washer and 5mm spacer securing the wheel hub on the drive shaft.
5. If necessary, repeat STEPS 2-3 to remove the remaining drive wheel.

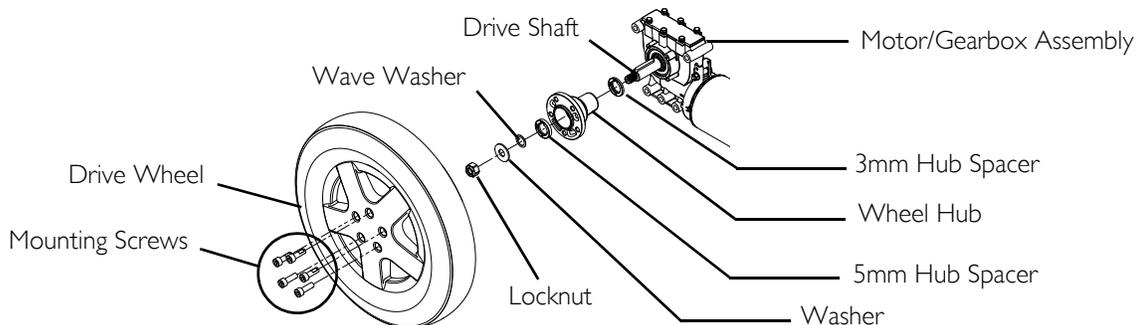


FIGURE 5.4 Removing/Installing the SSD Motor Drive Wheel/Wheel Hub

Replacing the SSD Motor or Gearbox Only

NOTE: For this procedure, refer to FIGURE 5.5.

NOTE: Take note of the position and orientation of the motor in relation to the gearbox before separating the motor from the gearbox.

1. Remove the square neck bolt, spacer, washer and locknut securing the band clamp to the motor/gearbox assembly.
2. Pulling the band clamp open, remove the existing band clamp from the motor/gearbox assembly. Discard existing band clamp.
3. Firmly gripping the motor and the gearbox, pull to separate the motor from the gearbox.
4. Remove the existing coupling from between the motor and the gearbox.
5. Discard the existing coupling and either the existing motor or gearbox depending on which is being replaced.
6. Insert the new coupling onto the motor drive shaft.
7. Align the gearbox drive shaft with the new coupling.
8. Twist the motor to the proper alignment to the gearbox. Refer to [Aligning the SSD Motor to the Gearbox](#) on page 49.
9. Push the motor into the gearbox.

NOTE: When installing the new band clamp, it may be necessary to pull the band clamp open to slide the new band clamp around the motor/gearbox.

10. Use the new band clamp, and the existing square neck bolt, spacer, washer and locknut to secure the motor to the gearbox. Torque locknut to 75 in-lbs \pm 10%.
11. If replacing the motor, install the brake lever. Refer to [Installing the SSD Brake Lever](#) on page 50.

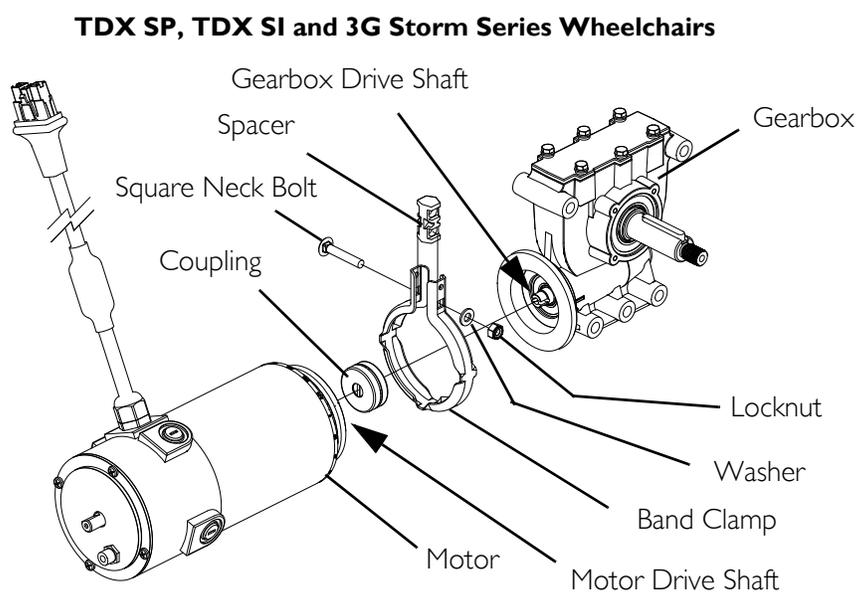
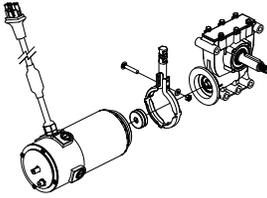
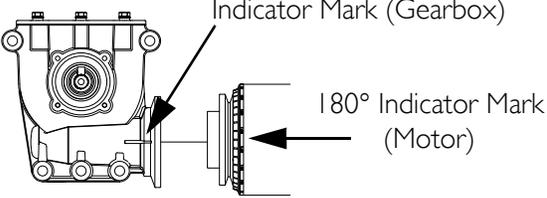
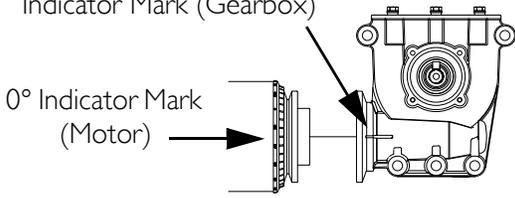


FIGURE 5.5 Replacing the SSD Motor or Gearbox Only

Aligning the SSD Motor to the Gearbox

1. If adjusting an assembled motor/gearbox, loosen the square neck bolt, spacer, washer and locknut securing the band clamp to the motor/gearbox assembly.
2. Align the motor to the gearbox according to the table below:

WHEELCHAIR	
TDX SP - 4 POLE	
	
LEFT SIDE	RIGHT SIDE
	

3. If adjusting an assembled motor/gearbox, securely tighten the square neck bolt, spacer, washer and locknut. Torque locknut to 75 in-lbs \pm 10%.

Installing the SSD Brake Lever

NOTE: For this procedure, refer to FIGURE 5.6.

NOTE: Brake levers are right and left side specific. Brake levers MUST mount to the brake lever post as described in STEP 2 and shown in FIGURE 5.6 to ensure the proper brake lever has been mounted to the correct motor.

1. Locate the brake lever post on the end of the motor opposite the gearbox.
2. Align the brake lever with the brake lever post so that:
 - The brake lever handle will be positioned towards the outside of the wheelchair.
 - The set screw will tighten against the flat space of the brake lever post.
 - The cut out on the bottom edge of brake lever will fit around the brake lever stop.
3. Securely tighten the set screw securing the brake lever to the brake lever post.
4. If necessary, perform STEPS 1-3 to install the remaining brake lever.

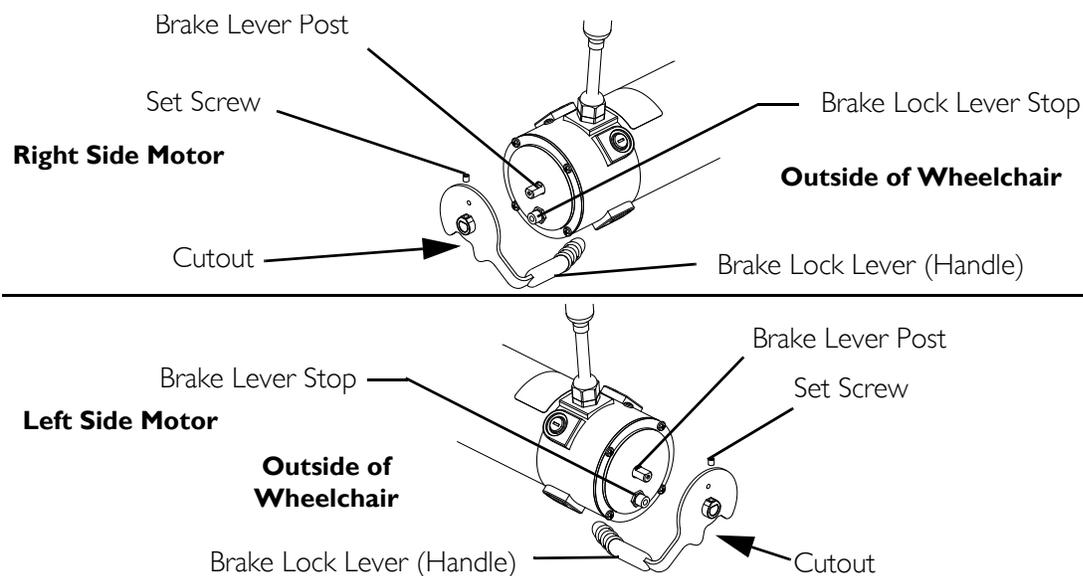


FIGURE 5.6 Installing the SSD Brake Lever

Installing the SSD Motor Push/Drive Label

NOTE: For this procedure, refer to FIGURE 5.7.

1. Peel the label from the adhesive backing.
2. Position the label on the motor near the brake lever as shown.
3. If necessary, repeat STEPS 1-2 for opposite motor to install the remaining label.

NOTE: Right side motor shown, use same location for left side motor.



FIGURE 5.7 Installing the SSD Motor Push/Drive Label

SECTION 6—SIDE FRAME

Removing/Installing the Walking Beam Assembly

NOTE: For this procedure, refer to FIGURE 6.1 on page 52.

NOTE: These procedures apply to both sides of the wheelchair.

NOTE: It is recommended that an assistant be present when lifting the wheelchair frame.

Removing the Walking Beam Assembly

1. Remove batteries. Refer to Replacing Batteries on page 69.
2. Place two 5-inch blocks under battery frame to lift frame off the ground for ease in performing this procedure.
3. Remove the drive wheel. Refer to Removing/Installing the Drive Wheel on page 35.
4. Disconnect the motor connector from the controller.

NOTE: Take note of position and orientation of tie-wraps and wiring prior to removing tie-wraps.

5. Cut tie-wraps securing the motor cable to the base frame.
6. Remove the 1/4-20 locknut securing the 5/16 x 2.25-inch socket head shoulder screw and the stability assist cylinder to the walking beam.
7. Pull the 5/16 x 2.25-inch socket head shoulder screw out away from the base frame and the stability assist cylinder to free the stability assist cylinder from the walking beam assembly.
8. Position the stability assist cylinder against the wheelchair frame.
9. Remove 1/2-20 locknut and .505 x 1.124 x .100-inch washer securing the motor with attached walking beam assembly to the walking beam mounting pin located on the base frame.

NOTE: A coved spacer is located between the walking beam assembly and the base frame.

10. Remove the motor with attached walking beam assembly and coved spacer from the walking beam mounting pin.

NOTE: To remove the motor from the walking beam assembly, Refer to Removing/Installing the Motor on page 44.

Installing the Walking Beam Assembly

1. Insert the 5/16 x 2.25-inch socket head shoulder screw into the walking beam assembly facing toward the battery box.
2. Place the .31 x .69 nylon washer onto the 5/16 x 2.25-inch socket head shoulder screw.
3. Position the stability assist cylinder against the walking beam assembly in line with the 5/16 x 2.25-inch socket head shoulder screw.
4. Install the 1/4-20 locknut securing the 5/16 x 2.25-inch socket head shoulder screw and the stability assist cylinder to the walking beam.
5. Apply Super Lube Multi Purpose Grease w/PTFE (Teflon®) or other silicon based grease to the walking beam mounting pin.
6. Install the motor with attached walking beam assembly and covered spacer onto the walking beam mounting pin.
7. Using the 1/2-20 locknut and .505 x 1.124 x .100-inch washer, secure the motor with attached walking beam assembly to the base frame. Torque to 13 ft-lbs \pm 20%, then back off 1/4 turn.
8. Connect the motor connector to the controller.
9. Install the drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.
10. Remove the two 5-inch blocks under battery frame, gently lowering the wheelchair frame to the ground.
11. Install the batteries. Refer to [Replacing Batteries](#) on page 69.
12. Using tie-wraps, reroute and secure the motor cable to the wheelchair frame. Refer to [Routing/Securing Motor Cables](#) on page 82.

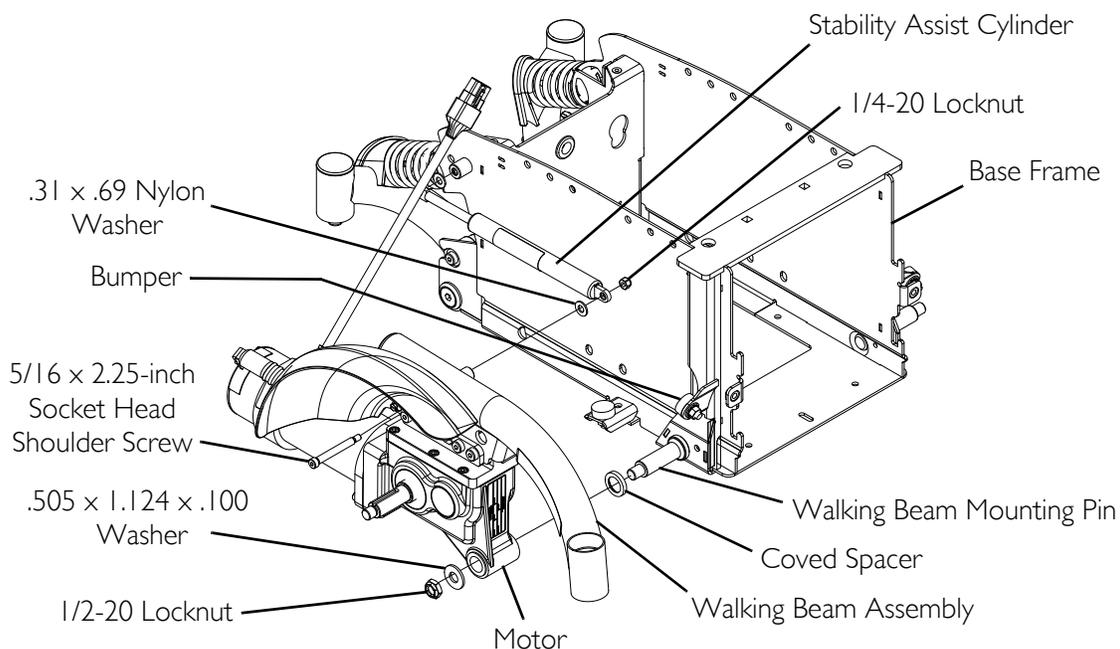


FIGURE 6.1 Removing the Walking Beam Assembly

Removing/Installing Stability Assist Cylinder

NOTE: For this procedure, refer to FIGURE 6.2.

NOTE: This procedure applies to both sides of the wheelchair.

NOTE: Reverse this procedure to install the cylinder.

Removing

1. If necessary, place two 5-inch blocks under the base frame.
2. Remove the drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.
3. Remove the 1/4-20 locknut securing the 5/16 x 2.25-inch socket head shoulder screw and the stability assist cylinder to the walking beam.
4. Pull the 5/16 x 2.25-inch socket head shoulder screw out away from the base frame to free the stability assist cylinder and .31 x .69 nylon washer from the walking beam assembly.
5. Position the stability assist cylinder against the wheelchair frame.
6. Remove 5/16 x .375-inch socket head shoulder screw and two .31 x .69 nylon washers securing the stability assist cylinder to the battery box.

