

# **2G Tarsys<sup>®</sup> Powered Seating System**

**2GT<sup>™</sup> - Tilt Only**

**2GR<sup>™</sup> - Recline Only**

**2GTR<sup>™</sup> - Tilt/Recline**

**on**

**TDX<sup>®</sup> Wheelchairs**

**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](http://www.invacare.com)



*Yes, you can.*

## ⚠ **WARNING**

**A QUALIFIED TECHNICIAN MUST PERFORM THE INITIAL SET UP OF THIS SEATING SYSTEM. ALSO, A QUALIFIED TECHNICIAN MUST PERFORM ALL PROCEDURES IN THIS SERVICE 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.**

## **USEFUL TERMS**

The following acronyms are used throughout this manual:

ACRONYM	DEFINITION
BPO	Back Post Only option ordered on Tilt Only systems.
TRSS	Tilt Recline Single Switch
SAC	Single Actuator Control
TAC	Two Actuator Control
TRCM	Tilt Recline Control Module
VSR	Vernier Shear Reduction

## **REFERENCE DOCUMENTS**

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

TDX BASE OWNER'S MANUAL	TDX SERVICE MANUAL	ELECTRONICS MANUAL
1114809	1114819	1114808 - MK <sub>5</sub> <sup>™</sup> EX <sup>™</sup> and MK <sub>5</sub> TT-EX

*NOTE: Updated versions of this manual are available on [www.invacare.com](http://www.invacare.com).*

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# SPECIAL NOTES

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

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

## NOTICE

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

### **WHEELCHAIR TIE-DOWN RESTRAINTS AND SEAT RESTRAINTS (TRBKTS)**

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

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

### **⚠ TRBKTS WARNINGS**

Only use the transport brackets included with TRBKTS for the purposes described in the wheelchair base owner's manual.

### **⚠ WARNING**

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

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.

Wheelchairs should be examined during maintenance for signs of corrosion (water exposure, incontinence, etc.). Electrical components damaged by corrosion should be replaced **IMMEDIATELY**.

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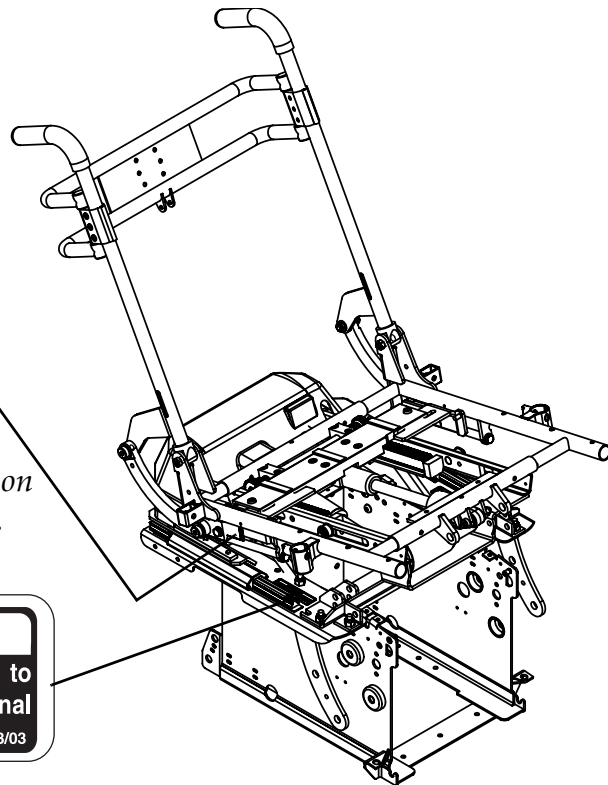
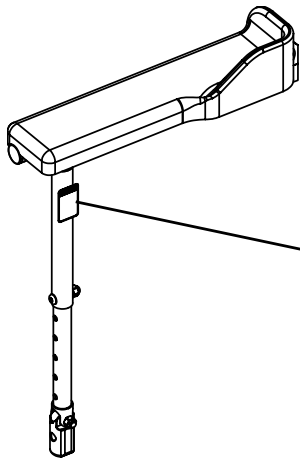
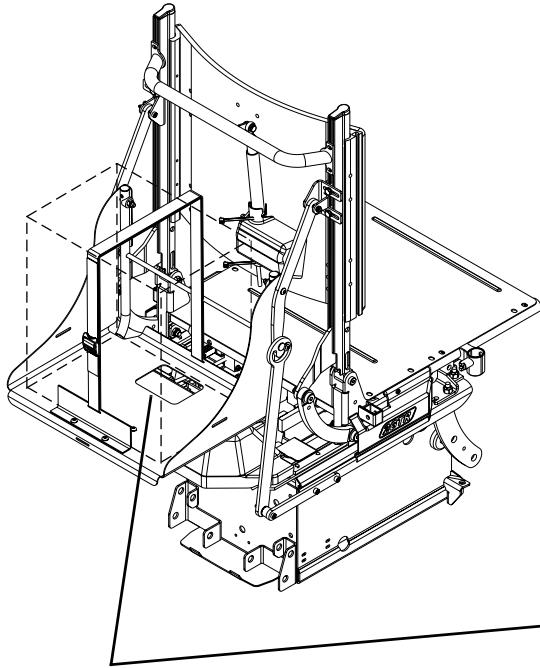
**⚠ WARNING**

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

**Refer to wheelchair base service manual for additional safety and operation information.**

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# LABEL LOCATIONS



*NOTE: These labels are present on both sides of the seating system.*



# TYPICAL PRODUCT PARAMETERS

	2G TARSYS SEATING SYSTEM
<b>SEAT WIDTH RANGE:</b>	16 - 22 inches in 1-inch increments
<b>SEAT DEPTH RANGE:</b>	16 - 22 inches in 1-inch increments
<b>BACK HEIGHT RANGE</b> TILT/RECLINE: RECLINE: TILT:	20 - 26 inches in 1-inch increments 20 - 26 inches in 1-inch increments 20 - 25 inches in 1-inch increments
<b>BACK ANGLE RANGE</b> TILT:	90° - 115° in 5° increments
<b>TILT RANGE</b> TILT AND TILT/RECLINE 0° Seat Angle: 5° Seat Angle:	0° - 45° ± 3° 5° - 50° ± 3°
<b>RECLINE RANGE (MEASURED RELATIVE TO THE GROUND)</b> RECLINE 0° Seat Angle: 5° Seat Angle: 10° Seat Angle: 15° Seat Angle:  TILT/RECLINE 0° Seat Angle: 5° Seat Angle:	90° - 175° ± 3° 95° - 175° ± 3° 100° - 175° ± 3° 105° - 175° ± 3°  90° - 175° ± 3° 95° - 175° ± 3°
<b>SEAT-TO-FLOOR</b> 0° SEAT ANGLE: 5° SEAT ANGLE:	18.5 inches ± .25 inches 20 inches ± .25 inches
<b>*OVERALL WIDTH</b> WITH 4-WAY SWITCH:	28.9 inches
<b>*OVERALL HEIGHT (WITHOUT HEADREST):</b>	40.9 inches
<b>*OVERALL LENGTH</b> WITH CENTER MOUNT FOOTREST AT 90°: WITHOUT FRONT RIGGINGS, FULL LENGTH ARM, MPJ™ JOYSTICK:	41.5 inches 39.3 inches
<b>ARMRESTS</b> TILT:  RECLINE AND TILT/RECLINE:	Flip Back, Adjustable Height (9 - 13 inches) - Desk or Full Length Adjustable Height (11 - 16 inches) - Desk or Full Length
<b>LEGRESTS:</b>	Swingaway Footrests, Center Mount Footrests, Mechanical Elevating, Genius Legrests, or Power Elevating Legrests
<b>HEADRESTS:</b>	Curved, Contoured, Small or Large
*NOTE: 20 inch deep x 20 inch wide with 24 inch high back.	
NOTE: All dimensions are ± .50 inches unless otherwise indicated.	
NOTE: All parameters apply to Tilt only, Recline only and Tilt/Recline systems except where specified. All parameters are approximate.	

2G TARSYS SEATING SYSTEM	
<b>WEIGHT LIMITATION:</b> ALL SEATING SYSTEMS WITHOUT HEAVY DUTY OPTION: TILT ONLY, RECLINE ONLY OR TILT/RECLINE SYSTEMS WITH HEAVY DUTY OPTION: ALL SEATING SYSTEMS WITH VENT TRAY:	250 lbs  350 lbs Subtract 50 lbs from the seating system weight limitations (200 and 300 lbs respectively)
<b>BATTERY REQUIREMENTS:</b>	Refer to <u>Batteries</u> on page 137.
<b>ELECTRONICS</b> SEATING SYSTEM CONTROL MODULES: WHEELCHAIR CONTROL MODULE: JOYSTICKS:	TRCM, SAC, TAC, TRSS MK <sub>5</sub> EX or MK <sub>5</sub> TT-EX MPJ™ or DPJ™
<p><i>*NOTE: 20 inch deep x 20 inch wide with 24 inch high back.</i></p> <p><i>NOTE: All dimensions are ± .50 inches unless otherwise indicated.</i></p> <p><i>NOTE: All parameters apply to Tilt only, Recline only and Tilt/Recline systems except where specified. All parameters are approximate.</i></p>	

**⚠ WARNING**

**If the seating system is mounted onto a power wheelchair that has a weight limitation greater than that of the seating system, the weight limitation is maintained at the seating system’s limitation. (Example: If the wheelchair is a TDX 5 with a 400 lb. weight limitation, the seating system still has a weight limitation of 350 lbs.).**

# SECTION I—GENERAL GUIDELINES

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## **⚠ WARNING**

**SECTION I - 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.

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## **Repair or Service Information**

Except for programming, **DO NOT** service or adjust the wheelchair while occupied, unless otherwise noted.

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

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

Cables **MUST** be routed and secured properly to ensure that the cables **DO NOT** become entangled and damaged during normal operation of seating system.

Cables **MUST** be secured to the wheelchair frame and/or base with tie-wraps after servicing is complete. Failure to follow the warnings and instructions listed within this manual could result in injury to the users, attendants and/or bystanders and/or damage to the wheelchair.

Cables **MUST** be secured so there are no loops of excess cable extending away from the wheelchair. Bundle all excess cable together and secure with a tie-wrap. It may also be necessary to secure these bundles to the frame and/or base.

**ALWAYS** test all wheelchair functions after securing the cables to be sure cables **DO NOT** get pinched, crushed, or strained during operation of the wheelchair.

## **Operation Information**

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

**DO NOT** attempt to lift the wheelchair by any removable (detachable) parts. Lifting by means of any removable (detachable) parts of a wheelchair may result in injury to the user or damage to the wheelchair.

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 chair and to surrounding property.

After the seating system has been set-up/adjusted, check to make sure that the seating system performs to the specifications entered during the set-up procedure. If the seating system does NOT perform to specifications, turn the wheelchair OFF IMMEDIATELY and re-enter the set-up specifications. Repeat this section until the seating system performs to specifications. Refer to Reference Documents on page 2.

Avoid storage or use near external flame or combustible products.

DO NOT operate the seating system while on an incline.

DO NOT operate the seating system while the wheelchair is moving.

NEVER operate the wheelchair while in any tilted/reclined/back angle position over 20° relative to the vertical position. If the drive lock-out does not stop the wheelchair from operating in a tilt position over 20° relative to the vertical position, DO NOT operate the wheelchair. The drive lock-out settings MUST be adjusted.

Pinch points may occur when returning the tilted seat to the full upright position. Make sure the hands and body of both the occupant and attendants/bystanders are clear of all pinch points before returning the tilted seat to the full upright position.

DO NOT operate tilt seat around children.

DO NOT overtighten hardware attaching to the frame. This could damage the frame tubing.

ALWAYS keep hands and fingers clear of moving parts to avoid injury.

ALWAYS keep hands and feet out from underneath tilt seat - otherwise serious injury may result.

When on an incline, NEVER leave an unoccupied wheelchair unattended at any time.

Use only SAC, TRSS, TRCM and TAC actuator controls to activate the tilt/recline functions\*. DO NOT USE any other actuator controls. Such devices may result in excess heating and cause damage to the actuator and associated cables and could cause a fire, death, physical injury or property damage. If such devices are used, Invacare shall not be liable and the limited warranty is void.

*\*NOTE: Specific actuator controls are noted for each function or combination throughout this manual.*

## 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. Where a two-prong wall receptacle is encountered, it is the personal responsibility and obligation of the customer to contact a qualified electrician and have the two-prong receptacle replaced with a properly grounded three-prong wall receptacle in accordance with the National Electrical Code. If you must use an extension cord, use ONLY a three-wire extension cord having the same or higher electrical rating as the device being connected. In addition, Invacare has placed RED/ORANGE warning tags on some equipment. DO NOT remove these tags.



# SECTION 2—SAFETY/HANDLING OF WHEELCHAIRS

## Pinch Points

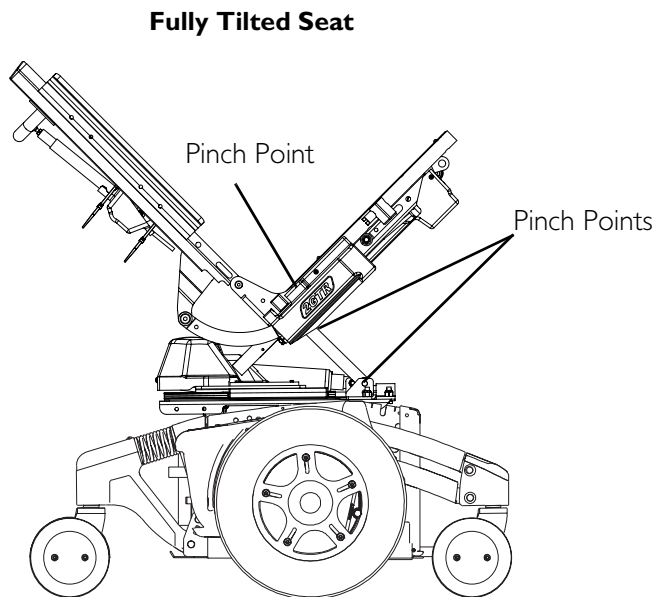
*NOTE: For this procedure, refer to FIGURE 2.1.*

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### **⚠ WARNING**

**Pinch points may occur when returning the tilted seat to the full upright position. Make sure the hands and body of both the occupant and attendants/bystanders are clear of all pinch points before returning the tilted seat to the full upright position.**

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**FIGURE 2.1** Pinch Points

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# SECTION 3—EMI INFORMATION

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## **⚠ 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.**

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**⚠ 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) This device has been tested to a radiated immunity level of 20 volts per meter.
- 3) The immunity level of the product is unknown.

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

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# SECTION 4—SAFETY INSPECTION/TROUBLESHOOTING

## Safety Inspection Checklist

These adjustments should be made whenever this product is serviced, especially as part of the initial unit setup. Follow these procedures:

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### CAUTION

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

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- Make sure all electrical connections are secure.
- Check that cables are routed and secured properly to ensure that cables DO NOT become entangled and damaged during normal operation of seating system.
- Make sure drive lock-out works properly.
- Make sure tilt operates smoothly and properly.
- Make sure recline operates smoothly and properly.
- Ensure all fasteners are secure on clothing guards.
- Ensure arms are secure but easy to release.
- Ensure arm adjustment levers operate and lock securely.
- Ensure adjustable height arms operate and lock securely.
- Inspect for rips in upholstery on armrests.
- Ensure armrest pad sits flush against arm tube.
- Inspect seat and back cushions for rips or sagging.
- Inspect hand grips for looseness. If loose, have them replaced by a qualified technician.
- 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.
- Check that all labels are present and legible. Replace if necessary.

## Post-Service Inspection Checklist

### **⚠ WARNING**

**NEVER** operate the wheelchair while in any tilted/reclined/back angle position over 20° relative to the vertical position. If the drive lock-out does not stop the wheelchair from operating in a tilt position over 20° relative to the vertical position, **DO NOT** operate the wheelchair. The drive lock-out settings **MUST** be adjusted. Refer to **Reference Documents** on page 2.

Cables **MUST** be secured to the wheelchair frame and/or base with tie-wraps after servicing is complete. Failure to follow the warnings and instructions below could result in injury to the users, attendants and/or bystanders and/or damage to the wheelchair.

Cables **MUST** be secured so there are no loops of excess cable extending away from the wheelchair. Bundle all excess cable together and secure with a tie-wrap. It may also be necessary to secure these bundles to the frame and/or base.

**ALWAYS** test all wheelchair functions after securing the cables to be sure cables **DO NOT** get pinched or crushed during operation of the wheelchair.

The following checklist must be performed after any procedure that requires:

- Removing/installing the seat
- Removing/installing/adjusting the tilt links
- Replacing electronic components
- Replacing actuators
- Verify all attaching hardware is tightened securely.
- Make sure drive lock-out engages when the wheelchair is in any tilt/recline/back angle combination over 20° relative to the vertical position.
- Cycle system up and down to verify wiring harnesses **DO NOT** obstruct the path of the system. If they do, perform one of the following:
  - Wires were damaged during inspection - Replace damaged wires.
  - Wires were not damaged during inspection - Cut tie-wraps and relocate wires to a location where they will not become damaged.
- Tilt Systems - Verify tilt link is properly secured to the frame.
- Tilt Systems - Ensure there is no interference with the base frame when the system is fully tilted.
- With the wheelchair unoccupied, test all system functions to verify proper operation.
- Verify charger function.
- Install all shrouds.
- Make sure linear guides **DO NOT** bind.

## Troubleshooting

NOTE: Refer to Reference Documents on page 2 for complete mechanical and electrical troubleshooting guides on the base.

NOTE: Refer to the Electronics Manual listed in Reference Documents on page 2 for additional troubleshooting information and explanation of error codes.

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Wheelchair power ON but does not drive	System tilted or reclined beyond drive lock-out angle (20°).	Return to neutral position (upright). Refer to <u>Operating Powered Seating Systems</u> on page 127.
Seating system not functioning or working intermittently.	Low batteries. Faulty electrical connection. Seat has been driven under a heavy load for an extended period of time.	Charge batteries. Check all connections. Allow time for the electronics to cool down (light duty use).
Tilt and/or recline functions DO NOT respond.	Open motor connection or bad switch. Possible programming error. E06 or E07 potentiometers calibration error code. Blown fuse in auxiliary power connectors on wiring harness.	Use the MKIV™ remote programmer to check the Current Status menu. Verify TRCM/TAC programming. Recalibrate potentiometers. Refer to the MK <sub>5</sub> EX Electronics Service manual that is listed in <u>Reference Documents</u> on page 2. Replace fuse, and possibly wiring harness.
Tilt and/or recline functions DO NOT stop at the desired position (excessive “drift”). <i>NOTE: It is normal to have some amount of “drift”. However it should not be more than 5°.</i>	Programming error for tilt/recline limits. Bad potentiometers or potentiometers out of calibration. Damaged tilt actuator.	Use the MKIV remote programmer to verify correct TRCM/TAC programming. Recalibrate potentiometers or replace. Refer to the MK <sub>5</sub> EX Electronics Service manual that is listed in <u>Reference Documents</u> on page 2, <u>Removing/Installing the Tilt Potentiometer</u> on page 150, or <u>Removing/Installing the Recline Potentiometer</u> on page 155. Replace tilt actuator. Refer to <u>Removing/Installing the Tilt Actuator</u> on page 131.

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Error Code: E28 - MPJ joystick or  5 flashes - DPJ™ and SPJ™ -80 joysticks	System tilted or reclined beyond drive lock-out angle (20°).  Charger is plugged into wheelchair.  Bad potentiometers or out of calibration.	Return to neutral position (upright). Refer to <u>Operating Powered Seating Systems</u> on page 127.  Unplug charger.  Recalibrate potentiometers or replace. Refer to the MK <sub>5</sub> EX Electronics Service manual that is listed in <u>Reference Documents</u> on page 2, <u>Removing/Installing the Tilt Potentiometer</u> on page 150, or <u>Removing/Installing the Recline Potentiometer</u> on page 155.
Programmer does not work or gives “communication error”.	System tilted or reclined beyond drive lock-out angle (20°).	Return to neutral position (upright). Refer to <u>Operating Powered Seating Systems</u> on page 127.
Switch response incorrect.	Programming error or bad switch.	Use the programmer to verify controller programming. Save the proper standard program to reset switch functions.
Drive lockout does not engage.	Programming error.  Bad potentiometers or out of calibration.	Check drive lockout settings using the programmer.  Recalibrate potentiometers or replace. Refer to the MK <sub>5</sub> EX Electronics Service manual that is listed in <u>Reference Documents</u> on page 2, <u>Removing/Installing the Tilt Potentiometer</u> on page 150, or <u>Removing/Installing the Recline Potentiometer</u> on page 155.
Slow motor speeds.	Low battery voltage or programming speed set too low.	Recharge batteries.  Check seating system controller performance adjustment settings for actuator speed and acceleration using programmer.
Motor speed too fast.	Programming error.	Check seating system controller performance adjustment settings for speed using programmer.
Seating system functions respond to switch commands, but not to driver control.	Programming error.  Incorrect/malfunctioning driver control.	Check the performance adjustment menu for the base and make sure that the tilt/recline adjustment is turned on in all available drives.  Replace drive control.
Seating system function will only operate in one direction.	Bad potentiometers or out of calibration.  Current Rollback.	Check for physical damage to potentiometers and wiring and replace if necessary.  Recalibrate potentiometers.  Leave power on, and DO NOT activate seating functions for at least 3 minutes. Call Invacare Technical Services.
Motor runs then loses power, then runs again.	Heavy load sensed by seating system controller.	Leave power on, and DO NOT activate seating functions for at least 3 minutes. Call Invacare Technical Services.

# SECTION 5—INTERFACE HARDWARE

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## **⚠ WARNING**

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

**Before adjusting, repairing or servicing the seating system, ALWAYS turn the wheelchair power OFF, otherwise, injury or damage may result.**

**Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.**

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## Repositioning the Seat

### About Repositioning the Seat

The seat position **MUST** be adjusted under the following conditions:

- The seat depth changes.
- The seating system changes so it has both a ventilator-ready battery tray and center mount footrests.

The mounting location of the seat depends on the seat depth of the seating system and whether or not both a ventilator-ready battery tray and center mount footrests are installed. The ventilator battery tray requires a long battery box door. When used in combination with center mount riggings, the seating system **MUST** be positioned further forward for proper clearance.

### Repositioning the Seat on 2GR Systems

*NOTE: For this procedure, refer to Table 1 - Table 7 on page 26 to page 32.*

1. Refer to the tables at the end of this procedure to determine if a seat position adjustment is needed.

*NOTE: The seat adjustment tables are based on the seat depth of the system. Some seat depths share the same mounting position.*

2. Remove the six hex screws, washers and locknuts securing the rear pivot assembly, spacer bars and seat brackets to the lower interface brackets.
3. Remove the two hex screws and locknuts securing the insides of the seat brackets to the lower interface brackets.
4. If necessary, remove the four hex screws and locknuts securing the front pivot assembly to the seat brackets and lower interface brackets.



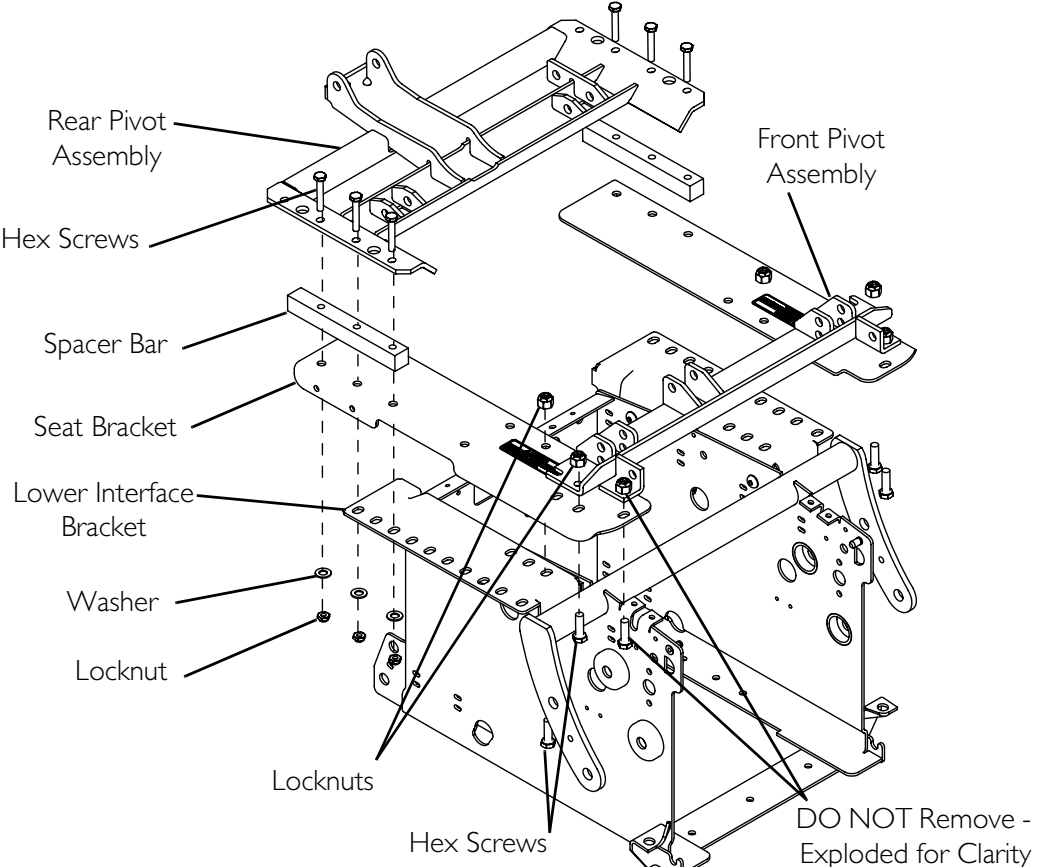
*NOTE: Not all mounting positions require the front pivot assembly to be secured to the lower interface brackets. Some mounting positions require that the front pivot assembly be secured to the seat brackets only. The hex screws securing the front pivot assembly to the seat brackets DO NOT need to be removed.*

5. Adjust the position of the seating system on the lower interface brackets.
6. Using the two hex screws and locknuts removed in STEP 3, secure the insides of the seat brackets to the lower interface brackets. Torque to 13 ft-lbs  $\pm$  20%.
7. Using the hex screws and locknuts removed in STEP 4, secure the front pivot assembly to the front of the seat brackets and the front of the seat brackets to the lower interface brackets. Torque to 13 ft-lbs  $\pm$  20%.

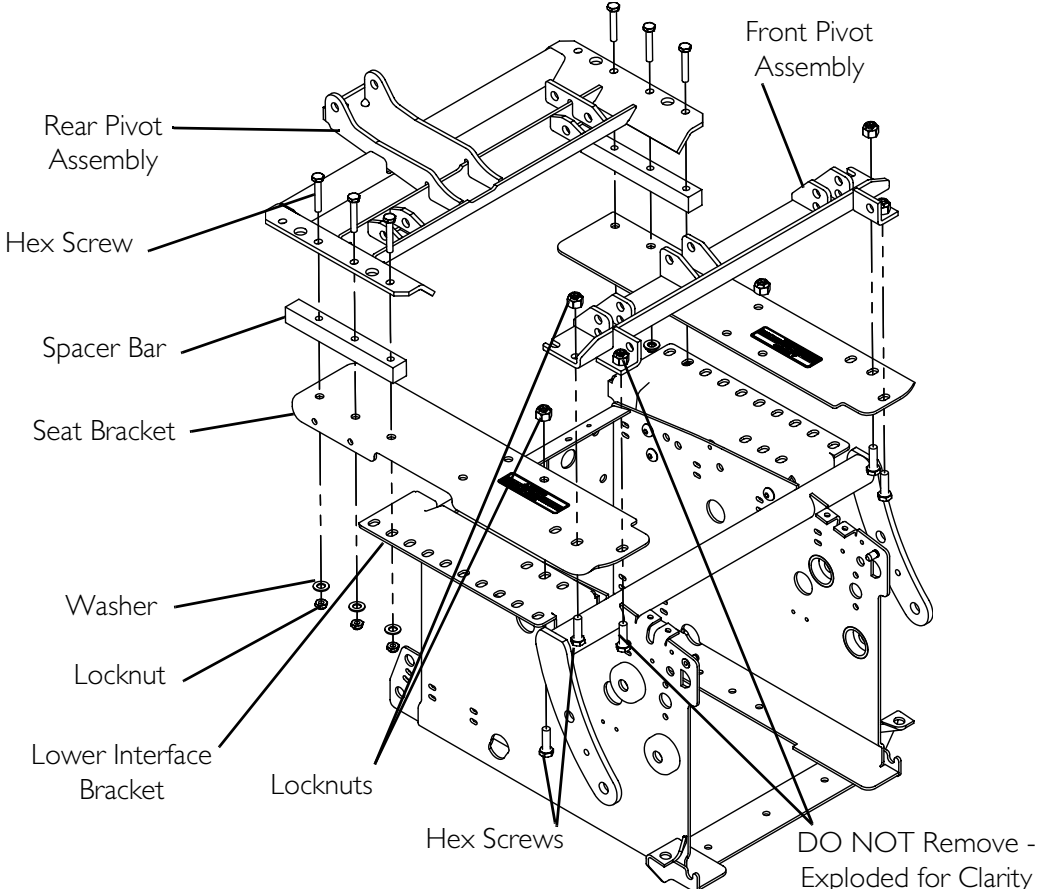
*NOTE: Not all mounting positions require the front pivot assembly to be secured to the lower interface brackets. Some mounting positions require that the front pivot assembly be secured to the seat brackets only.*

8. Using the six hex screws, washers and locknuts removed in STEP 2, secure the rear pivot assembly and the spacer bars to the seat brackets and lower interface brackets. Torque to 75 in-lbs  $\pm$  20%.
9. Perform the post-service inspection checklist. Refer to Post-Service Inspection Checklist on page 21.

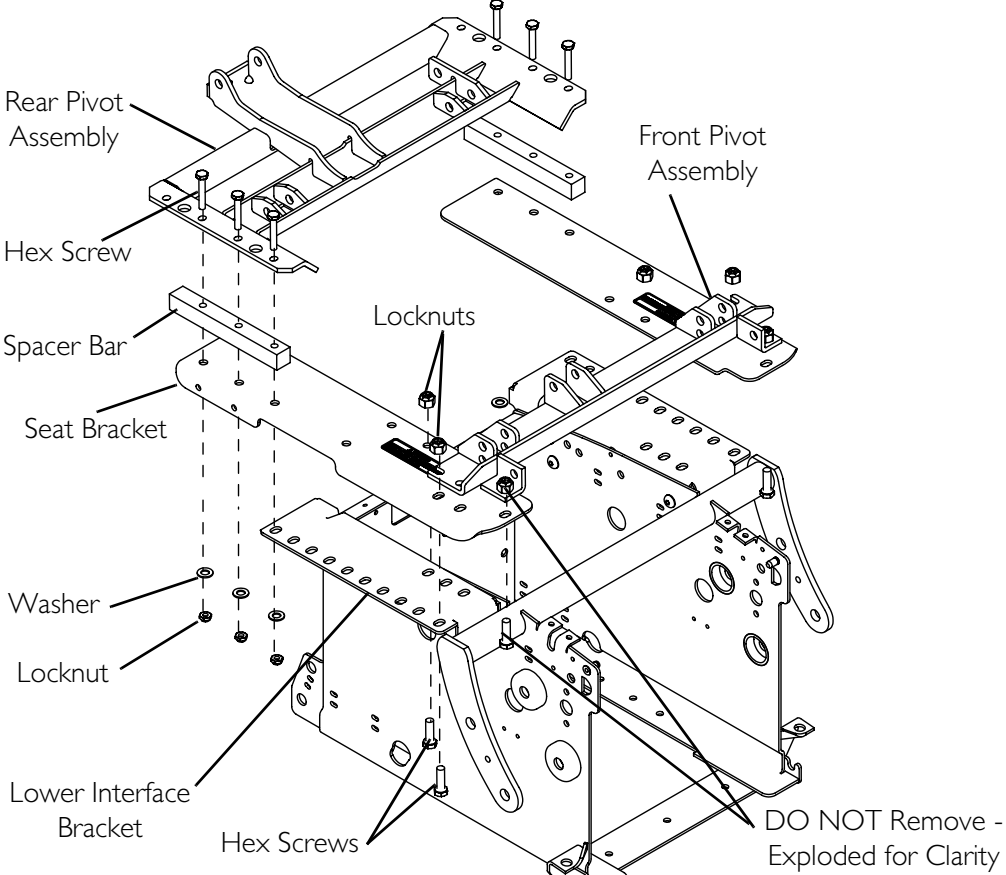
**TABLE 1 - 2GR Systems WITHOUT Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
16-INCH 17-INCH	 <p>Diagram illustrating the mounting position for 16-inch and 17-inch seat depths. The components shown include:</p> <ul style="list-style-type: none"> <li>Rear Pivot Assembly</li> <li>Hex Screws</li> <li>Spacer Bar</li> <li>Seat Bracket</li> <li>Lower Interface Bracket</li> <li>Washer</li> <li>Locknut</li> <li>Locknuts</li> <li>Hex Screws</li> <li>Front Pivot Assembly</li> </ul> <p>DO NOT Remove - Exploded for Clarity</p>
<p><b>NOTE:</b> Torque the hardware as listed below:</p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

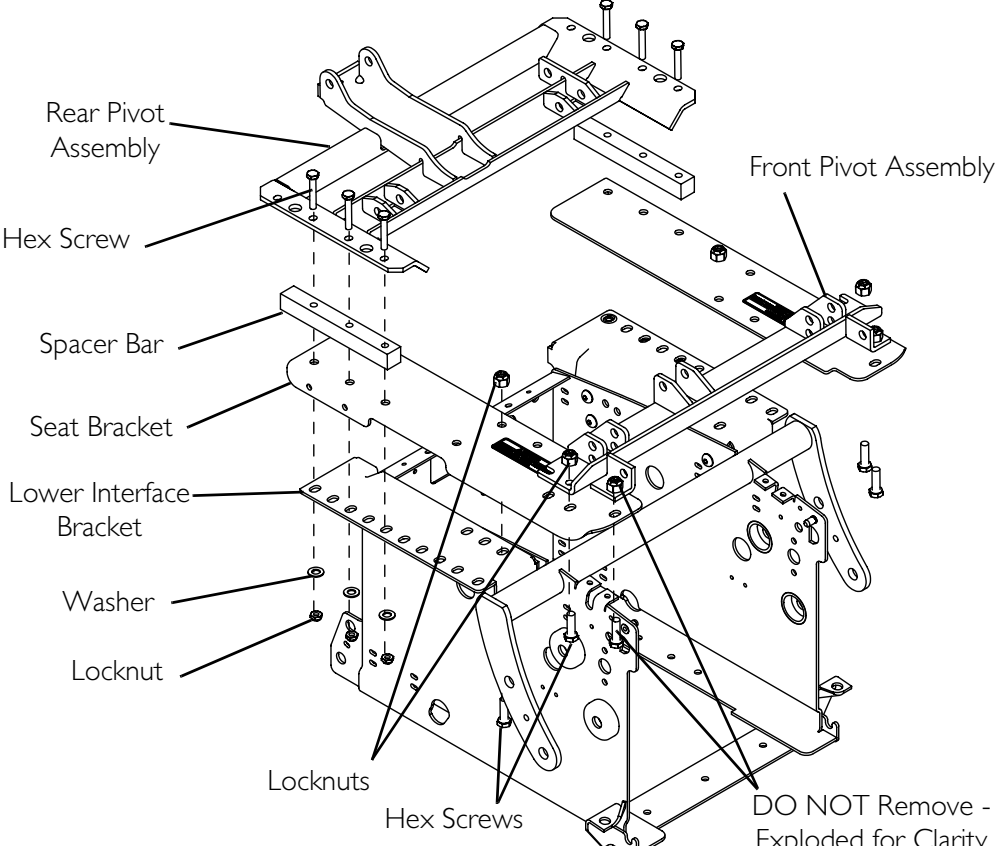
**TABLE 2 - 2GR Systems WITHOUT Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
18-INCH 19-INCH	 <p>Diagram illustrating the mounting position for 18-inch and 19-inch seat depths. The diagram shows the seat bracket, spacer bar, lower interface bracket, rear pivot assembly, front pivot assembly, and various hardware including hex screws, locknuts, washers, and locknuts. A note at the bottom right of the diagram reads "DO NOT Remove - Exploded for Clarity".</p>
<p><b>NOTE:</b> Torque the hardware as listed below:</p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

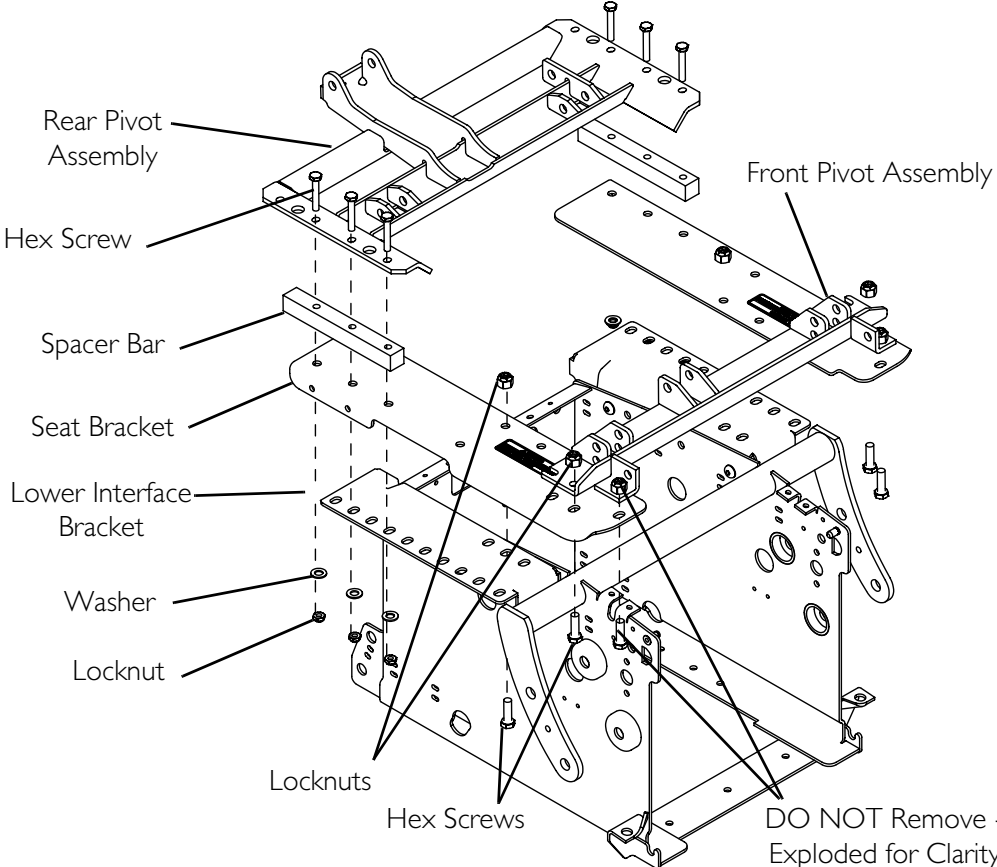
**TABLE 3 - 2GR Systems WITHOUT Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
20-INCH 21-INCH 22-INCH	 <p>Diagram illustrating the mounting position for the seat hardware, showing the following components and their assembly:</p> <ul style="list-style-type: none"> <li>Rear Pivot Assembly</li> <li>Front Pivot Assembly</li> <li>Hex Screw</li> <li>Spacer Bar</li> <li>Locknuts</li> <li>Seat Bracket</li> <li>Washer</li> <li>Locknut</li> <li>Lower Interface Bracket</li> <li>Hex Screws</li> </ul> <p>DO NOT Remove - Exploded for Clarity</p>
<p><b>NOTE:</b> Torque the hardware as listed below:</p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

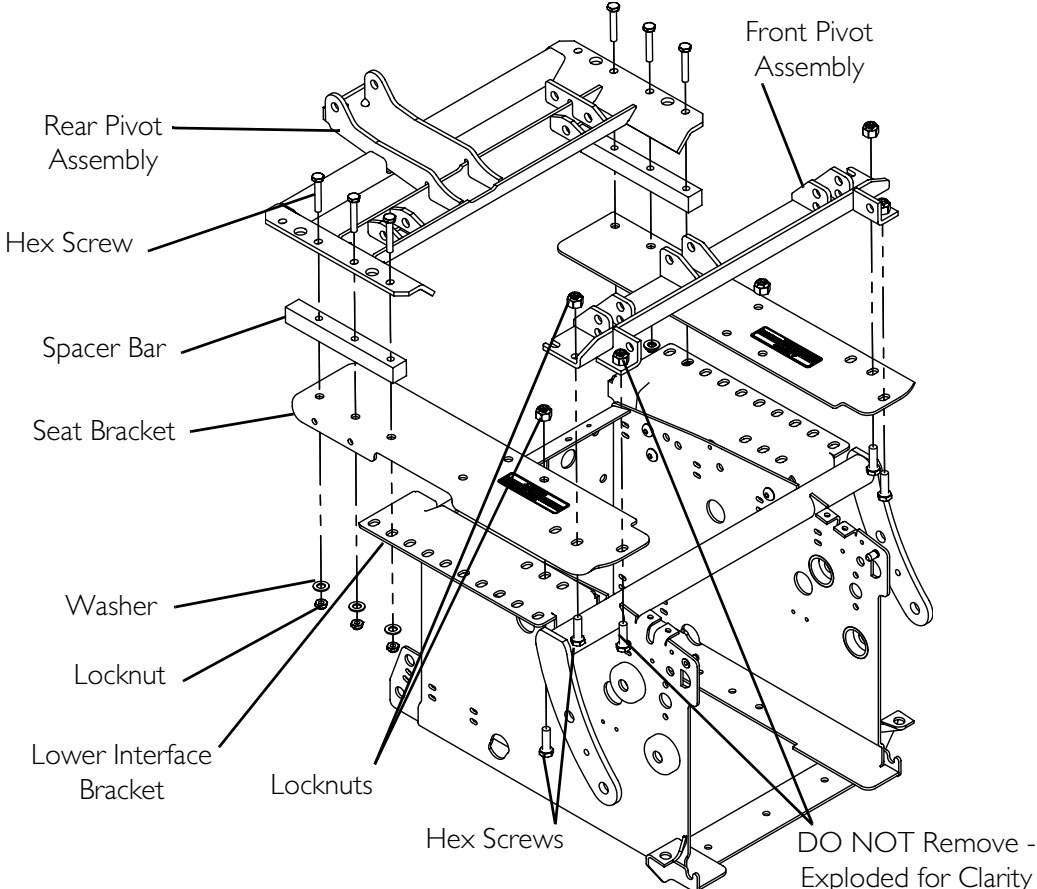
**TABLE 4 - 2GR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
16-INCH	 <p>Rear Pivot Assembly</p> <p>Hex Screw</p> <p>Spacer Bar</p> <p>Seat Bracket</p> <p>Lower Interface Bracket</p> <p>Washer</p> <p>Locknut</p> <p>Locknuts</p> <p>Hex Screws</p> <p>Front Pivot Assembly</p> <p>DO NOT Remove - Exploded for Clarity</p>
<p><b>NOTE:</b> Torque the hardware as listed below:</p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

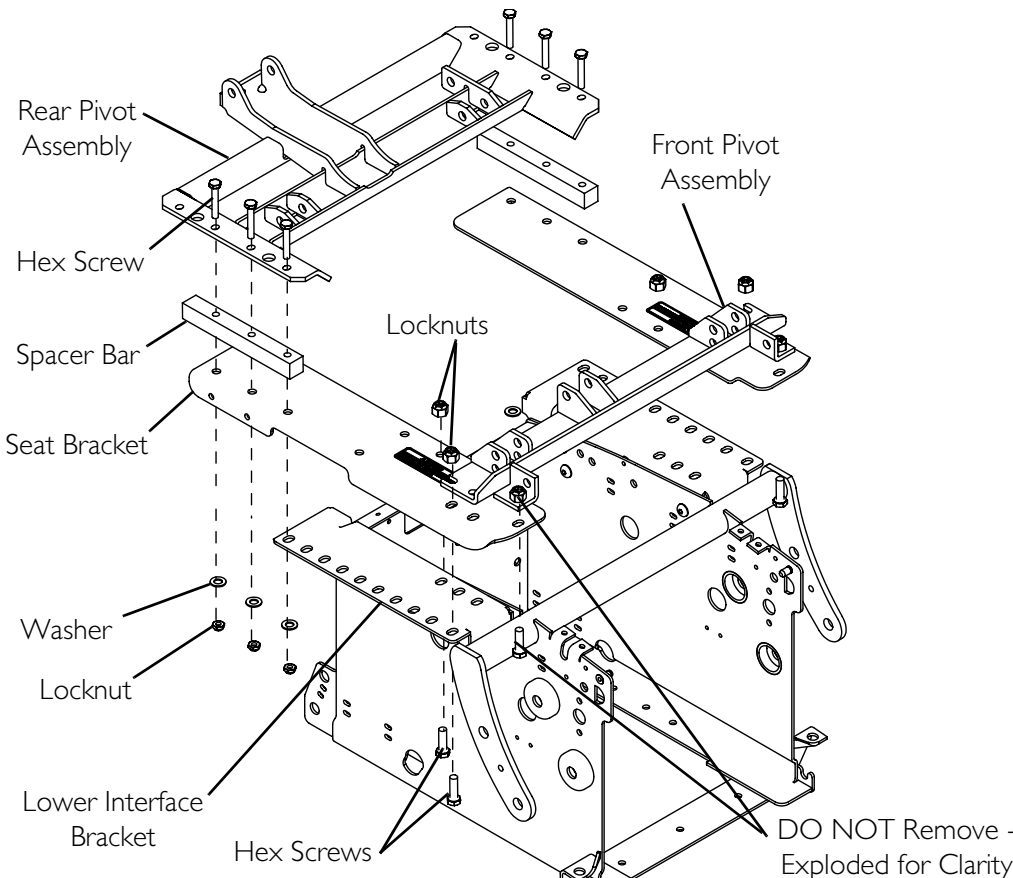
**TABLE 5 - 2GR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
17-INCH 18-INCH 19-INCH	 <p>Rear Pivot Assembly</p> <p>Hex Screw</p> <p>Spacer Bar</p> <p>Seat Bracket</p> <p>Lower Interface Bracket</p> <p>Washer</p> <p>Locknut</p> <p>Locknuts</p> <p>Hex Screws</p> <p>Front Pivot Assembly</p> <p>DO NOT Remove - Exploded for Clarity</p>
<p><b>NOTE:</b> Torque the hardware as listed below:</p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

**TABLE 6 - 2GR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
20-INCH	 <p>Diagram illustrating the mounting position for a 20-inch seat depth. The diagram shows the seat bracket, spacer bar, rear pivot assembly, front pivot assembly, lower interface bracket, and various hardware including hex screws, locknuts, and washers. A note at the bottom right of the diagram reads "DO NOT Remove - Exploded for Clarity".</p>
<p><b>NOTE:</b> Torque the hardware as listed below:</p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

**TABLE 7 - 2GR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
21-INCH 22-INCH	 <p>DO NOT Remove - Exploded for Clarity</p>
<p><b>NOTE:</b> Torque the hardware as listed below:</p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	



## Repositioning the Seat for 2GT and 2GTR Systems

*NOTE: For this procedure, refer to FIGURE 5.1 on page 34 and Table 8 - Table 14 on page 35 to page 41.*

1. Refer to the tables at the end of this procedure to determine if a seat position adjustment is needed.

*NOTE: The seat adjustment tables are based on the seat depth of the system. Some seat depths share the same mounting position.*

2. Note the appropriate mounting holes to use to secure the seating system to the lower interface brackets.
3. Remove the locknut and shoulder bolt to disconnect the front of the tilt actuator from the front pivot assembly.
4. Remove the two hex screws and locknuts securing the insides of the seat brackets to the lower interface brackets.
5. If necessary, remove the four hex screws and locknuts securing the front pivot assembly to the seat brackets and lower interface brackets.

*NOTE: Not all mounting positions require the front pivot assembly to be secured to the lower interface brackets. Some mounting positions require that the front pivot assembly be secured to the seat brackets only. The hex screws securing the front pivot assembly to the seat brackets DO NOT need to be removed.*

6. Remove the four socket screws, washers and locknuts securing the linear guides, rear pivot assembly, shims\* and seat brackets to the lower interface brackets.

*NOTE: To remove the hardware securing the linear guides, it is necessary to slide the rear pivot assembly back and forth. Use the access holes to remove the socket screws from mounting holes in the lower portion of the linear guides (FIGURE 5.1).*

*\*NOTE: Shims are not present on seating systems manufactured after 12/18/2005.*

7. Adjust the position of the seating system on the lower interface brackets.
8. Using the two hex screws and locknuts removed in STEP 4, secure the insides of the seat brackets to the lower interface brackets. Torque to 13 ft-lbs  $\pm$  20%.
9. Using the four hex screws and locknuts removed in STEP 5, secure the front pivot assembly to the front of the seat brackets and the front of the seat brackets to the lower interface brackets. Torque to 13 ft-lbs  $\pm$  20%.

*NOTE: Not all mounting positions require the front pivot assembly to be secured to the lower interface brackets. Some mounting positions require that the front pivot assembly be secured to the seat brackets only.*

10. Using the four socket screws, washers and locknuts removed in STEP 6, secure the linear guides, rear pivot assembly and shims\* to the seat brackets and lower interface brackets. Hand tighten.

*NOTE: To secure the linear guides, it is necessary to slide the rear pivot assembly back and forth. Use the access holes to install the socket screws through mounting holes in the lower portion of the linear guides (FIGURE 5.1).*

\*NOTE: Shims are not present on seating systems manufactured after 12/18/2005.

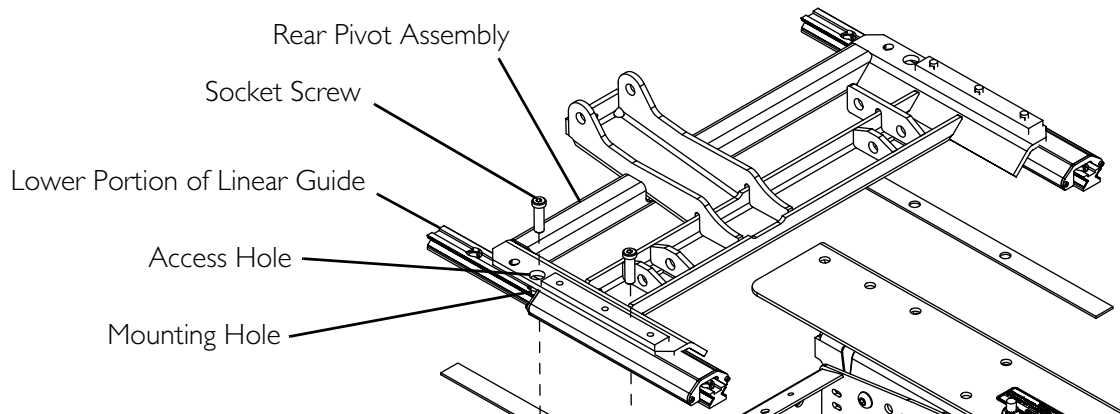
### CAUTION

The linear guides **MUST** be parallel and the rear pivot assembly **MUST** move freely on the linear guides. Otherwise, damage to the seating system will occur during operation.

11. Adjust the linear guides until they are parallel.
12. Slide the rear pivot assembly forward and back to see if it slides freely on the linear guides.
13. Perform one of the following:
  - Rear Pivot Assembly Slides Freely - Proceed to STEP 14.
  - Rear Pivot Assembly Is Hard To Move - Repeat STEP 11 and STEP 12 until the rear pivot assembly moves freely.

