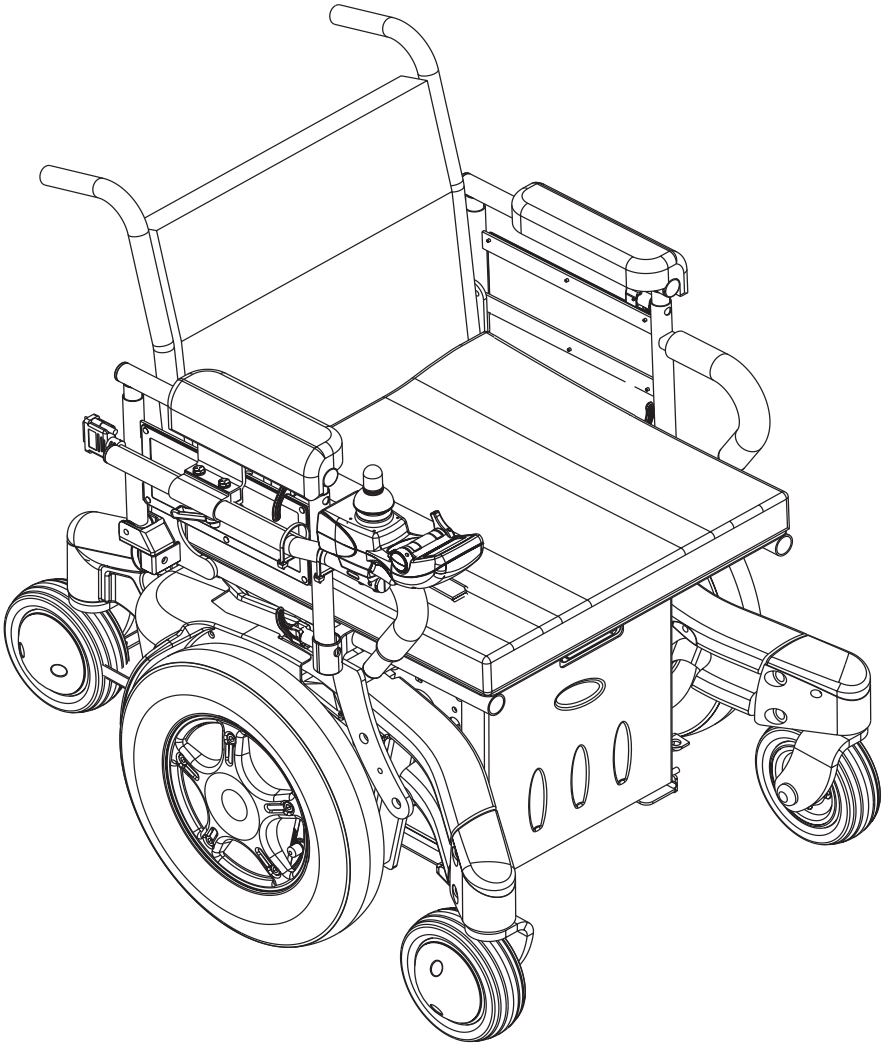
Service Manual

Storm Series® TDX™



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

INVACARE®

Yes, you can.™

⚠ WARNING

A QUALIFIED TECHNICIAN MUST PERFORM THE INITIAL SET UP OF THIS WHEELCHAIR. ALSO, A QUALIFIED TECHNICIAN MUST PERFORM ALL PROCEDURES IN THIS MANUAL.

DEALERS AND QUALIFIED TECHNICIANS: DO NOT SERVICE OR OPERATE THIS EQUIPMENT WITHOUT FIRST READING AND UNDERSTANDING (1) THE OWNER'S OPERATOR AND MAINTENANCE MANUAL, (2) THE SERVICE MANUAL (IF APPLICABLE) AND (3) THE SEATING SYSTEM'S MANUAL (IF APPLICABLE). IF YOU ARE UNABLE TO UNDERSTAND THE WARNINGS, CAUTIONS AND INSTRUCTIONS, CONTACT INVACARE TECHNICAL SUPPORT BEFORE ATTEMPTING TO SERVICE OR OPERATE THIS EQUIPMENT - OTHERWISE, INJURY OR DAMAGE MAY RESULT.

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

SPECIAL NOTES

WARNING/CAUTION notices as used in this manual apply to hazards or unsafe practices which could result in personal injury and/or property damage.

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 health care professional capable of making such a selection.

WHEELCHAIR TIE-DOWN RESTRAINTS AND SEAT RESTRAINTS

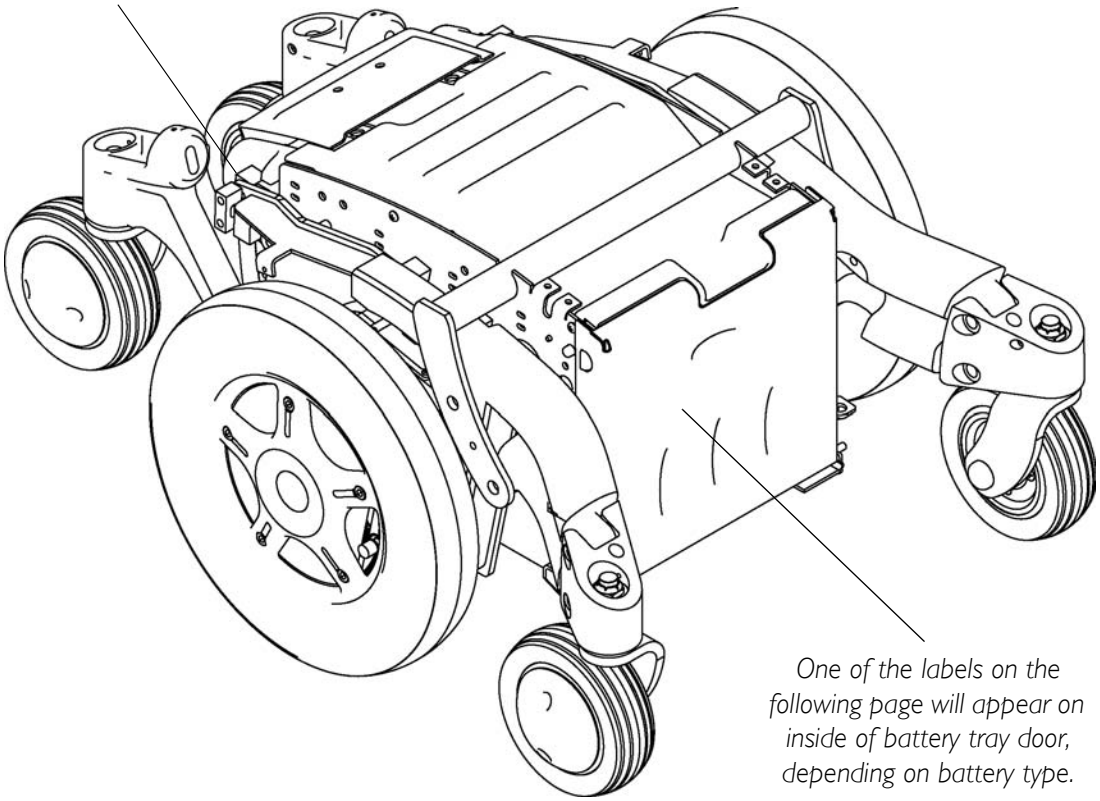
Wheelchair users should NOT be transported in vehicles of any kind while in wheelchairs. As of this date, the Department of Transportation has not approved any tie-down systems for transportation of a user while in a wheelchair, in a moving vehicle of any type.

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.

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, belt must be replaced immediately.

LABEL LOCATIONS

Serial Number Label is located on a plate below the controller.



One of the labels on the following page will appear on inside of battery tray door, depending on battery type.

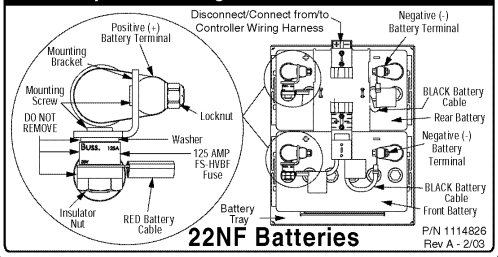
⚠ WARNING

Wiring Diagram and Battery Remove/Install 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). Install protective caps on positive and negative battery terminals. Replace cable(s) immediately if cable(s) insulation becomes damaged. 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, part number 1114809.

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



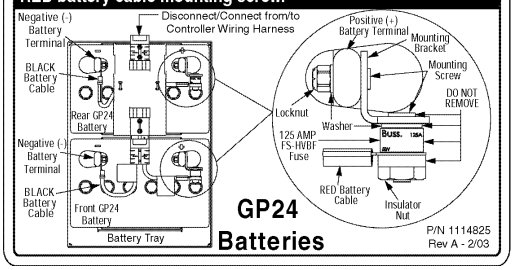
⚠ WARNING

Wiring Diagram and Battery Install/Remove for GP24 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). Install protective caps on positive and negative battery terminals. Replace cable(s) immediately if cable(s) insulation becomes damaged. 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, part number 1114809.

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



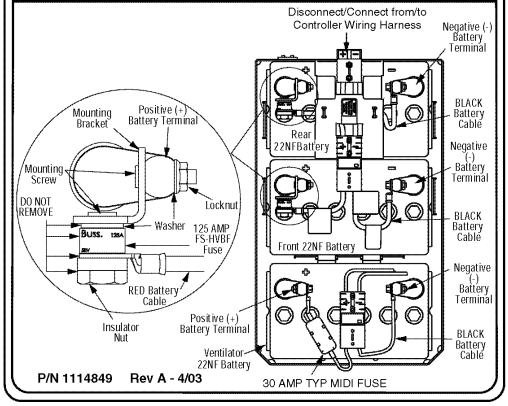
WHEELCHAIRS EQUIPPED WITH VENT TRAY ONLY

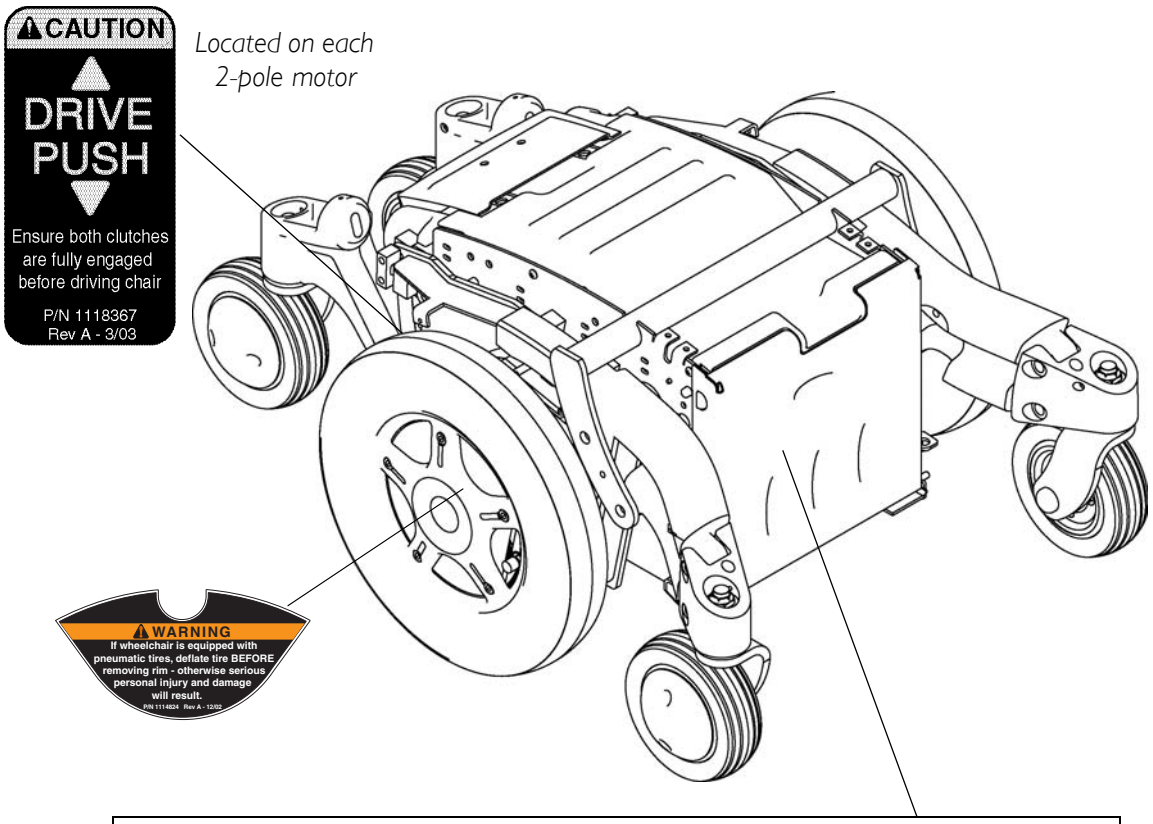
⚠WARNING

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). Install protective caps on positive and negative battery terminals. Replace cable(s) immediately if cable(s) insulation becomes damaged. 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.

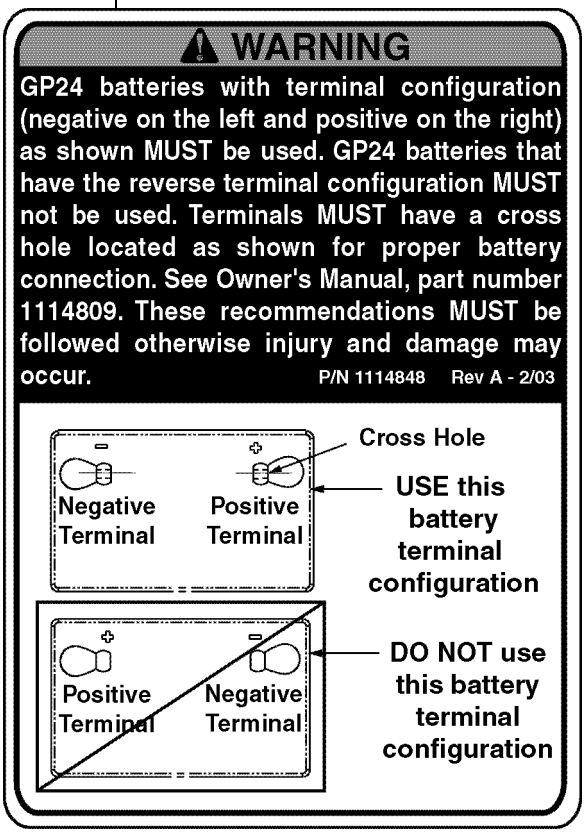
DO NOT remove fuse or mounting hardware from POSITIVE (+) RED battery cable mounting screw.

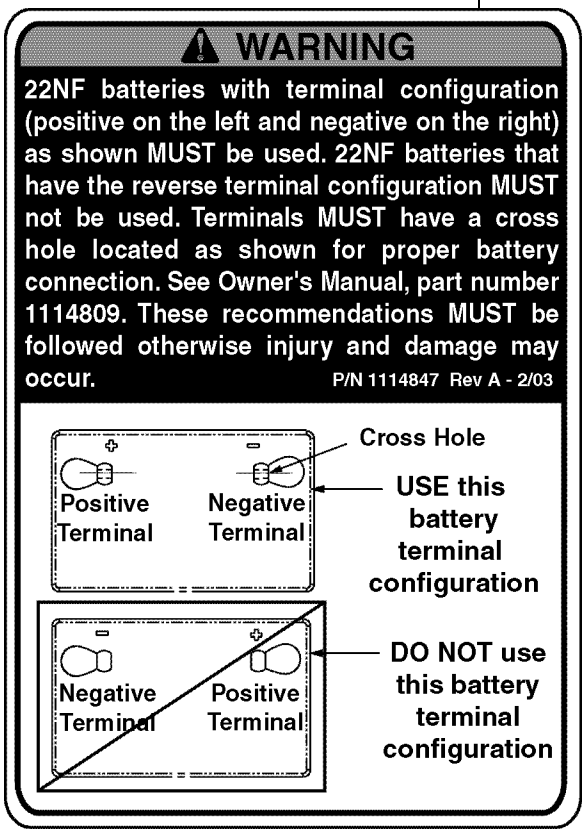
DO NOT REMOVE THIS LABEL



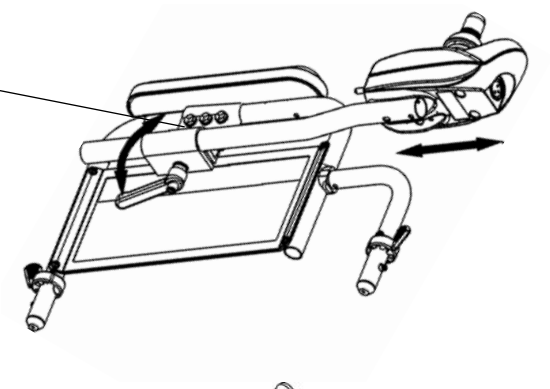


One of these labels will appear on inside of battery tray door depending on battery type.





Weight Capacity Label located here

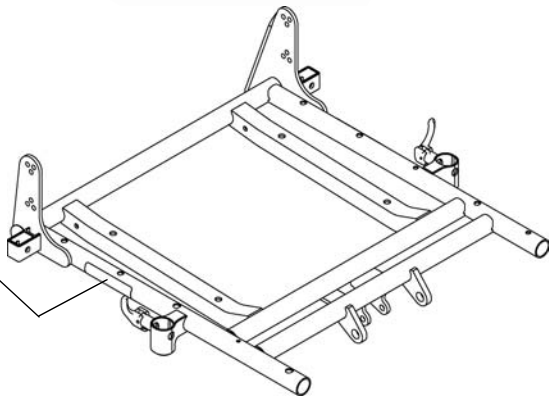


TDX 3 AND TDX 4

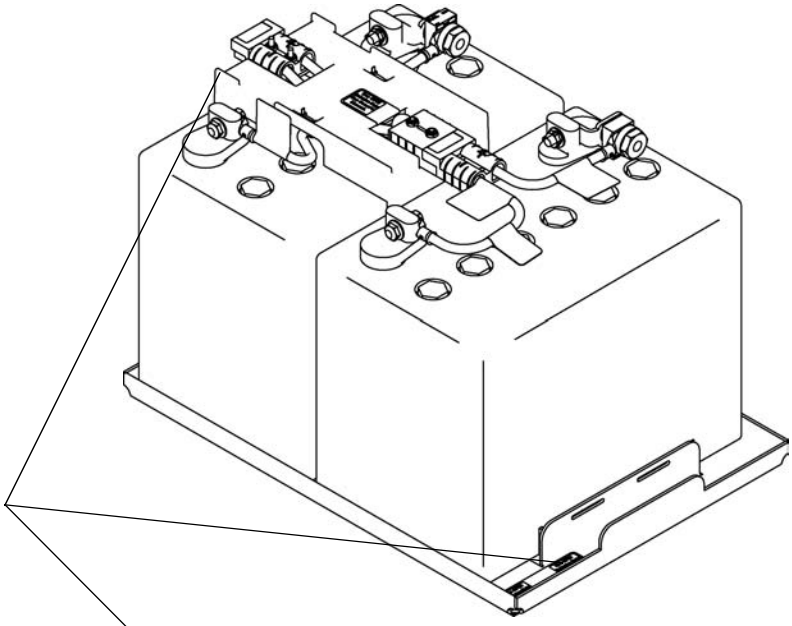
WEIGHT CAPACITY
300 LBS. (136 kgs.)
REFER TO OWNER'S MANUAL
P/N 1111016

TDX 3 AND TDX 5

WEIGHT CAPACITY
400 LBS. (182 kgs.)
REFER TO OWNER'S MANUAL
P/N 1111019



⚠WARNING Refer to Service Manual, p/n 1114819, to reposition the seat - otherwise serious personal injury and damage will result. P/N 1114823 Rev A - 2/03



One of these labels will appear on the battery tray and the battery wiring connector bracket, depending on battery type.

Use GP24 Batteries Only. See Owner's Manual, p/n 1114809.	P/N 1118355 / P/N 1118355 REV A - 2/03	Use GP24 Batteries Only. See Owner's Manual, p/n 1114809.

Use 22NF Batteries Only. See Owner's Manual, p/n 1114809.	P/N 1118356 / P/N 1118356 REV A - 2/03	Use 22NF Batteries Only. See Owner's Manual, p/n 1114809.

TYPICAL PRODUCT PARAMETERS TDX 5

	ADULT (FIXED WIDTH)	JUNIOR (ADJUSTABLE WIDTH)
SEAT WIDTH RANGE: Adjustable Seat Back Angle (ASBA)	16 to 24 inches	12 to 15 inches
SEAT DEPTH RANGE: (in 1-inch increments)	16 to 22 inches	12 to 16 inches
BACK HEIGHT RANGE:	12 to 24 inches	
BACK ANGLE RANGE:	80° to 100° in 5° increments	
SEAT-TO-FLOOR (APPROXIMATE) Standard: Medium: Tall:	17 inches @ 5° 19 inches @ 5° 21 inches @ 5°	
OVERALL WIDTH OF BASE:	25-inches (w/o joystick)	
OVERALL HEIGHT ASBA FRAME: 0° SEAT ANGLE, 16-INCH HIGH BACK Standard: Medium: Tall:	33-¼ inches 35-¼ inches 37-¼ inches	
OVERALL LENGTH:	35-1/4-inches w/o front rigging 42.9-inches w/center mount front rigging, 0° Seat Angle	
WEIGHT TRUETRACK HD MOTOR PACKAGE- W/O GP24 Batteries: With two (2) GP24 Batteries:	208 lbs. 310 lbs.	
MOTOR:	TrueTrack HD Motor Package (7.5 MPH)	
DRIVE AXLE:	Non-adjustable	
DRIVE WHEELS/TIRES (FOAM FILLED OR PNEUMATIC) Standard:	14 x 3 inches	
PHYSICAL DIMENSIONS CASTERS W/PRECISION SEALED BEARINGS SEMI-PNEUMATIC (4 CASTERS) Standard:	6 x 2 inches	
ARMRESTS:	Flip Back, Fixed or Adjustable Height (Desk and Full Length)	
BATTERY REQUIREMENTS:	Use MK p/n M24SLDG or p/n M22NFSLDG batteries only.	
WHEELCHAIR UPHOLSTERY OPTIONS:	Nylon	
ELECTRONICS:	MK5™ TT-EX™ with MK5 MPJ™ Joystick	
FRONT RIGGINGS:	Center Mount and Swingaway Styles	

	ADULT (FIXED WIDTH)	JUNIOR (ADJUSTABLE WIDTH)
FOOTRESTS:	Swingaway Styles, Telescoping Front Rigging Supports, 2-inch and 4-inch long Pivot Slide Tube, Manually Elevating, Power Elevating.	
SEAT TILT ANGLE ADJUSTMENT:	Adjustable (0° to 10°)	
SEAT CUSHION:	Cushion (Optional)	
WEIGHT LIMITATION:	Up to 400 lbs	

TYPICAL PRODUCT PARAMETERS TDX 4

	ADULT (FIXED WIDTH)	JUNIOR (ADJUSTABLE WIDTH)
SEAT WIDTH RANGE: Adjustable Seat Back Angle (ASBA) *NOTE: 22-inch maximum width with standard motor*	16 to 24 inches	12 to 15 inches
SEAT DEPTH RANGE: (in 1-inch increments)	16 to 22-inches	12 to 16-inches
BACK HEIGHT RANGE:	12 to 24 inches	
BACK ANGLE RANGE:	80° to 100° in 5° increments	
SEAT-TO-FLOOR (APPROXIMATE) Standard: Medium: Tall:	17 inches @ 5° 19 inches @ 5° 21 inches @ 5°	
OVERALL WIDTH OF BASE:	25-1/2-inches (w/o joystick)	
OVERALL HEIGHT ASBA FRAME: 0° SEAT ANGLE, 16-INCH HIGH BACK Standard: Medium: Tall:	33-¼-inches 35-¼-inches 37-¼-inches	
OVERALL LENGTH:	35-1/4 inches w/o front rigging 42.9-inches w/center mount front rigging, 0° Seat Angle	
WEIGHT 4-POLE MOTOR- W/O GP24 Batteries: With two (2) GP24 Batteries:	186 lbs. 290 lbs.	
MOTOR:	4 Pole 18:1 (6.3 MPH), 4 Pole HD 24:1 (4.5 MPH) or True Track HD (7.5 MPH)	
DRIVE AXLE:	Non-adjustable	
DRIVE WHEELS/TIRES (FOAM FILLED OR PNEUMATIC) Standard:	14 x 3 inches	
PHYSICAL DIMENSIONS CASTERS W/PRECISION SEALED BEARINGS SEMI-PNEUMATIC (4 CASTERS) Standard:	6 x 2 inches	
ARMRESTS:	Flip Back, Fixed or Adjustable Height (Desk and Full Length)	
BATTERY REQUIREMENTS:	Use MK p/n M24SLDG or p/n M22NFSLDG batteries only.	
WHEELCHAIR UPHOLSTERY OPTIONS:	Nylon	
ELECTRONICS:	MK5 EX™ with MK5 DPJ™ Joystick	

	ADULT (FIXED WIDTH)	JUNIOR (ADJUSTABLE WIDTH)
FRONT RIGGINGS:	Center Mount and Swingaway Styles	
FOOTRESTS:	Swingaway Styles, Telescoping Front Rigging Supports, 2-inch and 4-inch long Pivot Slide Tube, Manually Elevating, Power Elevating.	
SEAT TILT ANGLE ADJUSTMENT:	Adjustable (0° to 10°)	
SEAT CUSHION:	Cushion (Optional)	
WEIGHT LIMITATION:	Up to 300 lbs	

TYPICAL PRODUCT PARAMETERS TDX 3

	ADULT (FIXED WIDTH)	JUNIOR (ADJUSTABLE WIDTH)
SEAT WIDTH RANGE: Adjustable Seat Back Angle (ASBA) *NOTE: 22-inch maximum width with standard motor*	16 to 24 inches	12 to 15 inches
SEAT DEPTH RANGE: (in 1-inch increments)	16 to 22 inches	12 to 16 inches
BACK HEIGHT RANGE:	12 to 24 inches	
BACK ANGLE RANGE:	80° to 100° in 5° increments	
SEAT-TO-FLOOR (APPROXIMATE) Standard: Medium: Tall:	17 inches @ 5° 19 inches @ 5° 21 inches @ 5°	
OVERALL WIDTH OF BASE:	25 inches (w/o joystick)	
OVERALL HEIGHT ASBA FRAME: 0° SEAT ANGLE, 16-INCH HIGH BACK Standard: Medium: Tall:	33- ¼ inches 35-¼ inches 37-¼ inches	
OVERALL LENGTH:	35-1/4-inches w/o front rigging 42.9-inches w/center mount front rigging, 0° Seat Angle	
WEIGHT 4-POLE MOTOR- W/O 22NF Batteries: With two (2) 22NF Batteries:	166 lbs. 260 lbs.	
MOTOR:	4 Pole 18:1(6.3 MPH), 24:1 HD 4 Pole (4.5 MPH) or True Track HD (7.5 MPH)	
DRIVE AXLE:	Non-adjustable	
DRIVE WHEELS/TIRES (FOAM FILLED OR PNEUMATIC) Standard:	12-1/2 x 2-¼ inches	
PHYSICAL DIMENSIONS CASTERS W/PRECISION SEALED BEARINGS SEMI-PNEUMATIC Standard:	6 x 2 inches	
ARMRESTS:	Flip Back, Fixed or Adjustable Height (Desk and Full Length)	
BATTERY REQUIREMENTS:	Use MK p/n M22NFSLDG batteries only.	
CASTER FORKS:	Standard, two side fork, one sided fork is optional.	
WHEELCHAIR UPHOLSTERY OPTIONS:	Nylon	
ELECTRONICS:	MK5 NX™ with MK5 SPJ™ 80 Joystick	

	ADULT (FIXED WIDTH)	JUNIOR (ADJUSTABLE WIDTH)
FRONT RIGGINGS:	Center Mount and Swingaway Styles	
FOOTRESTS:	Swingaway Styles, Telescoping Front Rigging Supports, 2-inch and 4-inch long Pivot Slide Tube, Manually Elevating, Power Elevating.	
SEAT TILT ANGLE ADJUSTMENT:	Adjustable (0° to 10°)	
SEAT CUSHION:	Cushion (Optional)	
WEIGHT LIMITATION:	Up to 300 lbs.	

SECTION 7—GENERAL GUIDELINES

REPAIR OR SERVICE INFORMATION

⚠ WARNING

SECTION 1 - GENERAL GUIDELINES contains important information for the safe operation and use of this product. 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 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 a healthcare professional, dealer or technical personnel before attempting to use this equipment - otherwise, injury or damage may occur.

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.

OPERATING INFORMATION

Performance adjustments should only be made by professionals of the healthcare field or persons fully conversant with this process and the driver's capabilities. Incorrect settings could cause injury to the driver, bystanders, damage to the wheelchair and to surrounding property.

After the wheelchair has been set-up, 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. Repeat this section until the wheelchair performs to specifications.

TIRE PRESSURE

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

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 (2) prong wall receptacle is encountered, it is the personal responsibility and obligation of the customer to contact a qualified electrician and have the two (2) prong receptacle replaced with a properly grounded three (3) 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 (3) prong to two (2) prong adapters should not be used. Use of three (3) prong adapters can result in improper grounding and present a shock hazard to the user.

BATTERIES

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 8—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 meter (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.

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 meter (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) **The immunity level of this product is unknown.**

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

SECTION 9—SAFETY INSPECTION/ TROUBLESHOOTING

SAFETY INSPECTION CHECKLISTS

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.

INSPECT/ADJUST

△ CAUTION

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

- ❑ Wheelchair rolls straight (no excessive drag or pull to one side).
- ❑ All fasteners on clothing guards are secure.
- ❑ Arms are secure but easy to release and adjustment levers engage properly.
- ❑ Adjustable height arms operate and lock securely.
- ❑ Upholstery (Seat and Back) 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).
- ❑ Wheel/fork assembly has proper tension when caster is spun. Caster 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.
- ❑ 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.
- ❑ Clean upholstery and armrests as needed.
- ❑ 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 motor brushes and gearbox coupling -4 pole motor/gearbox only.
- ❑ Inspect walking beam ratchet assembly for wear and corrosion.

TROUBLESHOOTING

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

WHEELS

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 - COMMON

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
E28 Error code.	Charger still plugged in when user tries to drive the wheelchair.	Unplug charger to drive wheelchair.
	Manual recliner, Power tilt and/or recline is in reclined position and drive lockout is engaged	To disengage drive lockout, return seat to upright position.
No LED's on DPJ/ SPJ Joystick	Batteries discharged. Fuse Open Loose Battery Terminal	Plug connections back together, and check for damaged wiring.

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 0-5 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.

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
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. Bad motor or gear box	Ohm out motors. Check brushes and replace brushes if necessary. Replace motor if high reading is present. Normal reading is 0-5 Ohms. 4 Pole ONLY. Calibrate GB motors
	Controller malfunction.	Check for error codes with programmer. Refer to electronics manual, part number 1114808.
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 (2/4-Pole only).
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 45-50 Ohms.
Gearbox is leaking Fluid.	Bad seal around drive shaft Loose hardware.	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.
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 connrctors 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. Batteries are dead.	Check all connections and housings for damage. If you have blown fuse a new battery wiring harness must be purchased. 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 battery.

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.	Remove charger cover and check for fuses. if fuses are present Ohm out fuses and replace if neces-sary.
Batteries won't charge.	Blown battery fuse in wiring harness, or charger.	Check battery wiring harness fuse on the wheel-chair Check fuse in the charger.
	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. Refer to MK5 electronics manual, part number 1114808.
	Check programming settings.	Torque setting and power level setting may be too high. Refer to MK5 electronics manual, part number 1114808.
	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 servcie 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 9.1

NOTE: The following test can also be performed through the controller of the wheelchair along with a remote programmer. Refer to the electronics manual, part number 1114808 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 1.0 volts under load (2.0 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.

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
4. Connect the voltmeter leads to the charger port on the wheelchair as shown in FIGURE 9.1. 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 25.5 to 26 VDC.

⚠ WARNING

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

5. Sit in wheelchair and place feet against a wall, 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 (2) individuals (one [1] 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 volts from a pair of fully charged batteries while under load, they should be replaced regardless of the unloaded voltages.

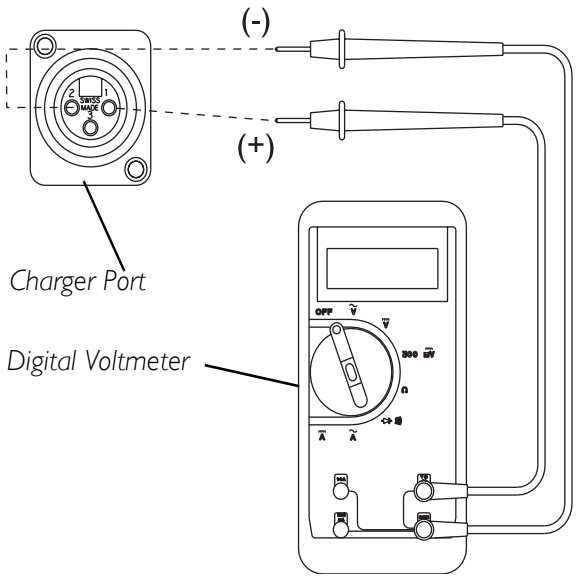


FIGURE 9.1 - FIELD LOAD TEST

MOTOR TESTING

NOTE: For this procedure, refer to FIGURE 9.2.

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

NOTE: A normal reading is between .02 and 5 ohms. A reading of 0 ohms or in excess of 15 ohms indicates a problem. High readings are generally caused by bad connections and/or damaged brushes. Contact Invacare.

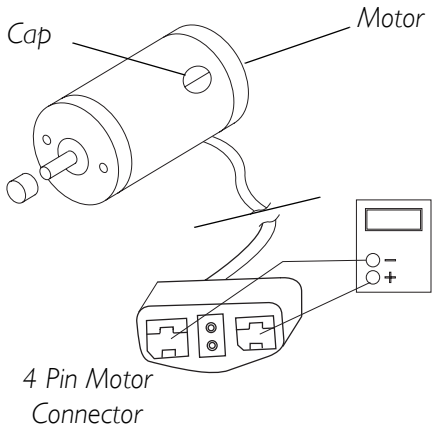


FIGURE 9.2 - MOTOR TESTING

MOTOR BRUSH INSPECTION AND/OR REPLACEMENT

4 POLE MOTOR

NOTE: There is one (1) contact brush under each brush cap on the motor housing. There are four (4) motor brushes on a 4 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 on the back cover.

1. Turn the power off.
2. Disengage the motors.
3. Locate a brush cap on the 4 pole motor (Four (4) caps in all). See Detail "A" in FIGURE 9.3.
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 9.3.

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.
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.

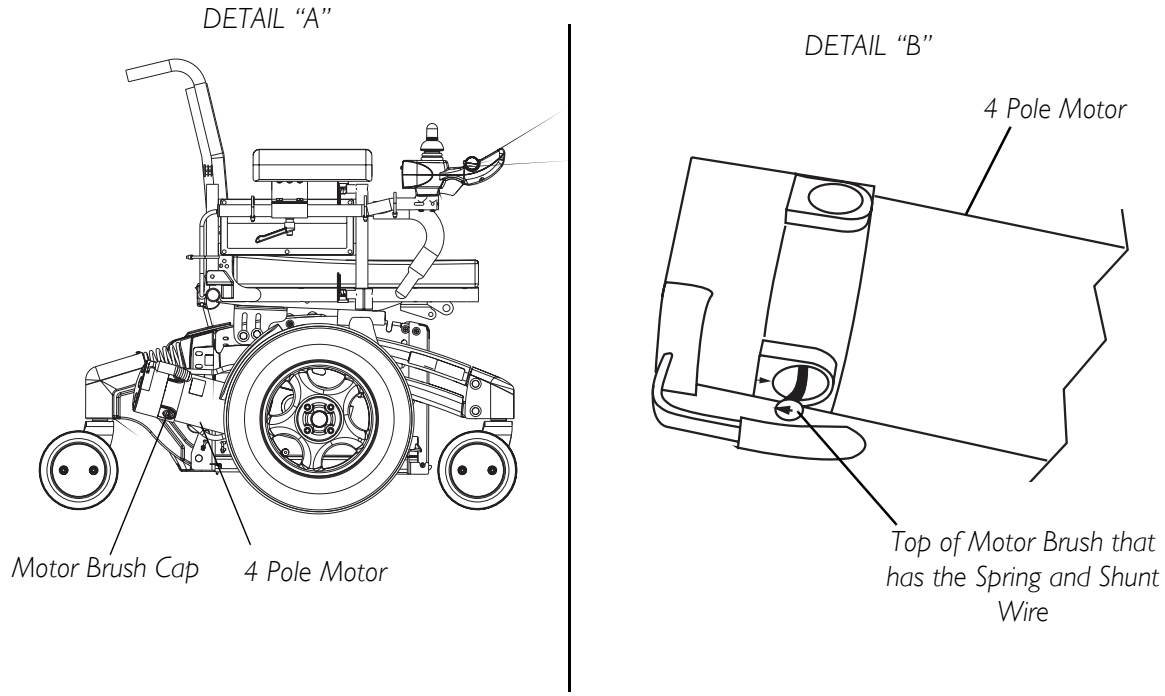


FIGURE 9.3 - MOTOR BRUSH INSPECTION AND/OR REPLACEMENT4 POLE MOTOR

9. Perform one (1) of the following:
   A. 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:
      a. Replace existing motor brush into brush holder exactly the same way it was pulled out using the marks as reference points.
      b. Install motor brush cap.

      NOTE: Tighten and loosen motor brush cap a couple times to ensure proper seating of the motor brush.
   B. If motor brush is in bad condition, brush is worn or damaged, replace immediately by performing the following:
      a. Install new motor brush into brush holder.
      b. 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.

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

NOTE: For steps d and f, 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.

d. Run the motors forward for one (1) hour.

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

f. Run the motors in reverse for one (1) hour.

g. When process is complete, remove wheelchair from blocks and test drive the wheel chair.

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

2 POLE MOTOR

NOTE: For this procedure, refer to FIGURE 9.4.

1. Turn power off.
2. Disengage motors.
3. Remove the two (2) end cap screws on the end cap. Refer to Detail "A.
4. Remove the end cap and locate the brush assembly on each side of the motor. Refer to Detail "B".

△ CAUTION

Use caution when removing the screw and washer that attaches the shunt wire to the motor. DO NOT discard the screw and washer. The screw and washer are not available as service parts.

5. Remove the mounting screw and washer that mounts the shunt wire to the motor assembly. DO NOT discard the mounting screw and washer. Refer to Detail "C" .

△ CAUTION

When removing the existing brushes, ensure that the spring retainer is not removed and/or discarded. The spring retainer is not available as a service part.

6. Release the tension on the brush spring retainer with a small screwdriver and position the screwdriver in place to hold the spring retainer. Refer to Detail "D".

7. Remove the motor brush and perform the following:
   A. Inspect the commutator (not shown) for damage.
   B. Inspect the motor brush thoroughly for excessive wear or chips in the brush and any discoloration in the shunt wire and perform one (1) of the following:
      a. If motor brush is in good condition, (i.e., the end of the brushes are smooth and shiny and shunt wire is not discolored), reinstall existing brush back into brush holder.
      b. If motor brush is in bad condition, brush is worn or damaged, discard immediately and install new brush into brush holder.
8. Remove the screwdriver to release spring retainer so as to hold brush in place.

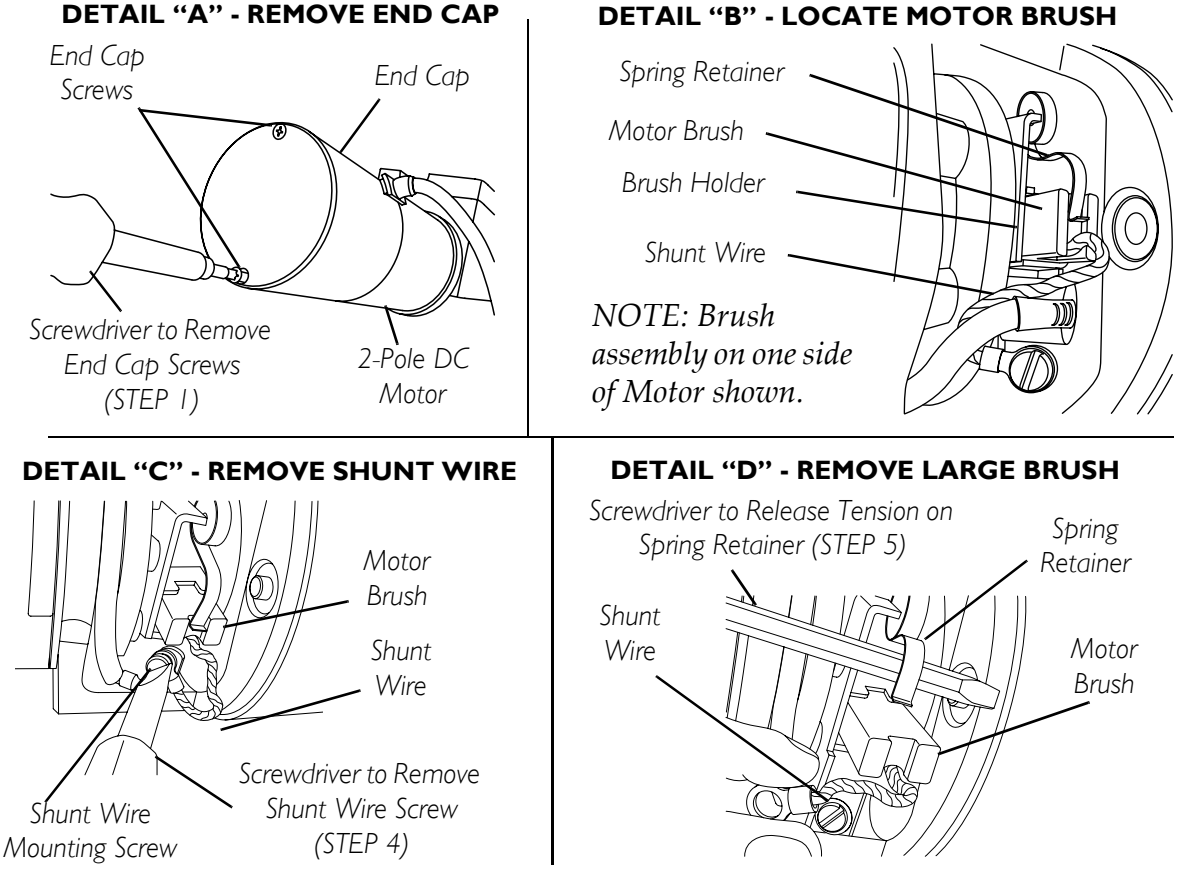


FIGURE 9.4 - MOTOR BRUSH INSPECTION AND/OR REPLACEMENT 2 POLE MOTOR

9. Attach the shunt wire to the motor housing using the mounting screw and washer (removed in STEP 5). Securely tighten.
10. Replace the motor end cap and secure using the two (2) end cap screws.