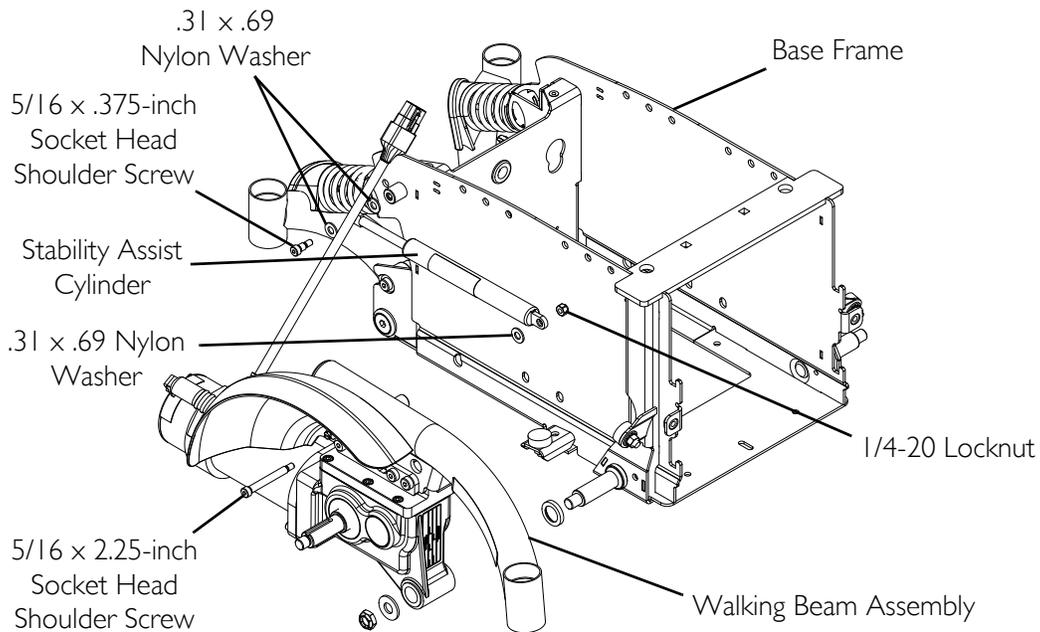


FIGURE 6.2 Removing/Installing Stability Assist Cylinder

Removing/Installing the Fender Assembly

NOTE: For this procedure, refer to FIGURE 6.3.

Removing

1. Remove the drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.
2. Remove the three 10-32 x 5/8-inch hex head screws that secure the fender to the walking beam.
3. Remove the fender from the walking beam.

Installing

1. Align the fender with the walking beam.
2. Secure the fender to the fender bracket with the three 10-32 x 5/8-inch mounting screws. Securely tighten. Torque to 40 in-lbs.
3. Install the drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.

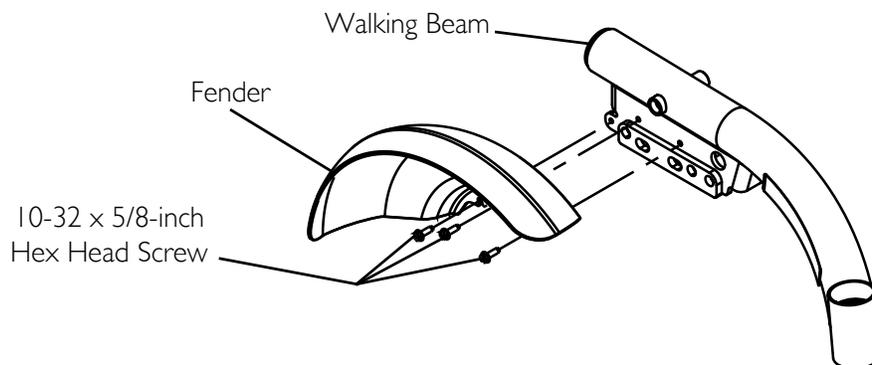


FIGURE 6.3 Removing/Installing the Fender Assembly

Removing/Installing the Bumpers

NOTE: For this procedure, refer to FIGURE 6.4.

NOTE: If replacing one or more bumpers, it is recommended to replace all four bumpers.

NOTE: This procedure applies to both sides of the wheelchair.

NOTE: Reverse this procedure to install the bumper.

Bolt-On Bumpers

1. Remove the drive wheel. Refer to [Removing/Installing the Drive Wheel](#) on page 35.
2. Remove the 5/16-18 keps nut and .328 x .75 x .060 washer securing the bumper to the wheelchair frame.
3. Remove the bumper from wheelchair frame.

NOTE: If necessary repeat STEPS 1-3 on remaining bumpers.

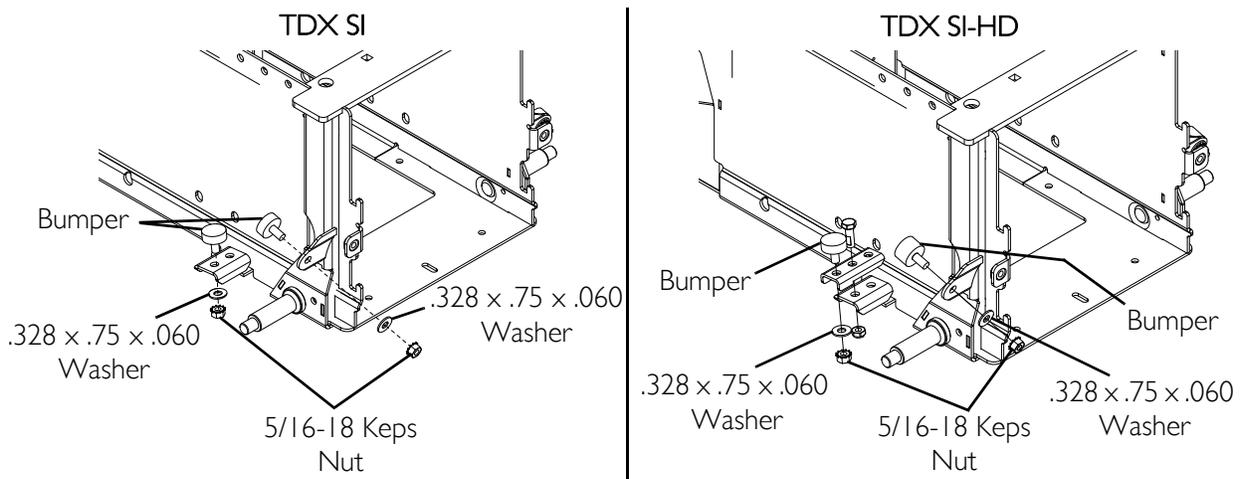


FIGURE 6.4 Removing/Installing the Bumpers

SECTION 7—REAR FRAME

Removing/Installing the Rear Suspension Assembly

NOTE: For this procedure, refer to FIGURE 7.1 on page 57.

NOTE: Place two 5-inch blocks under the base frame to lift frame off the ground for ease in performing this procedure.

Removing

1. Place two 5-inch blocks under battery frame.
2. Remove the rear shroud. Refer to Removing/Installing the Wheelchair Shrouds on page 63.
3. If necessary, rotate motor up to access both sets of mounting hardware.

NOTE: Before cutting tie-wraps, note position and orientation of tie-wraps and wiring prior to removing tie-wraps.

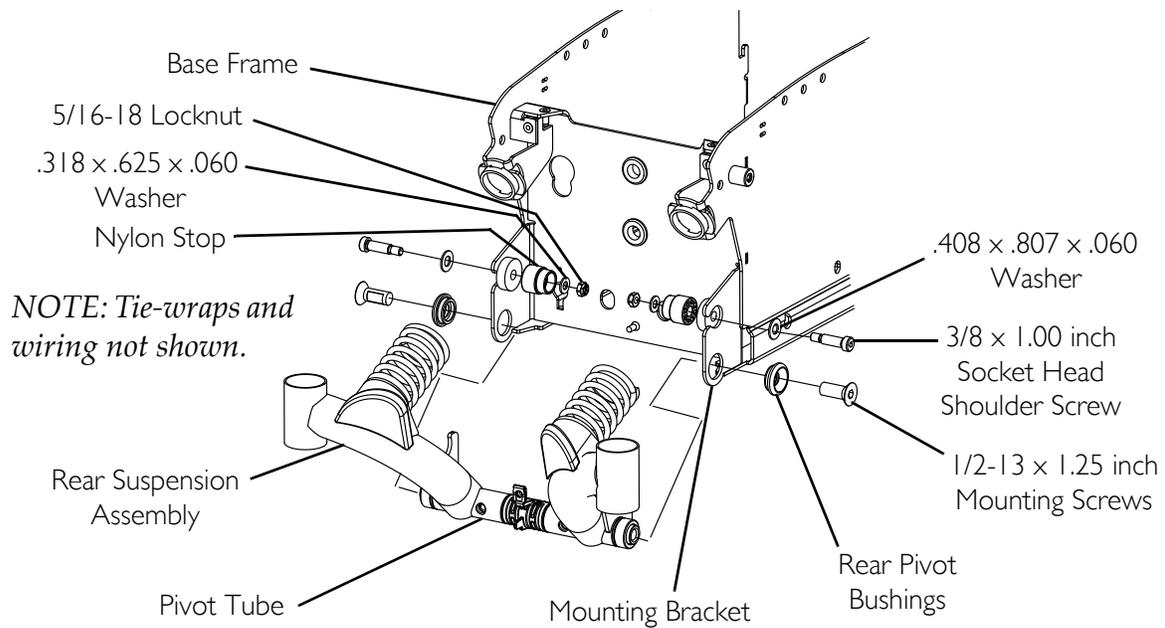
4. Cut tie-wraps securing the motor leads, joystick cable, and any other wiring to the rear suspension assembly.
5. Disconnect the right and left motor leads and the joystick cable from the controller.
6. Remove the two 1/2-13 x 1.25-inch mounting screws and rear pivot bushings securing the rear suspension assembly to the base frame.
7. Remove the rear suspension assembly from the base frame.

Installing

1. Position the rear suspension assembly between the mounting brackets of the base frame.
2. Secure the rear suspension assembly to the base frame using the two 1/2-13 x 1.25-inch mounting screws and rear pivot bushings. Torque to 45 ft-lbs \pm 20%.
3. Connect the right and left motor leads and the joystick cable to the controller.

NOTE: When Securing the wiring, ensure motor leads have enough slack to allow full motion of the walking beam and that all wiring will not become pinched or damaged by moving parts.

4. Using tie-wraps, secure wiring and cables to the rear suspension assembly.
5. Remove the 5-inch blocks supporting the base frame.
6. Reinstall the rear shroud. Refer to Removing/Installing the Wheelchair Shrouds on page 63.



NOTE: Rear suspension frame shown disassembled for clarity.

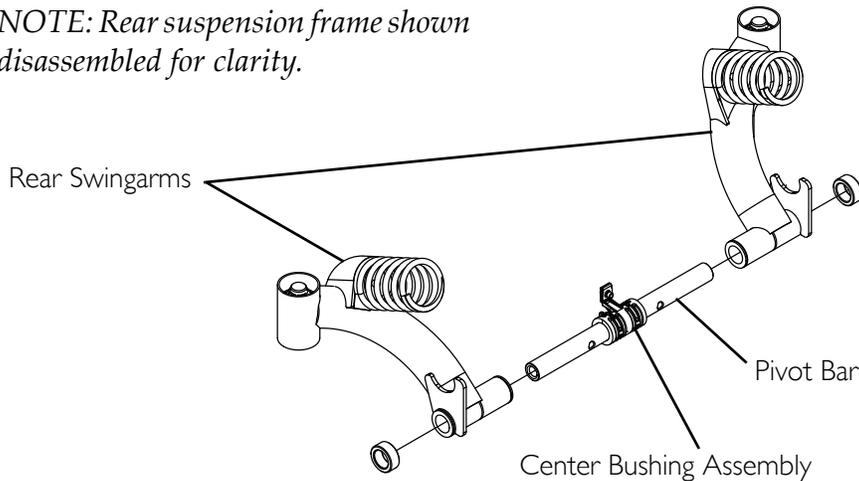


FIGURE 7.1 Removing/Installing the Rear Suspension Assembly

Removing/Installing the Rear Springs

NOTE: For this procedure, refer to FIGURE 7.2 on page 58.

NOTE: Place two 5-inch blocks under the base frame to lift frame off the ground for ease in performing this procedure.

NOTE: If replacing a rear spring, it is strongly recommended to replace both springs to ensure proper operation of wheelchair.

Removing

1. Place two 5-inch blocks under the base frame.

NOTE: If necessary, move the motors up and down to gain access to the rear spring hardware.

- Lift the rear frame assembly up and add spacers under the rear casters until the rear springs remain compressed and the nylon spacer can be removed.
- Remove the two socket head screws, locknuts, four washers and two nylon stops from the wheelchair base frame.

NOTE: If necessary, use a flat screwdriver to pry nylon stop from the wheelchair base frame.

- Remove spacers from under the rear casters.

NOTE: Take note of position and orientation of tie-wraps and wiring prior to removing tie-wraps.

- Remove the two rear springs.

Installing

NOTE: If replacing the spring, perform this procedure with a new spring.

- Position the two rear springs between the wheelchair base frame and the rear frame assembly.
- Lift the rear frame assembly up and add spacers under the rear casters until the rear springs remain compressed.
- Using the two socket head screws, locknuts and four washers, secure the two nylon stops to the wheelchair base frame. Torque to 75 in-lbs \pm 20%.
- Install the two 5/16-18 locknuts, 5/16 x 5/8 x 1/16-inch washers and nylon stops onto the two spring brackets. Torque to 75 in-lbs \pm 20%.
- Remove spacers from under the rear casters.

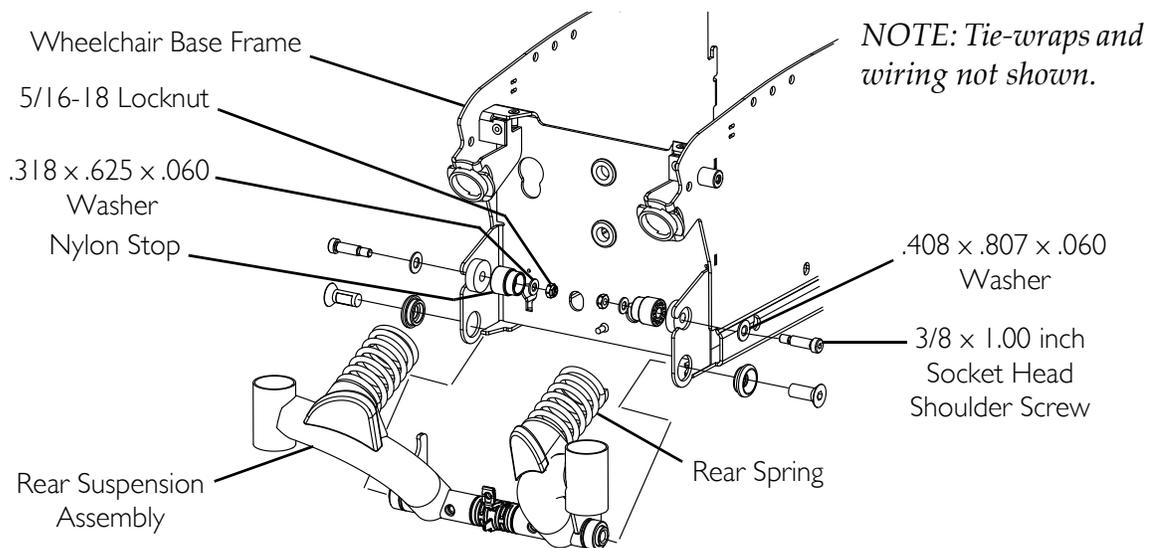


FIGURE 7.2 Removing/Installing the Rear Springs

Disassembling/Assembling Rear Suspension Assembly

NOTE: For this procedure, refer to FIGURE 7.3.