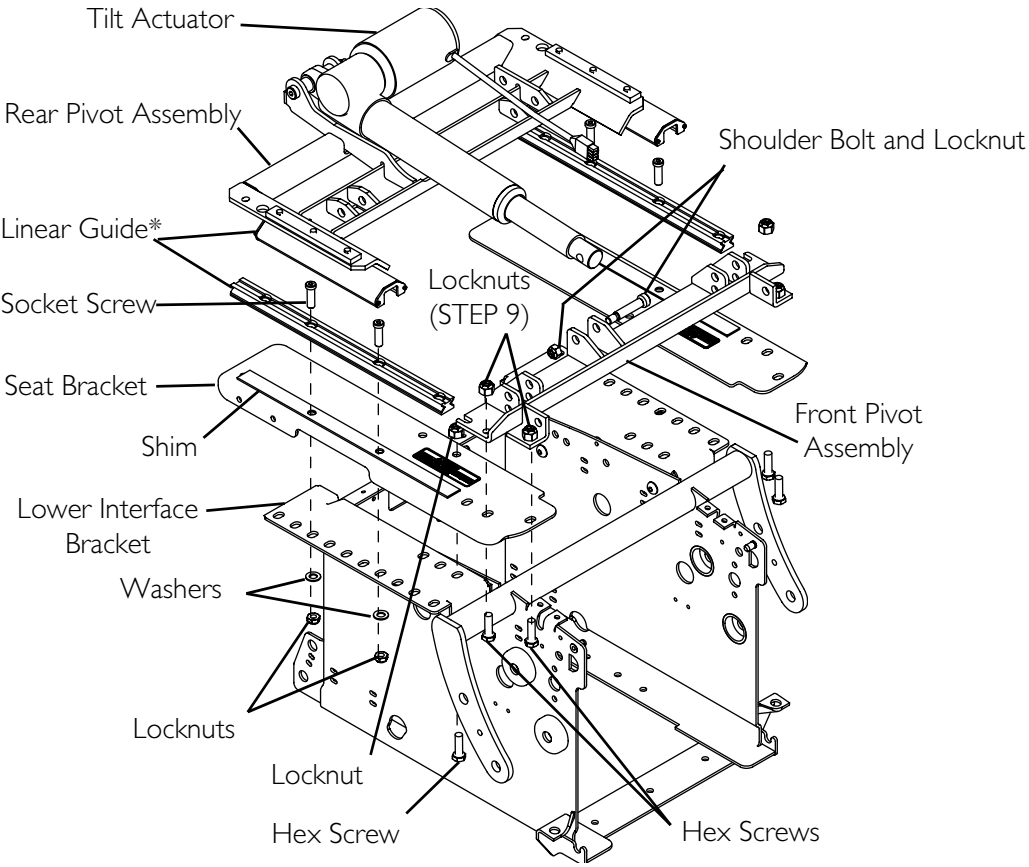
NOTE: It may be necessary to loosen the screws installed in STEP 10 to adjust the linear guides.

14. Torque the socket screws to 75 in-lbs  $\pm$  20%.
15. Install the shoulder bolt and locknut to secure the front of the tilt actuator to the front pivot assembly. Torque to 23 ft-lbs  $\pm$  20%.
16. Perform the post-service inspection checklist. Refer to Post-Service Inspection Checklist on page 21.

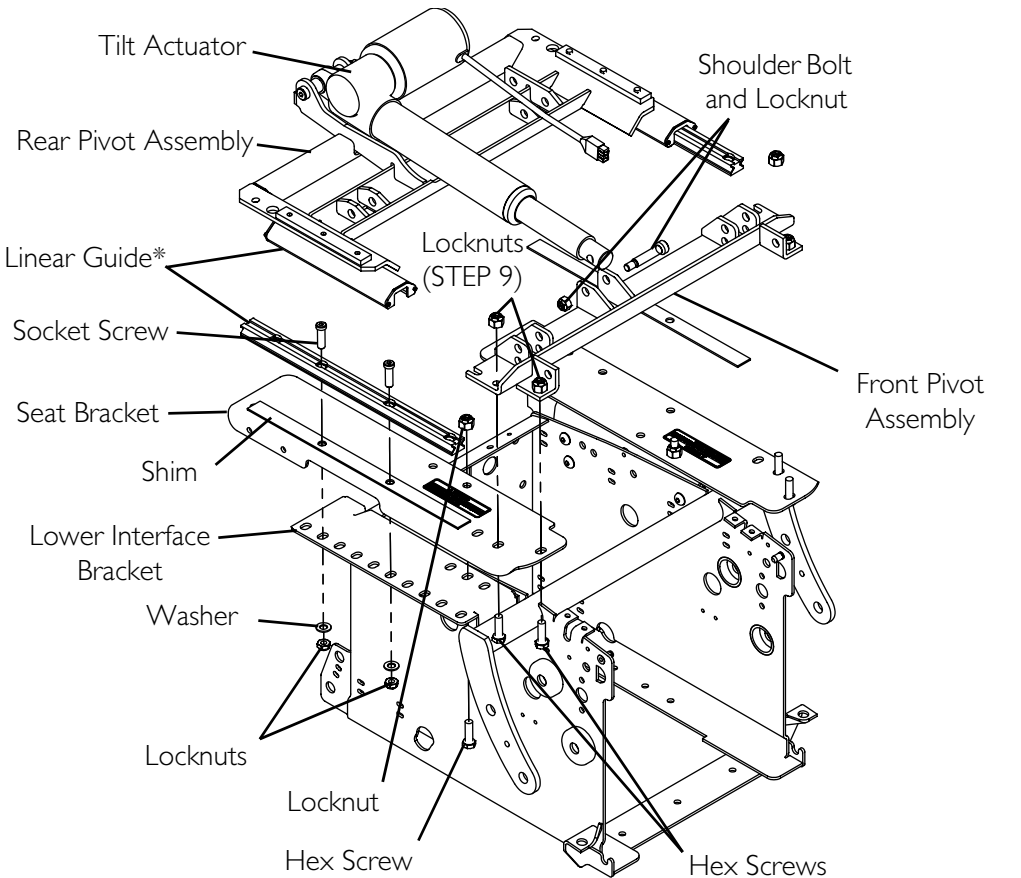


**FIGURE 5.1** Repositioning the Seat for 2GT and 2GTR Systems - Securing the Linear Guides

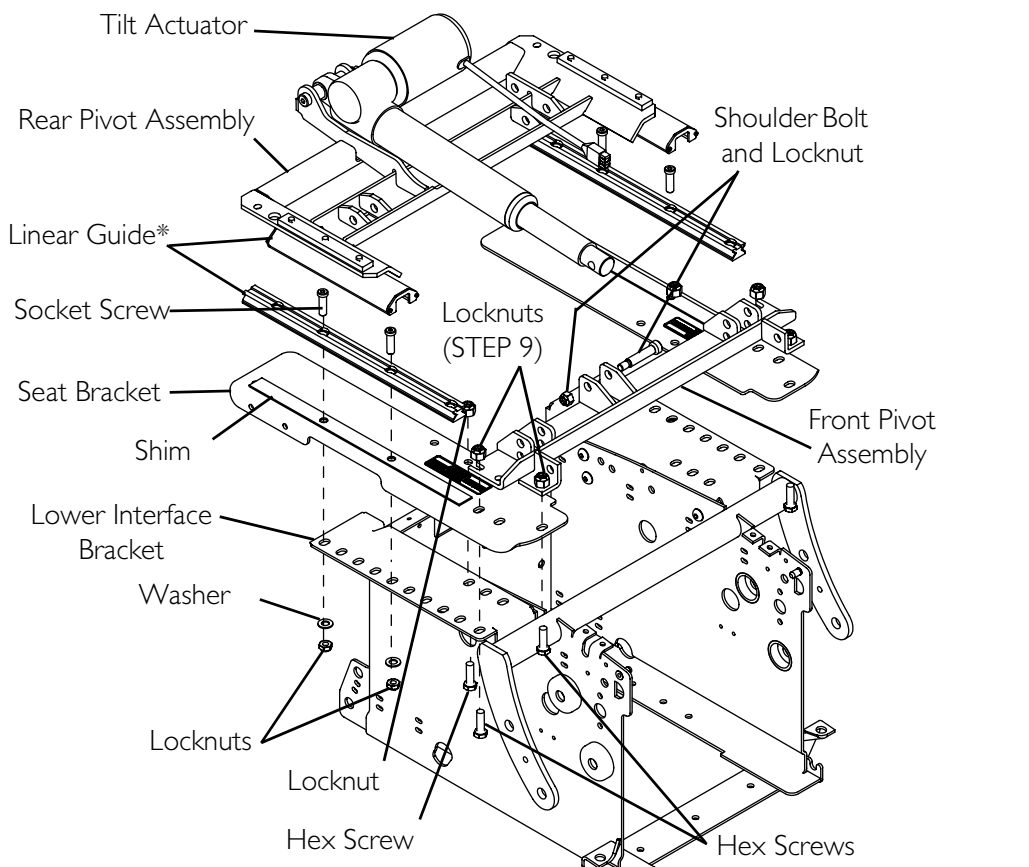
**TABLE 8 - 2GT and 2GTR Systems WITHOUT Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
16-INCH 17-INCH	<p><i>*NOTE: Linear guides are exploded for clarity. DO NOT disconnect the upper and lower portions of the linear guides. The linear guide cannot be reassembled.</i></p>  <p>The diagram is an exploded view of the seat mounting hardware. It shows the following components and their assembly points:</p> <ul style="list-style-type: none"> <li><b>Tilt Actuator:</b> Located at the top, connected to the rear pivot assembly.</li> <li><b>Rear Pivot Assembly:</b> Connects the tilt actuator to the seat bracket.</li> <li><b>Linear Guide*:</b> Exploded view showing its connection to the seat bracket and the lower interface bracket.</li> <li><b>Socket Screw:</b> Used to secure the rear pivot assembly to the seat bracket.</li> <li><b>Seat Bracket:</b> The main component that holds the seat.</li> <li><b>Shim:</b> A thin plate used to adjust the seat's position.</li> <li><b>Lower Interface Bracket:</b> Connects the seat bracket to the seat base.</li> <li><b>Washers:</b> Used to secure the lower interface bracket to the seat base.</li> <li><b>Locknuts:</b> Used to secure the lower interface bracket to the seat base.</li> <li><b>Hex Screw:</b> Used to secure the lower interface bracket to the seat base.</li> <li><b>Front Pivot Assembly:</b> Connects the seat bracket to the seat base.</li> <li><b>Shoulder Bolt and Locknut:</b> Used to secure the front pivot assembly to the seat base.</li> <li><b>Locknuts (STEP 9):</b> Used to secure the front pivot assembly to the seat base.</li> <li><b>Hex Screws:</b> Used to secure the front pivot assembly to the seat base.</li> </ul>
<p><b>NOTE: Torque the hardware as listed below:</b></p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

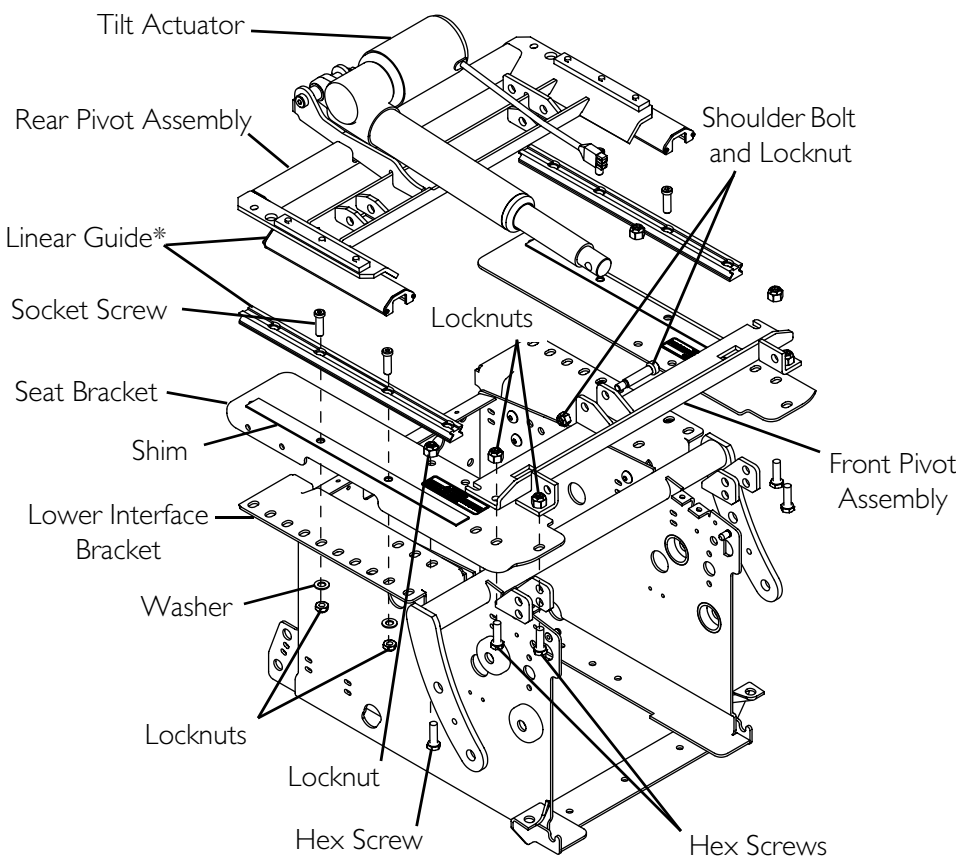
**TABLE 9 - 2GT and 2GTR Systems WITHOUT Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
18-INCH 19-INCH	<p><i>*NOTE: Linear guides are exploded for clarity. DO NOT disconnect the upper and lower portions of the linear guides. The linear guide cannot be reassembled.</i></p>  <p>Labels in diagram:</p> <ul style="list-style-type: none"> <li>Tilt Actuator</li> <li>Rear Pivot Assembly</li> <li>Linear Guide*</li> <li>Socket Screw</li> <li>Seat Bracket</li> <li>Shim</li> <li>Lower Interface Bracket</li> <li>Washer</li> <li>Locknuts</li> <li>Locknut</li> <li>Hex Screw</li> <li>Hex Screws</li> <li>Shoulder Bolt and Locknut</li> <li>Locknuts (STEP 9)</li> <li>Front Pivot Assembly</li> </ul>
<p><b>NOTE: Torque the hardware as listed below:</b></p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

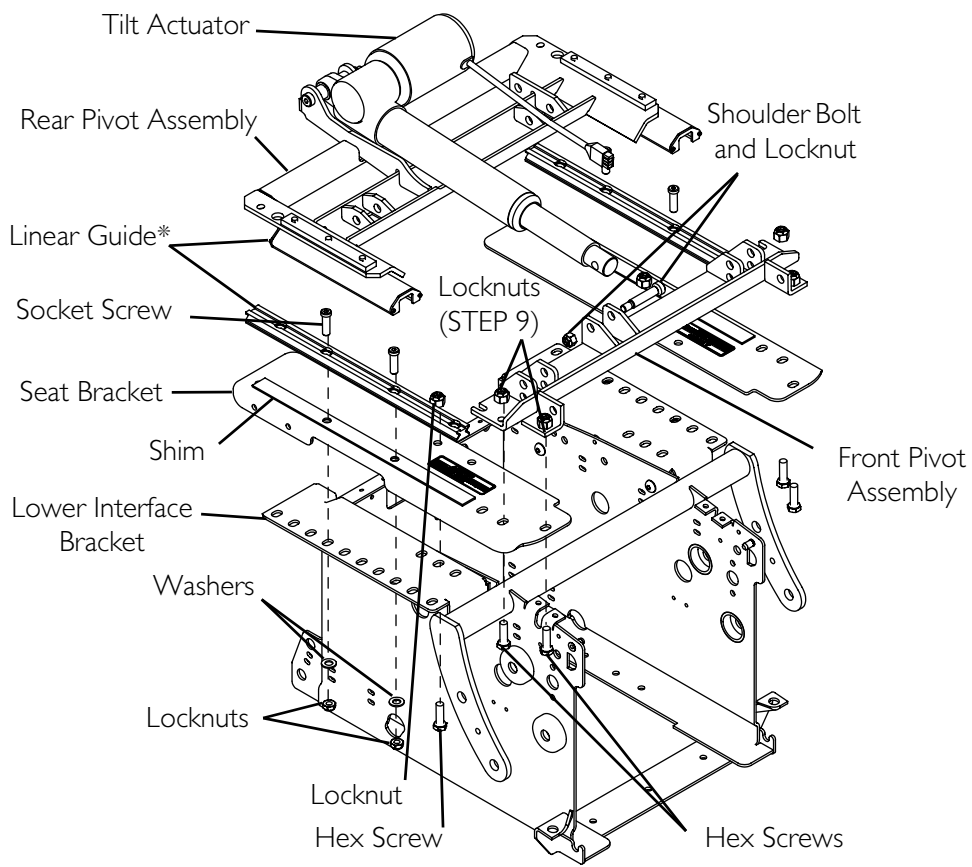
**TABLE 10 - 2GT and 2GTR Systems WITHOUT Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
20-INCH 21-INCH 22-INCH	<p><i>*NOTE: Linear guides are exploded for clarity. DO NOT disconnect the upper and lower portions of the linear guides. The linear guide cannot be reassembled.</i></p> 
<p><b>NOTE: Torque the hardware as listed below:</b></p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

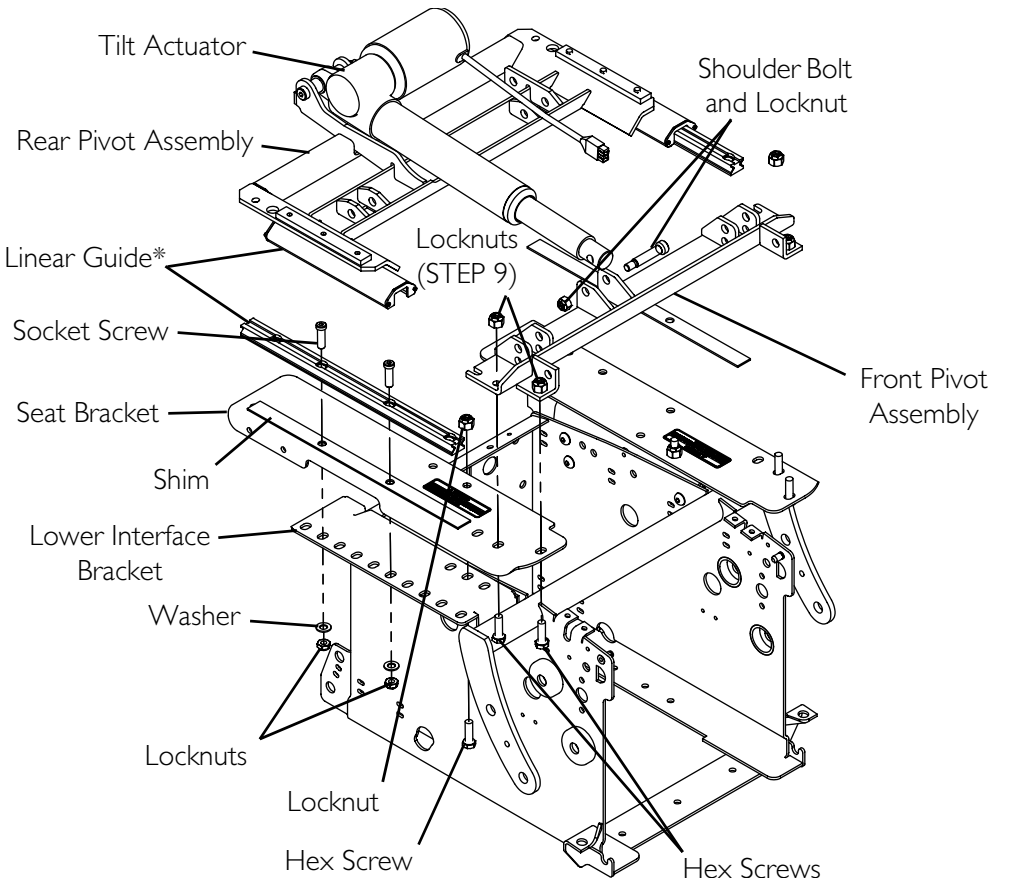
**TABLE 11 - 2GT and 2GTR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
16-INCH	<p><i>*NOTE: Linear guides are exploded for clarity. DO NOT disconnect the upper and lower portions of the linear guides. The linear guide cannot be reassembled.</i></p> 
<p><b>NOTE: Torque the hardware as listed below:</b></p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

**TABLE 12 - 2GT and 2GTR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

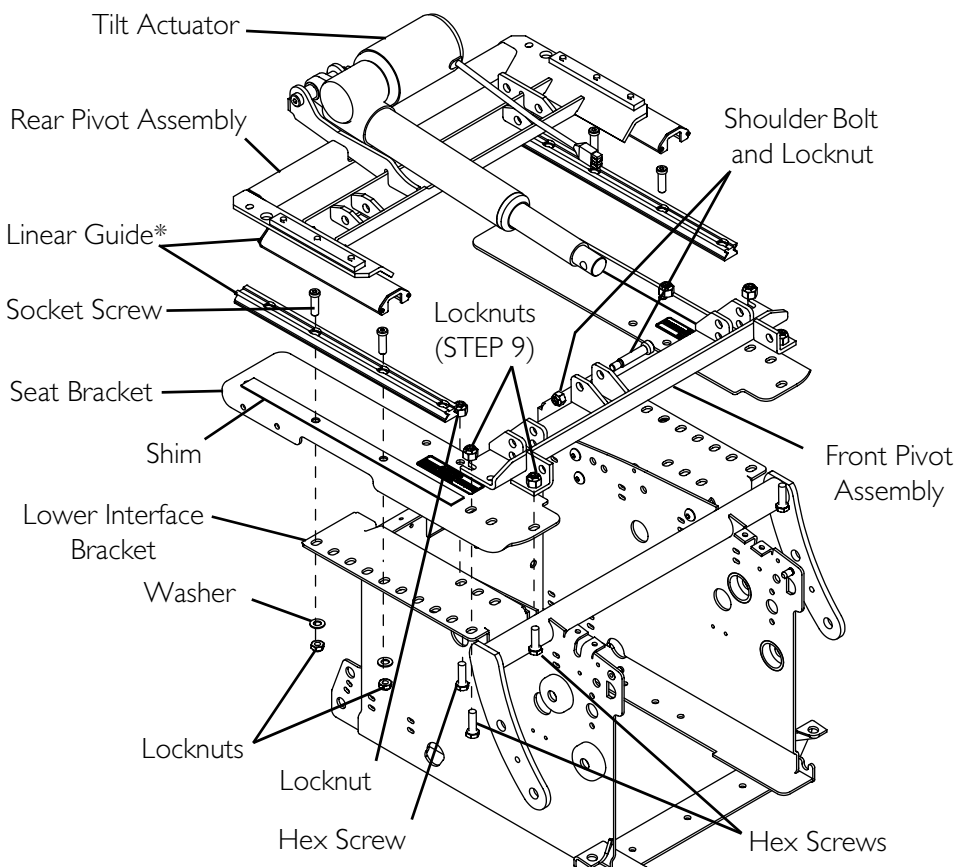
SEAT DEPTH	MOUNTING POSITION
17-INCH 18-INCH 19-INCH	<p><i>*NOTE: Linear guides are exploded for clarity. DO NOT disconnect the upper and lower portions of the linear guides. The linear guide cannot be reassembled</i></p> 
<p><b>NOTE: Torque the hardware as listed below:</b></p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	

**TABLE 13 - 2GT and 2GTR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
20-INCH	<p><i>*NOTE: Linear guides are exploded for clarity. DO NOT disconnect the upper and lower portions of the linear guides. The linear guide cannot be reassembled.</i></p> 
<p><b>NOTE: Torque the hardware as listed below:</b></p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs <math>\pm</math> 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs <math>\pm</math> 20%.</li> </ul>	



**TABLE 14 - 2GT and 2GTR Systems WITH Center Mount Footrests AND Ventilator-Ready Battery Tray**

SEAT DEPTH	MOUNTING POSITION
21-INCH 22-INCH	<p><i>*NOTE: Linear guides are exploded for clarity. DO NOT disconnect the upper and lower portions of the linear guides. The linear guide cannot be reassembled.</i></p> 
<p><b>NOTE: Torque the hardware as listed below:</b></p> <ul style="list-style-type: none"> <li>• Hex screws or socket screws (securing the rear pivot): 75 in-lbs ± 20%.</li> <li>• Hex screws (securing the front pivot assembly and front of seat bracket) and shoulder screw (securing the tilt actuator): 13 ft-lbs ± 20%.</li> </ul>	

## Removing/Installing the Rear Pivot Assembly

### Tilt Only and Tilt/Recline Systems

*NOTE: For this procedure, refer to FIGURE 5.2 on page 43.*

#### Removing

1. Remove the seat assembly. Refer to [Removing/Installing the Seat](#) on page 75.

2. Remove the shoulder bolt, two bushings and locknut securing the rear of the tilt actuator to the rear pivot assembly.
3. Slide the rear pivot assembly forward.
4. Align the rear access holes with the rear two socket screws securing the rear of the lower portion of the linear guides to the seat bracket.

*NOTE: If necessary, remove the batteries and turn the wheelchair on its side to check the alignment of the hardware with the access hole.*

5. Remove the two socket screws, washers and locknuts securing the rear of the lower portion of the linear guides to the seat bracket.
6. Slide the rear pivot assembly backward.
7. Align the rear access holes with the rear two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.
8. Remove the two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.
9. Slide the rear pivot assembly forward.
10. Align the access holes revealed after performing STEP 6 with the front two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.
11. Repeat STEPS 9 and 10 for the remaining two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.
12. Remove the clamp bars and rear pivot assembly from the wheelchair.

### Installing

1. Reverse STEP 7 to STEP 12 in Removing to install the rear pivot onto the linear guides. Torque socket screws to 75 in-lbs  $\pm$  20%.
2. Reverse STEP 3 to STEP 6 in Removing to install the linear guides onto the seat bracket. Hand tighten the two socket screws securing the linear guides to the seat brackets.

---

### CAUTION

**The linear guides MUST be parallel and the rear pivot assembly MUST move freely on the linear guides. Otherwise, damage to the seating system will occur during operation.**

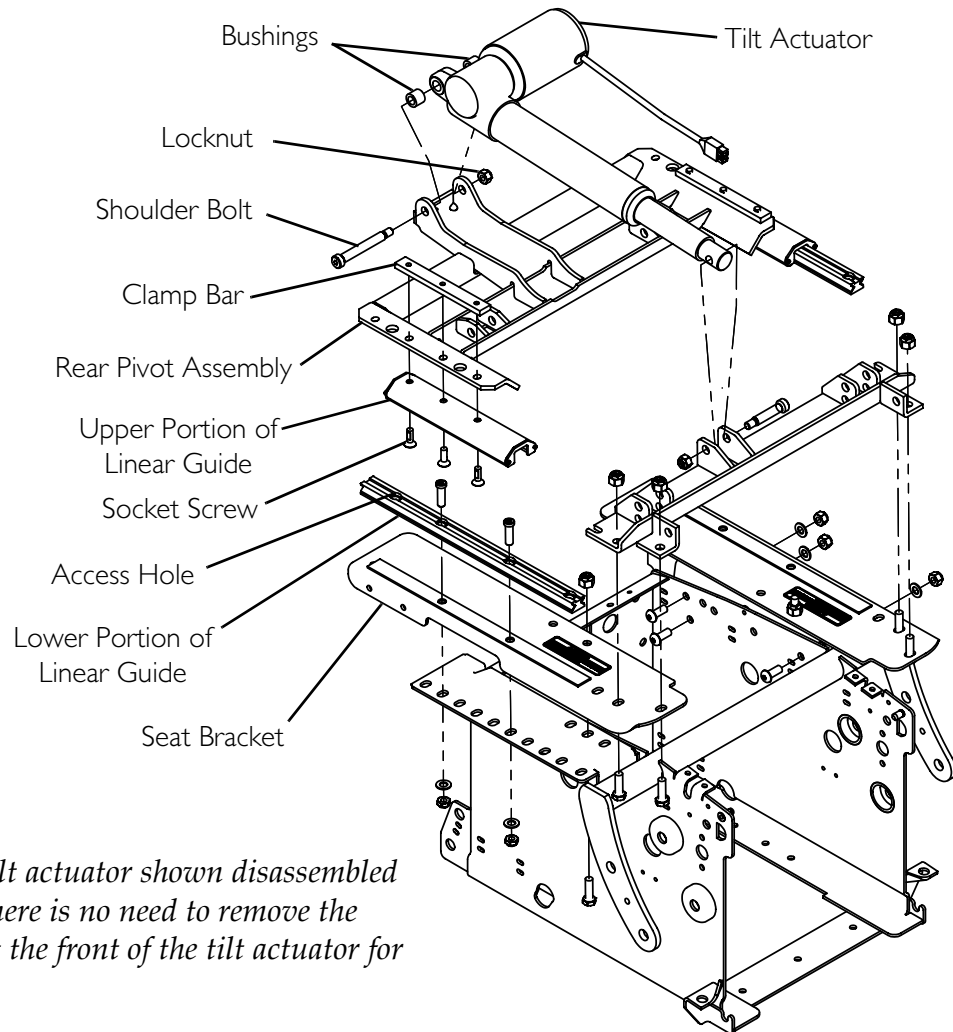
---

3. Adjust the linear guides until they are parallel.
4. Slide the rear pivot assembly forward and back to see if it slides freely on the linear guides.
5. Perform one of the following:
  - Rear Pivot Assembly Slides Freely - Proceed to STEP 6.

- Rear Pivot Assembly Is Hard To Move - Repeat STEP 3 and STEP 4 until the rear pivot assembly moves freely.

*NOTE: It may be necessary to loosen the socket screws to adjust the linear guides.*

6. Torque the socket screws to 75 in-lbs  $\pm$  20%.
7. Secure the rear of the tilt actuator to the rear pivot assembly using the shoulder bolt, two bushings and the locknut. Torque to 23 ft-lbs  $\pm$  20%.
8. Install the seat assembly. Refer to Removing/Installing the Seat on page 75.



*NOTE: Front of tilt actuator shown disassembled for clarity only. There is no need to remove the hardware securing the front of the tilt actuator for this procedure.*

**FIGURE 5.2** Removing/Installing the Rear Pivot Assembly - Tilt Only and Tilt/Recline Systems

## Recline Only Systems

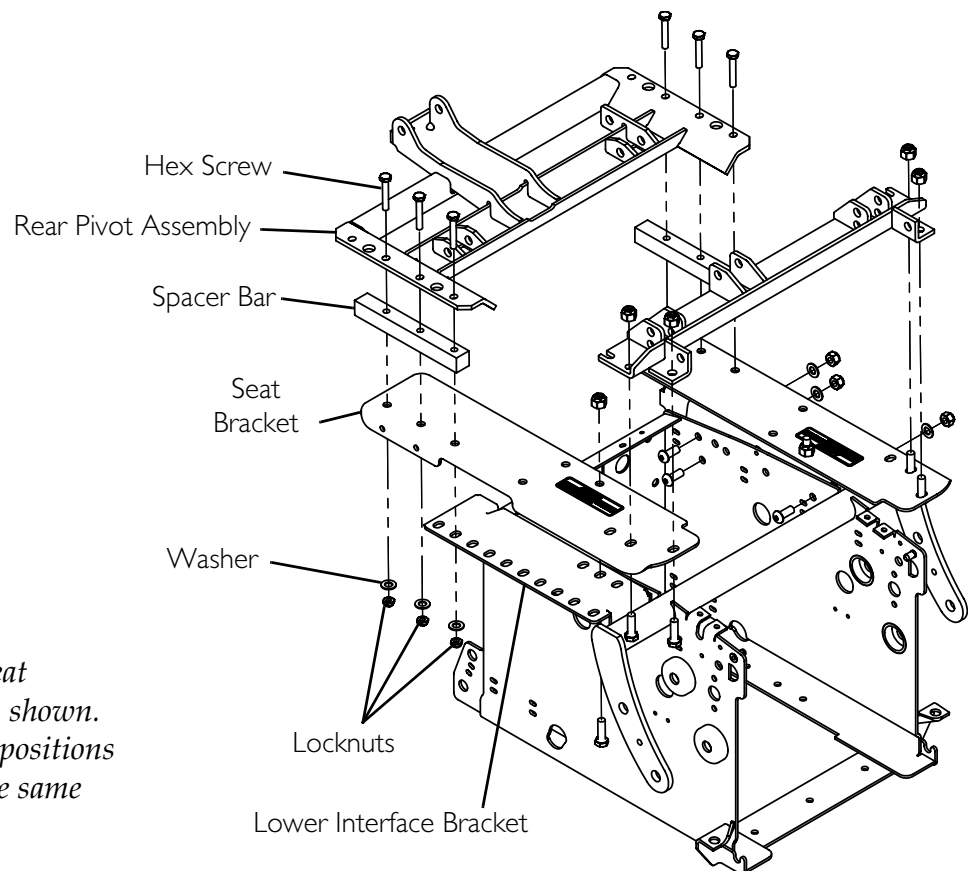
NOTE: For this procedure, refer to FIGURE 5.3.

### Removing

1. Remove the seat assembly. Refer to Removing/Installing the Seat on page 75.
2. Note the mounting location of the six hex screws, washers and locknuts securing the rear pivot assembly to the spacer bars, seat brackets and lower interface brackets.
3. Remove the six hex screws, washers and locknuts securing the rear pivot assembly to the spacer bars, seat brackets and lower interface brackets.
4. Remove the rear pivot assembly from the wheelchair.

### Installing

1. Align the rear pivot assembly, spacer bars, seat brackets and lower interface brackets.
2. Using the six hex screws, washers and locknuts, secure the rear pivot assembly to the spacer bars, seat brackets and lower interface brackets in the locations noted in STEP 2 of Removing on page 44. Torque to 75 in-lbs  $\pm$  20%.
3. Install the seat assembly. Refer to Removing/Installing the Seat on page 75.



NOTE: Only one seat adjustment position shown. All seat adjustment positions remove/install in the same way.

**FIGURE 5.3** Removing/Installing the Rear Pivot Assembly

## Removing/Installing the Front Pivot Assembly

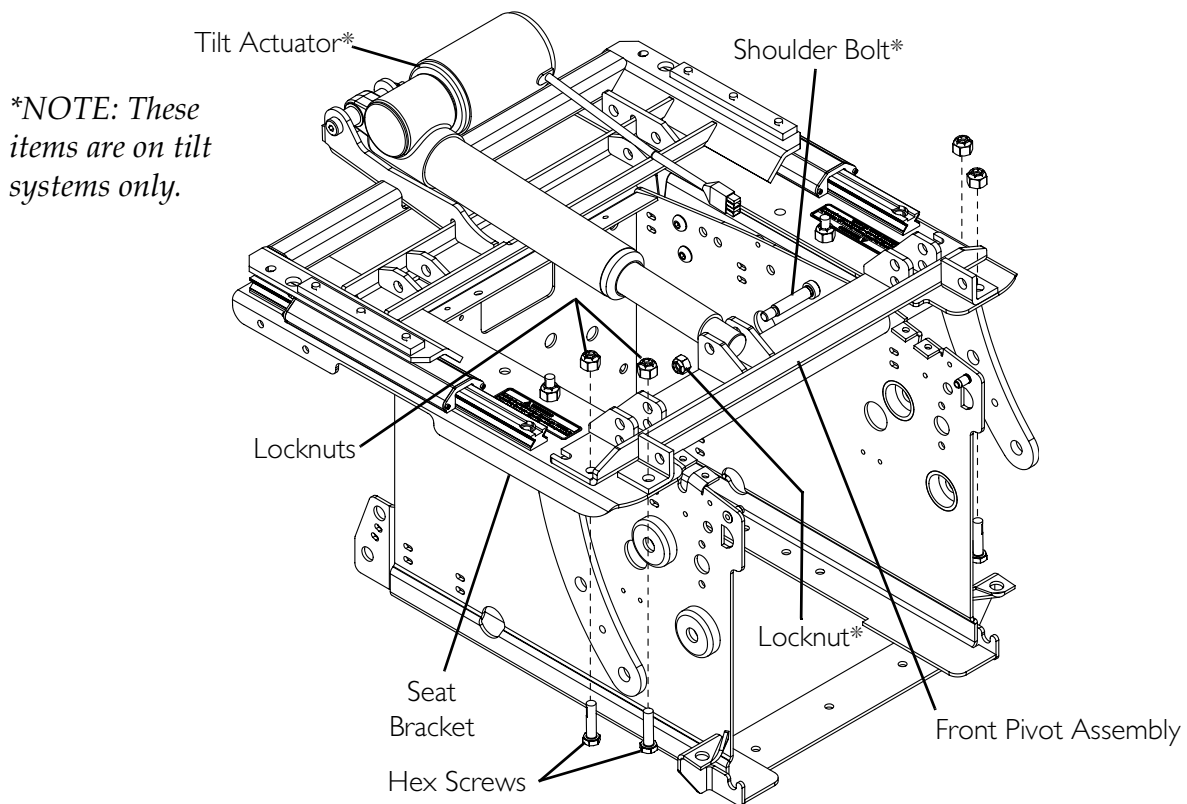
*NOTE: For this procedure, refer to FIGURE 5.4 on page 46.*

### Removing

1. Remove the seat assembly. Refer to [Removing/Installing the Seat](#) on page 75.
2. Tilt Only and Tilt/Recline Systems - Remove the shoulder bolt and locknut securing the front of the tilt actuator to the front pivot assembly.
3. Note the mounting location of the four hex screws and locknuts securing the front pivot assembly to the seat brackets.
4. Remove the four hex screws and locknut securing the front pivot assembly to the seat brackets.
5. Remove the front pivot assembly from the seat brackets.

### Installing

1. Align the front pivot assembly with the seat brackets.
2. Secure the front pivot assembly to the seat brackets in the location noted in STEP 3 of [Removing](#) on page 45. Torque to 13 ft-lbs  $\pm$  20%.
3. Tilt Only and Tilt/Recline Systems - Secure the front of the tilt actuator to the front pivot assembly using the shoulder bolt and the locknut. Torque to 23 ft-lbs  $\pm$  20%.
4. Install the seat assembly. Refer to [Removing/Installing the Seat](#) on page 75.



**FIGURE 5.4** Removing/Installing the Front Pivot Assembly

## Removing/Installing the Linear Guides

*NOTE: For this procedure, refer to FIGURE 5.5 on page 48.*

*NOTE: This procedure applies to Tilt Only and Tilt/Recline Systems Only.*

### Removing

1. Remove the seat assembly from the rear pivot assembly. Refer to Removing/Installing the Seat on page 75.
2. Remove the shoulder bolt, two bushings and locknut securing the rear of the tilt actuator to the rear pivot assembly.
3. Slide the rear pivot assembly forward.
4. Align the rear access holes with the rear two socket screws securing the rear of the lower portion of the linear guides to the seat bracket.

*NOTE: If necessary, remove the batteries and turn the wheelchair on its side to check the alignment of the hardware with the access hole.*

5. Remove the two socket screws, washers and locknuts securing the rear of the lower portion of the linear guides to the seat bracket.
6. Slide the rear pivot assembly backward.

7. Remove the two socket screws, washers and locknuts securing the front of the lower portion of the linear guides to the seat bracket.
8. Slide the rear pivot assembly backward.
9. Align the rear access holes with the rear two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.
10. Remove the two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.
11. Slide the rear pivot assembly forward.
12. Align the access holes revealed after performing STEP 6 with the front two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.
13. Repeat STEP 10 and STEP 11 for the remaining two socket screws securing the upper portion of the linear guides and clamp bars to the rear pivot assembly.

*NOTE: Retain the clamp bars for reinstallation.*

### **Installing**

1. Reverse STEP 8 to STEP 13 in Removing to install the rear pivot onto the linear guides. Torque socket screws to 75 in-lbs  $\pm$  20%.
2. Reverse STEP 3 to STEP 7 in Removing to install the linear guides onto the seat bracket. Hand tighten the two socket screws securing the linear guides to the seat brackets.

---

### **CAUTION**

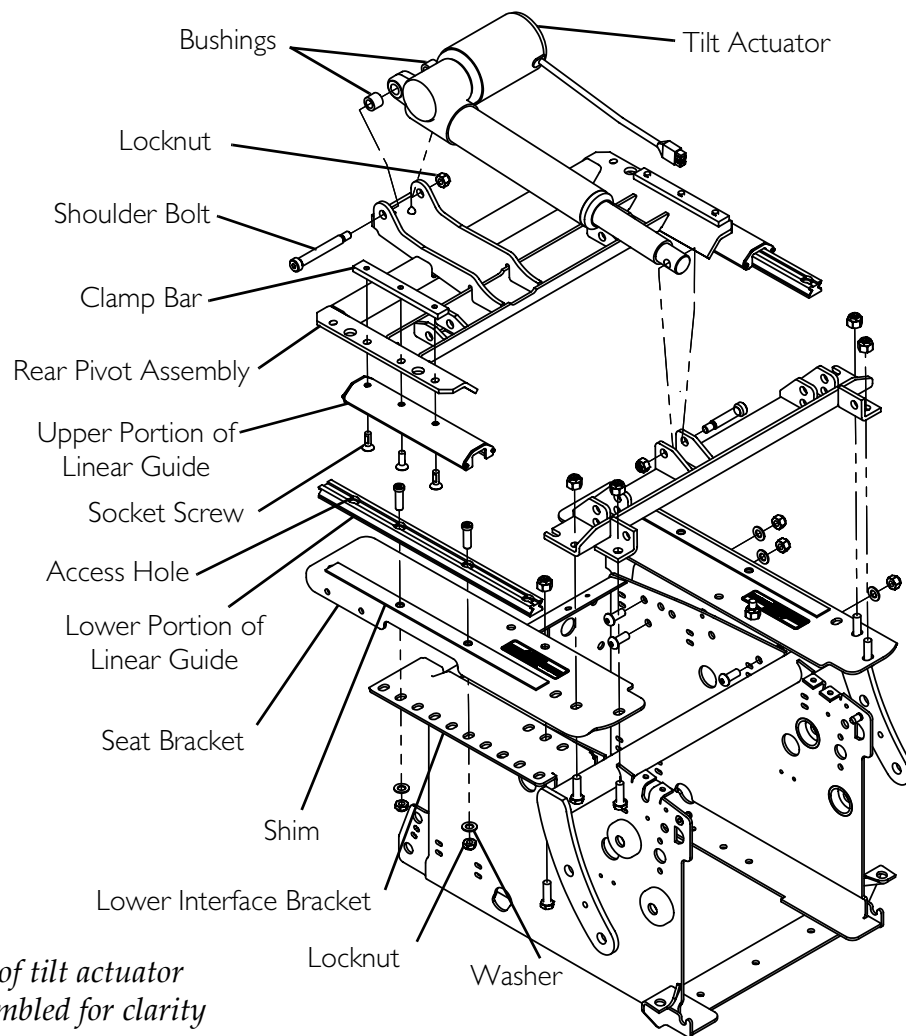
**The linear guides MUST be parallel and the rear pivot assembly MUST move freely on the linear guides. Otherwise, damage to the seating system will occur during operation.**

---

3. Adjust the linear guides until they are parallel.
4. Slide the rear pivot assembly forward and back to see if it slides freely on the linear guides.
5. Perform one of the following:
  - Rear Pivot Assembly Slides Freely - Proceed to STEP 6.
  - Rear Pivot Assembly Is Hard To Move - Repeat STEP 3 and STEP 4 until the rear pivot assembly moves freely.

*NOTE: It may be necessary to loosen the socket screws to adjust the linear guides.*

6. Torque the socket screws to 75 in-lbs  $\pm$  20%.
7. Secure the rear of the tilt actuator to the rear pivot assembly using the shoulder bolt, two bushings and the locknut. Torque to 23 ft-lbs  $\pm$  20%.
8. Install the seat assembly. Refer to Removing/Installing the Seat on page 75.



*NOTE: Front of tilt actuator shown disassembled for clarity only. There is no need to remove the hardware securing the front of the tilt actuator for this procedure.*

**FIGURE 5.5** Removing/Installing the Linear Guides

## Removing/Installing the Seat Brackets

### Tilt Only and Tilt/Recline Systems

*NOTE: For this procedure, refer to FIGURE 5.6 on page 50.*

#### Removing

1. Remove the seat assembly from the rear pivot assembly. Refer to Removing/Installing the Seat on page 75.
2. Note the mounting location of the four hex screws and locknuts securing the front pivot assembly to the seat brackets.



3. Remove the four hex screws and locknuts securing the front pivot assembly to the seat brackets.
4. Remove the front pivot assembly from the seat brackets.
5. Note the mounting location of the hex screw and locknut securing the inside of the seat bracket to the lower interface bracket.
6. Remove the hex screw and locknut securing the inside of the seat bracket to the lower interface bracket.
7. Slide the rear pivot assembly forward.
8. Note the mounting location of the two socket screws, washers and locknuts securing the lower portion of the linear guide to the shim\*, seat bracket and lower interface bracket.

*\*NOTE: Shims are not present on seating systems manufactured after 12/18/2005.*

9. Align the rear access holes with the rear two socket screws securing the rear of the lower portion of the linear guides to the seat bracket.

*NOTE: If necessary, remove the batteries and turn the wheelchair on its side to check the alignment of the hardware with the access hole.*

10. Remove the two socket screws, washers and locknuts securing the rear of the lower portion of the linear guides to the seat bracket.
11. Slide the rear pivot assembly backward.
12. Remove the two socket screws, washers and locknuts securing the front of the lower portion of the linear guides to the seat bracket.
13. Remove the seat bracket from the lower interface bracket.
14. Repeat STEP 8 to STEP 13 for the opposite side if desired.

### **Installing**

1. Using the hex screws and locknuts, secure the insides of the seat brackets to the lower interface brackets in the location noted in STEP 5 of Removing. Torque to 13 ft-lbs  $\pm$  20%.
2. Reverse STEP 7 to STEP 12 in Removing to install the linear guides onto the seat bracket. Hand tighten the two socket screws securing the linear guides to the seat brackets.

---

### **CAUTION**

**The linear guides MUST be parallel and the rear pivot assembly MUST move freely on the linear guides. Otherwise, damage to the seating system will occur during operation.**

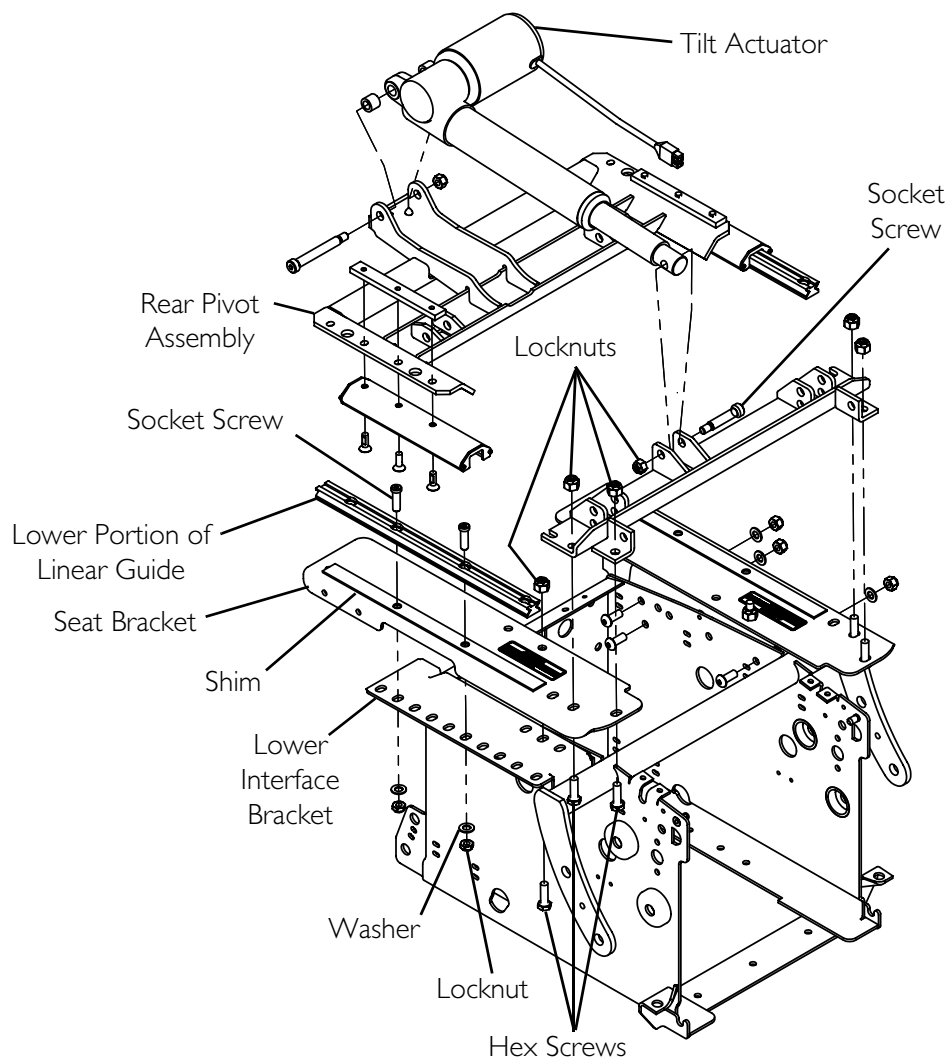
---

3. Adjust the linear guides until they are parallel.
4. Slide the rear pivot assembly forward and back to see if it slides freely on the linear guides.

5. Perform one of the following:
  - If the rear pivot assembly slide freely, proceed to STEP 6.
  - If the rear pivot assembly is hard to move, repeat STEP 3 and STEP 4 until the rear pivot assembly moves freely.

*NOTE: It may be necessary to loosen the socket screws to adjust the linear guides.*

6. Torque the socket screws to 75 in-lbs  $\pm$  20%.
7. Align the front pivot assembly with the seat brackets.
8. Secure the front pivot assembly to the seat brackets in the location noted in STEP 1 of Removing. Torque to 13 ft-lbs  $\pm$  20%.
9. Secure the front of the tilt actuator to the front pivot assembly using the shoulder screw and locknut. Torque to 23 ft-lbs  $\pm$  20%.
10. Install the seat assembly. Refer to Removing/Installing the Seat on page 75.



**FIGURE 5.6** Removing/Installing the Seat Brackets - Tilt Only and Tilt/Recline Systems

## Recline Only Systems

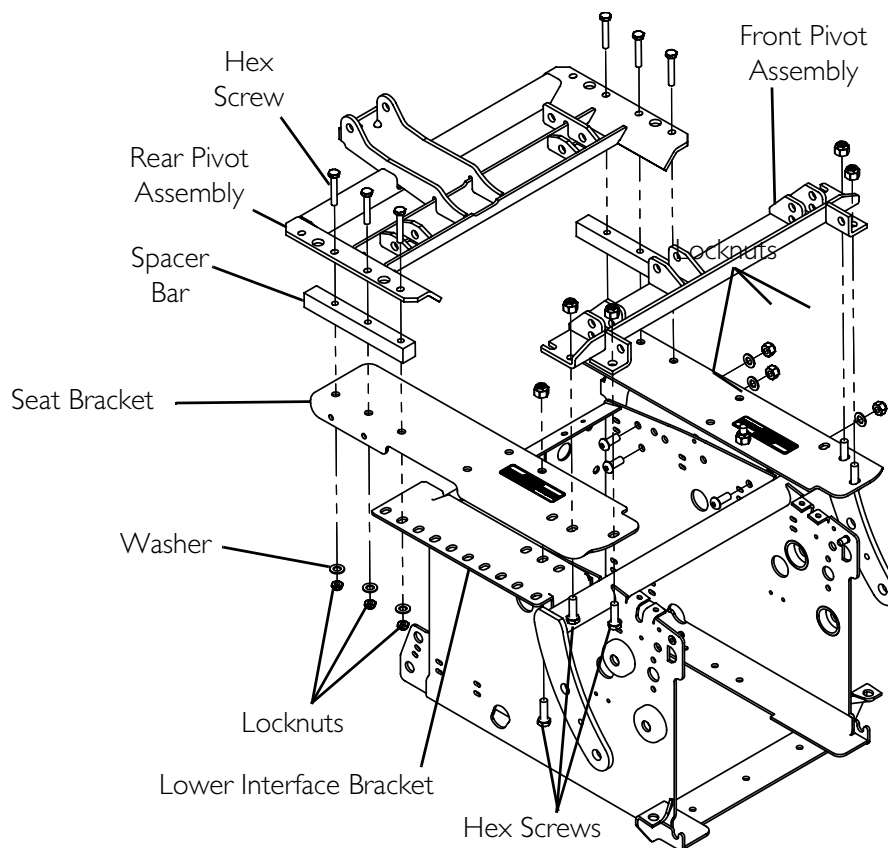
NOTE: For this procedure, refer to FIGURE 5.7 on page 52.

### Removing

1. Remove the seat assembly from the rear pivot assembly. Refer to [Removing/Installing the Seat](#) on page 75.
2. Note the mounting location of the four hex screws and locknuts securing the front pivot assembly to the seat brackets.
3. Remove the four hex screws and locknuts securing the front pivot assembly to the seat brackets.
4. Remove the front pivot assembly from the seat brackets.
5. Note the mounting location of the six socket screws, washers and locknuts securing the rear pivot assembly to the spacer bars, seat brackets and lower interface brackets.
6. Remove the six socket screws, washers and locknuts securing the rear pivot assembly to the spacer bars, seat brackets and lower interface brackets.
7. Remove the rear pivot assembly from the wheelchair.
8. Note the mounting location of the hex screw and locknut securing the inside of the seat bracket to the lower interface bracket.
9. Remove the hex screw and locknut securing the inside of the seat bracket to the lower interface bracket.
10. Remove the seat bracket from the lower interface bracket.
11. Repeat STEP 8 to STEP 10 for the opposite side if desired.

