

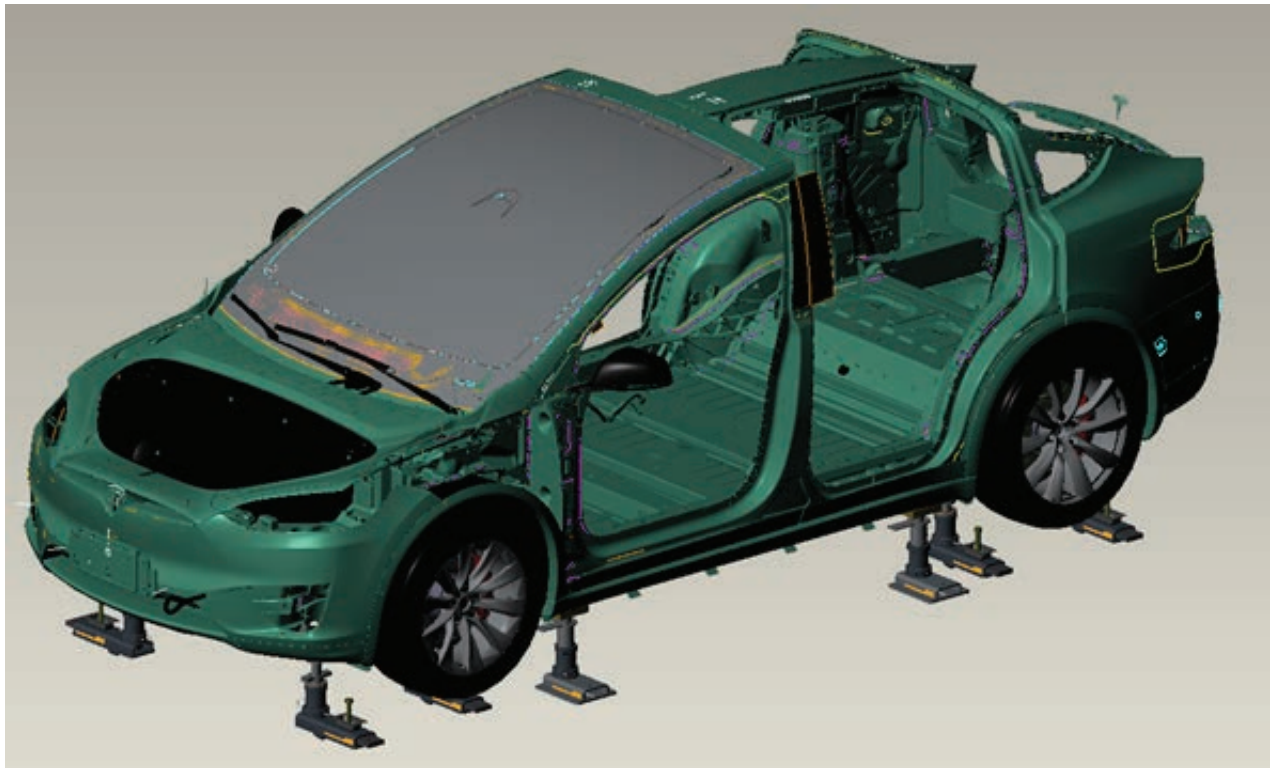


# Tesla Model X

## Structural Holding System

### Users Manual

**IMPORTANT** Always refer to OEM repair procedures for proper repair guidelines. Never subject Tesla Model X to pulling forces.



## CHIEF'S LIMITED ONE-YEAR WARRANTY & LIABILITY

Chief Automotive Technologies warrants for one year from the date of installation and/or purchase any of its products which do not perform satisfactorily due to defect caused by faulty material or workmanship. Chief's obligation under this warranty is limited to the repair or replacement of products which are defective and which have not been misused, carelessly handled, or defaced by repairs made or attempted by others.

CHIEF AUTOMOTIVE TECHNOLOGIES DOES NOT ASSUME RESPONSIBILITY FOR ANY DEATH, INJURY OR PROPERTY DAMAGE RESULTING FROM THE OPERATOR'S NEGLIGENCE OR MISUSE OF THIS PRODUCT OR ITS ATTACHMENTS. CHIEF MAKES NO WRITTEN, EXPRESS OR IMPLIED WARRANTY WHATSOEVER OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE REGARDING THE EQUIPMENT OR ANY PART OF THE PRODUCT OTHER THAN THE LIMITED ONE-YEAR WARRANTY STATED ABOVE.

This users manual is designed to assist operators with the safe and efficient use of the Chief Model X Structural Holding System. When used with Chief Electronic Measuring, the parts holding system provides operators with the ability to accurately and securely hold replacement parts during vehicle repair.

### **IMPORTANT:**

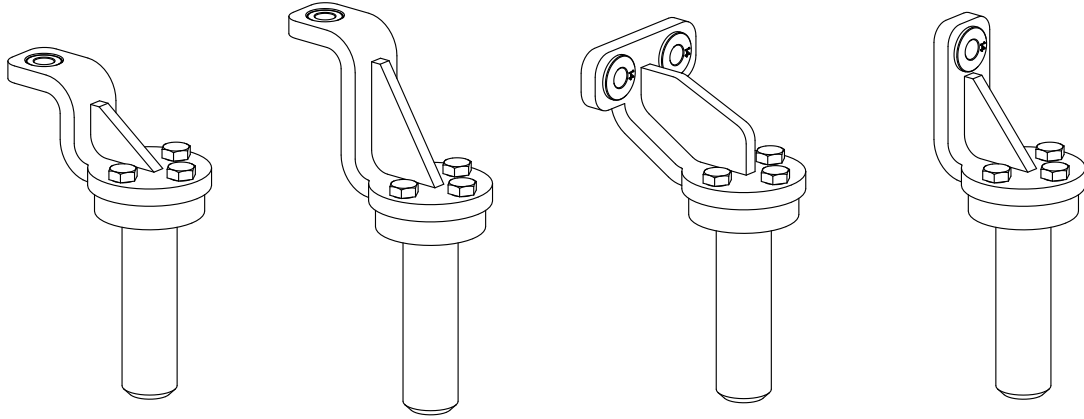
This manual only identifies basic usage procedures for the Model X Structural Holding System, it must be used with the Chief Structural Holding System. The usage of the system is limited only by the imagination of the technician doing the work.