NOTE: Reverse this procedure to assemble the rear suspension assembly.

NOTE: If it is necessary to replace part of the rear suspension assembly, use the necessary new parts when assembling the rear suspension assembly.

1. Remove the rear springs from the rear suspension assembly. Refer to Removing/Installing the Rear Springs on page 57.
2. Remove the rear suspension assembly from the base frame. Refer to Removing/Installing the Rear Suspension Assembly on page 56.
3. Separate the two rear swingarms from the pivot bar.
4. Remove the center bushing assembly from the pivot bar.

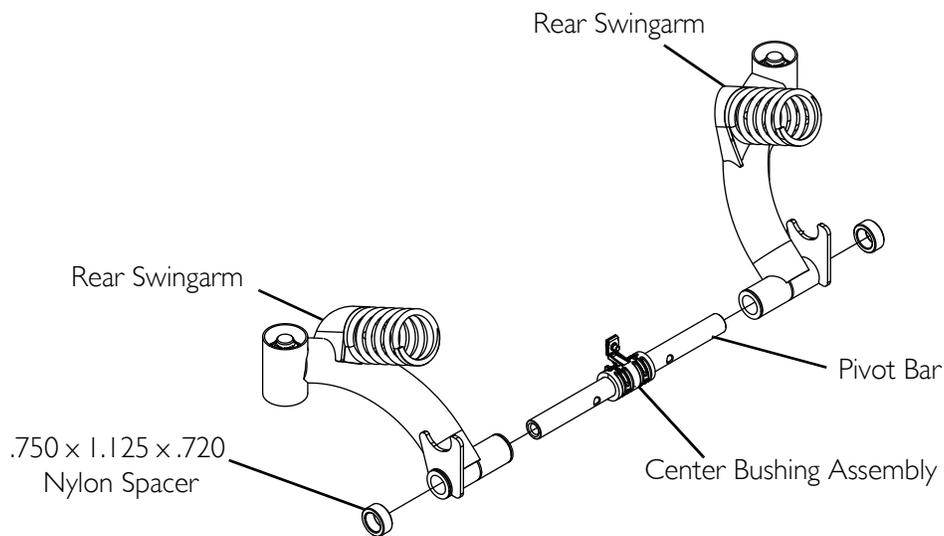


FIGURE 7.3 Disassembling/Assembling Rear Suspension Assembly

SECTION 8—BASE FRAME

Removing/Installing Seat

NOTE: Before removing the seat assembly, note the position and orientation of the mounting position and hardware.

Jr. Size Seats

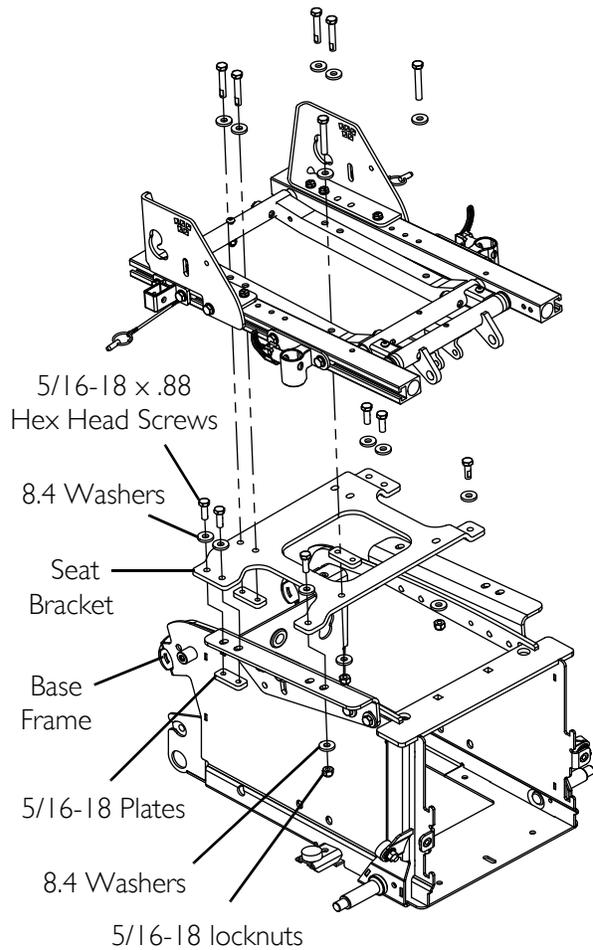
NOTE: For this procedure, refer to FIGURE 8.1 on page 60.

Removing

1. Remove the four rear 5/16-18 x .88 hex head screws, 8.4 washers and two 5/16-18 plates that secure the rear of the seat bracket to the base frame.
2. Remove the two front 5/16-18 x .88 hex head screws, four 8.4 washers and two 5/16-18 locknuts securing the front of the seat bracket to the base frame.
3. Lifting up, remove the seat assembly from the base frame.

Installing

1. Position the seat assembly onto the base frame.
2. Using the four rear 5/16-18 x .88 hex head screws, 8.4 washers and two 5/16-18 plates, secure the rear of the seat bracket to the base frame. Torque to 13 ft-lbs \pm 20%.
3. Using the two front 5/16-18 x .88 hex head screws, four 8.4 washers and two 5/16-18 locknuts, secure the front of the seat bracket to the base frame. Torque to 13 ft-lbs \pm 20%.



NOTE: Seat frame shown separated from seat bracket for clarity.

FIGURE 8.1 Removing/Installing Seat - Jr. Size Seats

Adult Size Seats

NOTE: For this procedure, refer to FIGURE 8.2 on page 61.

Removing

1. Remove seating system and seat pan.
2. Remove the eight 5/16-18 x 3/4 socket head screws, 11/32 x 13/16 x 3/4 ground washers and four 5/16-18 plates that secure the seat frame to the base frame.
3. Lifting up, remove the seat assembly from the base frame.

Installing

1. Position the seat assembly onto the base frame.
2. Using the eight 5/16-18 x 3/4 socket head screws, 11/32 x 13/16 x 3/4 ground washers and four 5/16-18 plates, secure the seat frame to the base frame. Torque to 13 ft-lbs ± 20%.
3. Remove seating system and seat pan.

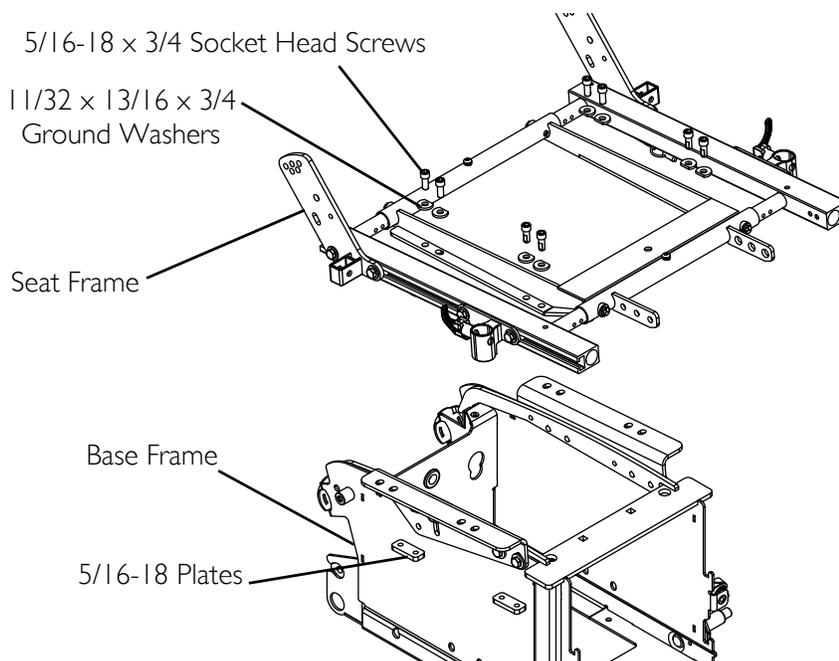


FIGURE 8.2 Removing/Installing Seat - Adult Size Seats

Adjusting Seat Angle (Non TRRO Wheelchairs Only)

⚠ WARNING

Wheelchairs with TRRO Only - Adjusting the back angle from the factory setting will void TRRO compliance. After adjusting the back angle, DO NOT transport an occupied wheelchair in a motor vehicle of any kind. The wheelchair may only be transported in a motor vehicle while unoccupied, and will be considered TRBKTS.

TDX SI with Junior Seat

NOTE: For this procedure, refer to FIGURE 8.3.

1. Remove the two rear 5/16-18 x .75-inch hex head screws securing the seat-to-floor bracket to the base frame.
2. Remove the two front 5/16-18 x .75-inch hex head screws securing the seat-to-floor bracket to the base frame.
3. Loosen but DO NOT remove the four center 5/16-18 x .75-inch hex head screws securing the seat-to-floor bracket to the base frame.
4. Reposition the two seat-to-floor brackets to the desired angle (Detail "A").

NOTE: The 5/16-18 x .75-inch hex head screws thread into the interface plate mounting holes. When tightening the two center 5/16-18 x .75-inch hex head screws ensure the interface plate mounting holes remain aligned with the mounting holes in the base frame and the seat-to-floor height bracket.

5. Tighten the two center 5/16-18 x .75-inch hex head screws. Torque to 13 ft-lbs \pm 20%.
6. Reinstall the two front and two rear 5/16-18 x .75-inch hex head screws securing the seat-to-floor bracket to the base frame. Torque to 13 ft-lbs \pm 20%.

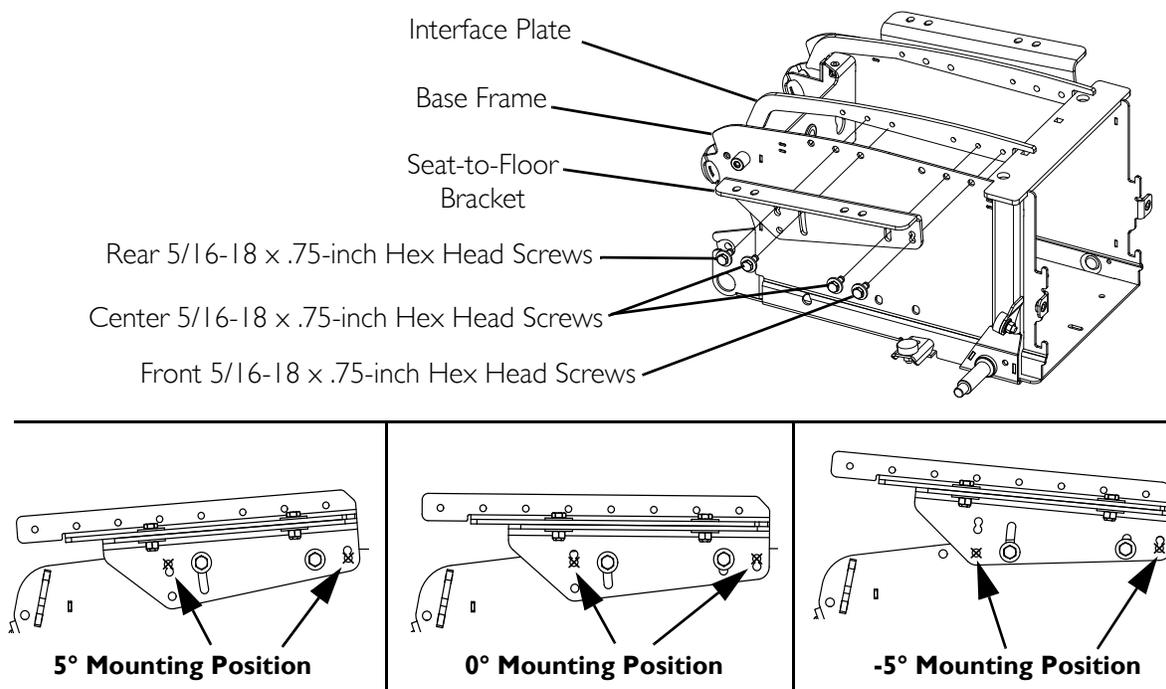


FIGURE 8.3 Adjusting Seat Angle (Non TRRO Wheelchairs Only)

TDX SI with Adult Seat

NOTE: For this procedure, refer to FIGURE 8.4.

NOTE: The following tools are required to perform this procedure.

- 5/16-inch Socket with Ratchet
 - Torque Wrench
 - Pitch Angle Gauge
1. Loosen but DO NOT remove the eight 5/16-18 x .75-inch hex head screws securing the seat-to-floor bracket to the base frame.
 2. Using the pitch angle gauge, reposition the two seat-to-floor brackets to the desired angle.
 3. Tighten the eight 5/16-18 x .75-inch hex head screws. Torque to 13 ft-lbs \pm 20%.

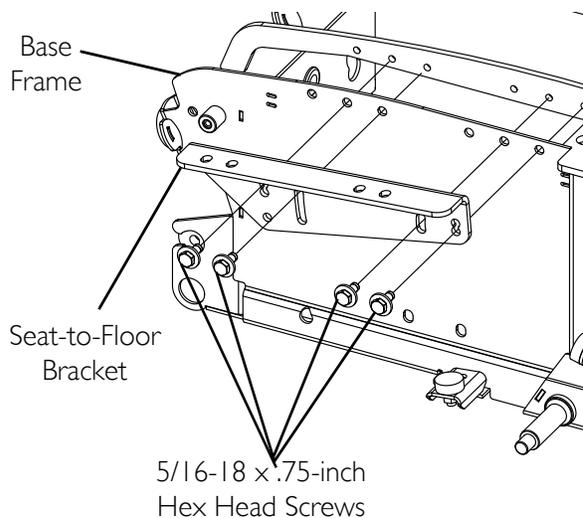


FIGURE 8.4 Adjusting Seat Angle (Non TRRO Wheelchairs Only)

Removing/Installing the Wheelchair Shrouds

NOTE: For this procedure, refer to FIGURE 8.5 on page 64.

NOTE: The following tools are required to perform this procedure.

- Phillips Head Screwdriver
- 5/16-inch Allen Wrench

Top Shroud

NOTE: Reverse this procedure to install the top shroud.