### Installing

1. Using the hex screw and locknut, secure the inside of the seat bracket to the lower interface bracket in the location noted in STEP 8 of [Removing](#). Torque to 13 ft-lbs  $\pm$  20%.
2. Repeat STEP 1 for the opposite side if necessary.
3. Align the front pivot assembly with the seat brackets.
4. Secure the front pivot assembly to the seat brackets in the location noted in STEP 2 of [Removing](#) above. Torque to 13 ft-lbs  $\pm$  20%.
5. Using the six hex screws, washers and locknuts, secure the rear pivot assembly to the spacer bars, seat brackets and lower interface brackets in the location noted in STEP 5 of [removing](#) above. Torque to 75 in-lbs  $\pm$  20%.
6. Install the seat assembly. Refer to [Removing/Installing the Seat](#) on page 75.



**FIGURE 5.7** Removing/Installing the Seat Brackets - Recline Only Systems

## Removing/Installing the Lower Interface Brackets

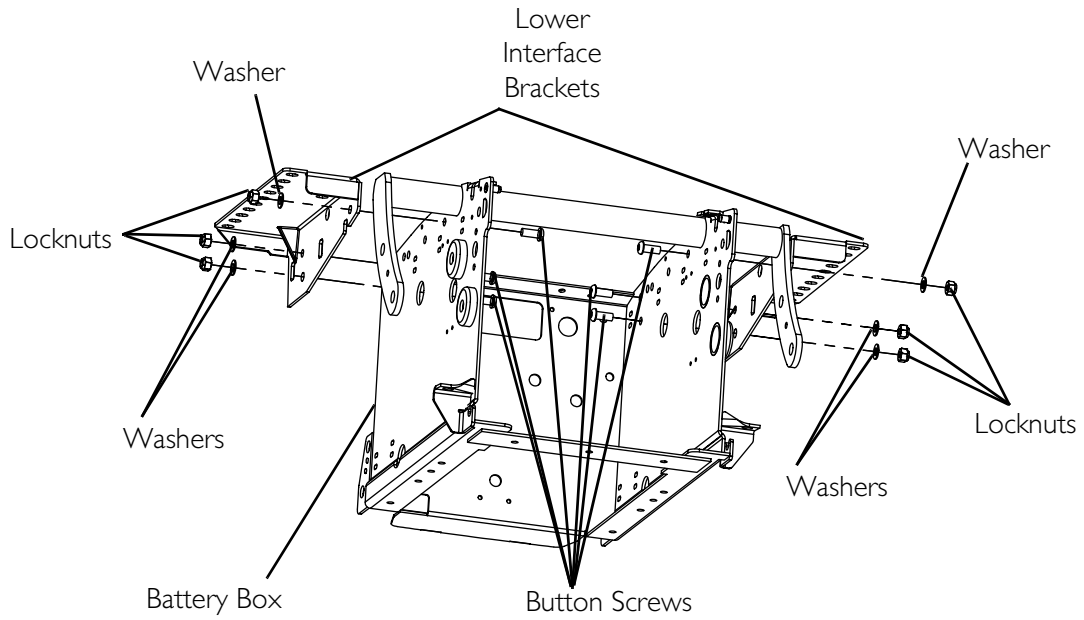
*NOTE: For this procedure, refer to FIGURE 5.8 on page 53.*

### Removing

1. Remove the seat assembly from the rear pivot assembly. Refer to Removing/Installing the Seat on page 75.
2. Remove both seat brackets. Refer to Removing/Installing the Seat Brackets on page 48.
3. Remove the six button screws, washers and locknuts securing the lower interface brackets to the battery box.

### Installing

1. Secure the lower interface brackets to the battery box using the six button screws, washers and locknuts. Torque to 13 ft-lbs  $\pm$  20%.
2. Install both seat brackets. Refer to Removing/Installing the Seat Brackets on page 48.
3. Install the seat assembly onto the rear pivot assembly. Refer to Removing/Installing the Seat on page 75.



**FIGURE 5.8** Removing/Installing the Lower Interface Brackets

# SECTION 6—SEAT ADJUSTMENTS

## ⚠ WARNING

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

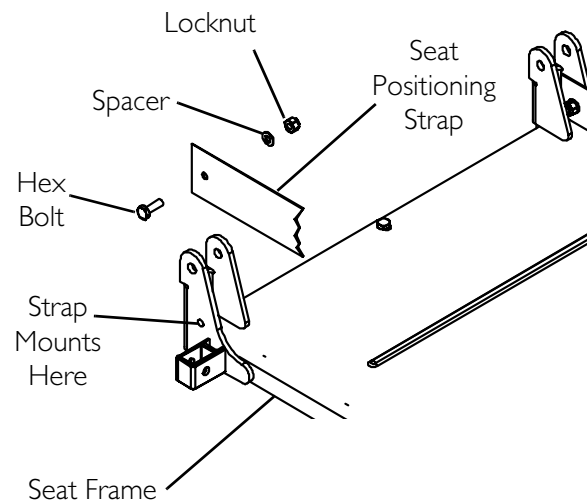
Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

## Replacing Seat Positioning Strap

*NOTE: For this procedure, refer to FIGURE 6.1.*

1. Remove the two hex bolts, washers and locknuts that secure the two halves of the seat positioning strap to the seat frame.
2. Remove the existing seat positioning strap from the seat frame.
3. Position the new seat positioning strap on the seat frame as shown.
4. Reinstall the hex bolt, washer and locknut as shown. Tighten securely.



**FIGURE 6.1** Replacing Seat Positioning Strap

## Removing/Installing Seat Pan

*NOTE: For this procedure, refer to FIGURE 6.2 on page 55.*

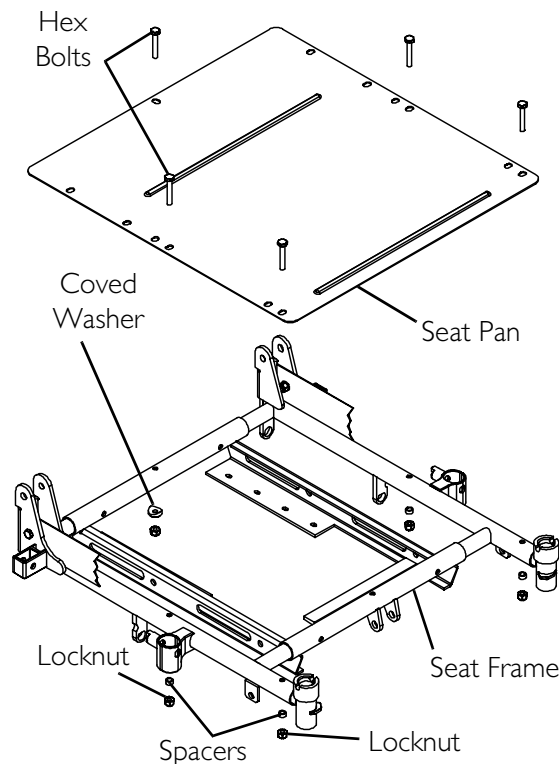
### Removing

1. Remove the seat cushion from the seat pan.
2. Remove the five hex bolts, locknuts, coved washer and spacers that secure the seat pan to the seat frame.

### Installing

1. Position the new/existing seat pan on the seat frame, aligning the mounting holes of the seat pan and the mounting holes of the seat frame.

2. Reinstall the five hex bolts, locknuts, covered washer and spacers that secure the seat pan to the seat frame. Torque to 75 in-lbs  $\pm$  20%.
3. Remove the protective strips from the new seat pan and reinstall the seat cushion onto the seat pan.



**FIGURE 6.2** Removing/Installing Seat Pan

## Adjusting Seat Width

### Preparing to Adjust Seat Width

*NOTE: Reverse these steps after adjusting seat width and before returning the wheelchair to the user.*

1. Tilt backward 5 to 10 degrees and/or recline backward 5 to 10 degrees in order to enable hardware removal.
2. Remove the telescoping front rigging supports. Refer to [Adjusting/Replacing Telescoping Front Rigging Supports](#) on page 73.
3. Remove the joystick(s). Refer to [Removing/Installing Joystick\(s\)](#) on page 149.
4. Remove the arms. Refer to [Arms](#) on page 114.
5. Remove the existing spreader bar. Refer to [Removing/Installing Spreader Bar](#) on page 87.
6. Remove the existing back pan. Refer to [Removing/Installing Back Pan](#) on page 85.
7. Remove the side shrouds. Refer to [Removing/Installing Side Shrouds](#) on page 100.
8. Remove the existing seat pan. Refer to [Removing/Installing Seat Pan](#) on page 54.

## Tilt-Only Seating Systems

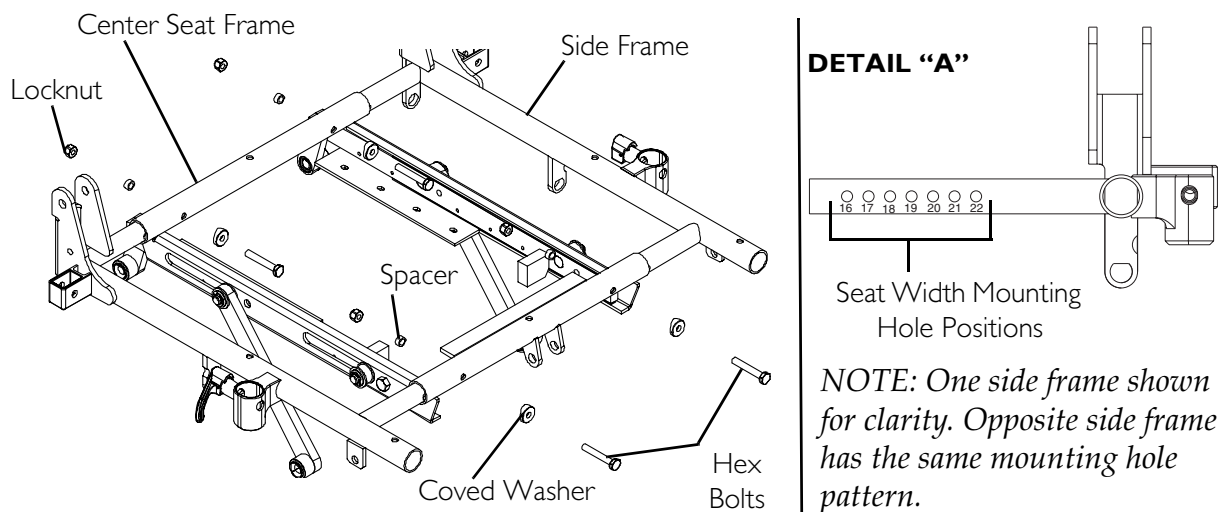
NOTE: For this procedure, refer to FIGURE 6.3.

1. Remove the four hex bolts, coved washers, spacers and locknuts that secure the side frames to the center seat frame.

### ⚠ WARNING

Both side frames **MUST** be adjusted to the same mounting hole position to maintain an even weight distribution of user and seat frame over the base frame. If weight is not distributed evenly, injury to the assistant and/or user and damage to the wheelchair may occur.

2. Slide the side frames in and/or out to the desired seat width. Make sure both side frames are at the same seat width. Refer to Detail "A" in FIGURE 6.3.
3. Reinstall the four hex bolts, coved washers, spacers and locknuts that secure the side frames to the center seat frame. Torque to 75 in-lbs  $\pm$  20%.
4. Reassemble the wheelchair by reversing the instructions in Preparing to Adjust Seat Width on page 55.



**FIGURE 6.3** Adjusting Seat Width - Tilt-Only Seating Systems



## Recline Only or Tilt/Recline Seating Systems

### CAUTION

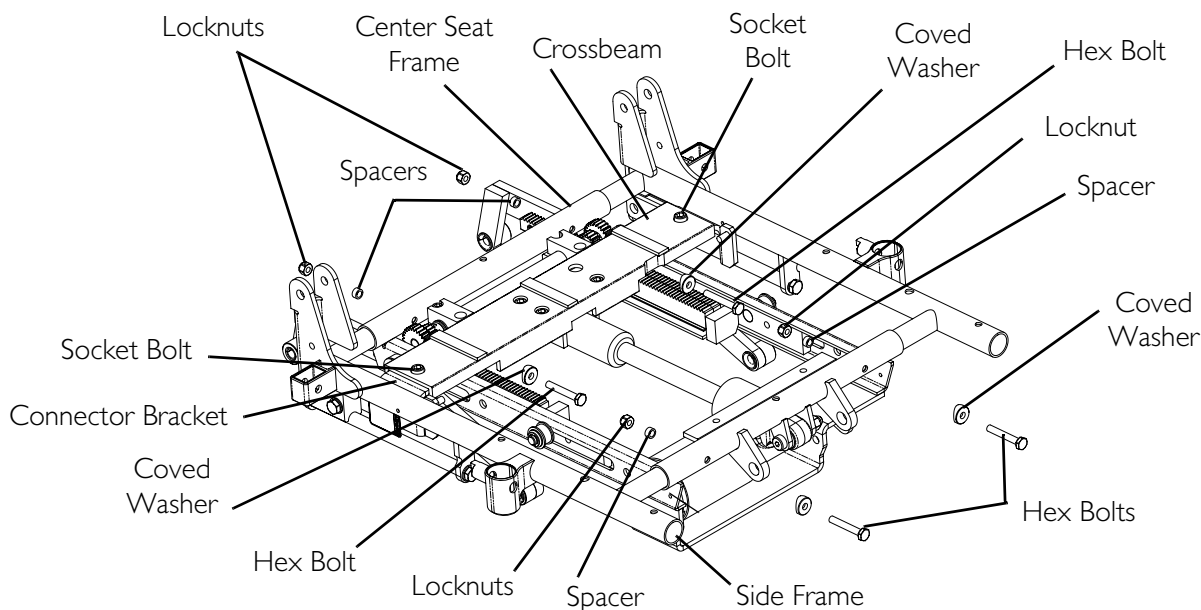
**If the crossbeam has to be changed for the desired seat width, the wheelchair **MUST** be returned to Invacare. Otherwise, damage to the recline function may occur.**

*NOTE: For this procedure, refer to FIGURE 6.4 on page 58.*

1. Measure across the side frames to determine the current seat width.
2. Determine the desired seat width.
3. Refer to the following chart and determine if the existing crossbeam needs to be replaced.
  - Example #1: If the current seat width is 16 inches and desired seat width is 18 inches, a new crossbeam of 18–19-inches is required.
  - Example #2: If the current seat width is 20 inches and the desired seat width is 21 inches, a new crossbeam is NOT required.

SEAT WIDTH	CROSSBEAM REQUIRED
16 or 17 inches	16-17-inch
18 or 19 inches	18-19-inch
20 or 21 inches	20-21-inch
22 inches	22-inch

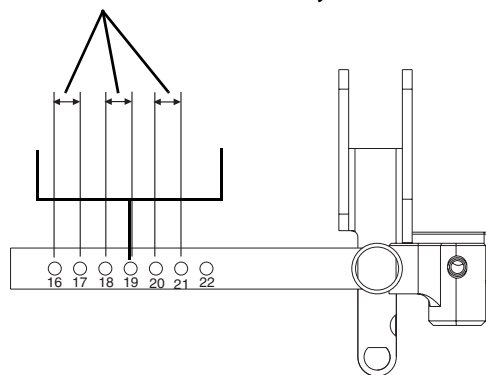
4. Perform one of the following:
  - New Crossbeam Required - Return seating system to Invacare for adjustment.
  - New Crossbeam NOT Required - Proceed to STEP 5.
5. Remove the four hex bolts, coved washers, spacers and locknuts that secure the side frames to the center seat frame.
6. Loosen the two socket bolts, washers and locknuts that secure the two connector brackets to the crossbeam.
7. Slide the side frames to the desired seat width. Make sure both side frames are at the same seat width. Refer to Detail "A" of FIGURE 6.4.
8. Tighten the two socket bolts, washers and locknuts that secure the two connector brackets to the crossbeam.
9. Reinstall the four hex bolts, coved washers, spacers and locknuts that secure the side frames to the center seat frame. Torque to 75 in-lbs  $\pm$  20%.
10. Reassemble the wheelchair by reversing the instructions in Preparing to Adjust Seat Width on page 55.



**DETAIL "A"**

**Available Seat Width Adjustments**

*NOTE: Any other seat width adjustment requires a new crossbeam, and the wheelchair MUST be returned to Invacare.*



Seat Width Mounting Hole Positions

**FIGURE 6.4** Adjusting Seat Width - Recline Only or Tilt/Recline Seating Systems

## Adjusting Seat Depth

### **CAUTION**

Read and understand **About Seat Depth** **BEFORE** changing the seat depth. Otherwise, damage to the seating system may occur.

### **About Seat Depth**

Seat depths range from 16 to 22 inches in one inch increments.

*NOTE: Seat depths are a combination of side frames, center seat frames, seat pans, leg support tubes (if equipped) and telescoping front rigging supports.*

**CAUTION**

Seating systems with recline **MUST** be returned to Invacare if the center frame has to be changed for a particular seat depth. Otherwise, damage to the recline function could occur.

**Side Frames**

Side frames are available in four depths: 16, 18, 20 or 22 inches.

The seat depth of the wheelchair can be adjusted up to two inches from the original depth without changing the side frames. The two additional seat depths per side frame are available by replacing the seat pan and adjusting (replacing) the leg support tubes (if equipped) and telescoping front rigging supports.

EXAMPLE:

SIDE FRAME	AVAILABLE SEAT DEPTHS
16-inch	16, 17 or 18-inch
18-inch	18, 19 or 20-inch
20-inch	20, 21 or 22-inch
22-inch	22-inch

**Center Seat Frames****CAUTION**

Seating systems with recline **MUST** be returned to Invacare if the center frame has to be changed for a particular seat depth. Otherwise, damage to the recline function could occur.

There are two center seat frame sizes:

Small - used for 16 and 18-inch deep side frames

Large - used for 20 and 22-inch deep side frames

*NOTE: If changing from a 16 or 18-inch deep side frame to a 20 or 22-inch deep side frame (or vice versa), the center seat frame must be changed.*

**Leg Support Tubes**

For seating systems with mechanical legrests, the leg support tubes are available in two sizes:

Short - adjusts from 16 to 19-inch seat depths

Long - adjusts from 20 to 22-inch seat depths

*NOTE: If changing from any seat depth between and including 16 and 19 inches to any seat depth between and including 20 and 22 inches (or vice versa), the leg support tube must be changed.*

## Adjusting Seat Depth

### ⚠ WARNING

To ensure stability, the seat may need repositioning when the seat depth is changed. Refer to [Repositioning the Seat](#) on page 24. Otherwise, injury or damage may occur.

### CAUTION

Seat depth adjustments that require a new center seat frame on Tilt-Only seating systems are permissible. Seat depth adjustments that require a new center seat frame on Tilt/Recline or Recline-Only seating systems are **NOT** permissible, and the system **MUST** be returned to Invacare for service. Otherwise, damage to the recline function may occur.

1. Refer to the following chart to determine the components that are required for a particular seat depth.

COMPONENT	SEAT DEPTH (INCHES)							
	16	17	18	19	20 OPTION 1	20 OPTION 2	21	22
Side Frame (inches)	16	16	16 or 18	18	18	20	20	20 or 22
Center Seat Frame	Small	Small	Small	Small	Small	Small	Large	Large
Seat Pan (inches)	16	17	18	19	20	20	21	22
*Leg Support Tube	Short	Short	Short	Short	Short	Long	Long	Long

\*NOTE: Seating systems with mechanical legrests only.

2. To replace an applicable component, refer to the following list of procedures:

COMPONENT	PROCEDURE
Side Frame	<a href="#">Removing/Installing Side Frames</a> on page 66
Center Seat Frame	<a href="#">Removing/Installing Center Seat Frame</a> on page 70
Seat Pan	<a href="#">Removing/Installing Seat Pan</a> on page 54
Leg Support Tube	<a href="#">Adjusting Leg Support Tubes</a> on page 73

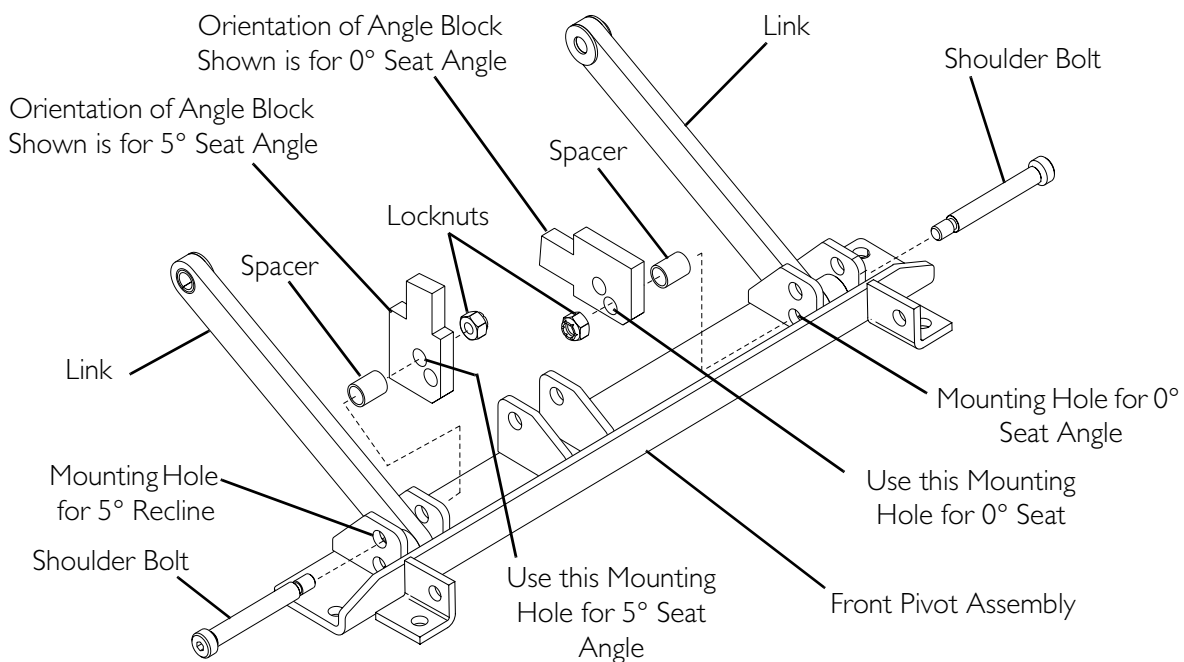
3. It may be necessary to reposition the seat. Refer to [Repositioning the Seat](#) on page 24 and to determine if this adjustment is necessary.

## Adjusting Seat Angle

### Tilt-Only and Tilt/Recline Seating Systems

NOTE: For this procedure, refer to FIGURE 6.5 on page 61.

1. To gain access to the mounting hardware, tilt seating system back to 45 degrees.
2. Remove the batteries.
3. Remove the shoulder bolt, spacer and locknut that secure the angle block to the front pivot assembly.
4. Secure the angle blocks and links to the front pivot assembly with the shoulder bolts, spacers and locknuts in one of the positions shown in FIGURE 6.5. Securely tighten.
5. Adjust the tilt potentiometer. Refer to the electronics manual listed in [Reference Documents](#) on page 2.
6. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.



**FIGURE 6.5** Adjusting Seat Angle - Tilt-Only and Tilt/Recline Seating Systems

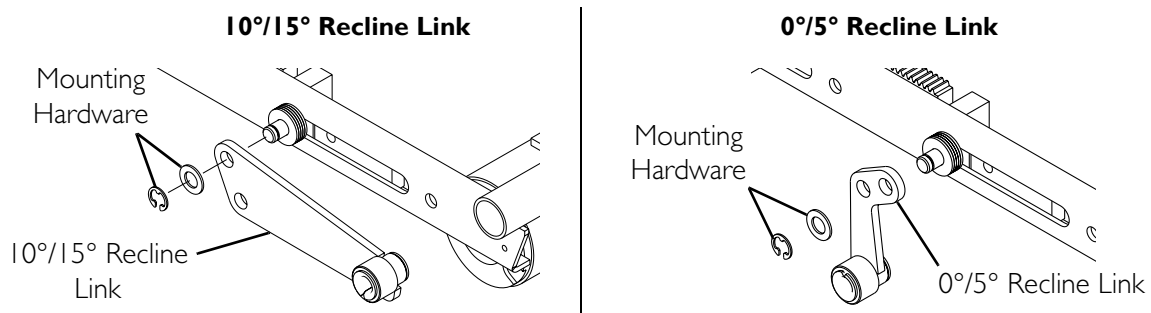
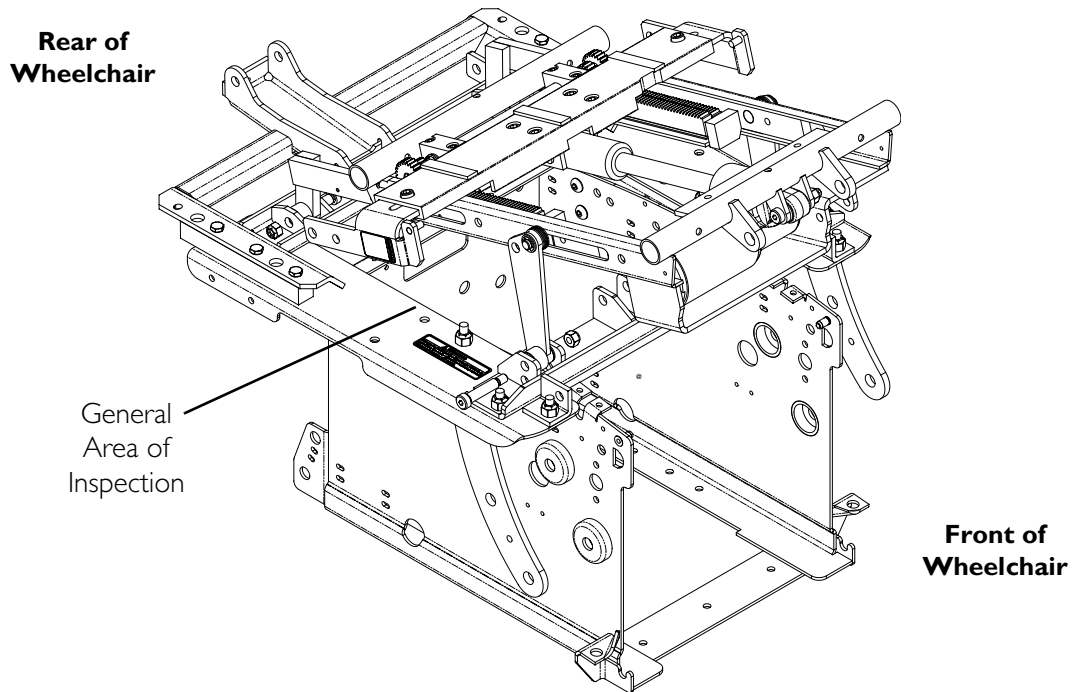
### Recline-Only Seating Systems

#### Preparing to Adjust the Seat Angle

NOTE: For this procedure, refer to FIGURE 6.6 on page 62.

1. Visually inspect the seating system for either 10°/15° recline links or 0°/5° recline links.
2. Perform one of the following:

- Use Existing Hardware to Adjust the Seat Angle Between 10° and 15° or Between 0° and 5° - Refer to Changing Seat Angle from 10° to 15° (or Vice Versa) on page 62 or Changing Seat Angle from 0° to 5° (or Vice Versa) on page 64.
- Change Hardware to Adjust the Seat Angle From 10°/15° to 0°/5° (or Vice Versa) - Refer to Replacing Recline Links on page 65.



**FIGURE 6.6** Recline-Only Seating Systems - Preparing to Adjust the Seat Angle

**Changing Seat Angle from 10° to 15° (or Vice Versa)**

*NOTE: For this procedure, refer to FIGURE 6.7 on page 63.*

1. Make sure the wheelchair is on a level surface.
2. Remove the batteries.
3. Remove the seat pan. Refer to Removing/Installing Seat Pan on page 54.
4. Remove the retaining ring and washer that secure the 10°/15° recline link to the pin of the seat frame. Refer to Detail "A". Discard the retaining ring.

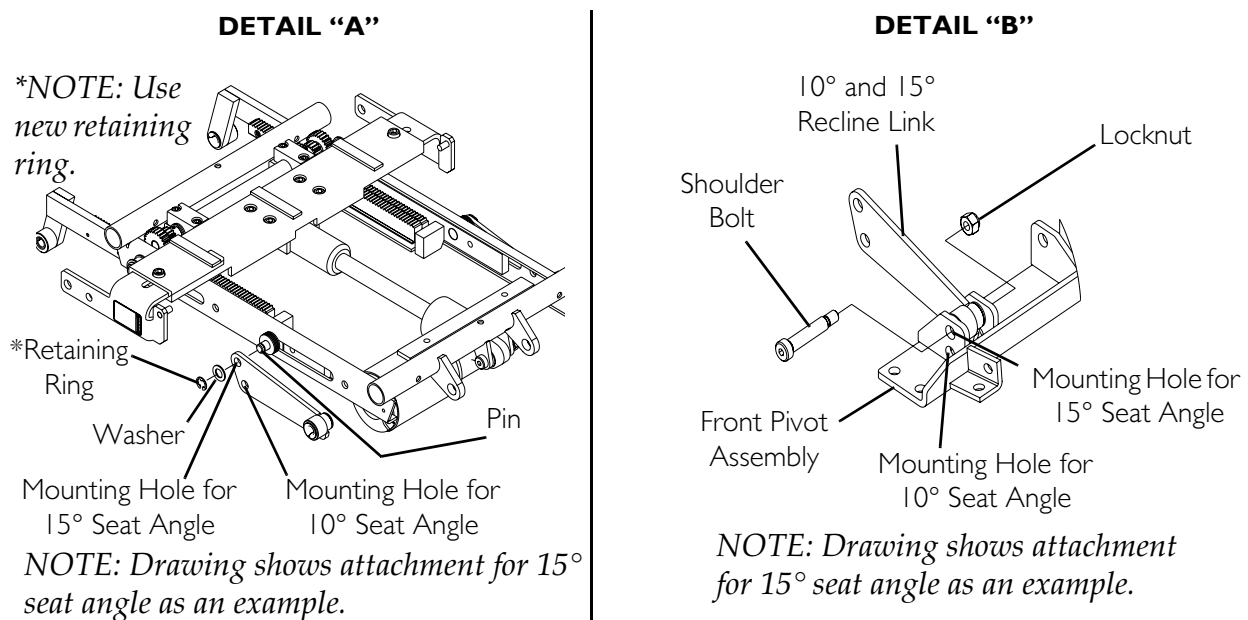
5. Remove the shoulder bolt and locknut that secure the 10°/15° recline link to the front pivot assembly. Refer to Detail “B”.
6. Remove the recline link.
7. Reposition the recline link to the seat frame pin through the other mounting hole. Refer to Detail “A” in FIGURE 6.7.
8. Secure the 10°/15° recline link to the seat frame pin with the washer and a new retaining ring.

### CAUTION

**Be sure to use a new retaining ring that is not bent or damaged.**

*NOTE: When completed, verify that the retaining ring is fully seated in the groove in the pin.*

9. Insert the existing shoulder bolt through the other mounting hole in the front pivot assembly and then through the pivot hole in the recline link. Refer to Detail “B” in FIGURE 6.7.
10. Securely tighten the locknut.
11. Repeat STEPS 4–10 for the opposite side.
12. Perform the post-service inspection. Refer to Post-Service Inspection Checklist on page 21.



**FIGURE 6.7** Changing Seat Angle from 10° to 15° (or Vice Versa)

**Changing Seat Angle from 0° to 5° (or Vice Versa)**

*NOTE: For this procedure, refer to FIGURE 6.8 on page 64.*

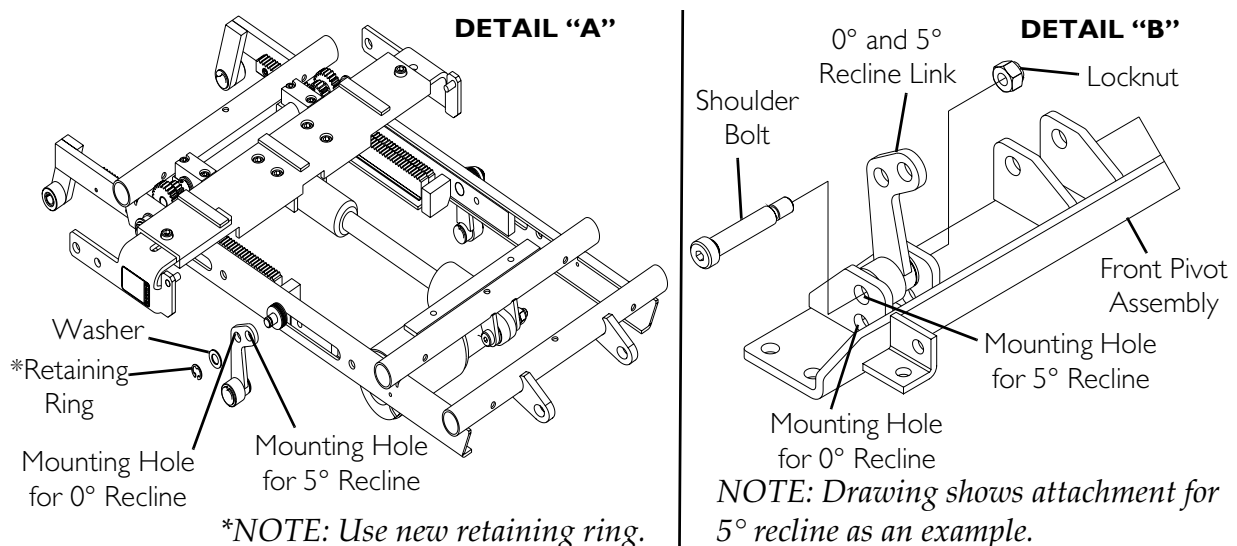
1. Make sure the wheelchair is on a level surface.
2. Remove the batteries. Refer to Reference Documents on page 2.
3. Remove the seat pan. Refer to Removing/Installing Seat Pan on page 54.
4. Remove the retaining ring and washer that secure the 0°/5° recline link to the pin of the seat frame. Discard the retaining ring.
5. Remove the shoulder bolt and locknut that secure the 0°/5° recline link to the front pivot assembly.
6. Remove the recline link.
7. Reposition the recline link to the seat frame pin through the other mounting hole. Refer to Detail "A" in FIGURE 6.8.
8. Secure the 0°/5° recline link to the seat frame pin with the washer and a new retaining ring.

**CAUTION**

**Be sure to use a new retaining ring that is not bent or damaged.**

*NOTE: When completed, verify that the retaining ring is fully seated in the groove in the pin.*

9. Insert the existing shoulder bolt through the other mounting hole in the front pivot assembly and then through the pivot hole in the recline link. Refer to Detail "B" in FIGURE 6.8.
10. Securely tighten the locknut.
11. Repeat STEPS 4–10 for the opposite side.
12. Perform the post-service inspection. Refer to Post-Service Inspection Checklist on page 21.



**FIGURE 6.8** Changing Seat Angle from 0° to 5° (or Vice Versa)



## Replacing Recline Links

*NOTE: For this procedure, refer to FIGURE 6.9 on page 66.*

1. Make sure the wheelchair is on a level surface.
2. Remove the batteries.
3. Remove the seat pan. Refer to [Removing/Installing Seat Pan](#) on page 54.
4. Remove the retaining ring and washer that secure the recline link to the pin of the seat frame.
5. Remove the shoulder bolt and locknut that secure the recline link to the front pivot assembly.
6. Remove the existing recline link.
7. Perform one of the following:
  - For 15° recline - Secure the 10°/15° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 6.9 (Detail "A").
  - For 10° recline - Secure the 10°/15° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 6.9 (Detail "B").
  - For 5° recline - Secure the 0°/5° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 6.9 (Detail "C").
  - For 0° recline - Secure the 0°/5° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 6.9 (Detail "D").

---

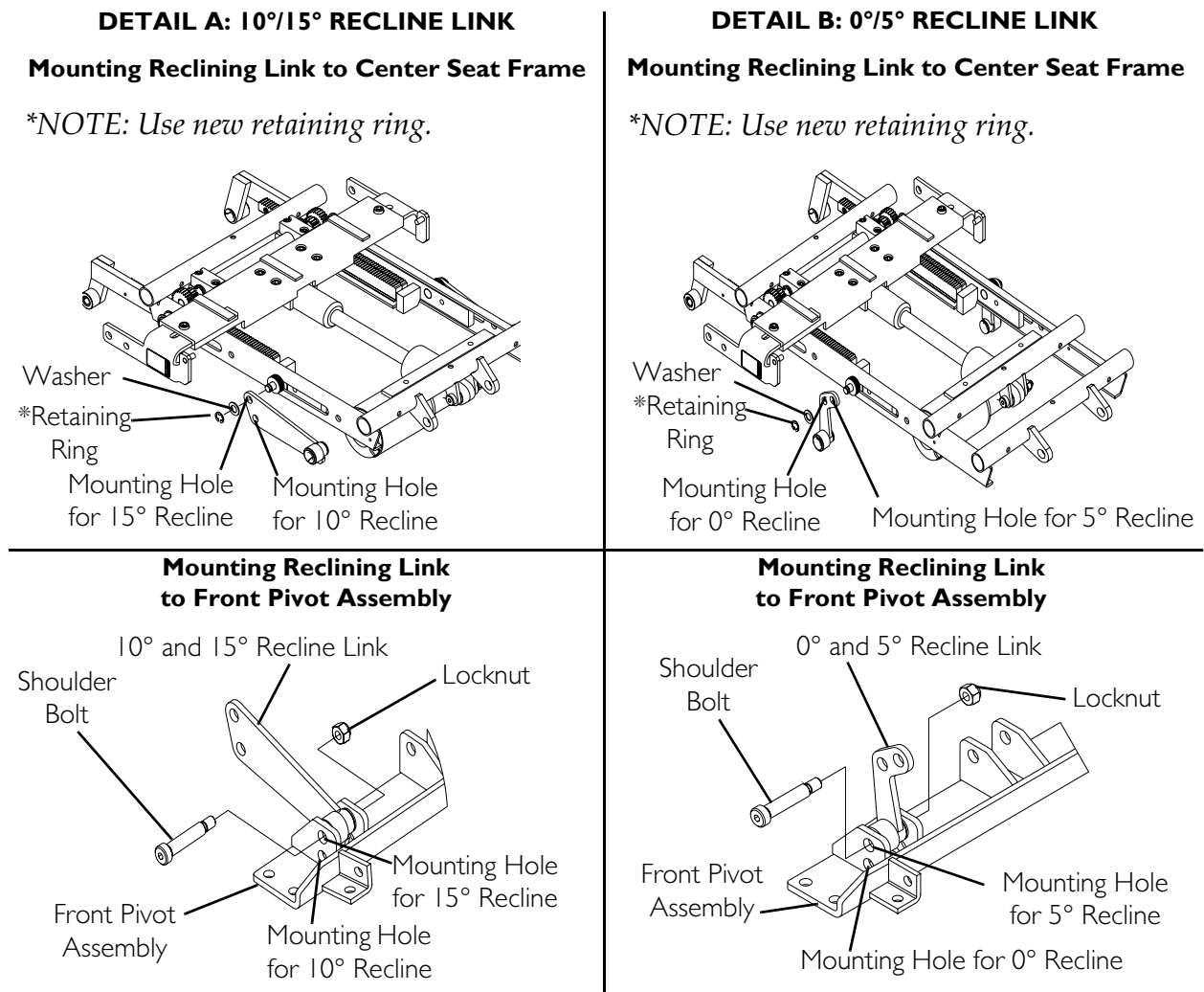
### CAUTION

**Be sure to use a new retaining ring that is not bent or damaged.**

---

*NOTE: When completed verify retaining ring is fully seated in the groove in the pin.*

8. Secure the recline link to the front pivot assembly with the existing shoulder bolt and locknut in the mounting hole shown in the respective details of FIGURE 6.9. Securely tighten.
9. Repeat for opposite side.
10. Install the seat pan. Refer to [Removing/Installing Seat Pan](#) on page 54.
11. Install the batteries.

**FIGURE 6.9** Replacing Recline Links

## Removing/Installing Side Frames

### Removing Side Frames

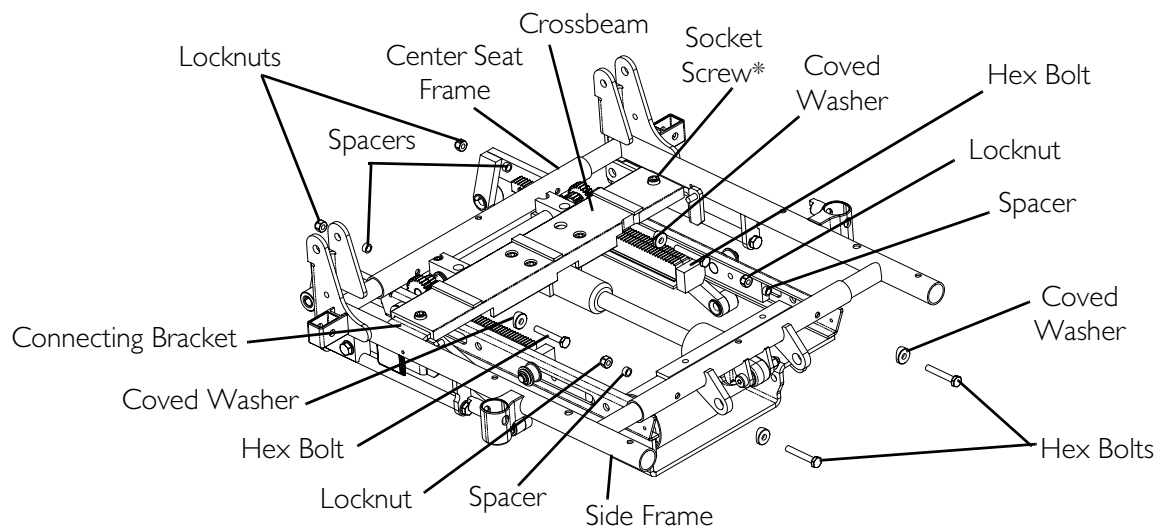
*NOTE: For this procedure, refer to FIGURE 6.10 on page 67.*

1. Recline backward 5 to 10 degrees and/or tilt backward 5 to 10 degrees in order to enable hardware removal.
2. Remove the side shrouds. Refer to [Removing/Installing Side Shrouds](#) on page 100.
3. Remove the seat pan. Refer to [Removing/Installing Seat Pan](#) on page 54.
4. Remove the arms. Refer to [Arms](#) on page 114.
5. Remove the back. Refer to [Removing/Installing Back Assembly](#) on page 91.
6. Remove the telescoping front rigging supports. Refer to [Adjusting/Replacing Telescoping Front Rigging Supports](#) on page 73.

7. Observe the mounting position of the existing side frame to the center seat frame for proper re-installation.
8. Remove two hex bolts, coved washers, spacers and locknuts that secure one side frame to the center seat frame.

*NOTE: For Tilt/Recline and Recline-Only seating systems, remove the socket screw, washer and locknut that secure the connecting bracket to the crossbeam.*

9. Remove the existing side frame from the center seat frame.
10. Perform STEPS 6-8 for the remaining side frame if necessary.
11. If replacing the side frame, refer to either Preparing Side Frames for Replacement on page 67.



*NOTE: Tilt/Recline seat frame shown.*

*\*NOTE: Only on systems with recline.*

**FIGURE 6.10** Removing Side Frames

## Preparing Side Frames for Replacement

### Tilt-Only Seating Systems

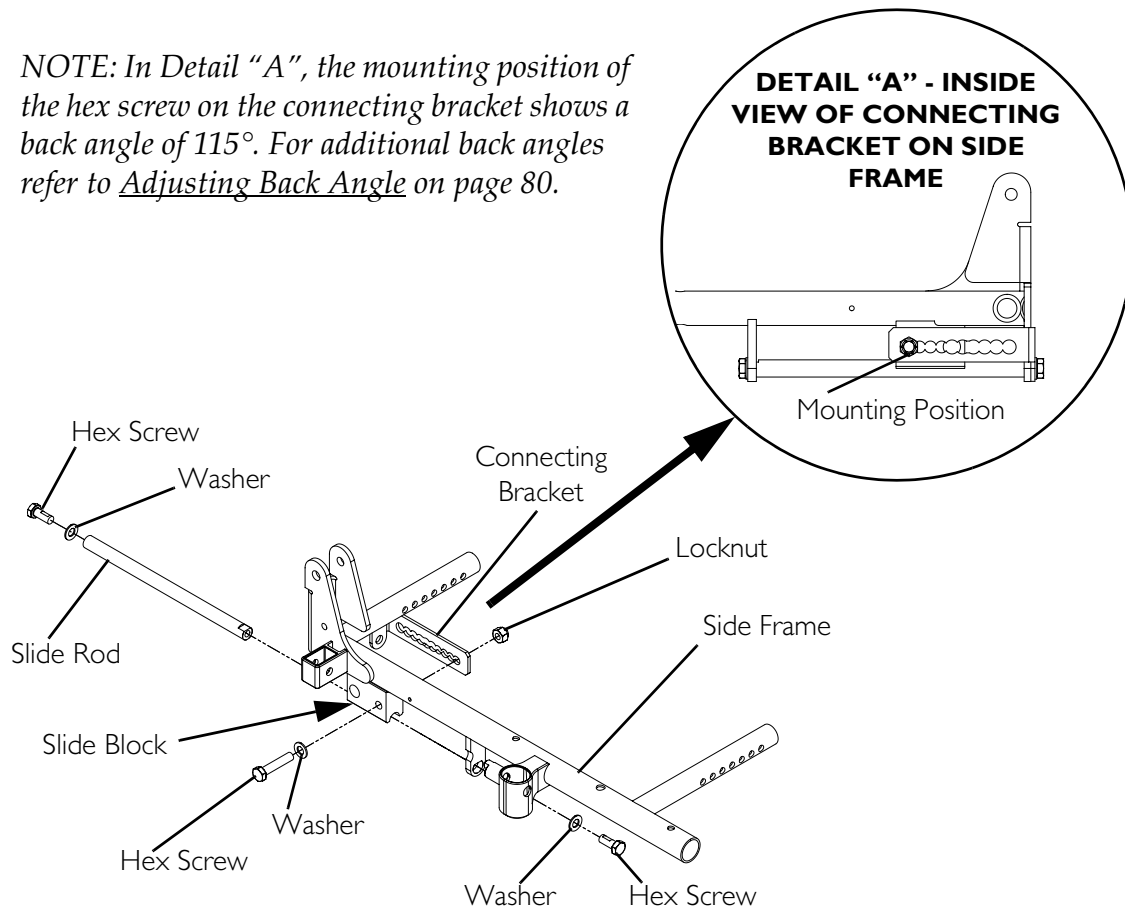
*NOTE: For this procedure, refer to FIGURE 6.11 on page 68.*

*NOTE: The mounting location of the hex screw on the connecting bracket determines the back angle of the back assembly.*

1. Note the mounting position of the hex screw on the connecting plate to obtain the same back angle when re-assembling. Refer to Detail "A".
2. Remove the hex screw and washer that secure the slide block to the connecting bracket.
3. Remove the two hex screws and washers that secure the slide rod to the side frame.
4. Remove the slide rod, slide block and connecting bracket from the existing side frame.
5. Secure the slide block to the connecting bracket with the hex screw, washer, and locknut.

- Secure the slide rod to the side frame, with the slide block in position, with the two hex screws and washers. Torque to 13 ft-lbs  $\pm$  20% (156 in-lbs  $\pm$  20%).

*NOTE: In Detail "A", the mounting position of the hex screw on the connecting bracket shows a back angle of 115°. For additional back angles refer to Adjusting Back Angle on page 80.*

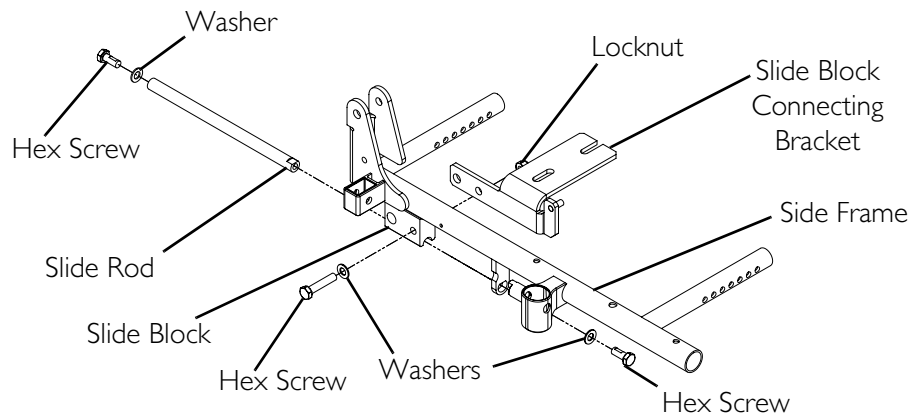


**FIGURE 6.11** Preparing Side Frames for Replacement - Tilt-Only Seating Systems

### Tilt/Recline and Recline-Only Seating Systems

*NOTE: For this procedure, refer to FIGURE 6.12 on page 69.*

- Remove the hex screw and washer that secure the slide block to the slide block connecting bracket.
- Remove the two hex screws and washers that secure the slide rod to the side frame.
- Remove the slide rod and slide block from the side frame.
- Secure the slide rod to the side frame, with the slide block in position, with the two hex screws and washers. Torque to 13 ft-lbs  $\pm$  20% (156 in-lbs  $\pm$  20%).
- Secure the slide block to the slide block connecting bracket with the hex screw and washer. Torque to 156 in-lbs  $\pm$  20%.



**FIGURE 6.12** Preparing Side Frames for Replacement - Tilt/Recline and Recline-Only Seating Systems

## Installing Side Frames

### **⚠ WARNING**

**Both side frames MUST be adjusted to the same mounting hole position to maintain an even weight distribution of the user and seat frame over the base frame. If weight is not distributed evenly, injury to the assistant and/or user and damage to the wheelchair may occur.**

*NOTE: For this procedure, refer to FIGURE 6.13 on page 70.*

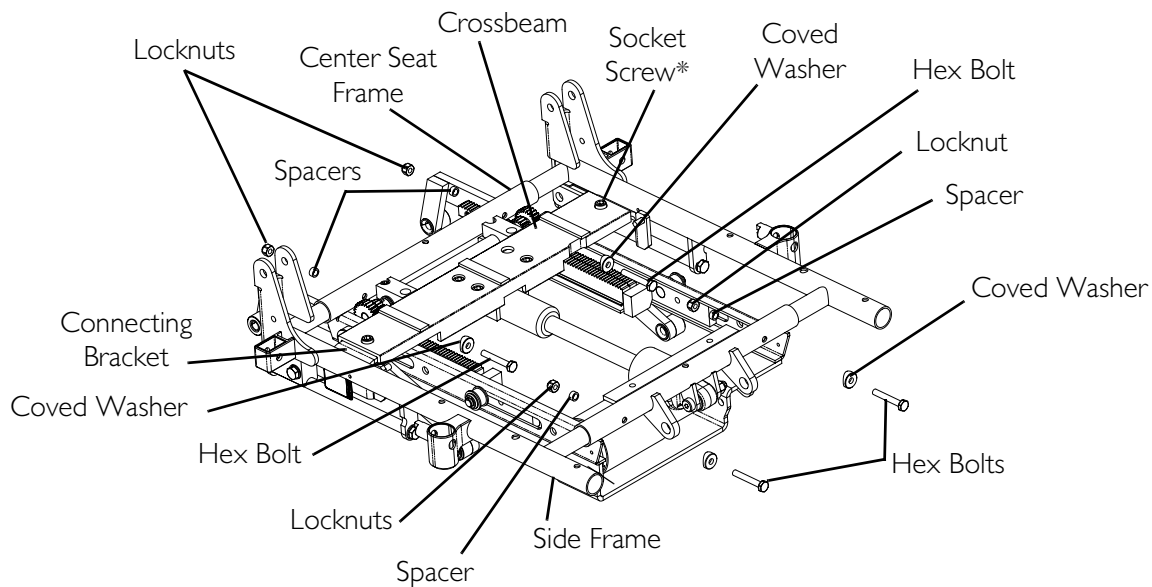
1. Recline and/or tilt the seating system 5 to 10 degrees to enable hardware installation.
2. Install the side frame into the center seat frame and slide to the seat width noted in the removal process.

*NOTE: If a new seat width is desired, refer to Adjusting Seat Width on page 55.*

*NOTE: For Tilt/Recline and Recline-Only seating systems, be sure to align the slide block connecting bracket with the crossbeam.*

3. Make sure both side frames are at the same mounting hole position.
4. Reinstall the four hex bolts, coved washers, spacers and locknuts that secure the side frames to the center seat frame. Torque to 75 in-lbs  $\pm$  20%.