The Chief Model X Structural Holding System is designed for the holding and positioning replacement parts. It is not designed as a replacement for Chief Anchoring. **IMPORTANT** The Model X Structural Holding System must not be subjected to pulling forces. The Chief Universal Stands provided will serve as the primary vehicle holding.

Because Chief Model X Structural Holding System works with Chief electronic measuring, special attention should be given to the replacement of the Structural Holding stands during setup. Best results will be achieved with the stands located on the perimeter of the vehicle being repaired to prevent shading of measuring targets.

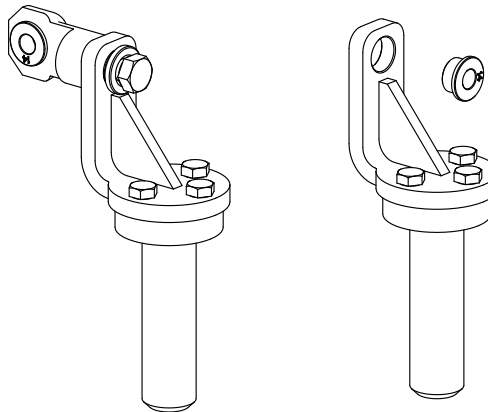
## PLANNING AND SETUP

The Holding System is a universal system that will adapt to any Chief style systems with rectangular holes in the deck. The Fixtures are designed to be bolted to any existing threaded bolt or any location there is a threaded nut, flange or boxed rail on a vehicle. This could be used with suspension (components) that are installed or removed and are designed with an offset to also be used with Chiefs computerized measuring system. The system includes short vertical fixtures and tall vertical fixtures that will accommodate most bolts or threaded holes from 6mm to 25mm with the use of bushings. The large and tall horizontal fixtures are designed for any bolts or bolt hole ranging from 6mm to 25mm with the use of bushings that is facing forward, inward, outward or rearward.

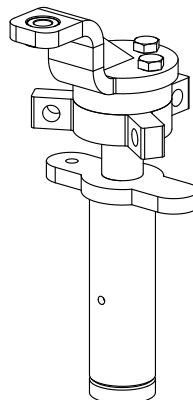


Additional attachments will allow for connection of the fixture to the structure in several different methods. The angle adapter allows for the location of the fixture to be used if the location is at an angle.

**Note:** All bushings are designed to allow for the correct sizing of the hole for the bolt to be used to allowing for centering of the Fixture and should be placed on the opposite side of the fixture away from the structure.



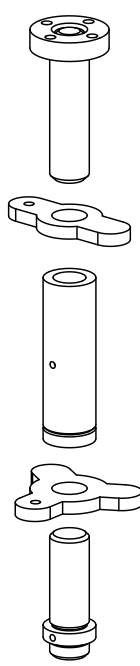
A heavy three-ear rigging nut can be placed directly below the foundation adapter. This will serve as a cable tie off when additional stability is needed.



Directly below the foundation adapter is the turnbuckle adjustment mechanism. The foundation adapter threaded stud screws into the top of the turnbuckle center section while the Structural Holding lower adapter screws into the bottom. A two-ear wing nut is threaded on to the foundation adapter to lock the top half of the turnbuckle once correct vertical position is achieved. A three-ear wing nut is threaded on the lower adapter to lock that half of the turnbuckle.

**Note:** The long threaded portion of the Structural Holding lower adapter utilizes a left hand thread, which is compatible with the bottom of the turnbuckle center section (marked with a v-groove around the outside of the part) and the three-ear wing nut.

Turnbuckle Assembly

	<ol style="list-style-type: none"><li>1. Completely thread two-ear wing nut onto foundation adapter threaded stud.</li><li>2. Thread non-grooved end of turnbuckle center section completely onto foundation adapter threaded stud.</li><li>3. Completely thread three-ear wing nut onto Parts Holding lower adapter.</li><li>4. Completely thread Structural Holding lower adapter three-ear wing nut assembly into grooved end of the turnbuckle center section.</li></ol>
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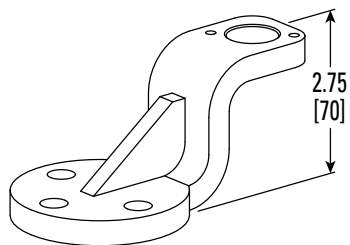
The short threaded side of the Structural Holding lower adapter is a standard right hand thread that is compatible with the Structural Holding stand base and extension tubes.

**Note:** It is not necessary to completely disassemble the turnbuckle section when changing setups or reconfiguring the stand. The fully assembled turnbuckle section can be unscrewed from the rest of the stand system using the included spanner wrenches.

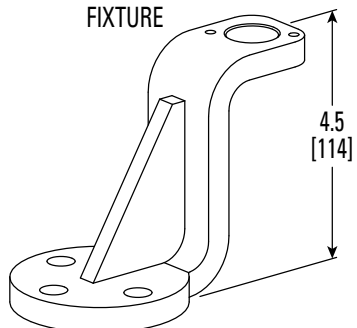
**Note:** For best results, always have foundation adapter and the lower Structural Holding adapter threaded into the turnbuckle center section equal amounts before starting up.

Vertical positioning of the Model X Structural Holding System, when used in conjunction with the Structural Holding System, uses a turnbuckle style adjustment over a 4.5" (115mm) range. Additional height can be achieved by using the extension tubes and extension adapters included with the system. Compare the approximate height required to the table below to determine how to configure the extension tubes and adapters.