1. Remove the seat from the base frame. Refer to [Removing/Installing Seat](#) on page 60.
2. Remove the four 10-32 x 1/2-inch pan head screws securing the top shroud to the base frame.
3. Lifting up, remove the top shroud from the base frame.

Rear shroud

NOTE: Reverse this procedure to install the rear shroud.

1. Remove the three 10-32 x 1/2-inch pan head screws that secure the rear shroud to the base frame.
2. Remove the rear shroud from the base frame.

Front Shroud and Battery Retention Bracket

NOTE: Reverse this procedure to install the front shroud and battery retention bracket.

NOTE: The front shroud and battery retention bracket are removed from and installed onto the wheelchair frame as a single unit.

1. Remove the two 5/16-18 x 5/8-inch socket head screws securing the front shroud/battery retention bracket to the base frame.
2. Lift up to unhook the battery retention bracket from the base frame and remove the front shroud/battery retention bracket from the base frame.
3. If necessary to replace the front shroud or the battery retention bracket, perform the following:
 - A. Remove the four #8-16 x 5/8-inch Phillips screws securing the battery retention bracket to the front shroud.
 - B. Separate the front shroud from the battery retention bracket.
 - C. Discard the item to be replaced and replace with new front shroud or battery retention bracket.
 - D. Using four #8-16 x 5/8-inch Phillips screws, secure front shroud to the battery retention bracket.

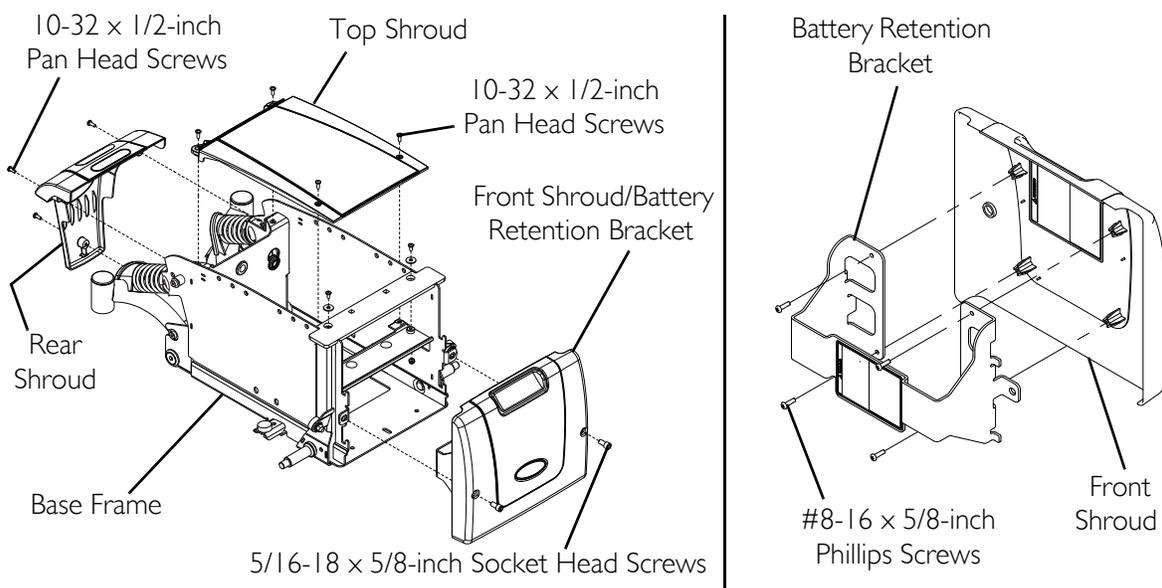


FIGURE 8.5 Removing/Installing the Wheelchair Shrouds

Checking the Clearance between the Front Rigging and Caster Wheel or Front Rigging and Front Shroud

NOTE: For this procedure, refer to FIGURE 8.6.

NOTE: These instructions apply to elevate power seating (tilt elevate, tilt recline elevate, and elevate only).

1. Perform one of the following:
 - Wheelchairs with Swing Away Front Rigging (Detail “A”) - Rotate front casters forward as if the wheelchair were moving in reverse.

NOTE: If wheelchair is equipped with composite footrests, point the front casters toward the footplate.
 - Wheelchair with Center Mount Front Rigging (Detail “B”) - Position center mount front rigging to the lowest setting to position the footplate as close as possible to the front shroud.
2. Measure the gap:
 - For swingaway front riggings - measure between the front caster and the footplate
 - For center mount front rigging - measure between the footplate and the front shroud.
3. Perform one of the following:
 - If the gap is between 1 inch and 1½ inches, the seat frame is in the proper mounting position.
 - If the gap is greater than 1½ inches, the seat frame is not in the proper mounting position, refer to [Adjusting the Seating System Mounting Position](#) on page 66.

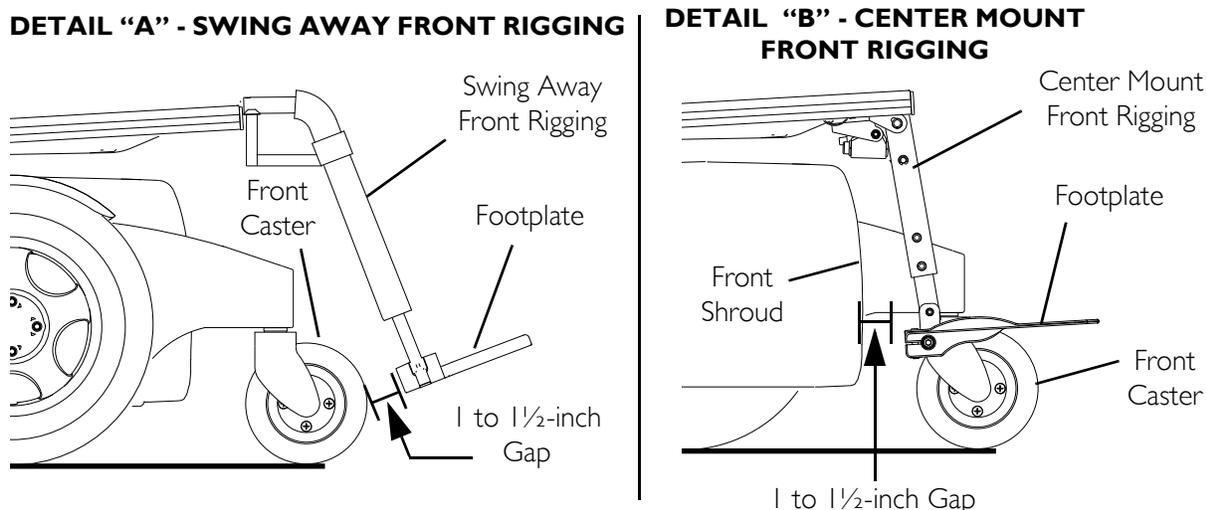


FIGURE 8.6 Checking the Clearance between the Front Rigging and Caster Wheel or Front Rigging and Front Shroud

Adjusting the Seating System Mounting Position

NOTE: For this procedure, refer to FIGURE 9 on page 67.

NOTE: These instructions apply to elevate power seating (tilt elevate, tilt recline elevate, and elevate only).

1. Loosen, but DO NOT remove, the four mounting screws and locknuts securing the seat frame to the interface mounting bracket.
2. Perform one of the following to ensure the Formula CG seating system is in the proper mounting position:

NOTE: Some front rigging and seat depth combinations may not allow for the 1-inch gap. In this situation, slide the seat frame mounting brackets as far back as possible.

- Wheelchairs with Swing Away Front Rigging - Slide the seat frame as far as possible towards the rear of the wheelchair (FIGURE 9). Leave 1 to 1½-inch of clearance between the front riggings and the front casters in all caster positions.
 - Wheelchairs with Manual or Power Center Mount Front Rigging - Slide the seat frame as far as possible towards the rear of the wheelchair (FIGURE 9). Leave 1 to 1½-inch of clearance between the center mount front riggings and the front shroud.
3. Ensure the interface mounting brackets and the seat frame are flush and square.
 4. Secure the seat frame to the interface mounting brackets. Torque the four mounting screws and locknuts to 13 ft-lbs \pm 20%.
 5. Cycle the tilt and/or recline functions to verify wiring harnesses DO NOT obstruct the path of the system. If they do, perform one of the following:
 - Wires were damaged during inspection - Replace damaged wires.
 - Wires were not damaged during inspection - Cut tie-wraps and relocate wires to a location where they will not become damaged.

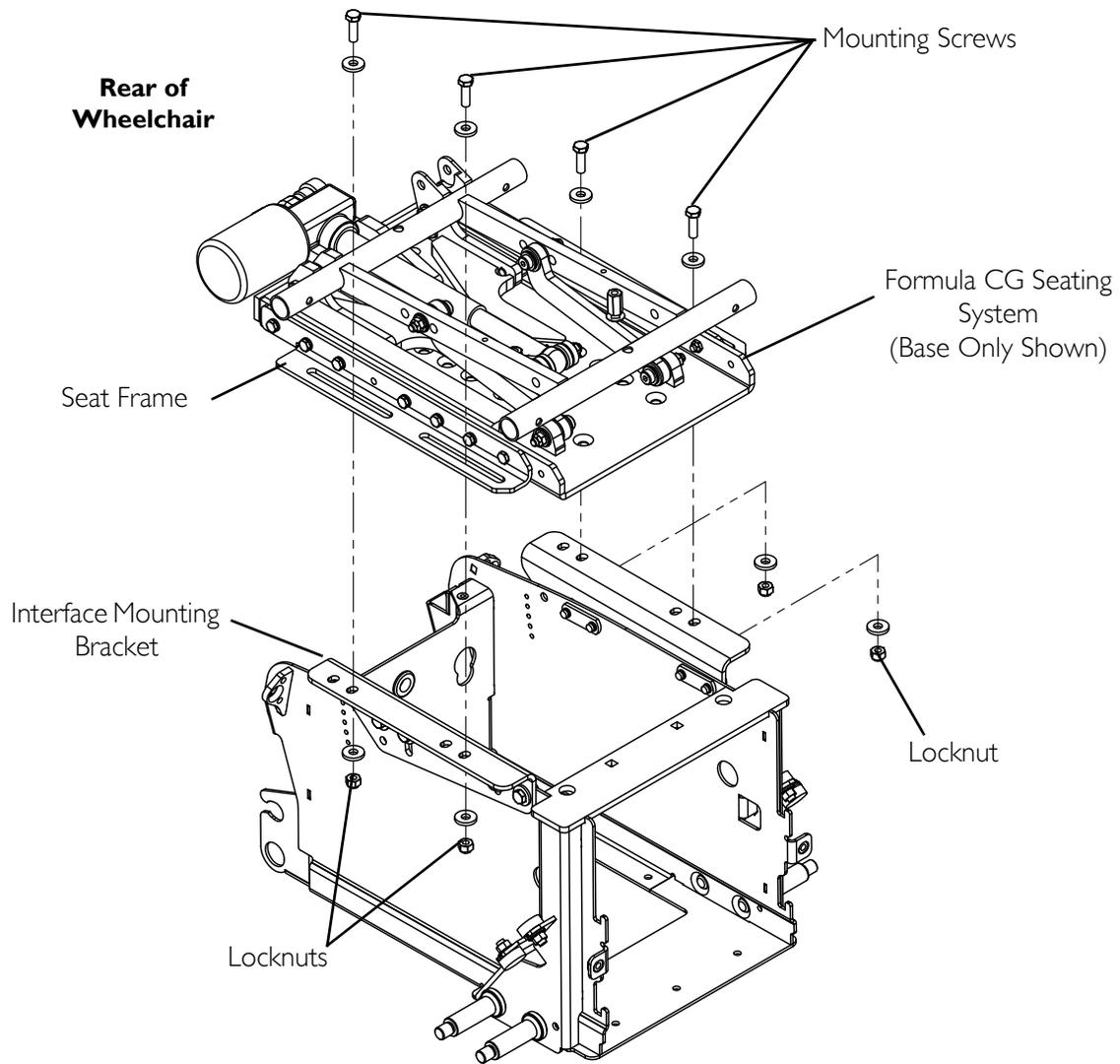


FIGURE 9 Adjusting the Seating System Mounting Position

SECTION 9— BATTERIES

⚠ DANGER

Risk of Death or Serious Injury

Failure to observe these warnings can cause an electrical short resulting in death, serious injury, or damage to the electrical system.

The **POSITIVE (+) RED** battery cable **MUST** connect to the **POSITIVE (+)** battery terminal(s)/post(s).

The **NEGATIVE (-) BLACK** battery cable **MUST** connect to the **NEGATIVE (-)** battery terminal(s)/post(s).

NEVER allow any of your tools and/or battery cable(s) to contact **BOTH** battery post(s) at the same time. An electrical short may occur and serious injury or damage may occur.

Install protective caps on positive and negative battery terminals.

Replace cable(s) immediately if cable(s) insulation becomes damaged.

DO NOT remove fuse or mounting hardware from **POSITIVE (+)** red battery cable mounting screw.

⚠ WARNING

The use of rubber gloves is recommended when working with batteries.

Invacare strongly recommends that battery installation and battery replacement **ALWAYS** be done by a qualified technician.

After **ANY** adjustments, repair or service and before use, make sure all attaching hardware is tightened securely - otherwise injury or damage may result.

22NF batteries weigh 37 pounds each. Use proper lifting techniques (lift with your legs) to avoid injury.

ALWAYS use a battery lifting strap when lifting a battery. It is the most convenient method and assures that the battery acid will not spill. It also helps to prolong the life of the battery.

DO NOT tip the batteries. Keep the batteries in an upright position.

When tightening the clamps, always use a box wrench. Pliers will “round off” the nuts. **NEVER** wiggle the battery terminal(s)/post(s) when tightening. The battery may become damaged.

Unless otherwise indicated, make sure power to the wheelchair is **OFF** before performing these procedures.

After **ANY** adjustments, repair or service and before use, make sure all attaching hardware is tightened securely - otherwise injury or damage may occur.

NOTE: If there is battery acid in the bottom of the battery tray or on the sides of the battery(ies), apply baking soda to these areas to neutralize the battery acid. Before reinstalling the existing or new battery(ies), clean the baking soda from the battery tray or battery(ies) being sure to avoid

contact with skin and eyes. Determine source of contamination. NEVER install/reinstall a battery with a cracked or otherwise damaged case.

Using the Proper Batteries

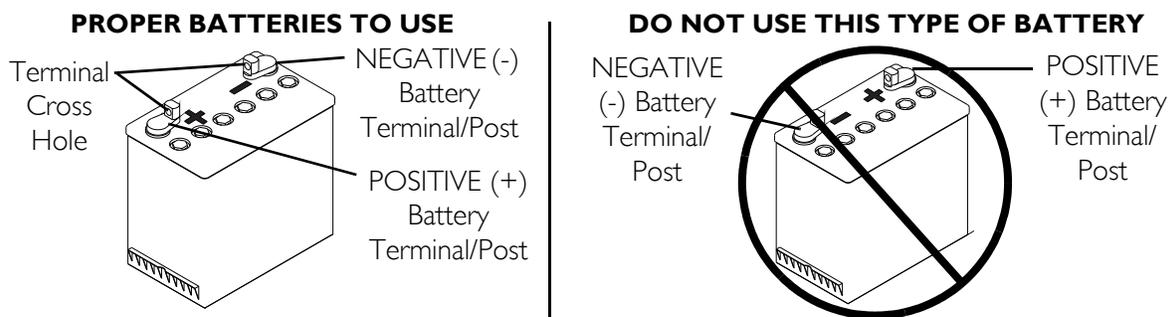
1. Position battery on ground/flat surface as shown below.
2. Visually inspect the battery to ensure proper polarity:

⚠ WARNING

FOR TDX SI WHEELCHAIRS USE 22NF BATTERIES

Batteries with terminal configuration (**POSITIVE** on the left and **NEGATIVE** on the right) as shown below **MUST** be used. Batteries that have the reverse terminal configuration **MUST** not be used - otherwise injury and damage may occur.