*NOTE: For Tilt/Recline and Recline-Only seating systems, secure the connecting bracket to the crossbeam with the socket screw, spacer and washer. Torque to 156 in-lbs  $\pm$  20%.*



NOTE: Tilt/Recline seat frame shown.

\*NOTE: Only on systems with recline.

**FIGURE 6.13** Installing Side Frames

## Removing/Installing Center Seat Frame

### **⚠ WARNING**

Pinch points exist between seat and base frames. Use caution to avoid injury.

### **CAUTION**

For Tilt/Recline and Recline-Only seating systems, the center seat frame assembly is a non-serviceable part. Whenever a new center seat frame is required (e.g., to achieve a desired seat width or depth), return the complete wheelchair to Invacare for service.

NOTE: For this procedure, refer to FIGURE 6.14 on page 72.

NOTE: The following procedure is for Tilt-Only seating systems.

### Removing Center Seat Frame

1. Remove the side shrouds. Refer to Removing/Installing Side Shrouds on page 100.
2. Remove the seat pan. Refer to Removing/Installing Seat Pan on page 54.
3. Remove the arms. Refer to Removing Armrests on page 114.
4. Remove the back. Refer to Back Adjustments on page 80.
5. Remove the legrests. Refer to Installing/Removing the Power Elevating Legrests on page 104.
6. Remove the side frames. Refer to Removing/Installing Side Frames on page 66.

7. Remove the two shoulder bolts and locknuts that secure the existing center seat frame to the rear pivot assembly. Refer to Detail "A".
8. Note the mounting position of the two tilt links. Refer to Detail "B".

---

**⚠ WARNING**

**Support the center seat frame before removing the shoulder bolt and locknuts that secure the tilt links to the front pivot assembly. Otherwise, injury or damage could occur.**

---

9. While supporting the center seat frame, remove the shoulder bolt and locknut that secure the tilt link to the front pivot assembly. Refer to Detail "B".
10. Remove the existing center seat frame from the base frame.
11. Remove the retaining ring that secures the tilt link and washers to the existing center seat frame. Refer to Detail "C".
12. Remove the washers and tilt link from the existing center seat frame.
13. If installing a new center seat frame, remove the four washers and one retaining ring from the front pin on the existing center seat frame and transfer onto the new center seat frame. Refer to Detail "B".
14. Repeat STEPS 11-13 for the opposite tilt link.

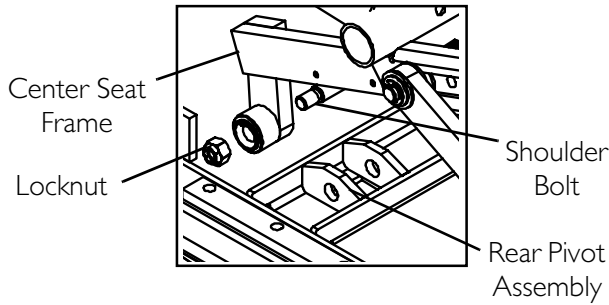
### **Installing Center Seat Frame**

1. Position the tilt link and washers on the new center seat frame. Refer to FIGURE 6.14 for hardware orientation.
2. Install the retaining ring that secures the tilt link and washers to the new center seat frame.
3. Repeat STEPS 1-2 for the opposite tilt link.
4. Align the mounting holes on the new center seat frame with the mounting holes on the rear pivot assembly.
5. Secure the new center seat frame to the rear pivot assembly with two shoulder bolts and locknuts. Torque to 75 in-lbs  $\pm$  20%.
6. Position the mounting hole in the tilt link with the mounting hole determined in STEP 8 of Removing Center Seat Frame on page 70.
7. Secure the tilt links to the front pivot assembly with the shoulder bolts and locknuts. Torque to 75 in-lbs  $\pm$  20%.
8. Install the new/existing side frames. Refer to Removing/Installing Side Frames on page 66.
9. Install the side shroud. Refer to Removing/Installing Side Shrouds on page 100.
10. Install the seat pan. Refer to Removing/Installing Seat Pan on page 54.
11. Install the telescoping front rigging supports. Refer to Adjusting/Replacing Telescoping Front Rigging Supports on page 73.

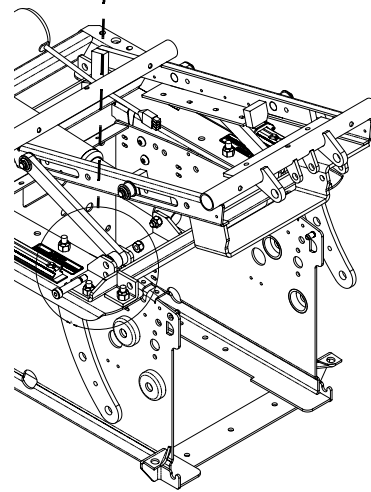
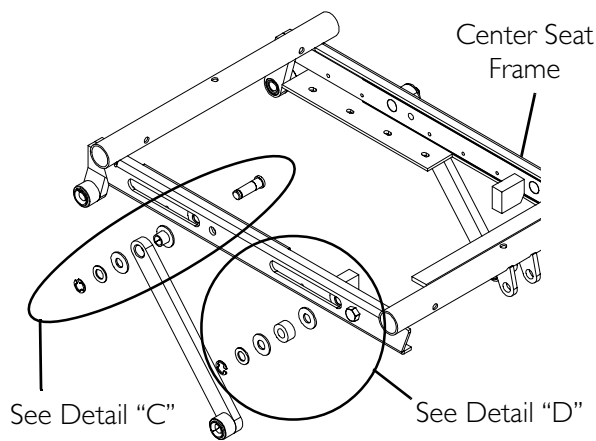
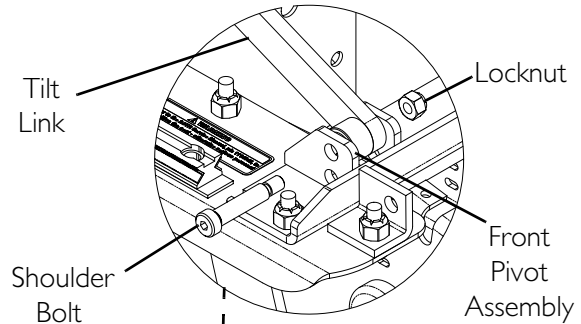
12. Install the back. Refer to Removing/Installing Back Assembly on page 91.

13. Install the arms. Refer to Arms on page 114.

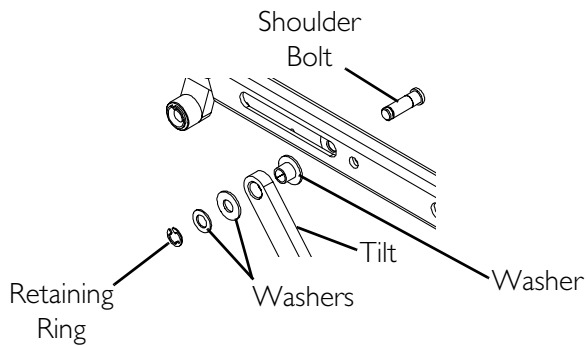
**DETAIL "A" - CENTER FRAME AND REAR PIVOT ASSEMBLY MOUNTING LOCATION**



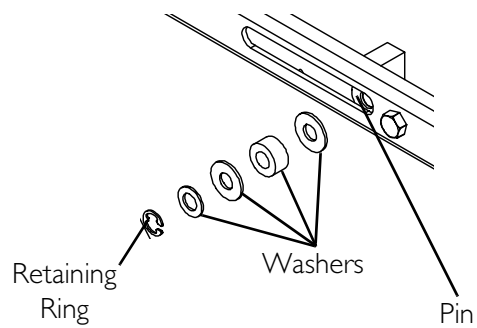
**DETAIL "B" - TILT LINK AND FRONT PIVOT ASSEMBLY MOUNTING LOCATION**



**DETAIL "C" - CENTER FRAME AND REAR PIVOT ASSEMBLY MOUNTING LOCATION**



**DETAIL "D" - TRANSFER HARDWARE**



**FIGURE 6.14** Removing/Installing Center Seat Frame

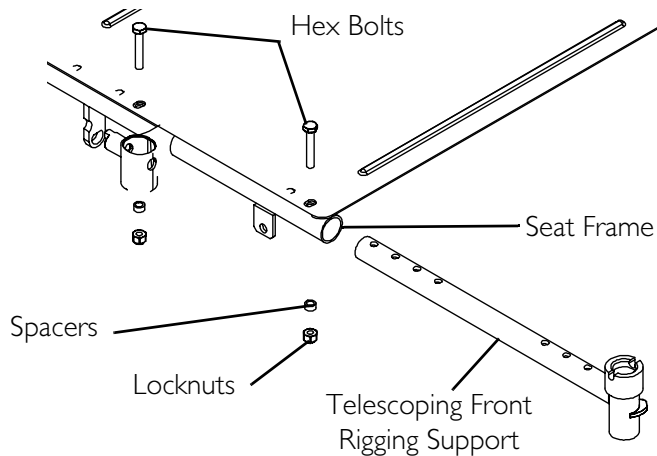


## Adjusting/Replacing Telescoping Front Rigging Supports

*NOTE: For this procedure, refer to FIGURE 6.15.*

1. Remove the two hex bolts, spacers and locknuts that secure the telescoping front rigging support to the seat frame.
2. Perform one of the following:
  - Slide existing telescoping front rigging support to one of three depth positions.
  - Remove existing telescoping front rigging support and install new telescoping front rigging support.
3. Secure telescoping front rigging at desired depth with existing two hex bolts, spacers, and locknuts. Torque mounting screws to 75 in-lbs  $\pm$  20%.

*NOTE: The two telescoping front rigging supports can be positioned at different depths depending on the need of the user.*



**FIGURE 6.15** Adjusting/Replacing Telescoping Front Rigging Supports

## Adjusting/Replacing Leg Support Tubes

*NOTE: For this procedure, refer to FIGURE 6.16 on page 74.*

*NOTE: Only systems equipped with mechanical legrests require leg support tubes.*

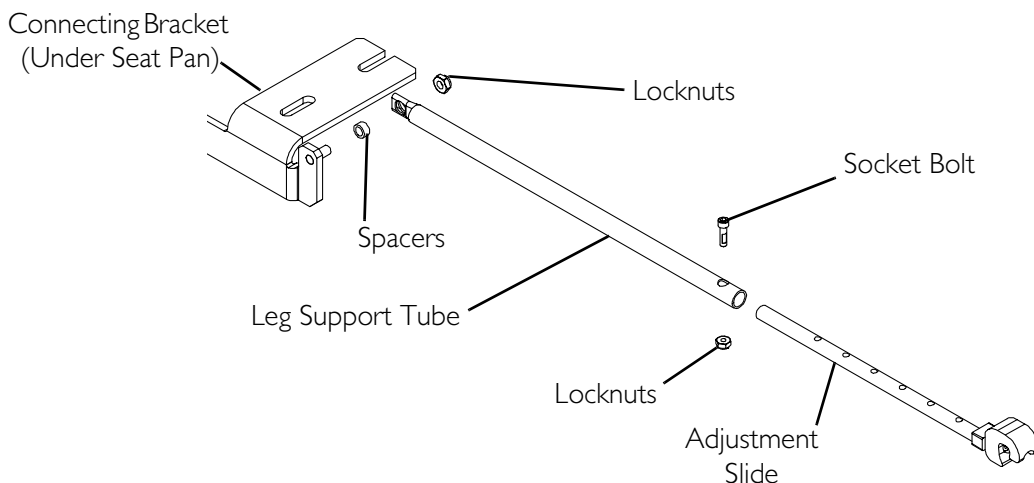
### Adjusting Leg Support Tubes

1. Refer to FIGURE 6.16 and determine the corresponding mounting hole on the adjustment slide for the desired seat depth.
2. Remove the socket bolt and locknut that secure the adjustment slide to the leg support tube.
3. Position the adjustment slide to the mounting hole determined in STEP 1.

4. Reinstall socket screw and locknut that secure the adjustment slide to leg support tube. Tighten securely.
5. Repeat STEPS 1-4 for the opposite leg support tube.

### Replacing Leg Support Tubes

1. Remove the locknut and spacer that secure the existing leg support tube to the connecting bracket.
2. Remove existing leg support from seating system.
3. Position the spacer and new leg support on the connecting bracket.
4. Install the locknut and tighten securely.
5. Adjust the leg support tube for the desired seat depth. Refer to Adjusting Leg Support Tubes on page 73.



SEAT DEPTH	LEG SUPPORT TUBE	MOUNTING POSITION ADJUSTMENT SLIDE
16 inches	Short	DO NOT use these holes 
17 inches	Short	
18 inches	Short	
19 inches	Short	
20 inches	Long	DO NOT use these holes 
21 inches	Long	
22 inches	Long	

**FIGURE 6.16** Adjusting/Replacing Leg Support Tubes

## Removing/Installing the Seat

*NOTE: If retrofitting a seating system, DO NOT use this procedure. Refer to the 2G Tarsys Seating System Installation on TDX instruction sheet, part number 1134889.*

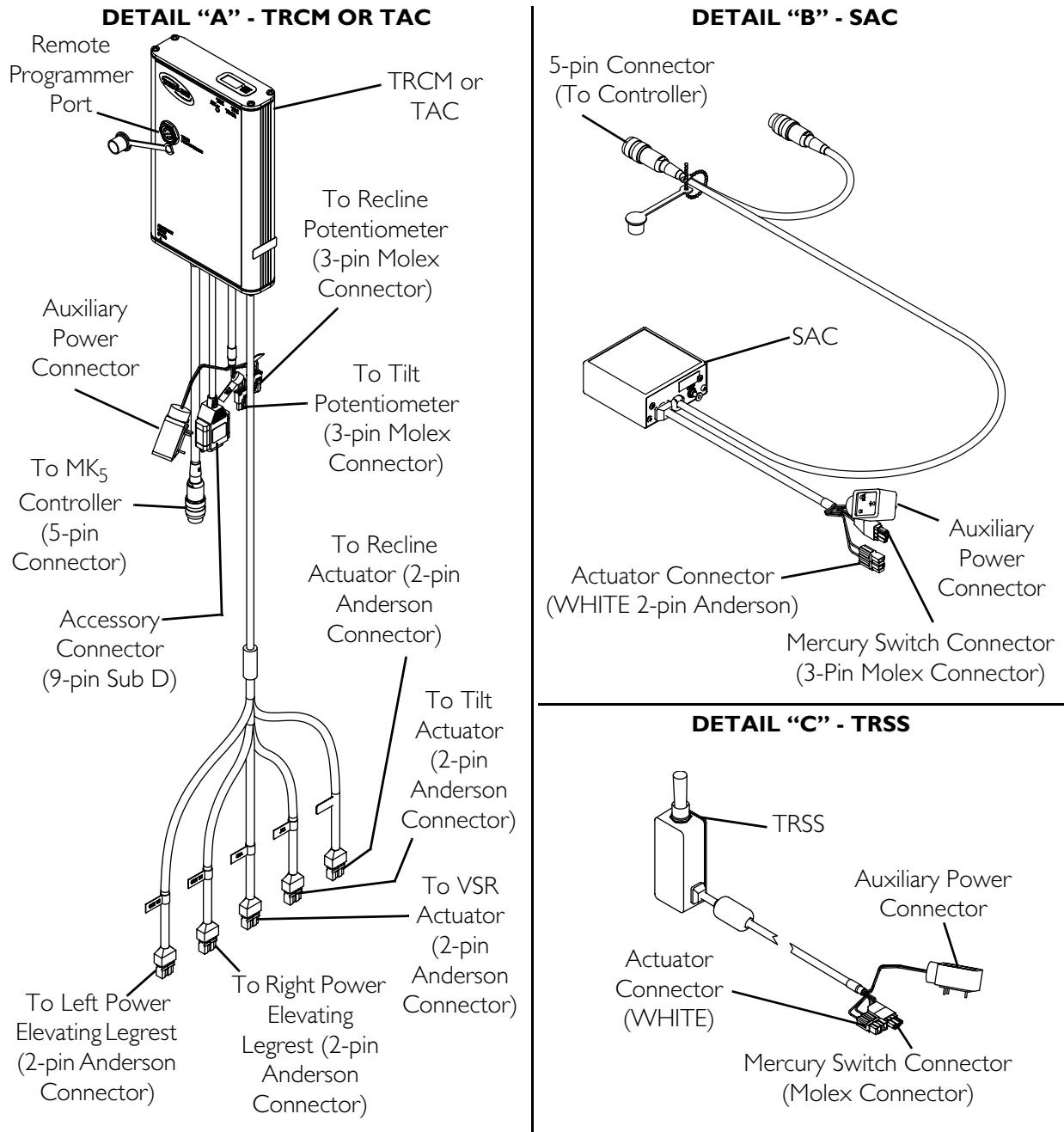
### Removing

#### Disconnecting Cables

*NOTE: For this procedure, refer to FIGURE 6.17 on page 76.*

*NOTE: Invacare recommends two people perform this procedure.*

1. Tilt Only and Tilt/Recline Systems - Tilt the seat back 10° to 15° to allow easier access to the hardware securing the seating system to the base.
2. Turn off the joystick.
3. Disconnect the joystick.
4. Disconnect the TRCM, TAC or SAC from the MK<sub>5</sub> controller (5-pin connector).
5. Disconnect the auxiliary power connectors from the power take off connectors (not shown) on the controller.
6. Perform one of the following:
  - Tilt Only and Tilt/Recline Systems -
    - i. Disconnect the tilt actuator connector (2-pin Anderson) from the TRCM, TAC, SAC or TRSS.
    - ii. Disconnect the tilt potentiometer connector (3-pin Molex) from the TRCM, TAC, SAC or TRSS.
  - Recline Only Systems - Disconnect the recline potentiometer connector (3-pin Molex) from the TRCM or TAC.



**FIGURE 6.17** Disconnecting Cables - Connecting Cables

## Removing the Seat

*NOTE: For this procedure refer to FIGURE 6.18 on page 78.*

1. Perform one of the following steps:
  - Tilt Only and Tilt/Recline Seating Systems:
    - i. Remove the socket screw to disconnect the tilt potentiometer linkage from the center seat frame (Detail “A”).
    - ii. Note the mounting position of the tilt angle blocks for proper installation (Detail “B”).
    - iii. One person should support the front of the seating frame.
    - iv. The remaining person should remove the two shoulder bolts and locknuts securing the tilt links, bushings and tilt angle blocks to the front pivot assembly (Detail “B”).
    - v. Carefully set the front of the seating system down onto the base.
  - Recline Only Seating Systems:
    - i. Note the mounting position of the recline links for proper installation (Detail “C”).
    - ii. One person should support the front of the seat frame.
    - iii. The remaining person should remove the two shoulder bolts and locknuts securing the recline links to the front pivot assembly (Detail “C”).
2. Remove the two socket head shoulder screws and locknuts securing the rear of the center seat frame to the rear pivot assembly (Detail “D”).
3. Carefully remove the seat from the base.

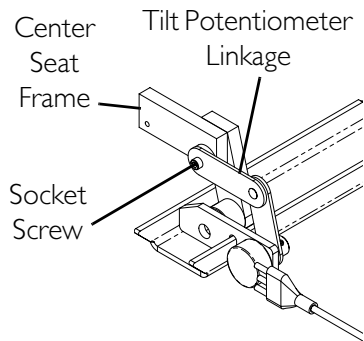
## Installing

### Connecting the Seat

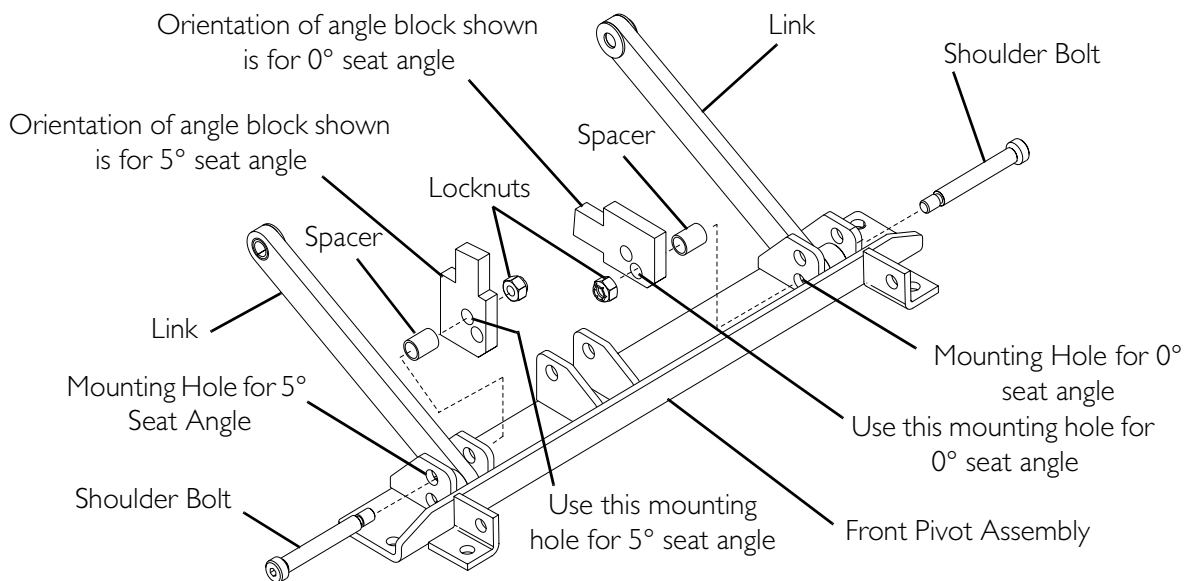
*NOTE: For this procedure refer to FIGURE 6.18 on page 78.*

1. Carefully set the seating system onto the base.
2. Install the two socket head shoulder screws and locknuts to secure the rear of the center seat frame to the rear pivot assembly (Detail “D”). Torque to 23 ft-lbs  $\pm$  20%.

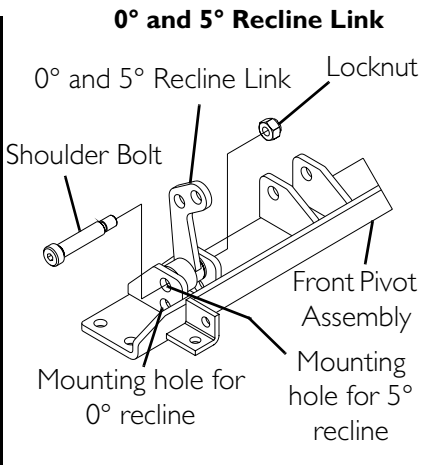
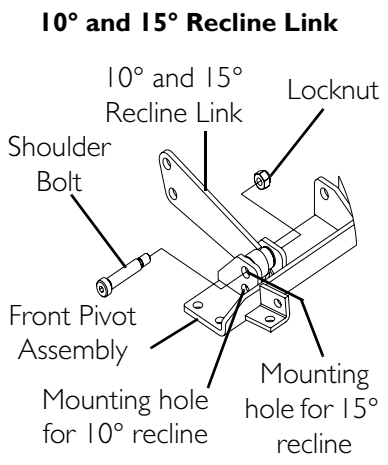
**DETAIL "A" - TILT POTENTIOMETER LINKAGE**



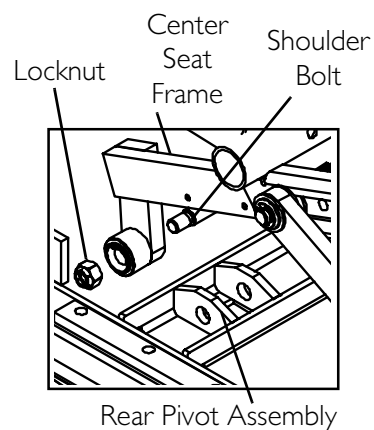
**DETAIL "B" - TILT LINKS AND TILT ANGLE BLOCKS**



**DETAIL "C" - RECLINE LINKS**



**DETAIL "D" - REAR PIVOT ASSEMBLY**



**FIGURE 6.18** Removing the Seat - Connecting the Seat

3. Perform one of the following:
  - Recline Only Systems -
    - i. One person should support the front of the seating system.
    - ii. The other person should secure the recline links to the front pivot assembly, using the two shoulder bolts and locknuts in the location noted when removing the seating system (Detail "C"). Torque to 23 ft-lbs  $\pm$  20%.
    - iii. Connect the recline potentiometer connector (3-pin Molex) to the TRCM.
  - Tilt Only and Tilt/Recline Systems -
    - i. One person should support the front of the seating system.
    - ii. Using the two shoulder bolts and locknuts, the other person should secure the tilt links, bushings and tilt angle blocks to the front pivot assembly (Detail "B"). Torque to 23 ft-lbs  $\pm$  20%.

*NOTE: The tilt angle blocks should be mounted in the position noted when removing the seating system.*
    - iii. Install the socket screw to secure the tilt potentiometer linkage to the center seat frame (Detail "A").
4. Connect the cables.

### Connecting Cables

*NOTE: For this procedure refer to FIGURE 6.17 on page 76.*

1. Perform one of the following:
  - Tilt Only and Tilt/Recline Systems -
    - i. Connect the tilt actuator connector (2-pin Anderson) to the TRCM, TAC, SAC or TRSS.
    - ii. Connect the tilt potentiometer connector (3-pin Molex) to the TRCM, TAC, SAC or TRSS.
  - Recline Only Systems - Connect the recline potentiometer connector (3-pin Molex) to the TRCM, TAC, SAC or TRSS.
2. Connect the auxiliary power connector to the power take-off connector (not shown) on the controller.
3. Connect the TRCM, SAC or TAC to the MK<sub>5</sub> controller (5-pin connector).
4. Connect the joystick.
5. Perform the post-service inspection of the system. Refer to Post-Service Inspection Checklist on page 21.

# SECTION 7—BACK ADJUSTMENTS

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## **⚠ WARNING**

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

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

---

## **Adjusting Back Width**

*NOTE: When changing the width of the back, the width of the entire seating system needs to be changed. Refer to [Adjusting Seat Width](#) on page 55.*

## **Adjusting Back Angle**

*NOTE: The following procedure is for Tilt-Only seating systems.*

*NOTE: For this procedure, refer to FIGURE 7.1 on page 81.*

1. Refer to Detail “A” in FIGURE 7.1 to determine the corresponding connector bracket mounting holes for the desired back angle.
- 

## **⚠ WARNING**

**Support the weight of the back BEFORE removing the hex bolt and shoulder bolt on the opposite side of the seat frame. Otherwise, injury or damage may occur.**

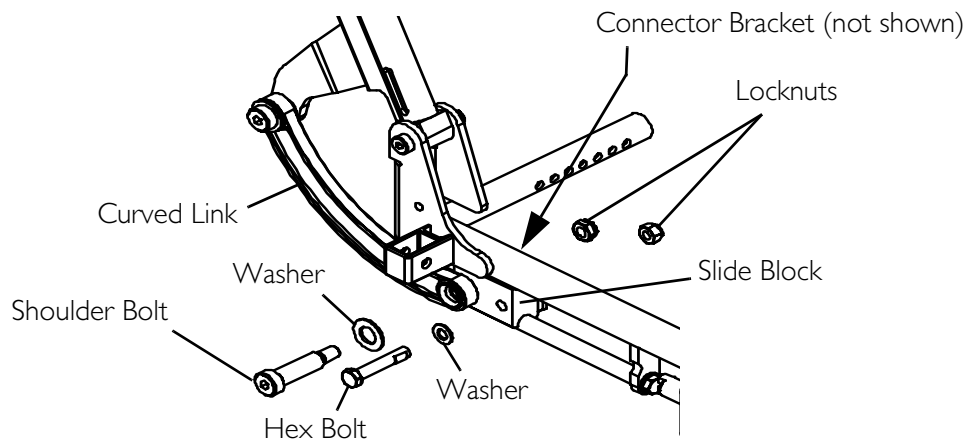
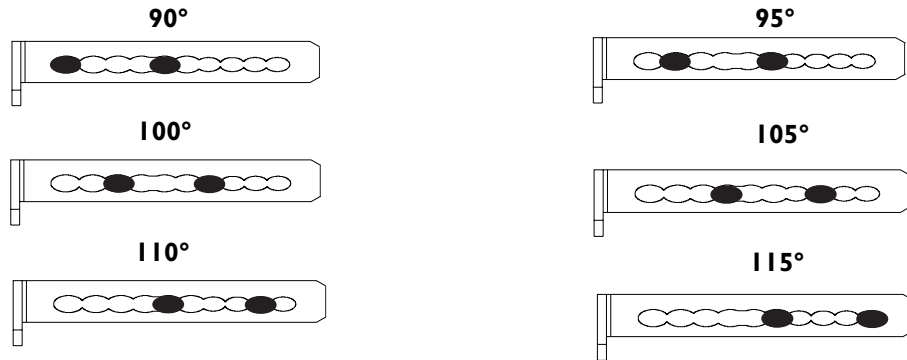
---

2. Remove the shoulder bolt, washer and locknut that secure the curved link to the rear of the slide block and connector bracket.
  3. Remove the hex bolt, washer and locknut that secure the front of the slide block to the connector bracket.
  4. With back supported, repeat STEPS 2-3 for the opposite side of the seat frame.
  5. Line up the mounting holes in the slide block with the connector bracket mounting holes determined in STEP 1.
  6. Reinstall the hex bolt, washer and locknut that secure the front of the slide block to the connector bracket and loosely tighten. Refer to FIGURE 7.1 for hardware orientation.
  7. Repeat STEP 6 for the opposite side of the seat frame.
  8. Line up the mounting holes in the curved link, slide block and connector bracket.
-



9. Reinstall the shoulder bolt, washer and locknut that secure the curved link to the rear of the slide block and connector bracket and loosely tighten. Refer to FIGURE 7.1 for hardware orientation.
10. Repeat STEPS 8-9 for the opposite side of the seat frame.
11. Torque all locknuts to 13 ft-lbs  $\pm$  20% (156 in-lbs  $\pm$  20%).
12. Adjust tilt and/or recline potentiometers. Refer to the electronics manual listed in Reference Documents on page 2.

**DETAIL "A" - CONNECTOR BRACKET MOUNTING HOLES**



**FIGURE 7.1** Adjusting Back Angle

## Removing/Installing the Curved Links

### Tilt Only Systems

*NOTE: For this procedure, refer to FIGURE 7.2 on page 83.*

#### Removing

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### **⚠ WARNING**

**Perform this procedure on one side of the wheelchair at a time. Otherwise the back will be completely disconnected from the seat and injury or damage may occur.**

---

1. Remove the side shroud. Refer to [Removing/Installing Side Shrouds](#) on page 100.
2. Remove the small socket screw and locknut securing the top of the curved link to the back cane.
3. Remove the large socket screw, nylon washer and locknut securing the rear of the slide block to the connecting bracket.
4. Remove the curved link from the wheelchair.

#### Installing

1. Secure the top of the curved link to the back cane using the small socket screw and locknut. Torque to 23 ft-lbs  $\pm$  20%.
2. Secure the bottom of the curved link to the rear of the slide block and the connecting bracket using the large socket screw, nylon washer and locknut in the same position used on the opposite side of the wheelchair. Torque to 156 in-lbs  $\pm$  20%.

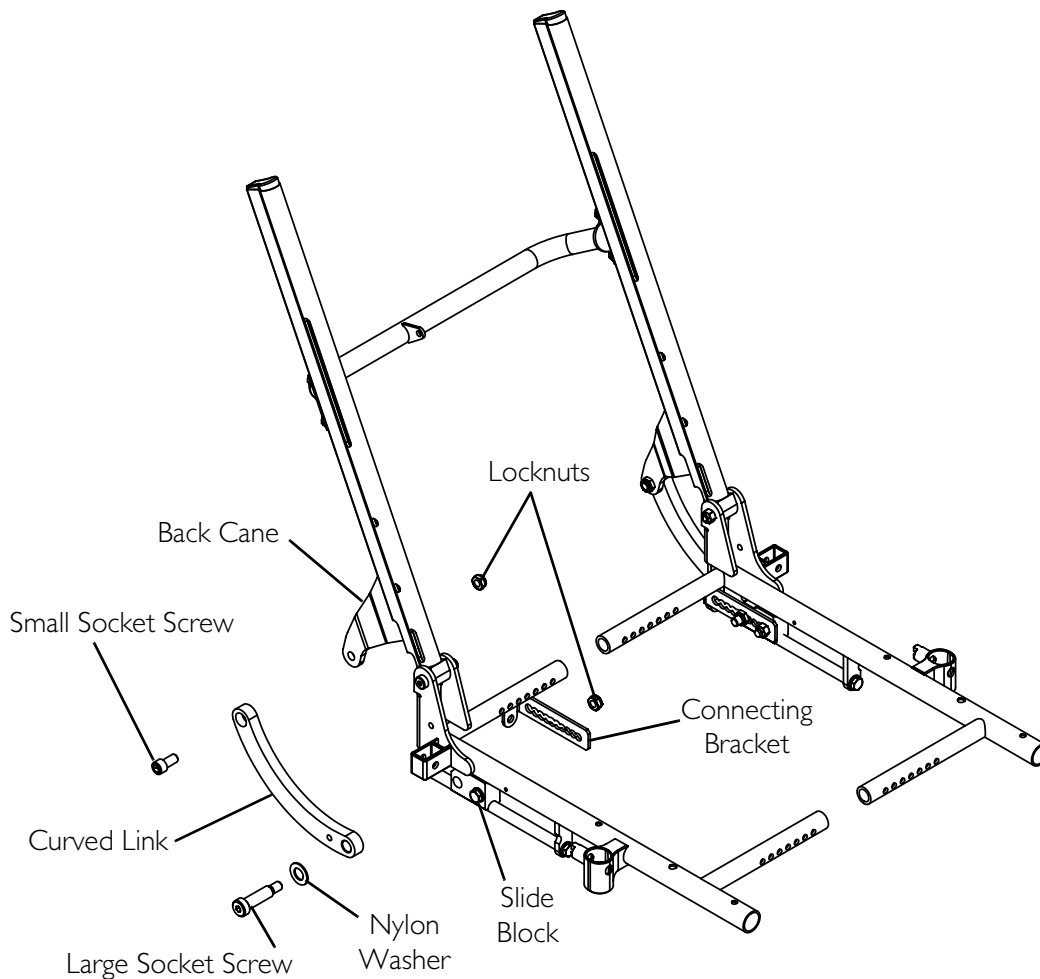
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### **⚠ WARNING**

**Side shroud(s) MUST be reinstalled before operation of the seating system. Otherwise injury may result.**

---

3. Install the side shroud. Refer to [Removing/Installing Side Shrouds](#) on page 100.



**FIGURE 7.2** Removing/Installing the Curved Links - Tilt Only Systems

### Recline Only and Tilt/Recline Systems

*NOTE: For this procedure, refer to FIGURE 7.3 on page 84.*

#### Removing

#### **⚠ WARNING**

**Perform this procedure on one side of the wheelchair at a time. Otherwise the back will be completely disconnected from the seat and injury or damage may occur.**

1. Remove the side shroud. Refer to [Removing/Installing Side Shrouds](#) on page 100.
2. Remove the short socket screw, nylon washer, flat washer and locknut securing the top of the curved link to the back cane.
3. Remove the long socket screw, nylon washer and locknut securing the rear of the slide block to the connecting bracket.
4. Remove the curved link from the wheelchair.

## Installing

**CAUTION**

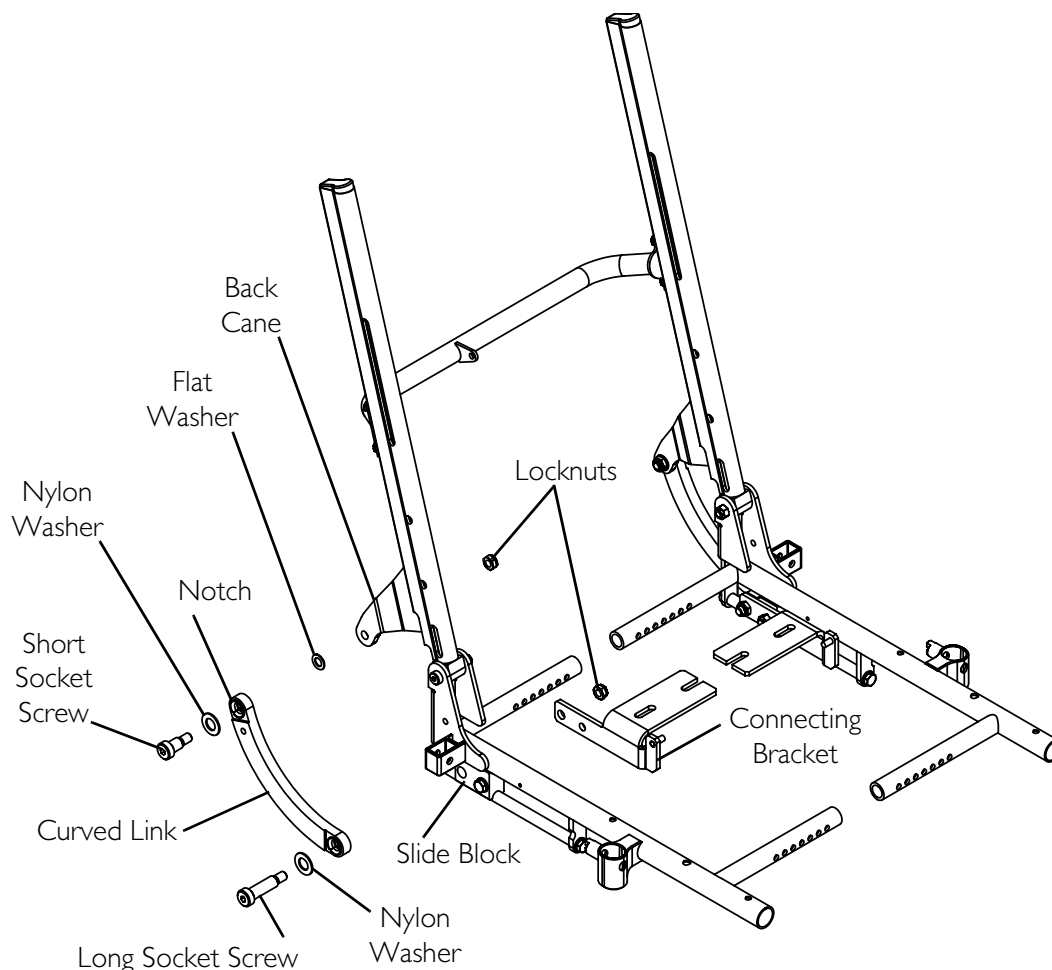
The curved link **MUST** be installed with the notched side facing out. Otherwise, damage to the seating system may result.

1. Orient the curved link so the notched side is facing out.
2. Secure the top of the curved link to the back cane using the short socket screw, nylon washer, flat washer and locknut. Torque to 156 in-lbs  $\pm$  20%.
3. Secure the bottom of the curved link to the rear of the slide block and the connecting bracket using the long socket screw, nylon washer and locknut in the same position used on the opposite side of the wheelchair. Torque to 23 ft-lbs  $\pm$  20%.

**⚠ WARNING**

Side shroud(s) **MUST** be reinstalled before operation of the seating system. Otherwise injury may result.

4. Install the side shroud. Refer to [Removing/Installing Side Shrouds](#) on page 100.



**FIGURE 7.3** Removing/Installing the Curved Links - Recline Only and Tilt/Recline Systems

## Removing/Installing Back Pan

*NOTE: For this procedure, refer to FIGURE 7.4 on page 86.*

### Removing

1. Remove the headrest from the seating system. Refer to Removing/Installing/Adjusting Headrest on page 124.
2. Lift up on the fastening straps and remove the cushion from the existing back pan.
3. Perform one of the following:
  - Tilt-Only Systems - Proceed to STEP 4.
  - Tilt/Recline and Recline-Only Systems:
    - i. Disconnect the VSR actuator cable from the TRCM or TAC.
    - ii. Remove the two mounting screws and locknuts that secure the VSR actuator mounting bracket to the existing back pan.
4. Remove the two mounting screws that secure the headrest mounting bracket to the existing back pan.
5. Remove headrest bracket from the existing back pan.

*NOTE: For 17, 19, and 21-inch width backs, spacers are required for proper installation.*

6. Remove the four mounting screws and spacers (if applicable) that secure the existing back pan to the two back slides.
7. Remove existing back pan from the two back slides.

### Installing

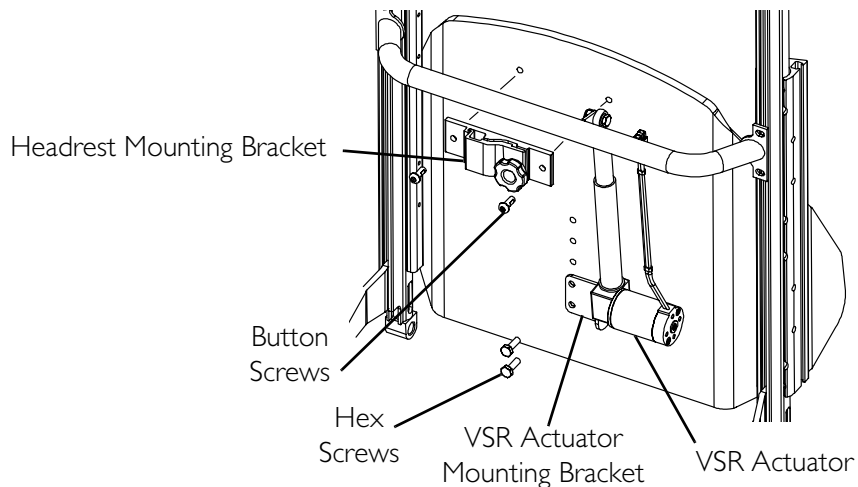
1. Line up the mounting holes in the new/existing back pan with the two new/existing back slides.

*NOTE: For 17, 19, and 21-inch width profile backs, spacers are required for proper installation.*

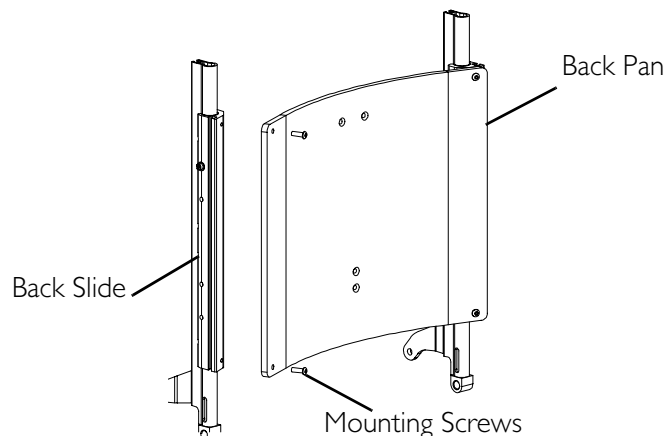
2. Install the four mounting screws and spacers (if applicable) that secure the new/existing back pan to the two new/existing back slides. Tighten securely.
3. Position the headrest bracket on the new/existing back pan.
4. Install the two mounting screws and locknuts that secure the headrest bracket to the new/existing back pan. Tighten securely.
5. Perform one of the following:
  - Tilt-Only Systems - Proceed to STEP 6.
  - Tilt/Recline and Recline-Only Systems:
    - i. Reposition the mounting holes in the VSR actuator bracket with the mounting holes in the new back pan.

## SECTION 7—BACK ADJUSTMENTS

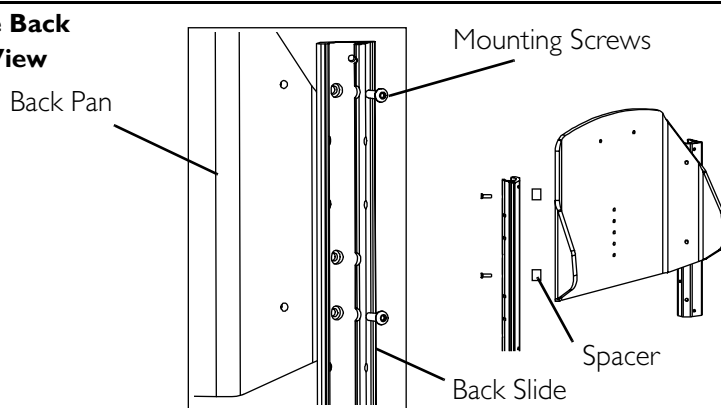
- ii. Reinstall the two mounting screws and locknuts that secure the VSR actuator mounting bracket to the new back pan. Tighten securely.
  - iii. Connect the VSR actuator to the TRCM or TAC.
  - iv. Adjust back height. Refer to Adjusting the Back Height on page 92.
6. Install the cushion onto the new back pan.
  7. Install the headrest onto the seating system. Refer to Removing/Installing/Adjusting Headrest on page 124.



### ABS Back



### Profile Back Rear View



*NOTE: For back widths of 17, 19, or 21 inches, spacers are required between back slide and back pan.*

**FIGURE 7.4** Removing/Installing Back Pan

## Removing/Installing Spreader Bar

### Slotted Back Canes

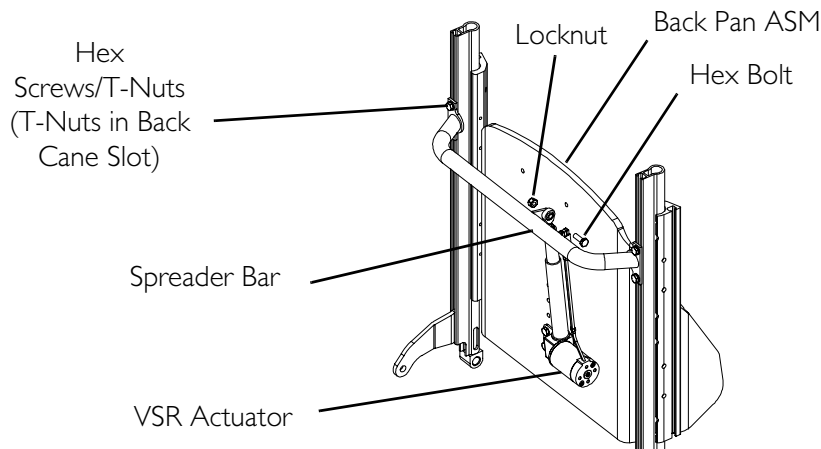
*NOTE: For this procedure, refer to FIGURE 7.5.*

#### Removing

1. Note the position of the existing spreader bar, by measuring from the top of the back canes to the top of the spreader bar.
2. Note the position of the back pan, by measuring from the top of the back pan to the top of the back canes. Systems with Recline - remove the hex bolt and locknut that secure the VSR actuator to the existing spreader bar.

*NOTE: When the spreader bar is disconnected from the VSR actuator, the back pan ASM may slide out of position.*

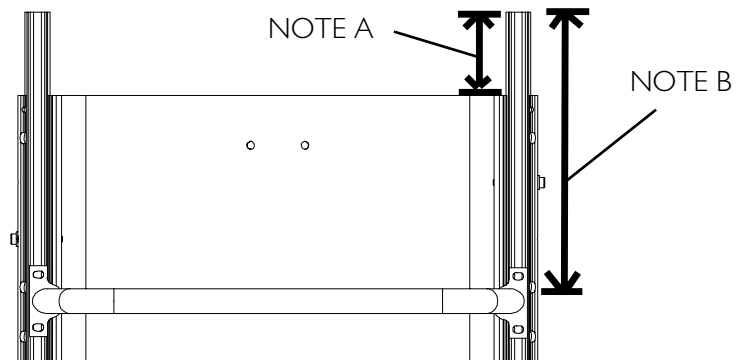
3. Loosen, but DO NOT remove, the four hex screws that secure the existing spreader bar to the back canes.
4. Lift up and remove the existing spreader bar, with T-nuts, from the slots on the back canes.
5. If installing a new spreader bar, remove the four screws and T-nuts from the existing spreader bar.



#### DETAIL "A"

*NOTE A: Measurements from the top of the back cane to the top of the back pan MUST be equal.*

*NOTE B: Measurements from the top of the back cane to the top of the spreader bar MUST be equal.*



**FIGURE 7.5** Removing/Installing Spreader Bar - Slotted Back Canes

**Installing**

1. For new spreader bars, loosely install the four T-nuts and hex screws onto the new spreader bar.
2. Align the T-nuts on the spreader bar with the slots in the back canes.
3. Slide the spreader bar to the position noted in STEP 1 of Removing on page 87.
4. Perform one of the following:
  - Tilt-Only systems - Proceed to STEP 5.
  - Tilt/Recline and Recline-Only Systems:
    - i. Line up the mounting holes in the VSR actuator and spreader bar.
    - ii. Install hex bolt and locknut through VSR actuator and spreader bar. Tighten securely.
5. Make sure the measurements shown in Detail “A” are the same on both sides.
6. Tighten the four hex screws that secure the spreader bar to the back canes. Torque to 75 in-lbs  $\pm$  20%.

**Round Back Canes**

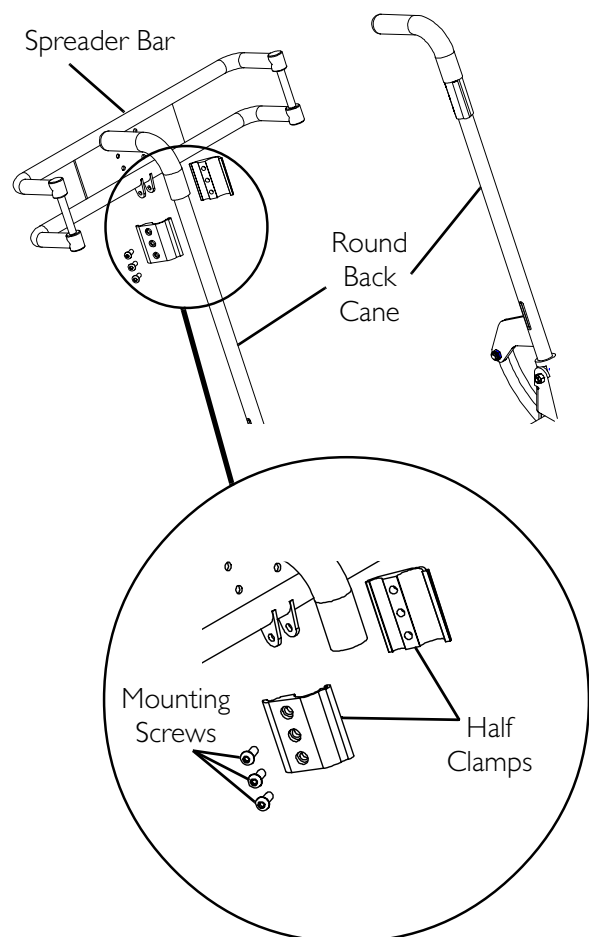
*NOTE: For this procedure, refer to FIGURE 7.6.*

**Removing**

1. Note the position of the existing spreader bar.
2. Remove the three mounting screws that secure the two half clamps and existing spreader bar to the back cane. Repeat for other side.
3. Remove the existing spreader bar and half clamps from the back canes.

**Installing**

1. Install the spreader bar to the position noted in STEP 1 of Removing with the existing two half clamps and six mounting screws.
2. Make sure the measurements shown in FIGURE 7.6 are the same.
3. Torque the six mounting screws that secure the half clamps and spreader bar to the back canes to 75 in-lbs  $\pm$  20%.



**FIGURE 7.6** Removing/Installing Spreader Bar - Round Back Canes



## Removing/Installing Back Canes

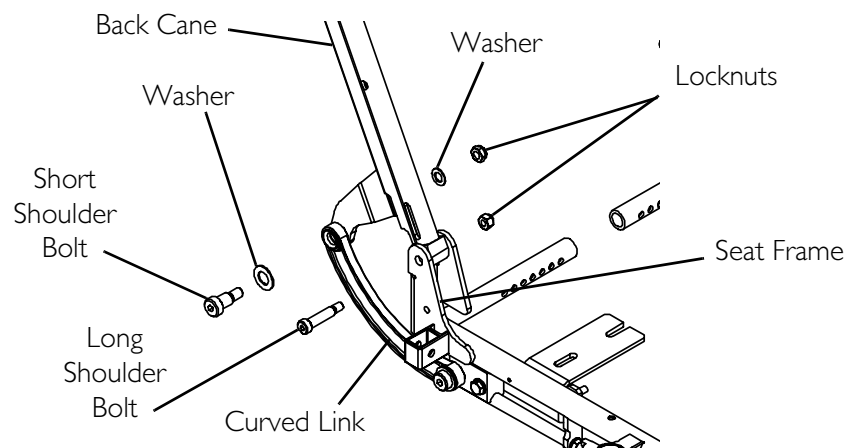
*NOTE: For this procedure, refer to FIGURE 7.7.*

### Removing

1. Remove the arms. Refer to [Arms](#) on page 114.
2. Remove the spreader bar. Refer to [Removing/Installing Spreader Bar](#) on page 87.
3. Remove the short shoulder bolt, two washers and locknut that secure the existing back cane to the curved link.
4. Remove the long shoulder bolt and locknut that secure the existing back cane to the seat frame.
5. Remove the existing back cane from the wheelchair.
6. If necessary, repeat STEPS 2-4 for opposite back cane.