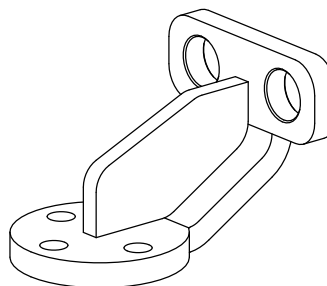
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SHORT VERTICAL FIXTURE  
(FOR EXTENDED REACH USE CK110123)



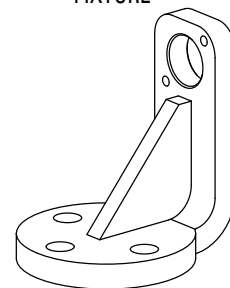
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TALL VERTICAL  
FIXTURE



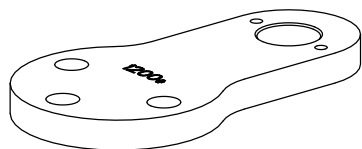
502005  
LARGE HORIZONTAL  
FIXTURE



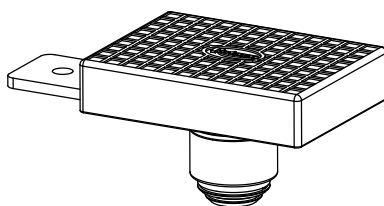
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TALL HORIZONTAL  
FIXTURE



502074  
FLAT FIXTURE



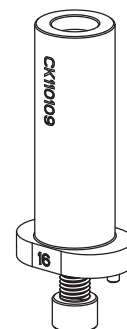
CK110124  
ADAPTER WITH  
LEVER ADJUSTMENT



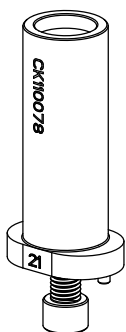
FJ6171-1  
90mm EXTENSION



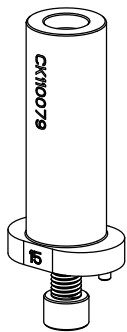
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BUSHING MOUNT  
16mm FLATS



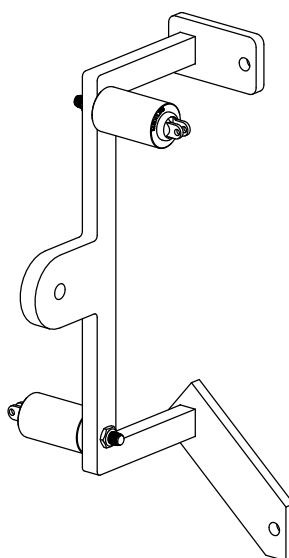
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PILOT BUSHING MOUNT  
21mm FLATS



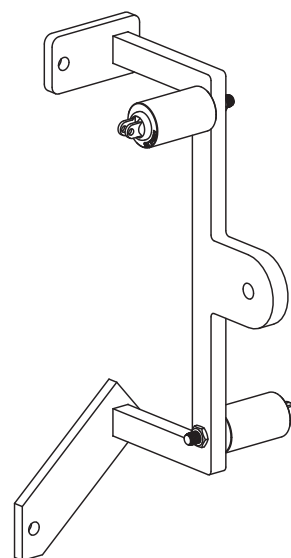
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PILOT BUSHING MOUNT  
15mm FLATS



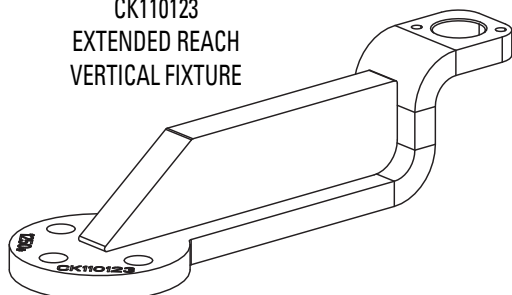
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A-PILLAR FIXTURE  
RIGHT



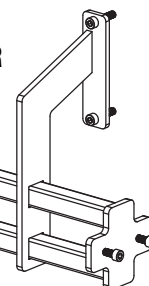
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LEFT



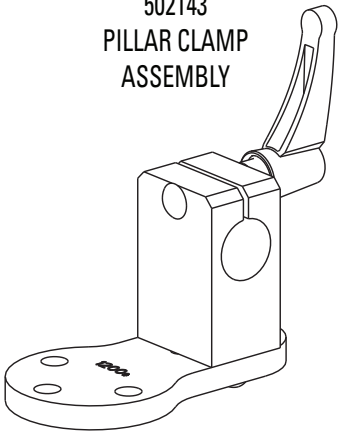
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EXTENDED REACH  
VERTICAL FIXTURE



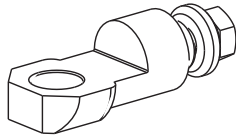
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INNER A-PILLAR  
FIXTURE



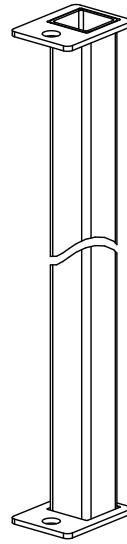
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PILLAR CLAMP  
ASSEMBLY



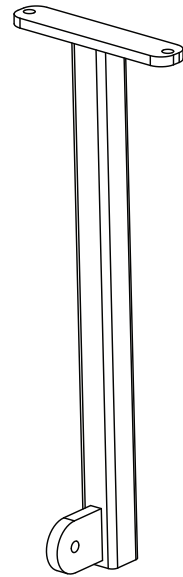
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ANGLE ADAPTER  
CLAMP



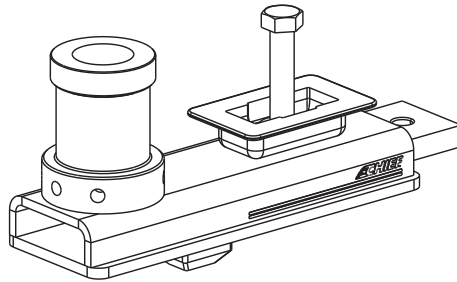
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B-PILLAR LOWER  
ASM MODEL X



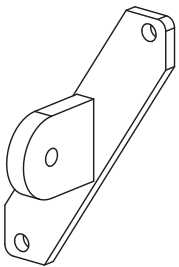
CK110134  
REAR STRUT  
STAND



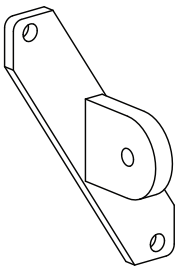
502128  
NARROW STRUCTURAL  
HOLDING BASE ASSY