Terminals **MUST** have a cross hole in them as shown below.



Replacing Batteries

NOTE: For this procedure, refer to FIGURE 9.1 on page 70.

1. Remove the batteries from the wheelchair. Refer to [Removing/Installing the Batteries From/Into the Wheelchair](#) on page 71.
2. Cut the tie-wraps that secure the battery terminal covers to the battery terminals.
3. Slide the RED battery terminal cover back on the RED battery cable to expose the POSITIVE battery terminal.
4. Slide the BLACK battery terminal cover back on the BLACK battery cable to expose NEGATIVE battery terminal.

⚠ WARNING

NEVER allow any of your tools and/or battery cable(s) to contact **BOTH** battery post(s) at the same time. An electrical short may occur and serious personal injury or damage may occur.

5. Remove the 1/4-20-inch hex flange nut that secures the bracket of the POSITIVE battery cable to the POSITIVE (+) battery post of the battery.
6. Remove the 1/4-20-inch hex flange nut and 1/4-20 x .88 hex flange screw that secures the NEGATIVE battery cable to the NEGATIVE(-) battery post of the battery.
7. Discard the existing battery.
8. Position battery connector bracket or wiring harness onto the new 22NF battery as shown.
9. Secure the NEGATIVE battery cable to the NEGATIVE (-) battery post with existing 1/4-20 x .88-inch hex flange screw and 1/4-20 hex flange nut. Securely tighten.
10. Secure the bracket of the POSITIVE battery cable to the POSITIVE (+) battery post with existing mounting screw and 1/4-20-inch hex flange nut. Securely tighten.
11. Position each battery terminal cover over top of each battery terminal.
12. Secure battery terminal covers in place with one tie-wrap.
13. Install batteries into wheelchair. Refer to Removing/Installing the Batteries From/Into the Wheelchair on page 71.

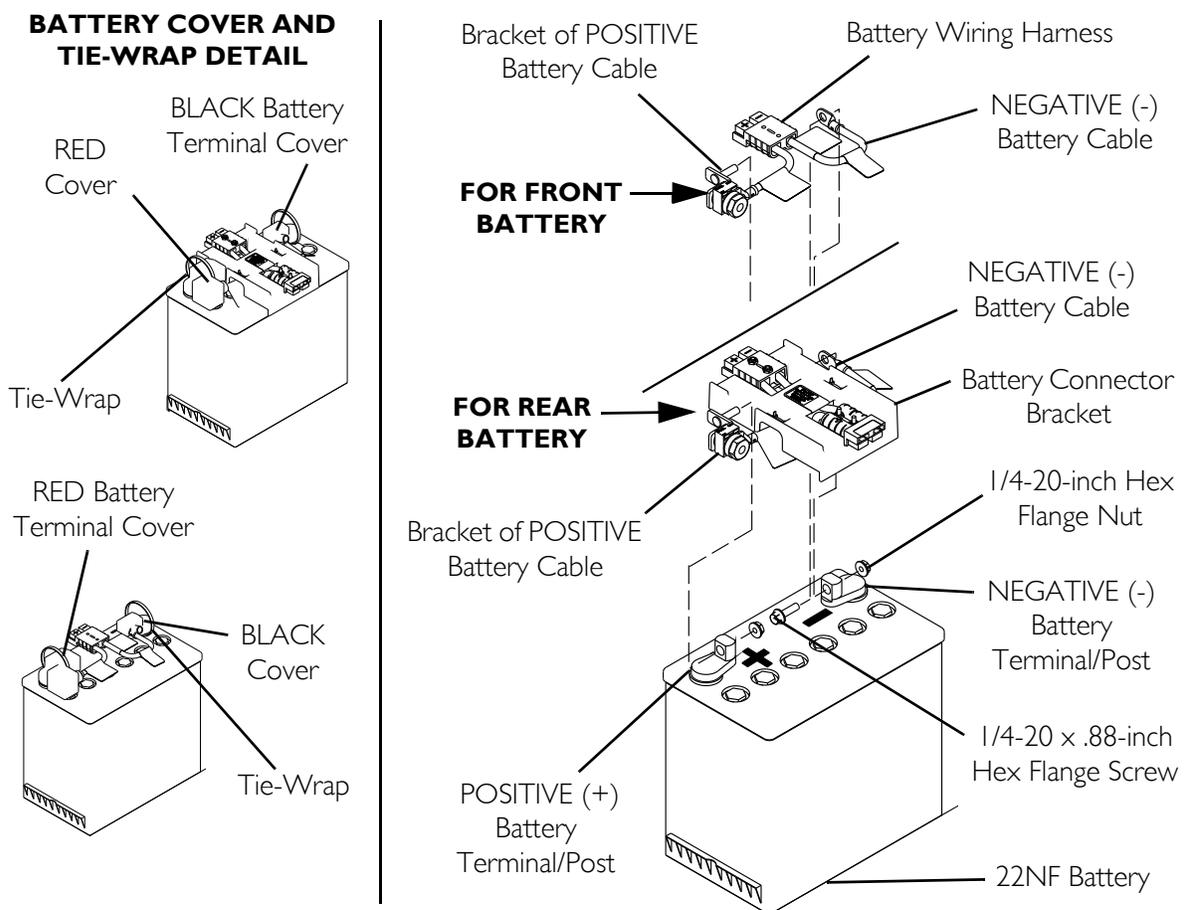


FIGURE 9.1 Replacing Batteries

Cleaning Battery Terminals

⚠ WARNING

Most batteries are not sold with instructions. However, warnings are frequently noted on the cell caps. Read them carefully.

DO NOT allow the liquid in the battery to come in contact with skin, clothes or other possessions. It is a form of acid and harmful or damaging burns may result. Should the liquid touch your skin, wash the area IMMEDIATELY and thoroughly with cool water. In serious cases or if eye contact is made, seek medical attention IMMEDIATELY.

1. Examine battery terminals for corrosion.
2. Verify the plastic caps are in place over battery cell holes.
3. Clean terminals by using a battery cleaning tool, wire brush, or medium grade sand paper.

NOTE: Upon completion, areas should be shiny, not dull.

4. Carefully dust off all metal particles.

Removing/Installing the Batteries From/Into the Wheelchair

Removing the Front Shroud/Battery Retention Bracket and Rear Shroud

CAUTION

Place the wheelchair in a well ventilated area where work can be performed without risking damage to carpeting or floor covering.

NOTE: For this procedure, refer to FIGURE 9.2 on page 72.

1. Verify the joystick On/Off switch is in the Off position.
2. Remove the three 10-32 x 1/2-inch pan head screws that secure the rear shroud to the wheelchair.
3. Remove the rear shroud from the wheelchair.

NOTE: The front shroud and battery retention bracket are removed from and installed onto the wheelchair frame as a single unit.

4. Remove the two 5/16-18 x 5/8-inch socket head screws securing the front shroud/battery retention bracket to the wheelchair.
5. Lift up to unhook the battery retention bracket from the wheelchair frame and remove the front shroud/battery retention bracket from the wheelchair.

6. Disconnect the controller from the batteries at the rear of the wheelchair.
7. Remove the batteries. Removing the Batteries from Wheelchair on page 72.

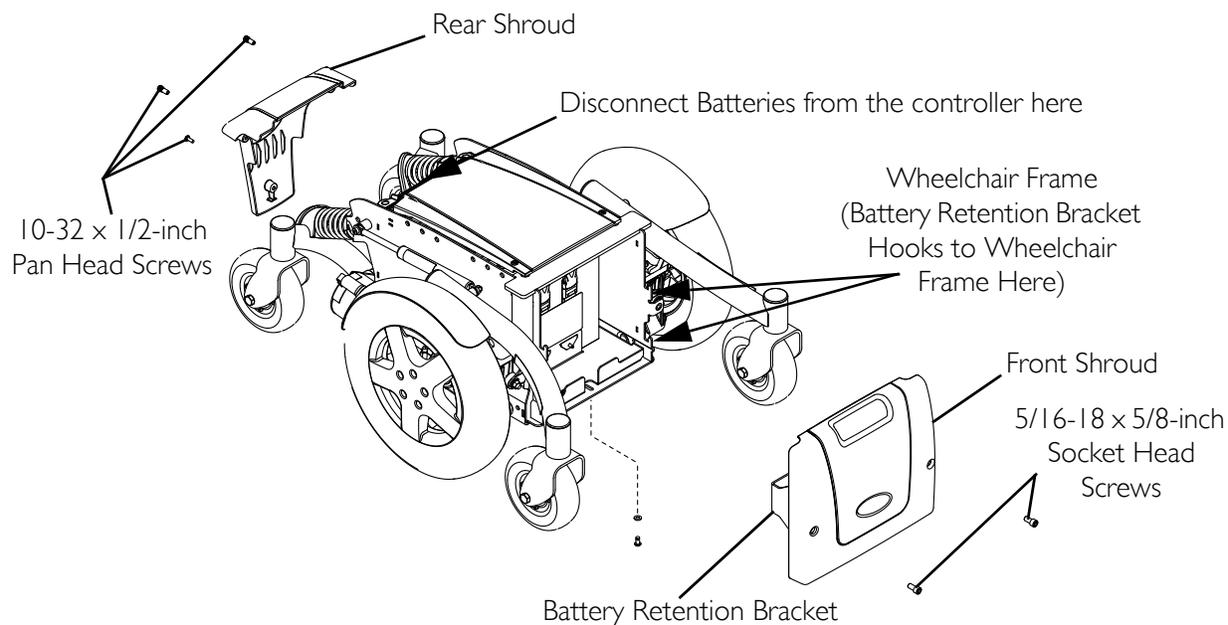
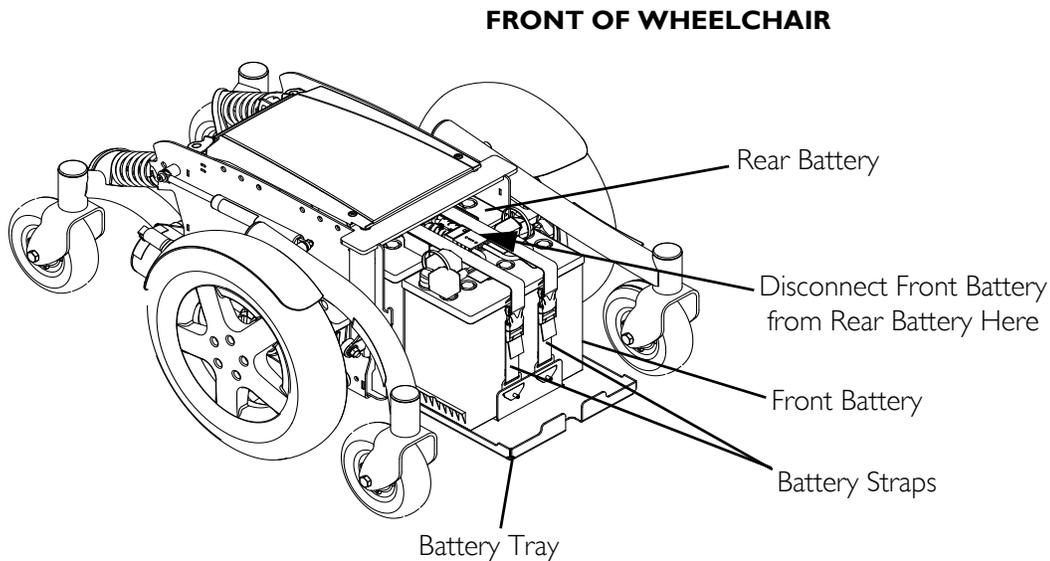


FIGURE 9.2 Removing the Front Shroud/Battery Retention Bracket and Rear Shroud - Installing the Front Shroud/Battery Retention Bracket and Rear Shroud

Removing the Batteries from Wheelchair

NOTE: For this procedure, refer to FIGURE 9.3.

1. Slide battery tray with batteries out.
2. Disconnect the battery straps.
3. Unplug front battery from rear battery.
4. Remove the front battery.
5. Slide the rear battery forward and remove it from the tray.



Installing Batteries into Wheelchair

⚠ WARNING

Risk of Serious Injury

Improperly installed battery tray can cause instability resulting in serious injury. Ensure batteries and battery tray are installed properly to maintain stability.

NOTE: For this procedure, refer to FIGURE 9.3 on page 73 and FIGURE 9.4.

NOTE: Positioning of the batteries into the battery tray is completed with battery tray positioned in wheelchair and partially pulled out. Refer to FIGURE 9.3 for full view of wheelchair base. Illustrations in FIGURE 9.4 are shown without the wheelchair for clarification purposes only.

1. Position the battery with battery connector bracket in the rear of the battery tray in the orientation as shown (Detail "A" of FIGURE 9.4).

NOTE: Front of battery tray is designated by the battery stop. Rear of the battery tray is the opposite end.

NOTE: Orientation of the battery is critical otherwise batteries will not connect to the controller or each other.

2. Position the remaining battery in the front of the battery tray in the orientation shown so that the wiring harnesses can be connected together (Detail "B" of FIGURE 9.4).
3. Connect front battery to rear battery (Detail "B" of FIGURE 9.4).
4. Connect battery straps (Detail "C" of FIGURE 9.4).
5. Slide the battery tray into the wheelchair (FIGURE 9.3).
6. Install the battery door and rear shroud. Refer to Installing the Front Shroud/Battery Retention Bracket and Rear Shroud on page 74.