### Installing

1. Position the new back cane on the seat frame as shown in FIGURE 7.7.
2. Install the long shoulder bolt that secures the new back cane to the seat frame.
3. Install the locknut onto the shoulder bolt and torque to 13 ft-lbs  $\pm$  20% (156 in-lbs  $\pm$  20%).
4. Line up the mounting holes in the new back cane and curved link.
5. Install the short shoulder bolt and two washers that secure the new back cane to the curved link. Refer to FIGURE 7.7 for correct hardware orientation.
6. Install the locknut onto the shoulder bolt and torque to 13 ft-lbs  $\pm$  20% (156 in-lbs  $\pm$  20%).
7. If necessary, repeat STEPS 1-6 for the opposite back cane.
8. Install the spreader bar. Refer to [Removing/Installing Spreader Bar](#) on page 87.
9. Install the arms. Refer to [Arms](#) on page 114.



**FIGURE 7.7** Removing/Installing Back Canes

## Removing/Installing Back Slide Assembly

*NOTE: For this procedure, refer to FIGURE 7.8 on page 91.*

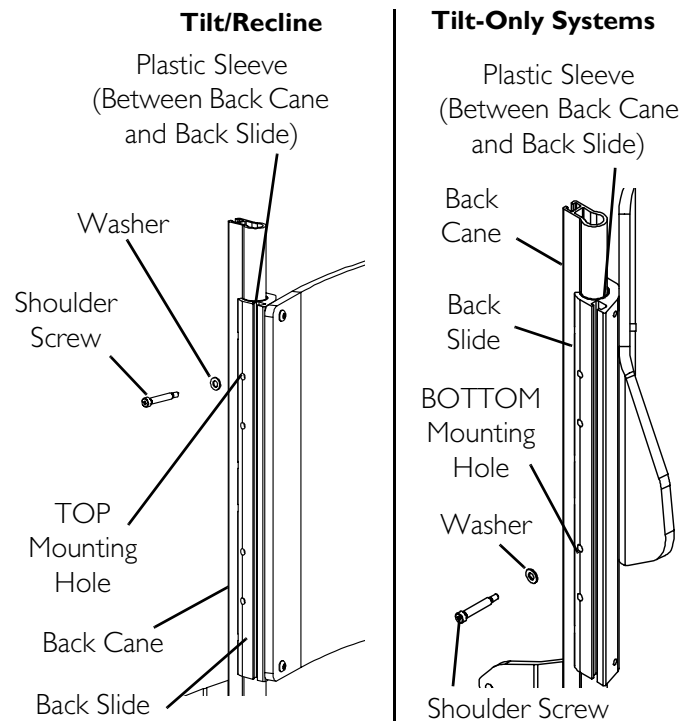
### Removing

1. Remove the back pan. Refer to [Removing/Installing Back Pan](#) on page 85.
2. Perform one of the following:
  - Tilt-Only Systems - Remove the two shoulder screws and washers that secure the two existing back slides to the existing back canes from the BOTTOM mounting hole.
  - Tilt/Recline and Recline-Only Systems - Remove the two shoulder screws and washers that secure the two existing back slides to existing back canes from the TOP mounting hole.
3. Slide the existing back slide assembly up and off the existing back canes.

*NOTE: There are plastic sleeves positioned between the back slides and the back canes. These may fall out when back slide assembly is removed.*

### Installing

1. Install the two new/existing plastic sleeves on the new/existing back canes.
2. Slide the new/existing back/back slide assembly onto the two new/existing back canes.
3. Line up the mounting holes in the new/existing back/back slide assembly, two plastic sleeves and new/existing back canes.
4. Perform one of the following:
  - Tilt-Only Systems - Install the two shoulder screws that secure the two new/existing back slides and plastic sleeves to the new/existing back canes on the BOTTOM mounting hole. Tighten securely.
  - Tilt/Recline and Recline-Only Systems - Install the two shoulder screws that secure the two new/existing back slides and plastic sleeves to the new/existing back canes on the TOP mounting hole. Tighten securely.
5. Perform one or more of the following:
  - Replace the back canes. Refer to [Removing/Installing Back Canes](#) on page 89.
  - Install the back pan. Refer to [Removing/Installing Back Pan](#) on page 85.



**FIGURE 7.8** Removing/Installing Back Slide Assembly

## Removing/Installing Back Assembly

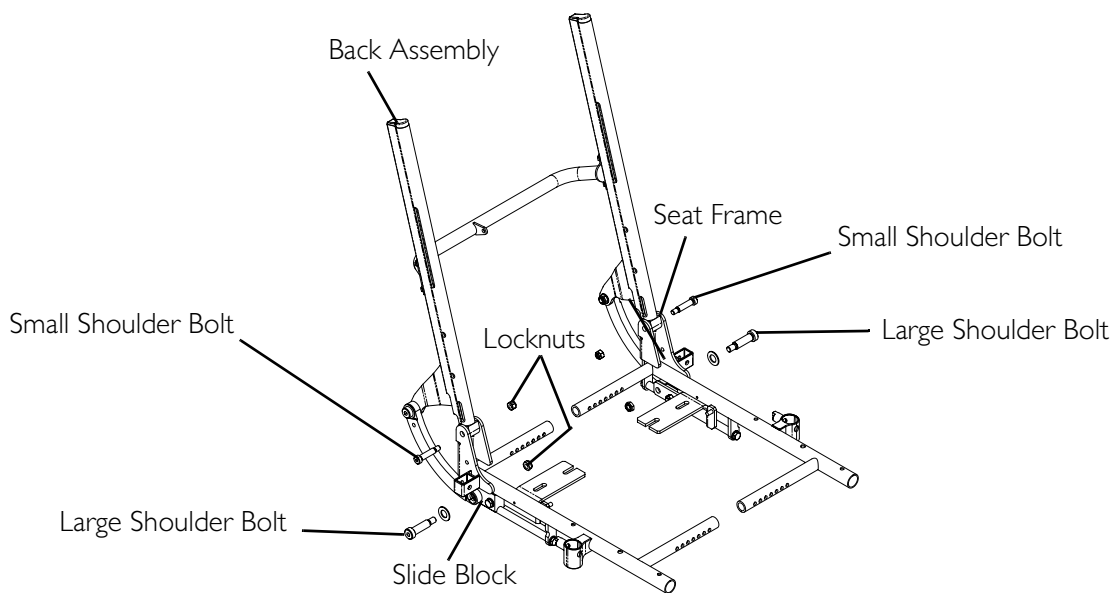
*NOTE: For this procedure, refer to FIGURE 7.9 on page 92.*

### Removing

1. Remove the two large shoulder bolts, washers and locknuts that secure the two curved links to the two slide blocks.
2. Remove the two small shoulder bolts and locknuts that secure the two back canes to the seat frame.
3. Remove the back assembly from the seat frame.

### Installing

1. Line up the mounting holes in the back assembly and the seat frame.
2. Loosely install the two small shoulder bolts and locknuts that secure the two back canes to the seat frame.
3. Loosely install the two large shoulder bolts, washers and locknuts that secure the two curved links to the two slide blocks.
4. Torque the four locknuts to 13 ft-lbs  $\pm$  20% (156 in-lbs  $\pm$  20%).



**FIGURE 7.9** Removing/Installing Back Assembly

## Adjusting the Back Height

### Overview

Back heights can be adjusted 1-inch within the range of back canes up to 25 inches high.

*NOTE: The back pan may need to be replaced\*\*. Refer to [Removing/Installing Back Pan](#) on page 85.*

The back height can be adjusted beyond the range of the existing back canes, up to 26 inches\*, when the back canes and back slides/plastic inserts\*\* are replaced.

- Refer to [Removing/Installing Back Canes](#) on page 89.
- Refer to [Removing/Installing Back Slide Assembly](#) on page 90.

#### Back Height Components

BACK HEIGHT	BACK CANE	BACK SLIDE/PLASTIC INSERT**
20	20	11¼
21		
22	22	13¼
23		
24	24	15¼
25		
26*	26	17¼

*NOTE: All measurements in inches.*

*\*NOTE: Tilt Only systems with round back canes can only be adjusted up to 25 inches.*

*\*\*NOTE: For systems with slotted back canes only.*

## Removing/Installing Arm Pivots

*NOTE: For this procedure, refer to FIGURE 7.10.*

*NOTE: The following procedure is for Tilt/Recline and Recline-Only seating systems.*

### Removing

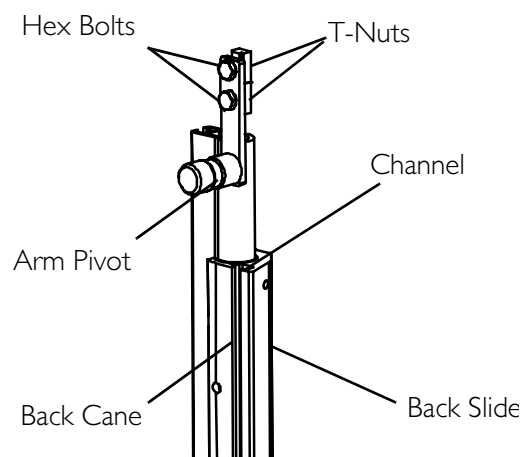
1. If necessary, remove the lateral supports from the seating system. Refer to [Installing/Removing/Adjusting Lateral Supports](#) on page 95.
2. Note the position of the existing arm pivot.
3. Loosen, but DO NOT remove, the two hex bolts that secure the existing arm pivot to the back slide.
4. Slide the existing arm pivot off the back slide.

### Installing

1. If necessary, loosely install the four T-nuts and hex bolts onto the new arm pivot.
2. Position the new/existing arm pivot and line up the T-nuts with the slots in the new/existing back slides.
3. Slide the new/existing arm pivot to the position noted in STEP 2 above.

*NOTE: If a change in armrest height is desired, Refer to [Adjusting Armrest Height](#) on page 115.*

4. Torque the two hex bolts that secure the new/existing arm pivot to the back slide to 50 in-lbs  $\pm$  20%.
5. If necessary, repeat STEPS 1-4 for the opposite side of the seating system.
6. If necessary, install the lateral supports onto the seating system. Refer to [Installing/Removing/Adjusting Lateral Supports](#) on page 95.



**FIGURE 7.10** Removing/Installing Arm Pivots

## Removing/Installing/Adjusting Chest Positioning Strap

*NOTE: For this procedure, refer to FIGURE 7.11.*

*NOTE: This procedure applies to systems with slotted canes only.*

### Removing

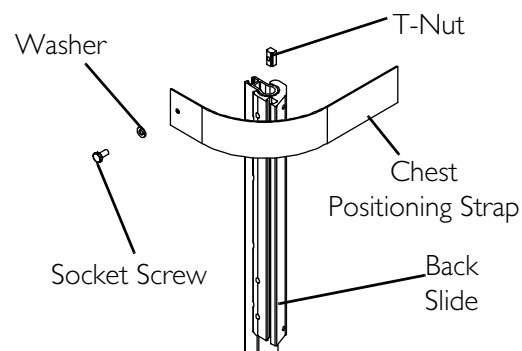
1. Note the position of the existing chest positioning strap.
2. Loosen, but DO NOT remove, the socket screw that secures the existing chest positioning strap to the back slide.
3. Slide the existing chest positioning strap off the back slide.

### Installing

1. If necessary, loosely install the T-nut and hex screw onto the new chest positioning strap.
2. Position the new/existing chest positioning strap and line up the T-nuts with the slots in the back slide.
3. Slide new/existing chest positioning strap to the position noted in STEP 1 in Removing on page 93.
4. Tighten the two socket screws that secure the new/existing chest positioning strap to the back slide securely.

### Adjusting Height

1. Loosen, but DO NOT remove, the two socket screws that secure the chest positioning strap to the back slide.
2. Slide the chest positioning strap to the desired position.
3. Tighten the two socket screws that secure the chest positioning strap to the back slide securely.



**FIGURE 7.11** Removing/Installing/Adjusting Chest Positioning Strap

# Installing/Removing/Adjusting Lateral Supports

## Slotted Canes

### Removing Lateral Supports

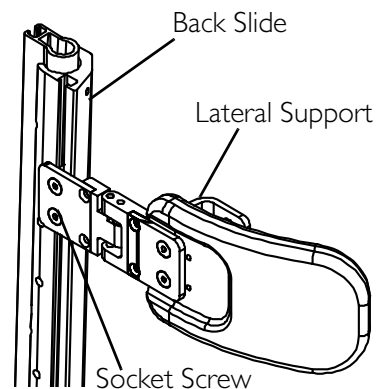
*NOTE: For this procedure, refer to FIGURE 7.12.*

1. Note the position of the existing lateral support on the back slide.
2. Loosen, but DO NOT remove, the two socket screws that secure the existing lateral support to the back slide.
3. Slide the existing lateral support up and off the back slide.

### Installing Lateral Supports

*NOTE: For this procedure, refer to FIGURE 7.12.*

1. If necessary, loosely install the two T-nuts and hex screws onto the new lateral support.
2. Position the new/existing lateral support and line up the T-nuts with the slots in the new/existing back slide.
3. Slide new/existing lateral support to the desired position.
4. Tighten the two socket screws that secure the new/existing lateral support to the back slide securely.



**FIGURE 7.12** Removing Lateral Supports - Installing Lateral Supports

### Adjusting Height

*NOTE: For this procedure, refer to FIGURE 7.13.*

1. Loosen, but DO NOT remove, the two socket screws that secure the existing lateral support to the back slide.
2. Slide the lateral support to the desired position.
3. Tighten the two socket screws that secure the lateral support to the back slide securely.

### Adjusting Depth

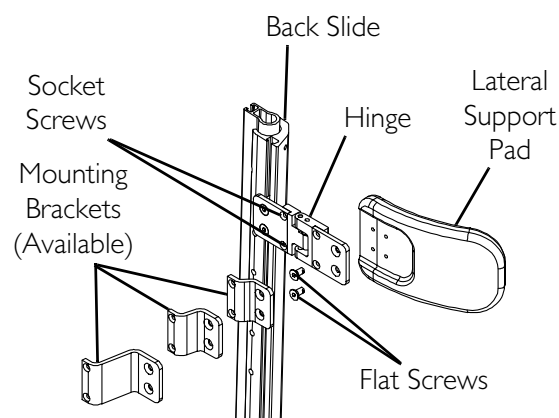
*NOTE: For this procedure, refer to FIGURE 7.13.*

1. Remove the two flat screws that secure the lateral support pad to the mounting bracket.
2. Reposition the lateral support pad to the other set of mounting holes.
3. Reinstall the two flat screws and tighten securely.

### Adjusting Width

*NOTE: For this procedure, refer to FIGURE 7.13.*

1. Note depth mounting position of the lateral support.
2. Remove the two flat screws that secure the lateral support pad to the existing mounting bracket.
3. Remove the two socket screws that secure the mounting bracket to the hinge.
4. Line up the mounting holes in the new mounting bracket with the hinge.
5. Install the socket screws to secure the new mounting bracket to the hinge and tighten securely.
6. Line up the lateral support pad to the position noted in STEP 1.
7. Reinstall the two flat screws and tighten securely.



**FIGURE 7.13** Adjusting Lateral Supports



## Round Canes

### Removing Lateral Supports

*NOTE: For this procedure, refer to FIGURE 7.14.*

1. Remove the three hex screws securing the half clamps to the back canes.
2. Remove the two socket screws securing the bracket (with lateral support attached) to the half clamp.

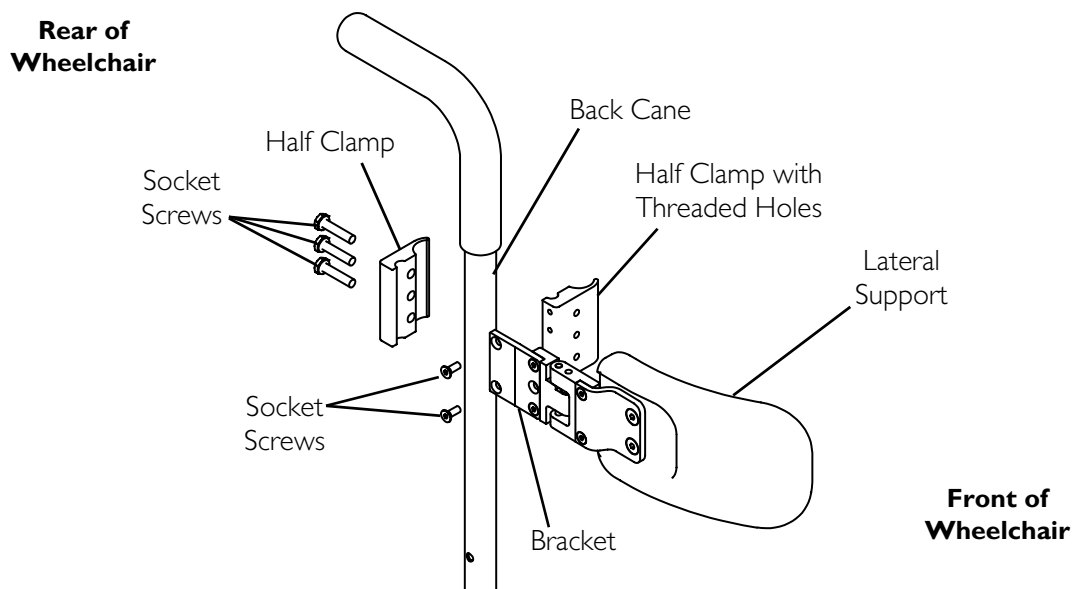
### Installing Lateral Supports

*NOTE: For this procedure, refer to FIGURE 7.14.*

1. Position the half clamps on the back cane.

*NOTE: Ensure the half clamp with the threaded holes is towards the front of the wheelchair.*

2. Secure the half clamps to the back canes using the three hex screws.
3. Secure the bracket (with lateral support attached) to the half clamp with threaded holes using two socket screws.

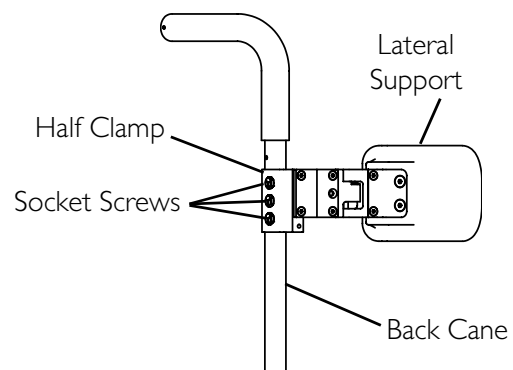


**FIGURE 7.14** Removing/Installing Lateral Supports - Round Canes

### Adjusting Lateral Height

*NOTE: For this procedure, refer to FIGURE 7.15.*

1. Loosen, but DO NOT remove, the three socket screws securing the half clamps to the back cane.
2. Adjust the height of the lateral support.
3. Tighten the three socket screws to secure the half clamps to the back cane.

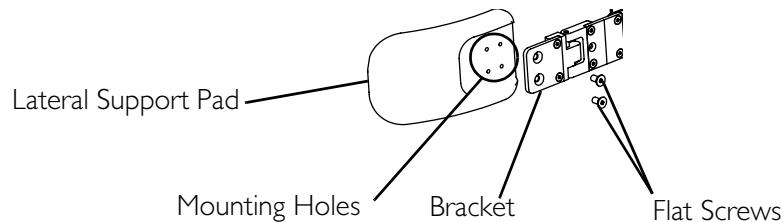


**FIGURE 7.15** Adjusting Lateral Height

### Adjusting Lateral Depth

*NOTE: For this procedure, refer to FIGURE 7.16.*

1. Remove the two flat screws that secure the lateral support pad to the bracket.
2. Reposition the bracket to the other set of mounting holes in the lateral support.
3. Install the two flat screws to secure the lateral support pad to the bracket.

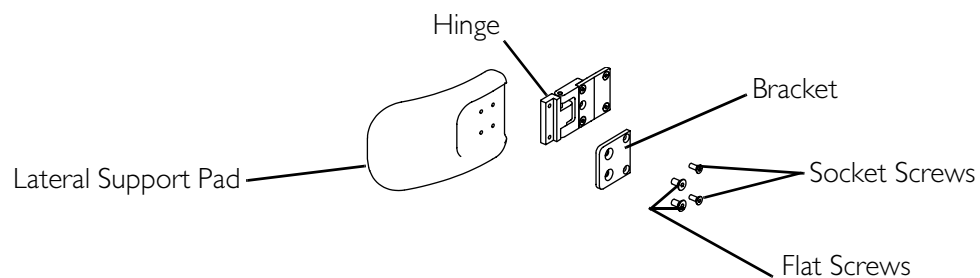


**FIGURE 7.16** Adjusting Lateral Depth

### Adjusting Lateral Width

*NOTE: For this procedure, refer to FIGURE 7.17.*

1. Note the depth mounting position of the lateral support pad.
2. Remove the two flat screws that secure the lateral support pad to the existing bracket.
3. Remove the two socket screws that secure the existing bracket to the hinge.
4. Align the mounting holes in the new bracket with the mounting holes in the hinge.
5. Use the two socket screws to secure the new bracket to the hinge.
6. Secure the lateral support pad to the new bracket with the two flat screws.



**FIGURE 7.17** Adjusting Lateral Width

# SECTION 8—SHROUDS

## ⚠ WARNING

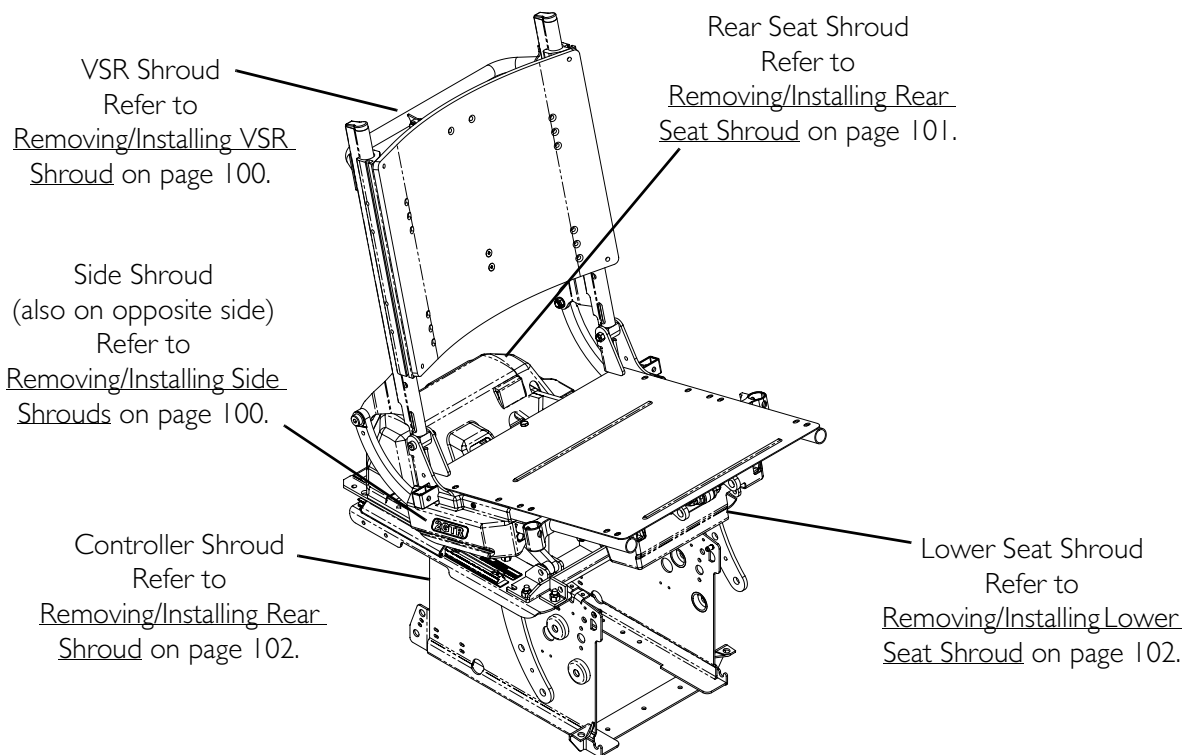
After **ANY** adjustments, repair or service and **BEFORE** use, make sure all attaching hardware is tightened securely - otherwise injury or damage may occur.

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

## Shroud Overview

*NOTE: For this procedure, refer to FIGURE 8.1.*

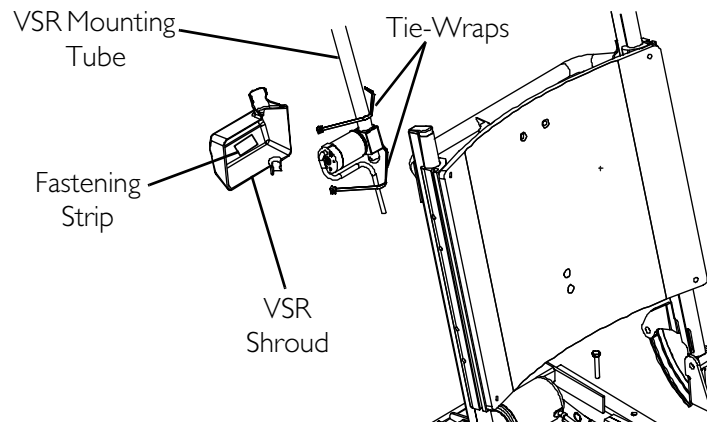


**FIGURE 8.1** Shroud Overview

## Removing/Installing VSR Shroud

*NOTE: For this procedure, refer to FIGURE 8.2.*

1. To remove, cut the two tie-wraps that secure the VSR shroud in place.
2. Pull on the VSR shroud to disengage from the fastening strip.
3. Secure VSR shroud to VSR mounting tube in place with two tie-wraps as shown in FIGURE 8.2.



**FIGURE 8.2** Removing/Installing VSR Shroud

## Removing/Installing Side Shrouds

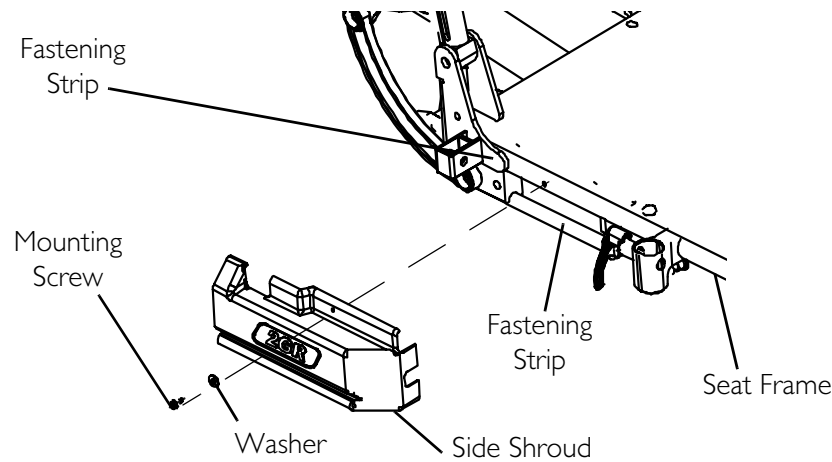
### **⚠ WARNING**

**Side shroud(s) MUST be reinstalled before operation of the seating system. Otherwise injury may result.**

*NOTE: For this procedure, refer to FIGURE 8.3 on page 101.*

1. Remove the mounting screw and washer that secure the side shroud to the seat frame.
2. To install side shrouds, align side shroud with fastening strips and secure with mounting screw and washer. Securely tighten.

*NOTE: Only the right side shroud is shown for clarity. The left side shroud removes/installs in the same manner.*

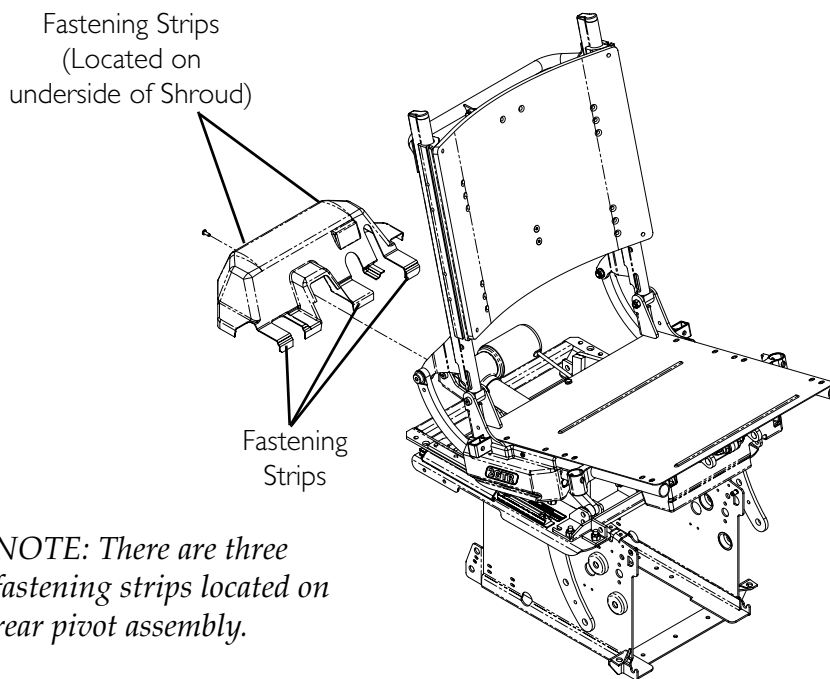


**FIGURE 8.3** Removing/Installing Side Shrouds

## Removing/Installing Rear Seat Shroud

*NOTE: For this procedure, refer to FIGURE 8.4.*

1. Remove the screw located on the back of the shroud.
2. To remove, pull up on rear seat shroud to disengage from fastening strips.
3. To install, align fastening strips on rear seat shroud with fastening strips on frame. Position rear seat shroud in place and firmly press down. Install the phillips head screw.



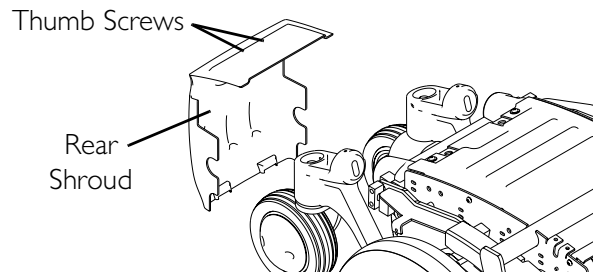
*NOTE: There are three fastening strips located on rear pivot assembly.*

**FIGURE 8.4** Removing/Installing Rear Seat Shroud

## Removing/Installing Rear Shroud

*NOTE: For this procedure, refer to FIGURE 8.5.*

1. Verify the joystick On/Off switch is in the Off position.
2. Remove the two thumb screws that secure the rear shroud to the wheelchair.
3. Remove the rear shroud from the wheelchair.



**FIGURE 8.5** Removing/Installing Rear Shroud

## Removing/Installing Lower Seat Shroud

*NOTE: For this procedure, refer to FIGURE 8.6 on page 103.*

1. Perform one of the following actions:
  - Tilt-Only Systems and Tilt/Recline Systems - Tilt seat to maximum angle.
  - Recline-Only Systems:
    - i. Note the mounting location of the hardware securing the recline links to the front pivot assembly.
    - ii. Remove the two shoulder bolts, washers and locknuts that secure the recline links to the front pivot assembly (Detail "A").

---

### **⚠ WARNING**

**To ensure safety, secure seat in tilted position before removing/installing the lower seat shroud. Otherwise, injury may result.**

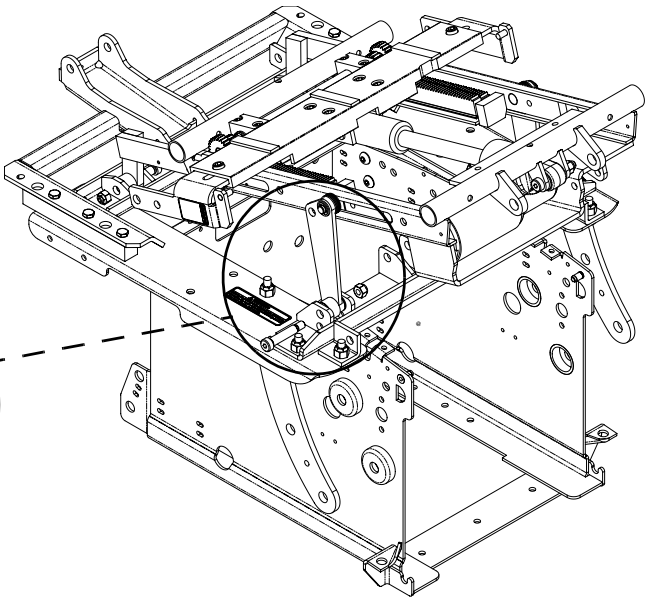
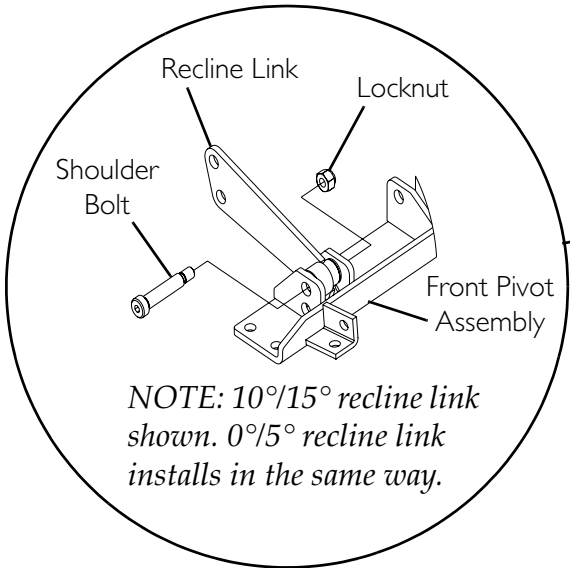
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- iii. Tilt seat back and secure in tilted position.
2. Remove the mounting screw, coved washer, washer and locknut that secure the rear portion of the lower seat shroud to the seat frame (Detail "B").

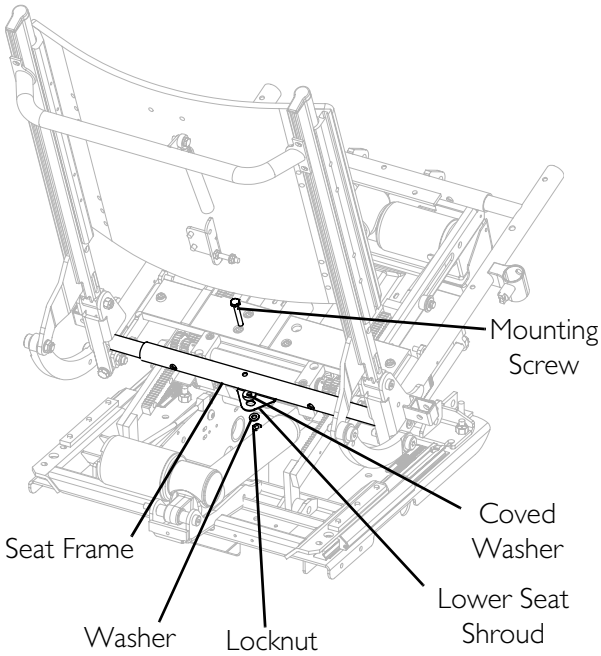
*NOTE: The mounting screw, coved washer, washer and locknut also secure the seat pan to the seat frame.*

3. Remove the two mounting screws that secure the front portion of the lower seat shroud to the seat frame (Detail "C").
4. To install lower seat shroud, reverse STEPS 1-3.

DETAIL "A" - RECLINE ONLY SYSTEMS



DETAIL B: REAR MOUNTING HARDWARE



NOTE: Seat pan not shown for clarity. Hardware shown also secures seat pan to seat frame.

DETAIL C: FRONT MOUNTING HARDWARE

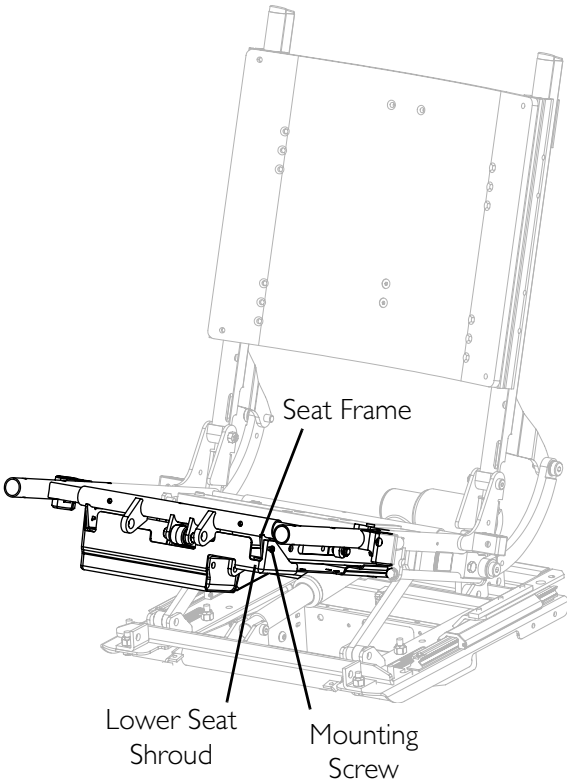


FIGURE 8.6 Removing/Installing Lower Seat Shroud

# SECTION 9—POWER ELEVATING LEGRESTS

---

## **⚠ WARNING**

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

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

---

*NOTE: For complete operating information on Invacare elevating legrests, refer to the TDX Owner's Manual, listed in Reference Documents on page 2.*

## Installing/Removing the Power Elevating Legrests

---

### **⚠ WARNING**

To prevent personal injury, **ALWAYS** verify proper positioning of legs and feet prior to use. Individual user weight may impact the rate of travel for each legrest assembly. If simultaneous operation is desired, select a speed which allows for the most uniform travel.

**DO NOT** insert fingers between legrest components. Otherwise personal injury may occur.

---

### **CAUTION**

**NEVER** allow items to become trapped between the legrest assemblies. Otherwise damage to the power legrests may occur.

Ensure that all parts of both power legrests are clear of any obstructions before raising and lowering, otherwise damage to the power legrests may occur.

---

*NOTE: For this procedure, refer to FIGURE 9.1 on page 105.*

*NOTE: Power legrests are linked to the recline function of the seating system. Operating the recline function automatically operates power legs. Power legrests can also be operated independently of the recline function.*



## Installing the Power Elevating Legrests

1. Turn power legrest to side (open footplate is perpendicular to wheelchair) and position the mounting pin on the legrest with mounting holes on the seat frame (Detail "A").
2. Insert the mounting pin of power legrest into the mounting hole of the seat frame (Detail "A").

*NOTE: Make sure the legrest sits flush on the seat frame.*

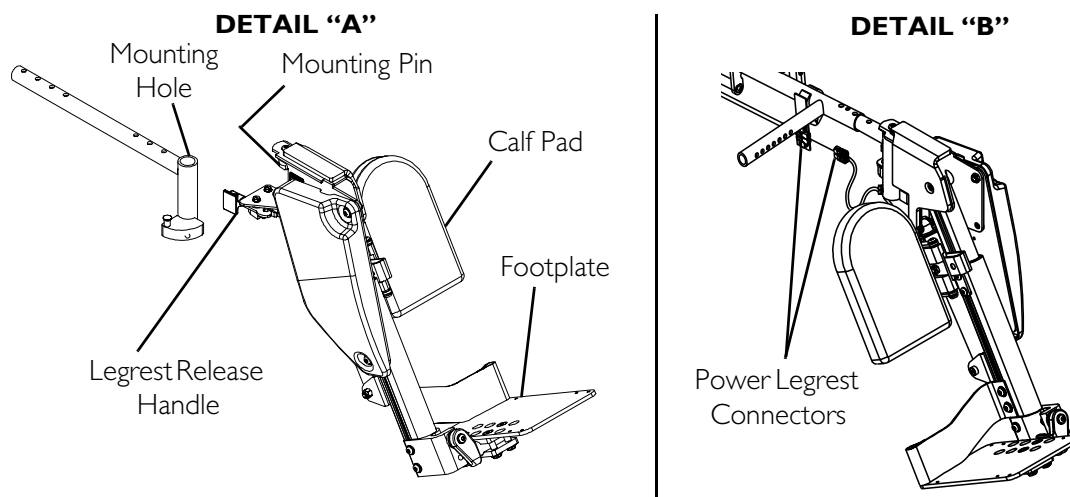
3. Rotate the power leg toward the inside of the wheelchair until it locks in place.

*NOTE: The footplate will be on the inside of the wheelchair when locked in place.*

4. Repeat STEPS 1-3 for the opposite legrest.
5. Connect the power legrest connectors (Detail "B").
6. If necessary, adjust powered legs. Refer to [Adjusting the Power Elevating Legrests on page 106](#).

## Removing the Power Elevating Legrests

1. Disconnect power legrest connectors.
2. Push powered legrest release handle toward the opposite side of the wheelchair and swing legrest to the outside of the wheelchair.
3. Lift up powered legrest and remove from wheelchair.
4. Repeat STEPS 1-3 for opposite power legrest.



**FIGURE 9.1** Installing/Removing the Power Elevating Legrests

## Adjusting the Power Elevating Legrests

### Adjusting the Footplate

#### **⚠ WARNING**

**DO NOT** remove heel loops without providing some other adequate means of support, otherwise personal injury may occur.

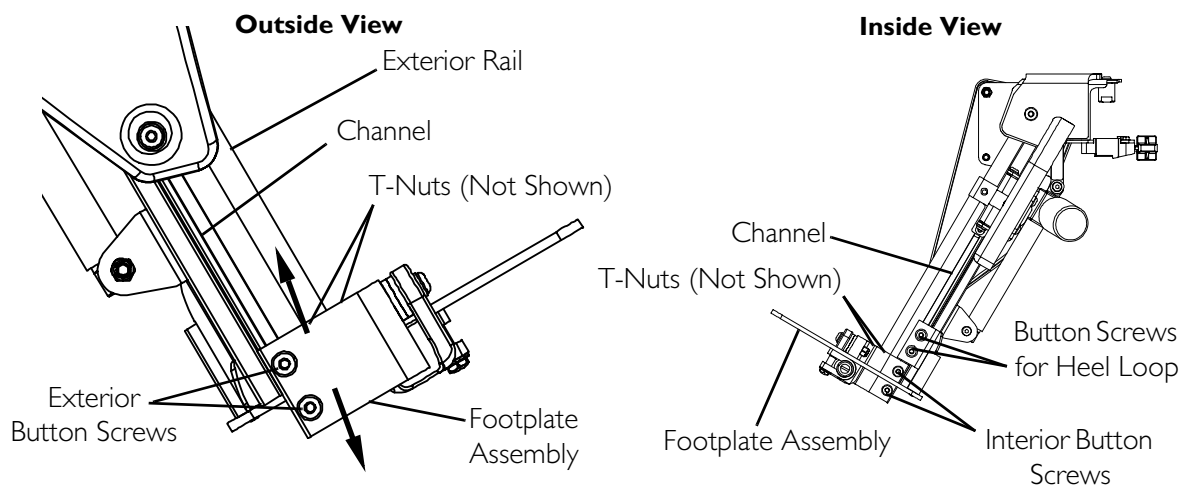
#### Adjusting the Footplate Height

*NOTE: For this procedure, refer to FIGURE 9.2.*

*NOTE: The following procedure should be performed with the user in the wheelchair.*

*NOTE: T-nuts ride in the channels of the exterior/interior rails of the power legrests.*

1. Loosen, but **DO NOT** remove, the two interior button screws that secure the footplate assembly to the T-nuts.
2. Loosen, but **DO NOT** remove, the two exterior button screws that secure the footplate assembly to the T-nuts.
3. Loosen, but **DO NOT** remove, the two button screws that secure the heel loop to the T-nuts.
4. Slide footplate assembly up or down, until desired height is achieved.
5. While holding footplate assembly in position, tighten all six button screws that were loosened in STEPS 1-3.
6. Repeat STEPS 1-5 for opposite footplate if necessary.

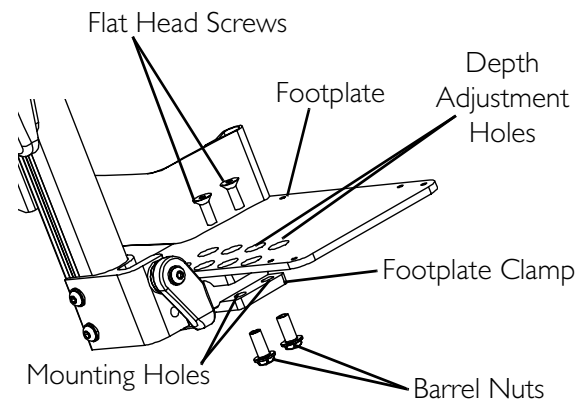


**FIGURE 9.2** Adjusting the Footplate Height

### Adjusting the Footplate Depth

*NOTE: For this procedure, refer to FIGURE 9.3.*

1. Remove the two flat head screws and the two barrel nuts that secure the footplate to the footplate clamp.
2. Reposition the footplate on the footplate clamp.
3. Align the depth adjustment holes on the footplate to the mounting holes on the footplate clamp.
4. Insert the barrel nuts through the bottom of the footplate clamp.
5. Install the two flat head screws through the footplate and footplate clamp.
6. Securely tighten with two barrel nuts.
7. Repeat STEPS 1-6 for opposite footplate if necessary.

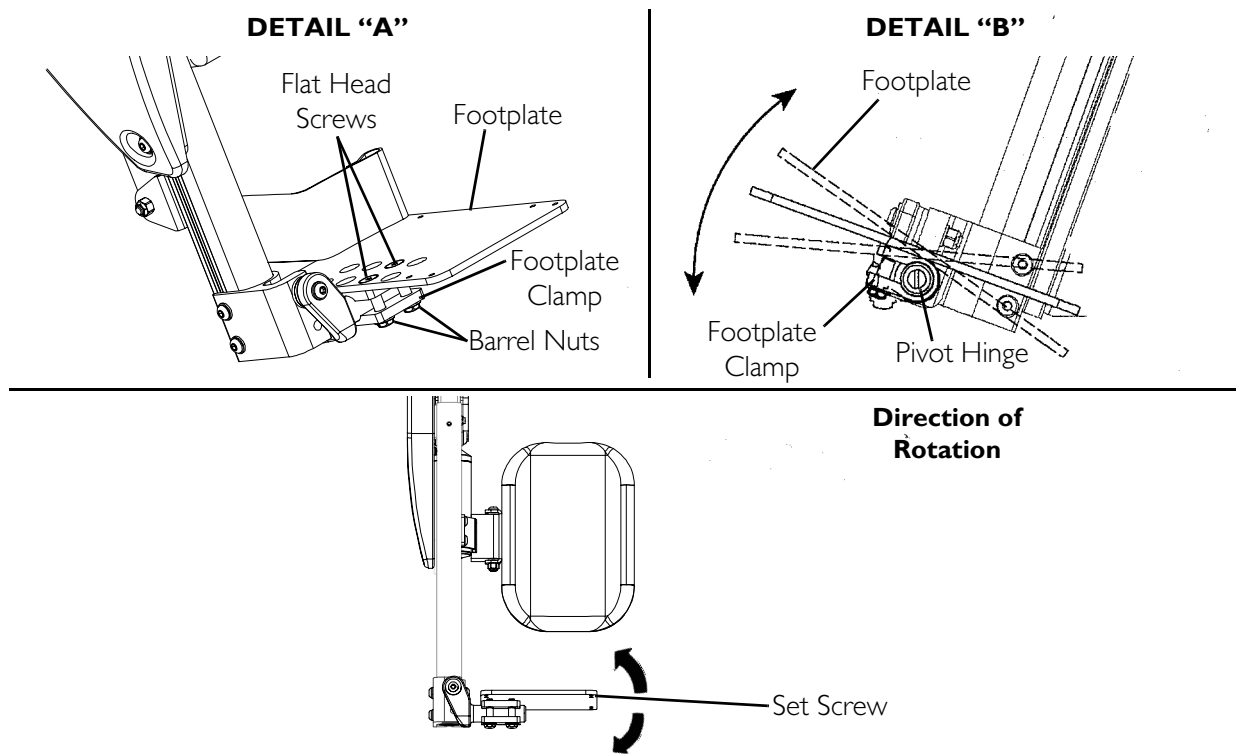


**FIGURE 9.3** Adjusting the Footplate Depth

### Adjusting the Footplate Angle

*NOTE: For this procedure, refer to FIGURE 9.4 on page 108.*

1. Loosen, but DO NOT remove, the two flat head screws and the two barrel nuts that secure the footplate to the footplate clamp. Refer to Detail "A".
2. Rotate the footplate clamp on the pivot hinge until the desired angle is achieved. Refer to Detail "B".
3. Securely tighten footplate to footplate clamp and hinge pivot with the two flat head screws and barrel nuts.
4. Repeat STEPS 1-3 for opposite side if necessary.
5. For additional angle adjustment, perform the following:
  - A. Loosen the set screw.
  - B. Rotate footplate up or down to desired position.
  - C. Retighten set screw.



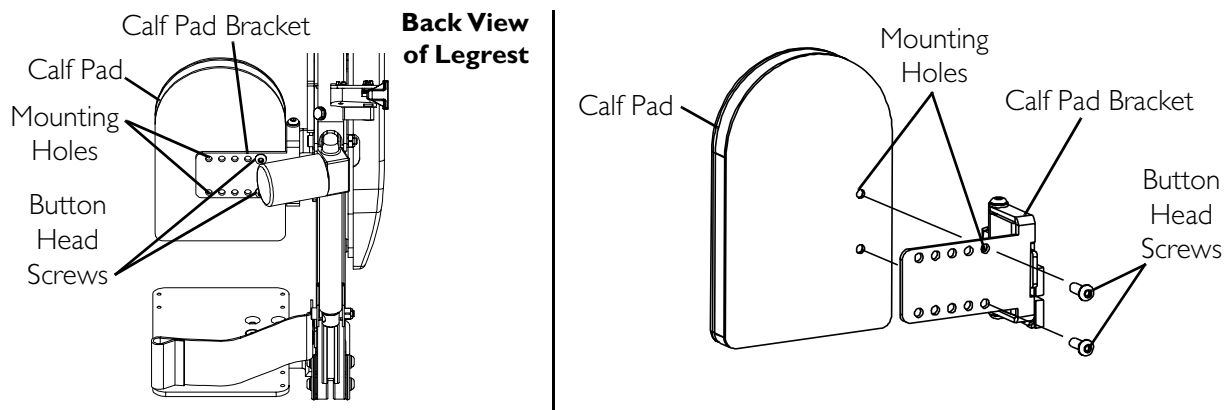
**FIGURE 9.4** Adjusting the Footplate Angle

## Adjusting the Calf Pad

### Adjusting the Calf Pad Width

*NOTE: For this procedure, refer to FIGURE 9.5.*

1. Remove the two button head screws from the calf pad and calf pad bracket.
2. Reposition calf pad to calf pad bracket to desired mounting position.
3. Align button head screws to mounting holes on calf pad and calf pad bracket.
4. Install button head screws into calf pad bracket and calf pad. Securely tighten.
5. Repeat STEPS 1-4 for opposite side, if necessary.

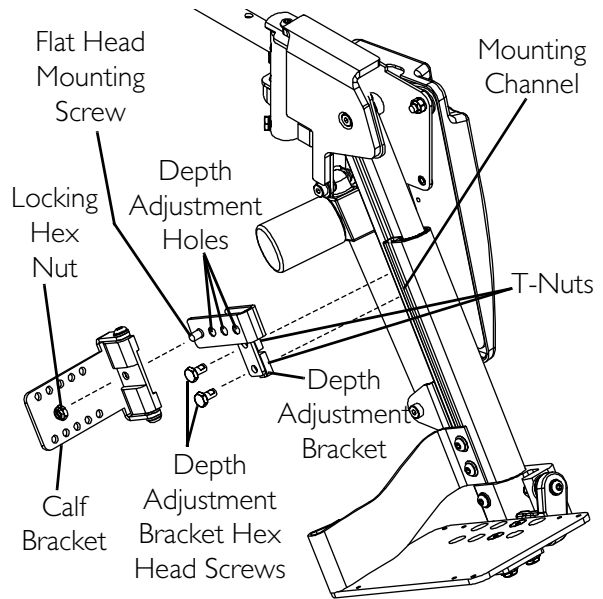


**FIGURE 9.5** Adjusting the Calf Pad Width

### Adjusting the Calf Pad Depth

*NOTE: For this procedure, refer to FIGURE 9.6.*

1. Loosen, but DO NOT remove, depth adjustment bracket mounting screws.
2. Slide calf pad assembly up and out of the mounting channel.
3. Remove the flat head socket screw and locking hex nut that secure the calf bracket to the depth adjustment bracket.
4. Reposition the calf bracket on the depth adjustment bracket to desired position.
5. Install the flat head socket screw through the calf bracket, depth adjustment bracket and locking hex nut.
6. Tighten locking hex nut until snug. DO NOT overtighten nut or calf pad will not pivot properly.
7. Align the two T-nuts on depth adjustment bracket assembly with channel on legrest.
8. Slide calf pad assembly to desired height. Tighten the two hex mounting screws securely.
9. Repeat STEPS 1-6 for opposite side.