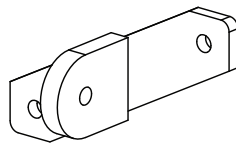
CK110116  
FRONT RIGHT  
RAIL END



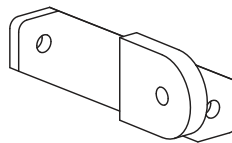
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FRONT LEFT  
RAIL END



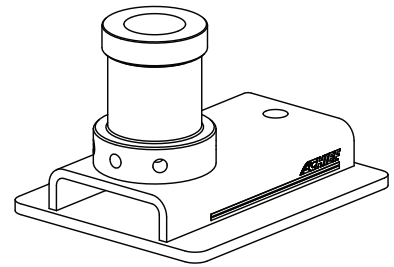
CK110118  
REAR RIGHT  
RAIL END



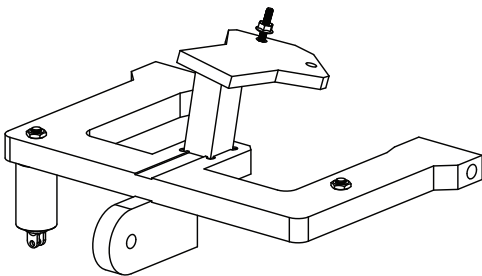
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REAR LEFT  
RAIL END



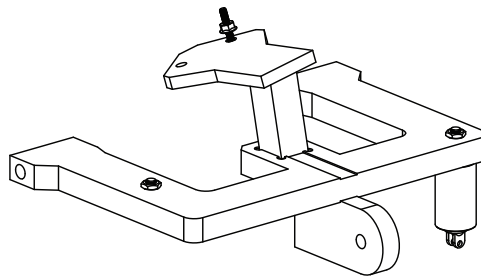
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FLAT BASE



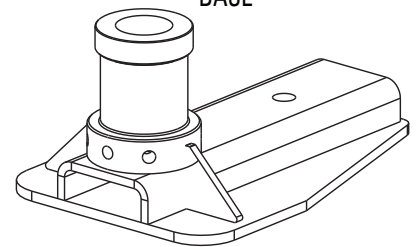
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CONTROL ARM  
RIGHT



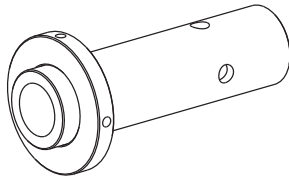
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CONTROL ARM  
LEFT



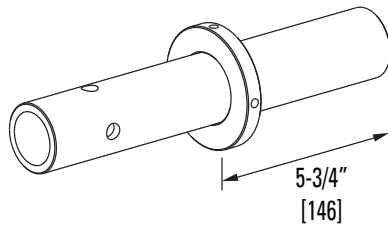
502047  
STRUCTURAL HOLDING  
BASE



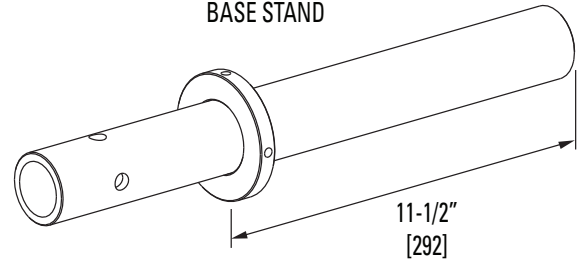
502055  
SHORT TUBE  
BASE STAND



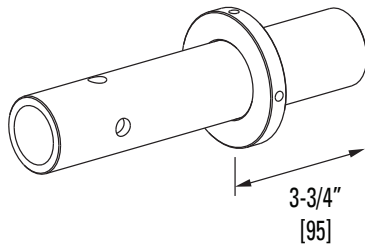
502063  
TALL TUBE  
BASE STAND



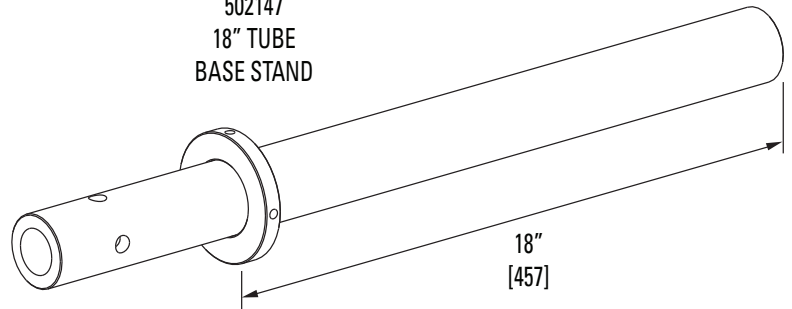
502075  
11-1/2" TUBE  
BASE STAND



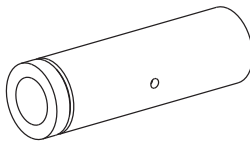
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3-3/4" TUBE  
BASE STAND



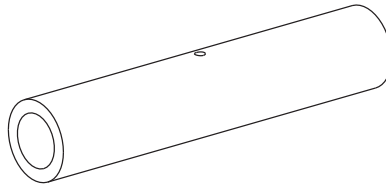
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18" TUBE  
BASE STAND



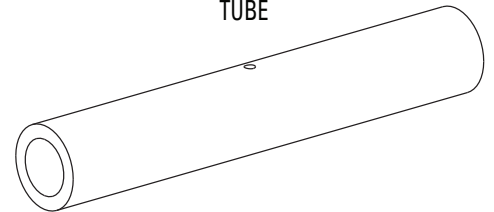
502034  
TURN BUCKLE  
CENTER TUBE



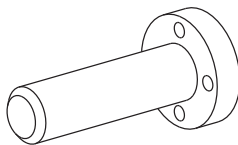
502061  
10" EXTENSION  
TUBE



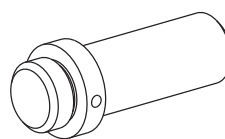
502017  
12" EXTENSION  
TUBE



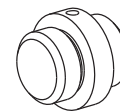
502039  
ADAPTER HEIGHT  
SCREW



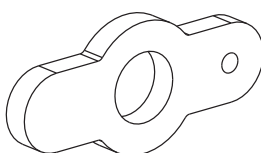
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LOWER ADAPTER  
SCREW