    NOTE: Repeat STEPS 1-12 for the opposite motor.
11. If new motor brush was installed, perform the following process:

    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.

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

NOTE: For steps B and D, 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.

B. Run the motors forward for one (1) hour.

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

D. Run the motors in reverse for one (1) hour.

E. When process is complete, remove wheelchair from blocks and test drive the wheel chair.

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

ELECTRO-MECHANICAL PARKING BRAKE TESTING

NOTE: 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 (2) brake contacts. A normal reading is between 45-100 ohms depending on the motor. A reading of 0 ohms (W) or a very high reading; i.e., MEG ohms or O.L. (out of limit) 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.

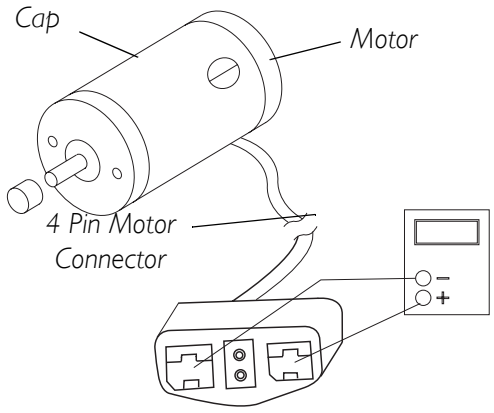
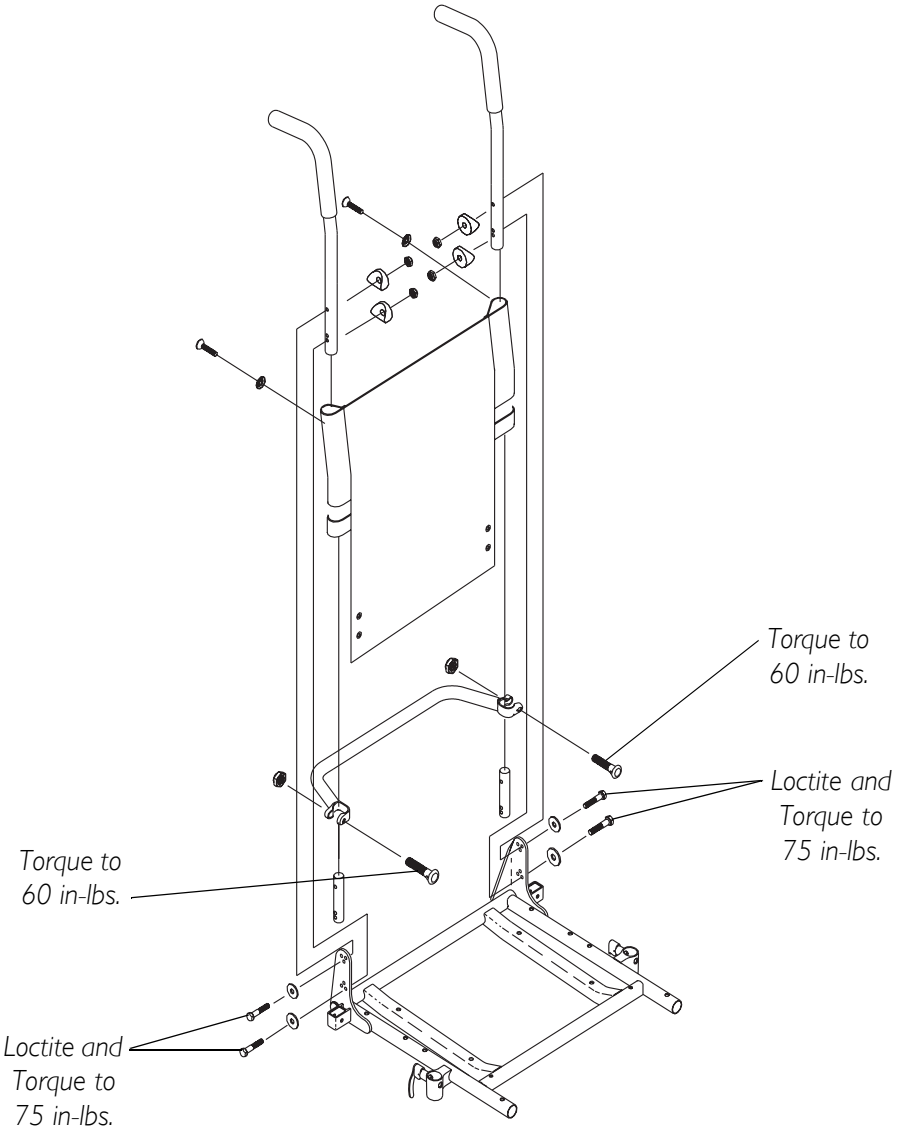


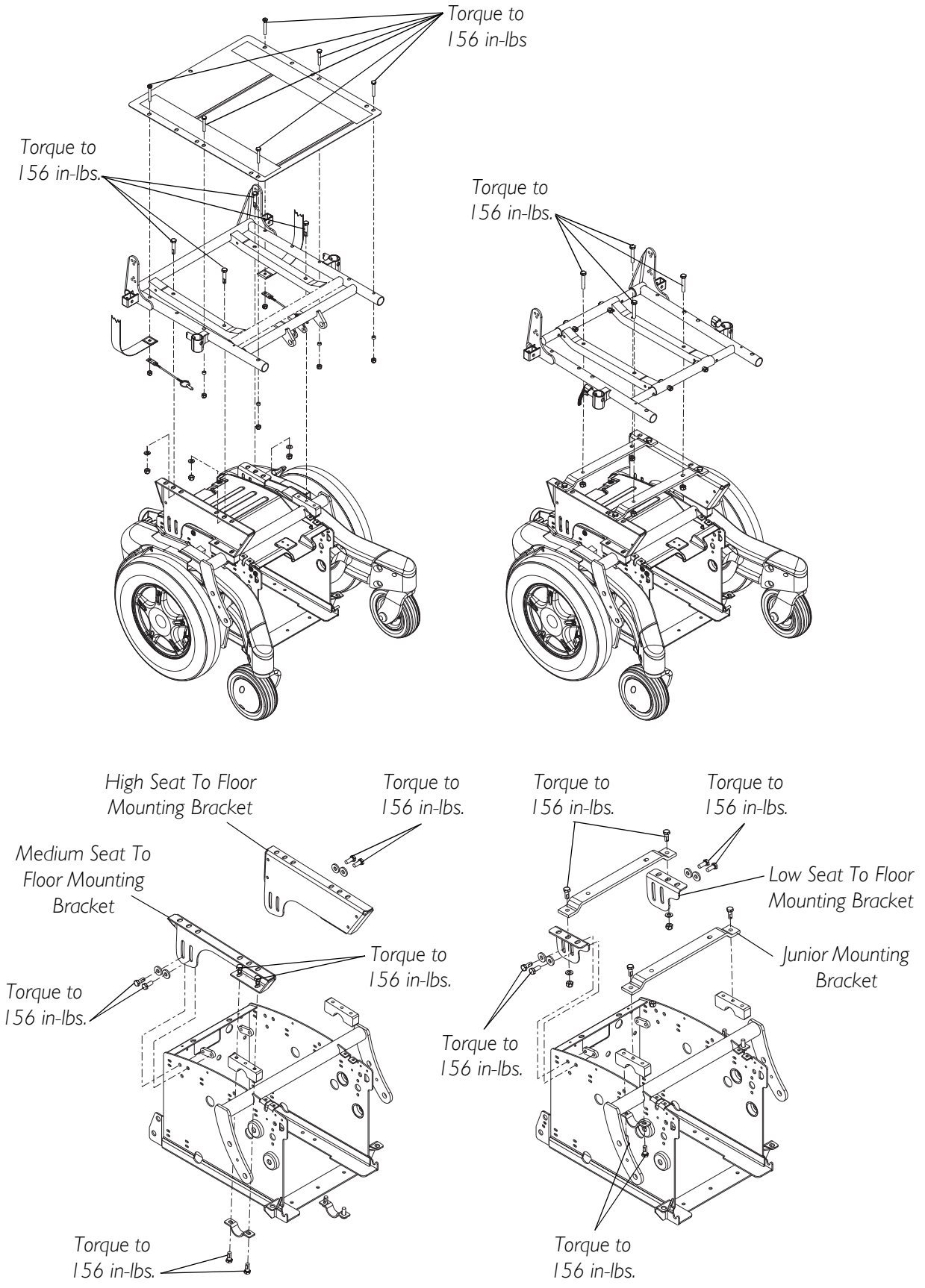
FIGURE 9.5 - ELECTRO-MECHANICAL PARKING BRAKE TESTING

SECTION 10— HARDWARE TORQUE SPECIFICATIONS

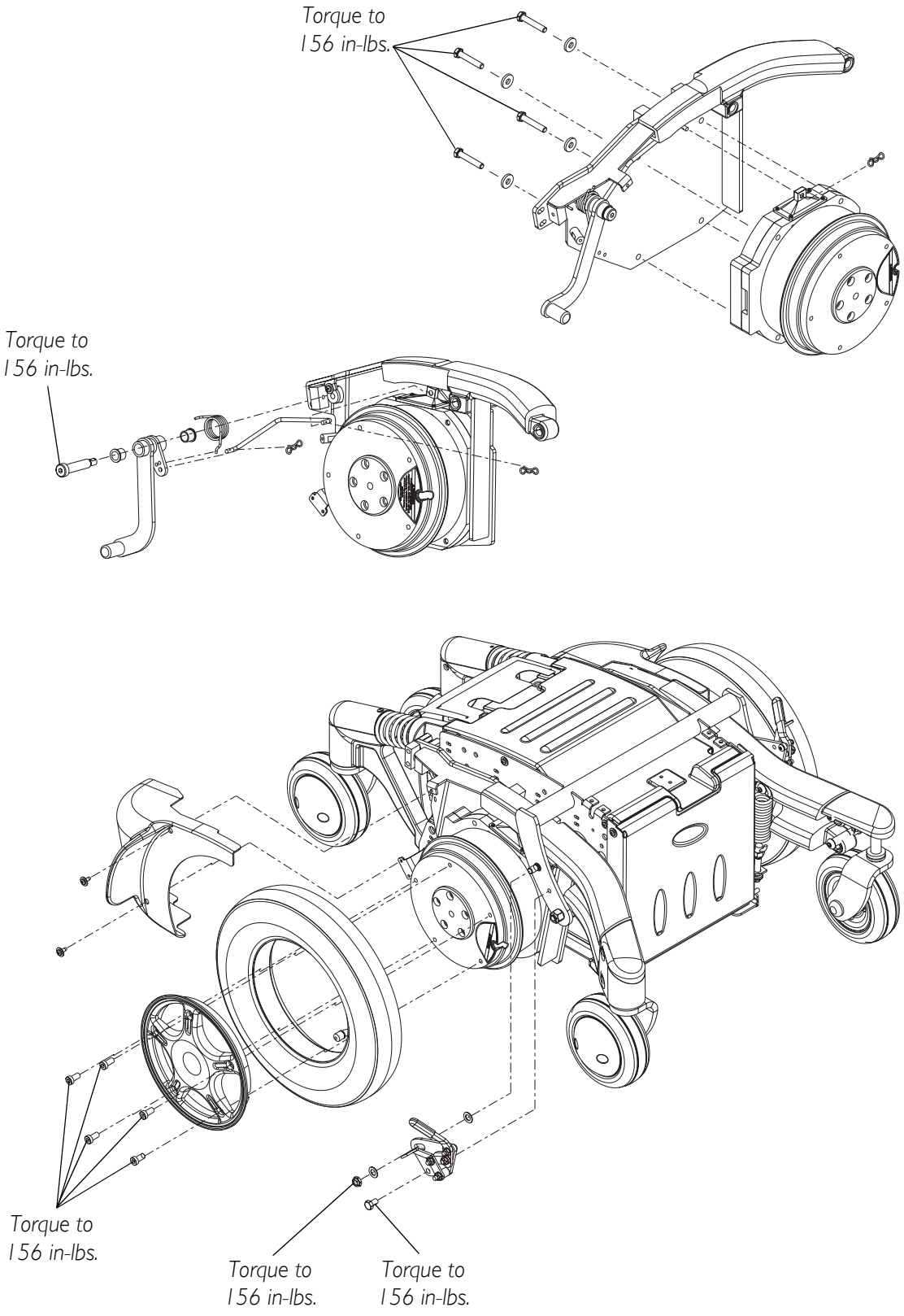
BACK CANES



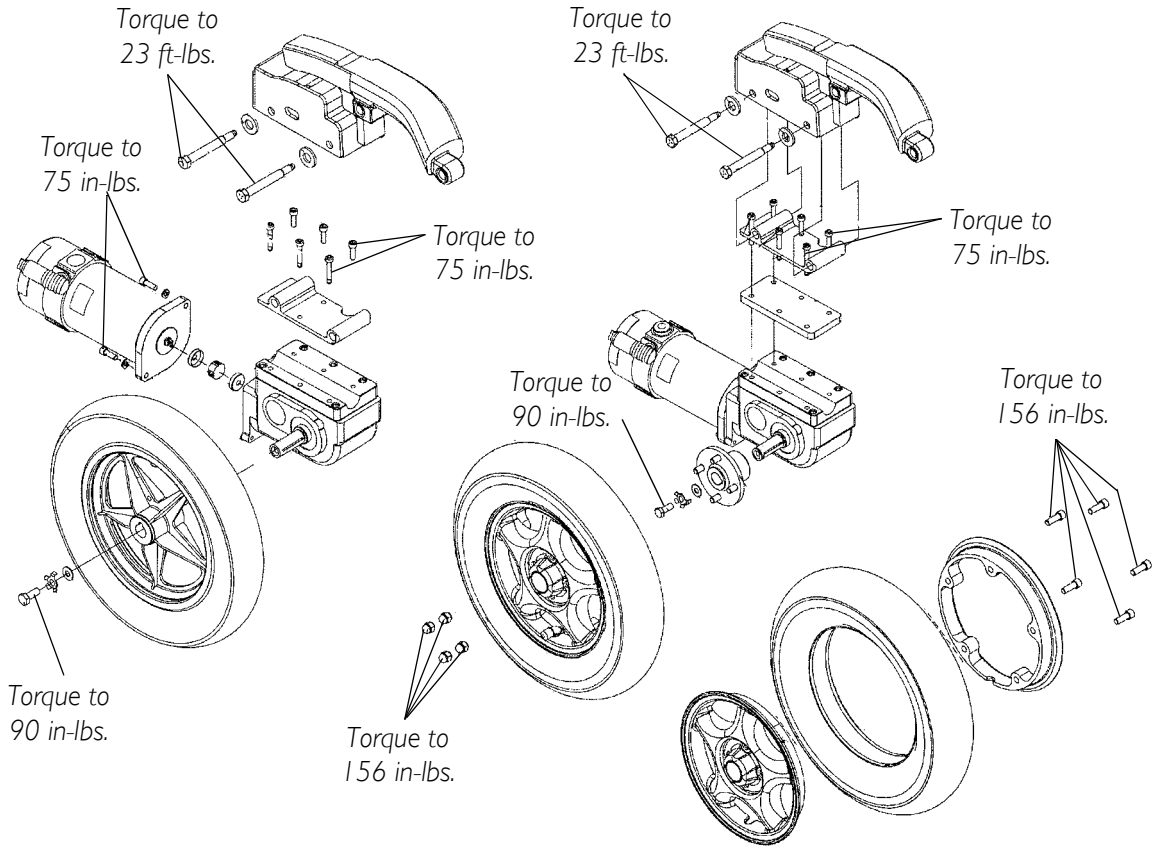
SEAT FRAME AND MOUNTING HARDWARE



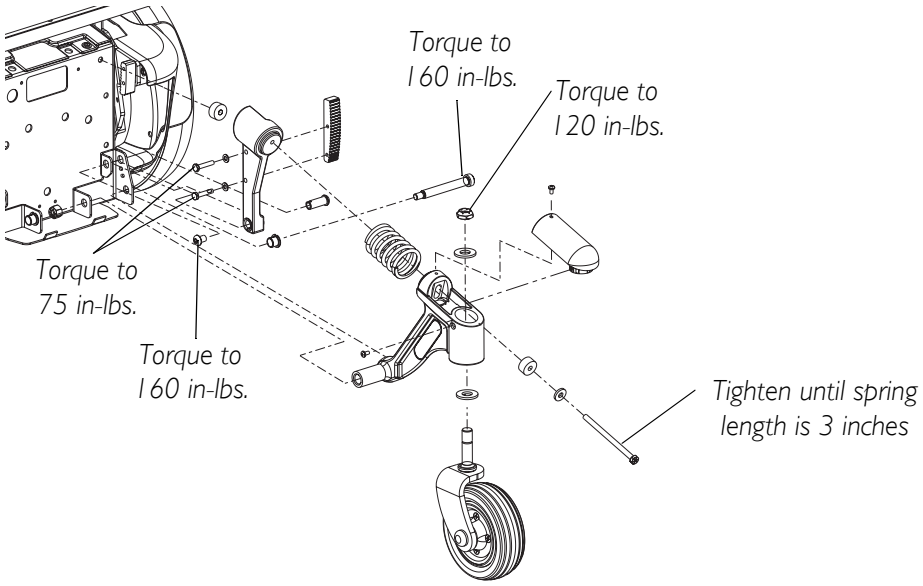
GB MOTOR AND DRIVE WHEEL

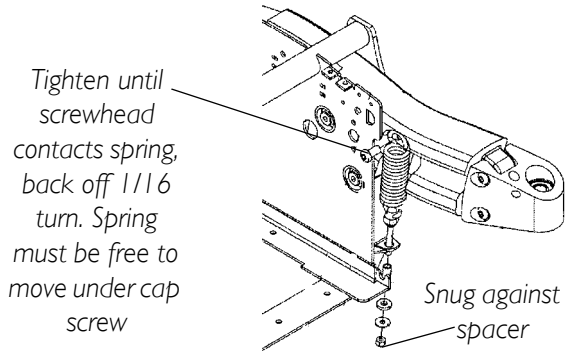


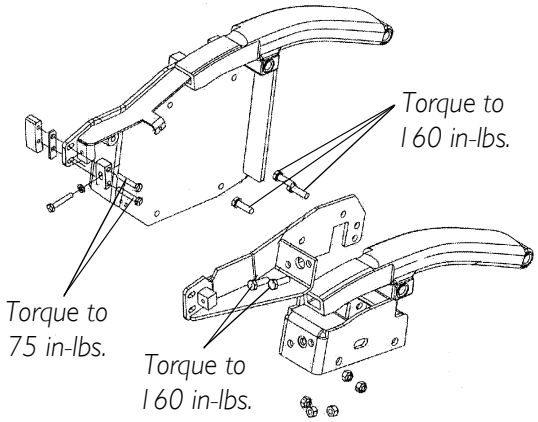
2-POLE/4-POLE MOTOR AND DRIVE WHEEL

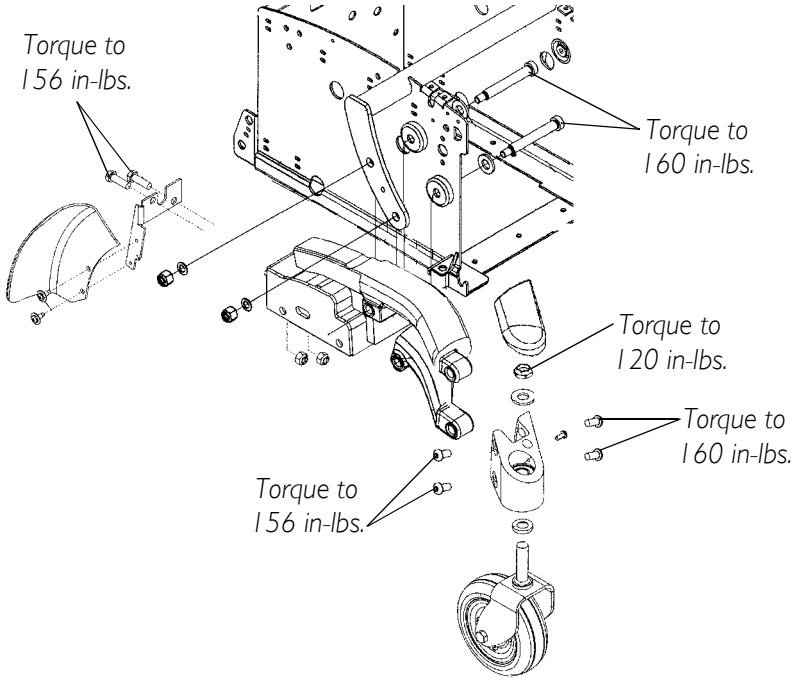


BASE FRAME

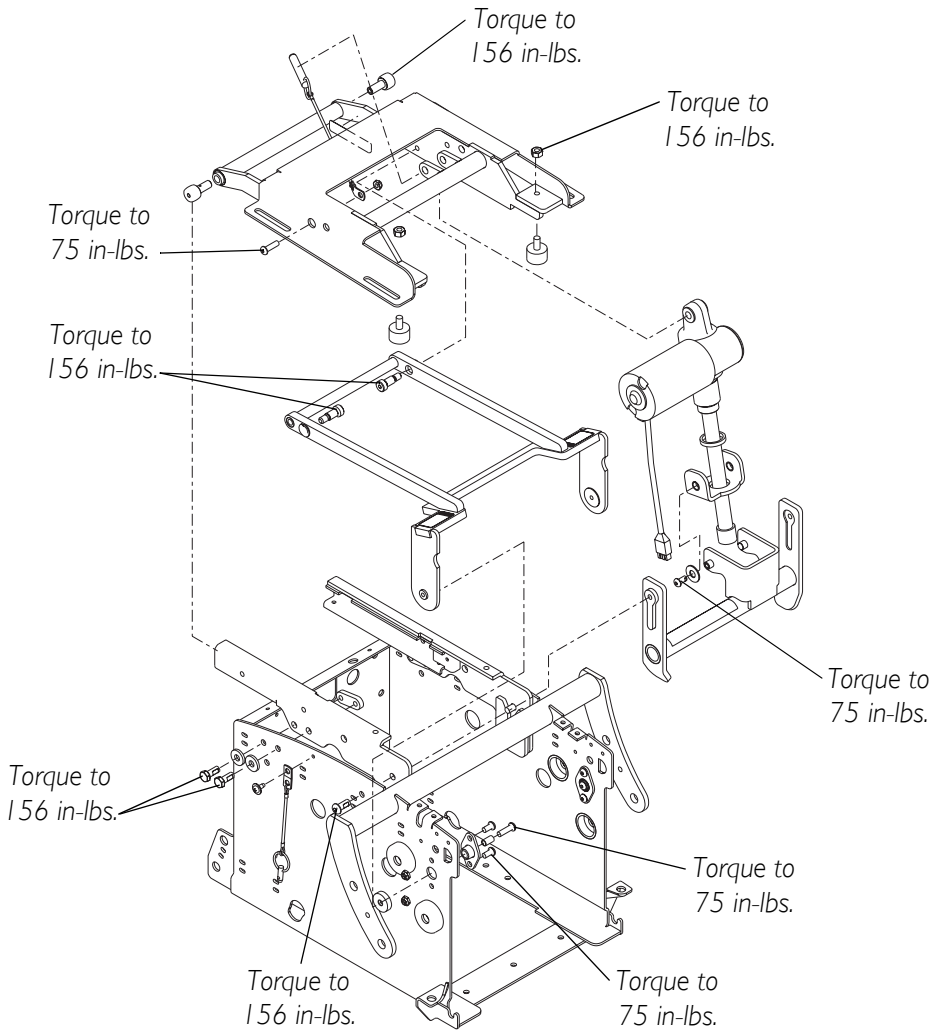

Torque to
160 in-lbs.
Torque to
120 in-lbs.
Torque to
75 in-lbs.
Torque to
160 in-lbs.
Tighten until spring
length is 3 inches


Tighten until
screwhead
contacts spring,
back off 1116
turn. Spring
must be free to
move under cap
screw
Snug against
spacer


Torque to
160 in-lbs.
Torque to
75 in-lbs.
Torque to
160 in-lbs.


Torque to
156 in-lbs.
Torque to
160 in-lbs.
Torque to
120 in-lbs.
Torque to
160 in-lbs.
Torque to
156 in-lbs.

TILT ASSEMBLY ON A TDX WITH FORMULA INVISIBLE SUPER LOW™ TILT



SECTION 11— BATTERIES

⚠ WARNING

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

WARNINGS FOR HANDLING AND REPLACING BATTERIES

⚠ WARNING

Make sure power to the wheelchair is OFF before performing this procedure.

The use of rubber gloves and chemical goggles or face shield is recommended when working with batteries.

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

22NF batteries weigh 37 pounds each. GP24 batteries weigh 51 pounds each. Use proper lifting techniques (lift with your legs) to avoid injury.

ONLY Use MK p/n M24SLDG or p/n M22NFSLDG batteries. Failure to use the correct battery size and/or voltage may cause damage to the wheelchair and give an unsatisfactory performance.

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.

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.

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.

The POSITIVE (+) RED battery cable MUST connect to the POSITIVE (+) battery terminal(s)/post(s), otherwise serious damage will occur to the electrical system.

Install protective caps on positive and negative battery terminals.

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

NOTE: For this procedure, refer to FIGURE 11.1.

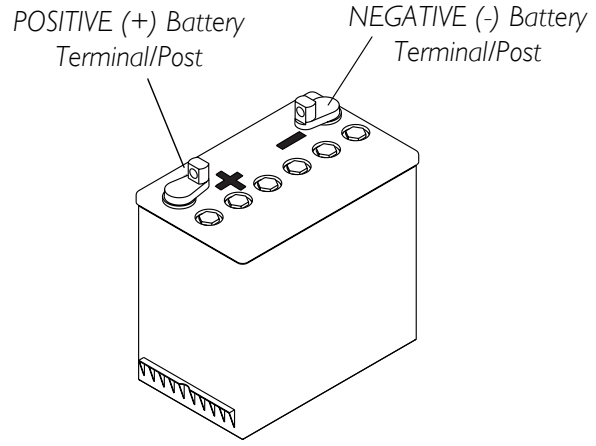
1. Position battery on ground/flat surface as shown below.
2. Visually inspect the battery to ensure proper polarity:

⚠ WARNING

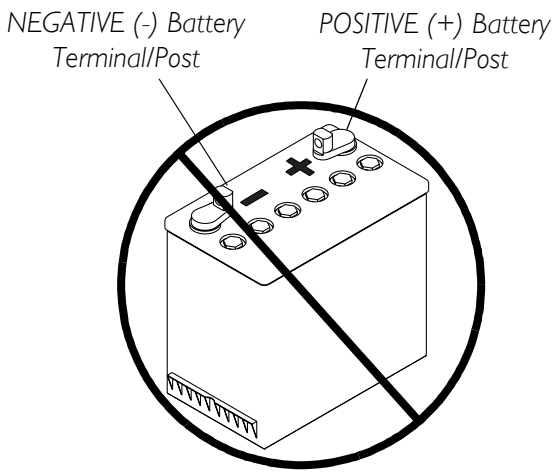
FOR TDX WHEELCHAIRS THAT USE 22NF BATTERIES

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

PROPER BATTERIES TO USE



DO NOT USE THIS TYPE BATTERY

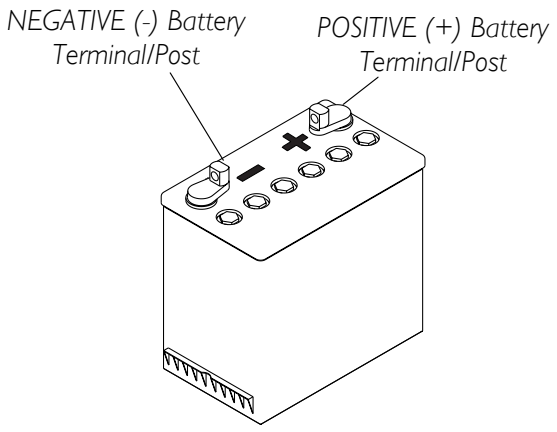


⚠ WARNING

FOR TDX WHEELCHAIRS THAT USE GP24 BATTERIES

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

PROPER BATTERIES TO USE



DO NOT USE THIS TYPE BATTERY

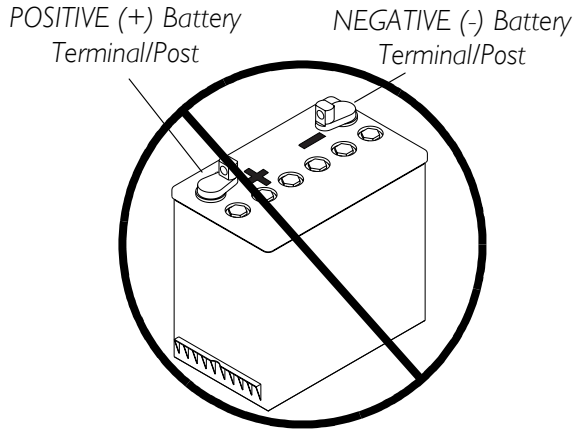


FIGURE 11.1 - USING THE PROPER BATTERIES

REMOVING/INSTALLING THE BATTERY BOX DOOR

NOTE: For this procedure, refer to FIGURE 11.2.

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

- *7/16-inch Socket with Ratchet*
- *Phillips Screwdriver*

REMOVING

1. Remove the two (2) 10-32 x 1/2-inch Phillips pan head tap screws that secure the TOP of the battery box door to the battery box.
2. Pivot the battery box door open and lift the door pivot sleeves OUT of the slots in the battery box.
3. Remove the battery box door.
4. Inspect door pivot sleeves for excessive wear.
5. To remove the door pivot sleeves, unfasten the 1/4-20 locknut and slide the door pivot sleeve off the pivot arm.

INSTALLING

1. Install new door pivot sleeves as necessary. To install, slide a door pivot sleeve onto the pivot arm and secure with a 1/4-20 locknut.
2. Holding the battery box door at an angle, insert the door pivot sleeves into the slots in the battery box.
3. Close the battery box door against the battery box.
4. Secure the TOP of the battery box door to the battery box with two (2) 10-32 x 1/2-inch Phillips pan head tap screws.

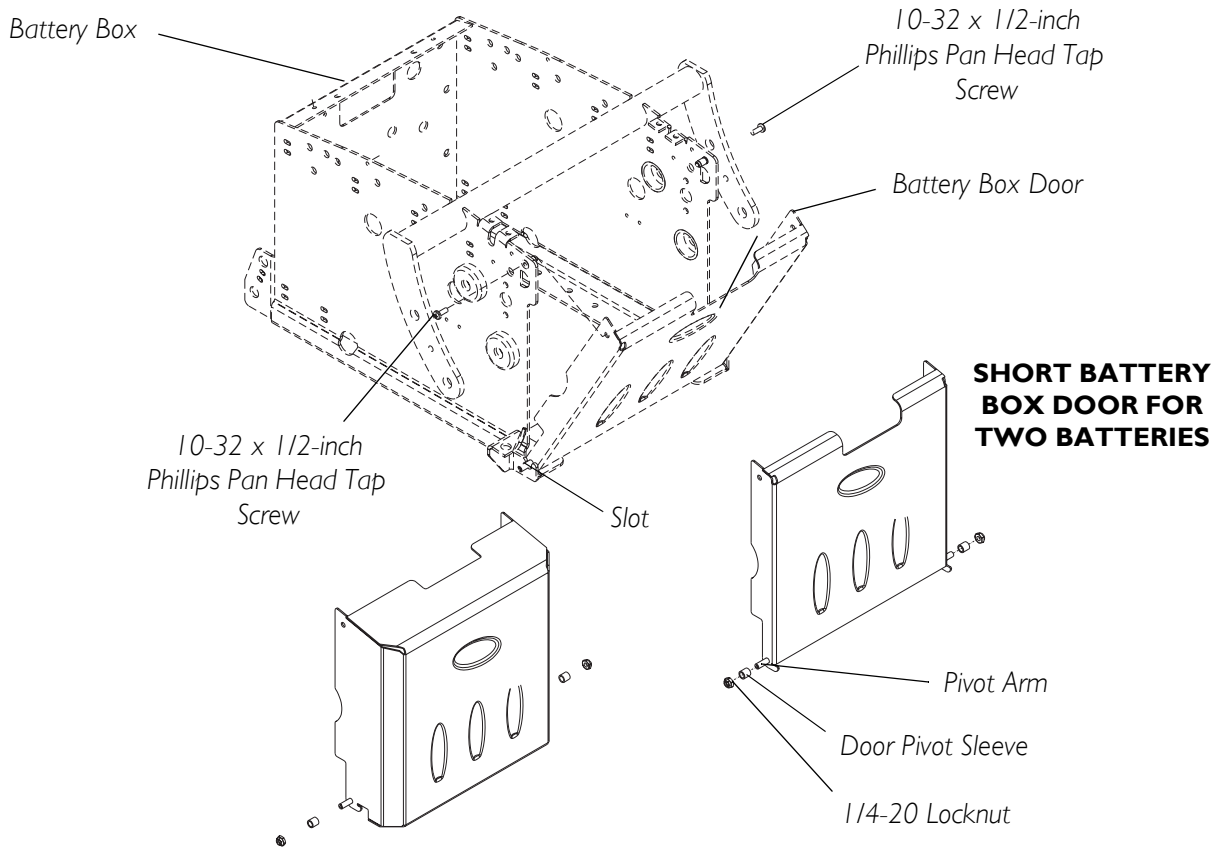


FIGURE 11.2 - REMOVING/INSTALLING THE BATTERY BOX DOOR

REMOVING/INSTALLING THE BATTERIES FROM/ INTO THE WHEELCHAIR

REMOVING THE BATTERIES (INCLUDING VENTILATOR BATTERY)

NOTE: For this procedure, refer to FIGURE 11.3.

△ CAUTION

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

1. Verify the joystick ON/OFF switch is in the OFF position.
2. Remove the two (2) thumb screws that secure the rear shroud to the wheelchair.
3. Remove the rear shroud from the wheelchair.
4. Disconnect the controller from the batteries at the REAR of the wheelchair by unplugging the controller from the battery connector.

5. Remove battery box door. Refer to Removing/Installing the Battery Box Door on page 43.
6. Slide battery tray with batteries out.
7. Perform one (1) of the following:

   A. If wheelchair is equipped with ventilator tray, perform the following:

   NOTE: Refer to DETAIL "A" in FIGURE 11.3.

      a. Disconnect ventilator battery from wiring harness.
      b. Disconnect the strap that secures the ventilator battery to the tray.
      c. Remove the ventilator battery.
      d. Continue with STEP 8.

   B. All other models, proceed to STEP 8.
8. Open the battery straps.
9. Unplug front battery from rear battery by unplugging the front battery connector from the rear battery connector.
10. Remove the front battery.
11. Slide the rear battery forward and remove it from the tray.

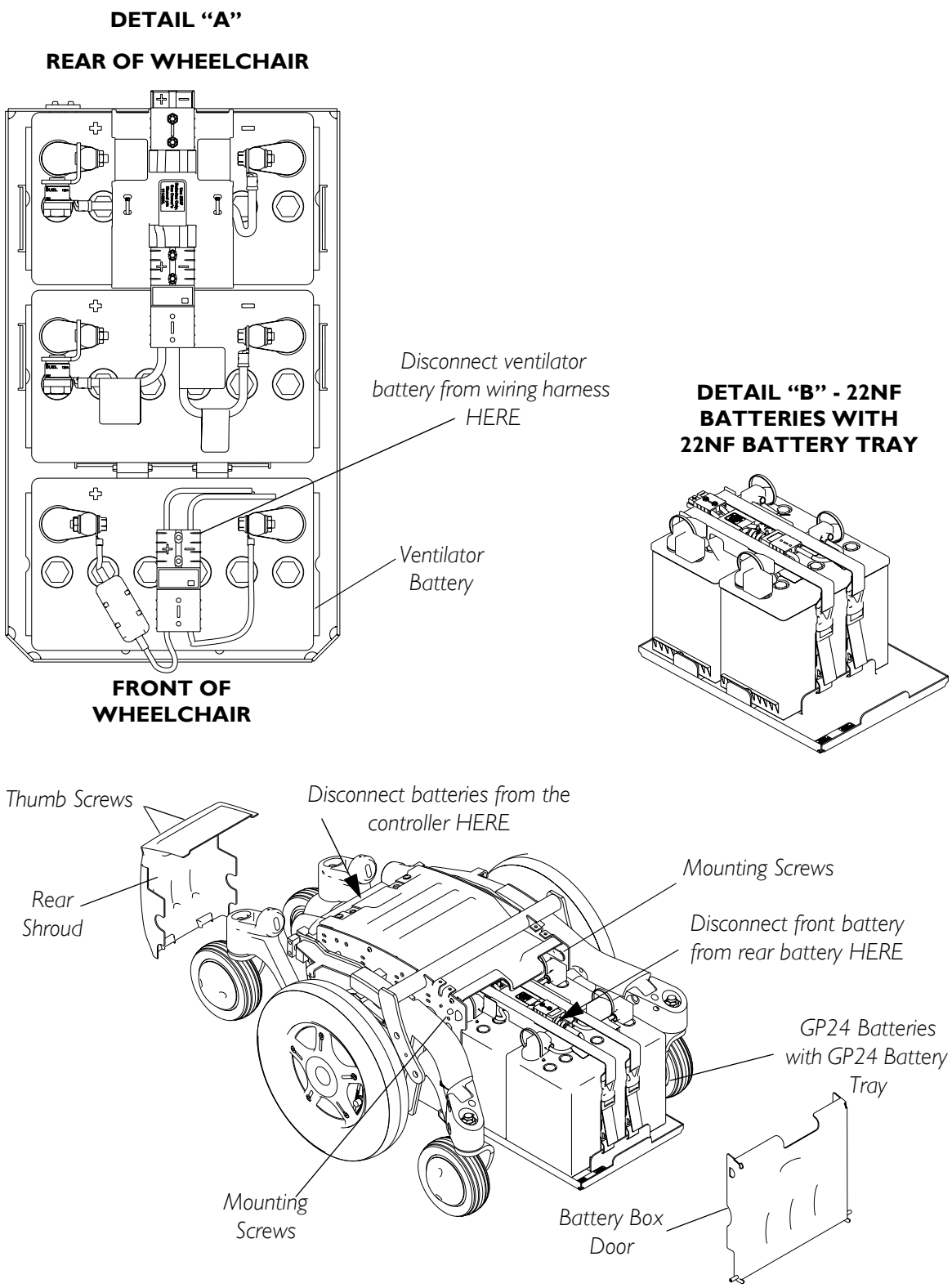


FIGURE 11.3 - REMOVING THE BATTERIES (INCLUDING VENTILATOR BATTERY)

REMOVING THE BATTERIES (FORMULA INVISIBLE SUPER LOW™ TILT)

NOTE: For STEPS 1-9 in this procedure, refer to Detail "A" in FIGURE 11.4.

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

- *3/16-inch Ball End Extended Hex Wrench*

△ CAUTION

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

1. Ensure the wheelchair seat is completely down.
2. Verify the joystick ON/OFF switch is in the OFF position.
3. Remove the two (2) thumb screws that secure the rear shroud to the wheelchair.
4. Remove the rear shroud from the wheelchair.
5. Remove two (2) mounting screws from side of battery door.
6. Remove battery door from front of wheelchair.
7. Using the tilt switch, tilt seat BACK approximately halfway.
8. Disconnect the controller from the batteries at the REAR of the wheelchair.

NOTE: For STEPS 10-15 in this procedure, refer to Detail "B" in FIGURE 11.4

9. Remove the two (2) 5/16-18 x 3/4-inch button head cap screws that secures the lower pivot mounting bracket to the battery box frame.
10. Manually, lift the seat until pivot mount disengages from battery box.

⚠ WARNING

Prop rod MUST be engaged to hold the seat frame up before manually releasing the seat frame from the maximum tilt position - otherwise injury will result.

11. While holding the seat in this position, engage the prop rod into the prop rod support bracket to secure seat in upright position.
12. Remove the release pin that secures the tilt actuator to the seat support crossmember.
13. Lift the tilt actuator with lower pivot mounting bracket UP and OUT of battery box frame and lay horizontal on seat support.
14. Slide battery tray with batteries OUT until it engages battery tray stop.

NOTE: Battery tray stop is designed to prevent battery tray from being pulled completely OUT of the wheelchair and having the batteries drop to the ground/floor.