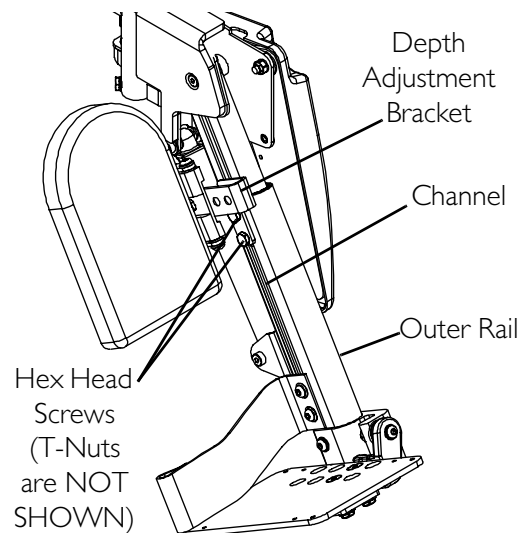
*NOTE: Calf pad not shown for clarity.*

**FIGURE 9.6** Adjusting the Calf Pad Depth

### Adjusting the Calf Pad Height

*NOTE: For this procedure, refer to FIGURE 9.7.*

1. Loosen, but DO NOT remove, the two hex head screws that secure depth adjustment bracket to the T-nuts.
2. Slide the calf pad assembly with T-nuts up or down in the channel to desired position.
3. Holding the calf pad assembly into position, tightly secure the hex screws to the T-nuts.
4. Repeat STEPS 1-3 for opposite side, if necessary.

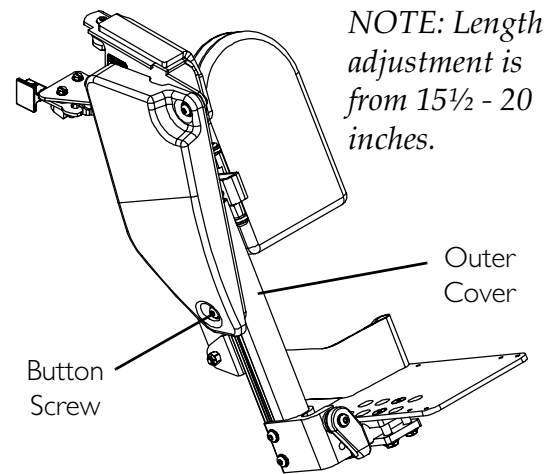


**FIGURE 9.7** Adjusting the Calf Pad Height

## Adjusting the Length of Power Legrest

*NOTE: For this procedure, refer to FIGURE 9.8.*

1. Loosen, but DO NOT remove, the length adjustment button screw (screw also secures lower end of shroud).
2. Slide footplate with outer cover up or down to desired position.
3. Securely tighten length adjustment button screw.
4. Repeat STEPS 1-3 for remaining legrest.



**FIGURE 9.8** Adjusting the Length of Power Legrest

## Removing/Installing the Power Elevating Legrest Harness

*NOTE: For this procedure, refer to FIGURE 9.9 on page 111.*

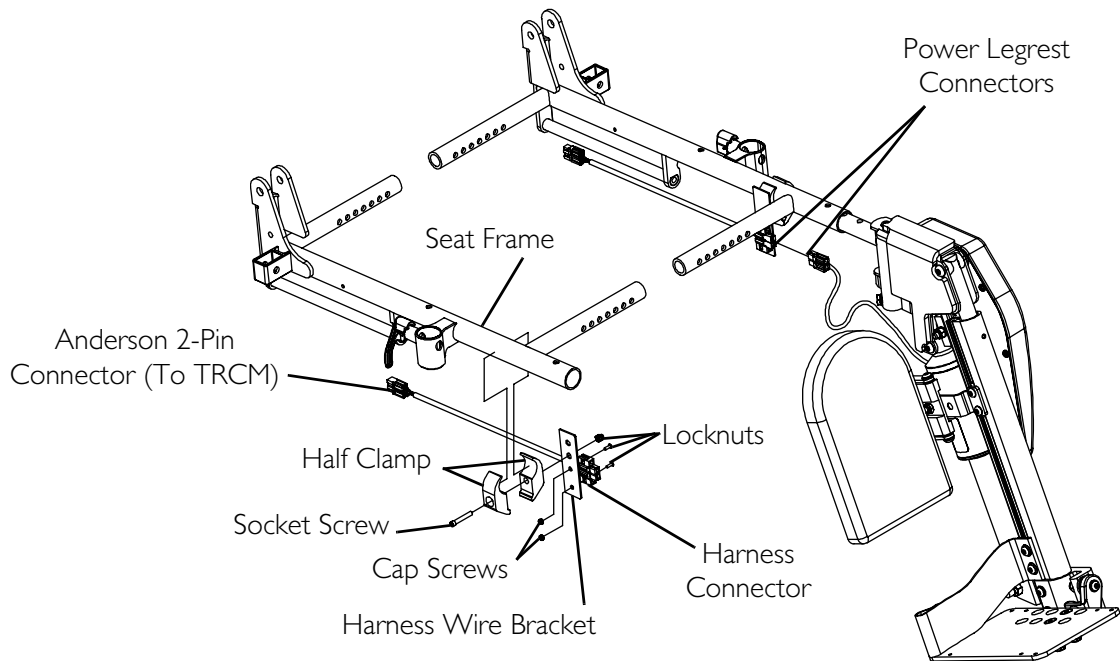
### Removing

1. Unplug the power elevating legrest connectors.
2. Unplug the harness from the TRCM.
3. Cut the tie-wraps securing the harness to the lower seat shroud (Detail "A").
4. Remove the hook and loop fastening strips securing the harness to the underside of the lower seat shroud.
5. Remove the two cap screws and locknuts securing the harness connector to the harness wire bracket.
6. Remove the harness from the seating system.

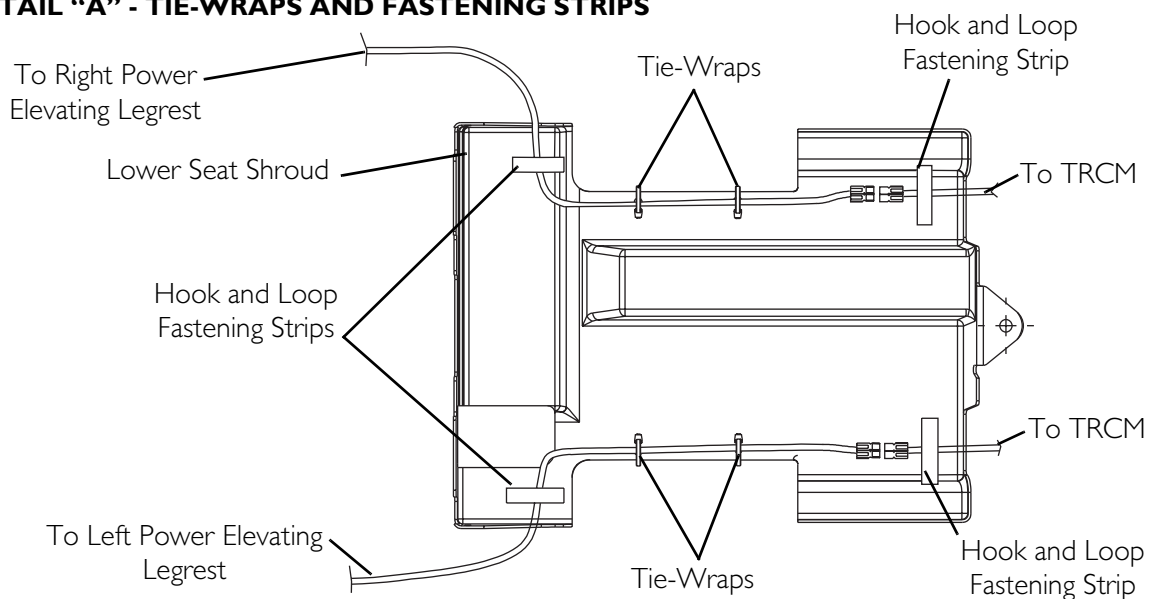
### Installing

1. If power legrests were not previously installed, perform the following steps:
  - A. Install the socket screw through the half clamp and harness wire bracket.
  - B. Position the half clamp with harness wire bracket onto the seat frame.
  - C. Install the locknut onto the socket screw to secure the half clamp to the seat frame.
  - D. Repeat STEPS A-C for the opposite side of the wheelchair.

2. Secure the power elevating legrest connector to the harness wire bracket using the two cap screws and locknuts.
3. Tie-wrap the harness to the lower seat shroud (Detail "A").
4. Secure the harness to the lower seat shroud using hook and loop fastening strips.
5. Plug the harness into the TRCM 2-pin Anderson connector.
6. Repeat STEPS 2-5 for the opposite side of the wheelchair.
7. Install the power elevating legrests. Refer to Installing/Removing the Power Elevating Legrests on page 104.



#### DETAIL "A" - TIE-WRAPS AND FASTENING STRIPS



**FIGURE 9.9** Removing/Installing the Power Elevating Legrest Harness

## Removing/Installing the Power Elevating Legrest Actuator

*NOTE: For this procedure, refer to FIGURE 9.10 on page 113.*

### Removing

1. Remove the power elevating legrest from the wheelchair. Refer to [Installing/Removing the Power Elevating Legrests](#) on page 104.
2. Remove the long shoulder screw, flat washer, washer and locknut securing the top of the power elevating legrest actuator to the power legrest bracket.
3. Remove the short shoulder screw and locknut securing the actuator rod to the actuator bracket.
4. Remove the power elevating legrest actuator from the legrest.

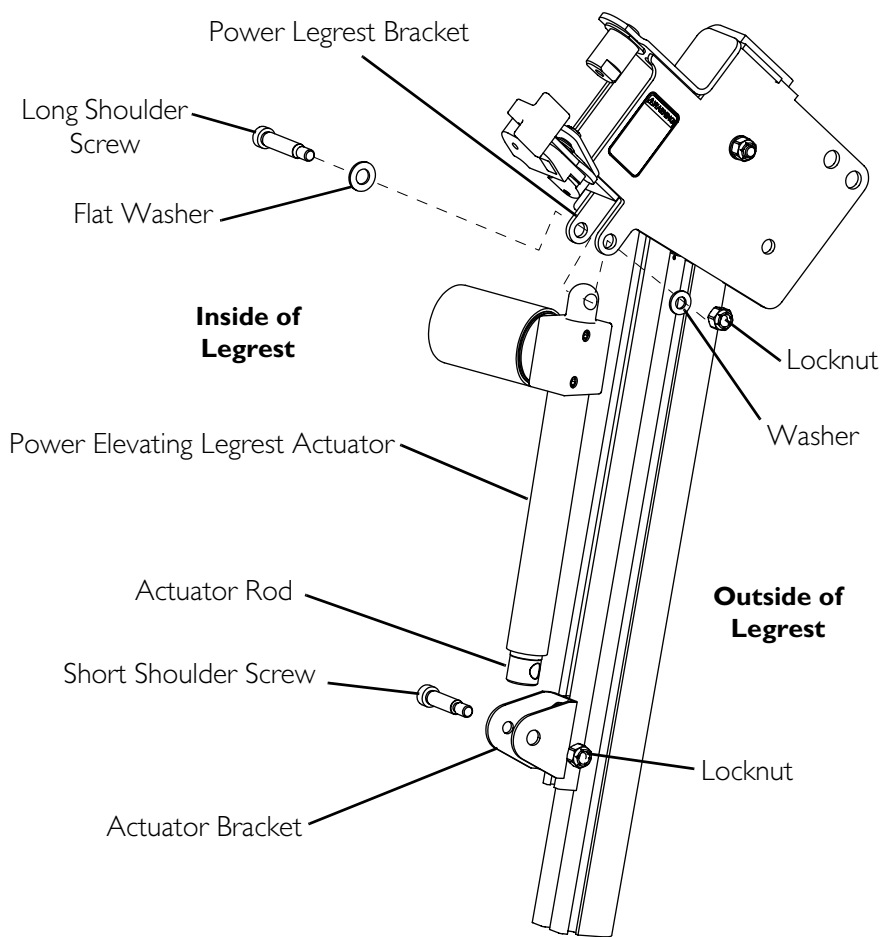
### Installing

1. Unscrew the actuator rod one half turn.
2. Secure the actuator rod to the actuator bracket using the short shoulder screw and locknut.
3. Secure the top of the power elevating legrest actuator to the power legrest bracket using the long shoulder screw, flat washer, washer and locknut.

*NOTE: The shoulder screw should be on the inside of the legrest and the locknut should be toward the outside of the legrest.*

4. Install the power elevating legrest. Refer to [Installing/Removing the Power Elevating Legrests](#) on page 104.
5. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.





*NOTE: Rear of right power elevating legrest shown. Left legrest actuator mounts in the same way.*

**FIGURE 9.10** Removing/Installing the Power Elevating Legrest Actuator

# SECTION 10—ARMS

---

## **⚠ WARNING**

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

**Before adjusting, repairing or servicing the seating system, ALWAYS turn the wheelchair power OFF, otherwise, injury or damage may result.**

**Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.**

**Make sure armrests are locked securely in place before using the wheelchair.**

**Pinch points exist on the armrests.**

---

## **Removing/Installing Reclining Armrests**

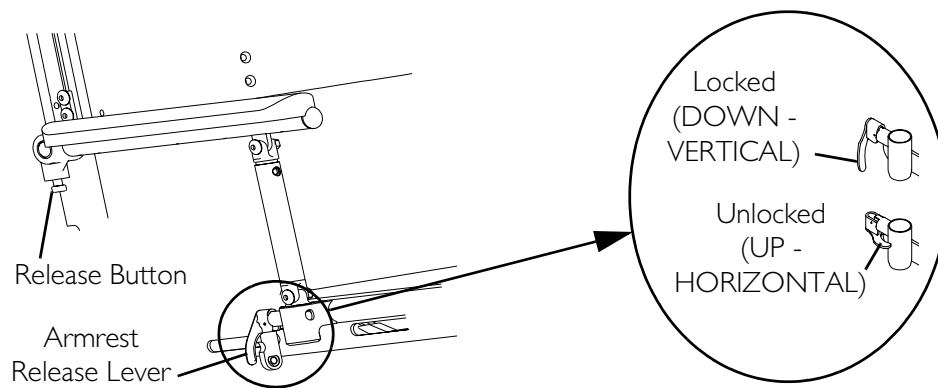
*NOTE: For this procedure, refer to FIGURE 10.1 on page 115.*

### **Removing Armrests**

1. Lift the armrest release lever at the front of the wheelchair to the unlocked (horizontal) position.
2. Lift the armrest and remove from the front arm socket.
3. Press the release button at the rear of the armrest.
4. While holding the release button in, remove the armrest from the seat frame.

### **Installing Armrests**

1. Position the armrest on the seat frame as shown in FIGURE 10.1.
2. Press the release button at the rear of the armrest.
3. While holding the release button in, slide the armrest onto the seat frame.
4. Make sure the armrest release lever is in the unlocked (horizontal) position.
5. Install the armrest into the front socket.
6. Push the armrest release lever down into the locked (vertical) position.



**FIGURE 10.1** Removing/Installing Reclining Armrests

## Adjusting Armrest Height

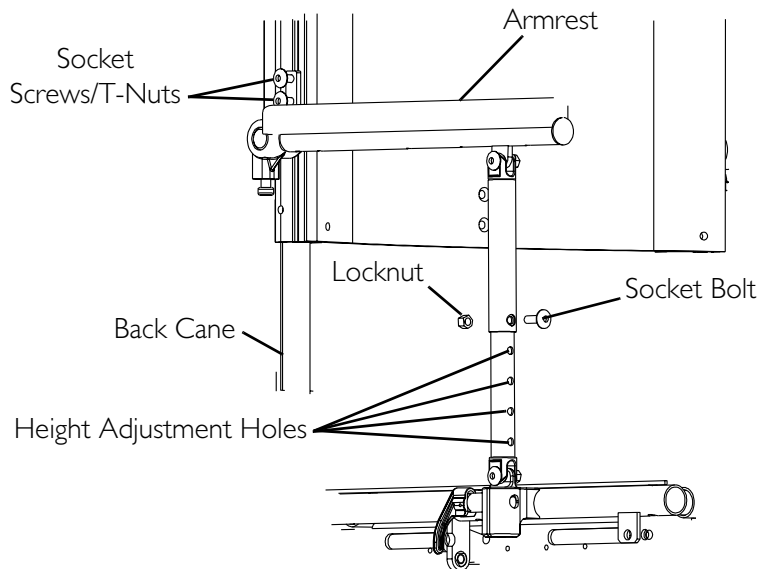
*NOTE: For this procedure, refer to FIGURE 10.2 on page 116.*

1. Make sure the seating system is in the full upright position.
2. Remove the socket bolt and locknut that secure the front of the upper armrest to the lower armrest.
3. Loosen, but DO NOT remove, the two socket screws and T-nuts that secure the rear of the recliner armrest to the back cane.
4. Refer to the chart below and adjust the armrest to the desired height for the user.

*HOLE NUMBER	1	2	3	4	5	6
ARMREST HEIGHT (IN INCHES)	11	12	13	14	15	16

*\*NOTE: Front armrest mounting holes are numbered from bottom to top for reference only. There are no numbers on the armrests.*

5. Reinstall the socket bolt through the mounting hole determined in STEP 4.
6. Reinstall the locknut and tighten securely.
7. While holding the armrest level, tighten the two socket screws and T-nuts securely.
8. Repeat STEPS 2-7 for the opposite side if necessary.



**FIGURE 10.2** Adjusting Armrest Height

## Installing/Removing Flip-Back Armrests

### **⚠ WARNING**

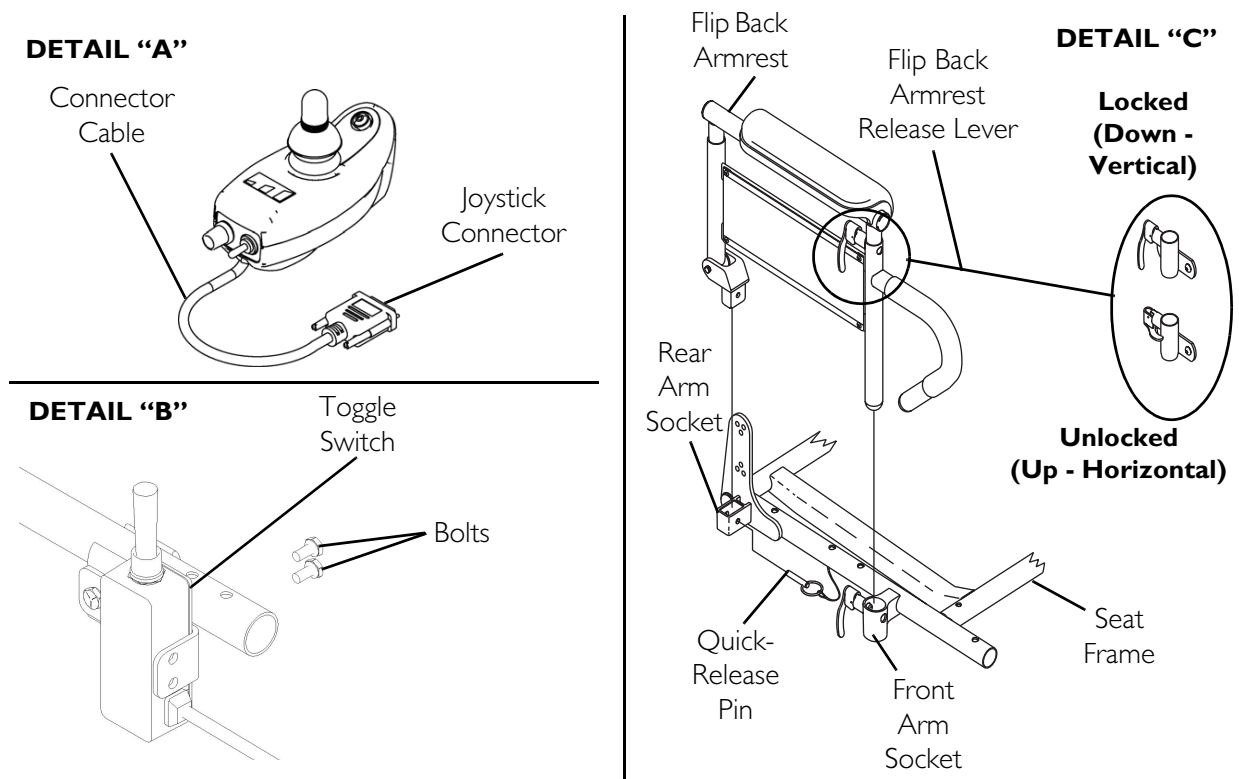
**Make sure the flip-back armrest release and height adjustment levers are in the locked position before using the wheelchair.**

*NOTE: For this procedure, refer to FIGURE 10.3 on page 117.*

*NOTE: Flip-back armrest release lever MUST be in the unlocked (up-horizontal) position when placing the armrest into the arm sockets.*

### **Installing**

1. Visually inspect to ensure flip back armrest release lever is in the unlocked (up-horizontal) position (Detail "C").
2. Slide the flip-back armrest into the arm sockets on the seat frame.
3. Install the quick-release pin through the rear arm socket and flip-back armrest.
4. Lock the flip-back armrest by pressing the flip-back armrest release lever into the down (vertical) position (Detail "C").
5. Connect joystick cable to joystick connector. Refer to FIGURE 10.3, Detail "A."
6. Attach the cable to the back cane with a tie-wrap (not shown).
7. Repeat STEPS 1-6 for the opposite flip-back armrest.



**FIGURE 10.3** Installing/Removing Flip-Back Armrests

## Removing

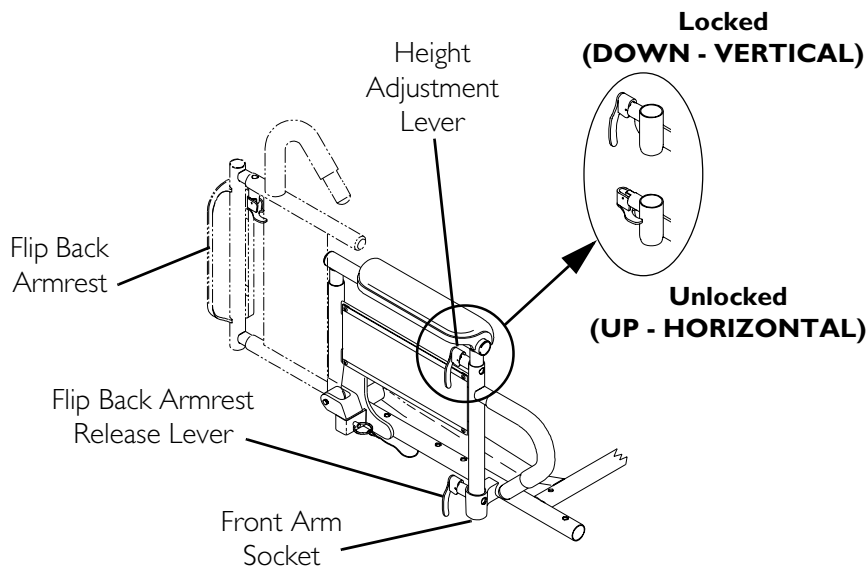
1. Disconnect joystick. Refer to Detail "A."
2. Cut the tie-wrap attaching the joystick cable to the back cane (not shown).
3. Unlock the flip-back armrest by positioning the flip-back armrest release lever into the up (horizontal) position. Refer to Detail "C".
4. Remove the quick-release pin that secures the flip-back armrest to the rear arm socket.
5. Pull on the flip-back armrest and remove the armrest from the arm sockets.
6. Repeat STEPS 3-5 for the opposite flip-back armrest, if necessary.

## Adjusting Flip-Back Armrest Height

*NOTE: For this procedure, refer to FIGURE 10.4.*

1. Unlock top of flip back armrest by pulling height adjustment lever into the up (horizontal) position.
2. Adjust top of the flip back armrest to the desired height.
3. Lock top of flip back armrest by pushing height adjustment lever into the down (vertical) position.

*NOTE: The arm is not locked until an audible “click” is heard.*



**FIGURE 10.4** Adjusting Flip-Back Armrest Height

# SECTION 11—CENTER MOUNT FOOTRESTS

## ⚠ WARNING

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

Before adjusting, repairing or servicing the seating system, ALWAYS turn the wheelchair power OFF, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

NOTE: For complete operating information on Invacare footrests, refer to the TDX Owner's Manual, part number 1114809, supplied for the base of the wheelchair.

## Removing/Installing the Center Mount Footrest

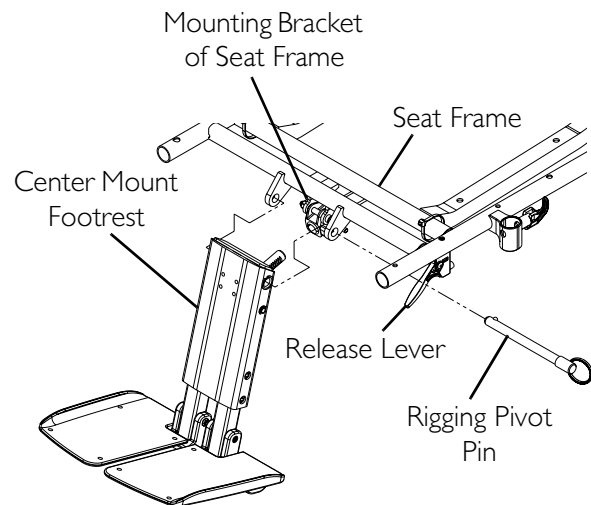
NOTE: For this procedure, refer to FIGURE 11.1.

### Removing

1. Remove the rigging pivot pin that secures the footrest to the mounting bracket of the seat frame.
2. Hold the footrest with one hand and engage the release lever with the other while simultaneously pulling the center mount footrest out of the mounting bracket of the seat frame.

### Installing

1. Engage the release lever with one hand, hold the center mount footrest with the other, and insert the center mount footrest into the mounting bracket of the seat frame.
2. Reinstall the rigging pivot pin to secure the center mount footrest to the mounting bracket of the seat frame.



**FIGURE 11.1** Removing/Installing the Center Mount Footrest

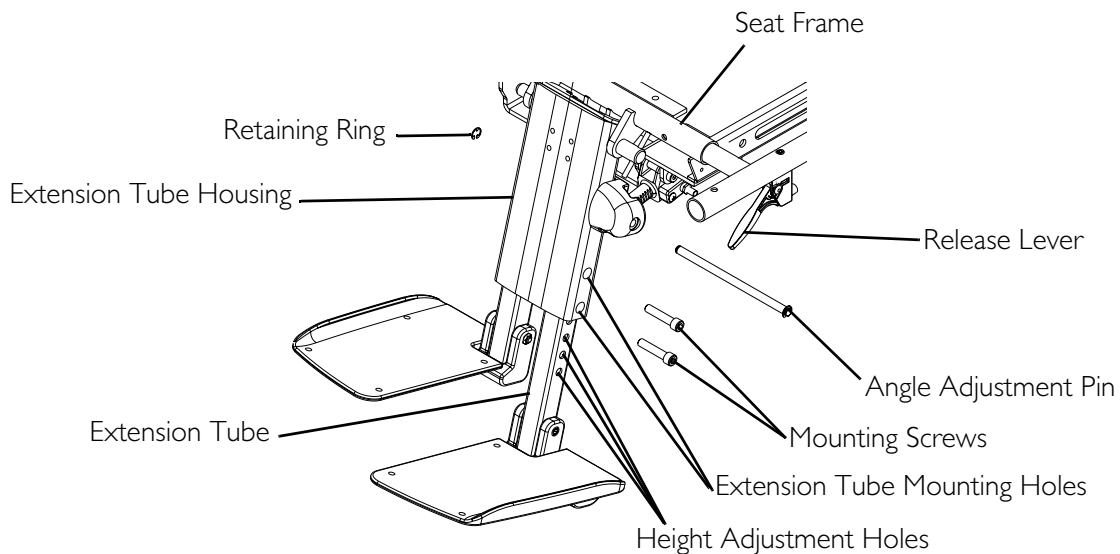
## Adjusting the Height of the Center Mount Footrest

### **⚠ WARNING**

After adjusting the Center Mount Footrest, minimum ground clearance for the footrest in the driving position is three inches. If the Center Mount Footrest is in the retracted position and the wheelchair is not moving, the footrest must maintain a minimum of one inch ground clearance. Otherwise personal injury and damage may result.

*NOTE: For this procedure, refer to FIGURE 11.2.*

1. Remove the two mounting screws that secure the footrest extension tube to the extension tube housing.
2. If adjusting to one of the three shortest settings for footrest height, remove the retaining ring on the angle adjustment pin and slide it out.
3. Adjust the footrest extension tube to the desired height and align the corresponding holes to the mounting holes on the extension tube housing.
4. If adjusting to one of the three shortest settings for footrest height, install the angle adjustment pin and the retaining ring.
5. Reinstall the two mounting screws to secure the footrest extension tube to the extension tube housing. Securely tighten.
6. Repeat STEPS 1-5 for the other extension tube.



**FIGURE 11.2** Adjusting the Height of the Center Mount Footrest



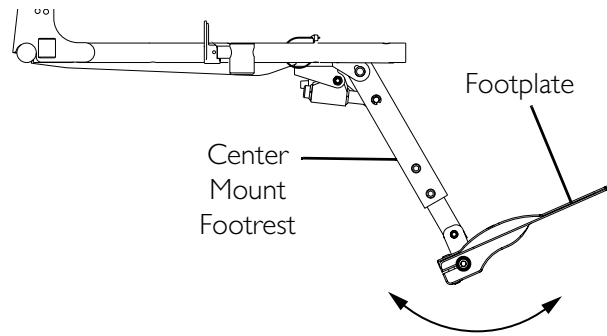
## Adjusting the Angle of the Center Mount Footrest

### **⚠ WARNING**

After adjusting the Center Mount Footrest, minimum ground clearance for the footrest in the driving position is three inches. If the Center Mount Footrest is in the retracted position and the wheelchair is not moving, the footrest must maintain a minimum of one inch ground clearance. Otherwise personal injury and damage may result.

*NOTE: For this procedure, refer to FIGURE 11.2 and FIGURE 11.3.*

1. Engage the release lever with one hand (FIGURE 11.2) and move the center mount footrest to the desired angle with the other hand (FIGURE 11.3).
2. Disengage the release lever to lock the center mount footrest in the new position.



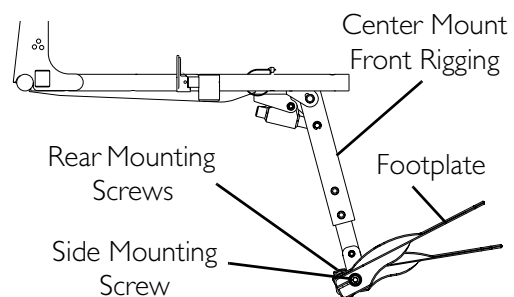
**FIGURE 11.3** Adjusting the Angle of the Center Mount Footrest

## Adjusting the Center Mount Footplate Angle

### **After 2/14/07**

*NOTE: For this procedure, refer to FIGURE 11.4.*

1. Loosen, but DO NOT remove, the two rear mounting screws and side mounting screw.
2. Move the footplate to the desired angle.
3. Tighten the two rear mounting screws and side mounting screw to secure the footplate in the desired position.
4. Repeat STEPS 1 and 2 for the other footplate.

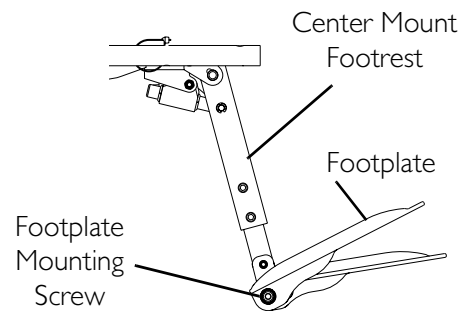


**FIGURE 11.4** Adjusting the Center Mount Footplate Angle - After 2/14/07

**Before 2/15/07**

*NOTE: For this procedure, refer to FIGURE 11.5.*

1. Loosen, but DO NOT remove, the footplate mounting screw.
2. Move the footplate to the desired angle.
3. Tighten the footplate mounting screw to secure the footplate in the desired position.
4. Repeat STEPS 1 and 2 for the other footplate.



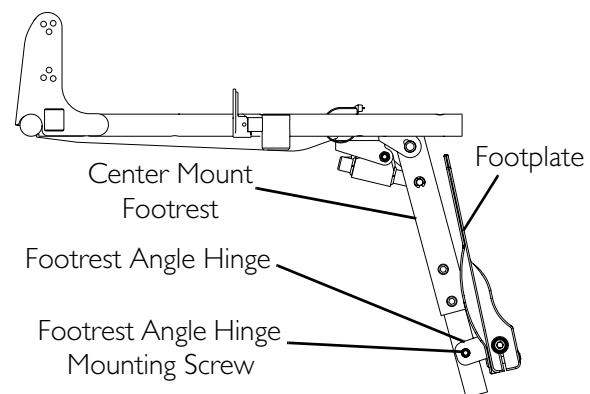
**FIGURE 11.5** Adjusting the Center Mount Footplate Angle - Before 2/15/07

**Adjusting the Tension of the Center Mount Footplate**

*NOTE: For this procedure, refer to FIGURE 11.6.*

*NOTE: The tension can be adjusted to increase or decrease the rotation effort of the flip up footplates.*

1. Loosen the mounting screw on the footrest angle hinge to decrease the rotation effort.
- NOTE: DO NOT remove the mounting screw.*
2. Tighten the footrest angle hinge mounting screw to increase the rotation effort.
  3. Repeat STEPS 1 and 2 for the other footplate.

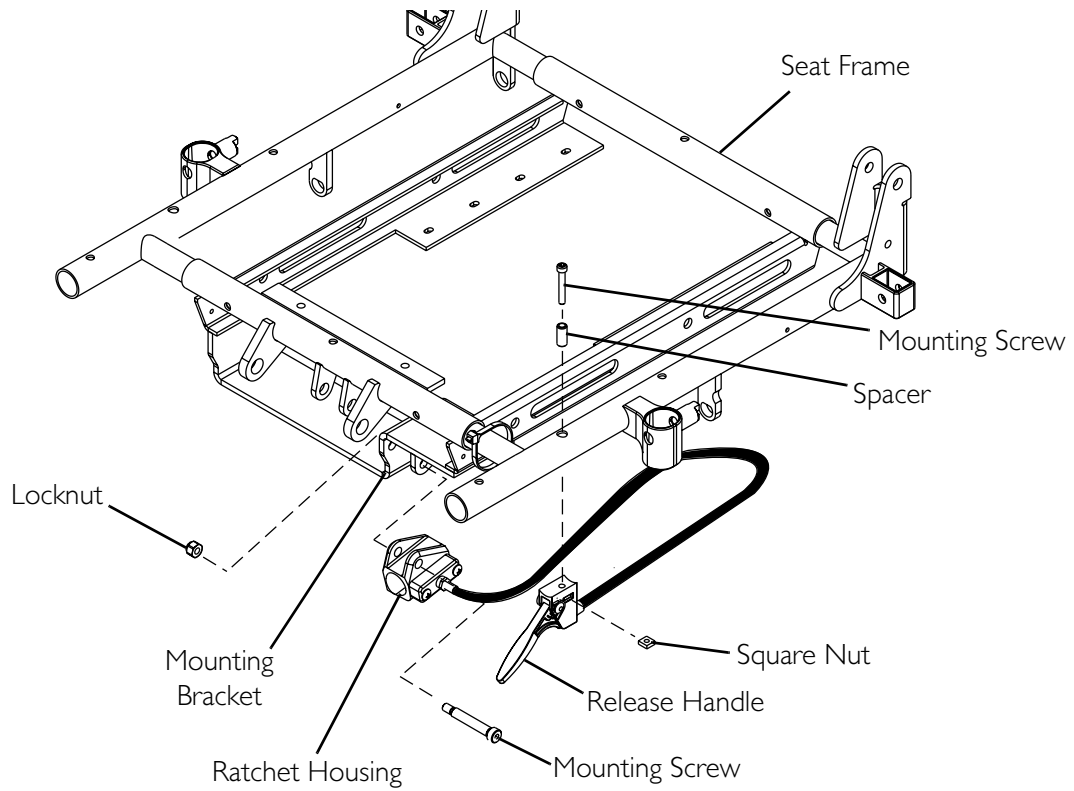


**FIGURE 11.6** Adjusting the Tension of the Center Mount Footplate

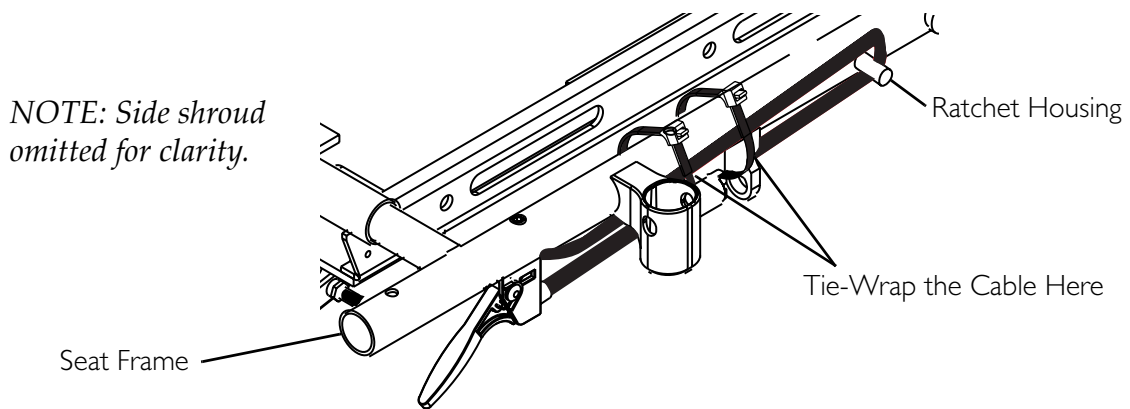
**Removing/Installing the Release Lever Assembly**

*NOTE: For this procedure, refer to FIGURE 11.7 on page 123.*

1. Remove the mounting screw that secures the side shroud in place.
2. Secure the ratchet housing to the mounting bracket on the seat frame with the mounting screw and locknut provided. Securely tighten.
3. Secure the release handle to the seat frame with the mounting screw, spacer and square nut provided. Securely tighten.
4. Tie-wrap cable as shown in Detail "A". Leave enough slack in the cable to loop around the mounting screw that secures the side shroud in place.
5. Secure the side shroud in place with existing mounting screw. Securely tighten.



**DETAIL "A"**



**FIGURE 11.7** Removing/Installing the Release Lever Assembly

# SECTION 12—HEADREST

## ⚠ WARNING

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

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

## Removing/Installing/Adjusting Headrest

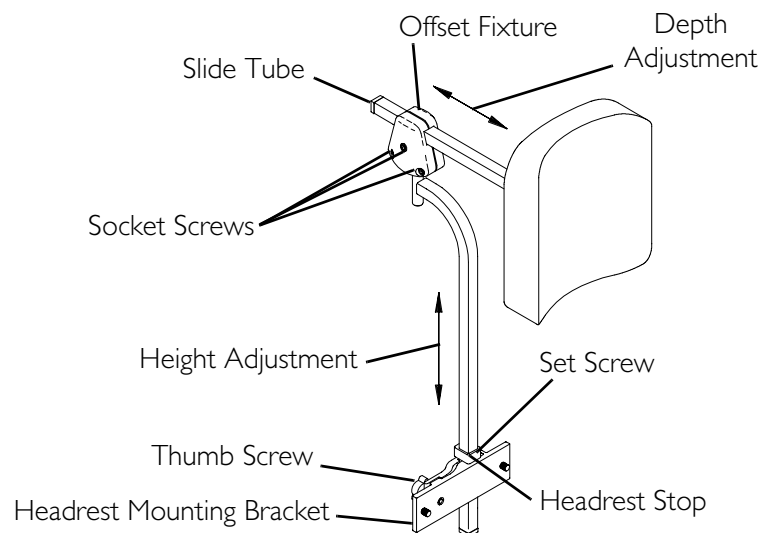
*NOTE: For this procedure, refer to FIGURE 12.1.*

### Removing

1. Loosen, but **DO NOT** remove, the thumb screw that secures the headrest to the headrest mounting bracket.
2. Remove the headrest from the headrest mounting bracket.

### Installing

1. Make sure thumb screw is loose.
2. Install the headrest until the headrest stop sits on the headrest mounting bracket.
3. If necessary, adjust the height, depth or direction of the headrest. Refer to [Adjusting Headrest Height](#) on page 125.



**FIGURE 12.1** Removing/Installing/Adjusting Headrest

## Adjusting Headrest Height

1. Loosen the set screw on the headrest stop.
2. Loosen, but DO NOT remove, the thumb screw that secures the headrest to the headrest mounting bracket.
3. Position the headrest to the desired height.
4. Tighten the thumb screw that secures the headrest to the headrest mounting bracket.
5. Tighten the set screw on the headrest stop.
6. If necessary, adjust the depth or direction of the headrest. Refer to Adjusting Headrest Depth/Direction below.

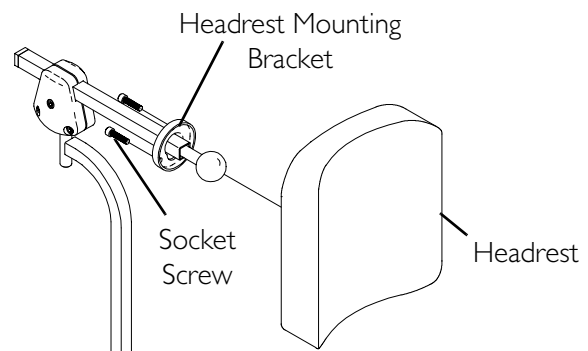
## Adjusting Headrest Depth/Direction

1. Loosen, but DO NOT remove, the three socket screws that secure the offset fixture to the slide tube.
2. If necessary, reposition the headrest to the desired depth by sliding the headrest towards the front of the wheelchair or towards the rear of the wheelchair.
3. If necessary, reposition the headrest to the desired position (headrest will move in any direction).
4. While holding the headrest in the desired position, securely tighten the three socket screws.
5. If necessary, adjust the height of the headrest. Refer to Adjusting Headrest Height above.

## Replacing Headrest

*NOTE: For this procedure, refer to FIGURE 12.2.*

1. Remove the three socket screws that secure the headrest to the headrest mounting bracket.
2. Position the new headrest on the headrest mounting bracket and secure with the existing three socket screws.
3. If necessary, adjust the height, depth or direction of the headrest. Refer to Adjusting Headrest Height above.



*NOTE: One style of headrest shown for clarity. Both styles of headrest attach the same way.*

**FIGURE 12.2** Replacing Headrest

## SECTION 13—TILT AND RECLINE

---

### **⚠ WARNING**

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

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

---

### A Note About Drive Lock-Out

---

### **⚠ WARNING**

**NEVER** operate the wheelchair while in any tilted/reclined/back angle position over 20° relative to the vertical position. If the drive lock-out does not stop the wheelchair from operating in a tilt position over 20° relative to the vertical position, **DO NOT** operate the wheelchair. **DO NOT** attempt to adjust the drive lock-out. Have the wheelchair serviced by a qualified technician.

The wheelchair user **MUST** have a clear line of sight to drive safely. On initial chair delivery and after adjusting the back angle, drive lock-out switch, tilt system or recline system, tilt and recline the seat back to the farthest driving position immediately before drive lock-out engages and ensure there is a clear line of sight present in which to drive the wheelchair. If a clear line of sight is not present, have the back angle repositioned or readjust the lockout angle such that safe driving with a clear line of sight is achieved. Otherwise injury or damage may occur.

---

The LED on the single function toggle switch will light when the drive lock-out feature has been activated. Drive lock-out is a feature designed to prevent the wheelchair from being driven after the seating system has been tilted or reclined beyond 20°\* relative to the vertical position. The back can be positioned at a 10° relative offset to the seat base, thereby resulting in a back angle potential of 30° before which the drive lock-out is activated. This may affect the wheelchair user's line of sight while driving. Make sure the wheelchair user can see properly to ensure safe driving.

*\*NOTE: 20° back angle can be any combination of recline, tilt and/or surface angle.*

*NOTE: Refer to Typical Product Parameters on page 12 for tilt and/or recline angle ranges.*

## Operating Powered Seating Systems

### **⚠ GENERAL WARNINGS**

Refer to **A Note About Drive Lock-Out** on page 126 before performing this procedure.

Pinch points may occur when returning the seat from any tilted position to the full upright position. Make sure the hands and body of both the occupant and attendants/bystanders are clear of all pinch points before returning the seat to the full upright position.

Use caution when driving in a tilted or reclined position.

**DO NOT** operate the seating system while on an incline.

**DO NOT** operate the seating system while the wheelchair is moving.

**DO NOT** operate the tilt function near or under a fixed object such as a table or desk.

### **CAUTION**

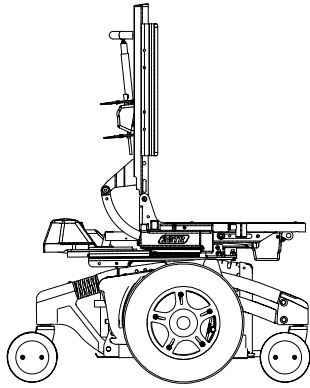
**DO NOT** operate the recline function of the seating system if one or both of the mechanical elevating legrest push rods are bent. Damage to the seating system can occur.

Use only the actuator controls listed in the following chart to activate the tilt/recline functions. **DO NOT** use any other actuator controls. Such devices may result in excess heating and cause damage to the actuator and associated cables and could cause a fire, death, physical injury or property damage. If such devices are used, Invacare shall not be liable and the limited warranty is void.

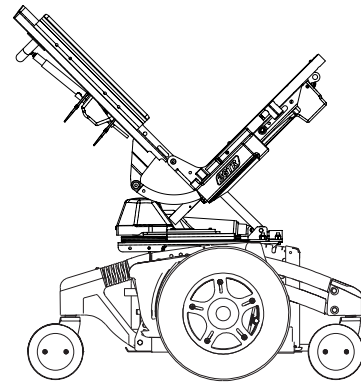
SEATING SYSTEM	ACTUATOR CONTROL			
	TRSS	TRCM	SAC	TAC
<b>TILT ONLY</b>	Y	Y	Y	Y
<b>TILT ONLY WITH POWER ELEVATING LEGRESTS</b>	N	Y	N	N
<b>RECLINE ONLY</b>	N	Y	N	Y
<b>RECLINE ONLY WITH POWER ELEVATING LEGRESTS</b>	N	Y	N	N
<b>TILT/RECLINE</b>	N	Y	N	N

*NOTE: For this section, refer to FIGURE 13.1 on page 128.*

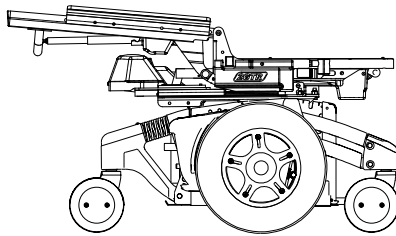
**DETAIL “A” - FULL UPRIGHT POSITION**



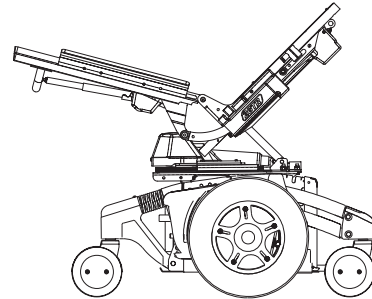
**DETAIL “B” - FULL TILT POSITION**



**DETAIL “C” - FULL RECLINE POSITION**



**DETAIL “D” - TILT/RECLINE COMBINATION**



**FIGURE 13.1** Operating Powered Seating Systems

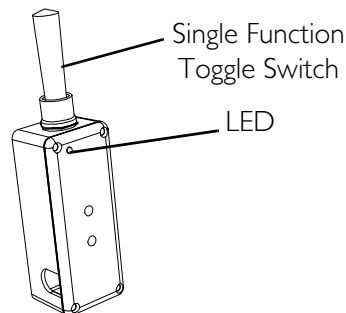
**Single Function Toggle Switch (TRSS)**

*NOTE: For this procedure, refer to FIGURE 13.2.*

1. Make sure the wheelchair is on a level surface.
2. Refer to the chart which follows for the operation of the seating system using a single function toggle switch mounted on the right side of the wheelchair:

SEATING SYSTEM	SINGLE FUNCTION TOGGLE SWITCH	
	FORWARD	BACK
<b>TILT ONLY</b>	Increase Tilt Angle	Decrease Tilt Angle
<b>RECLINE ONLY</b>	Increase Recline Angle	Decrease Recline Angle

3. Release single function toggle switch to neutral position.



**FIGURE 13.2** Single Function Toggle Switch (TRSS)



## Optional Four-Way Toggle Switch

*NOTE: For this procedure, refer to FIGURE 13.3.*

1. Make sure the wheelchair is on a level surface.
2. Refer to the charts which follow for the operation of the seating system using a four-way toggle switch:

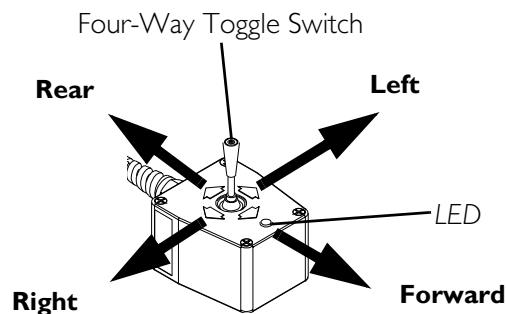
*NOTE: The charts which follow show the factory programmed settings only. Switch assignments can be reprogrammed.*

SEATING SYSTEM	FOUR-WAY TOGGLE SWITCH			
	FORWARD	REAR	LEFT	RIGHT
Tilt Only	Increase/Decrease the Tilt Angle*	N/A	N/A	Power Legrest Up/Down*
Recline Only	N/A	Increase/Decrease the Recline Angle*	Increase/Decrease the Back Height (VSR)*	Power Legrest Up/Down*
Tilt/Recline	Increase/Decrease the Tilt Angle*	Increase/Decrease the Recline Angle	Increase/Decrease the Back Height (VSR)*	Power Legrest Up/Down*

*\*NOTE: The four-way toggle switch will alternate functions (increase tilt angle, decrease tilt angle) after it has been released to the neutral position for a minimum of three seconds. Refer to MK<sub>5</sub><sup>TM</sup> EX<sup>TM</sup> and MK<sub>5</sub> TT-EX ELECTRONICS Service Manual, part number 1114808 for complete four-way toggle switch operating instructions.*

*NOTE: If the wheelchair is equipped with switch options, scan to the correct ECU or Auxiliary Mode and activate the control device in the corresponding "forward" direction to operate the tilt function. Refer to MK<sub>5</sub> EX and MK<sub>5</sub> TT-EX Electronics Service Manual, part number 1114808, for complete switch option operating instructions.*

3. Release four-way toggle switch to neutral position.



**FIGURE 13.3** Optional Four-Way Toggle Switch

## Vernier Shear Reduction (2G Tarsys Systems Only)

*NOTE: For this procedure, refer to FIGURE 13.3 on page 129.*

### About Vernier Shear Reduction

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#### **⚠ WARNING**

**The relationship between Vernier Shear Reduction (VSR) and the recline function of the seating system is dependant on the needs of the user and **MUST** be set and adjusted by a trained qualified technician.**

---

Vernier Shear Reduction (VSR) moves the back of the seating system along with the recline function. VSR reduces shear between the user and the seating system as the seating system reclines.

*NOTE: VSR is electronically linked to the recline function of the seating system and operating the recline function automatically activates VSR.*

VSR function can also be used independently from the recline function to allow for a change in seating position or access to additional seating system options. Refer to [Using Vernier Shear Reduction \(VSR\) Independently of Recline Function](#) on page 130.