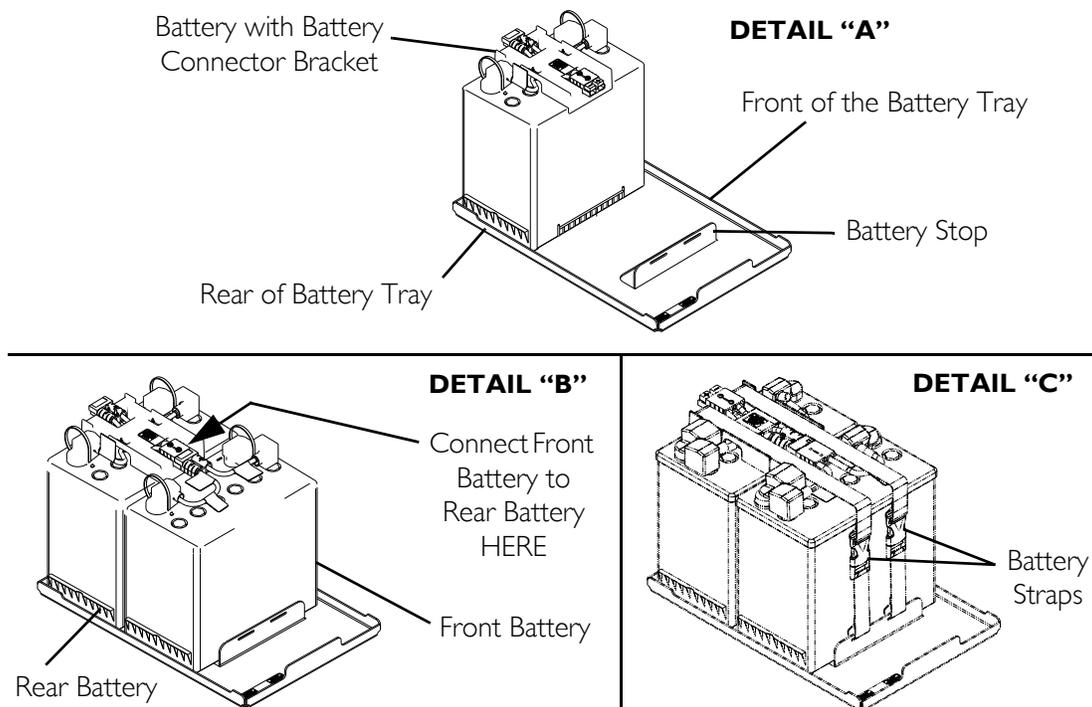


FIGURE 9.4 Installing Batteries into Wheelchair

Installing the Front Shroud/Battery Retention Bracket and Rear Shroud

⚠ WARNING

Wheelchairs with TRRO or TRBKTS Only - Battery retention brackets **MUST be installed at all times. Otherwise, the wheelchair will not be WC/19 compliant.**

After installing front shroud, ensure that the mounting screws on the front shroud/battery retention bracket are fully engaged into the battery box.

NOTE: For this procedure, refer to FIGURE 9.2 on page 72.

1. Reinstall the front shroud/battery retention bracket onto front of wheelchair frame.
2. Install two 5/16-18 x 5/8-inch socket head screws on the sides of the front shroud/battery retention bracket.

⚠ WARNING

When installing batteries, ensure battery connector is securely engaged to the controller connector - otherwise serious personal injury may result.

3. Connect the controller to the batteries at the rear of the wheelchair.
4. Reinstall the rear shroud and secure in place with three 10-32 x 1/2-inch pan head screws.

NOTE: New batteries MUST be fully charged before using, otherwise the life of the battery(ies) will be reduced.

5. If necessary, charge the batteries. Refer to Charging Batteries on page 77.

Removing/Installing the Battery Tray

NOTE: For this procedure, refer to FIGURE 9.5.

Removing

1. Remove the batteries. Refer to Removing/Installing the Batteries From/Into the Wheelchair on page 71.
2. Slide the battery tray back into the battery box.
3. Remove the two #10-32 x .50-inch riv nuts, .200/.193 x .334 x .062-inch lock washers and #10-32 x .75-inch socket head screws.
4. Slide battery tray out of battery box.

Installing

1. Slide battery tray into battery box.
2. Install the two #10-32 x .50-inch riv nuts, .200/.193 x .334 x .062-inch lock washers and #10-32 x .75-inch socket head screws, one in each side of the battery box. Torque to 25 in-lbs \pm 20%.
3. Install the batteries. Refer to Removing/Installing the Batteries From/Into the Wheelchair on page 71.

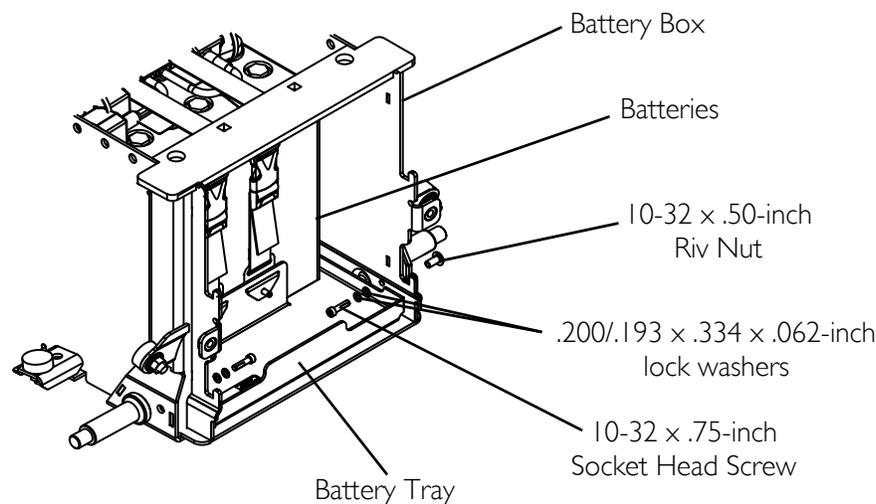


FIGURE 9.5 Removing/Installing the Battery Tray

When to Charge Batteries

SPJ Joysticks

NOTE: For this procedure, refer to FIGURE 9.6.

The Information Gauge Display located on the front of the joystick housing, it provides the state-of-battery charge, including notification of when the battery requires charging. It also provides the following information to the user on the status of the wheelchair:

- A. GREEN LEDs are lit, indicating well charged batteries.
- B. AMBER LEDs are lit, indicating batteries are moderately charged. Recharge batteries before taking a long trip.
- C. RED LEDs are lit, indicating batteries are running out of charge. Recharge batteries as soon as possible.

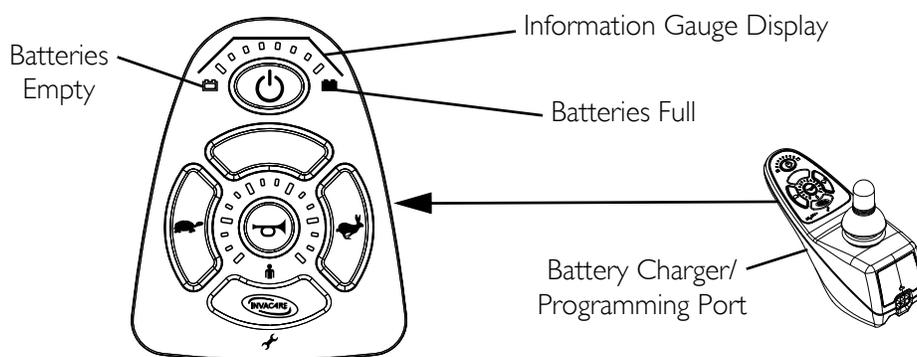


FIGURE 9.6 SPJ Joysticks

MPJ Joystick

NOTE: For this procedure, refer to FIGURE 9.7 on page 78.

The far right side of the screen is the Battery Gauge Display (BGD). It provides information on the remaining charge in the batteries. At full charge, solid blocks fill in all ten segments between E (Empty) and F (Full). As the battery becomes discharged, the farthest right segments will progressively disappear a half bar at a time until no segments appear between E and F. At this level, the user should charge the batteries as soon as possible.

Charging Batteries

⚠ WARNING

NEVER attempt to recharge the batteries by attaching cables directly to the battery terminals or clamps. **ALWAYS** use the recharging plug located on the back of the joystick.

DO NOT attempt to recharge the batteries and operate the power wheelchair at the same time.

During use and charging, unsealed batteries will vent hydrogen gas which is explosive in the right concentration with air.

CAUTION

ALWAYS charge new batteries before initial use or battery life will be reduced.

NOTE: For this procedure, refer to FIGURE 9.7 on page 78.

NOTE: New batteries MUST be fully charged prior to initial use of the wheelchair.

NOTE: As a general rule, batteries should be recharged daily to assure the longest possible life and minimize the required charging time. Plan to recharge the batteries when it is anticipated the wheelchair will not be used for a long period of time.

The range per battery charge using recommended batteries should be approximately five to nine hours of typical operation. Extensive use on inclines may substantially reduce per charge mileage.

Description and Use of Battery Chargers

The charger automatically reduces the charge from an initially high rate to a zero reading at a fully charged condition. If left unattended, the charger should automatically shut-off when full charge is obtained.

There are some basic concepts which will help you understand this automatic process. They are:

The amount of electrical current drawn within a given time to charge a battery is called the “charge rate”. If, due to usage, the charge stored in the battery is low, the charge rate is high, as indicated by the GREEN light on the charger. Initially, the GREEN light will stay illuminated for a short period of time followed by a longer period of off time. As a charge builds up, the charge rate is reduced, and the GREEN light will stay illuminated for a longer period of time followed by a shorter off time.

⚠ WARNING

NEVER leave the charger unattended when the breaker has tripped. A fault condition exists. **Unplug and discontinue using IMMEDIATELY. Contact an Invacare dealer.**

NOTE: If performing the charging procedures independently, READ and CAREFULLY follow the individual instructions for each charger (supplied or purchased).

NOTE: If charging instructions are not supplied, consult a qualified service technician for proper procedures.

Required Items:

TOOL	QUANTITY	COMMENTS
Battery Charger	1	Supplied
Extension Cord	1	Not Supplied

1. Attach the battery charger connector to the charger port on the joystick.
2. Plug the charger’s AC power cord, or extension, into the grounded 120 VAC wall outlet.
3. Wait until charging is complete.

NOTE: Allow eight hours for normal charging. Larger batteries (greater than 55 ampere-hours) or severely discharged batteries may require up to sixteen hours to be properly charged and equalized.

NOTE: It is advantageous to recharge frequently rather than only when necessary. In fact, a battery’s life is extended if the charge level is maintained well above a low condition.

NOTE: If the batteries need to be charged more often or take longer to charge than normal, they may need to be replaced. Contact an Invacare dealer for service.

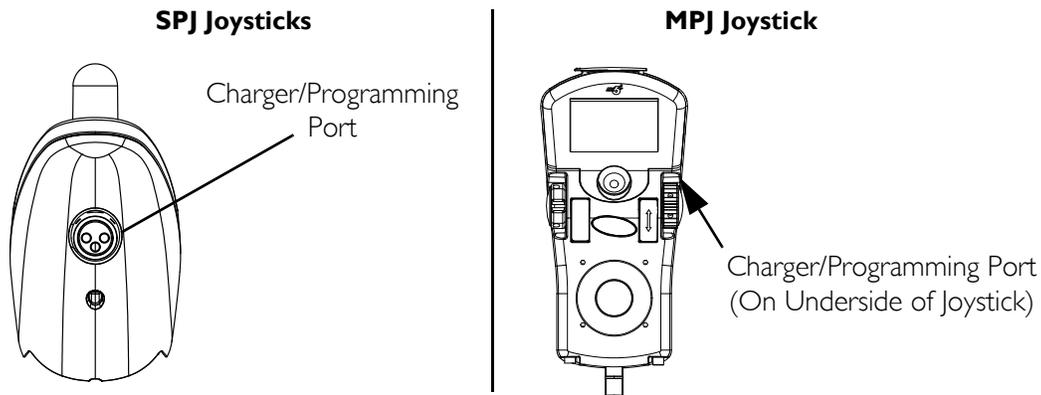


FIGURE 9.7 Charging Batteries

SECTION 10—ELECTRONICS

Controller Calibration

NOTE: For this procedure, refer to FIGURE 10.1.

1. Connect the programmer to the charger/programming port.
2. Refer to MK6i electronics field reference guide part number 1141471 for controller calibration information.

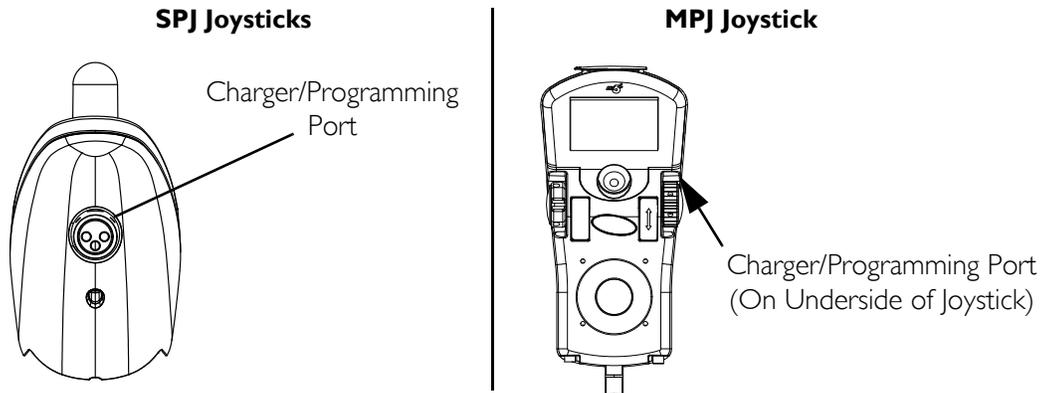


FIGURE 10.1 Controller Calibration

Removing/Installing the Controller

NOTE: For this procedure, refer to FIGURE 10.2 on page 80.

Removing

1. Remove the rear shroud. Refer to [Removing/Installing the Wheelchair Shrouds](#) on page 63.
2. Disconnect the right and left motor cables from the controller.
3. Disconnect the joystick cable from the controller.
4. Disconnect the battery cable from the controller.
5. Lift the controller up until the two 9/16 ID x 1-1/16 OD x 3/8-inch washers release from the base frame.
6. Pull the controller away to remove from the wheelchair frame.
7. If necessary to replace the controller mounting hardware, perform the following:
 - A. Remove the two 8-32 x 1.00-inch pan head screws and 8-32 locknuts that secure the controller mounting washers and 9/16 ID x 1-1/16 OD x 3/8-inch washers to the controller.
 - B. Remove the two controller mounting washers from the two 9/16 ID x 1-1/16 OD x 3/8-inch washers.

Installing

1. If necessary to install the controller mounting hardware, perform the following:
 - A. Insert the two controller mounting washers into two 9/16 ID x 1-1/16 OD x 3/8-inch washers.
 - B. Using the two 8-32 x 1.00-inch Phillips pan head tap screws and 8-32 locknuts, secure the controller mounting washers and 9/16 ID x 1-1/16 OD x 3/8-inch washers to the controller.
2. Align the two 9/16 ID x 1-1/16 OD x 3/8-inch washers of the controller with the two large openings of the base frame.
3. Insert the two 9/16 ID x 1-1/16 OD x 3/8-inch washers into the two large openings of the base frame and push down until the controller is securely locked into position.
4. Connect the battery cable to the controller.
5. Connect the joystick cable to the controller.
6. Connect the right and left motors to the controller.
7. Install the rear shroud. Refer to [Removing/Installing the Wheelchair Shrouds](#) on page 63.