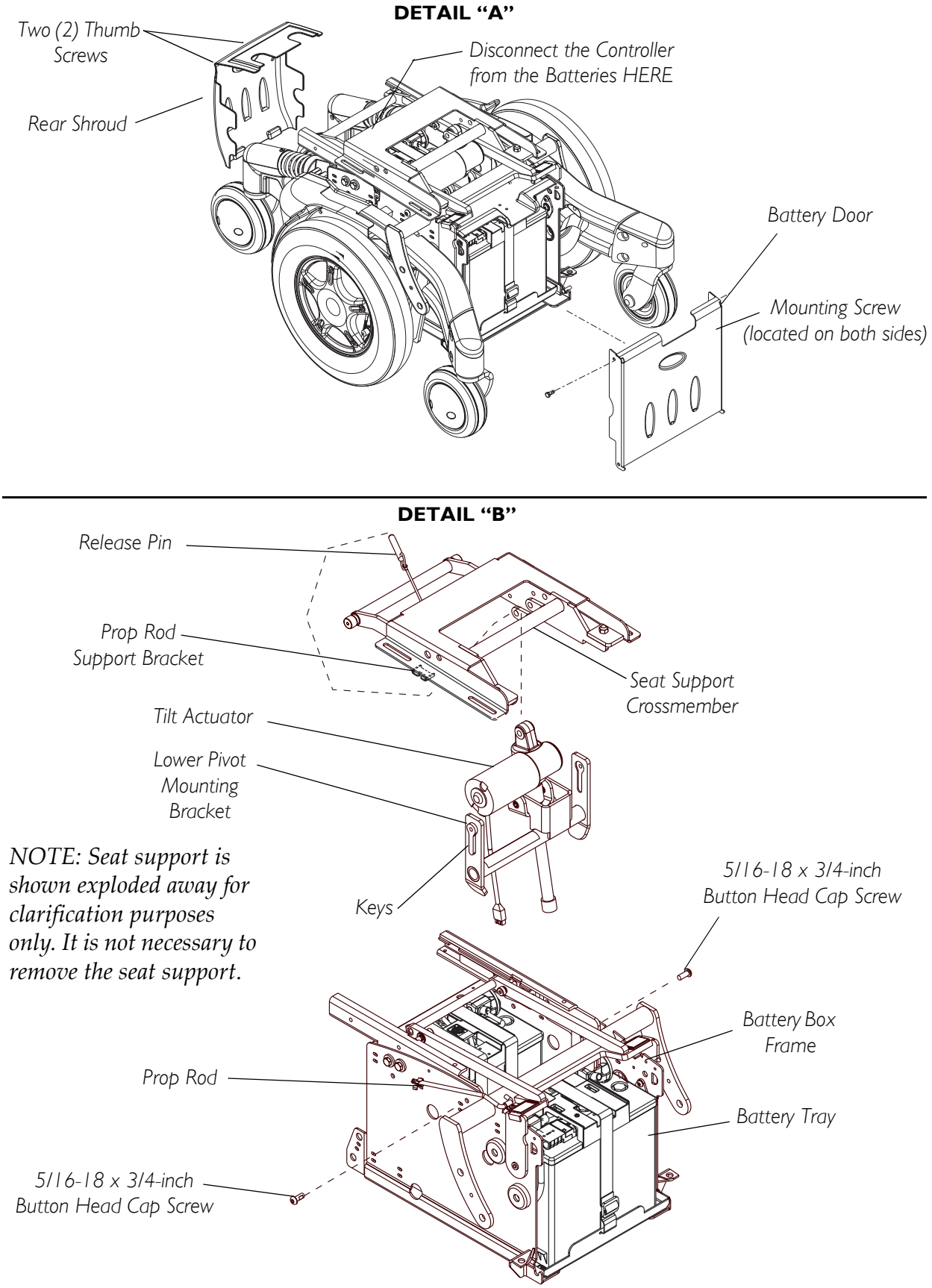
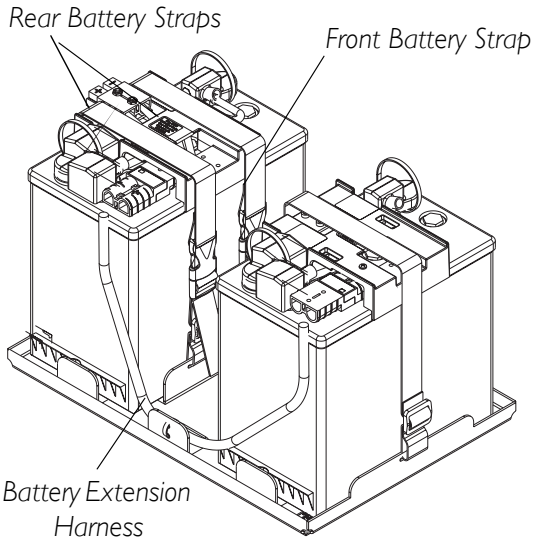


FIGURE 11.4 - REMOVING THE BATTERIES (FORMULA® INVISIBLE SUPER LOW™ TILT)

NOTE: For this STEPS 15-20, refer to FIGURE 11.5.

15. Once battery tray has reached the battery stop, disconnect front battery strap. On the front battery strap, the quick-release is located behind the Battery.
16. Disconnect the front battery from the battery extension harness.
17. Remove front battery.
18. Disconnect rear battery straps.
19. Disconnect the rear battery from the battery extension harness.
20. Remove rear battery.



NOTE: Batteries shown without wheelchair for clarification purposes only. Battery tray does not pull completely out of the wheelchair.

FIGURE 11.5- REMOVING/ INSTALLING THE BATTERIES FROM/ INTO THE WHEELCHAIR

INSTALLING THE BATTERIES (INCLUDING VENTILATOR BATTERY)

NOTE: For STEPS 1-4 in this procedure, refer to FIGURE 11.6.

NOTE: Positioning of the batteries is completed with battery tray positioned in wheelchair and partially pulled out. Refer to FIGURE 11.4 for full view of wheelchair. Illustrations in FIGURE 11.6 are shown without the wheelchair for clarification purposes only.

1. Perform the following to install batteries onto the battery tray.
   A. Position the battery with battery connector bracket in the REAR of the battery tray in the orientation as shown. See Detail "A" in FIGURE 11.6.

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

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

   B. Position the remaining battery in the front of the battery tray in the orientation shown so that the wiring harnesses can be connected together. See DETAIL "B"
2. Connect front battery to rear battery. See Detail "B".
3. Connect battery straps. See Detail "C".
4. Slide the battery tray into the wheelchair.

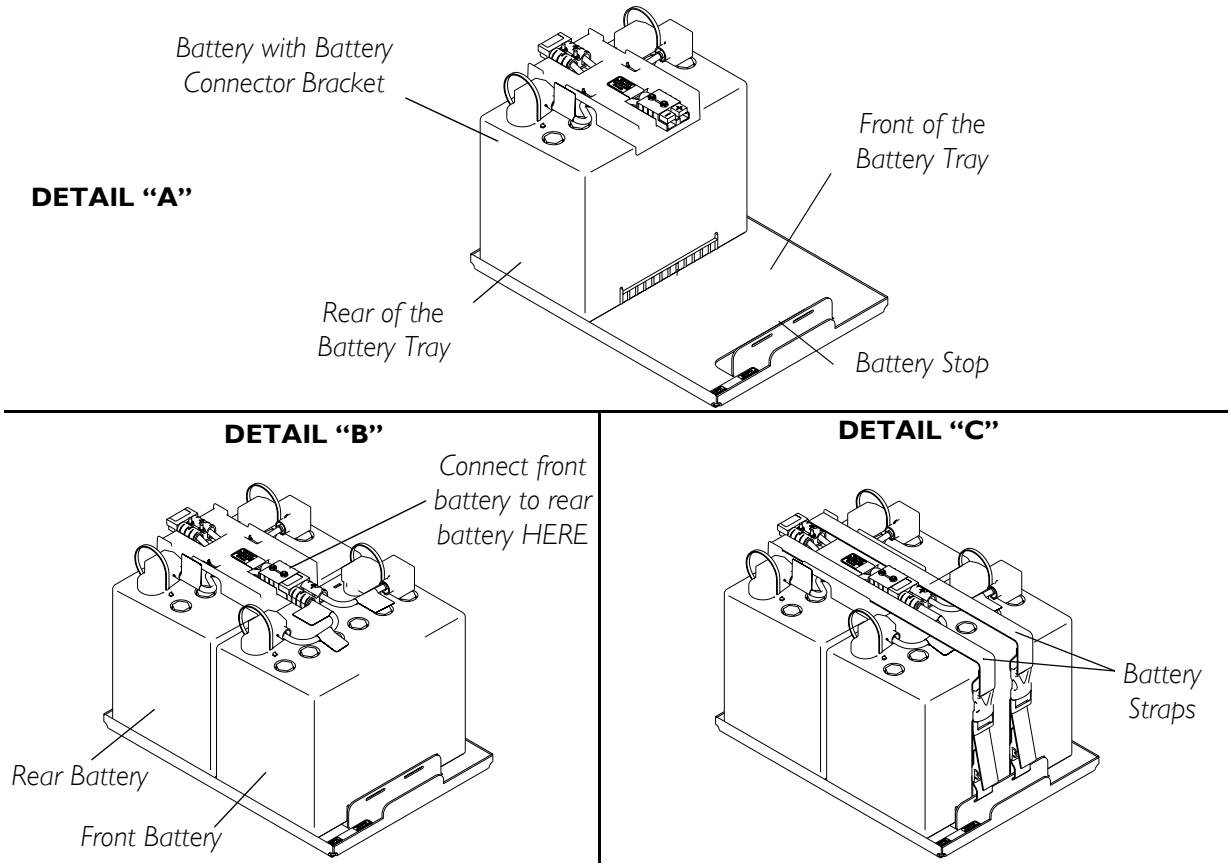


FIGURE 11.6 - INSTALLING BATTERIES INTO WHEELCHAIR (INCLUDING VENTILATOR BATTERY)

NOTE: For STEPS 5-10 in this procedure, refer to FIGURE 11.7.

5. Perform one (1) of the following:
   A. If wheelchair is equipped with ventilator tray, perform the following:
      a. Install ventilator battery in the tray (Detail "A").
      b. Connect ventilator battery to wiring harness.
      c. Connect the strap to secure the ventilator battery to the tray.
      d. Proceed to STEP 6.
   B. For all models that do not have ventilator tray, proceed to STEP 6.

⚠ WARNING

After installing battery door, ensure that the mounting screws on the side of the battery door are fully engaged into the side of the battery box - otherwise door may disengage from chair while in motion resulting in injury or damage.

6. Reinstall battery door onto front of wheelchair.
7. Install both mounting screws on the side of the battery door.

⚠ WARNING

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

8. Connect the controller to the batteries at the REAR of the wheelchair.
9. Reinstall the rear shroud and secure in place with the existing two (2) thumb screws.

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

10. If necessary, charge the battery(ies). Refer to Charging Batteries on page 61.

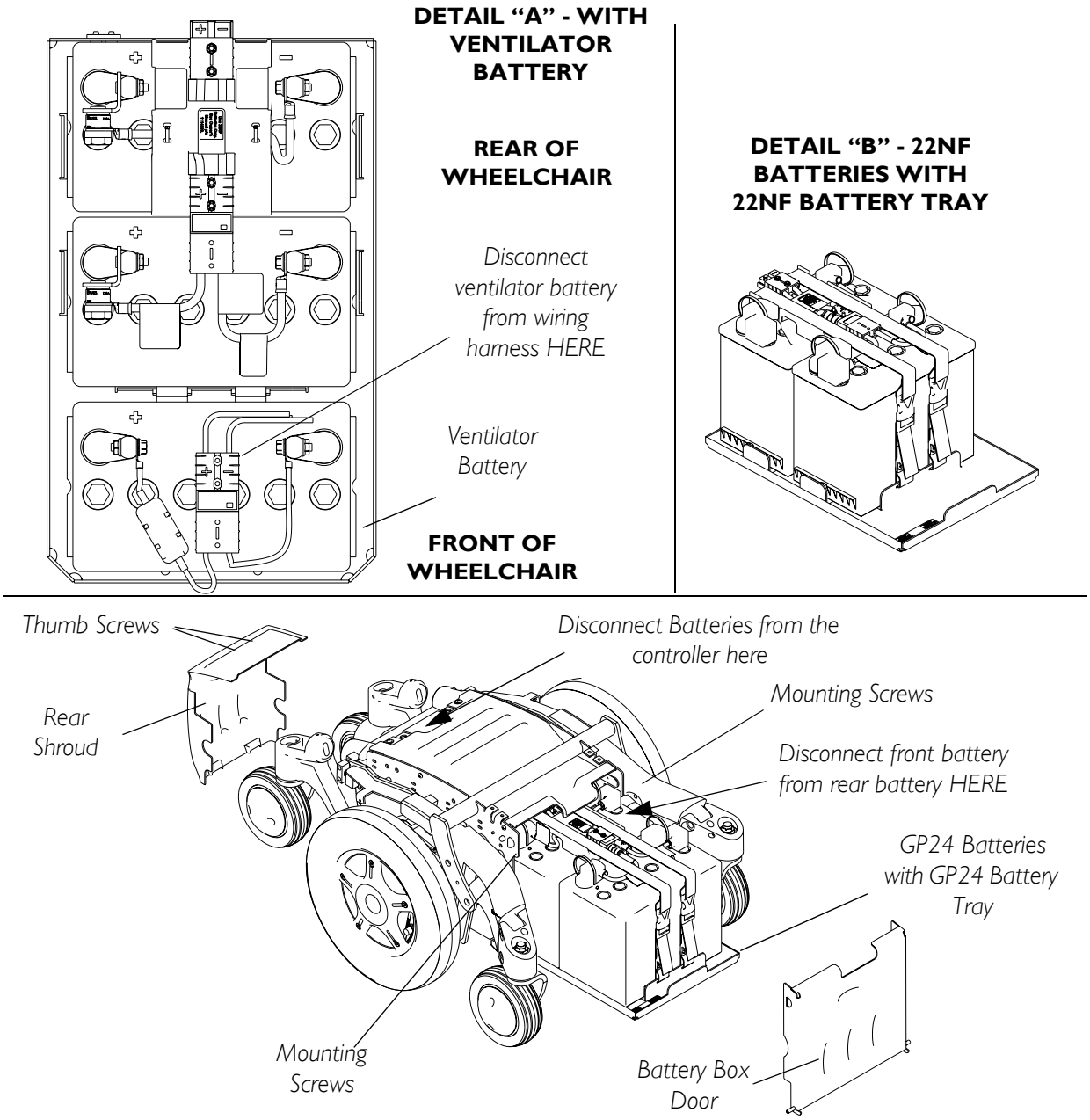


FIGURE 11.7 - INSTALLING BATTERIES INTO WHEELCHAIR (INCLUDING VENTILATOR BATTERY)

INSTALLING THE BATTERIES (FORMULA INVISIBLE SUPER LOW™ TILT)

NOTE: For STEPS 1-6 in this procedure, refer to Detail "A" in FIGURE 11.8.

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

- *3/16-inch Ball End Extended Hex Wrench*

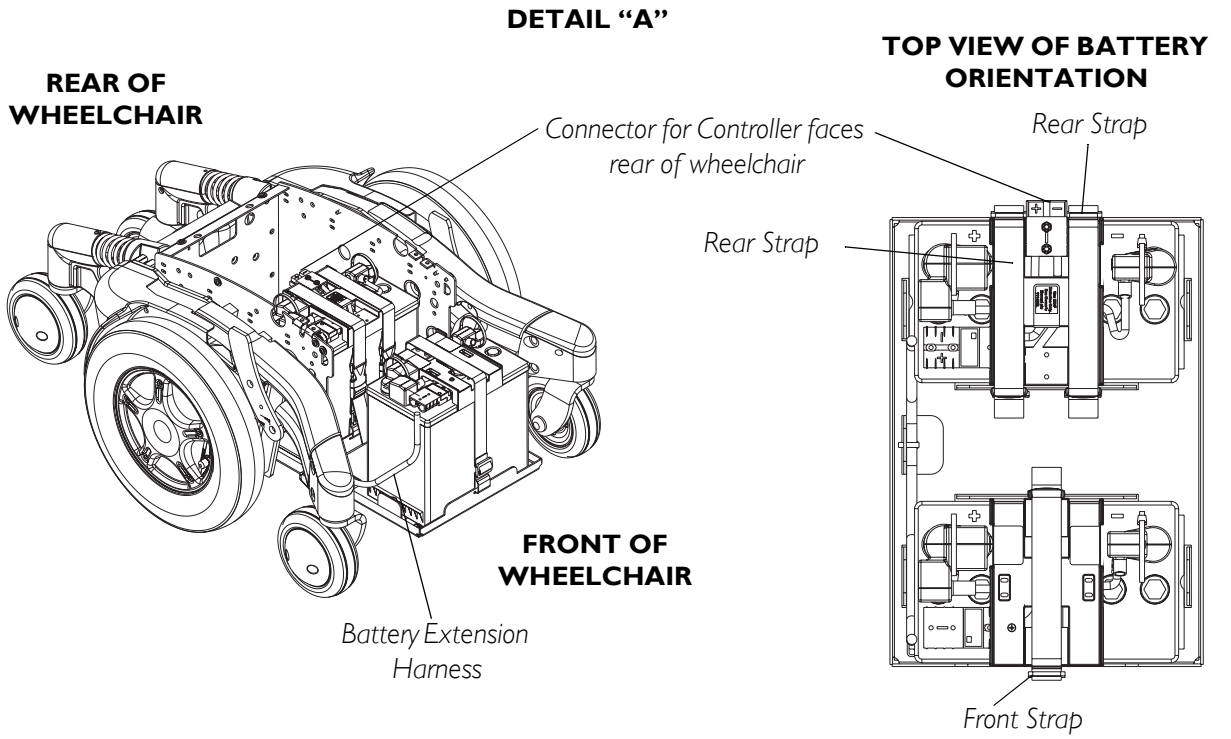
1. Install the rear battery in the orientation shown otherwise the battery extension harness cannot be installed. The connector for the controller faces the rear of the wheelchair (Detail "A").
2. Connect the rear battery to the battery extension harness (Detail "A").
3. Connect the rear battery straps (Detail "A").
4. Install front battery in the orientation shown otherwise the battery extension harness cannot be installed (Detail "A").
5. Connect the front battery to the battery extension harness.
6. Connect front battery strap (Detail "A").
7. Slide battery tray with batteries into wheelchair (Detail "B").
8. Secure the tilt actuator to the seat support with the release pin (Detail "C").
9. While holding the seat in the maximum tilt position, disengage the prop rod from the prop rod support bracket that holds the seat in the upright position. Engage the prop rod into the prop rod retainer clip (Detail "C").
10. Align the keys of the lower pivot mounting (one on each side) with the channel in the alignment brackets (Detail "B").
11. Slide the tilt actuator with lower pivot mounting down in between the batteries by manually lowering the seat down. (Detail "B").

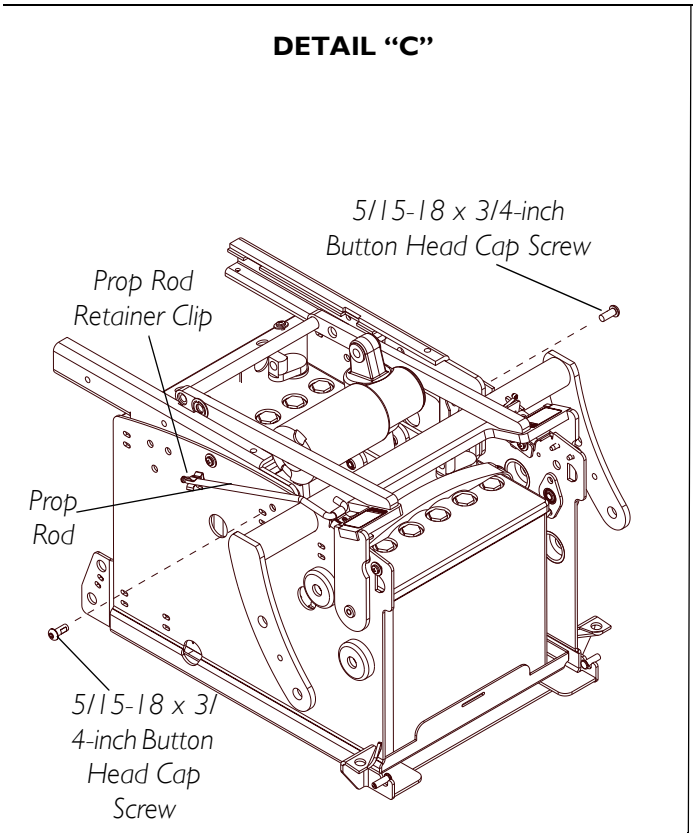
NOTE: Keys on bracket will self-align as assembly is lowered into position.

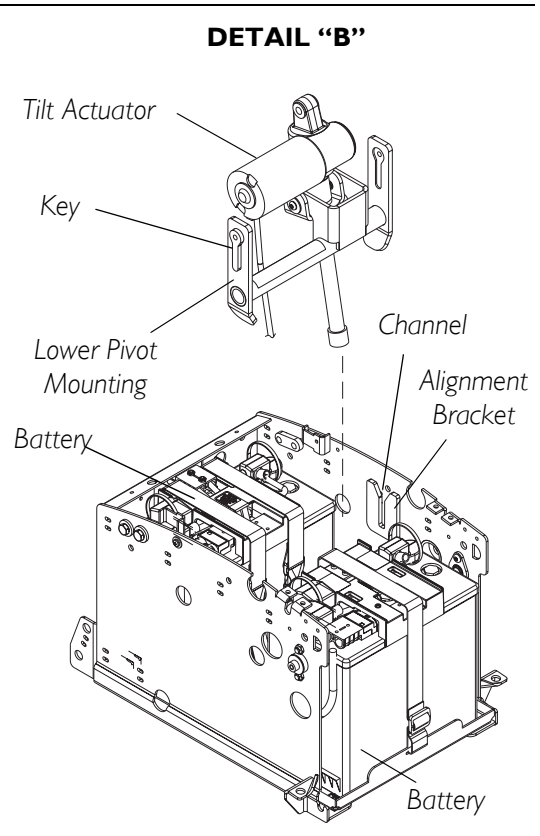
⚠ WARNING

Failure to install the two (2) mounting screws to secure actuator in place WILL result in sudden seating system tilt and may result in serious bodily injury.

12. Secure the lower pivot mounting to the battery box frame with two (2) 5/16-18 x 3/4-inch button head cap screws (Detail "C"). Securely tighten.







NOTE: Seat support is not shown for clarification purposes only. It is not necessary to remove the seat support.

FIGURE 11.8 - INSTALLING THE BATTERIES (FORMULA INVISIBLE SUPER LOW™ TILT) - INSTALLING THE TILT ACTUATOR

NOTE: For STEPS 13-16, refer toFIGURE 11.9.

13. Connect the controller to the batteries at the rear of the wheelchair.
14. Return seat to upright position (either 0 or 5 degrees).
15. Secure battery door to FRONT of wheelchair with two (2) mounting screws. Securely tighten.
16. Secure the rear shroud to the wheelchair with the two (2) thumb screws.

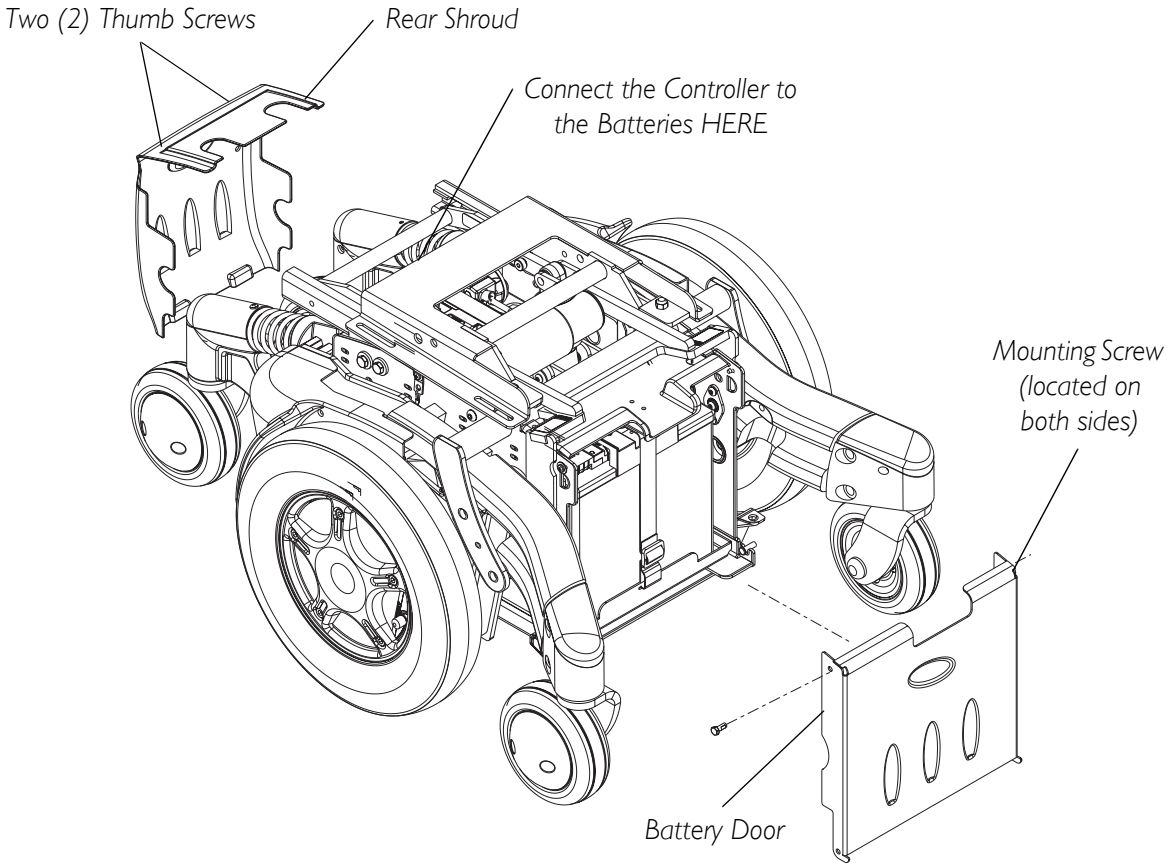


FIGURE 11.9 - INSTALLING THE BATTERIES (FORMULA INVISIBLE SUPER LOW™ TILT) - INSTALLING THE SHROUD AND DOOR

CONNECTING/DISCONNECTING BATTERY WIRING HARNESS FROM BATTERIES

NOTE: For this procedure, refer to FIGURE 11.10.

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

- *Wire Cutter, 7/16 wrench and 3/8 wrench*
- *Tie Wraps*

1. Remove the batteries from the wheelchair. Refer to Removing the Batteries (Including Ventilator Battery) on page 44.

2. Cut the tie-wraps that secure the battery terminal covers to the battery terminals. Refer to Battery Cover and Tie Wrap Detail on page 56.
3. Perform the following:
   A. Slide the RED battery terminal cover back on the RED battery cable to expose the positive battery terminal.Refer to Battery Cover and Tie Wrap Detail on page 56.
   B. Slide the BLACK battery terminal cover back on the BLACK battery cable to expose battery terminal. Refer to Battery Cover and Tie Wrap Detail on page 56.

⚠ 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.

4. Perform the following:
   A. Remove the locknut that secures the bracket of the POSITIVE battery cable to the POSITIVE (+) battery post of the battery.
   B. Remove the locknut that secures the NEGATIVE battery cable to the NEGATIVE (-) battery post of the battery.
5. Discard the existing battery properly.
6. Position battery connector bracket or wiring harness onto the NEW battery as shown in Detail "A".
7. Perform the following:
   A. Secure the NEGATIVE battery cable to the NEGATIVE(-) battery post with existing mounting screw and locknut.
   B. Secure the bracket of the POSITIVE battery cable to the POSITIVE (+) battery post with the existing mounting screw and locknut.
8. Position each battery terminal cover over top of each battery terminal. Refer to Battery Cover and Tie Wrap Detail on page 56.
9. Secure battery terminal covers in place with one tie-wrap. Refer to Battery Cover and Tie Wrap Detail on page 56.
10. Install batteries into wheelchair. Refer to Installing the Batteries (Including Ventilator Battery) on page 49.

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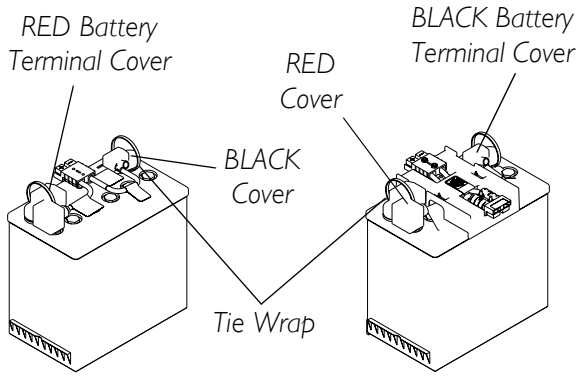
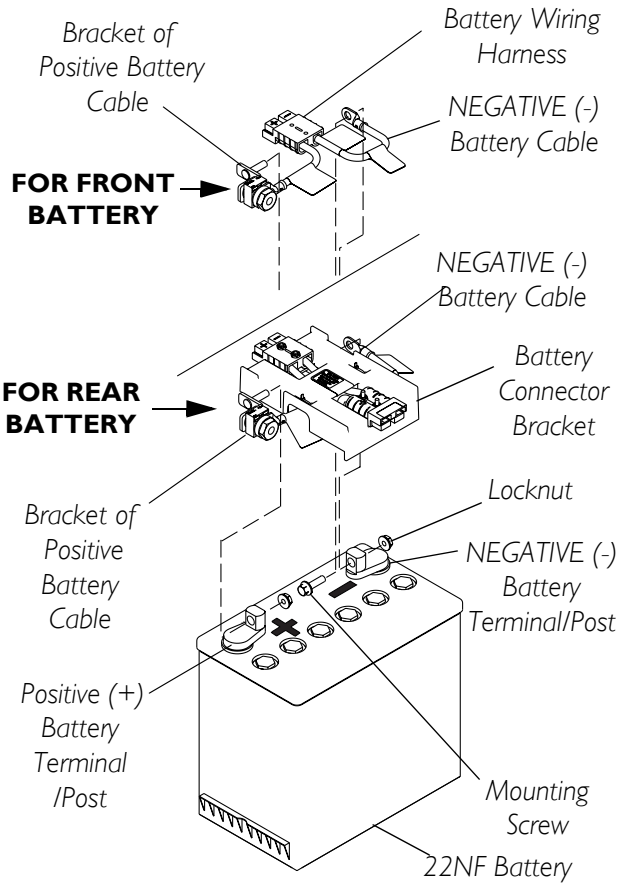
BATTERY COVER AND TIE WRAP DETAIL



DETAIL "A"



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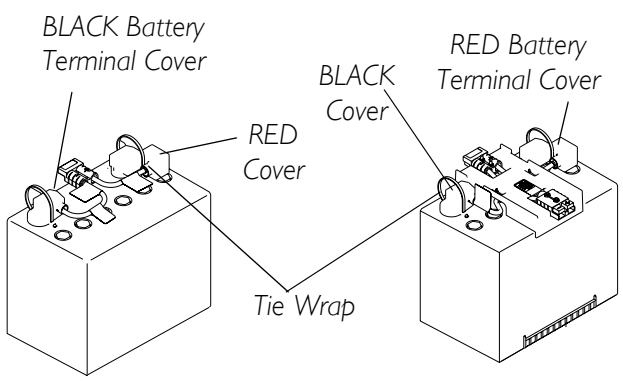
BATTERY COVER AND TIE WRAP DETAIL



DETAIL "A"

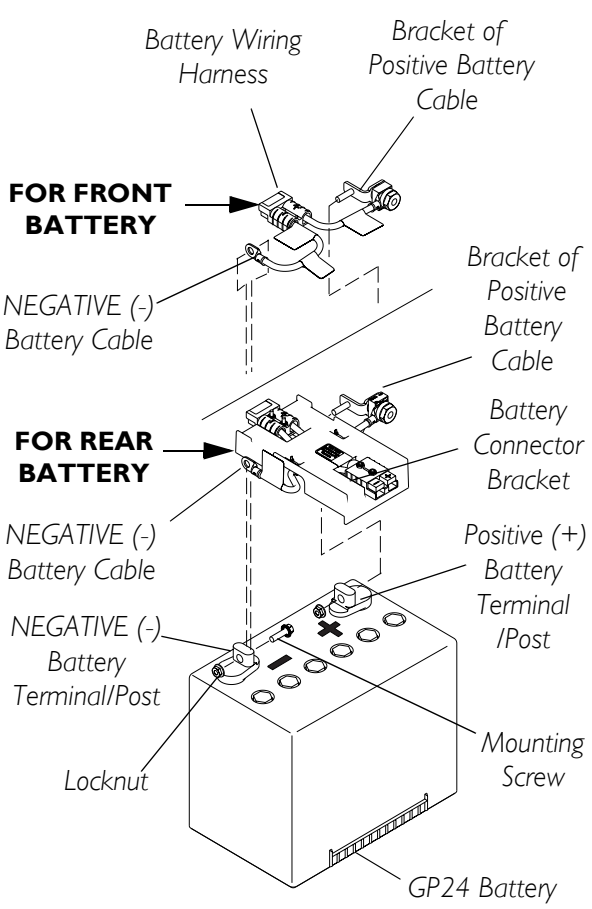


FIGURE 11.10 - CONNECTING/DISCONNECTING BATTERY WIRING HARNESS FROM BATTERIES

REMOVING/INSTALLING THE BATTERY TRAY

NOTE: For this procedure, refer to FIGURE 11.11.

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

- *Phillips Screwdriver*

NOTE: The LEFT and RIGHT sides are determined by looking from the FRONT of the wheelchair in towards the battery box.

REMOVING

1. Remove the batteries. Refer to Removing the Batteries (Including Ventilator Battery) on page 44.
2. Slide the battery tray OUT until the battery tray stop bracket hits against the battery box frame.
3. Remove two (2) 10-32 x 5/16-inch pan head screws securing the battery tray stop bracket to the lower left edge of the battery tray and remove the battery tray stop bracket.
4. Slide the battery tray OUT of the battery box.

INSTALLING

1. Place the REAR of the battery tray into the battery box.
2. Place the battery tray stop bracket against the lower left rear edge of the battery tray and secure with two (2) 10-32 x 5/16-inch pan head screws.
3. Slide the battery tray into the battery box frame.
4. Install the batteries. Refer to Installing the Batteries (Including Ventilator Battery) on page 49.

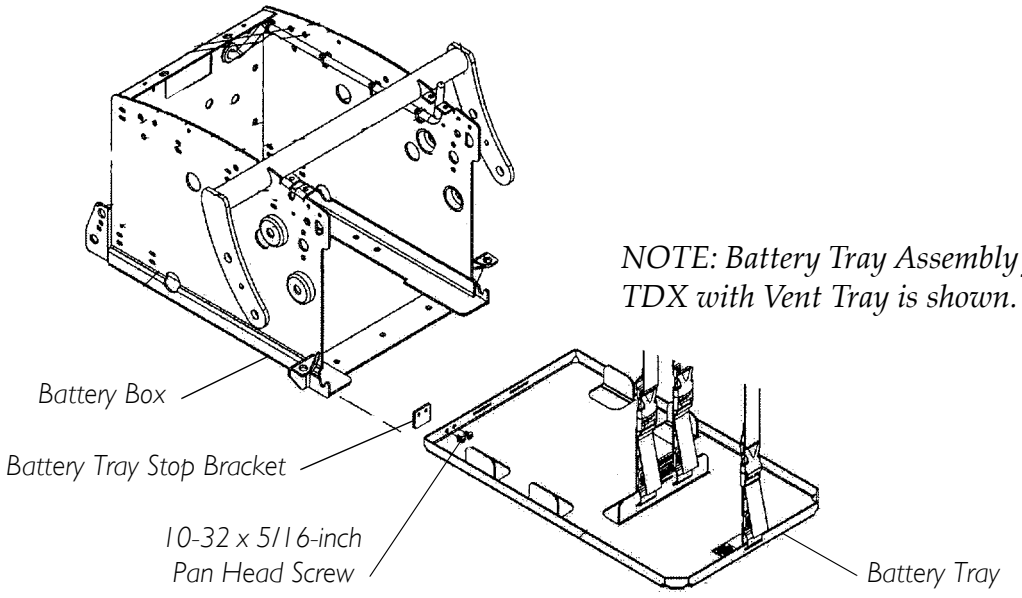


FIGURE 11.11 - REMOVING/INSTALLING THE BATTERY TRAY

REMOVING/INSTALLING THE BATTERY BOX SHROUD COVER

NOTE: For this procedure, refer to FIGURE 11.12.

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

- *Phillips Screwdriver*
- *Wire Cutter*
- *Tie Wraps*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the seat pan.Refer to Removing/Installing Seat Pan on page 63.
3. Remove the seat frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
4. Perform one (1) of the following:
   A. TO REMOVE STANDARD BATTERY BOX SHROUD COVER -
      a. Remove two (2) 10-32 x 1/2-inch pan head tap screws securing the TOP of the battery box shroud cover to the battery box.
      b. Remove four (4) 10-32 x 1/2-inch pan head tap screws securing the sides of the battery box shroud cover to the battery box.
      c. Pull the battery box shroud cover OUT of the battery box.
   B. TO REMOVE SUPER LOW TILT BATTERY BOX SHROUD COVER -
      a. Remove two (2) 10-32 x 1/2-inch pan head tap screws securing the sides of the battery box shroud cover to the battery box.
      b. Cut and remove the two (2) cable ties securing the sides of the battery box shroud cover to the battery box.
      c. Lift the battery box shroud cover off the battery box.

INSTALLING

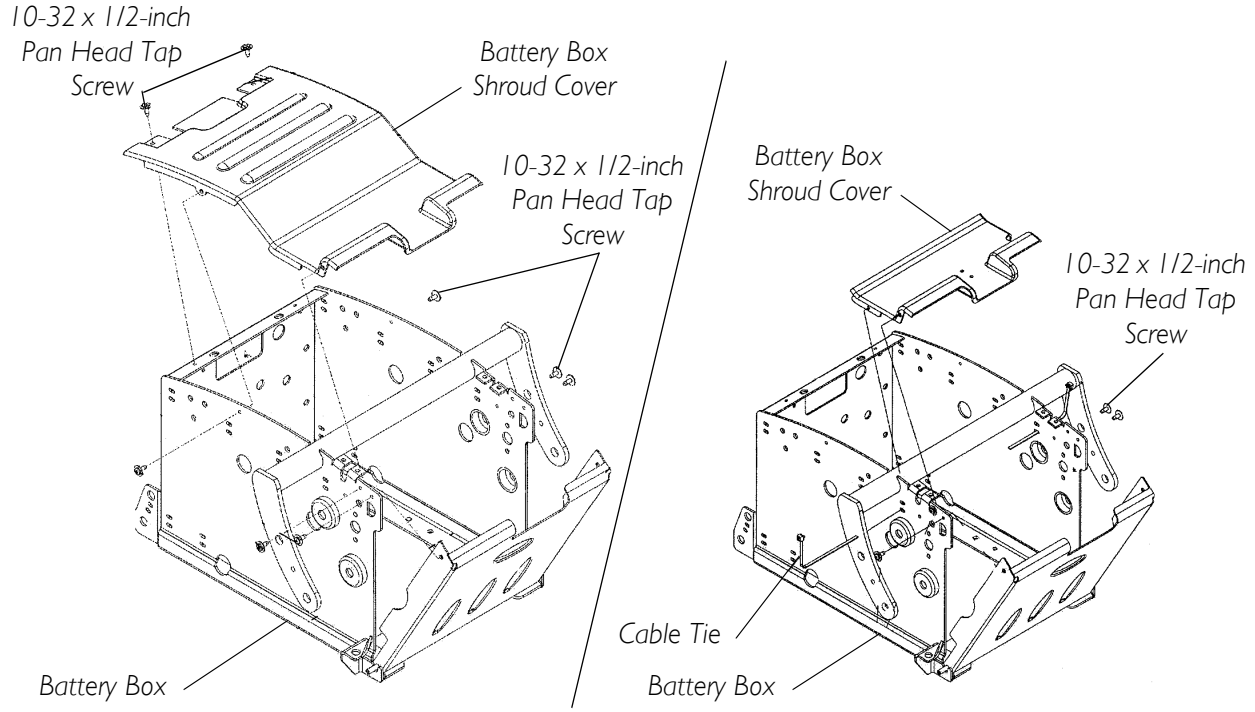
1. Perform one (1) of the following:
   A. TO INSTALL STANDARD BATTERY BOX SHROUD COVER -
      a. Place the battery box shroud cover in the battery box.
      b. Secure the top of the battery box shroud cover to the battery box with two (2) 10-32 x 1/2-inch pan head tap screws.
      c. Secure the sides of the battery box shroud cover to the battery box with four (4) 10-32 x 1/2-inch pan head tap screws.
   B. TO INSTALL SUPER LOW TILT BATTERY BOX SHROUD COVER -

a. Place the battery box shroud cover on the battery box.

b. Secure the sides of the battery box shroud cover to the battery box with two (2) 10-32 x 1/2-inch pan head tap screws.

c. Secure the sides of the battery box shroud cover to the battery box with two (2) Cable Ties.

2. Install the Battery Box Door.Refer to Removing/Installing the Battery Box Door on page 43.
3. Install the Seat Frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
4. Install the Seat Pan. Refer to Removing/Installing Seat Pan on page 63.
5. Install the Batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.



BATTERY BOX SHROUD COVER

BATTERY BOX SHROUD COVER FOR SUPER LOW TILT

FIGURE 11.12 - REMOVING/INSTALLING THE BATTERY BOX SHROUD COVER

BATTERY DISCHARGE INDICATOR (BDI) DESCRIPTIONS

DPJ AND SPJ-80 JOYSTICK

NOTE: For this information, refer to FIGURE 11.13.

The Battery Discharge Indicator (BDI) is a bar graph display located on the MK5 joystick. It will keep you informed as to power availability. A visual warning is given before the power becomes too low to operate the wheelchair. At full charge, the two (2) LEFT segments and the farthest RIGHT segment of the bar graph will be illuminated. As the battery becomes discharged, the farthest RIGHT segment will progressively move to the LEFT until only the last two (2) bars (LEFT) are illuminated. At this level the last two (2) bars (LEFT) will start to Flash ON and OFF to indicate that the end user should charge the batteries as soon as possible.

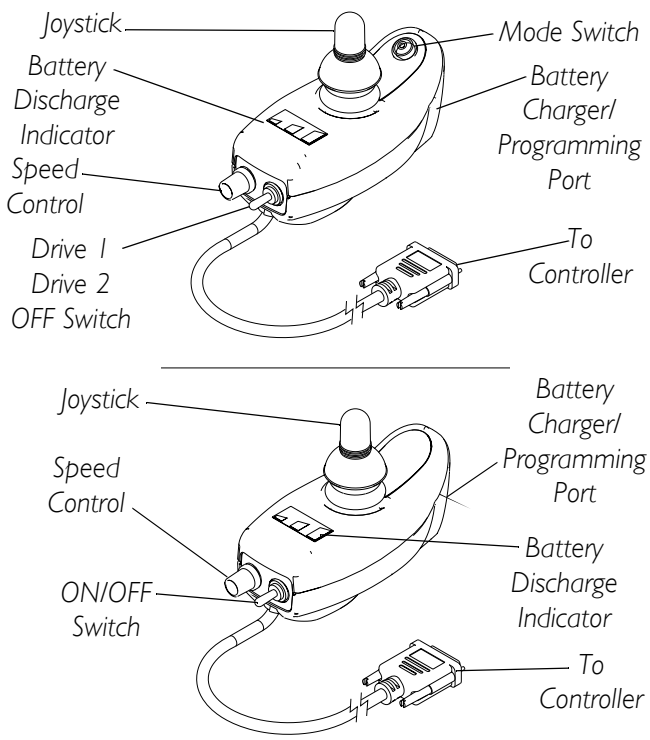


FIGURE 11.13 - DPJ AND SPJ-80 JOYSTICK

MPJ JOYSTICK

NOTE: For this information, refer to FIGURE 11.14.