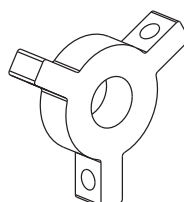
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ADAPTER  
EXTENSION



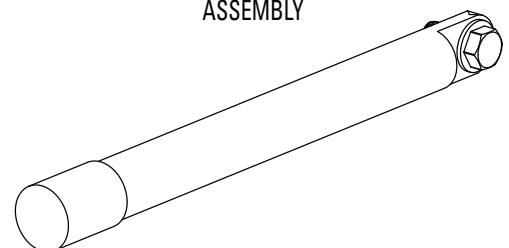
502015  
RIGHT HAND  
WING NUT



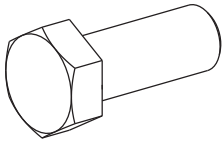
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RIGGING NUT



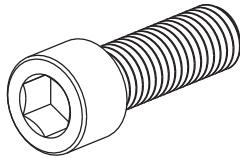
CK110090  
OVERHEAD ARM  
ASSEMBLY



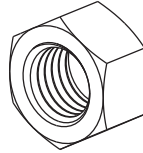
41684  
M12-1.75 x 30 HHCS



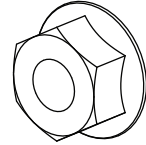
502078  
M12-1.75 x 35 SHCS



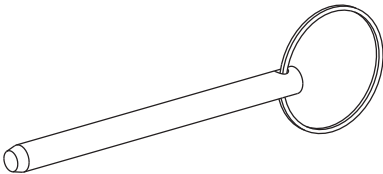
41589  
M10 x 1.25 HEX NUT



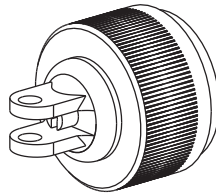
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#10-24NC  
WHIZLOCK NUT



502058  
RELEASE PIN

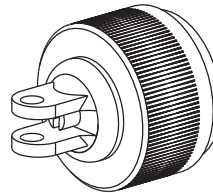


780102  
MAGNETIC BOLT  
ATTACHMENT 14mm



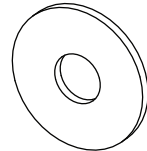
USE W/ M10 SHCS

791980  
MAGNETIC HOLE  
ATTACHMENT 10mm

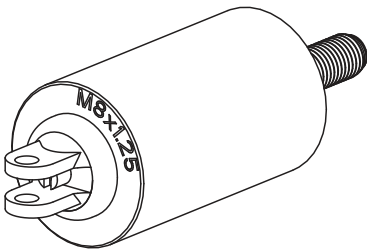


USE W/ M12 SHCS

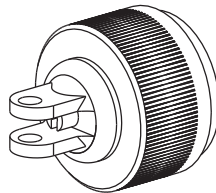
41673  
M10 x 30 O.D.  
FLAT WASHER



CK110083  
THREAD-IN TARGET x 2" Lg.  
M8 x 1.25

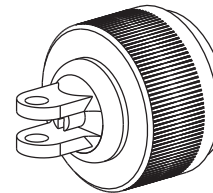


780134  
MAGNETIC BOLT  
ATTACHMENT 12mm



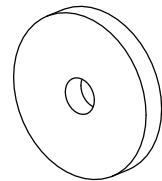
USE W/ M8 SHCS

791982  
MAGNETIC HOLE  
ATTACHMENT 12mm

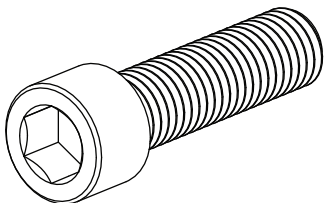


USE W/ M14 SHCS

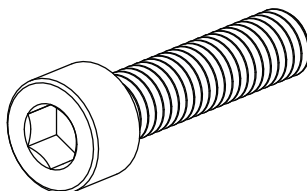
CK130064  
#10 FLAT WASHER  
OVERSIZED



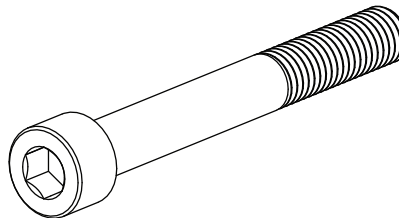
CK130057  
M14-2.0 x 50 SHCS



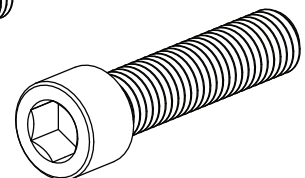
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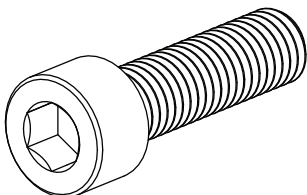
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M10-1.5 x 80 SHCS



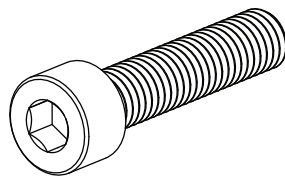
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M12-1.75 x 50 SHCS



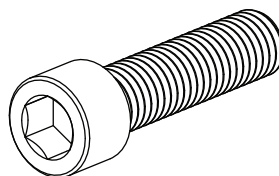
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M10-1.5 x 35 SHCS



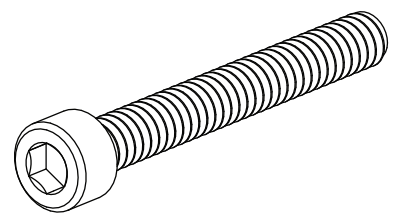
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M8-1.25 x 35 SHCS