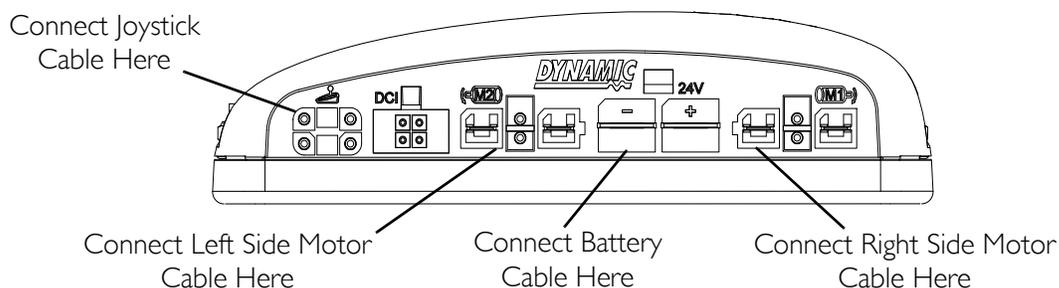
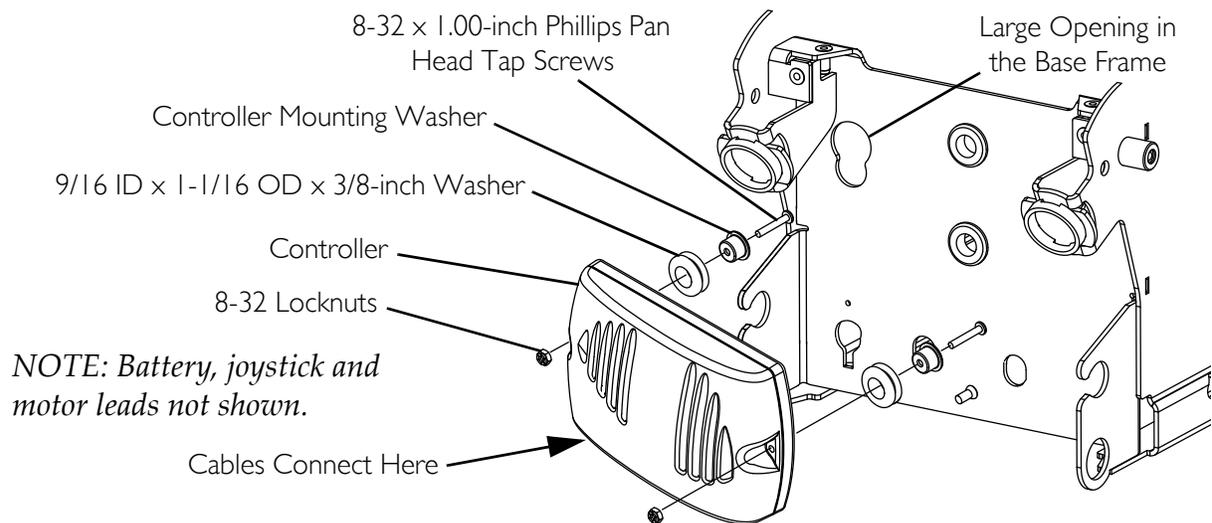


FIGURE 10.2 Removing/Installing the Controller

Preparing MK6i Joystick For Use

NOTE: For this procedure, refer to FIGURE 10.3.

1. Turn the adjustment lock lever to release the adjustment lock from joystick mounting tube (FIGURE 10.3).
2. Slide joystick mounting tube to the desired position.
3. Turn the adjustment lock lever to secure the adjustment lock to the joystick mounting tube.

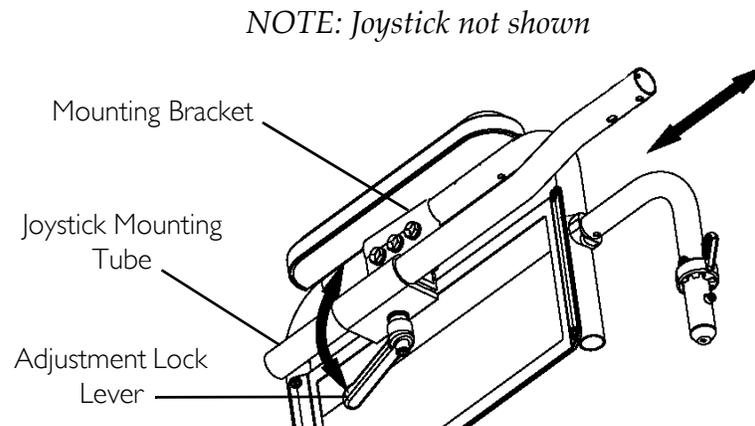


FIGURE 10.3 Preparing MK6i Joystick For Use

Removing/Installing/Repositioning MK6i Joystick

NOTE: For this procedure, refer to FIGURE 10.4 on page 82.

1. Turn the adjustment lock lever to release the joystick mounting tube from the mounting bracket.
2. Remove the rear shroud. Refer to [Removing/Installing the Wheelchair Shrouds](#) on page 63.
3. Disconnect the joystick connector from the controller connector.
4. Cut the tie wraps that secure the joystick cable in place.
5. Remove the joystick from wheelchair.
6. If repositioning joystick, perform the following:
 - A. Remove the three hex head mounting screws and washers that secure both halves of the mounting bracket to the arm tube.
 - B. Reposition the mounting bracket on the opposite arm tube, ensuring the threaded plate of the mounting bracket is on the inside of the arm tube as shown.
 - C. Using the three hex head mounting screws and washers, secure both halves of the mounting bracket to the arm tube.

NOTE: If replacing the exact same joystick then proceed to STEP 6. If installing a different joystick, call Technical Services for assistance.

7. Slide the new or existing joystick mounting tube through the mounting bracket to the desired position.
8. Turn the adjustment lock lever to secure the joystick mounting tube into the mounting bracket.
9. Connect the joystick connector to the controller connector.
10. Install the rear shroud. Refer to Removing/Installing the Wheelchair Shrouds on page 63.
11. Secure joystick cable in place with new tie wraps.

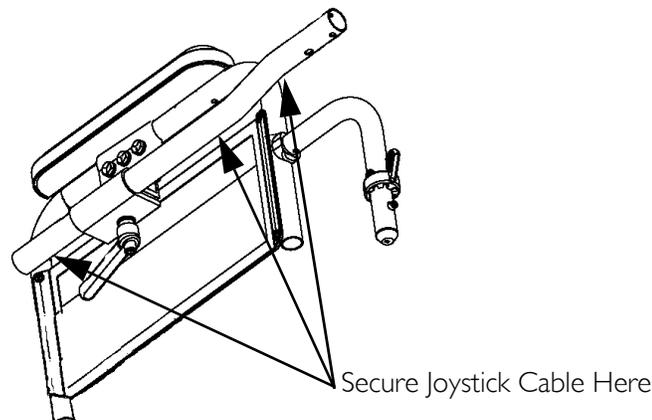
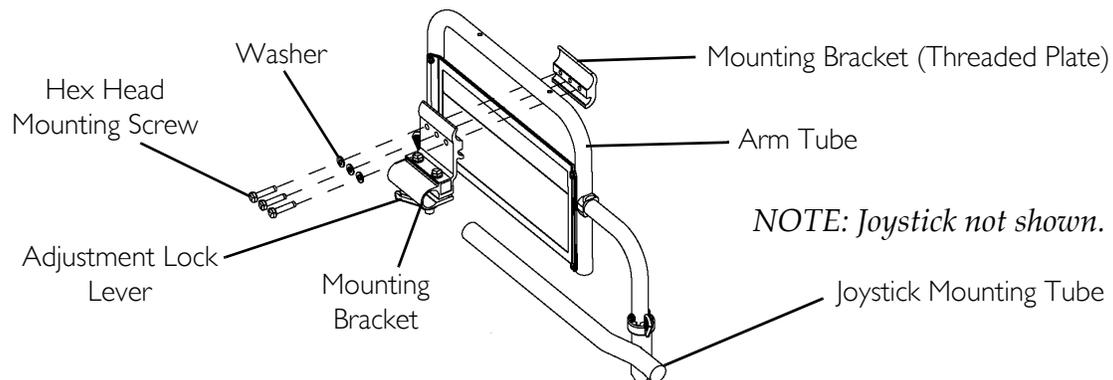


FIGURE 10.4 Removing/Installing/Repositioning MK6i Joystick

Routing/Securing Motor Cables

NOTE: For this procedure, refer to FIGURE 10.5 on page 84.

NOTE: This procedure applies to both sides of the wheelchair.

1. If necessary, place two 5-inch blocks under the base frame so that all six wheels are suspended above work surface.
2. Press down on the front head tube to move the walking beam, allowing access to the spring cylinder.

3. Position the motor cable from the motor to the controller in the following order:
 - A. Position the cable between the spring cylinder and the wheelchair base frame.
 - B. Route the motor cable over the spring cylinder, along the top edge of the wheelchair base frame.
 - C. Route the motor cable down along the rear of the wheelchair base frame.
 - D. Position the motor cable along the pivot bar.
 - E. Connect the motor cable connector to the desired controller connection.
4. Using tie-wraps, secure the motor cable to the wheelchair base frame in the following order:
 - A. Ensure there is approximately 5-inches of motor cable beyond the cable mounting position.
 - B. Secure the motor cable to the wheelchair base frame in a loop as shown in the side view of FIGURE 10.5.
 - C. Secure the motor cable to the wheelchair base frame above the rear spring.
 - D. Secure the motor cable to the wheelchair base frame below the rear spring.
 - E. Secure the excess motor cable to the pivot bar.
5. Rotate walking beam thru entire range of motion (top bumper to lower bumper) to ensure the motor cable has sufficient slack and the motor cable does not interfere with other components.
6. If necessary, remove the two 5-inch blocks from under the wheelchair base frame.

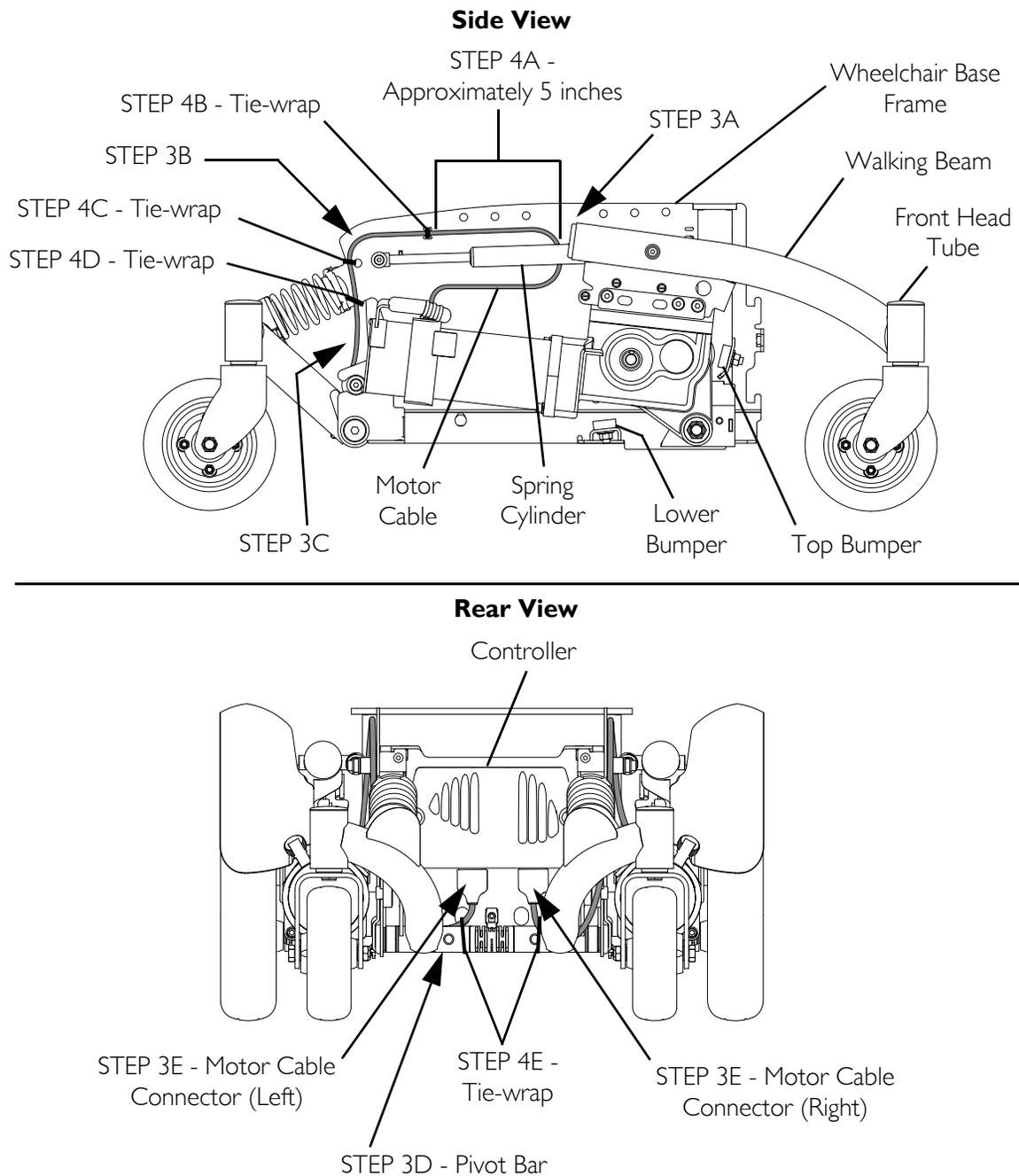


FIGURE 10.5 Routing/Securing Motor Cables

SECTION 11—TRANSPORT READY PACKAGE (TRRO)

NOTE: The information in this section is for wheelchairs ordered with the transport ready package ONLY.

⚠ WARNING

Risk of Death, Serious Injury, or Property Damage

Failure to observe the following transport warnings may result in death, serious injury, or property damage.

Contact Invacare Corporation (800-333-6900) with any questions about using this wheelchair for seating in a motor vehicle.

When feasible, wheelchair occupants should transfer into the vehicle seat and use the OEM (Original Equipment Manufacturer) vehicle-installed restraint system.

This wheelchair has been dynamically tested in a forward-facing mode with the specified crash test dummy restrained by **BOTH** pelvic and upper-torso belt(s) (shoulder belts), and that **BOTH** pelvic and upper-torso belt(s) should be used to reduce the possibility of head and chest impacts with vehicle components.

Use **ONLY** Wheelchair Tie-down and Occupant Restraint Systems (WTORS) which meet the requirements of the SAE (Society of Automotive Engineers) J2249 Recommended Practice during travel in a motor vehicle.

This wheelchair has been tested for seating in a motor vehicle with the factory installed wheelchair seating system **ONLY**.

This wheelchair **MUST** be in a forward facing position during travel in a motor vehicle.

This wheelchair is equipped and has been dynamically tested to rely on **WHEELCHAIR-ANCHORED** pelvic belts. If desired, **VEHICLE-ANCHORED** pelvic belts may be used.

IT IS STRONGLY RECOMMENDED THAT BOTH PELVIC AND UPPER-TORSO BELT(S) BE USED TO REDUCE THE RISK OF INJURY.

To reduce the potential of injury to vehicle occupants, wheelchair-mounted accessories, including but not limited to IV poles, trays, respiratory equipment, backpacks, and other personal items should be removed and secured separately.

Postural supports, positioning devices, and/or strap(s) should not be relied on for occupant restraint. These items may be used **IN ADDITION TO** the wheelchair-anchored or vehicle-anchored belts.

Seat angle is factory set at time of shipment. Adjustments to the wheelchair may void WC 19 compliance. To maintain compliance, refer to wheelchair service manual before making any adjustments.