The left half of the second line is the Battery Discharge Indicator (BDI). It provides information on the remaining charge in the batteries. At full charge solid blocks fill in all five segments between E (Empty) and F (Full). As the battery becomes discharged, the furthest right segments will progressively disappear a half bar at a time until no segments appear between E and F. At this level the word RECHARGE will appear on the second line to indicate that the user should charge the batteries as soon as possible.

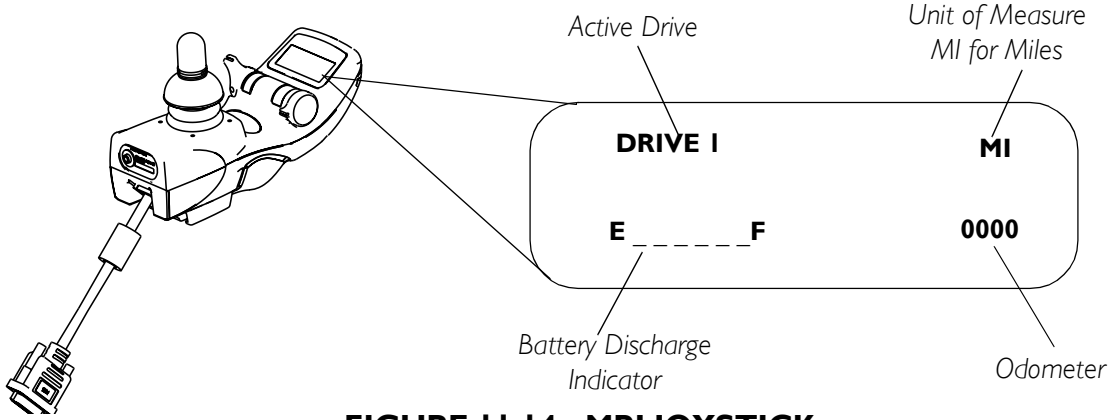


FIGURE 11.14 - MPJ JOYSTICK

CHARGING BATTERIES

NOTE: For this procedure, refer to FIGURE 11.15.

⚠ CAUTION

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

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.

⚠ 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 front 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.

The range per battery charge using recommended batteries should be approximately five (5) to nine (9) hours of typical operation. Extensive use on inclines, programming of controller, age of batteries, and terrain 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.

NOTE: 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

△ CAUTION

When attaching battery charger connector to the charger port of joystick, note that the plug is keyed and connector should go in easily. If excessive force is required, the plug is being put in wrong which can damage the joystick.

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

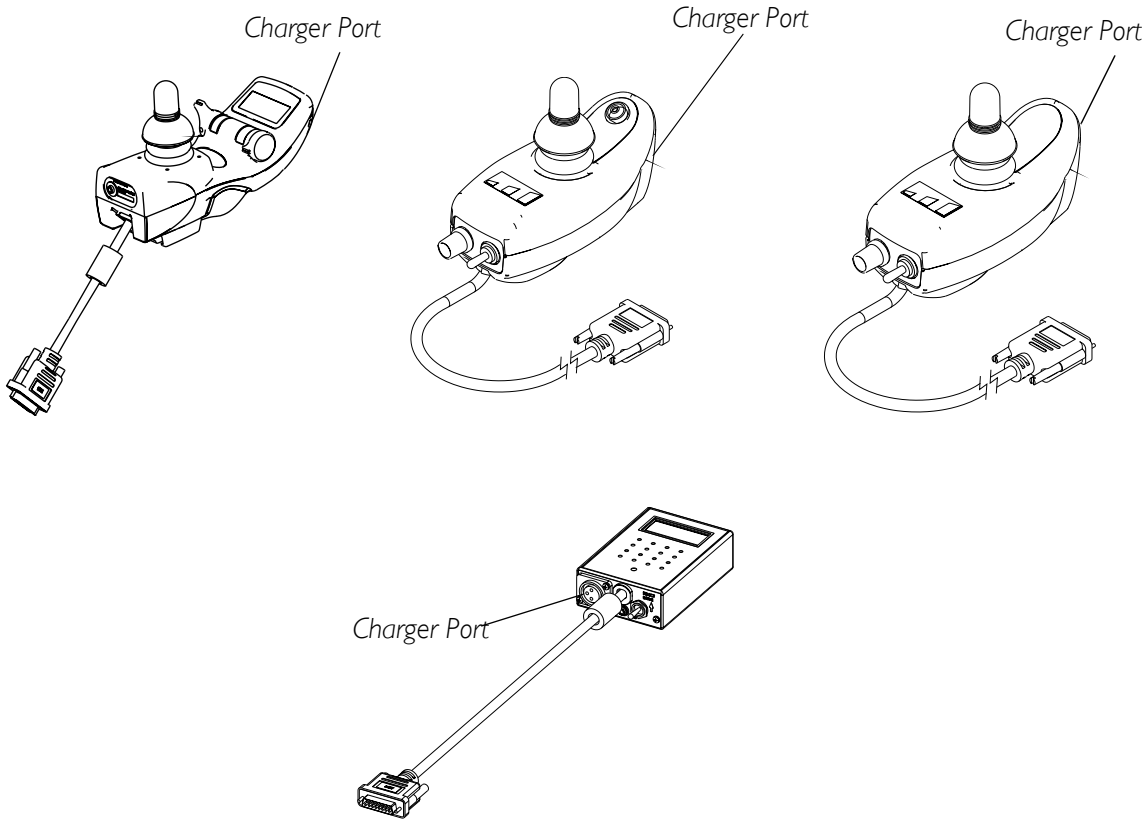


FIGURE 11.15 - CHARGING BATTERIES

SECTION 12— SEAT FRAME

REMOVING/INSTALLING SEAT PAN

NOTE: For this procedure, refer to FIGURE 12.1.

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

- *Two (2) - 7/16-inch Socket with Ratchet*
- *Torque Wrench*

REMOVING

1. Remove the seat cushion by lifting UP and disengaging from strips on the seat pan.
2. Remove the two (2) 1/4-20 x 1-5/8-inch hex head cap screws and 1/4-20 locknuts that secure the seat pan, seat positioning strap and pull pin to the seat frame.
3. Remove the four (4) 1/4-20 x 1-1/2-inch hex head cap screws, 1/4 x 3/8 x 3/16-inch spacers, and 1/4-20 locknuts that secure the seat pan to the seat frame.
4. Remove the seat pan.

INSTALLING

1. Secure the rear of the seat pan, seat positioning strap, and pull pin to the seat frame with two (2) 1/4-20 x 1-5/8-inch hex head cap screws and 1/4-20 locknuts. Torque to 75 in-lbs.
2. Secure the front of the seat pan to the seat frame with four (4) 1/4-20 x 1-1/2-inch hex head cap screws, 1/4 x 3/8 x 3/16-inch spacers, and 1/4-20 locknuts. Torque to 75 in-lbs.
3. Install seat cushion onto seat pan.

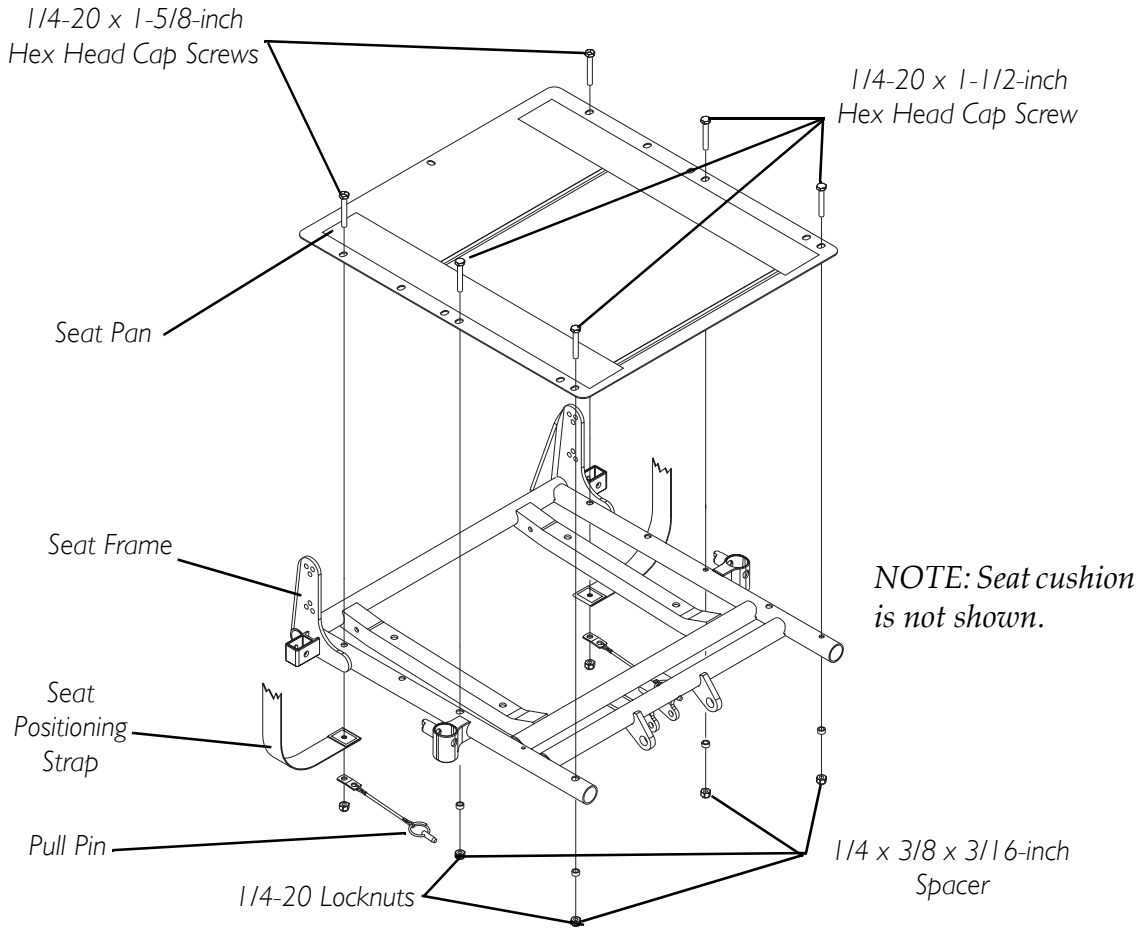


FIGURE 12.1 - REMOVING/INSTALLING SEAT PAN

REMOVING/INSTALLING SEAT FRAME FOR ASBA ONLY

16 - 24-INCH FIXED WIDTH

NOTE: For this procedure, refer to FIGURE 12.2.

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

- *Two (2) - 1/2-inch Socket with Ratchet*
- *Torque Wrench*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the seat pan. Refer to Removing/Installing Seat Pan on page 63.
3. Remove the back canes. Refer to Changing Back Height or Replacing the Back Upholstery on page 77. Perform only enough steps to remove back canes.
4. Disconnect the joystick from the controller.

5. Remove the armrests.
6. Perform one (1) of the following:
   A. Low Seat to Floor height -
      - Remove the two (2) 5/16-18 x 1-1/2-inch hex head cap screws that secure the seat frame to the front upper seat brackets.
      - Remove the two (2) 5/16-18 x 1-1/2-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts that secure the seat frame to the low seat to floor rear mounting plates.
      - Remove the seat frame.
   B. Medium Seat To Floor height -
      - Remove the four (4) 5/16-18 x 1-1/2-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts that secure the seat frame to the medium seat to floor mounting plates.
      - Remove the Seat Frame.
   C. High Seat To Floor height -
      - Remove the four (4) 5/16-18 x 1-1/2-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts that secure the seat frame to the high seat to floor mounting plates.
      - Remove the seat frame.

INSTALLING

NOTE: Refer to ASBA Seat Positions on page 69 for adjusting the ASBA seat positions.

1. Perform one (1) of the following:
   A. Low Seat to Floor height -
      - Secure the rear of the seat frame to the low seat to floor rear mounting plates with two (2) 5/16-18 x 1-1/2-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts. Torque to 156 in-lbs.
      - Secure the front of the seat frame to the front upper seat brackets with two (2) 5/16-18 x 1-1/2-inch hex head cap screws. Torque to 156 in-lbs.
   B. Medium Seat To Floor height -
      - Secure the seat frame to the medium seat to floor mounting plates with four (4) 5/16-18 x 1-1/2-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts. Torque to 156 in-lbs.
   C. High Seat To Floor height -
      - Secure the seat frame to the high seat to floor mounting plates with four (4) 5/16-18 x 1-1/2-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts. Torque to 156 in-lbs.
2. Install the armrests.

3. Connect the joystick to the controller.
4. Install the back canes. Refer to Changing Back Height or Replacing the Back Upholstery on page 77.
5. Install the seat pan. Refer to Removing/Installing Seat Pan on page 63.
6. Install the batteries.Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.

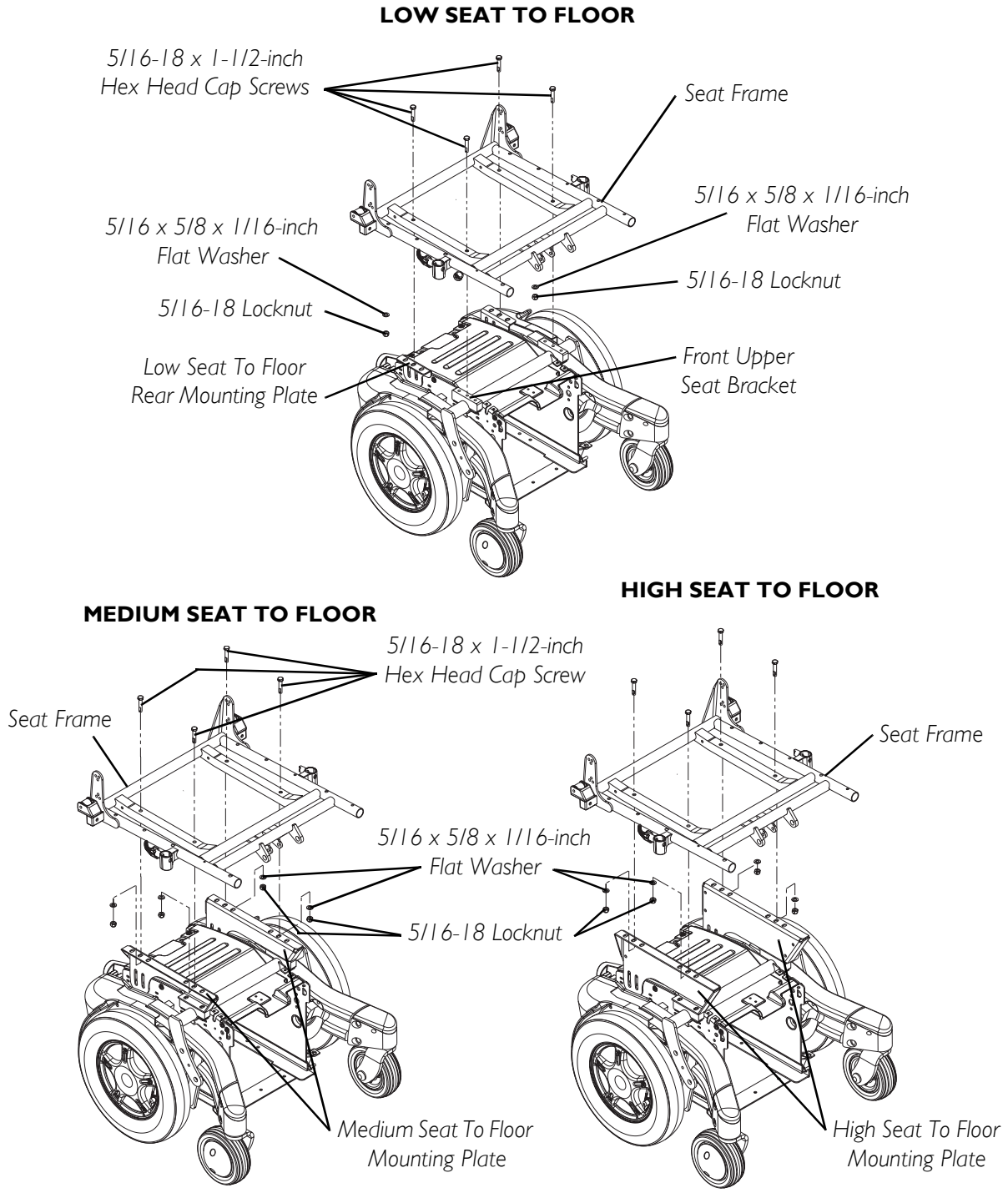


FIGURE 12.2 - REMOVING/INSTALLING SEAT FRAME - 16 - 24-INCH FIXED WIDTH

12 - 16-INCH ADJUSTABLE WIDTH

NOTE: For this procedure, refer to FIGURE 12.3.

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

- *Two (2) - 1/2-inch Socket with Ratchet*
- *Torque Wrench*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the seat pan. Refer to Removing/Installing Seat Pan on page 63.
3. Remove the back canes. Refer to Changing Back Height or Replacing the Back Upholstery on page 77. Perform only enough steps to remove back canes.
4. Disconnect the joystick from the controller.
5. Remove the armrests.
6. Perform one (1) of the following:
   A. Low Seat to Floor height -
      - Remove the four (4) 5/16-18 x 1-¾-inch hex head cap screws and 5/16-18 locknuts that secure the seat frame to the junior mounting brackets.
      - Remove the seat frame.
   B. Medium Seat To Floor height -
      - Remove the four (4) 5/16-18 x 1-¾-inch hex head cap screws and 5/16-18 locknuts that secure the seat frame to the junior mounting brackets.
      - Remove the seat frame.
   C. High Seat To Floor height -
      - Remove the four (4) 5/16-18 x 1-¾-inch hex head cap screws and 5/16-18 locknuts that secure the seat frame to the junior mounting brackets.
      - Remove the seat frame.

INSTALLING

NOTE: Refer to ASBA Seat Positions on page 69 for adjusting the ASBA seat positions,.

1. Perform one (1) of the following:
   A. Low Seat to Floor height -
      - Secure the seat frame to the junior mounting brackets with four (4) 5/16-18 x 1-¾-inch hex head cap screws and 5/16-18 locknuts. Torque to 156 in-lbs.
   B. Medium Seat To Floor height -
      - Secure the seat frame to the junior mounting brackets with four (4) 5/16-18 x 1-¾-inch hex head cap screws and 5/16-18 locknuts. Torque to 156 in-lbs.

C. High Seat To Floor height -

- Secure the seat frame to the junior mounting brackets with four (4) 5/16-18 x 1-¾-inch hex head cap screws and 5/16-18 locknuts. Torque to 156 in-lbs.

2. Install the armrests.
3. Connect the joystick to the controller.
4. Install the back canes. Refer to Changing Back Height or Replacing the Back Upholstery on page 77.
5. Install the seat pan. Refer to Removing/Installing Seat Pan on page 63.
6. Install the batteries.Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.

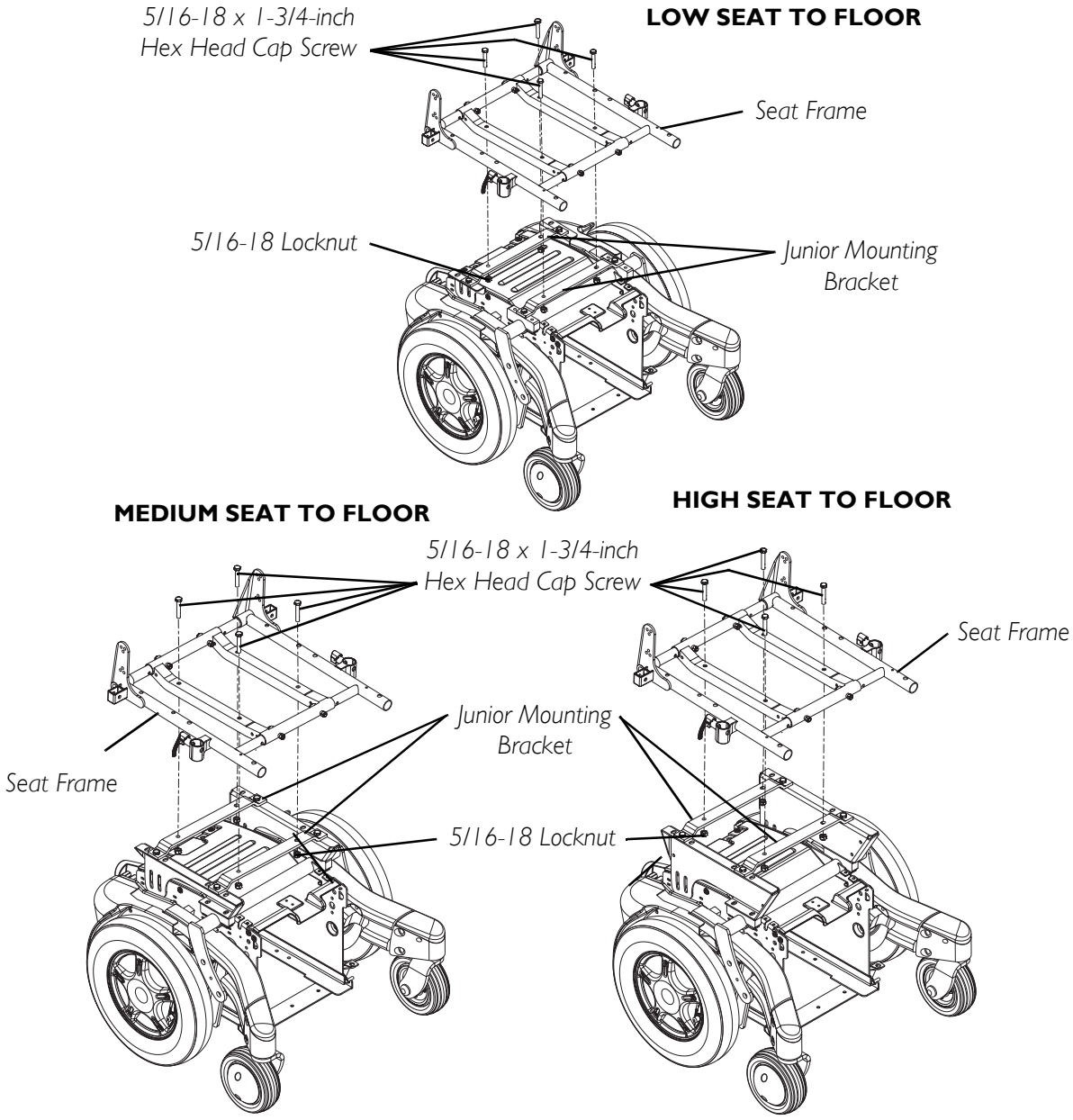


FIGURE 12.3 - REMOVING/INSTALLING SEAT FRAME - 12 - 16-INCH ADJUSTABLE WIDTH

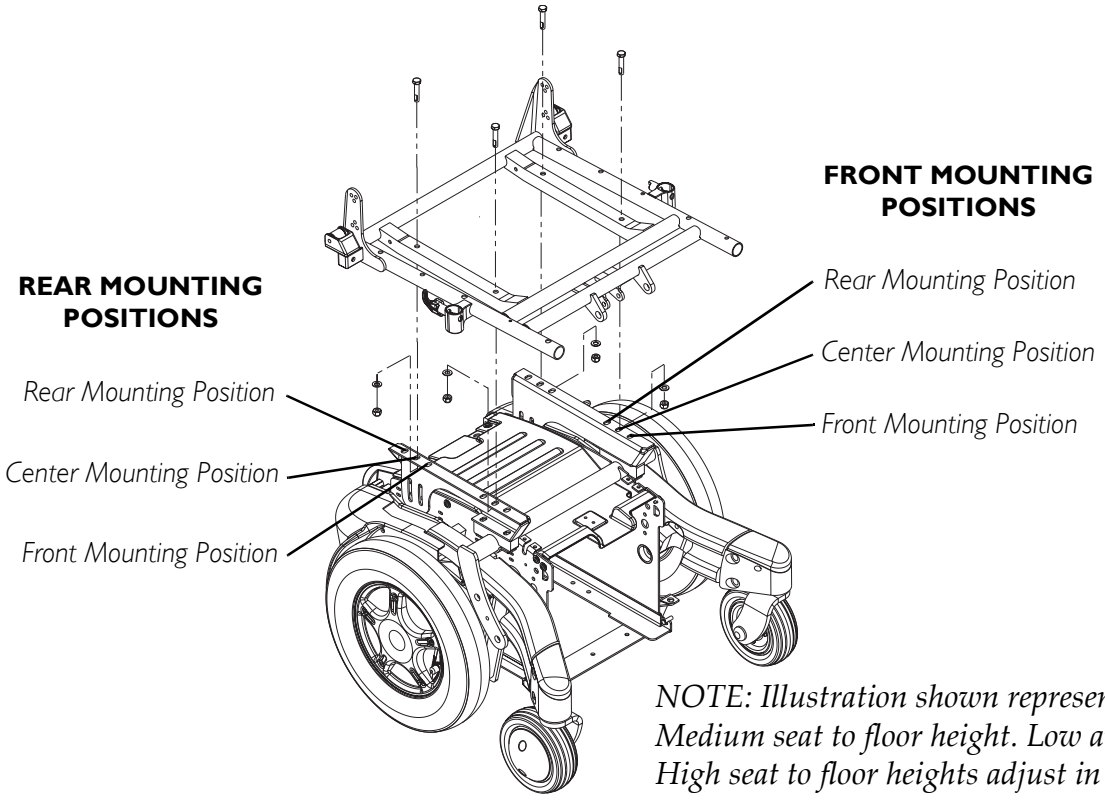
ASBA SEAT POSITIONS

⚠ WARNING

The TDX wheelchair is shipped with the seat in the standard position, noted in the chart below. If seat depth adjustment in desired, refer to Removing/Installing Seat Frame for ASBA only on page 64 to reposition the seat

NOTE: The chart below indicates which mounting position is used for each width and depth of seat frame. Front, Center or Rear indicates the mounting position in the chart below.

		WIDTH (INCHES)								
		16	17	18	19	20	21	22	23	24
DEPTH (INCHES)	16	Center	Center	Center	Center	Center	Center	Center	Rear	Rear
	17	Center	Center	Center	Center	Center	Center	Center	Rear	Rear
	18	Center	Center	Center	Center	Center	Center	Center	Rear	Rear
	19	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear
	20	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear
	21	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear
	22	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear	Rear



NOTE: Illustration shown represents Medium seat to floor height. Low and High seat to floor heights adjust in the same manner.

FIGURE 12.4 - ASBA SEAT POSITIONS

REMOVING/INSTALLING SEAT FRAME MOUNTING HARDWARE

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

- *Two (2) - 1/2-inch Socket with Ratchet*
- *Torque Wrench*
- *Pitch Angle Gauge*

LOW SEAT TO FLOOR HEIGHT

NOTE: For this procedure, refer to FIGURE 12.5.

REMOVING

1. Remove the seat frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
2. Perform one (1) of the following:
   A. For Adjustable Seat Width perform the following:
      - Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws that secure a junior mounting bracket to the front upper seat brackets.
      - Remove junior mounting bracket.
      - Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts that secure a junior mounting bracket to the low seat to floor rear mounting plates.
      - Remove junior mounting bracket.
      - Proceed to STEP 3.
   B. For Fixed Width proceed to STEP 3.
3. Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws, 21/64 x 53/64 x 7/64-inch flat washers and strap nut that secure the low seat to floor rear mounting plate to the battery box.
4. Remove the low seat to floor rear mounting plate.
5. Repeat STEPS 3-4 for the remaining low seat to floor rear mounting plate.
6. Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws that secure a front lower seat bracket and front upper seat bracket to the support beam tube.
7. Remove the front upper seat bracket and front lower seat bracket.
8. Repeat STEPS 6-7 for the remaining front upper seat bracket and front lower seat bracket.

INSTALLING

NOTE: Position the front upper seat bracket and front lower seat bracket 1/4-inch away from the side of the battery box.

1. Secure a front upper seat bracket and a front lower seat bracket on the support beam tube with two (2) 5/16-18 x 3/4-inch with patch hex head cap screws, but do not tighten. Repeat step for other side of support beam.
2. Secure a low seat to floor rear mounting plate to the battery box with two (2) 5/16-18 x 3/4-inch hex head cap screws, 21/64 x 53/64 x 7/64-inch flat washers and strap nut, but do not tighten. Repeat step for other side of battery box.
3. For adjustable width perform the following:
   A. Secure the junior mounting bracket to the low seat to floor rear mounting plates with two (2) 5/16-18 x 3/4-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts. Torque to 156 in-lbs.
   B. Secure the junior mounting bracket to the front upper seat brackets with two (2) 5/16-18 x 3/4-inch hex head cap screws. Torque to 156 in-lbs.
4. Install the seat frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
5. Using Pitch Angle Gauge move seat frame to desired angle (0-10 degrees).
6. Torque all eight (8) 5/16 x 3/4-inch hex head cap screws from STEPS 1 and 2 to 156-in-lbs.

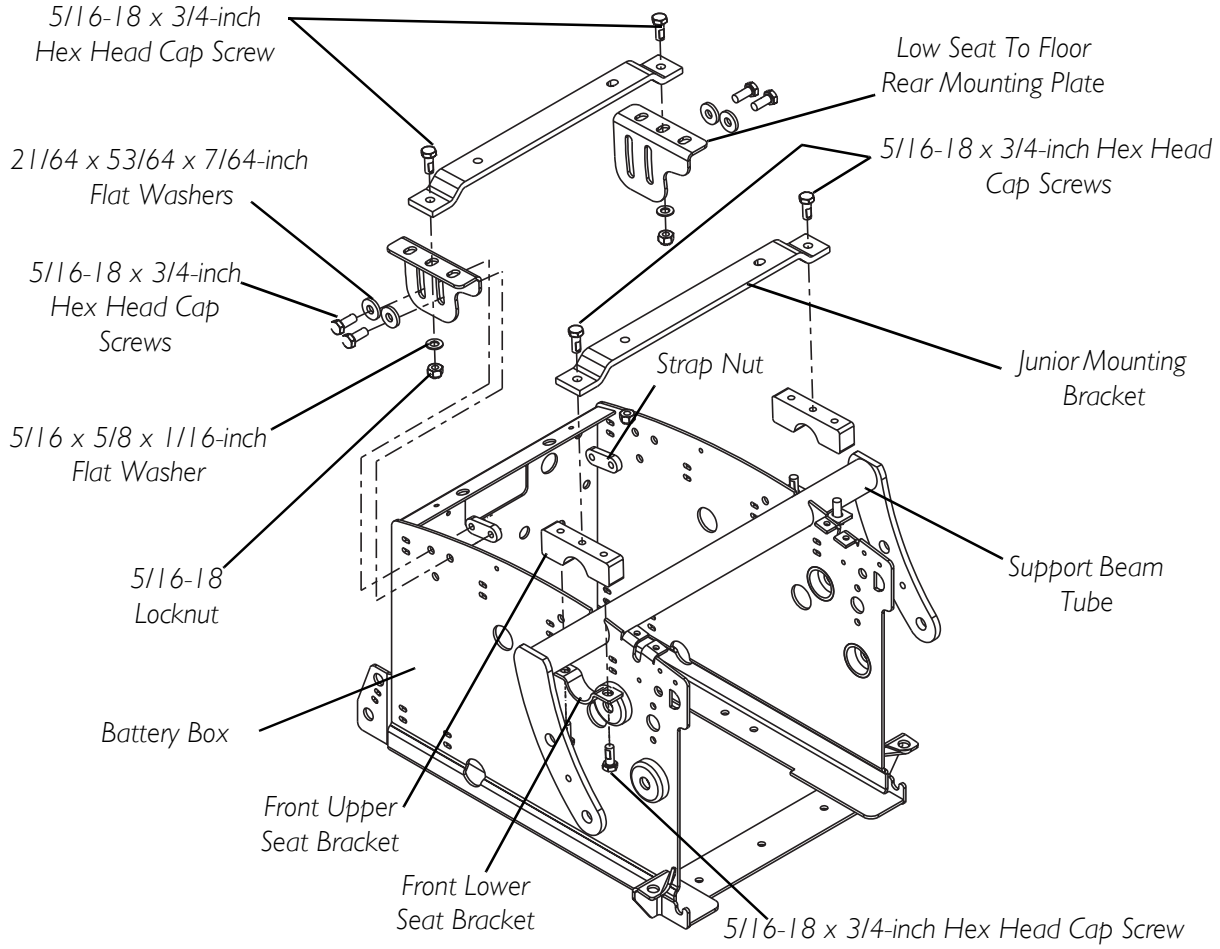


FIGURE 12.5 - REMOVING/INSTALLING SEAT FRAME MOUNTING HARDWARE - LOW SEAT TO FLOOR HEIGHT

MEDIUM SEAT TO FLOOR HEIGHT

NOTE: For this procedure, refer to FIGURE 12.6.

REMOVING

1. Remove the Seat Frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
2. Perform one (1) of the following:

   A. For Adjustable Seat Width, perform the following:

   - Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts that secure a junior mounting bracket to the medium seat to floor mounting plates.
   - Remove junior mounting bracket.
   - Repeat steps for remaining junior mounting bracket.
   - Proceed to STEP 3.

B. For Fixed Width proceed to STEP 3.

3. Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws, 21/64 x 53/64 x 7/64-inch flat washers and strap nut that secure a medium seat to floor mounting plate to the battery box.
4. Remove the two (2) 5/16-18 x 1/2-inch hex head cap screws that secure a medium seat to floor mounting plate to the front upper seat bracket.
5. Remove the medium seat to floor mounting plate.
6. Repeat STEPS 3-5 for remaining medium seat to floor mounting plate.
7. Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws that secure the front lower seat bracket and front upper seat bracket to the support beam tube.
8. Remove front upper seat bracket and front lower seat bracket.
9. Repeat STEPS 7-8 for remaining front upper seat bracket and front lower seat bracket.

INSTALLING

NOTE: Position the front upper seat bracket and front lower seat bracket ¼-inch away from the side of the battery box.

1. Secure the front upper seat bracket and front lower seat bracket on the support beam tube with two (2) 5/16-18 x 3/4-inch hex head cap screws, but do not tighten. Repeat step for other side of support beam.
2. Secure the medium seat to floor mounting plate to the battery box with two (2) 5/16-18 x 3/4-inch hex head cap screws, 21/64 x 53/64 x 7/64-inch flat washers and strap nut, but do not tighten. Repeat step for other side of wheelchair.
3. Secure the medium seat to floor mounting plate to the front upper seat bracket with two (2) 5/16-18 x 1/2-inch with patch hex head cap screws. Torque to 156 in-lbs. Repeat for other side of wheelchair.
4. For adjustable width perform the following:
   A. Secure the junior mounting bracket to the medium seat to floor mounting plates with two (2) 5/16-18 x 3/4-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts. Torque to 156 in-lbs. Repeat for remaining junior mounting bracket
5. Install the seat frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
6. Using Pitch Angle Gauge move seat frame to desired angle (0-10 degrees).
7. Torque all eight (8) 5/16 x 3/4-inch hex head cap screws from steps 1 and 2 to 156-in-lbs.

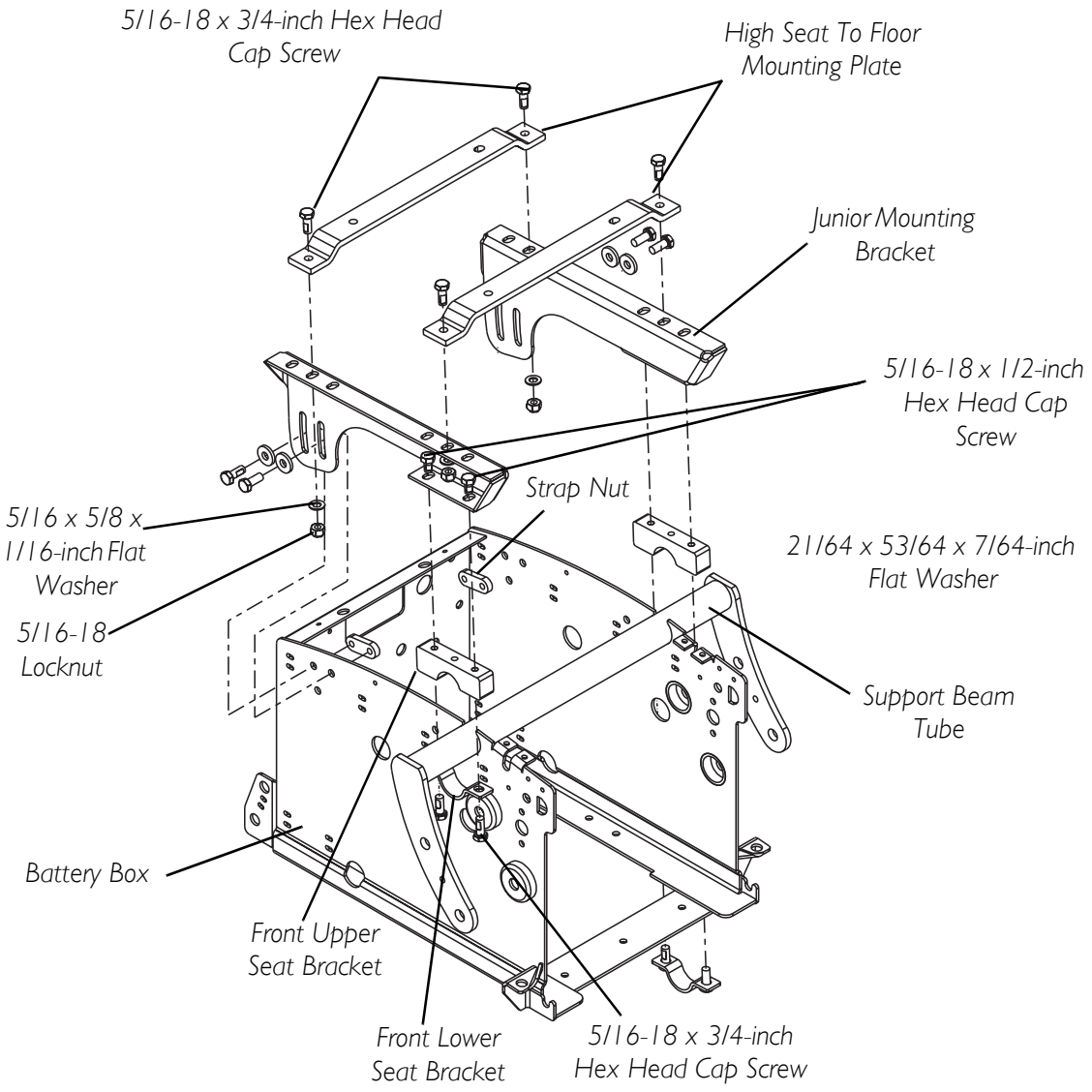


FIGURE 12.6 - REMOVING/INSTALLING SEAT FRAME MOUNTING HARDWARE - MEDIUM SEAT TO FLOOR HEIGHT

HIGH SEAT TO FLOOR HEIGHT

NOTE: For this procedure, refer to FIGURE 12.7.

REMOVING

1. Remove the seat frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
2. Perform one (1) of the following:

   A. For Adjustable Seat Width, perform the following:

   - Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts that secure the junior mounting bracket to the high seat to floor mounting plates.

- Remove front junior mounting bracket.
- Repeat the above two steps for remaining junior mounting bracket.

3. Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws, 21/64 x 53/64 x 7/64-inch flat washers and strap nut that secure the high seat to floor mounting plate to the battery box.
4. Remove the two (2) 5/16-18 x 1/2-inch hex head cap screws that secure the high seat to floor mounting plate to the left front upper seat bracket.
5. Remove the high seat to floor mounting plate.
6. Repeat STEPS 3-4 for remaining high seat to floor mounting plate.
7. Remove the two (2) 5/16-18 x 3/4-inch hex head cap screws that secure the front lower seat bracket and front upper seat bracket to the support beam tube.
8. Remove the front upper seat bracket and front lower seat bracket.
9. Repeat STEPS 7-8 for remaining front upper seat bracket and front lower seat bracket.

INSTALLING

NOTE: Position the front upper seat bracket and front lower seat bracket 1/4-inch away from the side of the battery box.

1. Secure the front upper seat bracket and front lower seat bracket on the support beam tube with two (2) 5/16-18 x 3/4-inch with patch hex head cap screws, but do not tighten. Repeat for other side of support beam.
2. Secure the high seat to floor mounting plate to the battery box with two (2) 5/16-18 x 3/4-inch hex head cap screws, 21/64 x 53/64 x 7/64-inch flat washers and strap nut, but do not tighten. Repeat for remaining high seat to floor mounting plate.
3. Secure the high seat to floor mounting plate to the front upper seat bracket with two (2) 5/16-18 x 1/2-inch with patch hex head cap screws. Torque to 156-in-lbs. Repeat for other side of high seat to floor mounting plate.
4. For adjustable width perform the following:
   A. Secure the junior mounting bracket to the high seat to floor mounting plates with two (2) 5/16-18 x 3/4-inch hex head cap screws, 5/16 x 5/8 x 1/16-inch flat washers and 5/16-18 locknuts. Torque to 156in-lbs. Repeat for remaining junior mounting bracket.
5. Install the Seat Frame. Refer to Removing/installing seat frame on page 54.
6. Using pitch angle gauge move seat frame to desired angle (0-10 degrees).
7. Torque all eight (8) 5/16 x 3/4-inch Hex Head Cap Srcrews from steps 1 and 2 to 156-in-lbs.