502085  
M12-1.75 x 45 SHCS

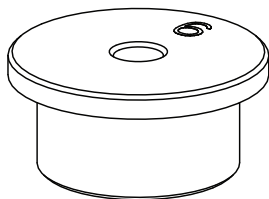


CK130063  
#10-24 x 1-1/2" Lg. SHCS

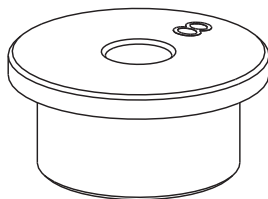




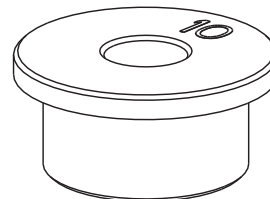
502165  
PILOT BUSHING  
6mm



502086  
PILOT BUSHING  
8mm



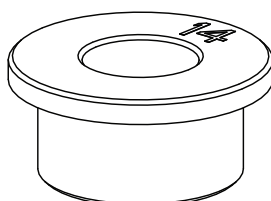
502027  
PILOT BUSHING  
10mm



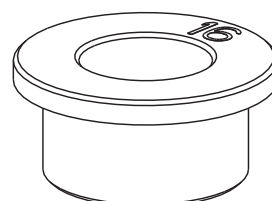
502028  
PILOT BUSHING  
12mm



502029  
PILOT BUSHING  
14mm



502030  
PILOT BUSHING  
16mm



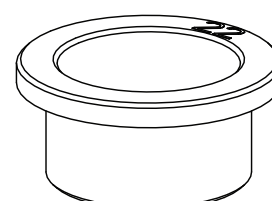
502035  
PILOT BUSHING  
18mm



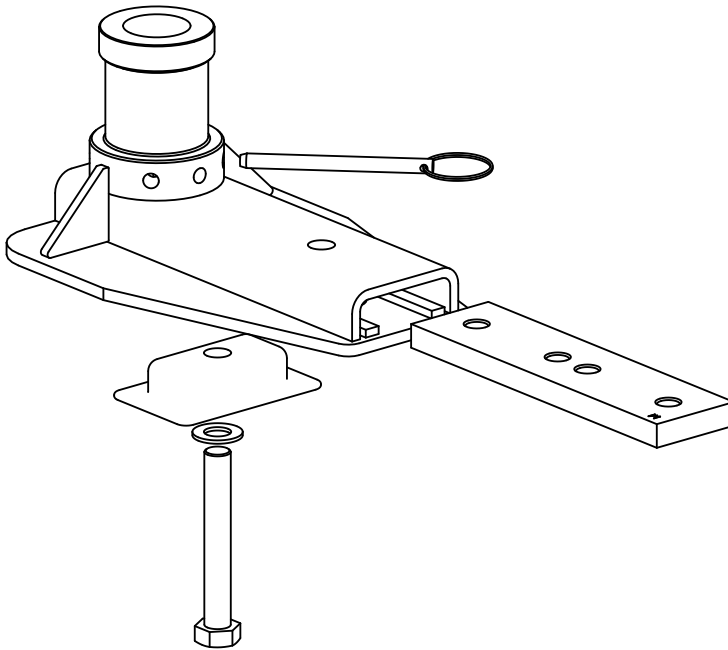
502036  
PILOT BUSHING  
20mm



502037  
PILOT BUSHING  
22mm



Once the proper configuration has been determined, assemble the required Structural Holding components on the base stand. The base stand should be loosely secured to the frame machine deck using M20x2.5 hardware and a UAS fastener plate. The M20x2.5 hardware will be fully tightened after the Structural Holding stand is located properly. Once the Structural Holding components are assembled, they can be fully tightened using the included spanner wrenches.