### Using Vernier Shear Reduction (VSR) Independently of Recline Function

---

#### **⚠ WARNING**

**The back of the seating system **MUST** be returned to original position before the degree of recline is changed (increased or decreased). Otherwise, the relationship between VSR and the recline function of the seating system will change, possibly resulting in injury to the user.**

---

1. Make sure the wheelchair is on a level surface.
2. Note the current position of the back.
3. Push four-way toggle switch toward the left of the wheelchair until the desired VSR is achieved.

*NOTE: Left and right are determined by standing behind the wheelchair.*

*NOTE: The four-way toggle switch will alternate functions (move VSR actuator up, move VSR actuator down) after it has been released to the neutral position for a minimum of one second.*

*NOTE: If the wheelchair is equipped with switch options, scan to the correct ECU or Auxiliary Mode and activate the control device in the corresponding "left" direction to operate the tilt function. Refer to MK<sub>5</sub> EX and MK<sub>5</sub> TT-EX Electronics Service Manual, part number 1114808, for complete switch option operating instructions.*

4. Return the back to the position noted in STEP 2 before changing the degree of recline.

## Removing/Installing the Tilt Actuator

*NOTE: For this procedure, refer to FIGURE 13.4 on page 132.*

### Removing

1. Tilt the seat back until the front of the actuator is visible.
2. Turn the wheelchair power OFF.
3. Remove the rear shroud. Refer to [Removing/Installing Rear Shroud](#) on page 102.
4. Disconnect the existing tilt actuator connector from the TRCM tilt actuator connector.
5. Remove the shoulder bolt, two spacers and locknut that secure the rear of the existing actuator to the rear pivot assembly.

---

### **⚠ WARNING**

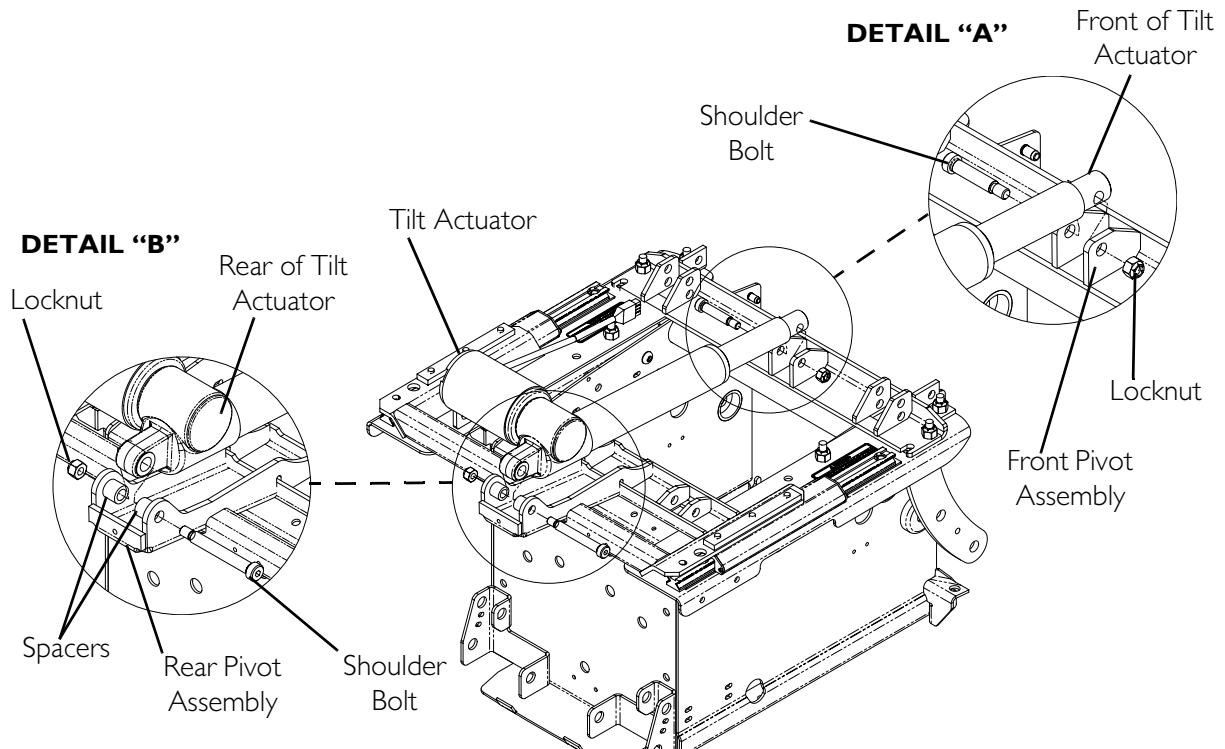
**Hold the seat frame while removing the front actuator hardware, otherwise injury may occur.**

---

6. While holding the seat frame, remove the shoulder bolt and locknut that secure the existing actuator to the front pivot assembly.
7. Remove the existing actuator from the rear pivot assembly.

### Installing

1. Position the tilt actuator on the rear pivot assembly as shown in FIGURE 13.4.
2. Line up the mounting holes in the rear of the actuator and the rear pivot assembly.
3. Install the shoulder bolt, two spacers and locknut that secure the rear of the actuator to the rear pivot assembly. Securely tighten. Torque to 13 ft-lbs  $\pm$  20%. Refer to FIGURE 13.4 for correct hardware orientation.
4. Line up the mounting holes in the front of the actuator and the front pivot assembly.
5. Install the shoulder bolt and locknut that secure the front of the actuator to the front pivot assembly. Securely tighten. Torque to 13 ft-lbs  $\pm$  20%. Refer to FIGURE 13.4 for correct hardware orientation.
6. Connect the tilt actuator connector to the TRCM tilt actuator connector.
7. Reinstall the rear shroud. Refer to [Removing/Installing Rear Shroud](#) on page 102.
8. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.



**FIGURE 13.4** Removing/Installing the Tilt Actuator

## Removing/Installing the VSR Actuator

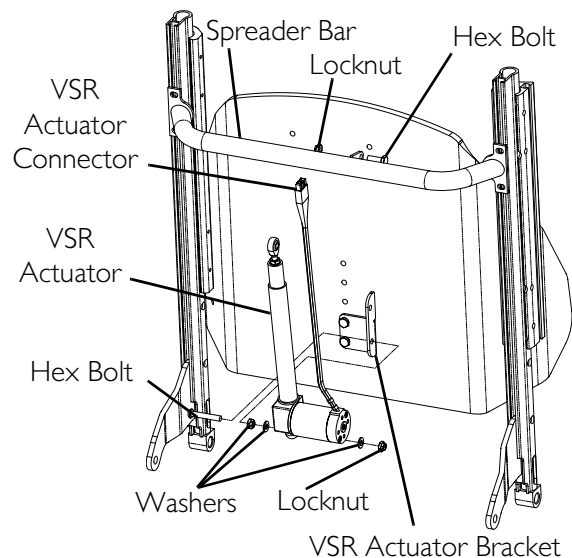
*NOTE: For this procedure, refer to FIGURE 13.5.*

### Removing

1. Remove the VSR actuator shroud. Refer to [Removing/Installing VSR Shroud](#) on page 100.
2. Disconnect the VSR actuator connector from the TRCM or TAC VSR actuator connectors (Not shown).
3. Remove the hex bolt and locknut that secure the existing VSR actuator to the spreader bar.

*NOTE: When the spreader bar is disconnected from the VSR actuator, the back pan ASM may slide out of position.*

4. Remove the hex bolt, washers and locknut that secure the existing VSR actuator to the actuator mounting bracket.



**FIGURE 13.5** Removing/Installing the VSR Actuator

## Installing

1. Position the new VSR actuator on the back as shown in FIGURE 13.5.
2. Line up the mounting holes in the new VSR actuator and VSR actuator bracket.
3. Install the hex bolt, washers and locknut that secure the new VSR actuator to the VSR actuator mounting bracket. Tighten securely. Torque to 75 ft-lbs  $\pm$  20%. Refer to FIGURE 13.5 for hardware orientation.
4. Connect the VSR actuator connector to the TRCM or TAC VSR actuator connectors (Not shown).
5. Reinstall the VSR actuator shroud. Refer to Removing/Installing VSR Shroud on page 100.
6. Perform the post-service inspection. Refer to Post-Service Inspection Checklist on page 21.

## Removing/Installing the Recline Actuator

*NOTE: For this procedure, refer to FIGURE 13.6 on page 134.*

### Removing

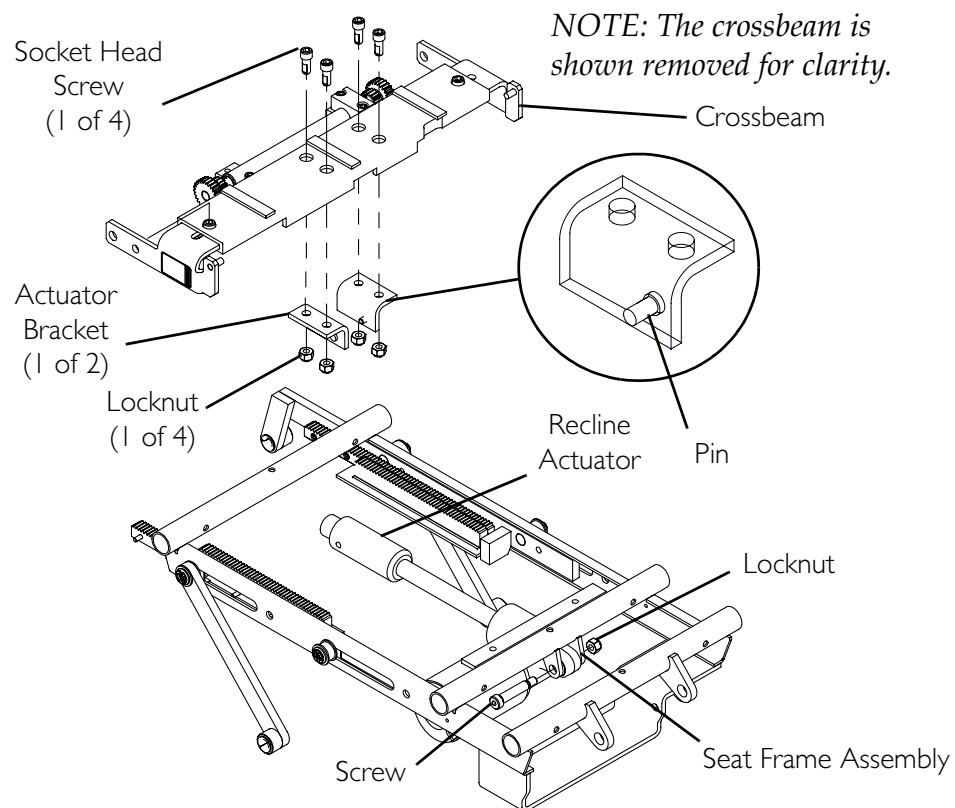
1. Remove the locknut and screw that secure the front of the recline actuator to the seat frame assembly.
2. Remove the four socket head screws and locknuts that secure the right and left actuator brackets to the crossbeam.
3. Take note of the right and left actuator bracket orientations.

*NOTE: The left and right brackets have long and short sides. The right and left brackets must be put back correctly or range of motion will be lost.*

4. Release the pins that secure the actuator brackets to the recline actuator.
5. Remove the recline actuator.

### Installing

1. Secure the pins in the right and left actuator brackets to the recline actuator. Make sure the orientation of each bracket is correct.
2. Install the right and left actuator brackets, with the recline actuator attached, to the crossbeam assembly with the four socket head screws and locknuts.
3. Install the front of the recline actuator to the seat frame assembly with the locknut and screw.



**FIGURE 13.6** Removing/Installing the Recline Actuator

## Testing the Actuators

1. Cycle each function of the seating system (tilt, recline, VSR, power legs) through the full range of motion and observe the cables to make sure no cables are pinched, crushed or pulled by the mechanisms.
2. Flip back armrests and observe the cables to make sure the joystick and/or switch cables are free to move and not pulled.
3. Perform one of the following:
  - If damage to the cables is found, replace the cables and re-route the new cables so they DO NOT get damaged during wheelchair/seating system operation.
  - If the cables are in danger of becoming damaged, re-route the cables to ensure damage does not occur.
4. Secure the cables. Refer to [Securing the Cables](#) on page 157.
5. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.

## Removing/Installing Recline Links

*NOTE: For this procedure, refer to FIGURE 13.7 on page 136.*

### Removing

1. Make sure the wheelchair is on a level surface.
2. Remove the batteries. Refer to the owner's manual shipped with the wheelchair.
3. Remove the seat pan. Refer to Removing/Installing Seat Pan on page 54.
4. Remove the retaining ring and washer that secure the recline link to the pin of the seat frame.
5. Remove the shoulder bolt and locknut that secure the recline link to the front pivot assembly.
6. Remove the existing recline link.

### Installing

1. Perform one of the following:
  - For 15° recline - Secure the 10°/15° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 13.7 (Detail "A").
  - For 10° recline - Secure the 10°/15° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 13.7 (Detail "B").
  - For 5° recline - Secure the 0°/5° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 13.7 (Detail "C").
  - For 0° recline - Secure the 0°/5° recline link with the washer and a new retaining ring to the pin in the mounting hole and orientation shown in FIGURE 13.7 (Detail "D").

---

### **CAUTION**

**Be sure to use a new retaining ring that is not bent or damaged.**

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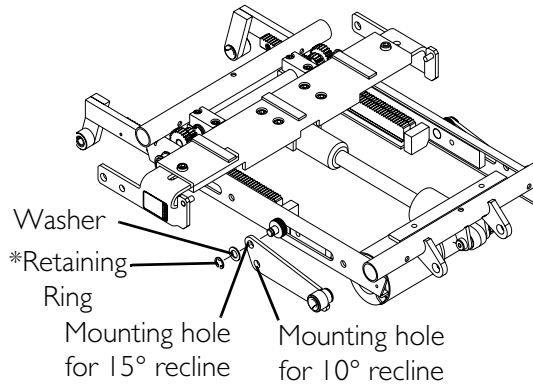
*NOTE: When completed verify retaining ring is fully seated in the groove in the pin.*

2. Secure the recline link to the front pivot assembly with the existing shoulder bolt and locknut in the mounting hole shown in the respective details of FIGURE 13.7. Securely tighten. Torque to 13 ft-lbs  $\pm$  20%.
3. Repeat for opposite side.
4. Install the seat pan. Refer to Removing/Installing Seat Pan on page 54.
5. Install the batteries. Refer to the owner's manual shipped with the wheelchair.

**DETAIL A: 10°/15° RECLINE LINK**

**Mounting Reclining Link to Center Seat Frame**

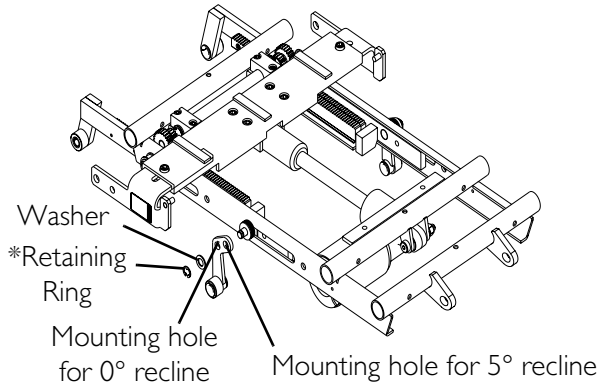
*\*NOTE: Use new retaining ring.*



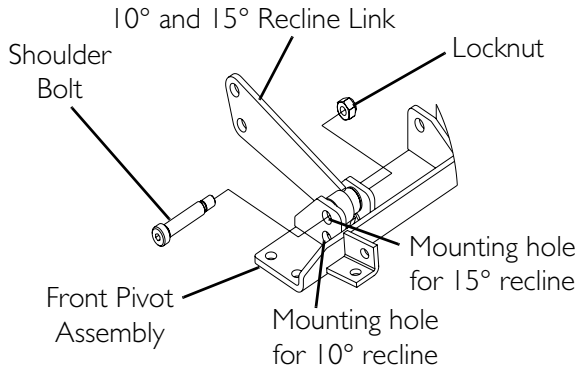
**DETAIL B: 0°/5° RECLINE LINK**

**Mounting Reclining Link to Center Seat Frame**

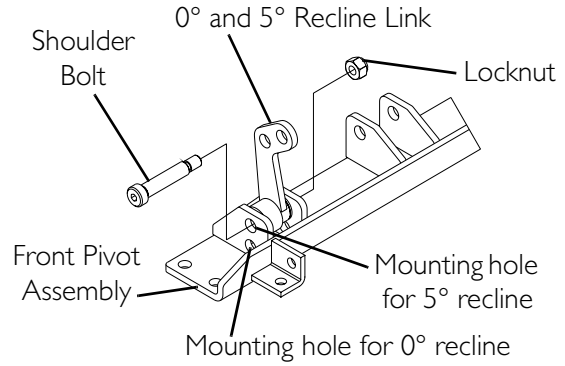
*\*NOTE: Use new retaining ring.*



**Mounting Reclining Link to Front Pivot Assembly**



**Mounting Reclining Link to Front Pivot Assembly**



**FIGURE 13.7** Removing/Installing Recline Links



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## Removing/Installing Tilt Links

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### **⚠ WARNING**

**Remove the existing tilt link and install the new tilt link on one side of the wheelchair at a time. Otherwise, injury or damage may occur.**

---

*NOTE: For this procedure, refer to FIGURE 13.8 on page 138.*

### **Removing**

1. Note the orientation of the tilt angle blocks for proper reinstallation.
2. Remove the locknut, bushing and shoulder bolt securing the tilt link to the front pivot assembly.
3. Remove the retaining ring securing the flat washer, two nylon washers and the tilt link to the center seat frame pin.
4. Remove the tilt link from the center seat frame pin.

### **Installing**

1. Position one nylon washer, tilt link, one nylon washer, and flat washer onto the center seat frame pin.
- 

### **CAUTION**

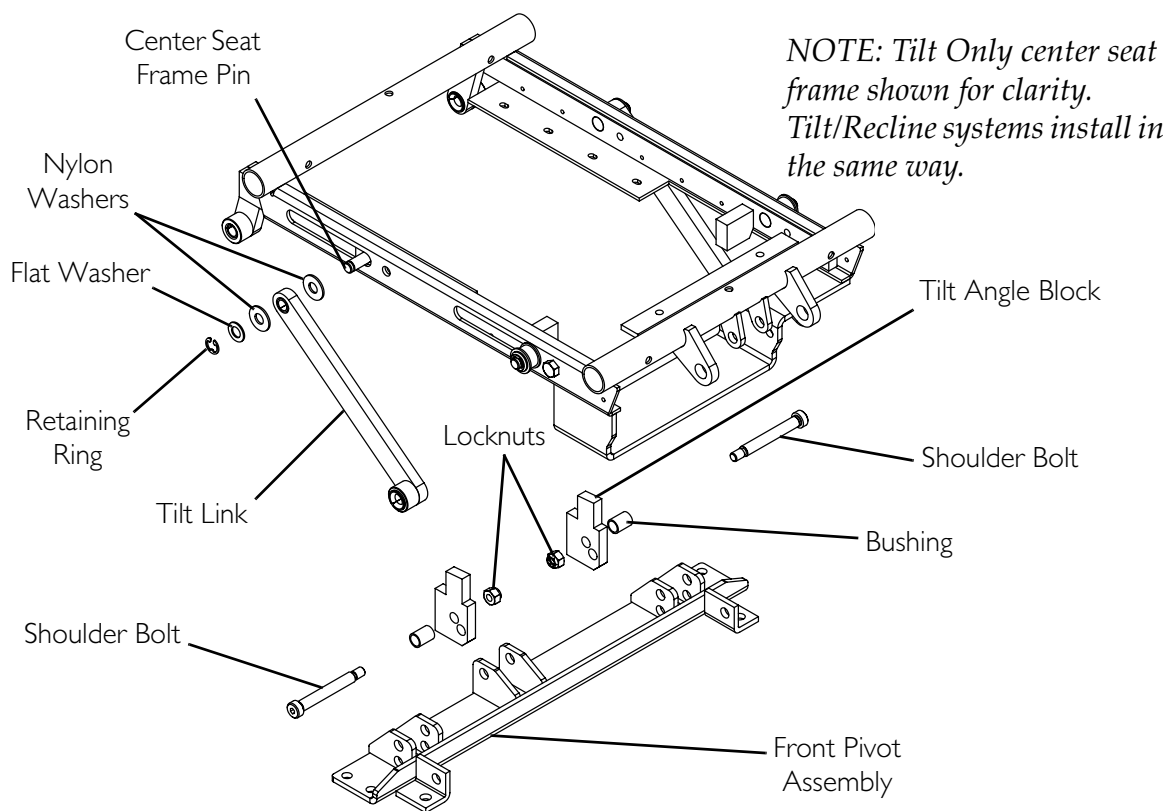
**Be sure to use a new retaining ring that is not bent or damaged.**

---

2. Secure the flat washer, two nylon washers and the tilt link to the center seat frame pin using a new retaining ring.
3. Verify that the retaining ring is fully seated in the groove in the pin.
4. Install the shoulder bolt through the front pivot assembly, tilt link, front pivot assembly, bushing and tilt angle block.

*NOTE: The tilt angle block should be oriented as noted in STEP 1 of Removing on page 137. If unsure of the orientation, refer to Adjusting Seat Angle on page 61.*

5. Secure the tilt link, tilt angle block and bushing to the front pivot assembly using the locknut. Torque to 23 ft-lbs  $\pm$  20%.
6. Perform the post-service inspection. Refer to Post-Service Inspection Checklist on page 21.



**FIGURE 13.8** Removing/Installing Tilt Links

# SECTION 14—ELECTRONICS

## ⚠ WARNING

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

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

After performing any of the procedures in this section, perform the post-service inspection. Refer to **Post-Service Inspection Checklist** on page 21.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

Use only the actuator controls listed in the following chart to activate the tilt/recline functions. **DO NOT** use any other actuator controls. Such devices may result in excess heating and cause damage to the actuator and associated cables and could cause a fire, death, physical injury or property damage. If such devices are used, Invacare shall not be liable and the limited warranty is void.

SEATING SYSTEM	ACTUATOR CONTROL			
	TRSS	TRCM	SAC	TAC
<b>TILT ONLY</b>	Y	Y	Y	N
<b>TILT ONLY WITH POWER ELEVATING LEGRESTS</b>	N	Y	N	N
<b>RECLINE ONLY</b>	N	Y	N	Y
<b>RECLINE ONLY WITH POWER ELEVATING LEGRESTS</b>	N	Y	N	N
<b>TILT/RECLINE</b>	N	Y	N	N

## Removing/Installing the Single Actuator Control (SAC)

*NOTE: For this procedure, refer to FIGURE 14.1 on page 141.*

*NOTE: The SAC is no longer available for replacement. If replacement is necessary, a TAC must be installed. Refer to Removing/Installing the TAC or TRCM on page 141.*

### Removing

1. Turn the joystick off.
2. Remove the two thumb screws (not shown) that secure the rear shroud to the base.
3. Remove the rear shroud. Refer to Removing/Installing Rear Shroud on page 102.
4. Disconnect the SAC 5-pin connector from the MK<sub>5</sub> controller (at the rear of the battery box). Refer to Detail "B".
5. Disconnect the SAC actuator connector (WHITE, 2-pin Anderson) from the tilt actuator cable. Refer to Detail "B".

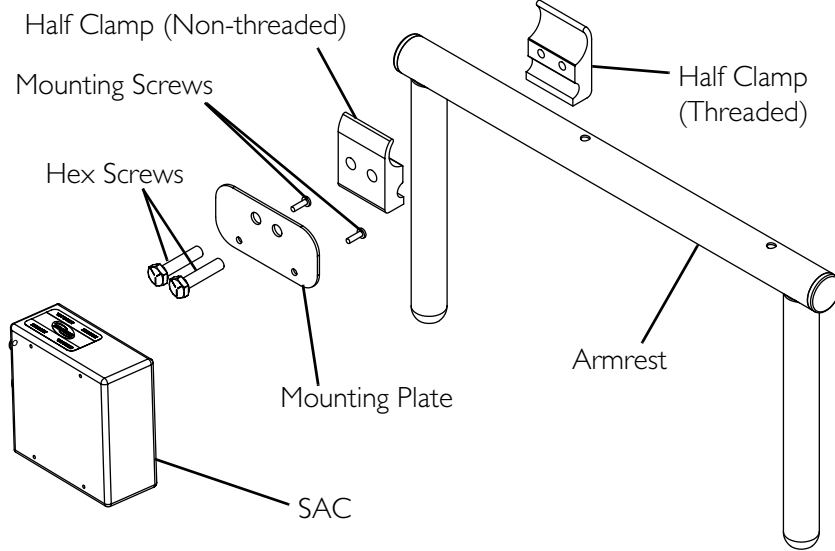
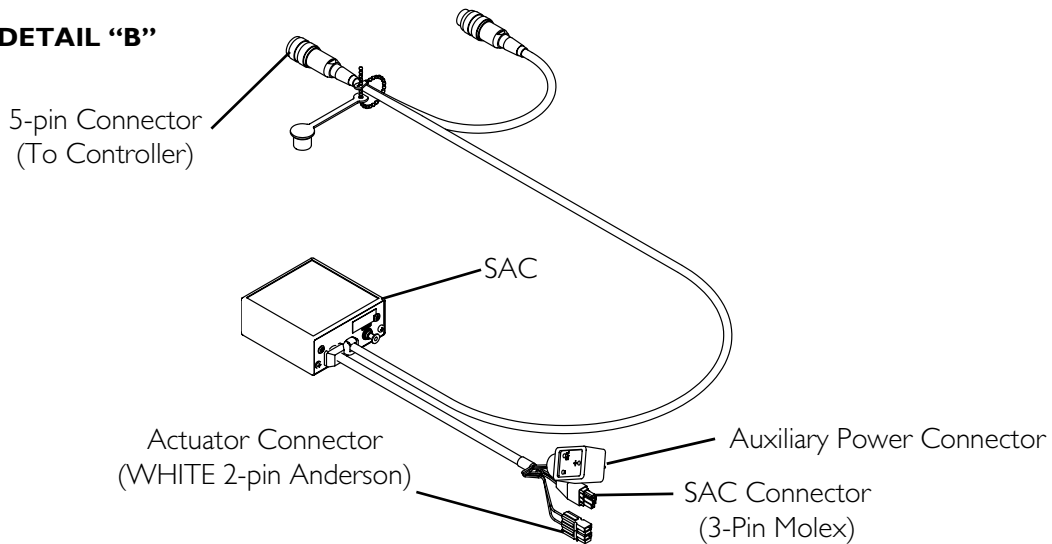
6. Disconnect the auxiliary power connector of the SAC from the power take off connector of the MK<sub>5</sub> controller.
7. Disconnect the tilt potentiometer connector from the SAC 3-pin Molex connector.
8. Remove the two hex screws securing the half clamps to the armrest. Refer to Detail "A".
9. Remove the SAC and mounting hardware from the armrest.

*NOTE: The mounting hardware includes the half clamps, mounting plate, hex screws and mounting screws.*

10. Remove the two mounting screws securing the SAC to the mounting plate.
11. Remove the SAC from the mounting plate.

### **Installing**

1. Secure the SAC to the mounting plate using the two mounting screws.
2. If necessary, secure the mounting plate to the non-threaded half clamp using the two hex screws.
3. Position the non-threaded half clamp onto the armrest.
4. Secure the threaded half clamp to the armrest by tightening the two hex screws.
5. Connect the SAC 5-pin connector to the MK<sub>5</sub> controller (at the rear of the battery box).
6. Connect the SAC actuator connector (WHITE, 2-pin Anderson) to the tilt actuator cable.
7. Connect the auxiliary power connectors.
8. Connect the tilt potentiometer connector to the SAC 3-pin Molex connector.
9. Secure the SAC cables. Refer to [Securing the Cables](#) on page 157.
10. Adjust the tilt potentiometer. Refer to [Adjusting the Tilt Potentiometer](#) on page 152.
11. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.
12. Install the rear shroud. Refer to [Removing/Installing Rear Shroud](#) on page 102.

**DETAIL "A"****DETAIL "B"****FIGURE 14.1** Removing/Installing the Single Actuator Control (SAC)**Removing/Installing the TAC or TRCM**

*NOTE: For this procedure, refer to FIGURE 14.2 on page 143 and FIGURE 14.3 on page 145.*

*NOTE: TAC stands for Two Actuator Control.*

*NOTE: TRCM stands for Tilt Recline Control Module.*

**Removing the TAC/TRCM Controller Bracket****Round Back Canes**

1. Remove the two long hex screws and locknuts securing the controller bracket to the upper bracket (Detail "C").

2. Remove the two short hex screws, washers and coved washers securing the upper bracket to the back cane.
3. Remove the controller bracket with TAC/TRCM from the back cane.

### **Extruded Canes**

1. Loosen the four hex screws that secure the spreader bar to the back canes.
2. Loosen the two hex screws and washers that secure the controller bracket to the T-nuts and back cane.
3. Remove the T-nuts.
4. Remove the controller bracket with TAC/TRCM from the back cane.

### **Installing the TAC/TRCM Controller Bracket**

#### **Securing the Controller Bracket to the Back Cane**

*NOTE: For this procedure, refer to FIGURE 14.2 on page 143 and FIGURE 14.3 on page 145.*

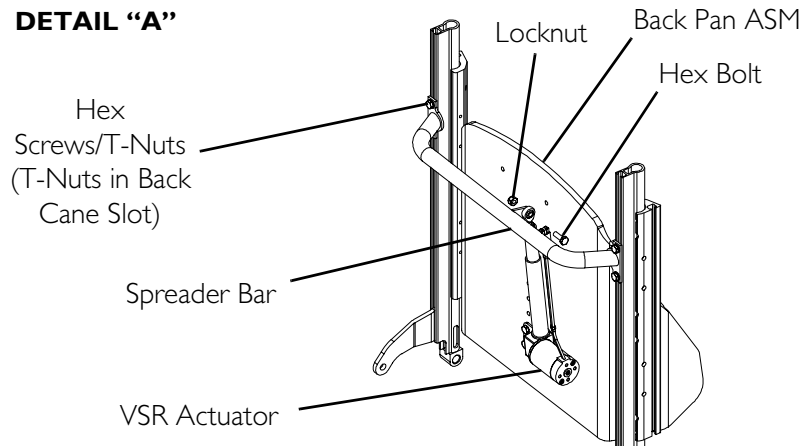
#### **Round Back Canes**

1. If necessary, install the TAC/TRCM onto the controller bracket. Refer to Installing the TAC/TRCM onto the Controller Bracket on page 144.
2. If necessary, install the two short hex screws, washers and coved washers to secure the upper bracket to the back cane (Detail “C”). Torque the hex screws to 75 in-lbs  $\pm$  20%.
3. Install the two long hex screws and locknuts to secure the controller bracket to the upper bracket.
4. Program the TAC. Refer to Refer to Programming the TAC on page 146.

#### **Extruded Canes**

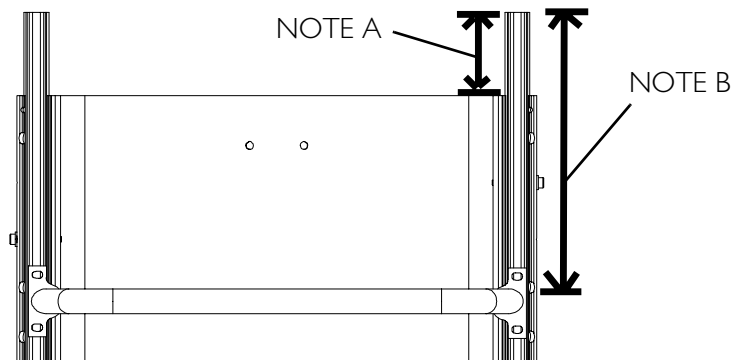
1. If necessary, install the TAC/TRCM onto the controller bracket. Refer to Installing the TAC/TRCM onto the Controller Bracket on page 144.
2. Note the position of the existing spreader bar, by measuring from the top of the back canes to the top of the spreader bar (Detail “B” of FIGURE 14.2 on page 143).
3. Note the position of the back pan, by measuring from the top of the back pan to the top of the back canes.
4. Loosen, but DO NOT remove, the four hex screws that secure the existing spreader bar to the back canes (Detail “A” of FIGURE 14.2 on page 143).
5. Lift up and remove the existing spreader bar, with T-nuts, from the slots on the back canes.
6. Loosely install the two hex screws and washers to secure the controller bracket to the T-nuts (Detail “B” of FIGURE 14.3 on page 145).
7. Slide the T-nuts into the slots in the back cane.

8. Slide the controller bracket up/down on the back cane until the bottom of the controller bracket is 1-inch  $\pm$  ¼-inch above the top of the pivot arm (Detail "A" FIGURE 14.3 on page 145).
9. Torque the hex screws to 75 in-lbs  $\pm$  20% to secure the controller bracket to the T-nuts and back cane.
10. Align the T-nuts on the spreader bar with the slots in the back canes.
11. Slide the spreader bar to the position noted when removing the spreader bar (Detail "A" of FIGURE 14.2).
12. Make sure the measurements shown in Detail "B" of FIGURE 14.2 and noted in STEP 2 are the same on both sides.
13. Tighten the four hex screws that secure the spreader bar to the back canes. Torque to 75 in-lbs  $\pm$  20%.
14. Program the TAC. Refer to Programming the TAC on page 146.

**DETAIL "A"****DETAIL "B"**

*NOTE A: Measurements from the top of the back cane to the top of the back pan MUST be equal.*

*NOTE B: Measurements from the top of the back cane to the top of the spreader bar MUST be equal.*



**FIGURE 14.2** Controller Bracket

### **Removing the TAC/TRCM from the Controller Bracket**

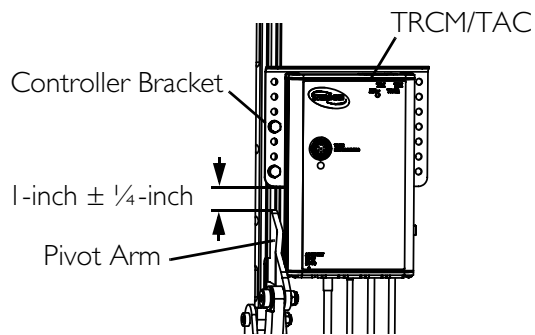
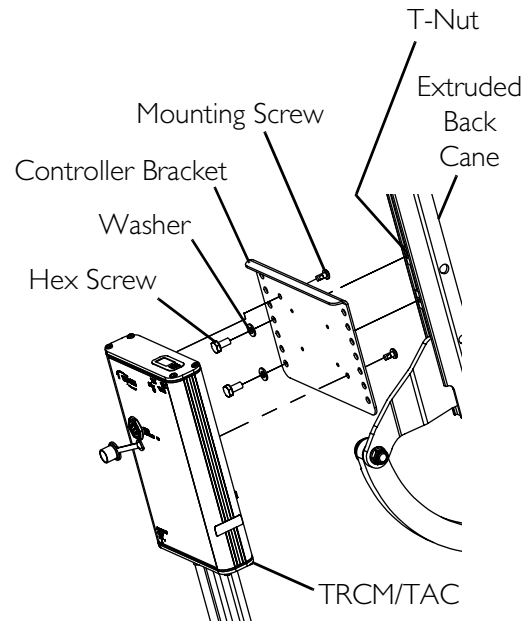
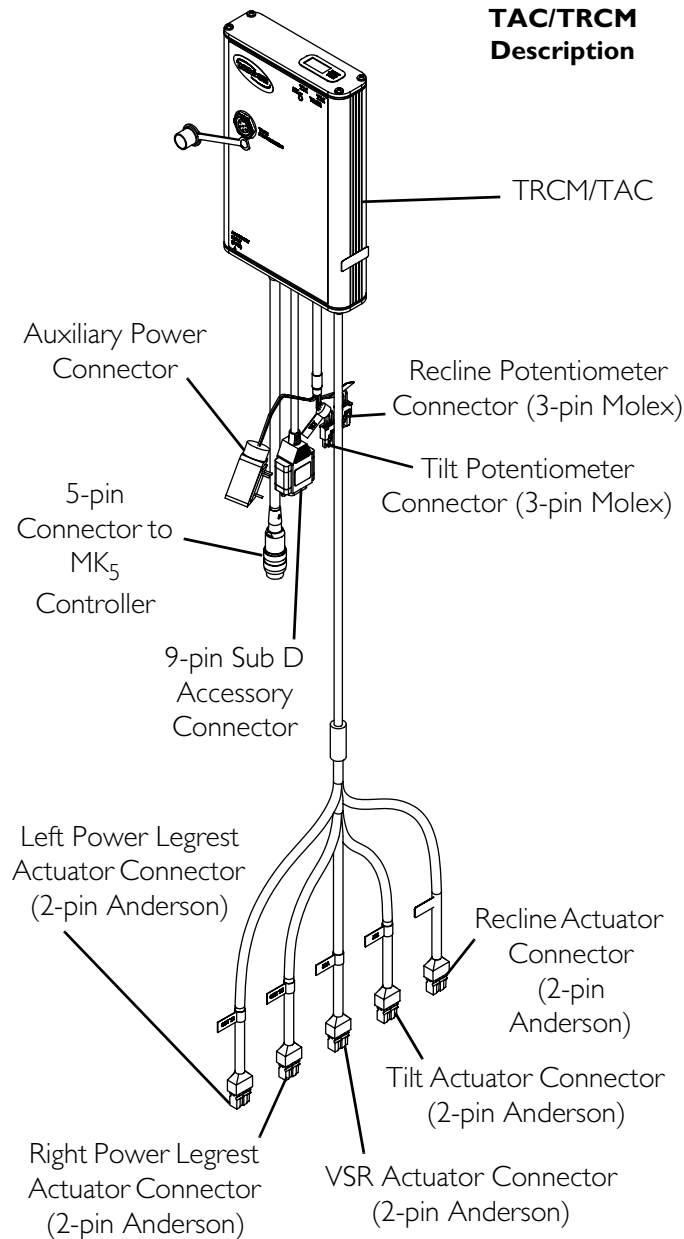
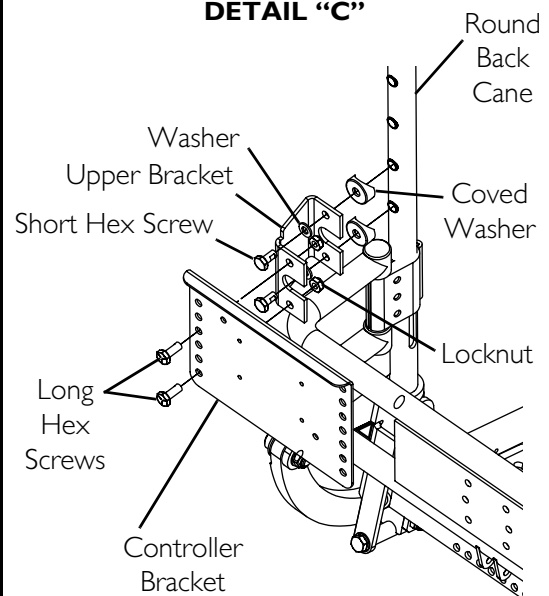
1. Turn the joystick off.
2. Remove the rear shroud. Refer to [Removing/Installing Rear Shroud](#) on page 102
3. Disconnect the auxiliary power connectors.
4. Disconnect the tilt and/or recline potentiometers from the 3-pin Molex connectors.
5. Disconnect the tilt, recline, VSR and/or power legrest actuators from the 2-pin Anderson connectors.
6. Disconnect the TRCM or TAC from the 9 pin sub D connector on the MK<sub>5</sub> controller.
7. Remove the two Phillips screws securing the TRCM/TAC to the controller bracket (Detail “B”).
8. Note the location of any tie-wraps securing the TRCM/TAC cables to the wheelchair frame and/or other cables.
9. Cut any tie-wraps securing the TRCM/TAC cables to the wheelchair frame and/or other cables.

### **Installing the TAC/TRCM onto the Controller Bracket**

*NOTE: For this procedure, refer to FIGURE 14.3 on page 145.*

1. Secure the TAC to the controller bracket using the two mounting screws (Detail “B”).
2. Connect the tilt actuator to the 2-pin Anderson connector labeled “Tilt” on the TAC.
3. Connect the tilt potentiometer to the 3-pin Molex connector labeled “Tilt” on the TAC.
4. Connect the auxiliary power connector of the TAC to the power take off connector of the MK<sub>5</sub> controller.
5. Connect the TAC to the 5-pin connector on the MK<sub>5</sub> controller.
6. Secure the controller bracket to the back cane. Refer to [Securing the Controller Bracket to the Back Cane](#) on page 142.
7. Install the rear shroud. Refer to [Removing/Installing Rear Shroud](#) on page 102



**DETAIL "A" - POSITIONING MOUNTING BRACKET ON EXTRUDED CANES****DETAIL "B"****TAC/TRCM Description****DETAIL "C"****FIGURE 14.3** Removing/Installing the TAC or TRCM

## Programming the TAC

1. Connect the remote programmer into the front face of the TAC.
2. Press the Power button to turn on the remote programmer.
3. Scroll to the ADVANCED menu and press the Select button.
4. Scroll to SYSTEM TYPE and select the appropriate standard program.
5. Press the Menu button.
6. Scroll to ACTUATOR SELECTION and press the Select button.
7. Select each direction input control and adjust to the following settings:
  - Forward - U/D
  - Reverse - U/D
  - Right - Up
  - Left - Down
8. Press the Save button.
9. Press the Menu button.
10. Scroll to PERFORMANCE ADJUST and press the Select button.
11. Scroll to LIMITS TYPE and press the Select button.
12. Select the appropriate input type (Potentiometers) and press the Save button.
13. Calibrate the tilt potentiometer. Refer to [Calibrating the Tilt Potentiometer for a TAC](#) on page 146.

## Calibrating the Tilt Potentiometer for a TAC

1. Select CALIBRATIONS from the main menu. The calibrations menu will be displayed.



2. Select the menu item that corresponds to the potentiometer to be adjusted. The Up Angle adjustment screen will then be displayed.
3. Position the seat back in the fully upright position.
4. Using a protractor or angle pitch calculator, measure the actual angle of the seat with respect to the floor. This measurement should range from 0° to 10°.
5. Adjust the tilt up angle setting on the programmer to the measured angle.

**TILT UP ANGLE**  
**5**  
**PRESS SELECT**  
**TO CONTINUE**

6. Press the SELECT key on the programmer to proceed to the Tilt Down adjustment screen.
7. Tilt the seat until the measured angle is approximately 50°.
8. Adjust the tilt down angle setting on the programmer to the measured angle. The range is between 45° and 55°.
9. Press the SAVE key on the programmer to store both the up and down angle adjustments in the user memory.

**TILT DOWN ANGLE**  
**50**  
**PRESS SAVE**  
**TO SET ANGLES**

*NOTE: The adjustments in STEPS 10 to 15 will ensure the programmed angle setting for the seat matches the mechanical adjustment made for the seat. This will prevent the actuator from running excessively when the seat has finished moving.*

10. Press the Menu button.
  11. Select PERFORMANCE ADJUST and press the Select button.
- NOTE: For STEP 12, listen to the tilt actuator while observing the seat position.*
12. Tilt the seating system to the full upright position.
  13. Perform one of the following:
    - If the tilt actuator continues to run after the seating system stops moving, proceed to STEP 14.
    - If the tilt actuator stops when the seating system stops moving, proceed to STEP 17.
  14. Increase the tilt up angle setting on the programmer.
  15. Press the Save button.
  16. Repeat STEPS 10 to 15 until the actuator stops when the seating system stops moving.
  17. Press the Power button.
  18. Disconnect the remote programmer from the TAC.

**⚠ WARNING**

**NEVER** operate the wheelchair while the seat is in any seat angle position over 20° **RELATIVE TO THE VERTICAL POSITION**. Drive lockout **MUST** not be adjusted beyond 20°.

The wheelchair user **MUST** have a clear line of sight to drive safely. On initial chair delivery and after adjusting the back angle, drive lockout switch or tilt system, tilt the seat back to the farthest driving position immediately before drive lockout engages and ensure there is a clear line of sight present in which to drive the wheelchair. If a clear line of sight is not present, have the back angle repositioned or readjust the lockout angle such that safe driving with a clear line of sight is achieved. **Otherwise injury or damage may occur.**

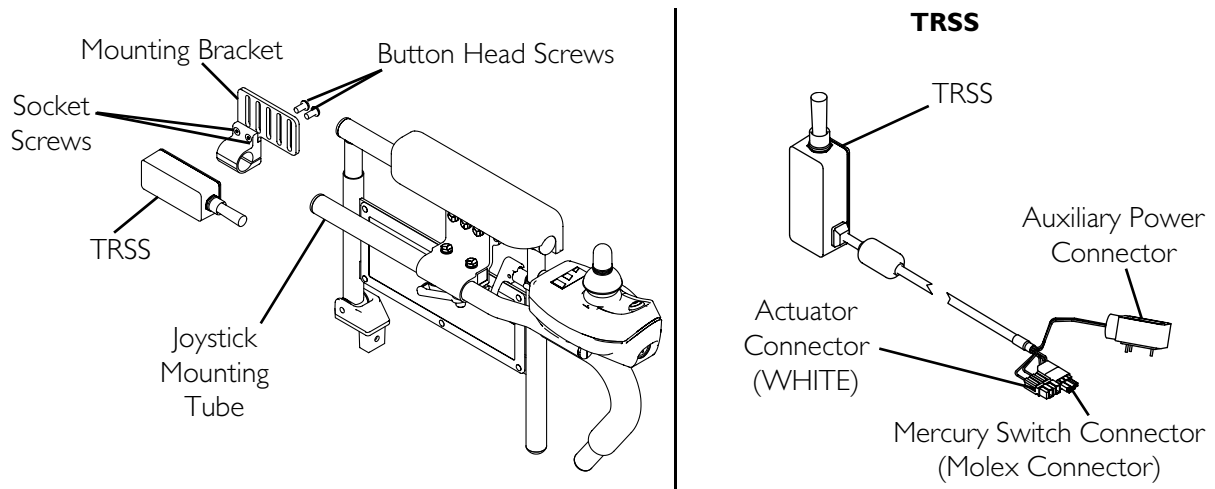
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19. Tilt the system up and down and test that the drive lockout works at no more than 20° of tilt.
20. Secure the TAC cables. Refer to [TAC Cables](#) on page 157.

## Replacing the Tilt Recline Single Switch (TRSS)

*NOTE: For this procedure, refer to FIGURE 14.4 on page 149.*

1. Turn the joystick off.
2. Disconnect the joystick.
3. Disconnect the auxiliary power connectors.
4. Disconnect the actuator (WHITE connector).
5. Disconnect the mercury switch (3-pin Molex connector).
6. Note the locations of any tie-wraps securing cables connected to the TRSS for proper installation.
7. Cut the tie-wraps securing the cables connected to the TRSS.
8. Remove the two button head screws securing the TRSS to the mounting bracket.
9. Remove the TRSS from the mounting bracket.
10. Reverse STEPS 2–9 to install the TRSS.
11. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.



**FIGURE 14.4** Replacing the Tilt Recline Single Switch (TRSS)

## Removing/Installing Joystick(s)

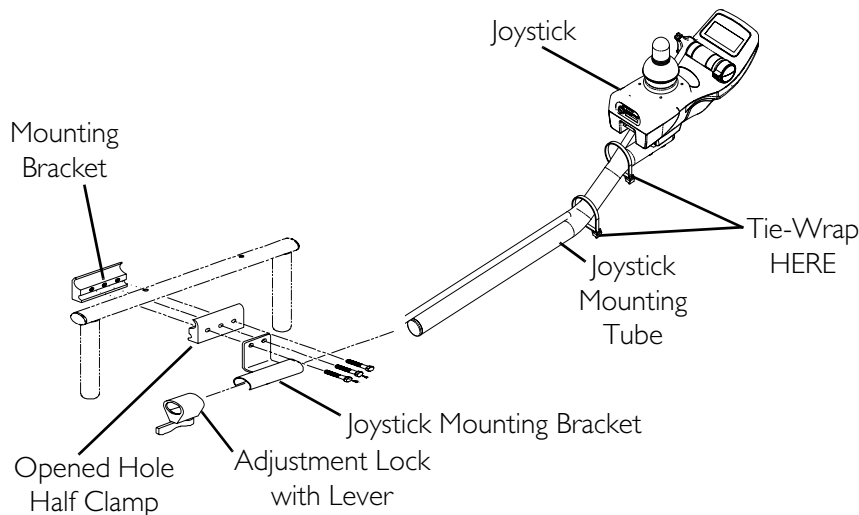
*NOTE: For this procedure, refer to FIGURE 14.5 on page 150.*

### Removing

1. Disconnect the joystick.
2. Turn the adjustment lock lever to release the joystick mounting tube.
3. Cut any tie-wraps securing the joystick to the seating system.
4. Remove the joystick mounting tube from wheelchair.

### Installing

1. Slide the joystick mounting tube through the bracket to the desired position.
2. Slide the adjustment lock with lever over the end of the joystick mounting tube and secure the adjustment lock to the tube by turning the adjustment lock lever.
3. Tie-wrap the joystick cable to the joystick mounting tube and to the bottom of the armrest (not shown).
4. Connect the joystick connectors (not shown).
5. Perform the post-service inspection. Refer to Post-Service Inspection Checklist on page 21.



*NOTE: It is not necessary to remove the mounting brackets.*

**FIGURE 14.5** Removing/Installing Joystick(s)

## Drive Lock-Out

Drive lock-out is a feature designed to prevent the wheelchair from being driven after the seating system has been tilted or reclined beyond 20°\* relative to the vertical position. The back can be positioned at a 10° relative offset to the seat base, thereby resulting in a back angle potential of 30° before which the drive lock-out is activated. This may affect the wheelchair user's line of sight while driving. Make sure the wheelchair user can see properly to ensure safe driving. When the drive lock-out feature has been activated, the LED on the single function toggle switch will light.

\*NOTE: 20° back angle can be any combination of tilt, recline, back angle, and/or surface angle.

### **⚠ WARNING**

**NEVER** operate the wheelchair while in any tilted/reclined position over 20° relative to the vertical position. If the drive lock-out does not stop the wheelchair from operating in a tilt/recline position 20° relative to the vertical position, **DO NOT** operate the wheelchair. Adjust the potentiometers. Refer to [Adjusting the Tilt Potentiometer](#) on page 152 or [Adjusting Recline Potentiometer](#) on page 154.

## Removing/Installing the Tilt Potentiometer

*NOTE: For this procedure, refer to FIGURE 14.6 on page 151.*

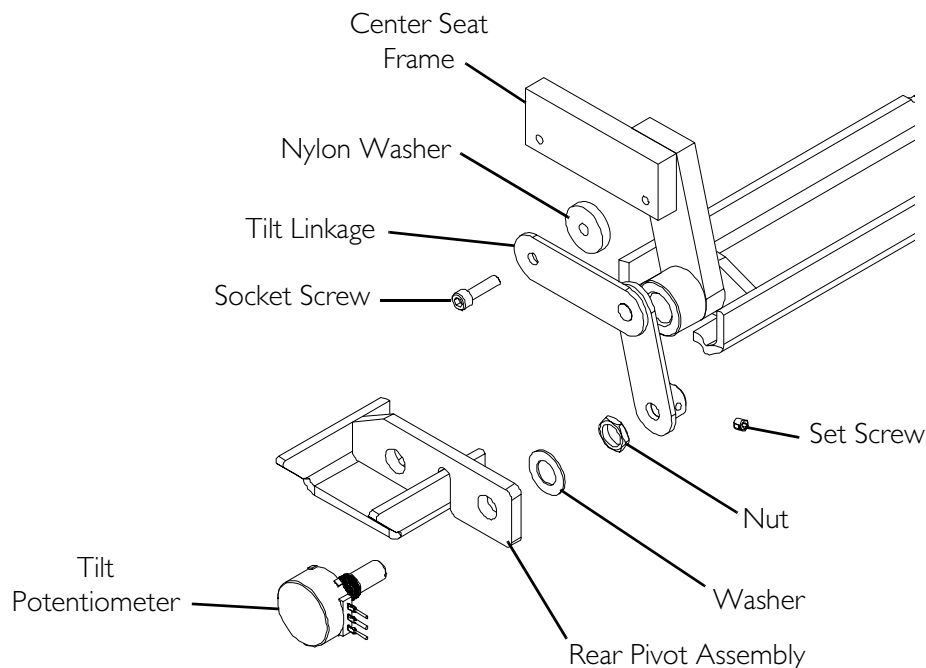
### Removing

1. Remove the rear seat shroud. Refer to [Removing/Installing Rear Shroud](#) on page 102.
2. Remove the nylon washer and socket screw that secure the tilt linkage to the center seat frame.