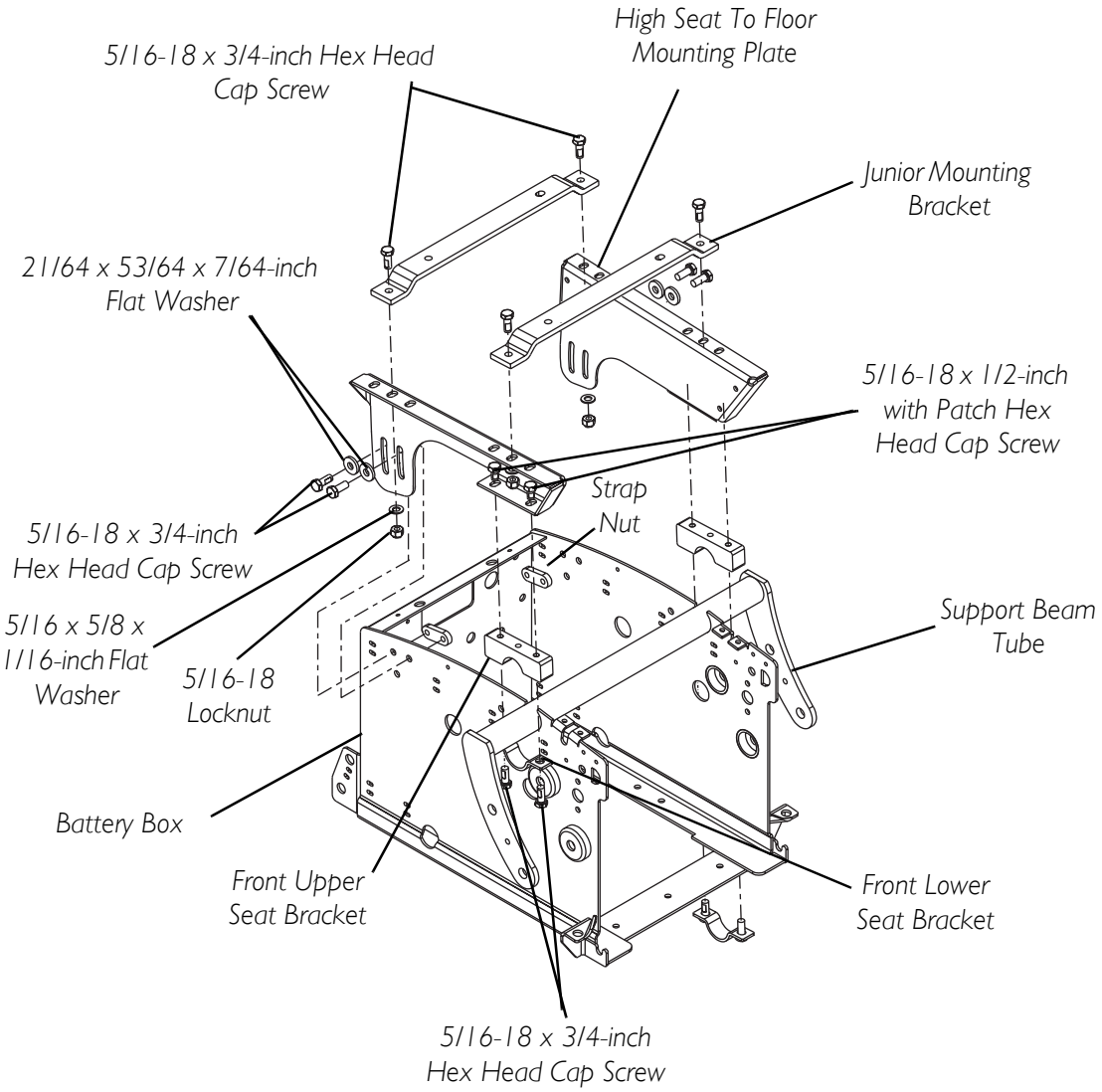


FIGURE 12.7 - REMOVING/INSTALLING SEAT FRAME MOUNTING HARDWARE - HIGH SEAT TO FLOOR HEIGHT

SECTION 13— BACK FRAME

NOTE: For this procedure, refer to FIGURE 13.1.

CHANGING BACK HEIGHT OR REPLACING THE BACK UPHOLSTERY

NOTE: The following tools and items are required to perform this procedure:

- *7/16-inch Socket with Ratchet*
- *7/16-inch Box Wrench*
- *Phillips Screwdriver*
- *Wire Cutters*
- *Tie Wraps*

1. Remove seat cushion.
2. Remove armrest.
3. To ensure proper back angle for reinstallation, note mounting positions on seat frame brackets.
4. Cut tie wraps that secure the back upholstery to the back canes.
5. Remove the four (4) 1/4-20 x 1-5/8-inch hex head cap screws, 1/4 x 23/32 x 1/16-inch washers, 1/4 x 11/16 x 1/2 - inch tube clamps, and 1/4-20 locknuts that secure the existing back canes to the seat frame.

NOTE: Existing hardware and inserts will be reused.

6. Remove the back assembly from the wheelchair.
7. Remove the 10 x 7/8 - inch screws with washers that secure the back upholstery to the back canes.
8. If applicable, loosen, but do not remove the 5/16-24 x 1-3/8 - inch screw with lug and 5/16-24 locknut that secure the spreader bar to the existing back canes.
9. Slide existing back canes up and out of the spreader bar and back upholstery.

NOTE: Back insert should automatically come out of the back cane.

10. Replace upholstery if desired.
11. Slide the new/existing back canes through the new/existing back upholstery and spreader bar.
12. Slide the back insert into the bottom of the new/existing back canes.
13. Line up the mounting holes of the back insert with the mounting holes in the back canes and partially insert one (1) 1/4-20 x 1-5/8-inch hex head cap screws to maintain location of back insert.
14. If equipped, tighten the 5/16-24 x 1-3/8-inch screw with lug to secure the spreader bar anywhere on the back canes.

NOTE: Proper location of spreader bar will be determined later in this procedure.

⚠ WARNING

The back canes MUST be fastened securely to the seat frame BEFORE using the wheelchair. Torque to 75-inch pounds.

15. Mount back canes to the seat frame in the location noted from STEP 3. Secure the back canes to the seat frame with the existing four (4) 1/4-20 x 1-5/8-inch hex head cap screws, 1/4 x 23/32 x 1/16-inch washers, 1/4 x 11/16 x 1/2-inch tube clamps, and 1/4-20 locknuts. Torque to 75-in/lbs.
16. Secure the TOP of the existing/new back upholstery to the back canes with the two (2) 10 x 7/8-inch screws with washers.
17. Secure the loop strip on bottom of the existing/new back upholstery to hook strip on the seat pan.
18. Secure the bottom of the existing/new back upholstery to the back canes with new tie-wraps.

NOTE: Clean upholstery with warm DAMP cloth and mild detergent to remove superficial soil.

⚠ WARNING

Laundering the upholstery or adding moisture to the upholstery will reduce flame retardancy.

NOTE: When replacing the back upholstery or changing back height, follow these guidelines for spreader bar height (where applicable).

NOTE: The spreader bar should be positioned per the following:

- *16-inch and *17-inch Back height - top of spreader bar is 5-inches above bottom of back cane.
- *18-inch, *19-inch, 20-inch, 21-inch Back height - top of spreader bar is 7-inches above bottom of back cane.

*NOTE: Spreader bar required on back heights 20-22-inches. *Spreader bar ONLY required on these back heights if the width or depth of the wheelchair exceeds 19-inches.*

19. If necessary, reposition the spreader bar at the correct height for the corresponding back height and torque the mounting hardware to 60-inch pounds.
20. Replace seat cushion and armrest.

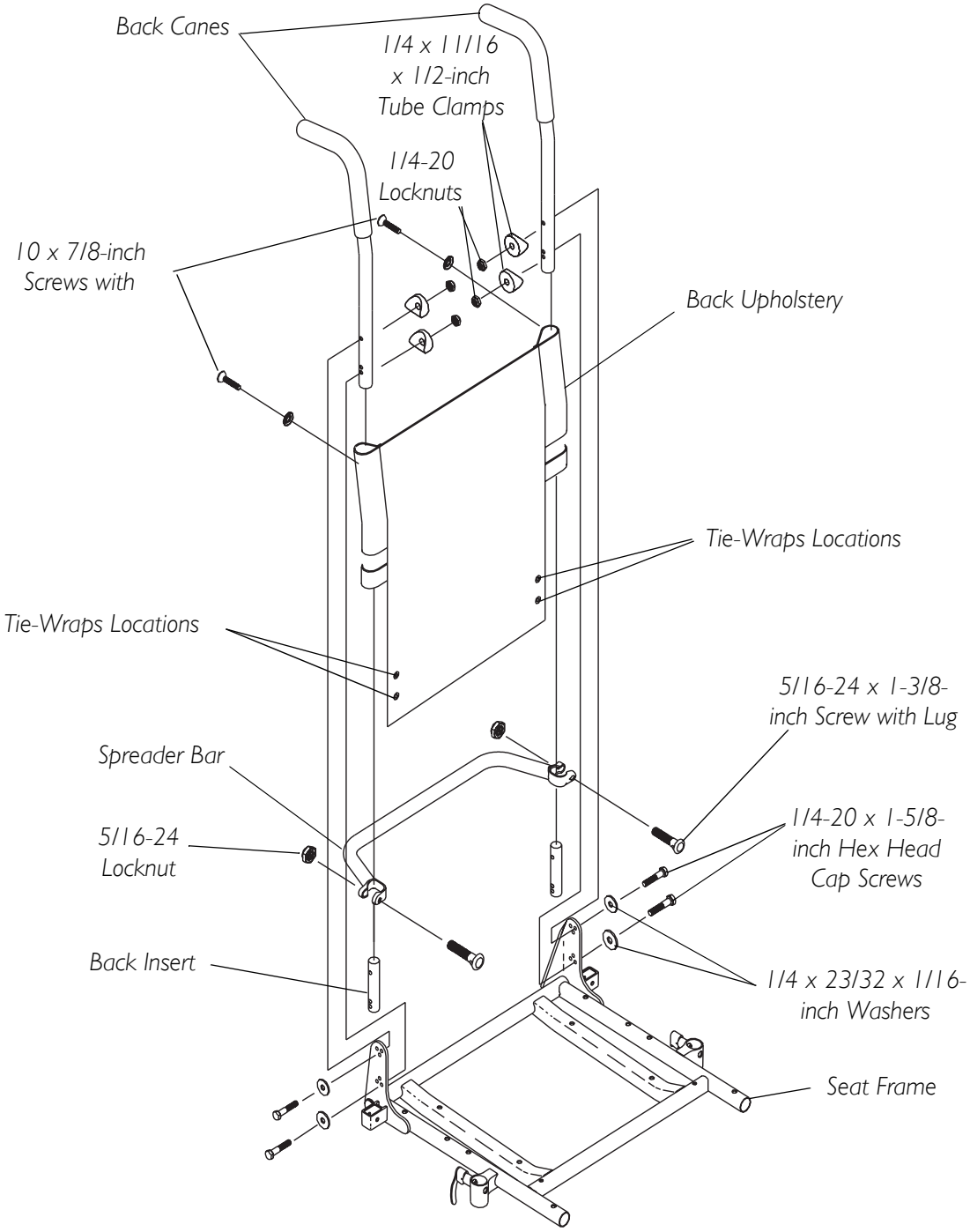


FIGURE 13.1 - CHANGING BACK HEIGHT OR REPLACING THE BACK UPHOLSTERY

ADJUSTING THE BACK ANGLE

NOTE: FIGURE 13.2 for this procedure.

1. Remove the flip back armrests from the wheelchair.

2. Remove the mounting screw and washer from the top mounting hole of back angle plate and back cane.

NOTE: To avoid losing the insert in each back cane, thread the mounting screw through the cane from the inside of wheelchair to hold the insert in place.

3. Remove the mounting screw and washer from the bottom mounting hole of the back angle plate and back cane.
4. Reposition the back canes into the correct mounting holes of the back angle plate to obtain a back angle between 80° and 100° in 5° increments.
5. Torque mounting screws to 75-inch pounds.
6. Reinstall the flip back armrests onto the wheelchair.

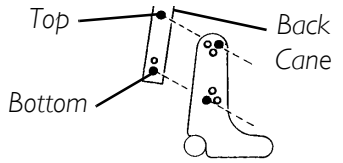
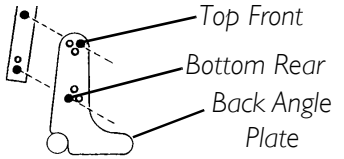
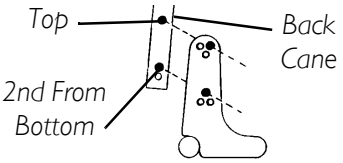
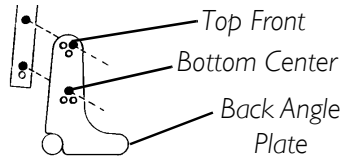
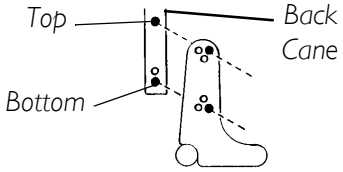
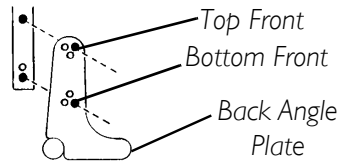
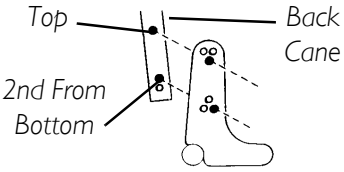
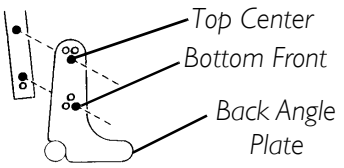
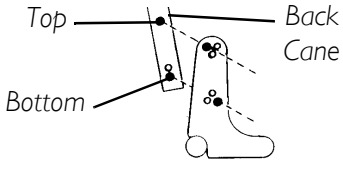
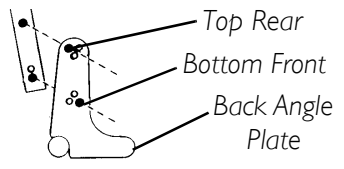
ANGLE	BACK CANE MOUNTING HOLE	BACK ANGLE PLATE HOLE
80°		
85°		
90°		
95°		
100°		

FIGURE 13.2 - ADJUSTING THE BACK ANGLE

SECTION 14— MANUAL RECLINER

POSITIONING THE LIMIT SWITCH

NOTE: For this procedure, refer to FIGURE 14.1

⚠ WARNING

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

NOTE: The battery charger connector, as well as the limit switch, are factory set on the RIGHT side of the wheelchair. However, they can be positioned on either side for user convenience. The limit switch MUST BE positioned on the same side as the battery charger connector.

1. Cut the two (2) tie wraps that secure the limit switch wire to the seat frame.
2. Remove the two (2) mounting screws and washers that secure the actuator to the gas cylinder pivot block.
3. Position actuator on opposite gas cylinder pivot block.

△ CAUTION

DO NOT over tighten the mounting screws that secure the actuator to the pivot block. Damage to actuator will occur.

4. Secure the actuator to the pivot block with the two (2) mounting screws and washers. DO NOT overtighten.
5. Remove the mounting screw that secures the wire retainer to the inside of the seat frame.
6. Remove the two (2) mounting screws and washers that secure the limit switch sensor to the seat frame.
7. Turn limit switch sensor over so opposite side is facing up and the wire is on the INSIDE of the seat frame.
8. Position the limit switch sensor onto the opposite side of the seat frame.

△ CAUTION

DO NOT over tighten the mounting screws that secure the limit switch sensor to the seat frame. Damage to the limit switch sensor will occur.

9. Secure limit switch sensor to the seat frame with the two (2) mounting screws and washers.
10. Secure the wire retainer onto the INSIDE of the seat frame with the mounting screw.

11. Tie wrap the limit switch wire to the seat frame.
12. Adjust the limit switch.Refer to Adjusting Limit Switch on page 82.

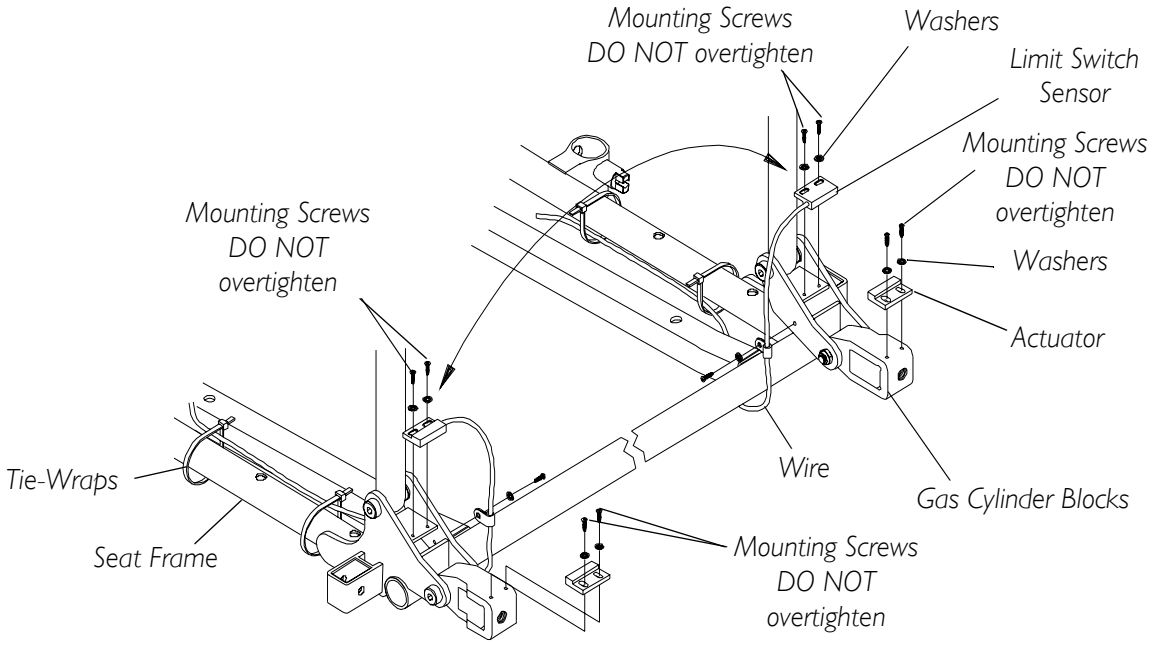


FIGURE 14.1 - POSITIONING THE LIMIT SWITCH

ADJUSTING LIMIT SWITCH

NOTE: For this procedure, refer to FIGURE 14.2.

⚠ WARNING

NEVER operate the wheelchair while in any recline position over 105 degrees RELATIVE TO THE SEAT FRAME. If the limit switch does not stop the wheelchair from operating in a recline position greater than 105◦ RELATIVE TO THE SEAT FRAME, do not operate the wheelchair. Adjust the limit switch BEFORE using the wheelchair, otherwise injury or damage can occur.

1. Recline the back of the wheelchair until the gas cylinder rod measures 3-5/8 of an inch.
2. Turn the power of the joystick to the ON position.

NOTE: On a SPJ joystick, ALL segments of the bar graph on the joystick should start to flash on and off and the wheelchair should not operate. On a DPJ joystick, the two yellow LED's blink. On a MPJ joystick it scrolls E28 on the menu screen.

3. **IF** the wheelchair operates, proceed to the following steps to adjust the actuator on the gas cylinder pivot block:
   A. Loosen, but do not remove, the two (2) mounting screws and washers that secure the actuator to the gas cylinder pivot block.
   B. Slide actuator UP (towards top of the wheelchair).

⚠ CAUTION

DO NOT over tighten the mounting screws that secure the actuator to the pivot block. Damage to the actuator will occur.

C. Only tighten the two (2) mounting screws and washers that secure the actuator to the gas cylinder pivot block until the actuator does not move.

D. Repeat STEPS 1 and 2 until the wheelchair does not operate when the gas cylinder rod is 3-5/8-inches long.

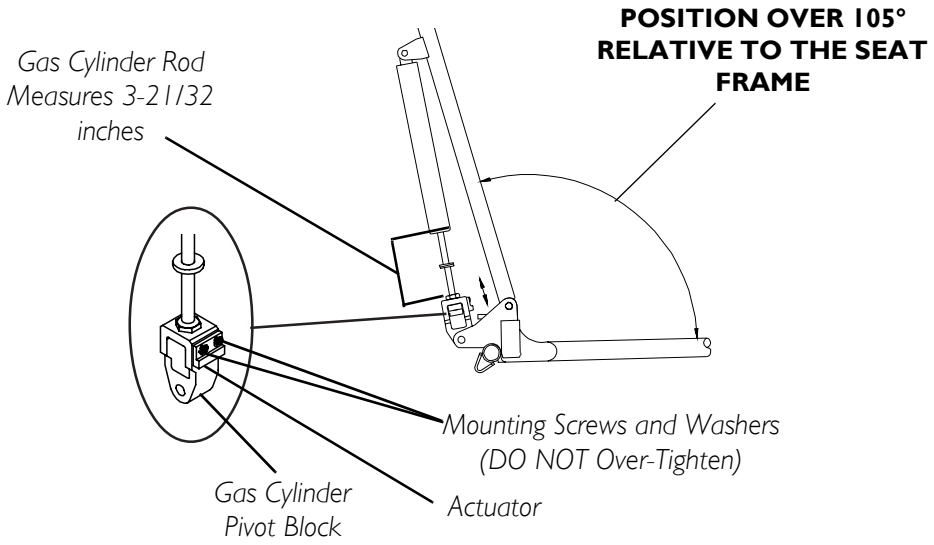


FIGURE 14.2 - ADJUSTING LIMIT SWITCH

REPLACING RECLINER CABLE ASSEMBLIES

NOTE: For this procedure, refer to FIGURE 14.3.

NOTE: There are three (3) different cable lengths depending on back height

CABLE LENGTH	BACK HEIGHT
Short	18-1/2 inches and 20 inches
Medium	22 and 24 inches
Long	26 inches

⚠ WARNING

Replace ONE (1) recliner cable assembly at a time to avoid injury.

1. Cut the tie wraps that secure the existing recliner cable assembly to the back cane.
2. Remove the pan screw that secures the handle of the existing recliner cable assembly to the back cane.

3. Loosen the jam nut on the gas cylinder rod.
4. Remove the mounting screw, washer, nylon washers and locknut that secure the TOP of the gas cylinder to the mounting bracket on the back cane.
5. Unscrew the gas cylinder from the operator of the existing recliner cable assembly but do not remove the gas cylinder from the pivot block.
6. Remove the operator of the existing recliner cable assembly from the pivot block.
7. Make sure the threads of the gas cylinder rod are flush with the inside of the pivot block.
8. With the operator of the NEW recliner cable assembly on the inside of the recliner seat frame, line up the mounting hole in the operator of the new recliner cable assembly with the gas cylinder rod.

⚠ CAUTION

DO NOT force the gas cylinder rod into the operator of the recliner cable assembly.

DO NOT cross thread the operator of the recliner cable assembly with the gas cylinder.

If slack in the recliner cable or movement in the operator of the cable assembly can not be eliminated, DO NOT use the recliner cable assembly.

9. Screw the NEW gas cylinder into the operator of the cable assembly until the jam nut sits on the pivot block, there is no slack in the recliner cable and there is no movement in the operator of the recliner cable assembly.
10. Visually inspect the handle to make sure that the cable is snapped completely into slot in handle and cable fitting is seat properly in the handle.
11. Reinstall the mounting screw through the mounting bracket of the back cane, nylon washer, gas cylinder, nylon washer, mounting bracket and washer and securely tighten with the existing locknut. Torque to 75-inch pounds.
12. Line up the mounting hole in the handle of the recliner cable assembly with the mounting hole in the back cane.
13. Insert the pan screw through the handle of the recliner cable assembly and the back cane and torque to 9-inch pounds.
14. Tie wrap the recliner cable assembly to the recliner back cane.
15. Adjust the gas cylinder. Refer to Replacing/Adjusting Gas Cylinders on page 85.

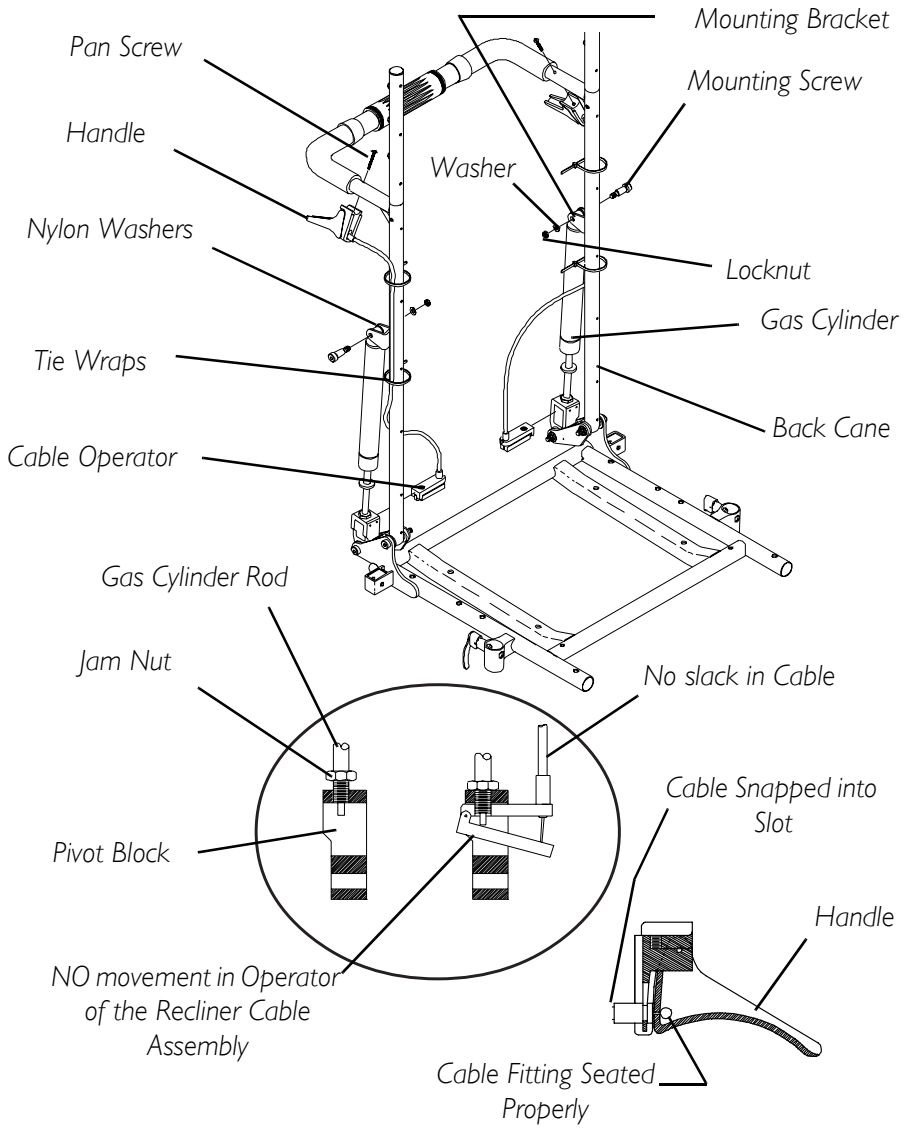


FIGURE 14.3 - REPLACING RECLINER CABLE ASSEMBLIES

REPLACING/ADJUSTING GAS CYLINDERS

⚠ WARNING

Replace ONE (1) gas cylinder at a time to avoid injury.

Both gas cylinders MUST be operational and adjusted properly BEFORE using the recliner. DO NOT operate the recliner if only one (1) of the gas cylinders is operational or adjusted properly.

REPLACING GAS CYLINDER

1. Remove the mounting screw, washer, nylon washers and locknut that secure the TOP of the gas cylinder to mounting bracket on back cane.

2. Loosen the jam nut on existing gas cylinder rod.
3. Unscrew the existing gas cylinder from the operator of the recliner cable assembly and the pivot block and remove the existing gas cylinder from the wheelchair.
4. Screw cylinder rod of the NEW gas cylinder into the pivot block until the threads of the cylinder rod are flush with inside of pivot block.
5. With the operator of the recliner cable assembly on the inside of the recliner seat frame, line up the mounting hole in the operator of the recliner cable assembly with the new gas cylinder rod.

⚠ CAUTION

DO NOT force the gas cylinder rod into the operator of the recliner cable assembly.

DO NOT cross thread the operator of the recliner cable assembly with the gas cylinder.

If slack in the recliner cable or movement in the operator of the cable assembly can not be eliminated, DO NOT use the recliner cable assembly.

6. Screw the NEW gas cylinder into the operator of the cable assembly until the jam nut sits on the pivot block, there is no slack in recliner cable and there is no movement in the operator of the recliner cable assembly.
7. Visually inspect the handle to make sure that the cable is snapped completely into slot in handle and cable fitting is seat properly in the handle.
8. Press the operator of the recliner cable assembly to extend the new gas cylinder.
9. Line up the mounting holes of the NEW gas cylinder and the bracket of the back cane.
10. Reinstall the mounting screw through the mounting bracket of the back cane, nylon washer, NEW gas cylinder, nylon washer, mounting bracket and washer and securely tighten with the existing locknut. Torque to 75-inch pounds.
11. Adjust the NEW gas cylinders. Refer to Replacing/Adjusting Gas Cylinders on page 85.

ADJUSTING GAS CYLINDER

1. To adjust the LEFT gas cylinder: Squeeze the handle of the RIGHT recliner cable assembly and try to recline the back. The back should not recline.
2. If the LEFT side of the back releases without squeezing the handle of the LEFT recliner cable assembly, perform the following steps:
   A. Finger tighten the jam nut on the rod of the gas cylinder until it bottoms out on the rod of the cylinder.
   B. Turn the jam nut on the LEFT gas cylinder COUNTERCLOCKWISE approximately one-half (1/2) revolution.

NOTE: The gas cylinder rod will turn.

C. Repeat step 1.

D. Repeat step B until the LEFT side of the back DOES NOT recline.

3. To adjust the RIGHT gas cylinder: Repeat steps 1 and 2 for the LEFT handle of the cable assembly.

△ CAUTION

Damage to the gas cylinder rod WILL occur if the following steps are NOT followed when the jam nut is torqued against the pivot block.

4. Using no larger than 1/4-inch wide, fine toothed pliers, wrap masking tape around the teeth of the pliers two (2) or (3) revolutions.
5. Using no excessive force, hold the gas cylinder rod just above the jam nut.
6. While holding the gas cylinder rod and using a 17mm wrench, turn the jam nut CLOCKWISE and torque the RIGHT and LEFT jam nuts against the RIGHT and LEFT pivot blocks to 156-inch pounds.

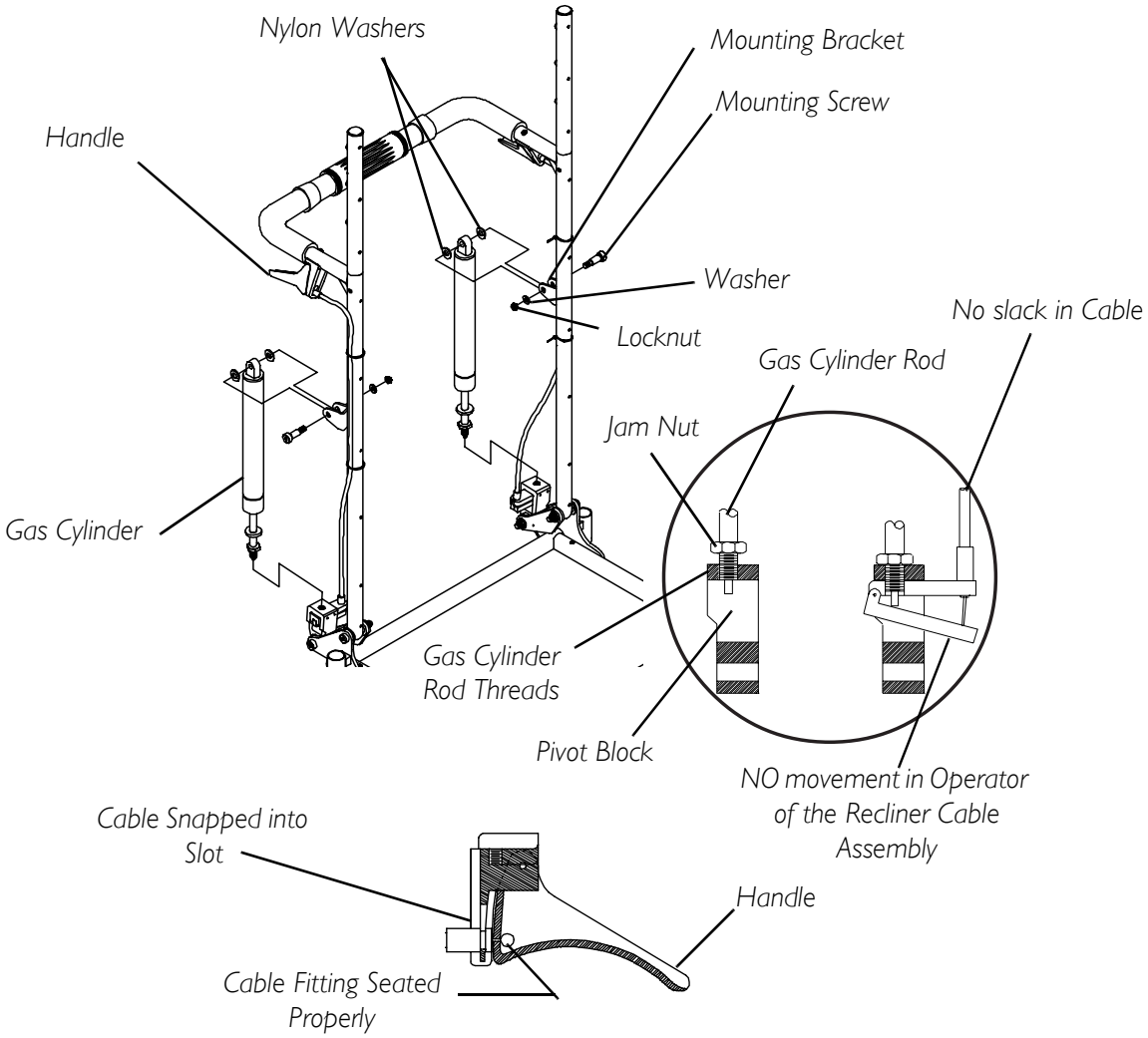


FIGURE 14.4 - REPLACING/ADJUSTING GAS CYLINDERS

CHANGING BACK HEIGHT

1. Press the push pins on the headrest extension tubes in and remove headrest extension from back canes.
2. Remove the recliner cables from the back canes. Refer to Replacing Recliner Cable Assemblies on page 83.
3. Remove the mounting screws, washers and locknuts that secure the TOP of the gas cylinders to the mounting bracket on the back canes.
4. Remove the mounting screws, washers and locknuts that secure the back canes to the seat frame.
5. Remove the existing recliner back assembly from the wheelchair.
6. Turn the spreader bar on the existing back canes **CLOCKWISE** (toward back upholstery) and remove the spreader bar from the existing back canes.
7. Loosely install the spreader bar onto the NEW back cane handles by rotating the spreader bar **COUNTERCLOCKWISE** (away from the back canes).

NOTE: If the spreader bar does not thread onto the back canes, do not force. Turn the spreader bar around and repeat STEP 7.

8. Line up two (2) bottom mounting holes of back canes with the two (2) mounting holes in the seat frame.

⚠ WARNING

The back canes MUST be fastened securely to the seat frame BEFORE using the wheelchair. Torque mounting screws to 156-inch pounds.

9. Reinstall the mounting screw, washer and locknut through the back cane and seat frame mounting holes and torque to 156-inch pounds.
10. Reinstall the mounting screw through the mounting bracket of the back cane, nylon washer, mounting hole in the TOP of the gas cylinder, nylon washer, mounting bracket and washer and securely tighten with the existing locknut. Torque to 75-inch pounds.
11. Reinstall the recliner cable assemblies onto the back canes. Refer to Replacing Recliner Cable Assemblies on page 83.

NOTE: There are three (3) different cable lengths depending on back height:

CABLE LENGTH	BACK HEIGHT
Short	18-1/2 inches and 20 inches
Medium	22 and 24 inches
Long	26 inches

NOTE: New recliner cables will be needed if back height is changed to a height not within the length of the original cable.

12. Install the NEW back upholstery onto the back canes.
13. Install the ten (10) or twelve (12) mounting screws (depending on back height) that secure the back upholstery to the recliner back canes.
14. Reinstall headrest extension onto recliner back canesFIGURE 14.5.

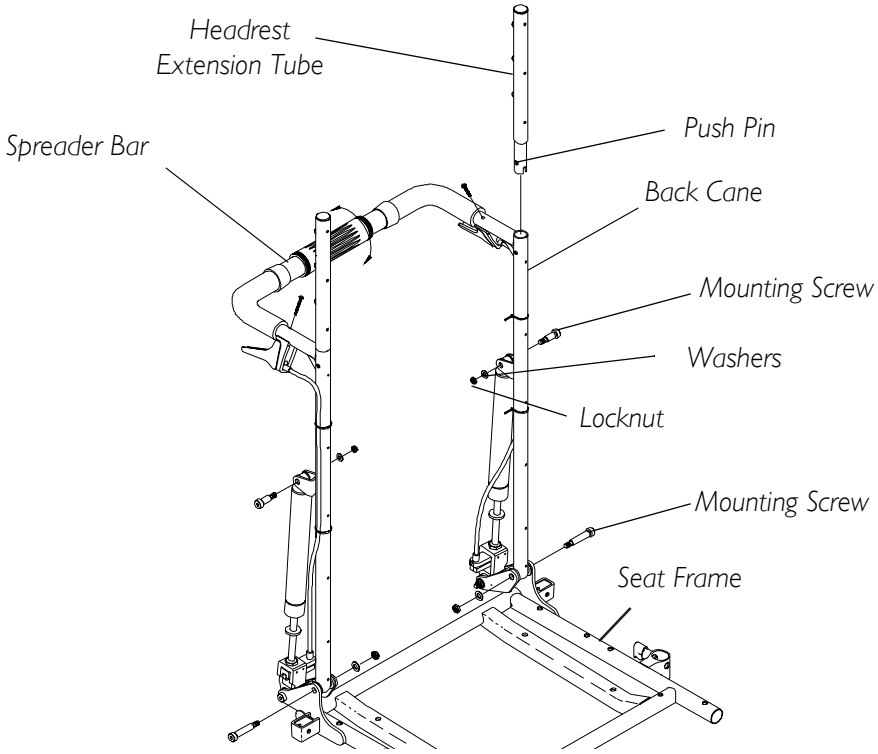


FIGURE 14.5 - CHANGING BACK HEIGHT

SECTION 15—BASE FRAME

REMOVING/INSTALLING THE RIM AND TIRE FROM THE GEARLESS/BRUSHLESS (GB) MOTOR

NOTE: For this procedure, refer to FIGURE 15.1.

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

- *Metric Allen Wrench, 6 mm*
- *Torque Wrench, 3/8 inch*

REMOVING

⚠ WARNING

If wheelchair is equipped with pneumatic tires, deflate tire before removing rim - otherwise serious personal injury and damage will result. Inflated tires are under pressure. Failure to observe this warning will result in the tire forcefully separating from the motor as the mounting screws are removed.

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. If the wheelchair is equipped with pneumatic tires, deflate the tire.
3. Place two (2) 5-inch blocks under battery frame to lift frame off the ground for ease in in performing this procedure.
4. Remove the five (5) mounting screws that secure the rim and tire to the GB motor.
5. Remove the rim and tire from the GB motor.

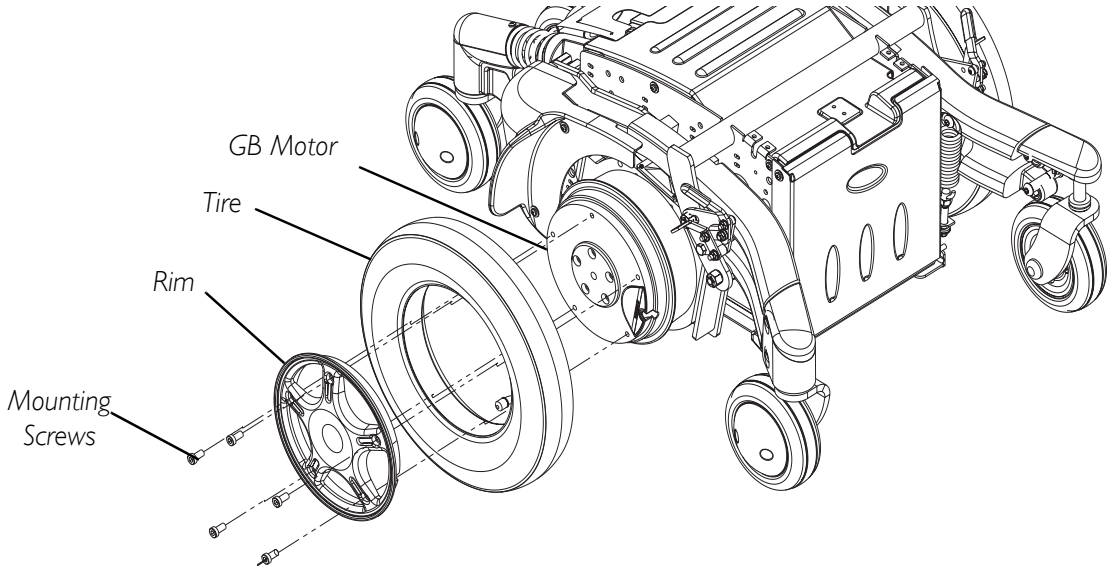


FIGURE 15.1 - REMOVING/INSTALLING THE RIM AND TIRE FROM THE GEARLESS/BRUSHLESS (GB) MOTOR

INSTALLING

1. Perform one (1) of the following:
   A. Secure new/existing rim and new/existing pneumatic tire (with new tube, if applicable) to the gearless/brushless motor and torque the five (5) mounting screws to 160 in-lbs. Repeat for other drive wheel.

NOTE: In order to install the tire with flat free properly, the tire must be compressed to a certain point to allow the use of the 16 mm mounting screws. This is accomplished by first using three (3) 25 mm mounting screws threaded in every other mounting hole. The longer mounting screws are not to be threaded completely into the GB motor. They are to be threaded 1/4 inch only to provide compression of the tire with flat free.

   B. Secure new/existing rim and new/existing tire with flat free to gearless/brushless motor with the three (3) M8 x 1-1/4 x 25 mm mounting screws (not provided).
   C. Once all three (3) mounting screws are in place, install one (1) shorter mounting screw in each of the two (2) remaining mounting holes. Remove one (1) longer mounting screw at a time and replace with the existing M8 x 1-1/4 x 16 mm mounting screws. Torque all five (5) mounting screws to 160 in-lbs.
2. Remove both 5-inch blocks from under base frame.
3. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
4. If wheelchair is equipped with pneumatic tires, inflate tire to proper tire pressure located on the side wall of the tire.
5. Repeat for other drive wheel.