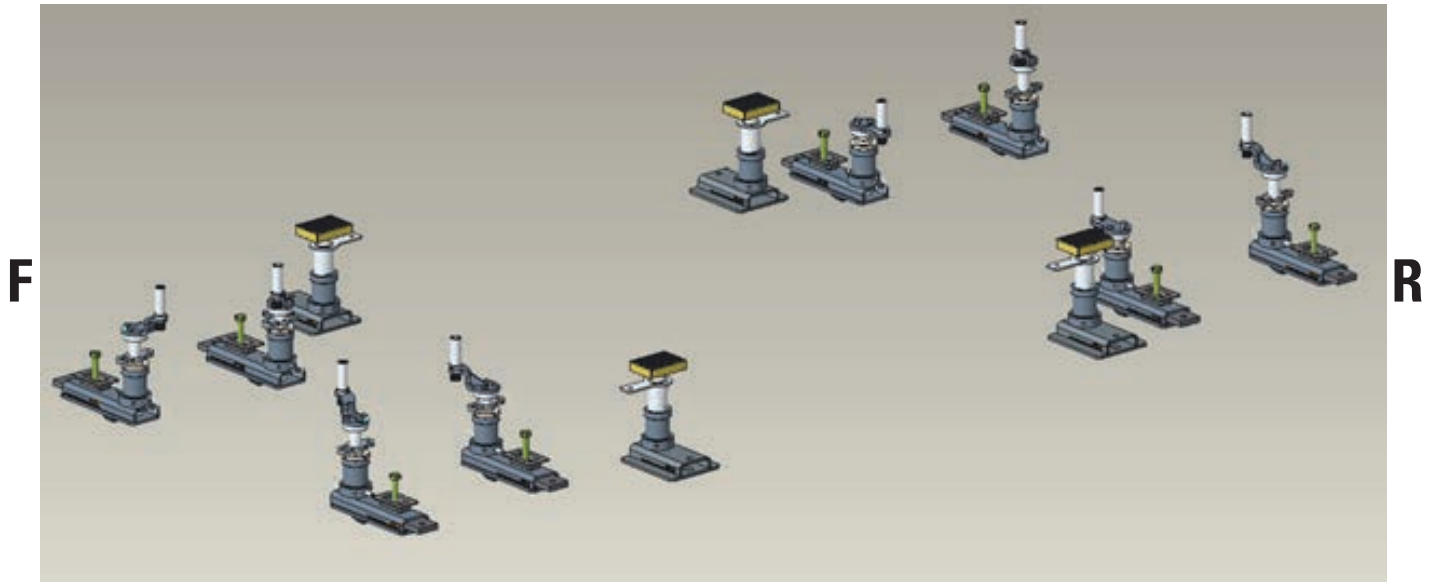


### Securing New Part

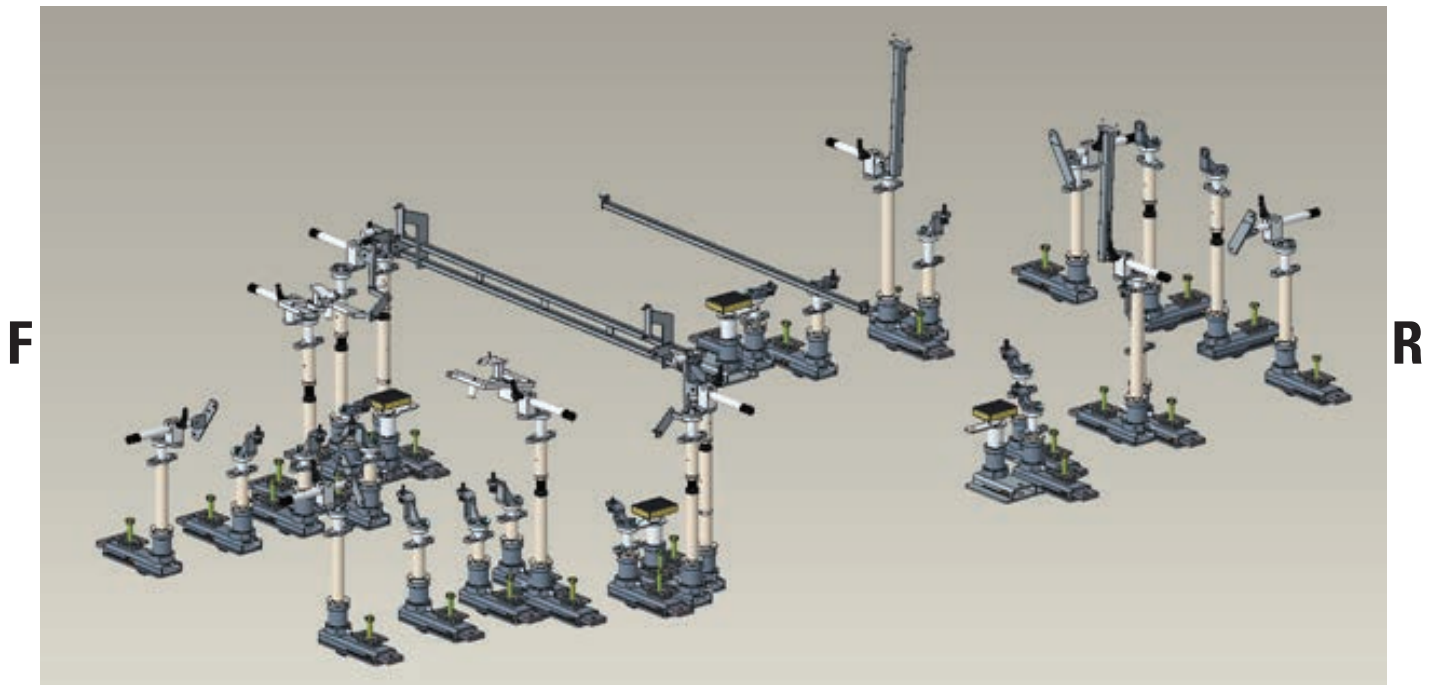
Secure the replacement part to the Structural Holding stand using the foundation adapter and fixtures. Horizontal adjustment of the part can be made by lightly tapping on the stand base. Once the part is located correctly in both horizontal directions, torque down the stand base using a 30 mm wrench or socket. Vertical adjustment of the parts is achieved by turning the clockwise rotation will raise the stand. The turnbuckle section should turn easily by hand, but there is a provision to use a spanner wrench if necessary. Once the part is at the proper vertical position, tighten the top and bottom wing nuts to lock the turnbuckle center section in place and insert the release pin into one of the three hole positions.

**Note:** For best results, the two-ear and three-ear wing nuts should be threaded away from the turnbuckle center section when making vertical position adjustments.