DO NOT alter or substitute wheelchair frame parts, components, or seating systems.

⚠ WARNING

A sudden stop and/or collision may structurally damage your wheelchair. Wheelchairs involved in such incidents should be replaced.

Spill proof batteries, such as “gel cells”, should be installed on wheelchairs to be used during travel in a motor vehicle.

Transport ready packages are not retrofittable to existing models and are not field serviceable.

Only use the transport brackets included with TRRO and TRBKTS for the purposes described in this manual.

Battery retention brackets MUST be installed at all times. Otherwise, the wheelchair will not be WC/19 compliant. Refer to Removing/Installing the Batteries From/Into the Wheelchair on page 71.

About Transport Ready Packages

TRRO includes four factory-installed transport brackets and a wheelchair anchored pelvic belt. TRRO has been crash-tested in accordance with ANSI/RESNA WC Vol 1 Section 19 Frontal Impact Test requirements for wheelchairs with a 130 lb crash test dummy, which corresponds to a person with a weight of 125 to 165 lbs. for Junior seat sizes or a 168 lb crash dummy, which corresponds to a person with a weight of 165 to 300 lbs. for Adult seat sizes.

TRBKTS includes four factory-installed wheelchair transport brackets. TRBKTS has not been crash-tested in accordance with WC 19. Use these transport brackets only to secure an unoccupied wheelchair during transport.

As of this date, the Department of Transportation has not approved any tie-down systems for transportation of a user while in a wheelchair, in a moving vehicle of any type. It is Invacare’s position that users of wheelchairs should be transferred into appropriate seating in vehicles for transportation and use be made of the restraints made available by the auto industry. Invacare cannot and does not recommend any wheelchair transportation systems.

Compliance Information

This wheelchair conforms with the requirements of the ANSI/RESNA WC/Vol. 1 - Section 19.

NOTE: ANSI = American National Standards Institute, RESNA= Rehabilitation Engineering and Assistive Technology Society of North America.

This wheelchair has been dynamically tested in a forward-facing mode with the specified crash test dummy, which corresponds to a person with a 130 lb crash test dummy, which corresponds to a person with a weight of 125 to 165 lbs for Junior seat sizes or a 168 lb crash dummy, which corresponds to a person with a weight of 165 to 300 lbs for Adult seat sizes, restrained by BOTH pelvic and upper-torso belts in accordance with ANSI/RESNA WC Vol 1 Section 19. BOTH pelvic and upper-torso belts should be used to reduce the possibility of head and chest impacts with vehicle components.

Specifications

MODEL	MOTOR	WHEELCHAIR WEIGHT LIMIT	
		ADULT	JUNIOR
TDX SI	2 Pole	Up to 300 pounds	Up to 165 pounds

Securing the Wheelchair to the Vehicle

Positioning the Wheelchair in the Vehicle

⚠ WARNING

This wheelchair must be in a forward facing position during travel in a motor vehicle.

The recommended clear zones for wheelchair seated occupants restrained by **BOTH** pelvic and upper-torso belt(s) and **ONLY** by a pelvic belt are shown in the diagrams and described below.

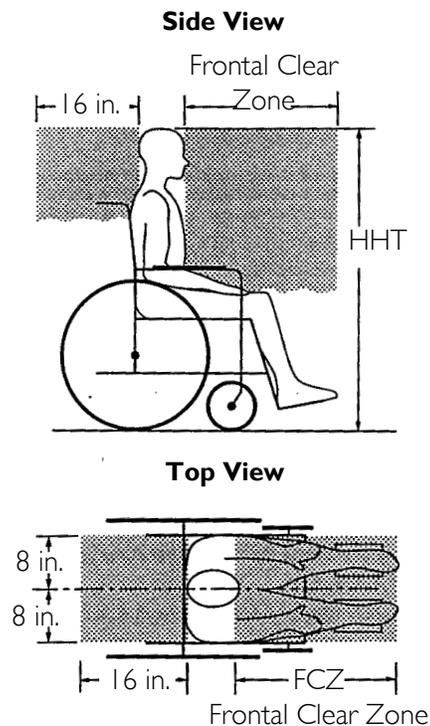
Frontal Clear Zones (FCZ) need to be **LARGER** when upper-torso belt(s) are **NOT** used.

The rear clear zone of 16-inches is measured from the rearmost point on an occupant's head.

The frontal clear zone is measured from the frontmost point on an occupant's head and is 26-inches with pelvic and upper-torso belt(s) and 37-inches with **ONLY** a pelvic belt.

The frontal clear zone may not be achievable for wheelchair-seated drivers.

The estimated seated height (HHT) from the ground or floor to the top of the wheelchair-seated occupant's head ranges from approximately 47-inches for a small adult female to about 61-inches for a tall adult male.



Securement Points

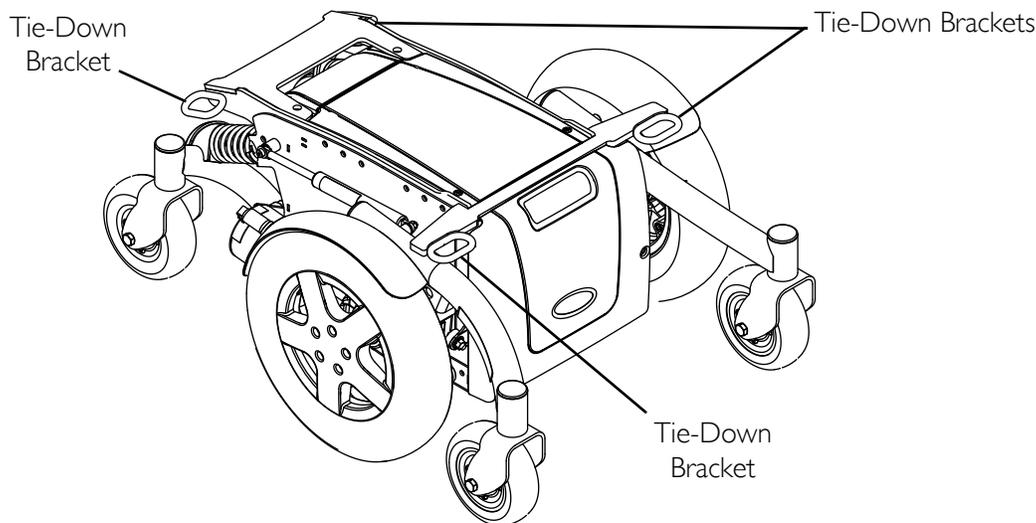


FIGURE 11.1 Securement Points

Securing the Wheelchair

This wheelchair is to be used only with Wheelchair Tie-down and Occupant Restraint Systems (WTORS) that have been installed in accordance with the manufacturer's instructions and SAE J2249.

NOTE: A copy of SAE J2249 Wheelchair Tie-down and Occupant Restraint Systems (WTORS) for use in Motor Vehicles can be obtained from: SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, (877) 606-7232 or (724) 776-4970.

Attach WTORS to the tie-down brackets in accordance with the manufacturer's instructions and SAE J2249.

Securing the Occupant

Wheelchair-Anchored Belts

⚠ WARNING

The pelvic belt that is provided by Invacare has been tested for use in a motor vehicle on this wheelchair ONLY. DO NOT replace the pelvic belt with a different style pelvic belt.

NOTE: For this procedure, refer to FIGURE 11.2 on page 89.

The wheelchair has been provided with a pelvic belt which meets the requirements of ANSI/RESNA W/C 19.

The pelvic belt, provided by Invacare, has been designed to accommodate use on either side of the vehicle. If necessary, follow the instructions below to reverse the orientation of the pelvic belt to accommodate the vehicle-anchored upper-torso belt.

1. Install the pelvic belt pin (Detail "A" of FIGURE 11.2) into the large end of the slot in the belt mounting bracket (Detail "B" or Detail "C"). Rotate downward and forward until it snaps into place into the small end of the slot.

NOTE: Note the position of the male end of the belt when installing the pelvic belt onto the belt mounting brackets. The male end of the pelvic belt (Detail "A" of FIGURE 11.2) has a pin which is used to secure the vehicle-anchored upper-torso belt.

2. Repeat STEP 1 for the opposite belt mounting bracket.
3. Install the vehicle-anchored upper-torso belt onto the pin on the male end of the pelvic belt.

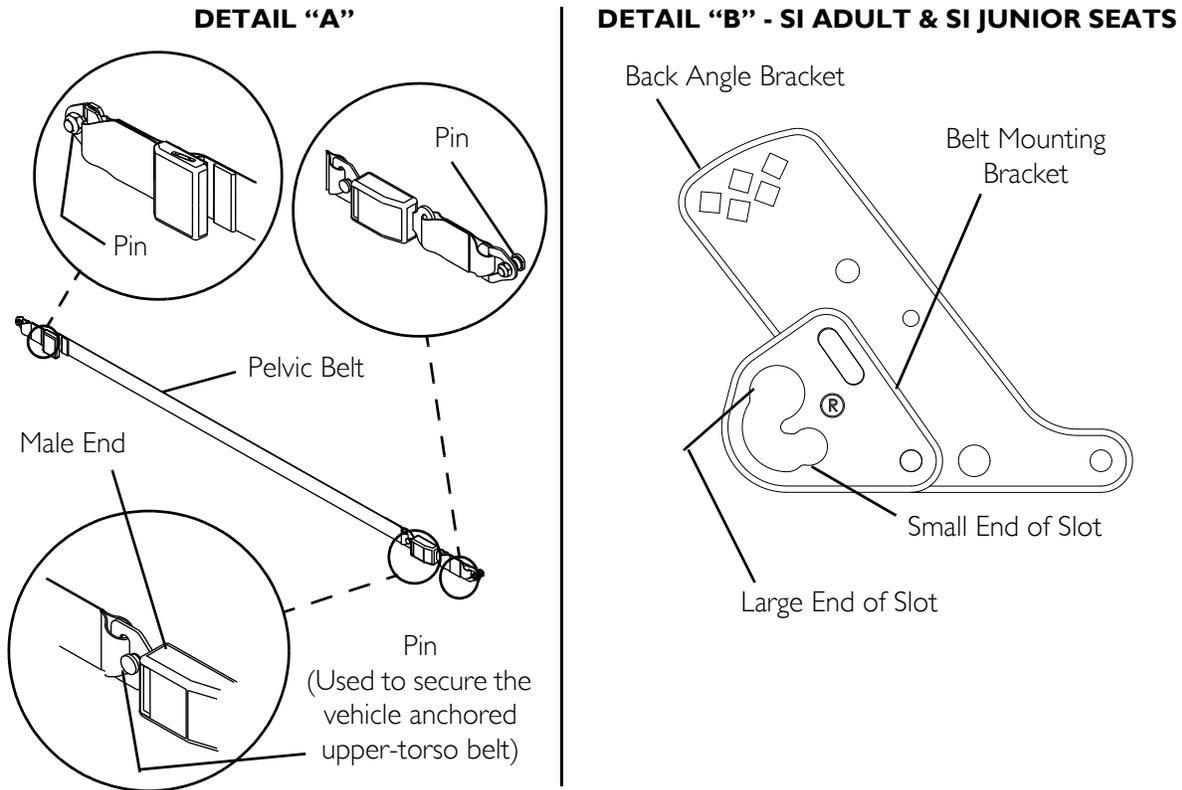


FIGURE 11.2 Wheelchair-Anchored Belts

Vehicle-Anchored Belts

NOTE: For this procedure, refer to FIGURE 11.3.

With regard to accommodating the use and fit of vehicle-anchored belts, this wheelchair has an overall rating of:

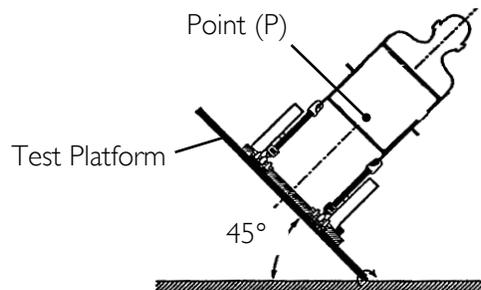
- TDX SI Adult - A
- TDX SI Junior - A

This rating is scored as follows:

RATING	DESCRIPTION
A	Excellent
B	Good
C	Fair
D	Poor

The test for Lateral Stability Displacement for Point (P) is shown in FIGURE 11.3. The average test result for point (P) is:

- TDX SI with Two 22NF Batteries -
 - TDX SI Adult - 0.53-inches (13.4 mm)
 - TDX SI Junior - 0.57-inches (14.4 mm)



NOTE: Rear view of the wheelchair and human surrogate secured on test platform and tilted to 45°.

FIGURE 11.3 Vehicle-Anchored Belts

Seating System

⚠ WARNING

This wheelchair has been tested for seating in a motor vehicle with the factory installed seating system **ONLY**.

Ensure that the factory installed seating system is secured to the wheelchair frame before operation. Refer to the seating system owner's manual.

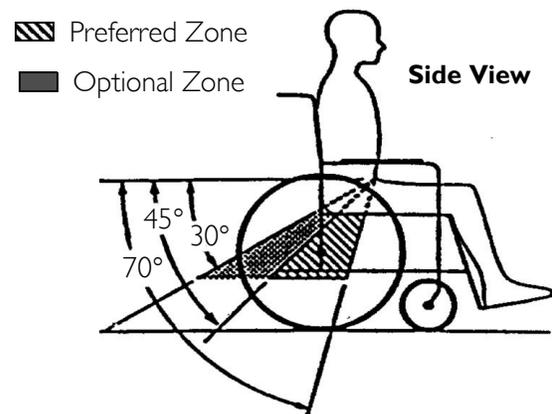
Positioning Belts

⚠ WARNING

The angle of the pelvic belt should be within the preferred zone of 45 to 75 degrees to the horizontal **OR** within the optional zone of 30 to 45 degrees to the horizontal.

Steeper side-view pelvic belt angles are especially important if the pelvic belt is intended to be used for postural support in addition to occupant restraint in a frontal crash. Steeper angles will reduce the tendency for a vertical gap to develop between the user and the belt due to compliance of seat cushions and belt movement, thereby reducing the tendency for the user to slip under the belt and for the belt to ride up on the soft abdomen during normal use.

Steeper belt angles also reduce the tendency for upper-torso belts to pull the pelvic belt onto the abdomen during frontal impact loading.



NOTE: For this procedure, refer to FIGURE 11.4.

1. The pelvic belt should be worn low across the front of the pelvis.
2. Position the upper-torso belt(s) over the shoulders.
3. The belt(s) should not be held away from the body by wheelchair components or parts, including but not limited to wheelchair armrests or wheels. Refer to FIGURE 11.4 for proper and improper positioning of the belts.
4. Ensure the belt(s) are not twisted.
5. Adjust belts as firmly as possible, being mindful of user comfort.

**DO POSITION
BELT INSIDE OF
ARMRESTS,
WHEELS, ETC.**



**DO NOT
POSITION BELT
OUTSIDE OF
ARMRESTS,
WHEELS, ETC.**



FIGURE 11.4 Positioning Belts

LIMITED WARRANTY

For warranty information, please refer to the original owner's manual which came with this product, or contact Invacare for more information.

Invacare Corporation www.invacare.com



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