REMOVING/INSTALLING THE DRIVE WHEEL FROM THE 2-POLE OR 4-POLE MOTOR

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

- *13-mm Socket with Ratchet*
- *Needle-nose Pliers*
- *Wheel Puller*
- *Torque Wrench*
- *Loctite 242®*
- *Anti-seize Compound*

12-½ X 2-¼-INCH WHEELS

NOTE: For this procedure, refer to FIGURE 15.2.

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Place two (2) 5-inch blocks under battery frame to lift frame off the ground for ease in performing this procedure.
3. Flatten the tab of the locking tab washer that is bent 90° up against the head of the M8 x 1-¼ x 20 mm screw.
4. Remove the M8 x 1-¼ x 20 mm screw, locking tab washer and 11/32 x 13/16 x 1/8 inch washer securing the drive wheel on the drive shaft.
5. Remove the drive wheel from the motor/gearbox assembly.
6. Remove the 6 x 6 x 40 mm key from the drive shaft.

INSTALLING

1. Insert the 6 x 6 x 40 mm key into the keyway of the drive shaft.
2. Place the drive wheel onto the motor/gearbox assembly.

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

NOTE: Make sure the chamfered side of the wheel hub is pointing away from the wheelchair.

3. Install 11/32 x 13/16 x 1/8-inch washer on the drive shaft.
4. Install the locking tab washer on the drive shaft. Make sure the locking tab is in line with the keyway of the drive wheel.
5. Apply Loctite™ 242 to the end of the M8 x 1-1/4 x 20 mm screw.
6. Install the M8 x 1-1/4 x 20 mm screw. Torque to 90 in-lbs.
7. Examine the head of the M8 x 1-1/4 x 20 mm screw and the locking tab washer. Make sure one (1) of the tabs on the locking tab washer is parallel with one (1) of the flats on the head of the M8 x 1-1/4 x 20 mm screw. Refer to Detail "A".

8. If one (1) of the tabs on the locking tab washer is NOT parallel with one (1) of the flats on the head of the M8 x 1-1/4 x 20 mm screw, TIGHTEN the M8 x 1-1/4 x 20 mm screw until the closest flat and locking tab are parallel. Refer to Detail "A".

NOTE: Tighten the M8 x 1-1/4 x 20 mm Screw only. DO NOT loosen the M8 x 1-1/4 x 20 mm screw to make one of the tabs on the locking tab washer parallel.

9. Bend the parallel tab of locking tab washer up tight against flat of the M8 x 1-1/4 x 20 mm screw. Refer to Detail "A".
10. Remove both 5-inch blocks from under base frame.
11. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
12. If wheelchair is equipped with pneumatic tires, inflate tire to proper tire pressure located on the side wall of the tire.

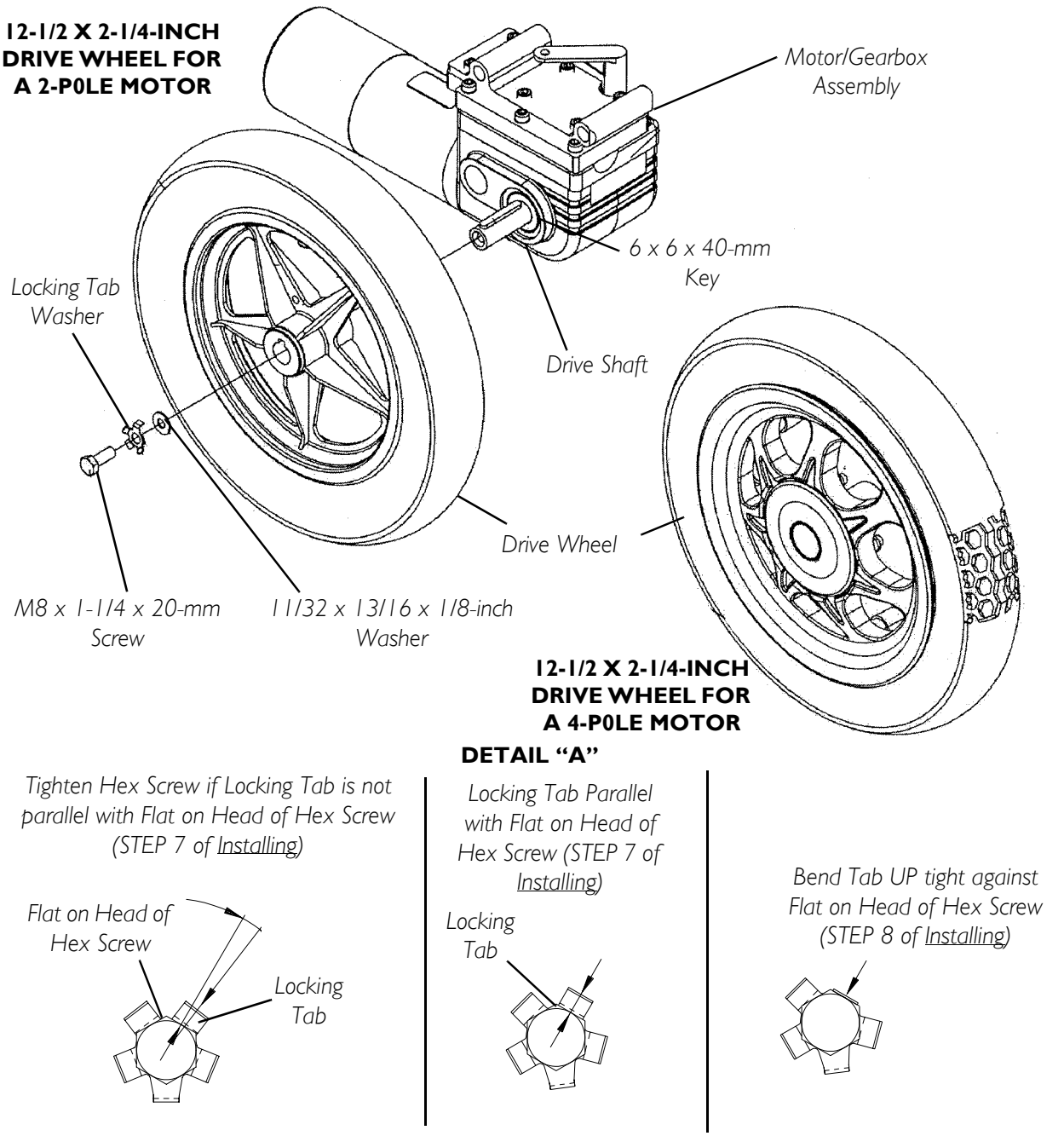


FIGURE 15.2 - REMOVING/INSTALLING THE DRIVE WHEEL FROM THE 2-POLE OR 4-POLE MOTOR - 12-1/2 X 2-1/4-INCH WHEELS

14 X 3-INCH WHEELS

NOTE: For this procedure, refer to FIGURE 15.3

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Place two (2) 5-inch blocks under battery frame to lift frame off the ground for ease in in performing this procedure.

3. Perform one (1) of the following:
   A. TO REMOVE THE DRIVE WHEEL ONLY -
      a. Remove the four (4) 5/16-24 beveled hex nuts securing the drive wheel to the wheel hub.
      b. Remove the drive wheel from the motor/gearbox assembly.
   B. TO REMOVE THE DRIVE WHEEL AND WHEEL HUB -
      a. Remove the four (4) 5/16-24 beveled hex nuts securing the drive wheel to the wheel hub.
      b. Remove the drive wheel from the motor/gearbox assembly.
      c. Flatten the tab of the locking tab washer that is bent 90° up against the head of the M8 x 1-1/4 x 20-mm screw.
      d. Remove the M8 x 1-1/4 x 20-mm screw, locking tab washer and 11/32 x 13/16 x 1/8-inch washer securing the wheel hub on the drive shaft.
      e. Remove the wheel hub from the motor/gearbox assembly.
      f. Remove the 6 x 6 x 40-mm key from the drive shaft.

INSTALLING

1. Perform one (1) of the following:
   A. TO INSTALL THE DRIVE WHEEL ONLY -
      a. Secure the drive wheel to the wheel hub with the four (4) 5/16-24 beveled hex nuts. Torque to 160 in-lbs.
   B. TO INSTALL THE DRIVE WHEEL AND WHEEL HUB -
      a. Insert the 6 x 6 x 40-mm key into the keyway of the drive shaft.

⚠ CAUTION

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

      b. Apply a thin film of anti-seize compound one (1) inch in length to the end of the drive shaft.
      c. 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.

      d. Install 11/32 x 13/16 x 1/8-inch washer on the drive shaft.
      e. Install the locking tab washer on the drive shaft. Make sure the locking tab is in line with the keyway of the wheel hub.

f. Apply Loctite 242 to the end of the M8 x 1-1/4 x 20-mm screw.

g. Install the M8 x 1-1/4 x 20-mm screw. Torque to 90 in-lbs.

h. Examine the head of the M8 x 1-1/4 x 20-mm screw and the locking tab washer. Make sure one (1) of the tabs on the locking tab washer is parallel with one (1) of the flats on the head of the M8 x 1-1/4 x 20-mm screw. Refer to Detail "A".

i. If one (1) of the tabs on the locking tab washer is NOT parallel with one (1) of the flats on the head of the M8 x 1-1/4 x 20-mm screw, TIGHTEN the M8 x 1-1/4 x 20-mm screw until the closest flat and locking tab are parallel. Refer to Detail "A".

⚠ WARNING

Failure to properly install locking tab washer can result in wheel separation and potential user injury or property damage. When replacing wheels always use a new locking tab washer. DO NOT reuse locking tab washers.

NOTE: Tighten the M8 x 1-1/4 x 20-mm screw only. DO NOT loosen the M8 x 1-1/4 x 20-mm screw to make one of the tabs on the locking tab washer parallel.

j. Bend the parallel tab of locking tab washer up tight against flat of the M8 x 1-1/4 x 20-mm screw. Refer to Detail "A".

k. Secure the drive wheel to the wheel hub with the four (4) 5/16-24 beveled hex nuts. Torque to 160 in-lbs.

2. Remove both 5-inch blocks from under base frame.

3. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.

4. If wheelchair is equipped with pneumatic tires, inflate tire to proper tire pressure located on the side wall of the tire.

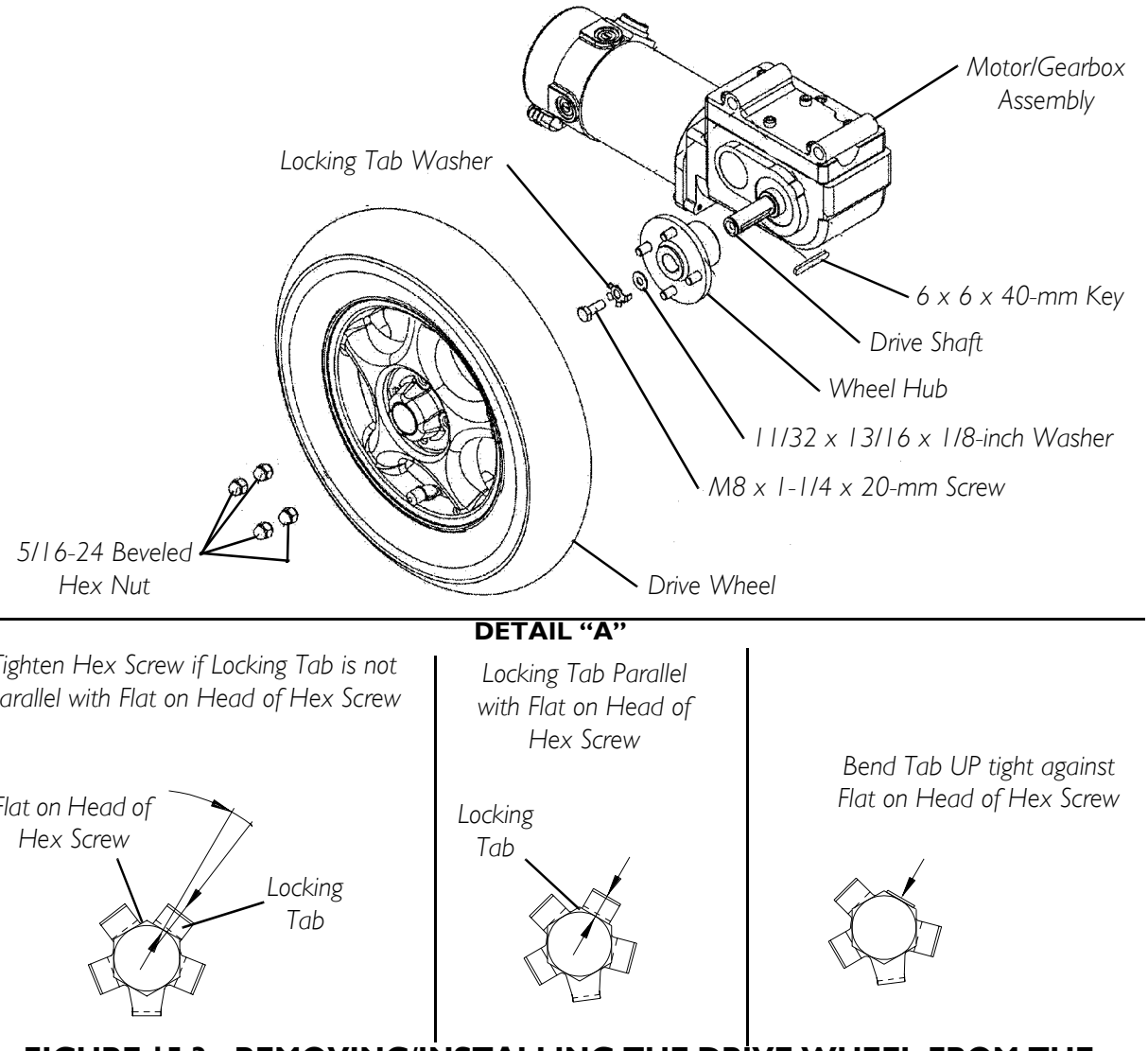


FIGURE 15.3 - REMOVING/INSTALLING THE DRIVE WHEEL FROM THE 2-POLE OR 4-POLE MOTOR - 14 X 3-INCH WHEELS

REMOVING/INSTALLING THE RIM AND TIRE FROM THE 14 X 3-INCH DRIVE WHEEL ON A 2-POLE OR 4-POLE MOTOR

NOTE: For this procedure, refer to FIGURE 7.4.

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

- *1/2-inch Socket with Ratchet*
- *Torque Wrench*

REMOVING

1. Remove the 14 x 3-inch Drive Wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.

⚠ WARNING

If wheelchair is equipped with pneumatic tires, deflate tire before removing rim - otherwise serious personal injury and damage will result. Inflated tires are under pressure. Failure to observe this warning will result in the tire forcefully separating from the motor as the mounting screws are removed.

2. Remove the five (5) 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 (1) 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) 5/16-18 x 7/8-inch hex head cap screw with patch. Torque to 160 in-lbs.
4. Install the 14 x 3-inch drive wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.

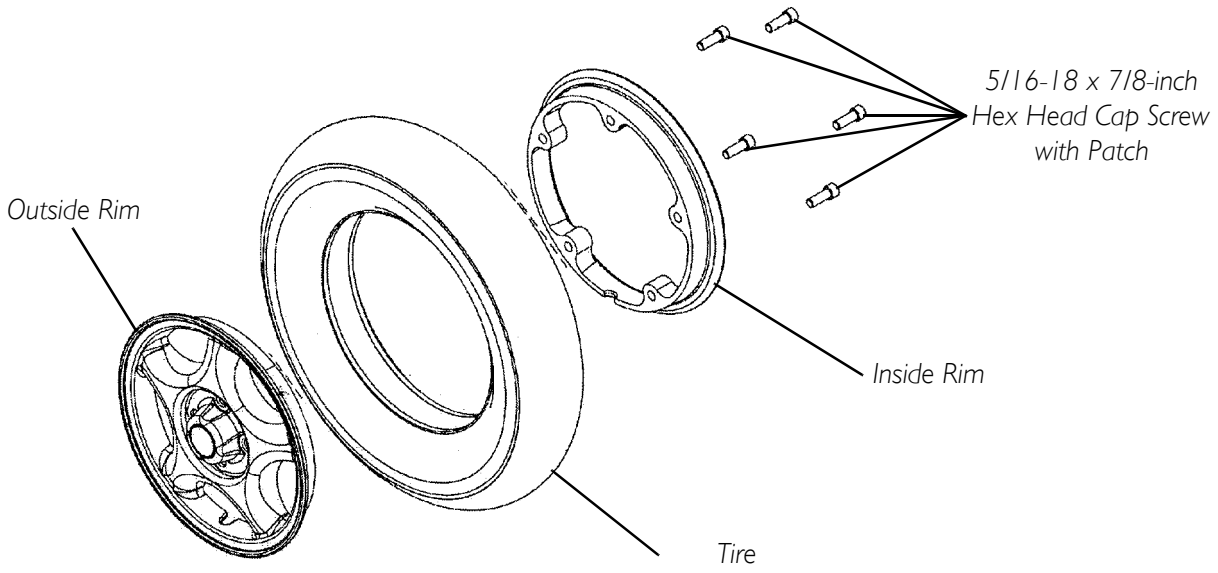


FIGURE 15.4 - REMOVING/INSTALLING THE RIM AND TIRE FROM THE 14 X 3-INCH DRIVE WHEEL ON A 2-POLE OR 4-POLE MOTOR

REMOVING/INSTALLING THE SIDE SHROUD ON A GB MOTOR

NOTE: For this procedure, refer to FIGURE 15.5.

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

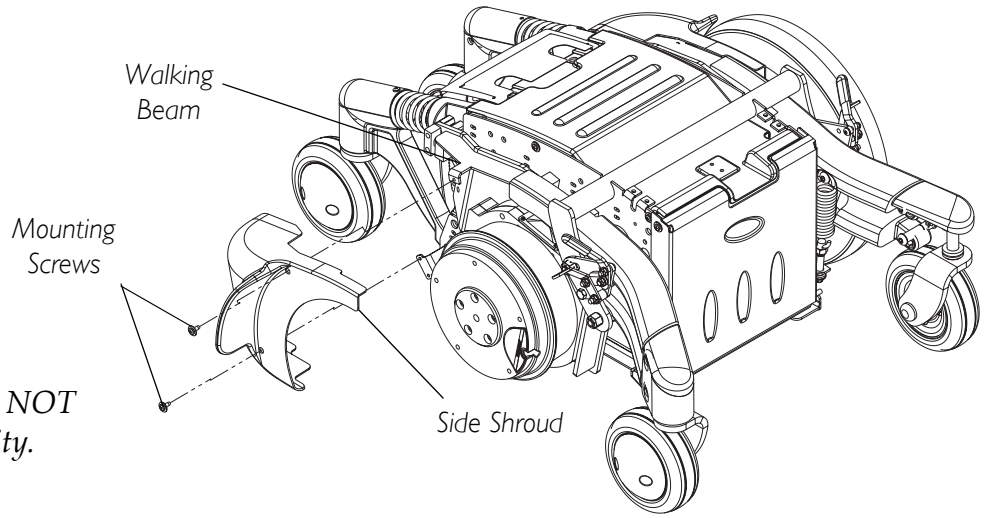
- *Phillips Screwdriver*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the two (2) mounting screws that secure the side shroud to the walking beam.

INSTALLING

1. Secure the side shroud to the walking beam with the existing two (2) mounting screws. Securely tighten.
2. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.



NOTE: Seat is NOT shown for clarity.

FIGURE 15.5 - REMOVING/INSTALLING THE SIDE SHROUD ON A GB MOTOR

REMOVING/INSTALLING THE WHEEL LOCK

NOTE: For this procedure, refer to FIGURE 15.6

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

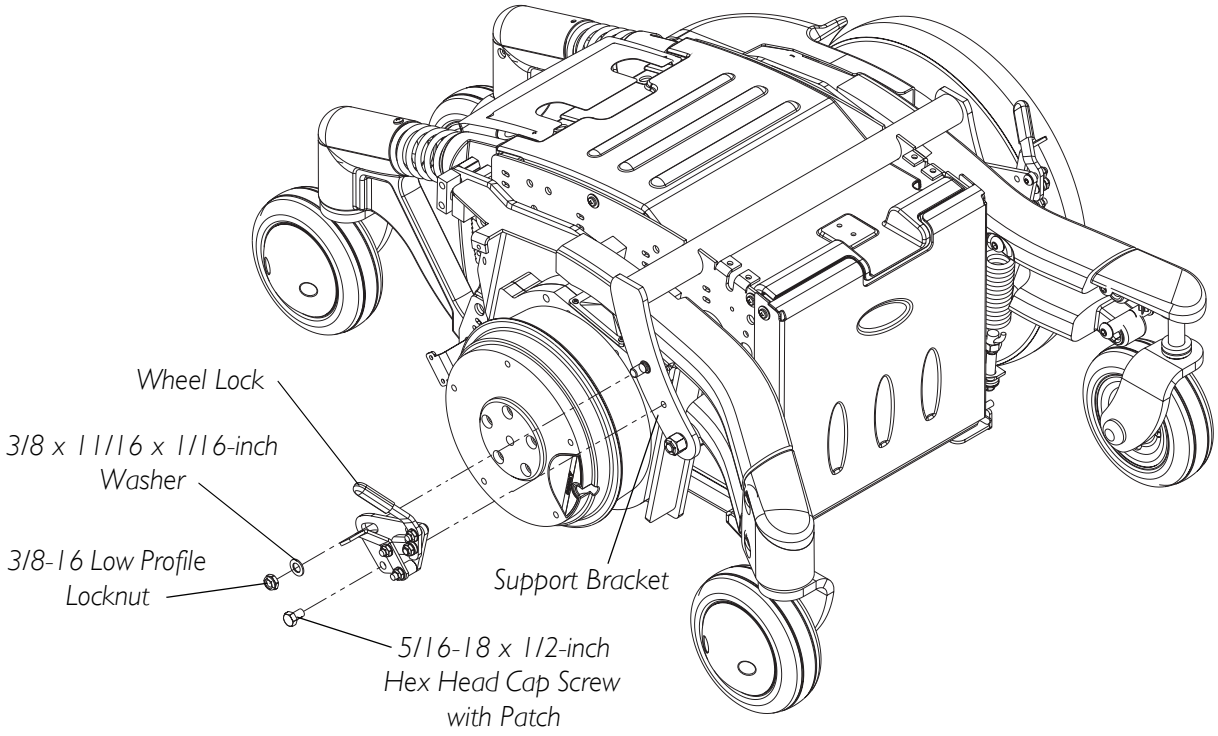
- *1/2-inch Socket with Ratchet*
- *9/16-inch Socket with Ratchet*
- *Torque Wrench*

REMOVING

1. Remove the Batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Perform one (1) of the following:
   A. TDX WITH A GB MOTOR - Remove the rim and tire. Refer to Removing/Installing the GB Motor on page 105.
   B. TDX WITH A 2-POLE OR 4-POLE MOTOR - Remove the Drive Wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
3. Remove the 5/16-18 x 1/2-inch hex head cap screw with patch that secures the wheel lock to the support bracket.
4. Remove the 3/8-16 low profile locknut and 3/8 x 11/16 x 1/16-inch washer that secures the wheel lock to the support bracket.
5. Remove the wheel lock from the support bracket.

INSTALLING

1. Position the wheel lock onto the support bracket.
2. Secure the wheel lock to the support bracket with the 3/8-16 low profile locknut and 3/8 x 11/16 x 1/16-inch washer. Torque to 160 in-lbs.
3. Secure the wheel lock to the support bracket with the 5/16-18 x 1/2-inch hex head cap screw with patch. Torque to 160 in-lbs.
4. Perform one (1) of the following:
   A. TDX WITH A GB MOTOR - Install the Rim and Tire. Refer to Removing/Installing the GB Motor on page 105.
   B. TDX WITH A 2-POLE OR 4-POLE MOTOR - Install the Drive Wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
5. Install the Batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.



NOTE: Wheel Lock shown being mounted on a TDX with a GB Motor.

FIGURE 15.6 - REMOVING/INSTALLING THE WHEEL LOCK

REMOVING/INSTALLING THE MOTOR LOCK RELEASE LEVER ON THE GB MOTOR

NOTE: For this procedure, refer to FIGURE 7.7.

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

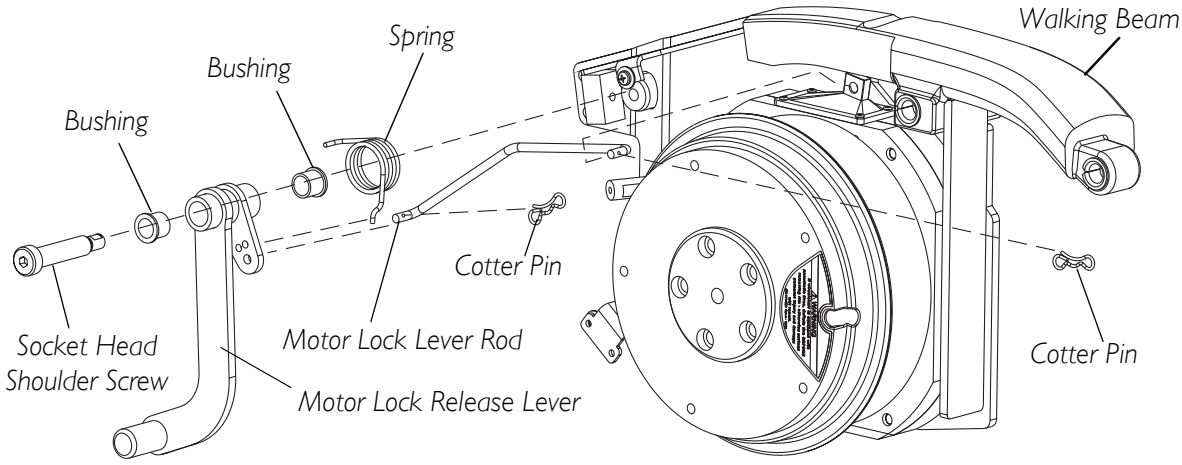
- *Allen Wrench*
- *Torque Wrench*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the shroud. Refer to Removing/Installing the Side Shroud on a GB Motor on page 99.
3. Remove the rim and tire.Refer to Removing/Installing the Rim and Tire from the Gearless/Brushless (GB) Motor on page 90.
4. Remove the two (2) cotter pins that secure the motor lock lever rod in place.
5. Remove the socket head shoulder screw that secures the motor lock release lever, two (2) bushings, and spring to the walking beam.

INSTALLING

1. Secure the new/existing motor lock release lever, two(2) bushings, and spring to the walking beam with socket head shoulder screw. Refer to FIGURE 7.7 for hardware orientation. Torque mounting screw to 160 in-lbs.
2. Secure the motor lock lever in place with the two (2) cotter pins.
3. Install the rim and tire. Refer to Removing/Installing the Rim and Tire from the Gearless/Brushless (GB) Motor on page 90.
4. Install the shroud. Refer to Removing/Installing the Side Shroud on a GB Motor on page 99.
5. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.



DETAIL "A" - ASSEMBLED

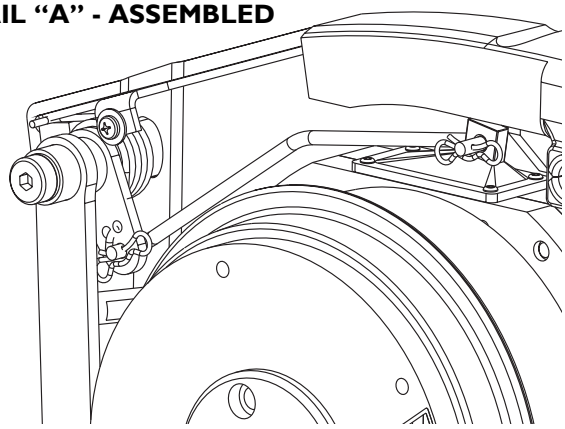


FIGURE 15.7 - REMOVING/INSTALLING THE MOTOR LOCK RELEASE LEVER ON THE GB MOTOR

REMOVING/INSTALLING THE WALKING BEAM FOR A GB MOTOR

NOTE: For this procedure, refer to FIGURE 15.8.

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

- *9/16-inch Socket with Ratchet*
- *3/4-inch Socket with Ratchet*
- *Torque Wrench*
- *Allen Wrench*
- *Loctite 242*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the rim and tire. Refer to Removing/Installing the Rim and Tire from the Gearless/Brushless (GB) Motor on page 90.
3. Remove the shroud. Refer to Removing/Installing the Side Shroud on a GB Motor on page 99.
4. If equipped with wheel lock, remove the wheel lock. Refer to Removing/Installing the Wheel Lock on page 100.
5. Unplug the wiring harness connector (not shown) from the gearless/brushless motor.
6. Remove the 3/8-16 x 3/4-inch socket button head cap screw and that secures the top of the spring to the walking beam.
7. Remove the one (1) 3/8-24 x 3/4-inch button head cap screws that secures the walking beam to the head tube.
8. Remove the pivot pin with 3/8-24 x 3/4-inch button head cap screw in place.
9. Remove the walking beam and motor from the wheelchair.
10. Remove the 1/2 x 3-1/4-inch socket head shoulder screw and 3/8-16 locknut that secures the walking beam to the battery box.

NOTE: If wheelchair is equipped with wheel lock then the 3/8-16 locknut has already been removed.

11. Remove the GB motor from the walking beam.

INSTALLING

NOTE: Invacare recommends that this procedure is performed utilizing two (2) people.

1. Secure GB motor to walking beam. Refer to Removing/Installing the GB Motor on page 105.
2. Position walking beam with GB motor onto wheelchair.
3. Align the mounting holes of the walking beam with the mounting holes of the head tube.

NOTE: If wheelchair is equipped with wheel lock then the 3/8-16 Locknut will be installed when wheel lock is installed.

4. Secure the walking beam to the battery box with 1/2 x 3-1/4-inch socket head shoulder screw and 3/8-16 locknut. Torque shoulder screw to 160 in-lbs.

5. Secure the walking beam to the head tube with two (2) 3/8-24 x 3/4-inch button head cap screws with Loctite 242. Torque mounting screws to 160 in-lbs.
6. Secure the spring to the walking beam with 3/8-16 x 3/4-inch socket button head cap screw with Loctite 242. Torque to 160 in-lbs.
7. Plug the wiring harness connector (not shown) into the gearless/brushless motor.
8. If so equipped, install the wheel lock. Refer to Removing/Installing the Wheel Lock on page 100.
9. Install the shroud. Refer to Removing/Installing the Side Shroud on a GB Motor on page 99.
10. Install the rim and tire. Refer to Removing/Installing the Rim and Tire from the Gearless/Brushless (GB) Motor on page 90.
11. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.

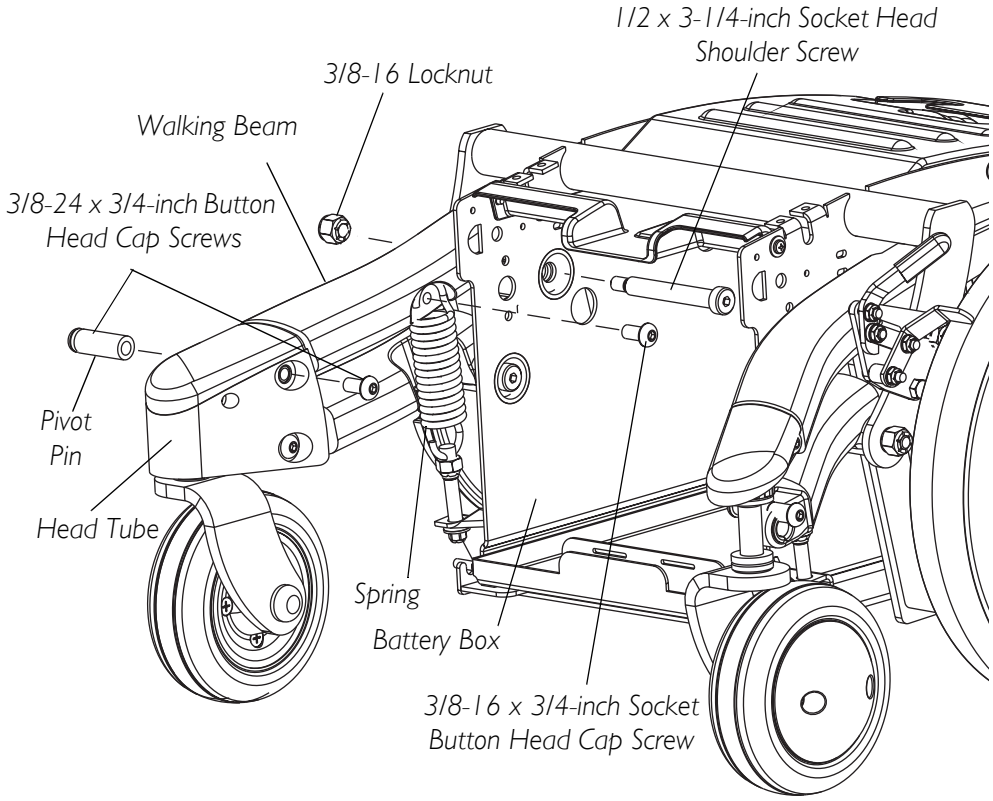


FIGURE 15.8 - REMOVING/INSTALLING THE WALKING BEAM FOR A GB MOTOR

REMOVING/INSTALLING THE GB MOTOR

⚠ WARNING

When replacing a GB controller or motor, re-calibration of the controller must be performed. Failure to observe this warning will result in erratic chair operation, personal injury or property damage.

NOTE: For this procedure, refer to FIGURE 15.9.

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

- *13-mm Socket with Ratchet*
- *Pliers*

REMOVING

1. Remove the walking beam from the wheelchair. Refer to Removing/Installing The Walking Beam for a GB Motor on page 102.
2. Remove the cotter pin that secure the motor lock lever rod to the GB Motor.
3. Remove the four (4) M8 x 1-1/4 x 45-mm hex head cap screws and 21/64 x 53/64 x 7/64-inch washers that secure the GB Motor to the walking beam.
4. Remove the existing GB Motor from the walking beam.

INSTALLING

1. Secure New/Existing GB Motor to the walking beam with four (4) M8 x 1-1/4 x 45-mm hex head cap screws and 21/64 x 53/64 x 7/64-inch washers. Torque to 160 in-lbs.
2. Secure the motor lock lever rod to the GB Motor with a cotter pin.
3. Install the walking beam with motor onto the wheelchair. Refer to Removing/Installing The Walking Beam for a GB Motor on page 102.

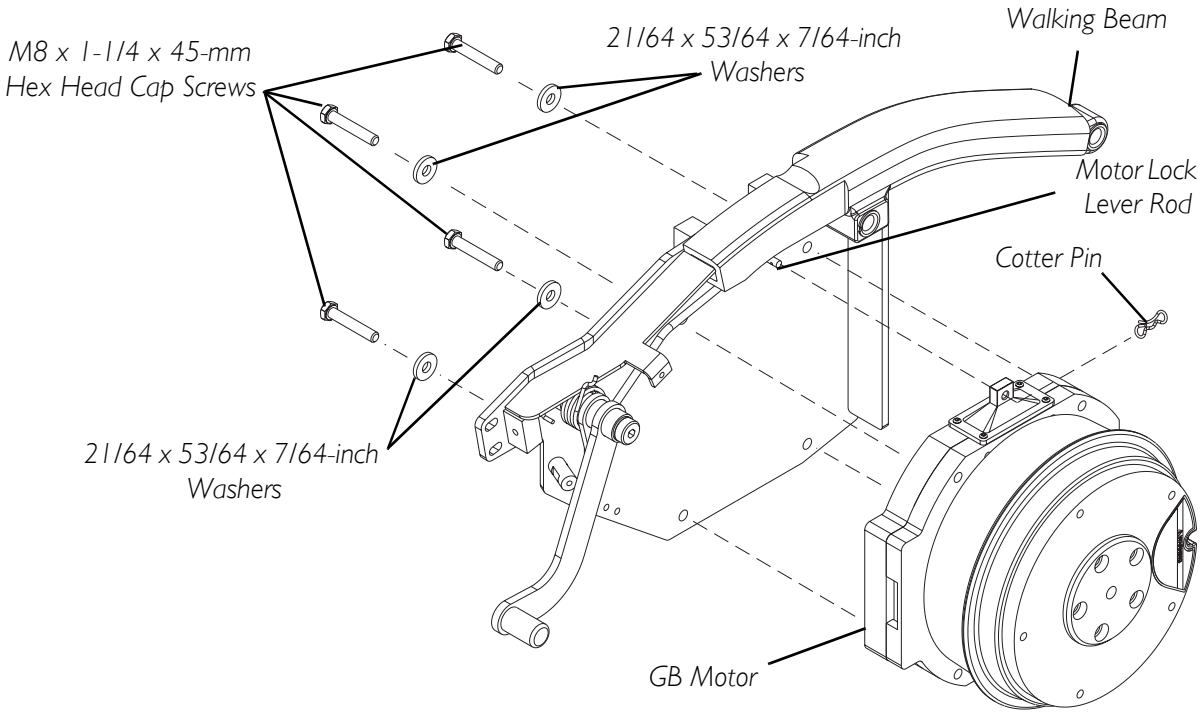


FIGURE 15.9 - REMOVING/INSTALLING THE GB MOTOR

REMOVING/INSTALLING THE 2-POLE AND 4-POLE MOTOR

REMOVING THE 2-POLE MOTOR/GEARBOX ASSEMBLY

NOTE: For this procedure, refer to FIGURE 15.10.

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

- *Metric Allen Wrench*
- *Needle-nose Pliers*
- *Torque Wrench*
- *15/16 Socket with Ratchet*

1. Remove the drive wheel from the wheelchair. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
2. Disconnect the motor connector from the controller.
3. Remove the two (2) motor release pins and 1/2 x 1 x 1/8-inch plain washers that secure the motor mounting plate to the walking beam.
4. Remove the motor/gearbox assembly.
5. To disassemble the 2-pole Motor/Gearbox Assembly, perform the following:
   A. Remove the 1/4-inch shaft locking bow-tie cotter pin, clevis pin, and 3/16 x 7/16 x 1/8-inch nylon washer that secures the gear release rod to the gearbox linkage.

B. Remove six (6) M6 x 1 x 16-mm socket head cap screw with patch that secure the motor mounting plate to the adapter plate.

C. Remove the three (3) M6 x 35-mm socket head cap screw with patch and three (3) M6 x 20-mm socket head cap screw with patch that secure the adapter plate to the gearbox.

NOTE: After 10/20/03 4-pole motors with a 12-1/2-inch drive wheel are standard on TDX3. To install the 4-pole motor, Refer to Removing/Installing The 2-Pole and 4-Pole Motor on page 106.

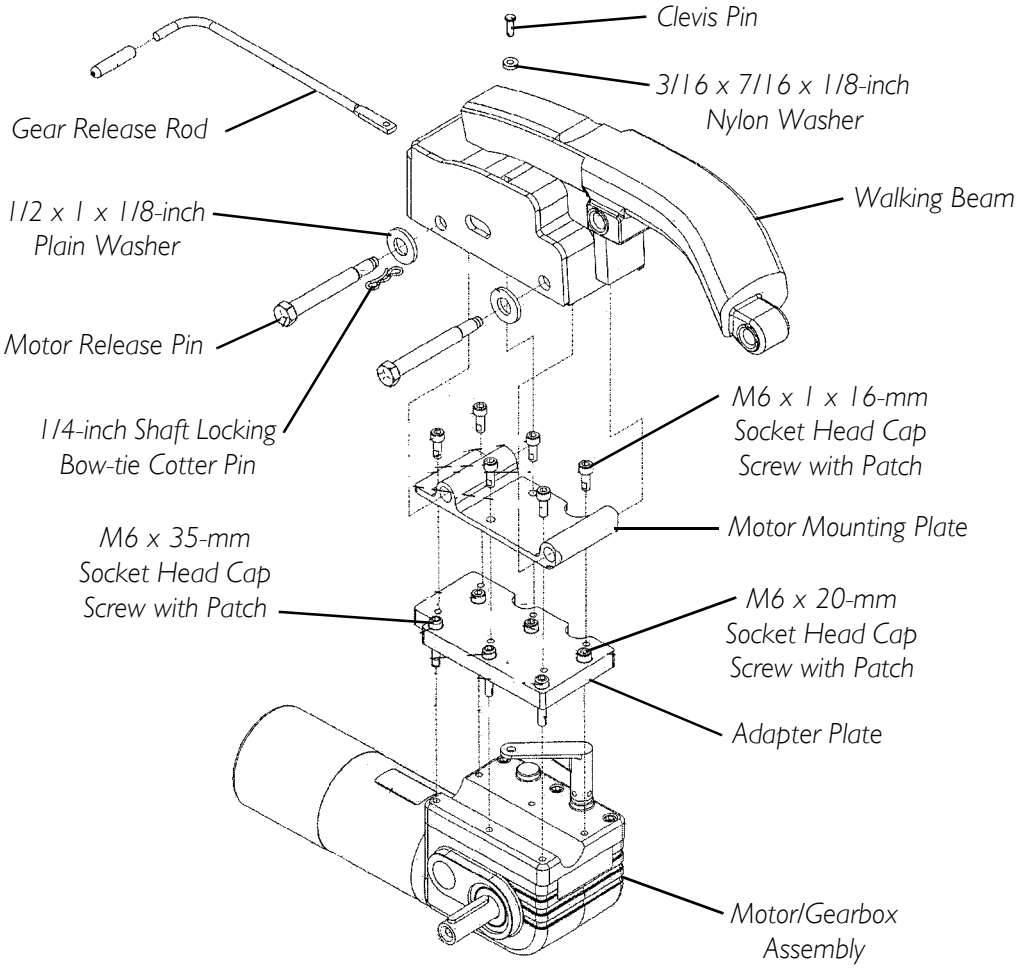


FIGURE 15.10 - REMOVING THE 2-POLE MOTOR/GEARBOX ASSEMBLY

REMOVING/INSTALLING THE 4-POLE MOTOR/GEARBOX ASSEMBLY

NOTE: For this procedure, refer to FIGURE 15.11.