3. Loosen the set screw from the tilt linkage.
4. Remove the tilt linkage from the tilt potentiometer.
5. Remove the nut and washer securing the tilt potentiometer to the rear pivot assembly.
6. Remove the tilt potentiometer from the rear pivot assembly.
7. Disconnect the tilt potentiometer cable from the TRCM or TAC (3-pin Molex connector).
8. Cut any tie-wraps that secure the tilt potentiometer cable to the wheelchair.

## Installing

1. Install the tilt potentiometer onto the rear pivot assembly.
2. Install the washer and nut onto the tilt potentiometer.
3. Install and secure the tilt linkage onto the tilt potentiometer with the set screw.
4. Secure the tilt linkage to the center seat frame using the socket screw and nylon washer.
5. Connect the tilt potentiometer cable to the TRCM or TAC (3-pin Molex connector).
6. Tie-wrap the tilt potentiometer cable to the wheelchair frame as described in [Securing the Cables](#) on page 157.
7. Adjust the tilt potentiometer. Refer to [Adjusting the Tilt Potentiometer](#) on page 152.
8. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.



**FIGURE 14.6** Removing/Installing the Tilt Potentiometer

## Adjusting the Tilt Potentiometer

*NOTE: For this procedure, refer to FIGURE 14.7 on page 153.*

*NOTE: The tilt potentiometer is adjusted at the factory for 20° drive lockout and should not require further adjustment. However, if it becomes necessary to adjust the tilt potentiometer, the following procedure may be used.*

### Adjusting a Tilt Potentiometer Used With a TRSS

To adjust the tilt potentiometer on a seating system with a single function toggle switch, follow these steps:

*NOTE: A single function toggle switch can only be used in conjunction with a tilt only seating system.*

1. Loosen the set screw on the tilt potentiometer. Refer to Detail "A".

*NOTE: Loosening the set screw enables the tilt potentiometer to be adjusted independently of the chair seat movement.*

*NOTE: The up and down directions are noted on the front face of the single function toggle switch.*

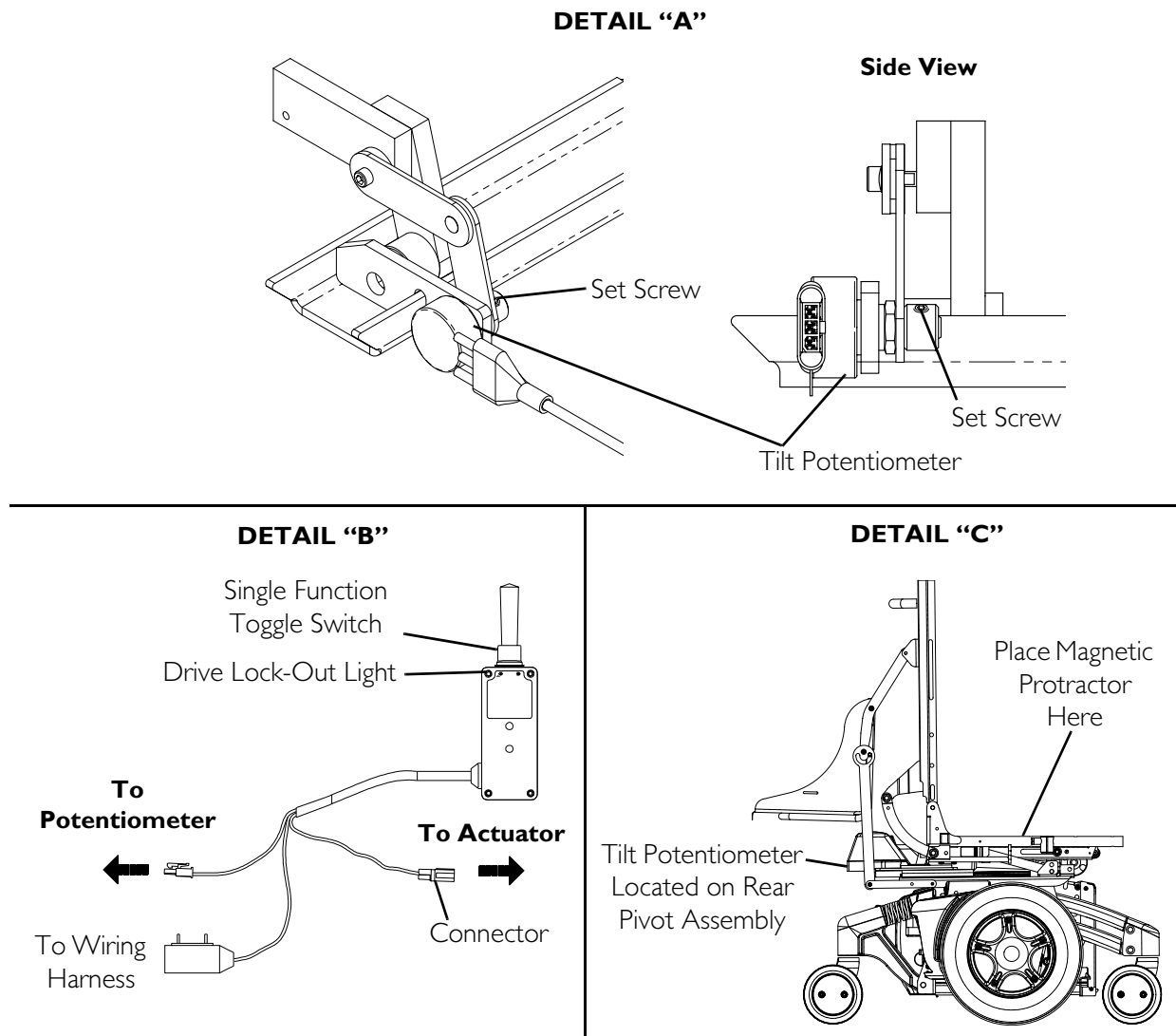
2. Push the single function toggle switch in the down direction and verify that the seat tilts back.
3. Push the single function toggle switch in the up direction and verify that the seat raises to the upright position.
4. Tilt the seat back 20° from the vertical position. Verify angles by using magnetic protractor (available at any hardware store).

*NOTE: 20° from the vertical position is the angle at which drive-lock out should occur.*

5. Disconnect the single function toggle switch connector from the actuator connector.
6. Push and hold the single function toggle switch in the up direction.
7. Turn the tilt potentiometer clockwise until it stops.
8. Verify that the drive lock-out light on the single function toggle switch is NOT illuminated.
9. Push the single function toggle switch in the down direction and verify that the drive lock-out light on the single function toggle switch is still NOT illuminated.
10. Holding the single function toggle switch in the down direction, turn the tilt potentiometer counter-clockwise until the drive lock-out light is illuminated.
11. Release the single function toggle switch.
12. Tighten the set screw on the tilt potentiometer.
13. Apply Glyptal to top of set screw to secure in place.
14. Reconnect actuator and single function toggle switch.
15. Tilt the seat up and down to confirm that the drive lock-out light illuminates on/off when the seat angle passes through the 20° lockout angle.



*NOTE: If drive lock-out light does NOT react as described in STEP 15, repeat procedure. If drive lock-out light still does NOT react as described in STEP 15, DO NOT use unit. Contact Invacare Technical Support at the number listed on the back cover.*



### Adjusting Tilt Potentiometer Used With a TRCM, TAC or SAC

To adjust the tilt potentiometer on a seating system with a TRCM, TAC or SAC, follow these steps:

1. Plug the remote programmer into the wheelchair TRCM controller.
2. Set remote programmer to the current status screen.

*NOTE: For STEPS 1-2, refer to the MK<sub>5</sub> electronics service manual supplied with wheelchair.*

3. Measure the back angle relative to the seat. Verify angles by using magnetic protractor (available at any hardware store).
4. Loosen the set screw on the tilt potentiometer.

5. Turn potentiometer with small flat screwdriver until screen on remote programmer reads the angle noted in STEP 3.

*NOTE: Seat angle is relative to the horizontal position.*

*NOTE: Tilt Up Limit - Shows the status of the limit as programmed in the Performance Menu. If the limit has been reached the status will be TRUE. If the seat or back is not at a limit the status will be FALSE.*

*NOTE: Tilt Down Limit - Shows the status of the limit as programmed in the Performance Menu. If the limit has been reached the status will be TRUE. If the seat or back is not at a limit the status will be FALSE.*

6. While monitoring the current status screen on the remote programmer, tighten the set screw on the tilt potentiometer shaft.
7. Apply Glyptal to top of set screw to secure in place.

## **Adjusting Recline Potentiometer**

*NOTE: For this procedure, refer to FIGURE 14.8 on page 155.*

To adjust the recline potentiometer on a seating system with a TRCM or TAC, follow these steps:

1. Hook up remote programmer to the wheelchair TRCM or TAC.
2. Set remote programmer to the current status screen.

*NOTE: For STEPS 1-2, refer to the MK<sub>5</sub> electronics Service Manual supplied with wheelchair.*

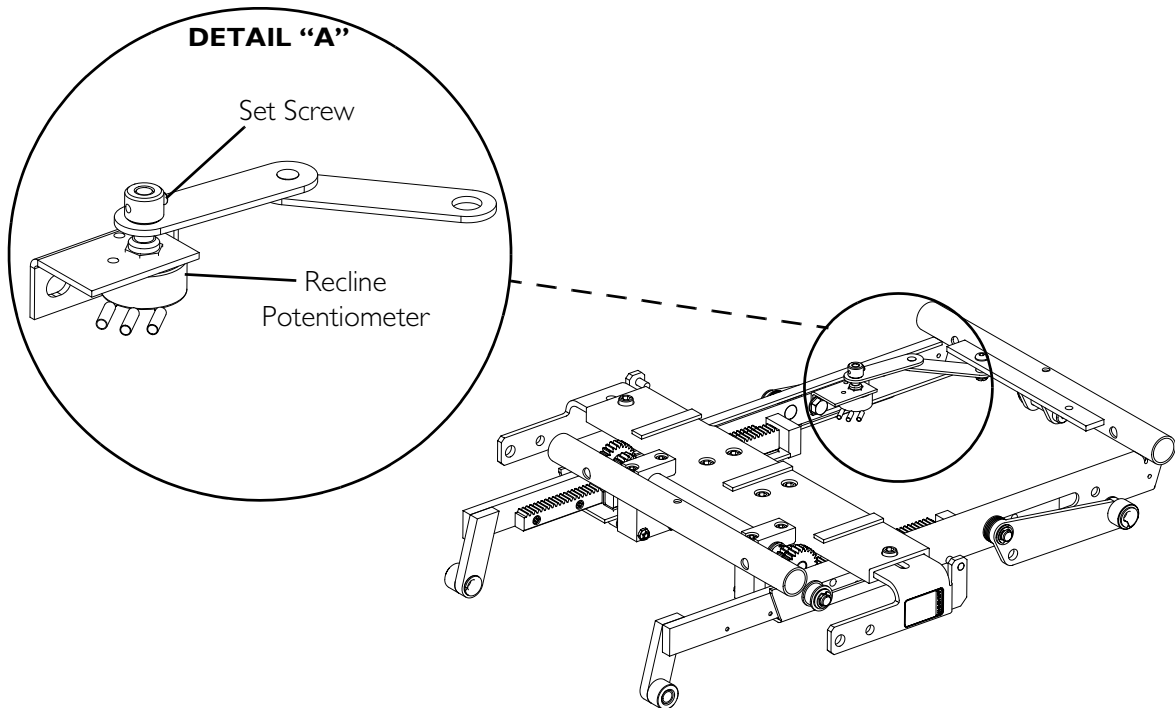
3. Measure the back angle relative to the seat. Verify angles by using magnetic protractor. (Available at any hardware store).
4. Remove the seat pan. Refer to [Removing/Installing Seat Pan](#) on page 54.
5. Loosen the set screw on the recline potentiometer shaft.
6. Turn potentiometer until screen on remote programmer reads 90° recline angle in current status screen of TRCM or TAC.

*NOTE: Back angle is relative to the seat frame.*

*NOTE: Recline Up Limit - Shows the status of the limit as programmed in the Performance Menu of TRCM or TAC. If the limit has been reached the status will be TRUE. If the seat or back is not at a limit the status will be FALSE.*

*NOTE: Recline Down Limit - Shows the status of the limit as programmed in the Performance Menu of TRCM or TAC. If the limit has been reached the status will be TRUE. If the seat or back is not at a limit the status will be FALSE.*

7. While monitoring the current status screen on the remote programmer, tighten the set screw on the recline potentiometer shaft.
8. Apply Glyptal to top of set screw to secure in place.



**FIGURE 14.8** Adjusting Recline Potentiometer

## Removing/Installing the Recline Potentiometer

*NOTE: For this procedure, refer to FIGURE 14.9 on page 156.*

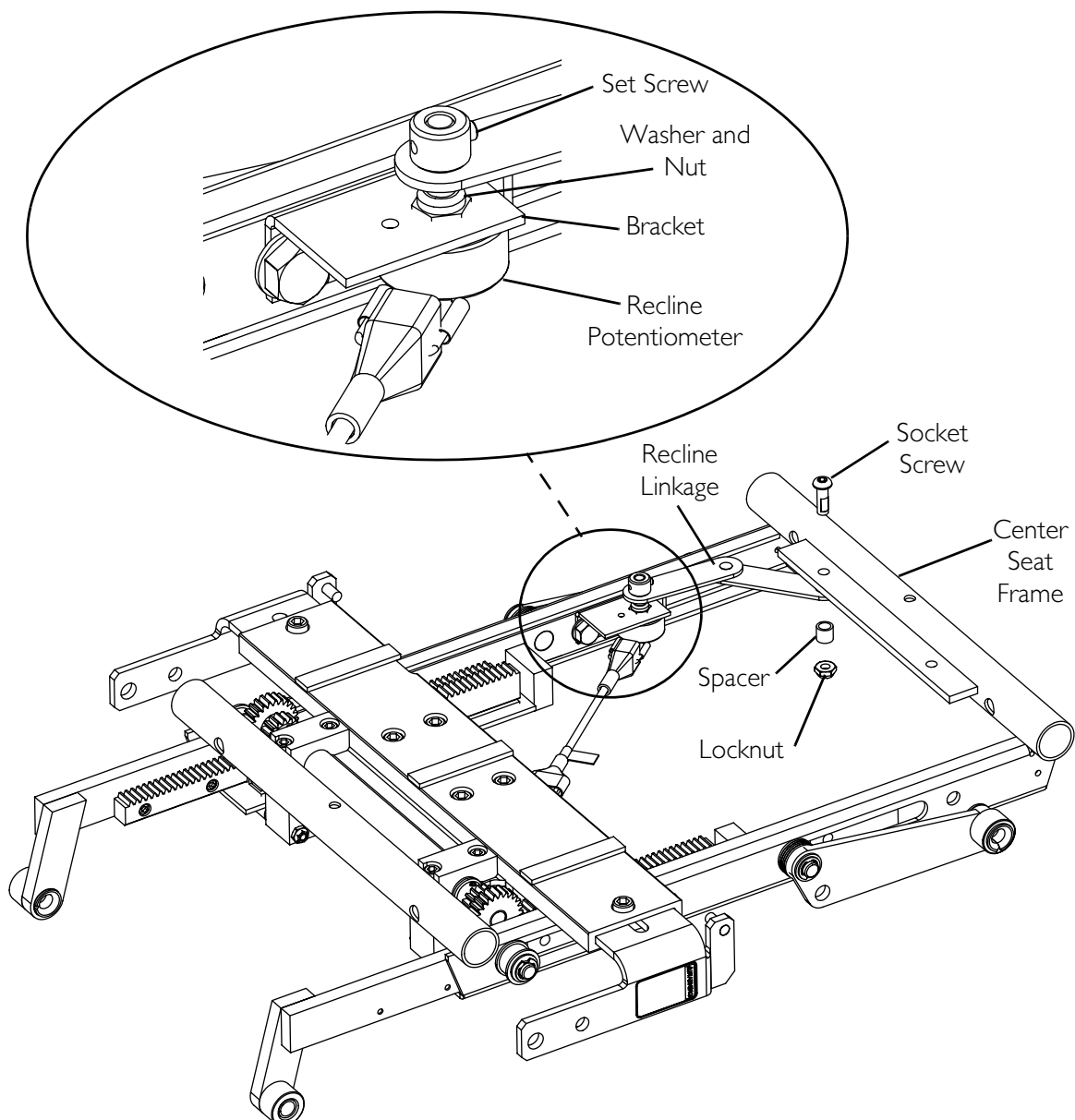
### Removing

1. Remove the socket screw, spacer and locknut securing the linkage to the center seat frame.
2. Loosen the set screw on the recline linkage.
3. Remove the recline linkage from the recline potentiometer.
4. Remove the nut and washer securing the recline potentiometer to the bracket.
5. Remove the recline potentiometer from the bracket.
6. Unplug the recline potentiometer cable from the TRCM or TAC.
7. Cut any tie-wraps securing the recline potentiometer cable to the wheelchair.

### Installing

1. Install the recline potentiometer up through the bracket.
2. Install the washer onto the recline potentiometer and secure to the bracket using the nut.
3. Install the recline linkage onto the recline potentiometer.

4. Turn the potentiometer fully clockwise until it stops, and then back 1/8 turn counter-clockwise.
5. Tighten the set screw to secure the recline linkage to the recline potentiometer.
6. Secure the recline linkage to the center seat frame using the socket screw, spacer and locknut.
7. Route and secure the recline potentiometer cable as described in [Securing the Cables](#) on page 157.
8. Plug the recline potentiometer cable into the TRCM or TAC (3-pin Molex connector).
9. Adjust the recline potentiometer. [Adjusting Recline Potentiometer](#) on page 154.
10. Perform the post-service inspection. Refer to [Post-Service Inspection Checklist](#) on page 21.



**FIGURE 14.9** Removing/Installing the Recline Potentiometer

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# SECTION 15—WIRING AND CABLES

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## **⚠ WARNING**

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

Before adjusting, repairing or servicing the seating system, **ALWAYS** turn the wheelchair power **OFF**, otherwise, injury or damage may result.

Pinch points exist between seat and base frames. Use caution, otherwise injury may occur.

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## Securing the Cables

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### **⚠ WARNING**

Cables **MUST** be secured to the wheelchair frame and/or base with tie-wraps after servicing is complete. Failure to follow the warnings and instructions below could result in injury to the users, attendants and/or bystanders and/or damage to the wheelchair.

Cables **MUST** be secured so there are no loops of excess cable extending away from the wheelchair. Bundle all excess cable together and secure with a tie-wrap. It may also be necessary to secure these bundles to the frame and/or base.

Always test all wheelchair functions after securing the cables to be sure cables **DO NOT** get pinched or crushed during operation of the wheelchair.

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### TAC Cables

*NOTE: For this procedure, refer to FIGURE 15.1 on page 158.*

1. Make sure the wheelchair is in the upright position.
- 

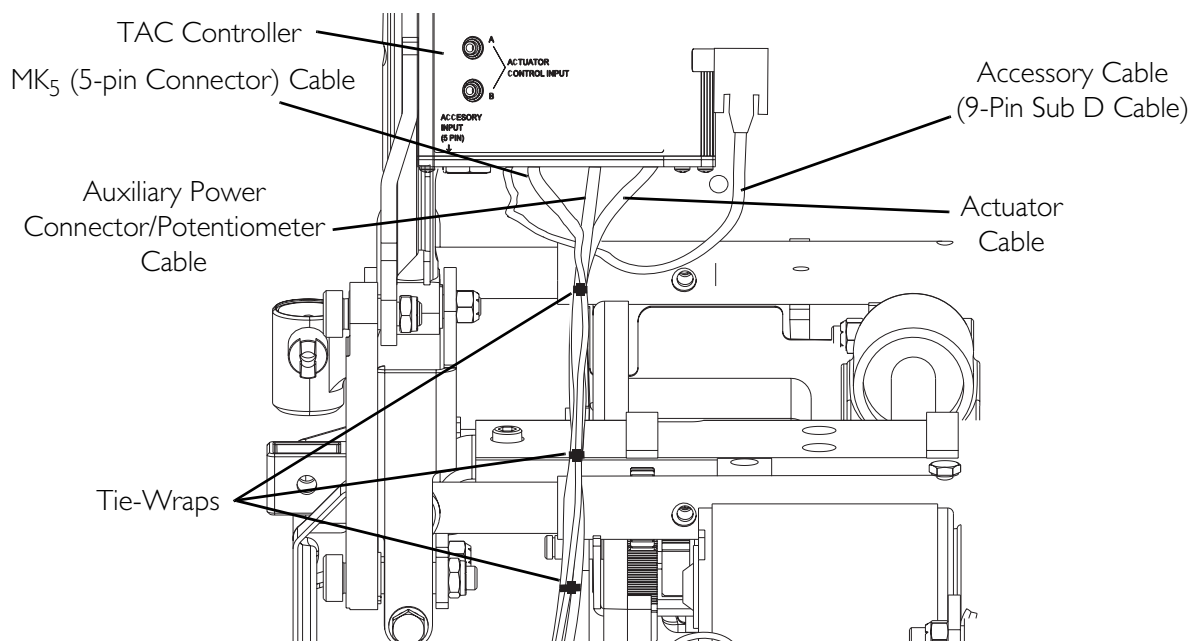
### **CAUTION**

The wheelchair **MUST** be in the upright position before securing the TAC cables to prevent stretching and possibly breaking cables.

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2. Tie-wrap the auxiliary power connector/potentiometer cable, actuator cable and MK<sub>5</sub> Controller (5-pin connector) cable from the TAC.

*NOTE: The accessory cable (9-pin sub D) does not need to be tie-wrapped with the other cables.*

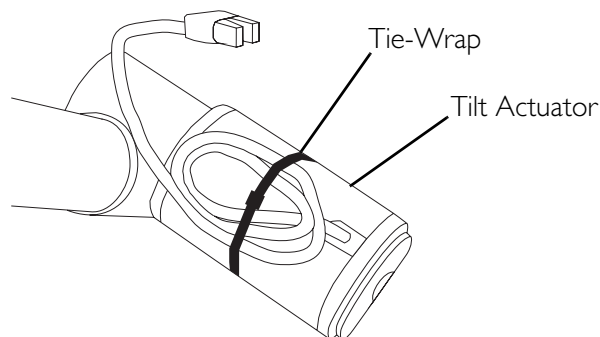


**FIGURE 15.1** Securing the TAC Cables

### Tilt Actuator Cable

*NOTE: For this procedure, refer to FIGURE 15.2.*

1. Connect the tilt actuator cable to the TRCM, SAC or TRSS connector (2-pin Anderson).
2. Bundle up the tilt actuator cable and tie-wrap it to the tilt actuator. Refer to FIGURE 15.2.

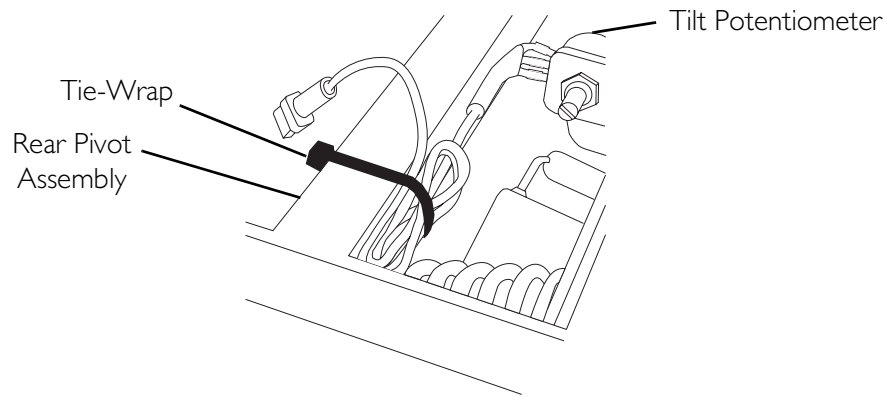


**FIGURE 15.2** Tilt Actuator Cable

### Tilt Potentiometer Cable

*NOTE: For this procedure, refer to FIGURE 15.3 on page 159.*

1. Connect the tilt potentiometer cable to the TRCM, SAC or TRSS connector (3-pin Molex).
2. Bundle up the tilt potentiometer cable and tie-wrap it to the rear pivot assembly. Refer to FIGURE 15.3.



**FIGURE 15.3** Tilt Potentiometer Cable

### Power Elevating Legrest, Recline Actuator and Recline Potentiometer Cables

*NOTE: For this procedure, refer to FIGURE 15.4 on page 160 and FIGURE 15.5 on page 161.*

1. Perform one of the following:

- Recline Only Systems - Perform the following steps:

*NOTE: Two people need to perform this procedure.*

- i. One person should support the front of the seat assembly.
- ii. Note the mounting location of the recline links for proper installation.
- iii. The remaining person should remove the two shoulder bolts and locknuts securing the recline links to the front pivot assembly.
- iv. Carefully tilt the seat assembly back.

- Tilt Only or Tilt/Recline Systems - Use the tilt mechanism to tilt the seat back 15° to allow room to work.

*NOTE: Right and left are determined from the perspective of an observer in front of the wheelchair.*

2. Route the left power elevating legrest cable and the recline actuator cable to the bottom of the lower seat shroud and tie-wrap the cables to the lower seat shroud. Refer to FIGURE 15.4.

3. Repeat STEP 2 for the right power elevating legrest cable.

4. Connect the power elevating legrest and recline potentiometer cables to the TRCM or TAC connectors (3-pin Molex).

5. Connect the recline actuator cable to the TRCM or TAC connector (2-pin Anderson).

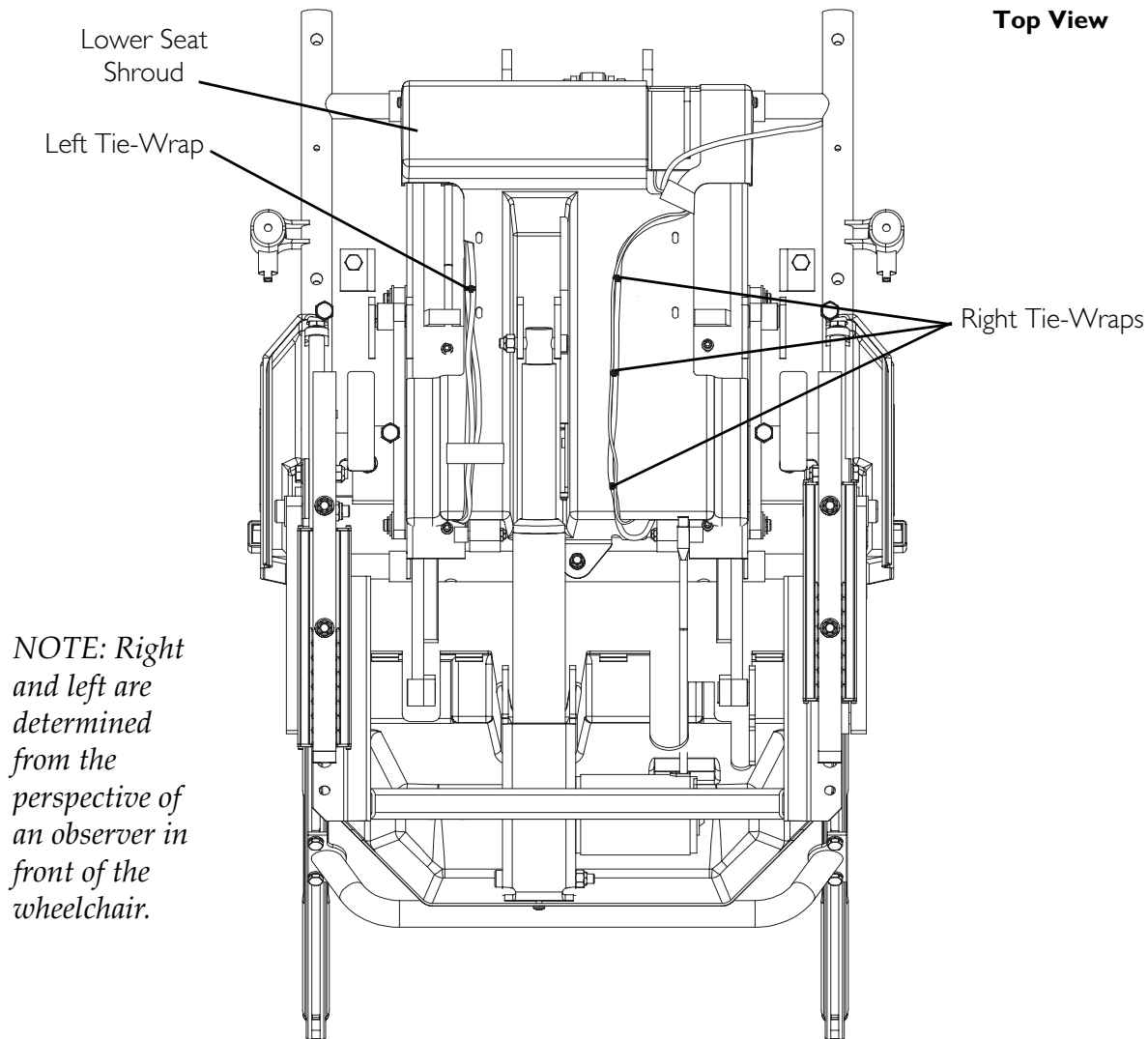
6. Perform one of the following:

- Recline Only Systems - Perform the following steps:

*NOTE: Two people need to perform this procedure.*

- i. One person should support the front of the seat assembly.

- ii. The remaining person should secure the recline links to the front pivot assembly in the position noted using the two shoulder bolts and locknuts. Torque to 23 ft-lbs  $\pm$  20%.
- Tilt Only or Tilt/Recline Systems - Use the tilt mechanism to return the seat to the upright position.



**FIGURE 15.4** Power Elevating Legrest, Recline Actuator and Recline Potentiometer Cables - Tie-Wrap to Lower Seat Shroud

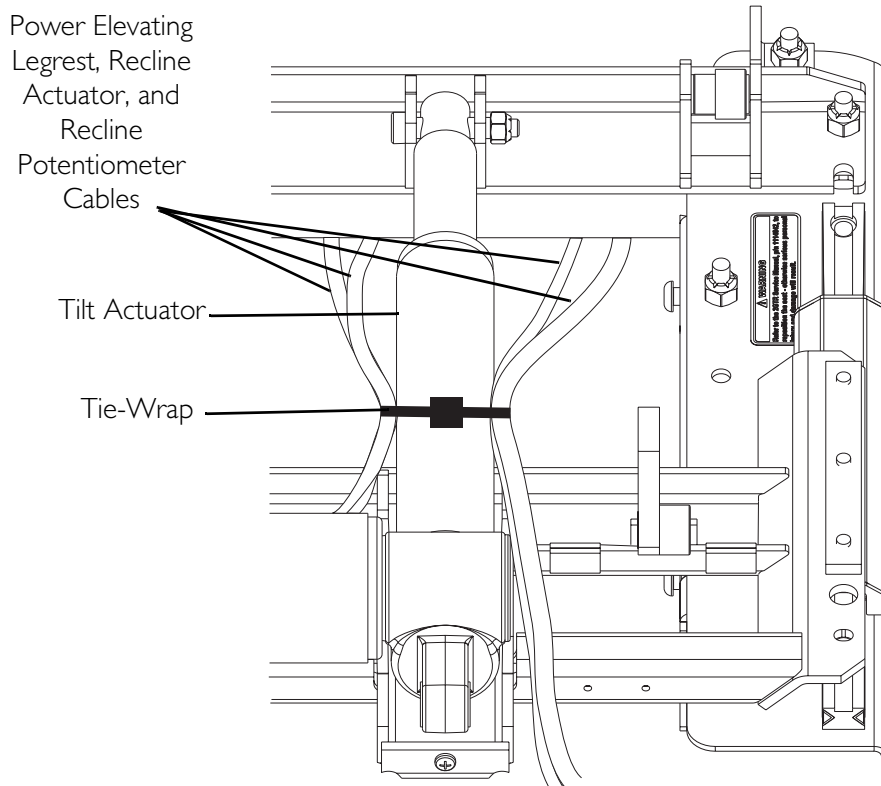
### CAUTION

The wheelchair **MUST** be reclined backward to the maximum position before securing the power elevating legrest, recline actuator and recline potentiometer cables to prevent stretching and possibly breaking cables.

7. Recline back as far as possible.
8. From behind the wheelchair, tie-wrap the power elevating legrest, recline actuator and recline potentiometer cables to the tilt actuator. Refer to FIGURE 15.5.



- Use the recline function to return the wheelchair to the upright position.



**FIGURE 15.5** Power Elevating Legrest, Recline Actuator and Recline Potentiometer Cables - Tie-Wrap to Tilt Actuator

### 4-Way Switch, TRCM and/or TAC Cables

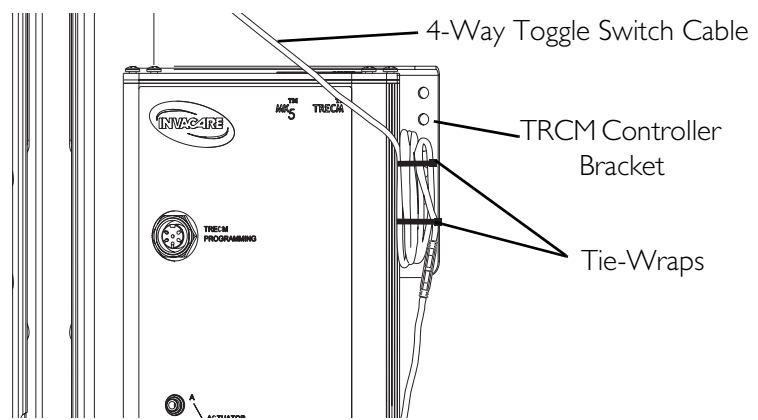
*NOTE: For this procedure, refer to FIGURE 15.6 on page 162 and FIGURE 15.7 on page 162.*

- Make sure the wheelchair is in the upright position.

### CAUTION

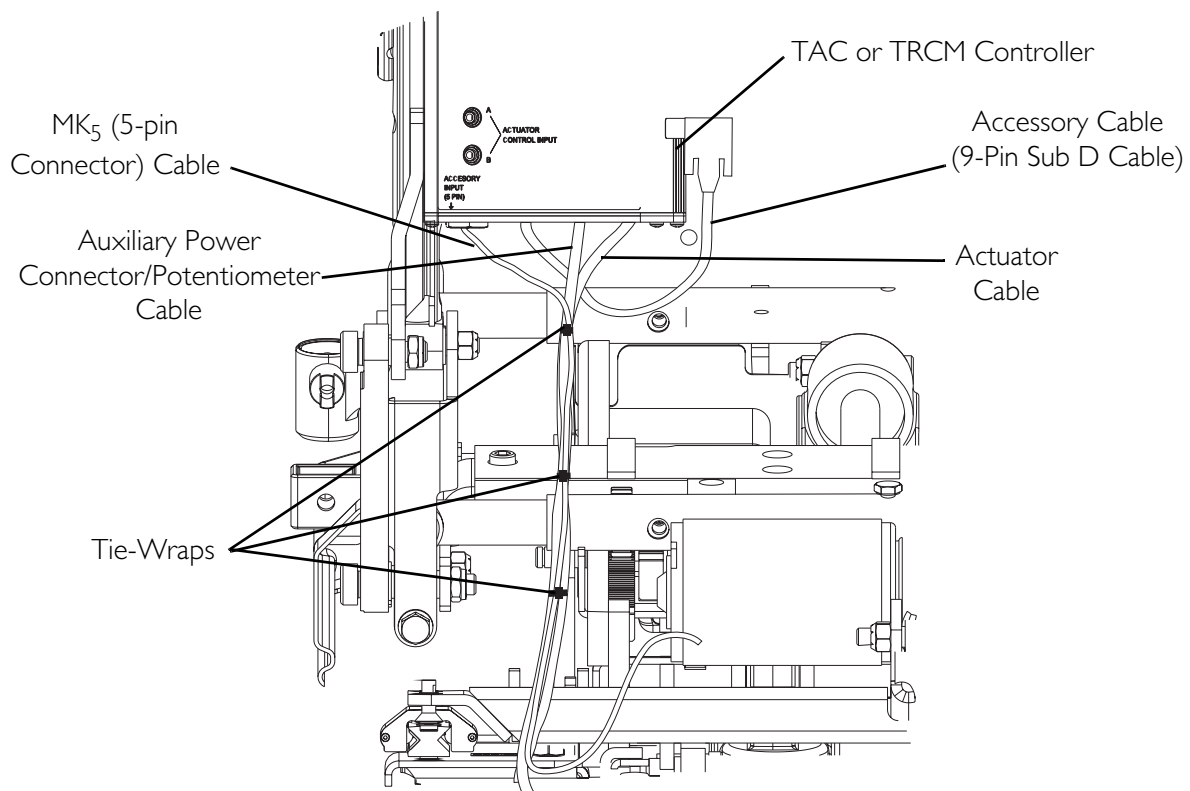
**The wheelchair MUST be in the upright position before securing the 4-way switch, TRCM and/or TAC cables, to prevent stretching and possibly breaking cables.**

- Bundle up the cable for the 4-way toggle switch and tie-wrap it to the TRCM or TAC controller bracket. Refer to FIGURE 15.6.



**FIGURE 15.6** 4-Way Toggle Switch Cable

3. Tie-wrap the auxiliary power connector/potentiometer cable, actuator cable and MK<sub>5</sub> Controller (5-pin connector) cable from the TRCM or TAC as shown in FIGURE 15.7.
- NOTE: The accessory cable (9-pin sub D) does not need to be tie-wrapped with the other cables.*
4. Connect the accessory cable to the 4-way switch cable.

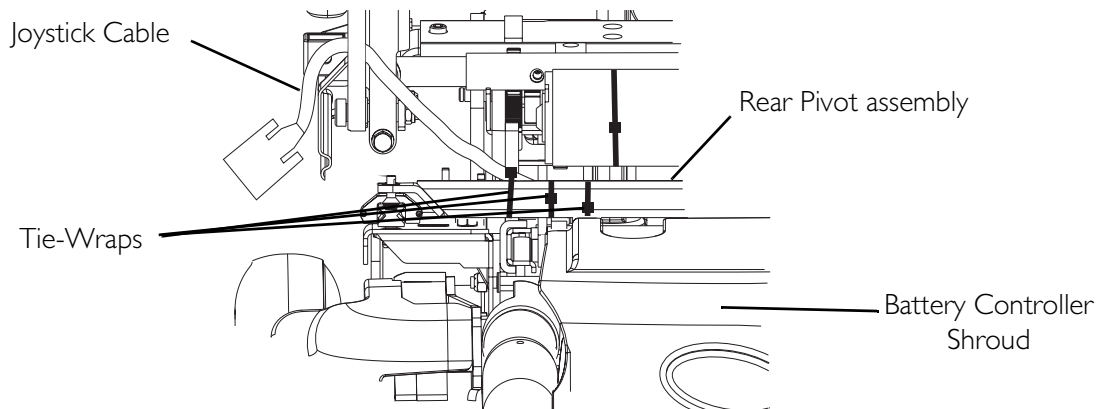


**FIGURE 15.7** 4-Way Switch, TRCM and/or TAC Cables

## Joystick, SAC or TRSS Cables

*NOTE: For this procedure, refer to FIGURE 15.8.*

1. Tie-wrap the joystick cable from the MK<sub>5</sub> controller to the rear pivot assembly. Refer to FIGURE 15.8.



**FIGURE 15.8** Joystick, SAC or TRSS Cables

2. Connect the joystick cables.
3. Bundle up the connected cables until there is no slack and then tie-wrap them and the SAC or TRSS cables (if present) to the armrest.

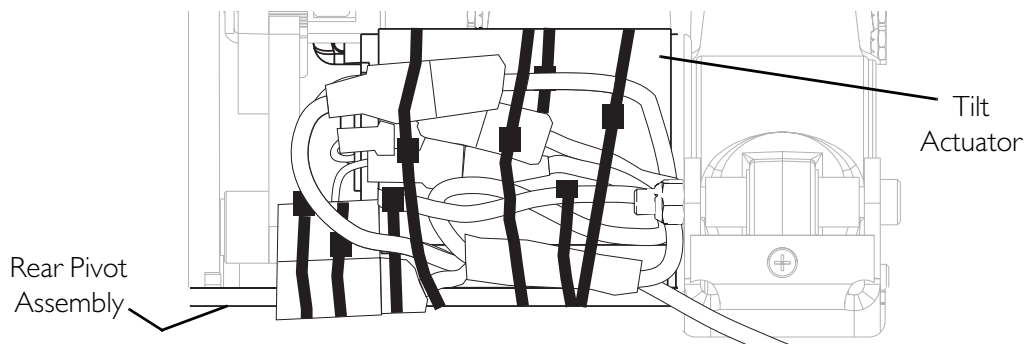
## All Cables (Final Steps)

*NOTE: For this procedure, refer to FIGURE 15.9 on page 164.*

1. Connect the auxiliary power connectors and any remaining cables.
2. Bundle up all loose cables and then tie-wrap them to the rear pivot assembly and to the rear of the tilt actuator. Refer to FIGURE 15.9.
3. Install the rear shroud in the location indicated in FIGURE 15.8. Refer to [Removing/Installing Rear Shroud](#) on page 102.

## CAUTION

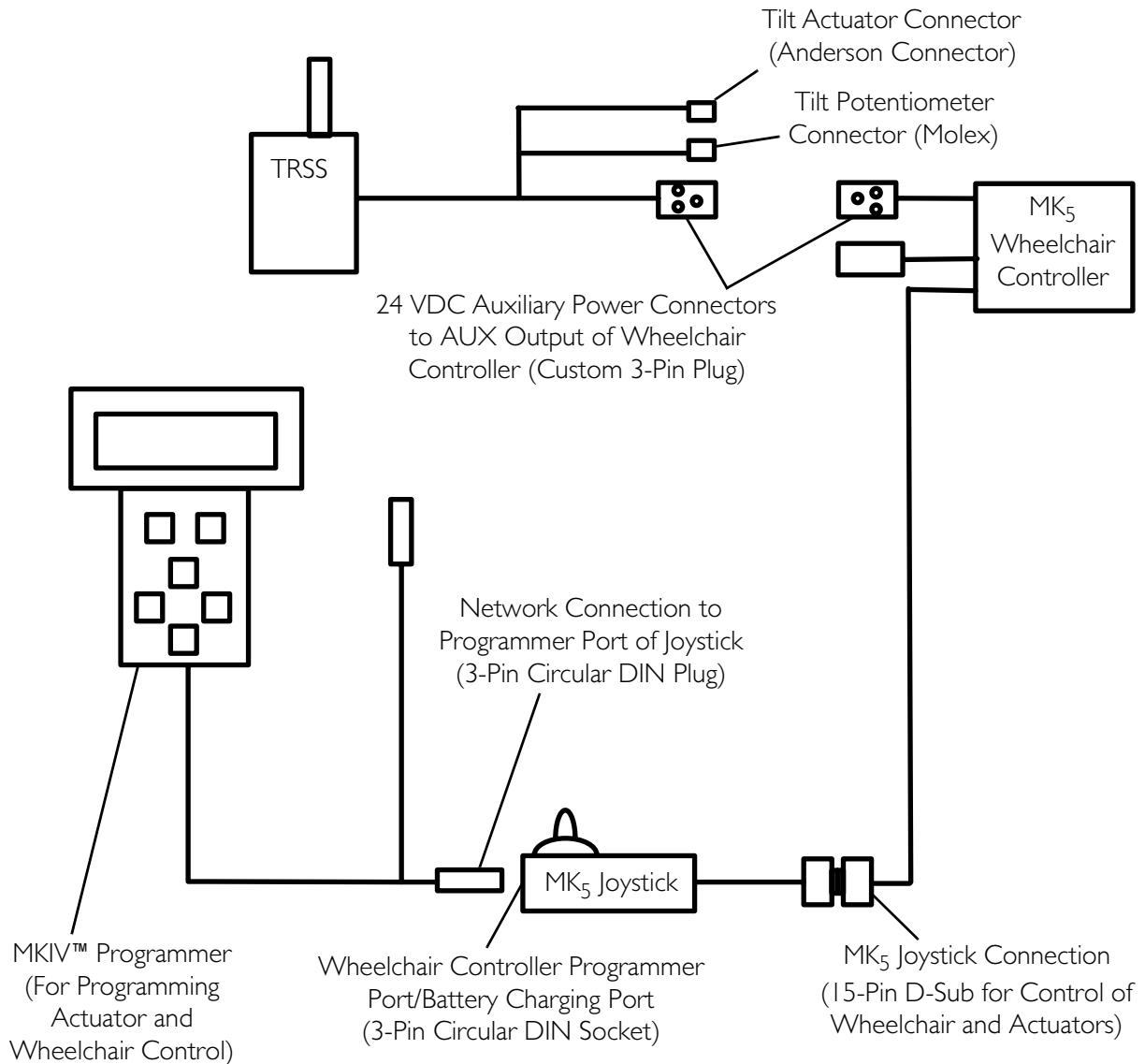
**The wheelchair must be carefully tilted backward and forward to the maximum positions in order to determine if any cables are snagged and stretched by the battery controller shroud. Tie-wrap any loose cables and test again until there is no snagging.**

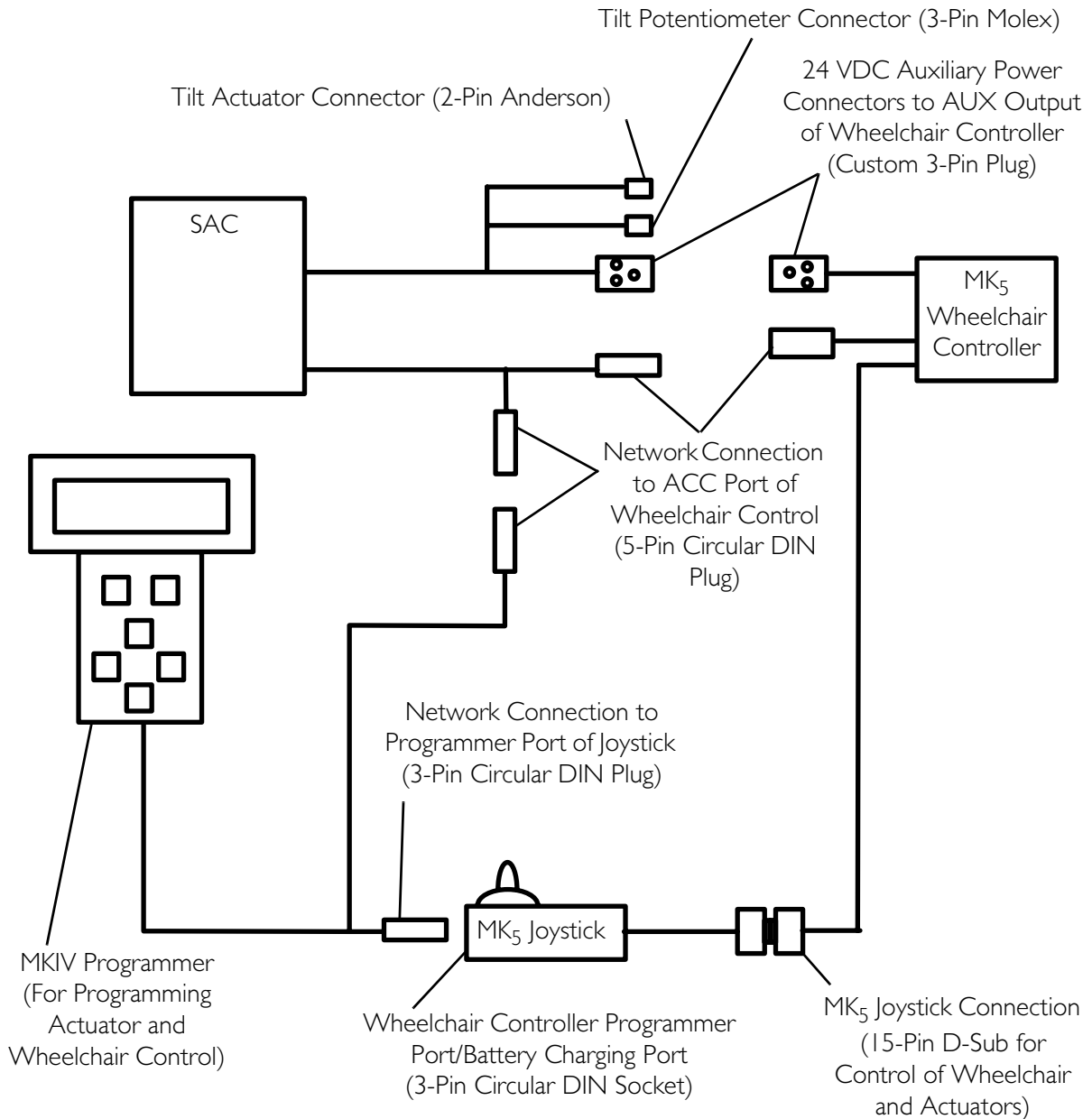


**FIGURE 15.9** All Cables (Final Steps)

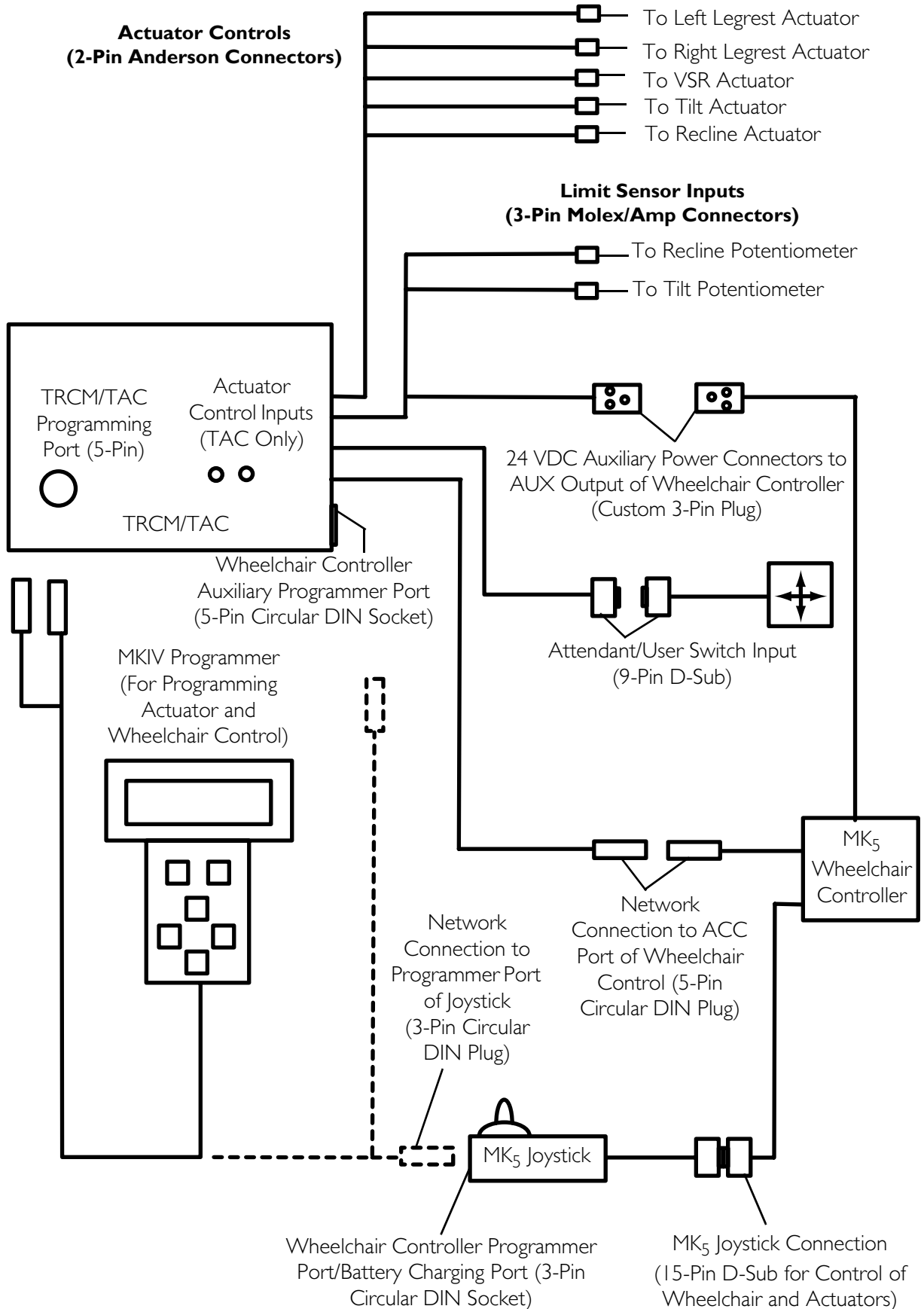
## Wiring Schematics

### TRSS



**SAC**

**TRCM/TAC**



# NOTES

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# LIMITED WARRANTY

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



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