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

- *15/16-inch Socket with Ratchet*
- *Metric Allen Wrench, 4 mm*
- *Torque Wrench*
- *Loctite 242*

REMOVING

1. Remove the drive wheel.Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
2. Disconnect the 4-Pole motor connector from the controller.
3. Cut tie-wraps that secure the motor cable to the battery box.
4. Perform one (1) of the following:
   A. TO REMOVE THE 4-POLE MOTOR ONLY-
      a. Remove the two (2) M6 x 1 x 20-mm socket head cap screws and 1/4-inch lock washers that secure the 4-Pole Motor to the Gearbox.

⚠ CAUTION

DO NOT damage the Motor/Gearbox Coupling.

      b. Carefully pull the 4-Pole motor away from the gearbox.
   B. TO REMOVE THE 4-POLE MOTOR/GEARBOX ASSEMBLY
      a. Remove the two (2) motor release pins and 1/2 x 1 x 1/8-inch plain washers that secure the motor/gearbox mounting plate to the walking beam.
      b. Remove the motor/gearbox assembly.
5. To disassemble the Gearbox, perform one (1) of the following:
   A. ON TDX3 AND TDX4 WITH 14 X 3-INCH DRIVE WHEELS - Remove the three (3) M6 x 35-mm socket head cap screw with patch and three (3) M6 x 20-mm socket head cap screw with patch that secure the motor/gearbox mounting plate to the motor/gearbox assembly.
   B. ON TDX3 WITH 12-1/2 X 2-1/4-INCH DRIVE WHEELS (EFFECTIVE 10/20/03) - Remove the three (3) M6 x 1 x 45-mm socket head cap screw with patch and three (3) M6 x 1 x 30-mm socket head cap screw with patch that secure the motor/gearbox mounting plate and adapter plate to the motor/gearbox assembly.

INSTALLING

1. Perform one (1) of the following:
   A. TO INSTALL THE 4-POLE MOTOR ONLY -
      a. Install NEW coupling onto gearbox input shaft, inserting coupling drive plate onto slot in shaft. Torque to 75 in-lbs

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

      b. Carefully align the 4-Pole motor with the coupling and place the 4-Pole motor against the gearbox. Torque to 75 in-lbs
      c. Turn gearbox drive shaft until the coupling seats into the gearbox. Torque to 280 in-lbs

d. Install two (2) M6 x 1 x 20-mm socket head cap screws and 1/4-inch lock washers. Torque to 75 in-lbs.

B. TO INSTALL THE 4-POLE MOTOR/GEARBOX ASSEMBLY - Prepare the 4-Pole motor/gearbox assembly for installation by performing the following:

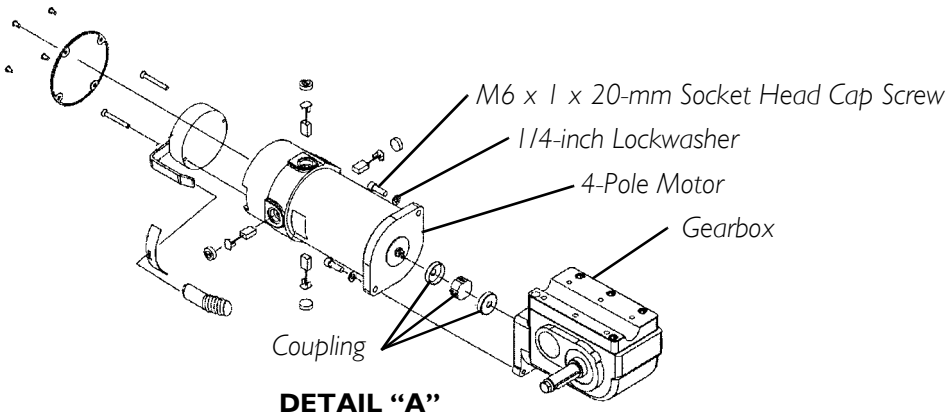
e. ON TDX3 AND TDX4 WITH 14 X 3-INCH DRIVE WHEELS - Install three (3) M6 x 35-mm socket head cap screw with patch and three (3) M6 x 20-mm socket head cap screw with patch that secure the motor/gearbox mounting plate to the motor/gearbox assembly.

f. ON TDX3 WITH 12-1/2 X 2-1/4-INCH DRIVE WHEELS (EFFECTIVE 10/20/03) - Install three (3) M6 x 1 x 45-mm socket head cap screw with patch and three (3) M6 x 1 x 30-mm socket head cap screw with patch that secure the motor/gearbox mounting plate and adapter plate to the motor/gearbox assembly.

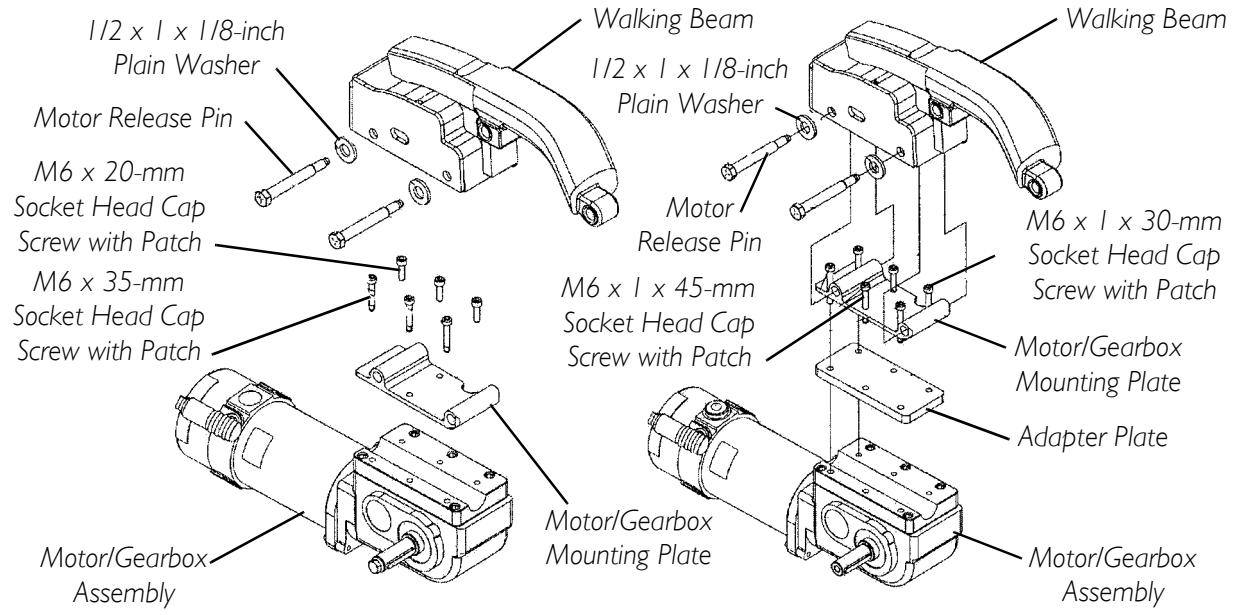
g. Install two (2) motor release pins and 1/2 x 1 x 1/8-inch plain washers that secure the 4-Pole motor/gearbox assembly to the walking beam.

NOTE: Use the 15/16-inch socket with ratchet to fasten the motor release pins.

2. Connect the 4-Pole motor connector to the controller.
3. Install the drive wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.



DETAIL "A"



FOR TDX3 AND TDX4 WITH 14 X 3-INCH DRIVE WHEEL

ONLY FOR TDX3 WITH 12-1/2 X 2-1/4-INCH DRIVE WHEEL (EFFECTIVE 10/20/03)

FIGURE 15.11 - REMOVING/INSTALLING THE 4-POLE MOTOR/GEARBOX ASSEMBLY

REMOVING/INSTALLING THE FENDER ASSEMBLY FROM A 2-POLE AND 4-POLE MOTOR

NOTE: For this procedure, refer to FIGURE 15.12.

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

- *1/2-inch Socket with Ratchet*
- *Phillips Screwdriver*

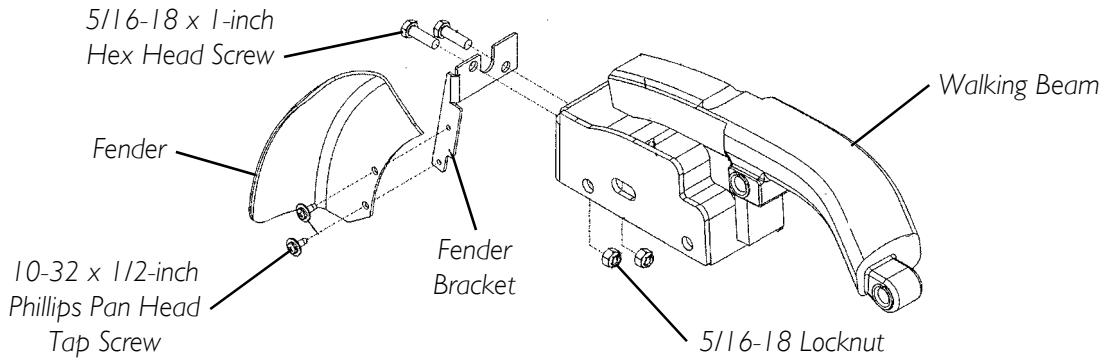
REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the Drive Wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
3. Remove the 2-Pole or 4-Pole Motor. Refer to Removing/Installing The 2-Pole and 4-Pole Motor on page 106.
4. Remove the two (2) 5/16-18 x 1-inch hex head screws and 5/16-18 locknuts that secure the fender bracket to the walking beam.
5. Remove two (2) 10-32 x 1/2-inch Phillips pan head tap screws that secure the fender to the fender bracket.

INSTALLING

1. Secure the fender to the fender bracket with two (2)10-32 x 1/2-inch Phillips pan head tap screws. Securely tighten.
2. Secure the fender bracket to the walking beam and stability lock rack (if present) with the two (2) 5/16-18 x 1-inch hex head screws and 5/16-18 locknuts. Torque to 160 in-lbs.
3. Install the 2-Pole or 4-Pole motor. Refer to Removing/Installing The 2-Pole and 4-Pole Motor on page 106.
4. Install the Drive Wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
5. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.

**FENDER ASSEMBLY
WITHOUT STABILITY LOCK**



**FENDER ASSEMBLY
WITH STABILITY LOCK**

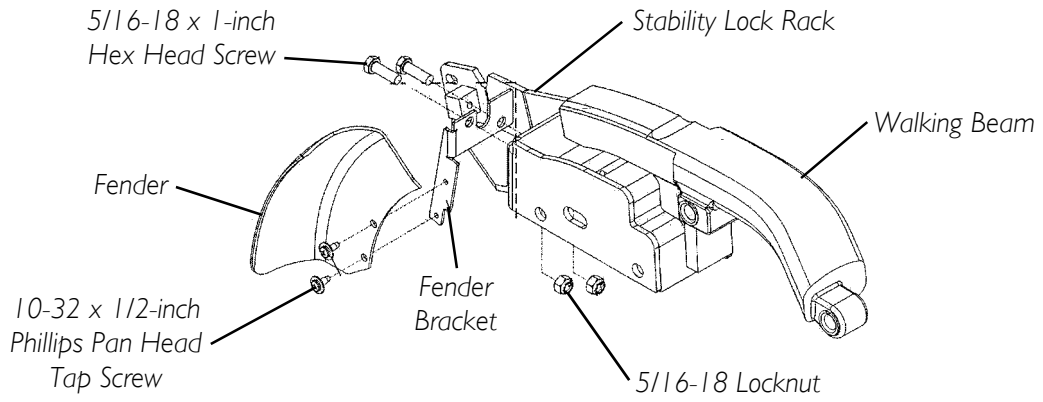


FIGURE 15.12 - REMOVING/INSTALLING THE FENDER ASSEMBLY FROM A 2-POLE AND 4-POLE MOTOR

REMOVING/INSTALLING THE FRONT SPRING ASSEMBLY

NOTE: For this procedure, refer to FIGURE 15.13.

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

- *7/16-inch Open End Wrench*
- *5/16 Allen Wrench*
- *Loctite 242*

REMOVING

1. Remove the 3/8-16 x 3/4-inch socket button head screw that secures the top end of the extension spring to the walking beam.

2. Remove the 1/4-20 locknut, 1/4 x 23/32 x 1/16-inch washer and 5/16 x 11/16 x 1/8-inch washer that secures the spring connector rod to the battery box.
3. Slide the spring connector rod and nylon sleeve out of the mounting hole in the battery box.
4. Remove the extension spring by sliding the lower end out of the spring connector rod with loctite.

INSTALLING

1. Slide the lower end of the extension spring into the hole at the end of the spring connector rod.
2. Insert the spring connector rod and nylon sleeve into the mounting hole in the battery box.
3. Secure the spring connector rod to the battery box with the 1/4-20 locknut, 1/4 x 23/32 x 1/16-inch washer and 5/16 x 11/16 x 1/8-inch washer.
4. Secure top end of the extension spring to the walking beam with the 3/8-16 x 3/4-inch socket button head screw.

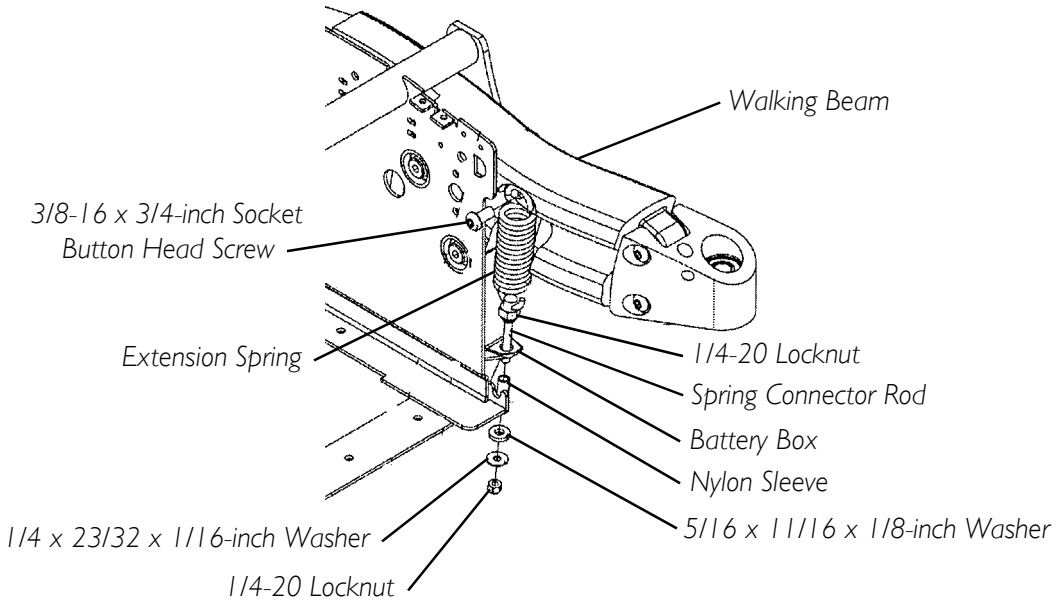


FIGURE 15.13 - REMOVING/INSTALLING THE FRONT SPRING ASSEMBLY

REMOVING/INSTALLING THE WALKING BEAM ASSEMBLY FOR A 2-POLE AND 4-POLE MOTOR

NOTE: For this procedure, refer to FIGURE 15.14.

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

- *9/16-inch Socket with Ratchet*
- *Allen Wrench*
- *Torque Wrench*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the drive wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
3. Remove the 2-pole or 4-pole motor. Refer to Removing/Installing The 2-Pole and 4-Pole Motor on page 106.
4. Remove the fender assembly. Refer to Removing/Installing the Fender Assembly from a 2-Pole and 4-Pole Motor on page 110.
5. If equipped with wheel lock, remove the wheel lock. Refer to Removing/Installing the Wheel Lock on page 100.
6. Remove the front spring assembly. Refer to Removing/Installing the Front Spring Assembly on page 112
7. Remove the front head tube. Refer to Removing/Installing the Head Tube and Front Caster Assembly on page 125.
8. Remove the 1/2 x 3-1/4-inch socket head shoulder screw, 1/2 x 1 x 1/8-inch plain washer, 3/8 x 11/16 x 1/16-inch flat washer and 3/8-16 locknut that secures the lower walking beam to the support bracket and battery box.
9. Remove the lower walking beam.
10. Remove the 1/2 x 3-1/4-inch socket head shoulder screw, 1/2 x 1 x 1/8-inch plain washer, 3/8 x 11/16 x 1/16-inch flat washer and 3/8-16 locknut that secures the walking beam to the support bracket and battery box.

NOTE: If wheelchair is equipped with wheel lock then the 3/8-16 locknut has already been removed.

11. Remove the walking beam.

INSTALLING

1. Position the walking beam between the support bracket and battery box so that the mounting holes are aligned.
2. Secure the walking beam to the support bracket and battery box with the 1/2 x 3-1/4-inch socket head shoulder screw, 1/2 x 1 x 1/8-inch plain washer, 3/8 x 11/16 x 1/16-inch flat washer and 3/8-16 locknut. Torque to 160 in-lbs.

NOTE: If wheelchair is equipped with a wheel lock then the 3/8-16 locknut will be installed when the wheel lock is installed.

3. Position the lower walking beam between the support bracket and battery box so that the mounting holes are aligned.
4. Secure the lower walking beam to the support bracket and battery box with the 1/2 x 3-1/4-inch socket head shoulder screw, 1/2 x 1 x 1/8-inch plain washer, 3/8 x 11/16 x 1/16-inch flat washer and 3/8-16 locknut. Torque to 160 in-lbs.

5. Install the front head tube. Refer to Removing/Installing the Head Tube and Front Caster Assembly on page 125.
6. Install the front spring assembly. Refer to Removing/Installing the Front Spring Assembly on page 112.
7. If so equipped, install the wheel lock. Refer to Removing/Installing the Wheel Lock on page 100.
8. Install the fender assembly. Refer to Removing/Installing the Fender Assembly from a 2-Pole and 4-Pole Motor on page 110.
9. Install the 2-pole or 4-pole motor. Refer to Removing/Installing The 2-Pole and 4-Pole Motor on page 106.
10. Install the drive wheel. Refer to Removing/Installing the Drive Wheel from the 2-Pole or 4-Pole Motor on page 92.
11. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.

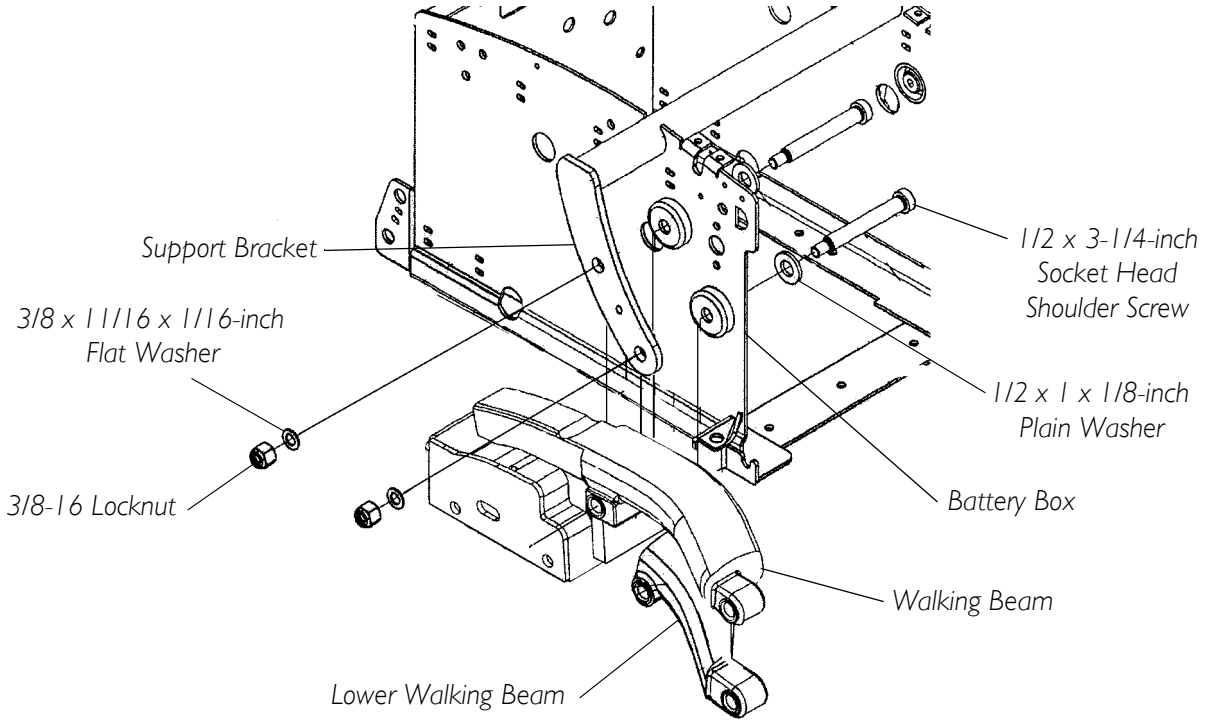


FIGURE 15.14 - REMOVING/INSTALLING THE WALKING BEAM ASSEMBLY FOR A 2-POLE AND 4-POLE MOTOR

REMOVING/INSTALLING THE STABILITY LOCK HARDWARE

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

- *7/16-inch Socket with Ratchet*
- *Torque Wrench*

GB MOTORS

NOTE: For this procedure, refer to FIGURE 15.15.

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the TTEX controller. Refer to Removing/Installing the Rear Swing Arm Assembly on page 119.
3. Remove the side shroud. Refer to Removing/Installing the Side Shroud on a GB Motor on page 99.
4. Remove two (2) 1/4-20 x 1-1/2-inch hex head cap screw that secure the motor rack and rack spacer to the stability lock clamp block.
5. Remove the motor rack and rack spacer from between the walking beam and rear spring mount.
6. Remove the 1/4-20 x 1-1/2-inch hex head cap screw and 1/4 x 1/2 x 1/16-inch washer that secure the stability lock clamp block to the walking beam.
7. Remove the stability lock clamp block.
8. Remove the two (2) 1/4-20 x 1-1/4-inch hex head screws and 1/4 x 1/2 x 1/6-inch washers that secure the pivot ratchet to the rear spring mount.

INSTALLING

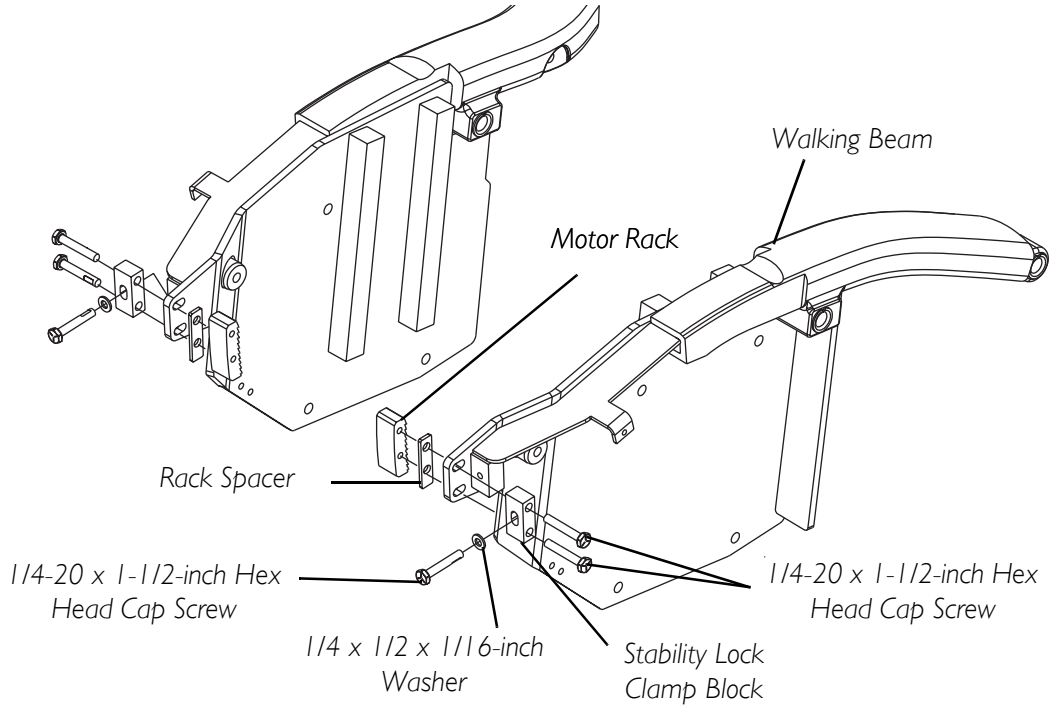
1. Place the motor rack and rack spacer between the walking beam and rear spring mount so that the mounting holes are aligned.
2. Secure the motor rack and rack spacer to the stability lock clamp block with two (2) 1/4-20 x 1-1/2-inch hex head cap screw. Torque to 75 in-lbs.
3. Secure the stability lock clamp block to the walking beam with the 1/4-20 x 1-1/2-inch hex head cap screw and 1/4 x 1/2 x 1/16-inch washer. Tighten until screw is snug against stability lock clamp block.
4. Secure the pivot ratchet to the rear spring mount with two (2) 1/4-20 x 1-1/4-inch hex head screws and 1/4 x 1/2 x 1/6-inch washers. Torque to 75 in-lbs. See Detail "A".

   A. Place 1/4-inch shim between pivot rack and battery box.

   B. Push motor rack to engage pivot rack and torque to 75 in-lbs.

C. Remove shim and snug back up.

5. Install the side shroud. Refer to Removing/Installing the Side Shroud on a GB Motor on page 99.
6. Install the TTEX controller.Refer to Removing/Installing the Rear Swing Arm Assembly on page 119.
7. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.



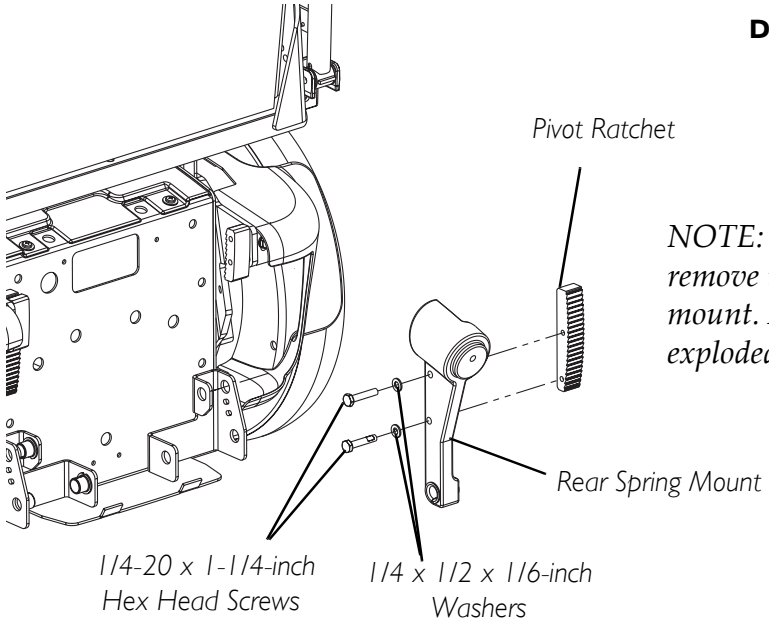


FIGURE 15.15 - REMOVING/INSTALLING THE STABILITY LOCK HARDWARE GB MOTORS

2-POLE OR 4-POLE MOTOR

NOTE: For this procedure, refer to FIGURE 15.16 unless otherwise noted.

REMOVING

1. Remove two (2) 1/4-20 x 1-1/2-inch hex head cap screw that secure the motor rack and rack spacer to the stability lock clamp block.
2. Remove the motor rack and rack spacer from between the walking beam and rear spring mount.
3. Remove the 1/4-20 x 1-1/2-inch hex head cap screw and 1/4 x 1/2 x 1/16-inch washer that secure the stability lock clamp block to the walking beam.
4. Remove the stability lock clamp block.
5. Remove the two (2) 1/4-20 x 1-1/4-inch hex head screws and 1/4 x 1/2 x 1/6-inch washers that secure the pivot ratchet to the rear spring mount. Refer to Detail "A"" in FIGURE 15.15.

INSTALLING

1. Place the motor rack and rack spacer against the side of the stability lock rack so that the mounting holes are aligned.
2. Secure the motor rack and rack spacer to the stability lock clamp block with two (2) 1/4-20 x 1-1/2-inch hex head cap screw. Torque to 75 in-lbs.
3. Secure the stability lock clamp block to the stability lock rack with the 1/4-20 x 1-1/2-inch hex head cap screw and 1/4 x 1/2 x 1/16-inch washer. Tighten until screw is snug against stability lock clamp block.
4. Secure the pivot ratchet to the rear spring mount with two (2) 1/4-20 x 1-1/4-inch hex head screws and 1/4 x 1/2 x 1/6-inch washers. Torque to 75 in-lbs. Refer to Detail "A"" in FIGURE 15.15.
   A. Place 1/4-inch shim between pivot rack and battery box.
   B. Push motor rack to engage pivot rack and torque to 75-in-lbs.
   C. Remove shim and snug back up.

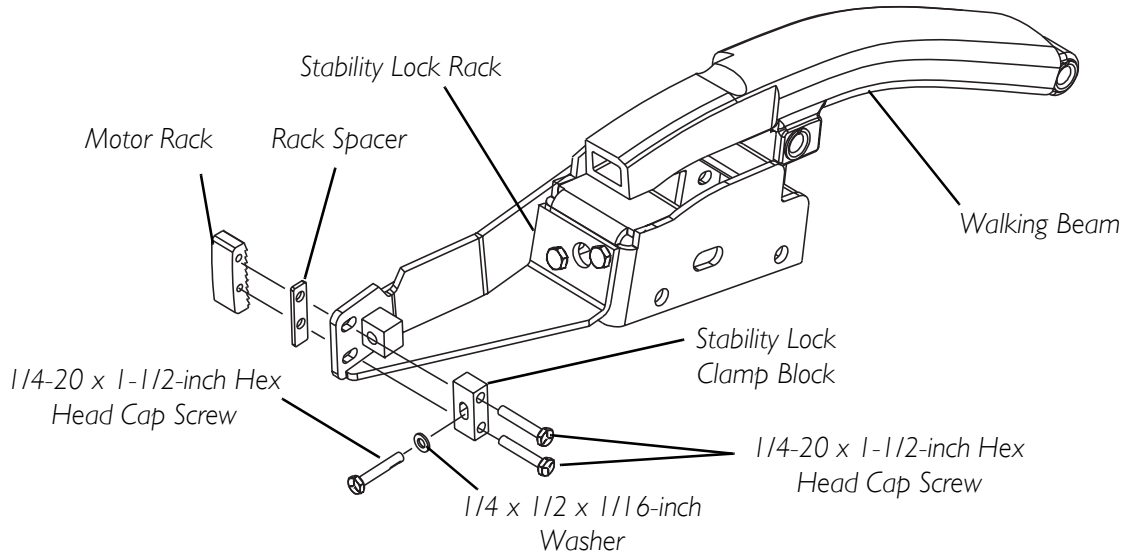


FIGURE 15.16 - REMOVING/INSTALLING THE STABILITY LOCK HARDWARE 2-POLE OR 4-POLE MOTOR

REMOVING/INSTALLING THE REAR SWING ARM ASSEMBLY

NOTE: For this procedure, refer to FIGURE 15.17.

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

- *Phillips Screwdriver*
- *1/2-inch Socket with Extension*
- *11/16-inch Socket and Ratchet*
- *1/4-inch Allen Wrench*
- *Torque Wrench and Mallet*

REMOVING

1. Remove the rear shroud by removing the two (2) thumb screws that secure it in place.
2. If necessary, remove the controller. Refer to Removing/Installing the Controller with Bracket on page 135.
3. Remove the 10-32 x 1/2-inch Phillips pan head screw that secures the top of the rear swing arm cap in place.
4. Remove the 10-32 x 1/2-inch Phillips pan head screw that secures the side of the rear swing arm cap in place.
5. Remove the 5/16-18 x 4-3/4-inch hex head cap screw, 11/32 x 13/16 x 1/8-inch washer, and YELLOW polyurethane damper that secures the rear swing arm assembly and YELLOW non-heavy duty spring to the base frame.

6. Remove the 1/2 x 3-1/2-inch socket head shoulder screw and 3/8-16 locknut that secures the rear swing arm assembly to the base frame.

NOTE: May need to use mallet to softly tap shoulder screw out enough to grab head and extract.

INSTALLING

1. Secure the rear swing arm assembly to the base frame with 1/2 x 3-1/2-inch socket head shoulder screw and 3/8-16 locknut. Torque to 160 in-lbs.
2. Secure the rear swing arm assembly and YELLOW non-heavy duty spring to the base frame with 5/16-18 x 4-3/4-inch hex head cap screw, 11/32 x 13/16 x 1/8-inch washer, and YELLOW polyurethane damper. Tighten until spring length is three (3) inches.

NOTE: Length of spring is measured from rear spring mount to rear swing arm assembly

3. Secure rear swing arm cap to rear swing arm assembly with two (2) 10-32 x 1/2-inch Phillips pan head screw. Securely tighten.
4. Secures the side of the rear swing arm cap in place with the 10-32 x 1/2-inch Phillips pan head screw.
5. If applicable, install the controller. Refer to Removing/Installing the Controller with Bracket on page 135.
6. Secure the rear shroud in place with two (2) thumb screws.

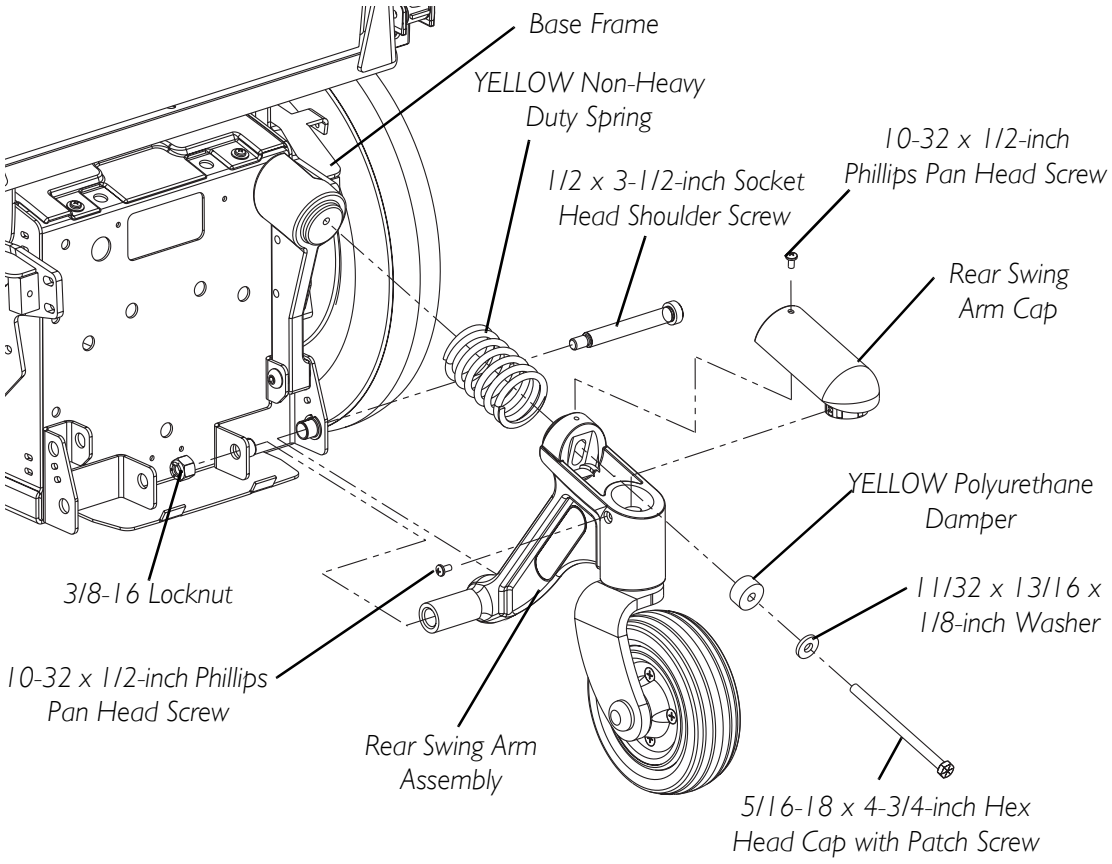


FIGURE 15.17 - REMOVING/INSTALLING THE REAR SWING ARM ASSEMBLY

REMOVING/INSTALLING THE REAR CASTER ASSEMBLY

NOTE: For this procedure, refer to FIGURE 15.19.

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

- Phillips Screwdriver
- 15/16-inch Socket and Ratchet

REMOVING

1. If necessary, remove the rear swing arm assembly. Refer to Removing/Installing the Rear Swing Arm Assembly on page 119.
2. Remove the #10-32 x 1/2-inch Phillips pan head screw that secures the top of the rear swing arm cap in place.
3. Remove the #10-32 x 1/2-inch Phillips pan head screw that secures the side of the rear swing arm cap in place.
4. Remove the 5/8-18 locknut, 5/8 x 1-5/16 x 1/8-inch washer, and washer that secures the rear caster assembly to the rear swing arm.
5. Remove the rear caster assembly from the rear swing arm.

INSTALLING

1. Install the rear caster assembly into the rear swing arm.
2. Secure the rear caster assembly to the rear swing arm with 5/8 x 1-5/16 x 1/8-inch washer and 5/8-18 locknut and perform the following:
   A. Torque locknut to 10 foot-pounds (120 in- lbs).
   B. Loosen the locknut 1/8 of a turn.
   C. Move the caster side to side.

NOTE: If the caster moves side to side, tighten the locknut slightly.

3. Position rear swing arm cap in place and secure with two (2) #10-32 x 1/2-inch Phillips pan head screws.
4. If necessary, install the rear swing arm assembly. Refer to Removing/Installing the Rear Swing Arm Assembly on page 119.

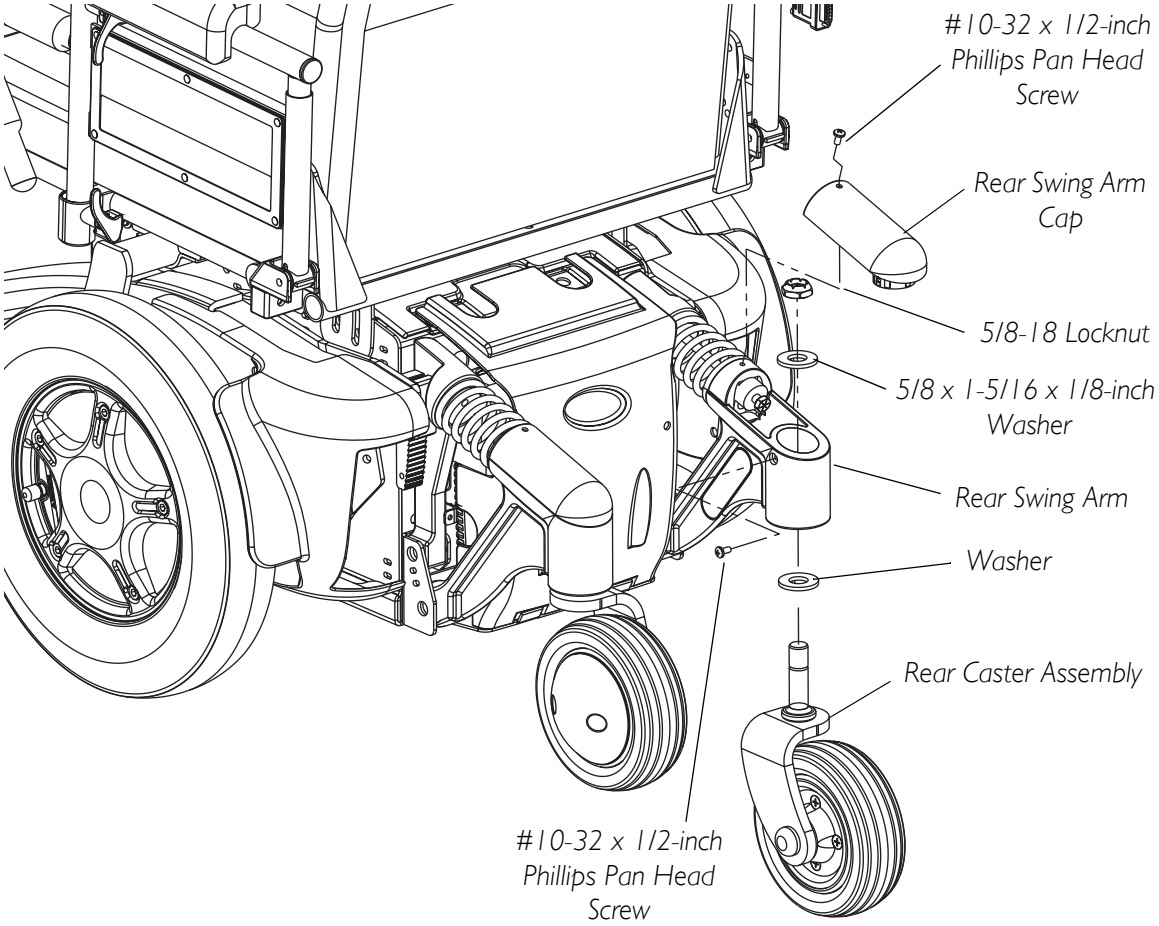


FIGURE 15.18 - REMOVING/INSTALLING THE REAR CASTER ASSEMBLY

REMOVING/INSTALLING THE REAR SPRING MOUNT

NOTE: For this procedure, refer to FIGURE 15.19.

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

- *Flashlight*
- *1/2-inch Socket with Ratchet*
- *7/16-inch Socket with Ratchet*
- *Two (2) 7/32-inch Allen Wrenches*
- *Torque Wrench*
- *Mallet*
- *Punch*
- *Loctite 242*

REMOVING

1. Remove the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
2. Remove the controller. Refer to Replacing the Controller and/or Bracket on page 137.
3. Remove the rear swing arm assembly. Refer to Removing/Installing the Rear Swing Arm Assembly on page 119.
4. Perform one of the following:
   A. If model does not have stability lock - remove the 5/16 - 18 x 1-inch hex head cap screw, from inside the battery box, that secures the 3/4 x 1 x 1/2-inch spacer to the rear spring mount. May require flashlight. Proceed to STEP 5.
   B. If model does have stability lock, proceed to STEP 5
5. Remove the 3/8-24 x 1/2-inch socket button head cap screw from the 3/8-24 x 1/2-inch socket button head cap screw with stability lock pivot.
6. Punch the 3/8-24 x 1/2-inch socket button head cap screw with stability lock pivot out of the mounting bracket.
7. If the model is equipped with stability lock, perform the following:
   A. Remove the two (2) 1/4-20 x 1-1/4-inch hex head screws and 1/4 x 1/2 x 1/6-inch washers that secure the pivot ratchet to the rear spring mount.

INSTALLING

1. If the model is equipped with stability lock, perform the following:
   A. Secure the pivot ratchet to the rear spring mount with two (2) 1/4-20 x 1-1/4-inch hex head screws and 1/4 x 1/2 x 1/6-inch washers. Torque to 75 in-lbs.
2. Ensure 3/4 x 1 x 1/2-inch spacer is properly seated in the rear spring mount.

3. Insert the 3/8-24 x 1/2-inch socket button head cap screw with stability lock pivot into the mounting bracket.
4. Rotate the 3/8-24 x 1/2-inch socket button head cap screw with stability lock pivot so that the flat edge is aligned with the flat edge of the mounting bracket. See DETAIL "A".
5. Use the mallet to tap the 3/8-24 x 1/2-inch socket button head cap screw with stability lock pivot securely in place.
6. Secure the remaining 3/8-24 x 1/2-inch socket button head cap screw to the 3/8-24 x 1/2-inch socket button head cap screw with stability lock pivot with Loctite. Torque to 160 in-lbs.
7. If model does not have stability lock, perform the following:
   A. Secure the 3/4 x 1 x 1/2-inch spacer to the rear spring mount with the 5/16 - 18 x 1-inch hex head cap screw, from inside the battery box.
8. Install the controller. Refer to Removing/Installing the Rear Swing Arm Assembly on page 119
9. Install the batteries. Refer to Removing/Installing the Batteries from/into the Wheelchair on page 44.
10. Install rear shroud by securing in place with two (2) thumb screws.

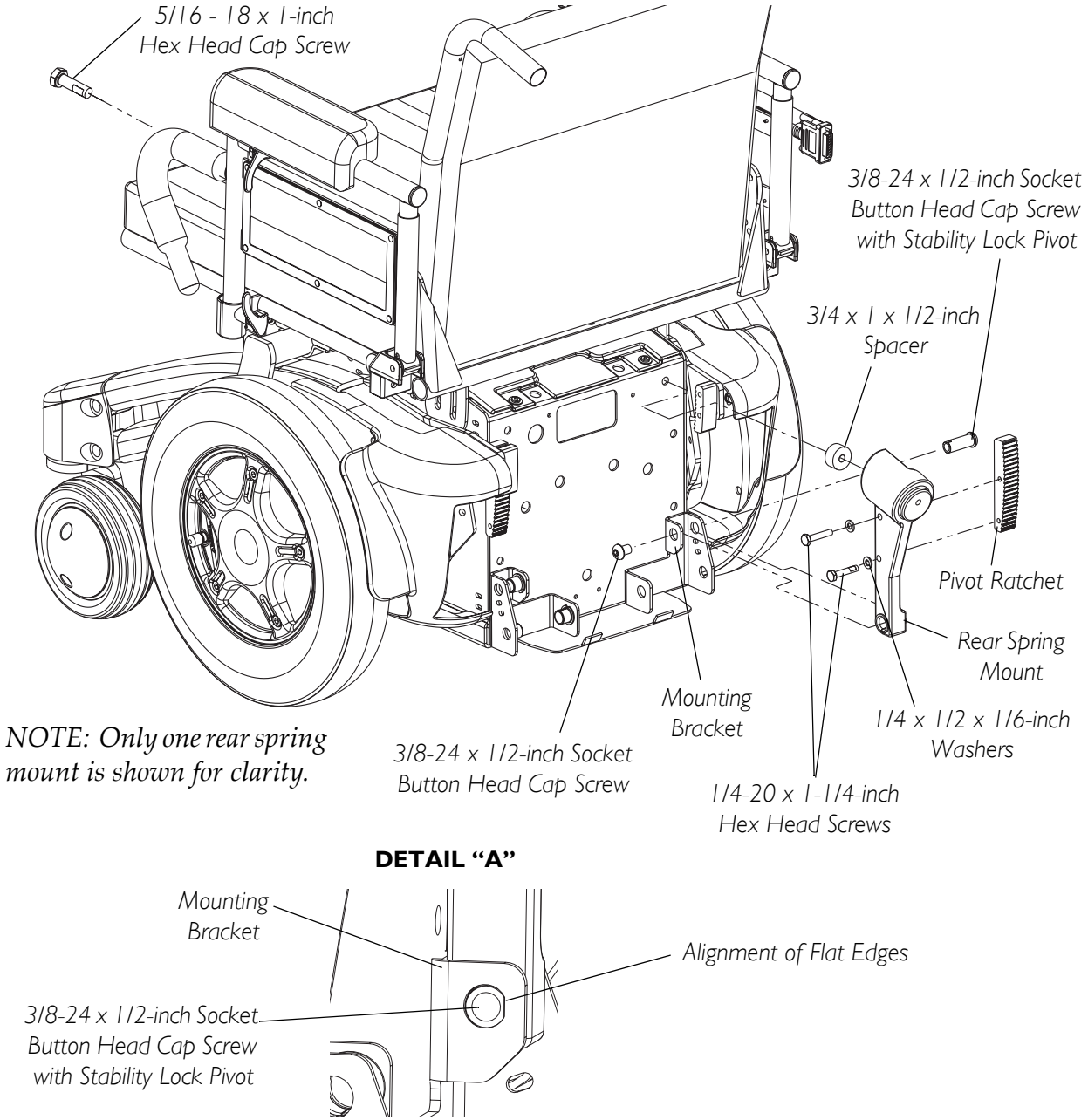


FIGURE 15.19 - REMOVING/INSTALLING THE REAR SPRING MOUNT

REMOVING/INSTALLING THE HEAD TUBE AND FRONT CASTER ASSEMBLY

NOTE: For this procedure, refer to FIGURE 15.20.

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

- *Phillips Screwdriver*
- *15/16-inch Socket and Ratchet*
- *7/32 Allen Wrench*
- *Torque Wrench*

REMOVING

1. Perform one (1) of the following:
   A. TO REMOVE THE HEAD TUBE -
      a. Remove the two (2) 3/8-24 x 3/4-inch button head cap screws that secure the head tube to the lower walking beam.
      b. Remove the two (2) 3/8-24 x 3/4-inch button head cap screws that secure the head tube to the walking beam.
      c. Remove the head tube and front caster assembly.
   B. TO REMOVE THE FRONT CASTER ASSEMBLY -
      a. Remove the 10-32 x 1/2-inch Phillips pan head screw that secures the side of the head tube cap in place.
      b. Remove the head tube cap from the head tube.
      c. Remove the 5/8-16 locknut, 5/8 x 1-5/16 x 1/8-inch washer, and 5/8 x 1-1/8 x 1/16-inch stem spacer that secures the front caster assembly to the head tube.
      d. Remove the front caster assembly from the head tube.

INSTALLING

1. Perform one (1) of the following:
   A. TO INSTALL THE HEAD TUBE -
      a. Position the head tube and front caster assembly onto the walking beam and lower walking beam so that the mounting holes are aligned.
      b. Secure the head tube to the walking beam with two (2) 3/8-24 x 3/4-inch button head cap screws. Torque to 156 in-lbs.
      c. Secure the head tube to the lower walking beam with two (2) 3/8-24 x 3/4-inch button head cap screws. Torque to 156 in-lbs.
   B. TO INSTALL THE FRONT CASTER ASSEMBLY -

   NOTE: Inspect the pivot bushings, bearing and tolerance ring for damage or excessive wear. Replace as necessary.
      a. Insert the front caster assembly into the head tube.
      b. Secure the front caster assembly to the head tube with the 5/8-16 locknut, 5/8 x 1-5/16 x 1/8-inch washer, and 5/8 x 1-1/8 x 1/16-inch stem spacer. Torque to XX in-lbs.
      c. Place the head tube cap onto the head tube.
      d. Secure the head tube cap in place with the 10-32 x 1/2-inch Phillips pan head screw.

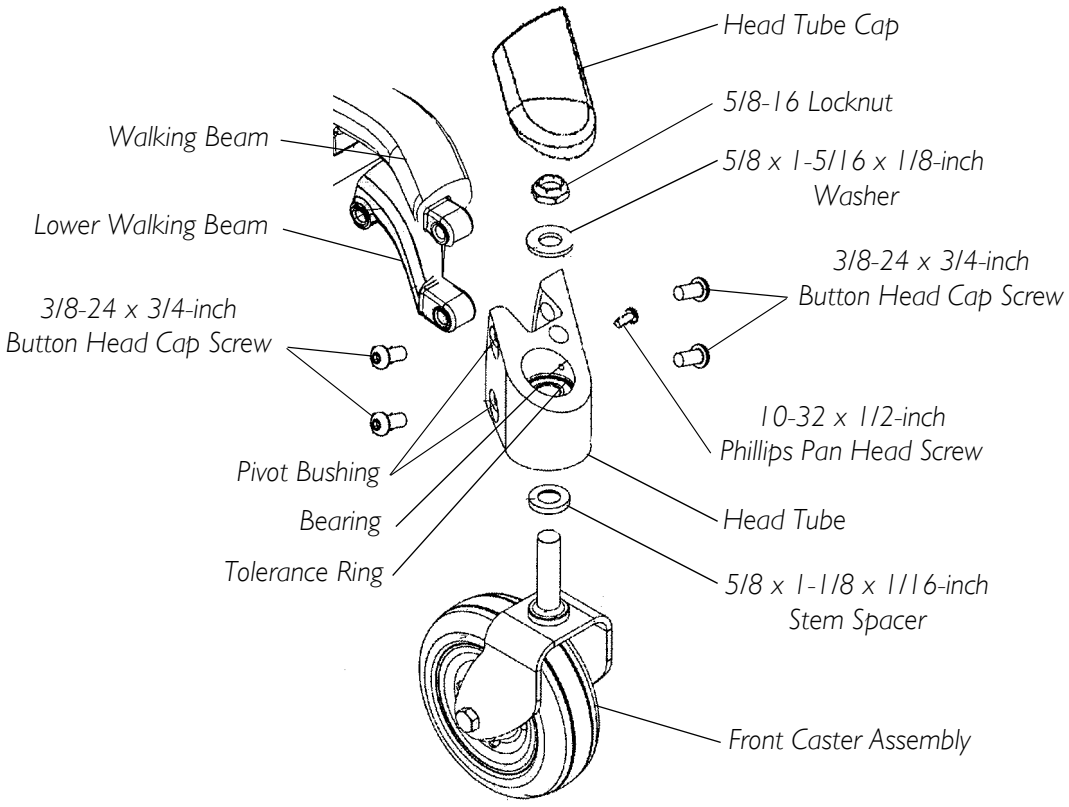


FIGURE 15.20 - REMOVING/INSTALLING THE HEAD TUBE AND FRONT CASTER ASSEMBLY

REMOVING/INSTALLING THE TILT ASSEMBLY AND MOUNTING HARDWARE ON A TDX WITH FORMULA INVISIBLE SUPER LOW™ TILT

NOTE: For this procedure, refer to FIGURE 15.21.

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

- *Phillips Screwdriver*
- *1/2-inch Socket and Ratchet*
- *Allen Wrench*
- *3/16-inch Ball End Extended Hex Wrench*
- *Torque Wrench*

REMOVING THE TILT ACTUATOR

1. Remove the Batteries. Refer to Removing the Batteries (Formula Invisible Super Low™Tilt) on page 47.

NOTE: During the removal of the batteries, the tilt actuator and lower pivot mounting will be removed from the battery box.

2. Disconnect the tilt actuator connector.

3. Move the tilt actuator from off the seat support.
4. TO REMOVE THE TILT ACTUATOR FROM THE LOWER PIVOT MOUNTING-
   A. Remove two (2) 1/4-20 x 1/2-inch button head cap screws and 3/8 x 7/8 x 1/16-inch nylon washers that secure the tilt actuator to the lower pivot mounting.

REMOVING THE SEAT SUPPORT CAM ROLLER

1. While holding the seat in the maximum tilt position, disengage the prop rod from the prop rod support bracket that holds the seat in the upright position. Engage the prop rod into the prop rod retainer clip.
2. Manually lower/tilt the seat into a flat position.
3. Remove the seat pan.Refer to Removing/Installing Seat Pan on page 63.
4. Remove the seat frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
5. Remove two (2) 3/8 x.625-inch socket head shoulder screws that secure the seat support cam roller to the front link.
6. Slide the seat support cam roller toward the REAR of the wheelchair until the cam rollers clear the rail slides.

NOTE: If there are cables secured to the rail slide, cut away the cable ties that secure the cables and carefully move the cables aside while sliding the seat support cam roller out of the rail slides.

7. Remove the seat support cam roller.
   A. TO REMOVE THE RUBBER BUMPERS-
      a. Remove the two (2) 5/16-18 nuts that secure the rubber bumpers to the seat support cam roller.
   B. TO REMOVE THE CAM ROLLERS-
      a. Unthread the two (2) cam rollers from the seat support cam roller.
   C. TO REMOVE THE QUICK RELEASE PINS-
      a. Remove the 1/4-20 x 7/8-inch button head screw and 1/4-20 locknut that secures the quick release pin to the seat support cam roller.

REMOVING THE FRONT LINK

1. Remove two (2) 1/4-20 x 7/8-inch button head screws, front pivot joint sleeves and front pivot joint spacers that secure the front link to both sides of the battery box.
2. Remove the front link.
3. Remove the two (2) 1/4-20 x 1/2-inch button head cap screws and 1/4-20 locknuts that secure the LEFT flange bearing to the battery box.
4. Remove the flange bearing.
5. Repeat STEPS 3-4 for the RIGHT flange bearing.

REMOVING THE RAIL SLIDES

1. Remove two (2) 5/16-18 x 3/4-inch hex head cap with patch screws, 21/64 x 53/64 x 7/64-inch flat washers and strap nut that secures the left rail slide to the battery box.
2. Remove the rail slide.
3. Repeat STEPS 1-2 for the right rail slide.
4. Remove the 10-32 x 1/2-inch Phillips pan head tap screw that secures the pull pin with lanyard to the outside of the battery box.

INSTALLING THE RAIL SLIDES

1. Position the left rail slide against the inside of the battery box.
2. Secure the left rail slide to the battery box with two (2) 5/16-18 x 3/4-inch hex head cap with patch screws, 21/64 x 53/64 x 7/64-inch flat washers and strap n
3. ut.
4. Repeat STEPS 1-2 for the right rail slide.
5. Secure the pull pin with lanyard to the outside of the battery box with the 10-32 x 1/2-inch Phillips pan head tap screw.

INSTALLING THE FRONT LINK

1. Position the LEFT flange bearing in the battery box.
2. Secure the LEFT flange bearing to the battery box with two (2) 1/4-20 x 1/2-inch button head cap screws and 1/4-20 locknuts.
3. Repeat STEPS 1-2 for the RIGHT flange bearing.
4. Position the front link on the battery box.
5. Secure the front link to both sides of the battery box with two (2) 1/4-20 x 7/8-inch button head screws, front pivot joint sleeves and front pivot joint spacers.

INSTALLING THE SEAT SUPPORT CAM ROLLER

1. Perform one (1) of the following:
   A. TO INSTALL THE QUICK RELEASE PINS-
      a. Secure the quick release pin to the seat support cam roller with the 1/4-20 x 7/8-inch button head screw and 1/4-20 locknut.
   B. TO INSTALL THE CAM ROLLERS-
      a. Thread the two (2) cam rollers into the seat support cam roller.
   C. TO INSTALL THE RUBBER BUMPERS-
      a. Secure the rubber bumpers to the seat support cam roller with two (2) 5/16-18 nuts.
2. Position the seat support cam roller so that the cam rollers align with the rail slides.

3. Slide the seat support cam roller toward the FRONT of the wheelchair.
4. Secure the seat support cam roller to the front link with two (2) 3/8 x.625-inch socket head shoulder screws.

NOTE: Re-secure cables to the Rail Slides using cable ties as necessary.

5. Install the seat frame. Refer to Removing/Installing Seat Frame for ASBA only on page 64.
6. Install the Seat Pan. Refer to Removing/Installing Seat Pan on page 63.
7. Manually lift/tilt the seat into the maximum tilt position.
8. While holding the seat in the maximum tilt position, disengage the prop rod from the prop rod retainer clip. Engage the prop rod into the prop rod support bracket to holds the seat in the upright position.

INSTALLING THE TILT ACTUATOR

1. TO INSTALL THE TILT ACTUATOR TO THE LOWER PIVOT MOUNTING-
   A. Secure the tilt actuator to the lower pivot mounting with two (2) 1/4-20 x 1/2-inch button head cap screws and 3/8 x 7/8 x 1/16-inch nylon washers.
2. Lay the tilt actuator horizontally on the seat support.
3. Connect the tilt actuator connector.
4. Install the Tilt Actuator and Batteries. Refer to Installing the Batteries (Formula Invisible Super Low™Tilt) on page 52
5. During the installation of the batteries, the tilt actuator and lower pivot mounting will be installed into the Battery Box.

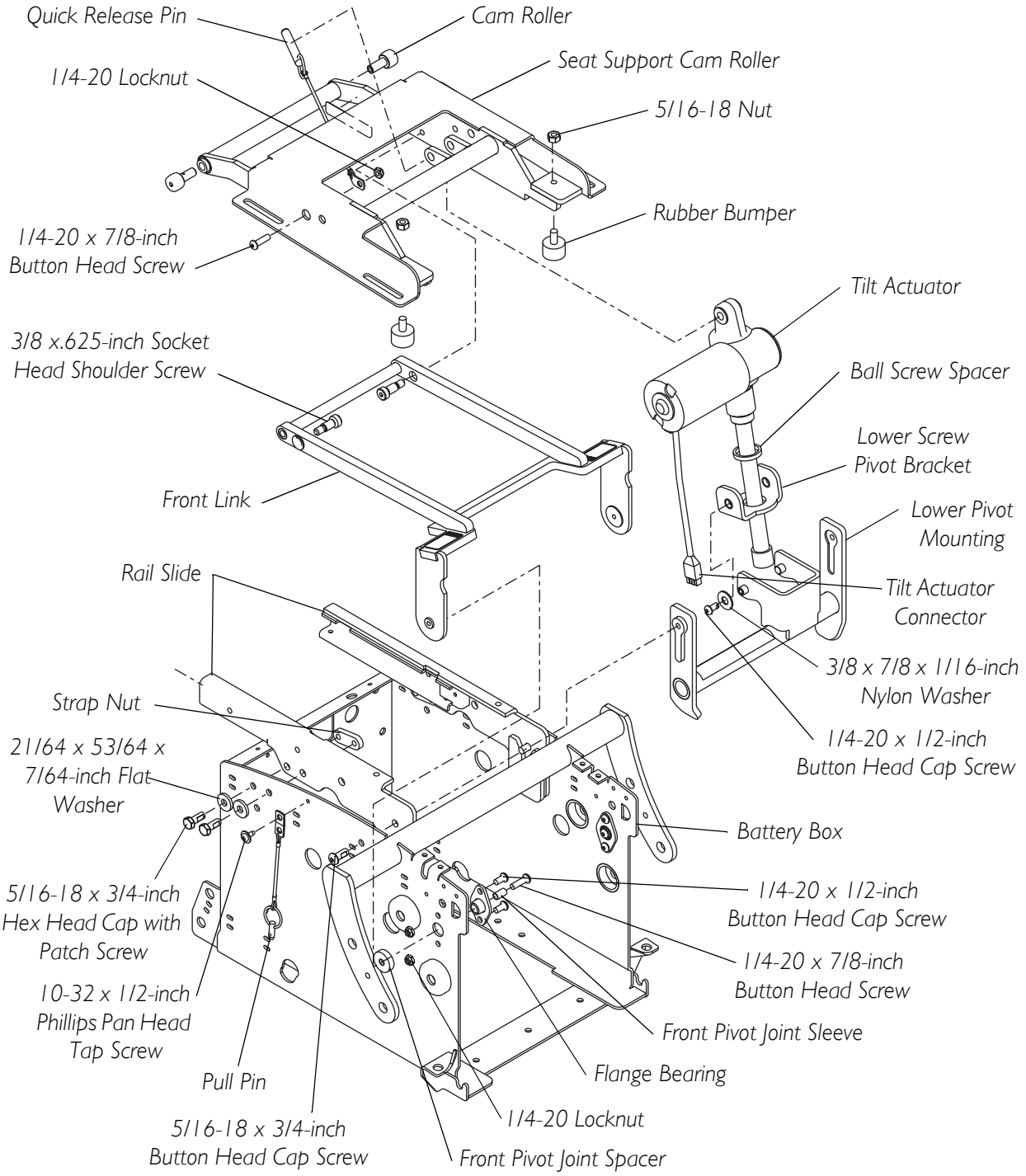


FIGURE 15.21 - REMOVING/INSTALLING THE TILT ASSEMBLY AND MOUNTING HARDWARE ON A TDX WITH FORMULA® INVISIBLE SUPER LOW™ TILT

SECTION 16—ELECTRONICS

CONTROLLER CALIBRATION

REMOTE PROGRAMMER KEY IDENTIFICATION

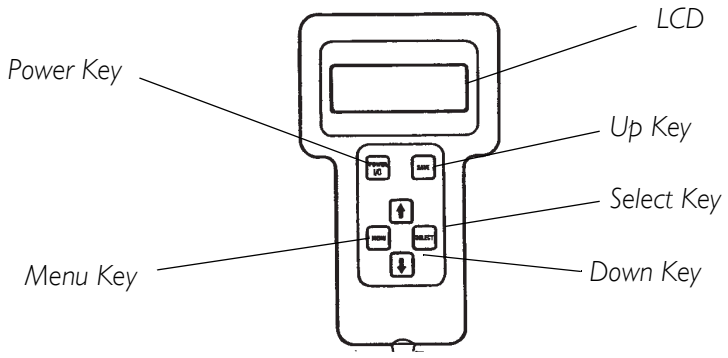


FIGURE 16.1 - REMOTE PROGRAMMER KEY IDENTIFICATION

CONNECTING REMOTE PROGRAMMER TO CONTROLLER

NOTE: For this procedure, refer to FIGURE 16.2.

The controller is matched to the motors in order to attain smooth control and high efficiency. Re-calibration of the controller is required when a motor or controller has been changed on the wheelchair.

⚠ WARNING

Before and during calibration, the drive wheels MUST be raised off of the ground (base frame must be supported) to allow the wheels to rotate freely and attain an accurate reading. Calibration is not to be performed with an occupant seated in the chair. Failure to raise the wheels could cause injury to the individual performing the calibration, bystanders, or damage to the chair and surrounding property.

1. Turn off wheelchair.
2. Position supports under the frame to suspend the drive wheels.
3. Remove the front shroud.
4. Plug remote programmer 5-pin connector into 5-pin port on controller.
5. Turn on power to wheelchair.

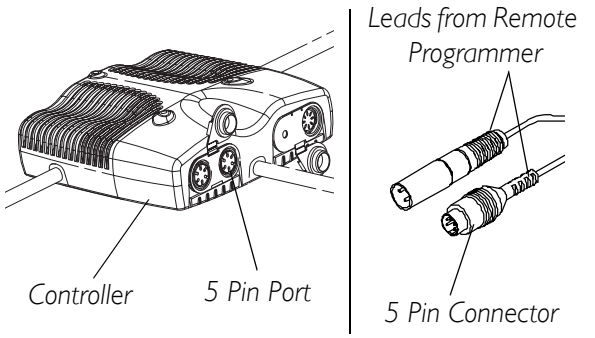


FIGURE 16.2 - CONNECTING REMOTE PROGRAMMER TO CONTROLLER

CALIBRATION PROCESS

1. Press the POWER key to show the main menu on the LCD. The main menu will display the following options.

NOTE: The selection pointer is in the left hand column and can be moved up or down the main menu by pressing the UP or DOWN key.

```
➜ PERFORMANCE ADJUST
  STANDARD PROGRAMS
  CALIBRATIONS
  CURRENT STATUS
```

2. Press the DOWN key to scroll the selection pointer down to CALIBRATIONS. Press the SELECT Key to choose CALIBRATIONS.

```
  PERFORMANCE ADJUST
  STANDARD PROGRAMS
➜ CALIBRATIONS
  CURRENT STATUS
```

NOTE: After selecting CALIBRATIONS, the menu will display the following options:

```
➜ BATTERY LEVEL
  MOTOR BALANCE
  BRAKE TIME OUT
  CALIBRATE MOTOR
```

3. Press the down key to scroll the selection pointer down to CALIBRATE MOTOR. Press the SELECT Key to choose CALIBRATE MOTOR.

```
  BATTERY LEVEL
  MOTOR BALANCE
  BRAKE TIME OUT
➜ CALIBRATE MOTOR
```

NOTE: After selecting calibrate motors, the menu will display the following:

```
  WHEELS WILL MOVE!
  DRIVE WHEELS RAISED
  YES
➜ NO
```

4. Confirm the wheels are raised by pressing the UP key to scroll the selection pointer up to "YES". Press the SELECT key to choose "YES".

NOTE: After selecting YES, the menu will display the following:

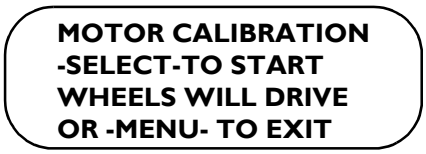
5. Confirm the wheels are raised by pressing the UP key to scroll the selection pointer up to "YES". Press the SELECT key to choose "YES".

NOTE: NOTE: After selecting YES, the menu will display the screen shown in STEP 11 below. This screen is a final reminder that the motors will turn while the calibration is performed. If the drive wheels are on the ground the chair will drive and the calibration will be inaccurate.

⚠ WARNING

Proceeding with the wheels on the ground could cause injury or property damage. To cancel the calibration now, press the MENU key to return to the main calibration menu.

6. Press the SELECT key to start the motor calibration.



7. When the process is complete, the screen will change to:

8. Press the POWER key to turn power off of remote programmer.
9. Turn off power to wheelchair.
10. Disconnect remote programmer 5-pin connector from 5-pin port on controller.
11. Remove supports from under the frame.

12. Install the front shroud.
13. Turn on power to wheelchair and verify proper operation.

REMOVING/INSTALLING THE CONTROLLER WITH BRACKET

NOTE: For this procedure, refer to FIGURE 16.3.

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

- *Phillips Screwdriver*

NOTE: Procedure describes TT-EX controller. EX Controller with Bracket removes/installs in the same manner.

REMOVING

1. For wheelchairs equipped with GB motors, remove the two (2) 10-32 x 1/2-inch Phillips pan head tap screws that secure the side shroud to the base frame. Repeat for remaining side shroud.
2. Remove the two (2) 10-32 x 1/2-inch thumb screws that secure the rear shroud in place.
3. Remove the rear shroud by removing the two thumb screws.
4. Perform the following:
   A. Disconnect controller lead from the motor.
   B. Disconnect the 10-32 x 5/16-inch Phillips pan head screw that secures the cable clamp to the base frame. Repeat for remaining cable clamp.
   C. Disconnect the controller connector from the joystick connector.
   D. Disconnect the controller connectors from any accessories.
   E. Disconnect the controller connector from PTO block.
5. Remove the three (3) 10-32 x 3/8-inch Phillips pan head tap screws that secure the controller assembly to the base frame.
6. Remove the controller with bracket from the wheelchair.

INSTALLING

1. Secure the controller assembly to the base frame with the three (3) 10-32 x 3/8-inch Phillips pan head tap screws. Securely tighten.
2. Perform the following:
   A. Connect controller lead to the motor.
   B. Connect the 10-32 x 5/16-inch Phillips pan head screw that secures the cable clamp to the base frame. Repeat for remaining cable clamp.
   C. Connect the controller connector to the joystick connector.
   D. Connect the controller connector to all accessories connectors.

E. Connect the controller connector for PTO block.

3. Secure the rear shroud in place with the two (2) 10-32 x 1/2-inch thumb screws.
4. Secure the side shroud to the base frame with the two (2) 10-32 x 1/2-inch Phillips pan head tap screws.
5. Repeat for remaining side shroud.

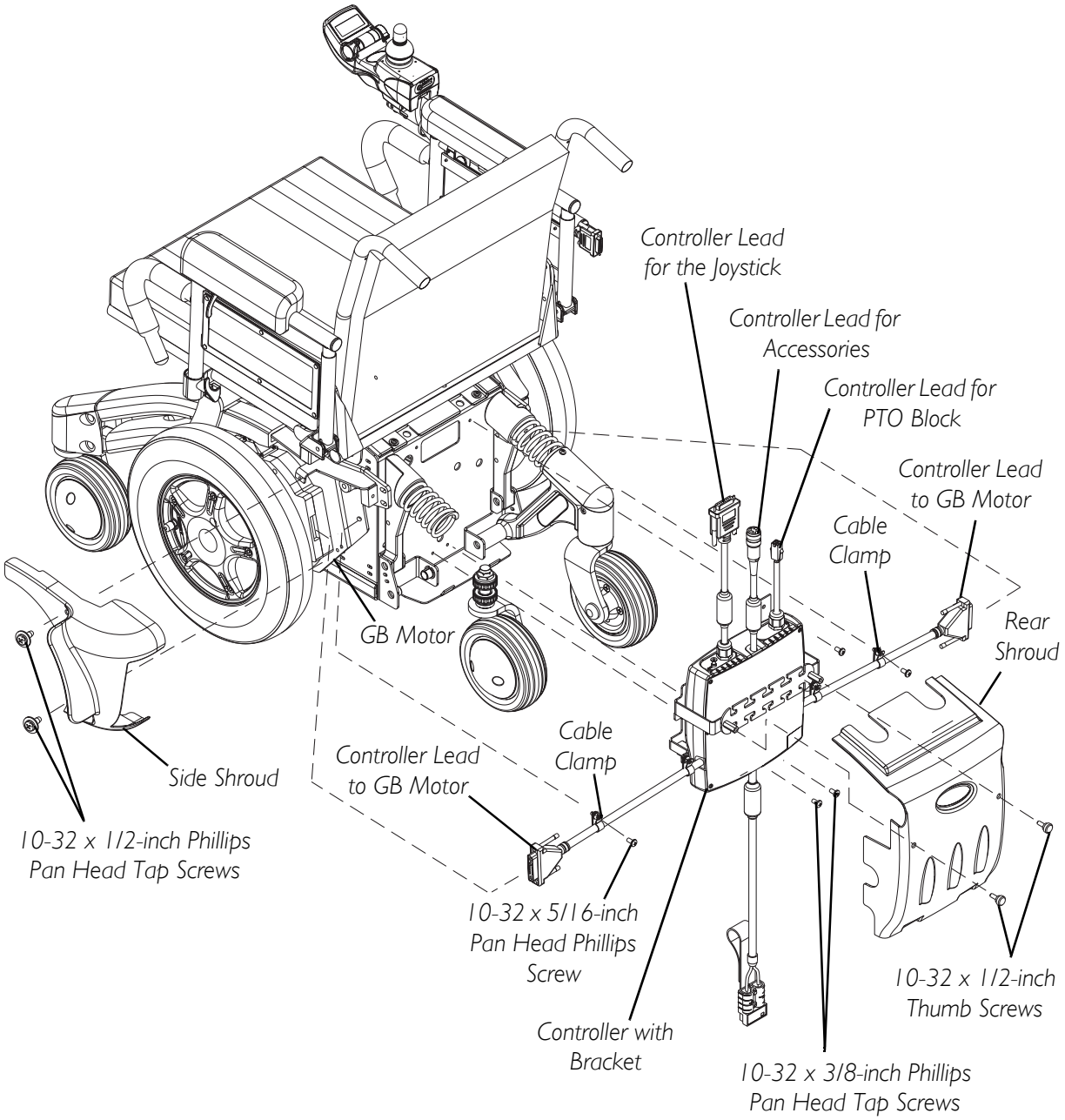


FIGURE 16.3 - REMOVING/INSTALLING THE CONTROLLER WITH BRACKET

REPLACING THE CONTROLLER AND/OR BRACKET

NOTE: For this procedure, refer to FIGURE 16.4.

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

- *Phillips Screwdriver*

1. Remove the controller with bracket from the wheelchair. Refer to Removing/Installing the Controller with Bracket on page 135.
2. Remove the 10-32 x 5/16-inch Phillips pan head screws that secures the cable clamp to the controller bracket. Repeat for remaining cable clamp.
3. Remove the three (3) 10-32 x 1/2-inch Phillips pan head screws that secure the controller to the controller bracket.
4. Secure new/existing controller to new/existing controller bracket with three (3) 10-32 x 1/2-inch Phillips pan head screws.
5. Secure cable clamp to controller bracket with 10-32 x 5/16-inch pan head Phillips screws. Securely tighten. Repeat for remaining cable clamp.
6. Install the controller with bracket onto the wheelchair. Refer to Removing/Installing the Controller with Bracket on page 135.

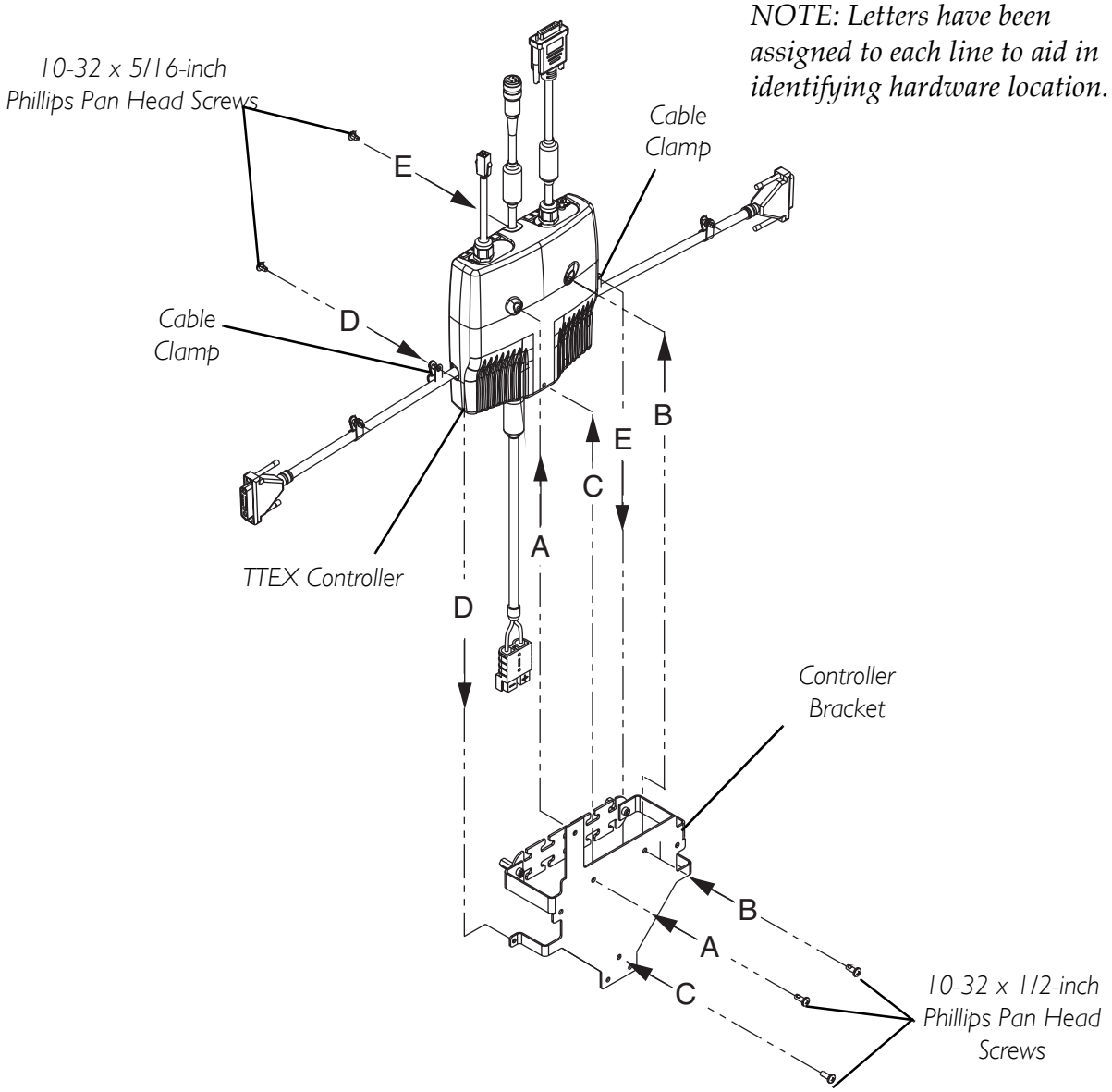


FIGURE 16.4 - REPLACING THE CONTROLLER AND/OR BRACKET

PREPARING MK5 JOYSTICK FOR USE

NOTE: For this procedure, refer to FIGURE 16.5

1. Turn the adjustment lock lever to release the adjustment lock from joystick mounting tube (FIGURE 16.5).
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.

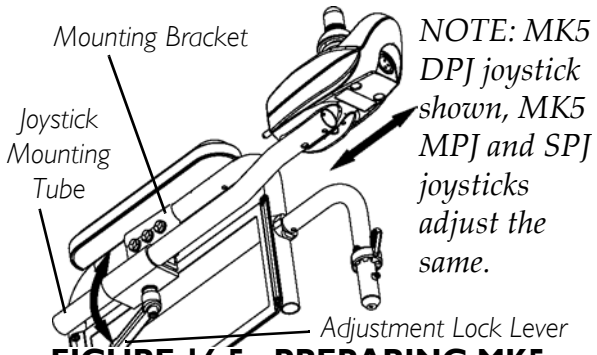


FIGURE 16.5 - PREPARING MK5 JOYSTICK FOR USE

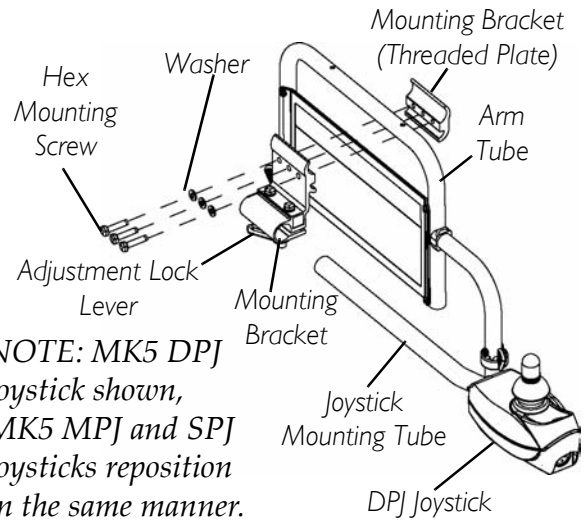
REMOVING/INSTALLING/REPOSITIONING MK5 JOYSTICK

NOTE: For this procedure, refer to FIGURE 16.6.

1. Turn the adjustment lock lever to release the joystick mounting tube from the mounting bracket.
2. Disconnect the joystick connector from the controller connector.
3. Cut the tie wraps that secure the joystick cable in place.
4. Remove the joystick from wheelchair.
5. If repositioning joystick, perform the following:
   A. Remove the three (3) hex screws 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 (3) hex 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.

6. Slide the new or existing joystick mounting tube through the mounting bracket to the desired position.
7. Turn the adjustment lock lever to secure the joystick mounting tube into he mounting bracket.
8. Connect the joystick connector to the controller connector.
9. Secure joystick cable in place with new tie wraps.



NOTE: MK5 DPJ joystick shown, MK5 MPJ and SPJ joysticks reposition in the same manner.

FIGURE 16.6 - REMOVING/INSTALLING/REPOSITIONING MK5 JOYSTICK

LIMITED WARRANTY

PLEASE NOTE: THE WARRANTY BELOW HAS BEEN DRAFTED TO COMPLY WITH FEDERAL LAW APPLICABLE TO PRODUCTS MANUFACTURED AFTER JULY 4, 1975.

This warranty is extended only to the original purchaser/user of our products.

This warranty gives you specific legal rights and you may also have other legal rights which vary from state to state.

Invacare warrants seat frame to be free from defects in materials and workmanship for a period of three (3) years from date of purchase; that electrical components and powered seating actuators are warranted for a period of one (1) year; gearbox/motors (4 pole) for a period of 18 months; Heavy Duty True-Track Gearless/Brushless motors for a period of 5 years (TTHD); and the base frame for the life of the product; all remaining components (including gas cylinders and motor lock pads) for one (1) year from the date of purchase except upholstered materials, padded materials and tires/wheels. If within such warranty period any such product shall be proven to be defective, such product shall be repaired or replaced, at Invacare's option. This warranty does not include any labor or shipping charges incurred in replacement part installation or repair of any such product. Invacare's sole obligation and your exclusive remedy under this warranty shall be limited to such repair and/or replacement.

For warranty service, please contact the dealer from whom you purchased your Invacare product. In the event you do not receive satisfactory warranty service, please write directly to Invacare at the address at the bottom of the back cover. Provide dealer's name, address, date of purchase, indicate nature of the defect and, if the product is serialized, indicate the serial number. Do not return products to our factory without our prior consent.

LIMITATIONS AND EXCLUSIONS: THE FOREGOING WARRANTY SHALL NOT APPLY TO SERIAL NUMBERED PRODUCTS IF THE SERIAL NUMBER HAS BEEN REMOVED OR DEFACED, PRODUCTS SUBJECTED TO NEGLIGENCE, ACCIDENT, IMPROPER OPERATION, MAINTENANCE OR STORAGE, COMMERCIAL OR INSTITUTIONAL USE, PRODUCTS MODIFIED WITHOUT INVACARE'S EXPRESS WRITTEN CONSENT INCLUDING, BUT NOT LIMITED TO, MODIFICATION THROUGH THE USE OF UNAUTHORIZED PARTS OR ATTACHMENTS; PRODUCTS DAMAGED BY REASON OF REPAIRS MADE TO ANY COMPONENT WITHOUT THE SPECIFIC CONSENT OF INVACARE, OR TO A PRODUCT DAMAGED BY CIRCUMSTANCES BEYOND INVACARE'S CONTROL, AND SUCH EVALUATION WILL BE SOLELY DETERMINED BY INVACARE. THE WARRANTY SHALL NOT APPLY TO PROBLEMS ARISING FROM NORMAL WEAR OR FAILURE TO ADHERE TO THESE INSTRUCTIONS.

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THIS WARRANTY SHALL BE EXTENDED TO COMPLY WITH STATE/PROVINCIAL LAWS AND REQUIREMENTS.

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