## Inspection Points For Completed Rolling Vehicle

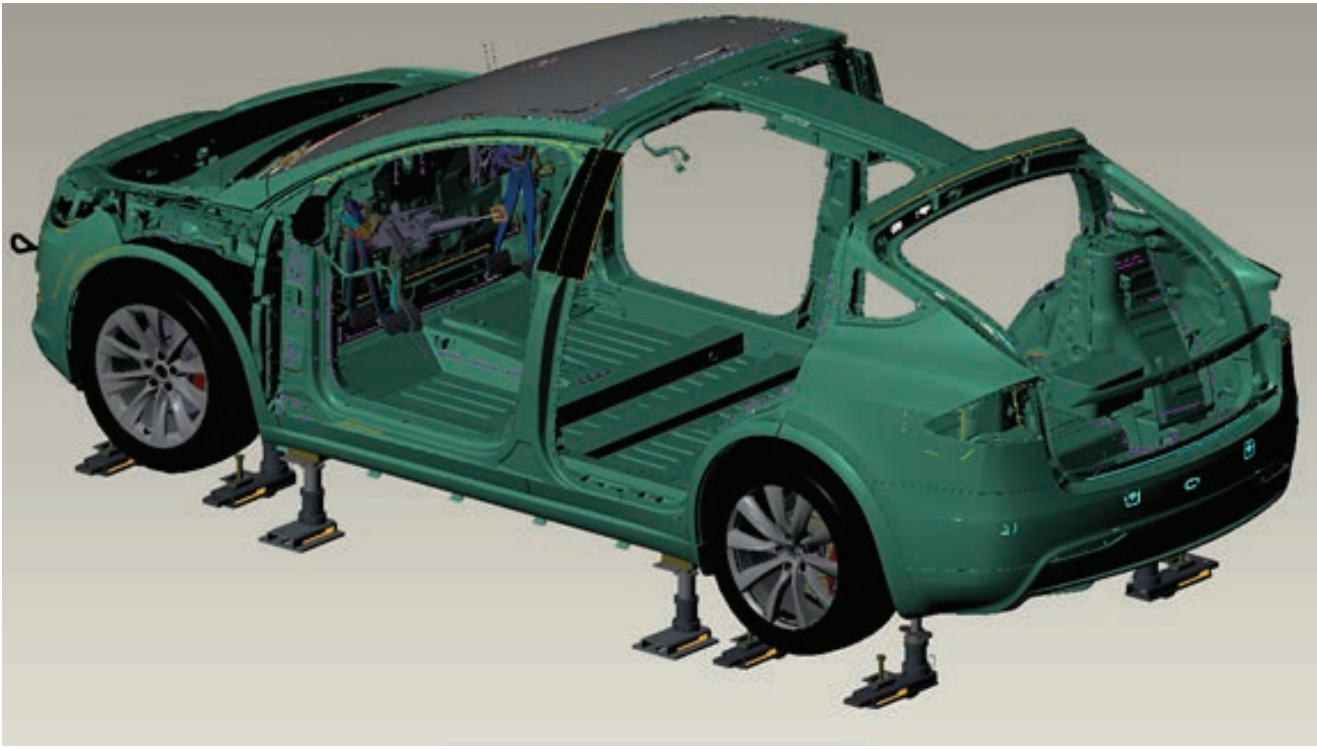


## BIW Complete Fixture Location

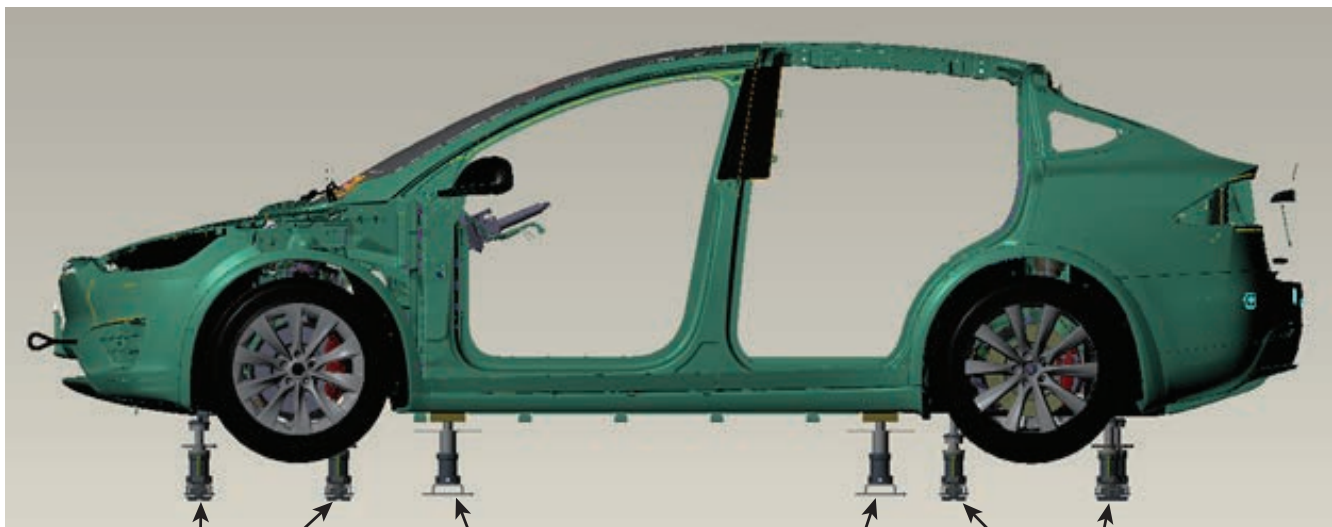


# Model X Parts-On

Positioning of the vehicle on the deck is very important, and the vehicle should be carefully located on the frame machine based on the type, severity and location of the damage. Once positioned, refer to your manual for proper installation and set-up procedures.



1. The initial setup requires four center section locations to be installed. Two in the front of the center section and two in the rear of the center section. Additionally, at least one set of fixtures must be placed on the front and rear rails, for a total of eight point holding for entire vehicle, see example below.



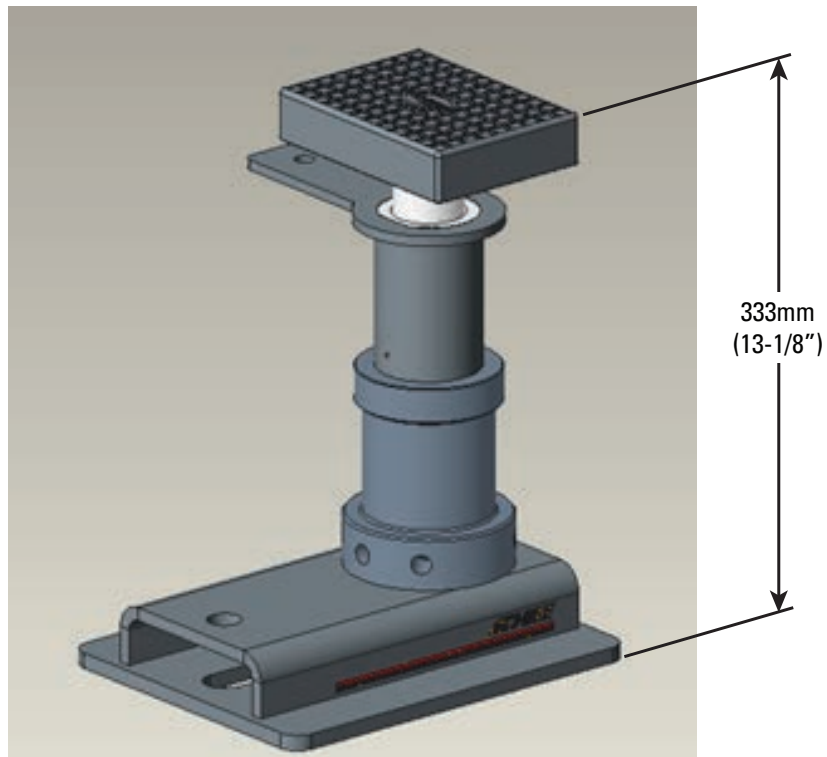
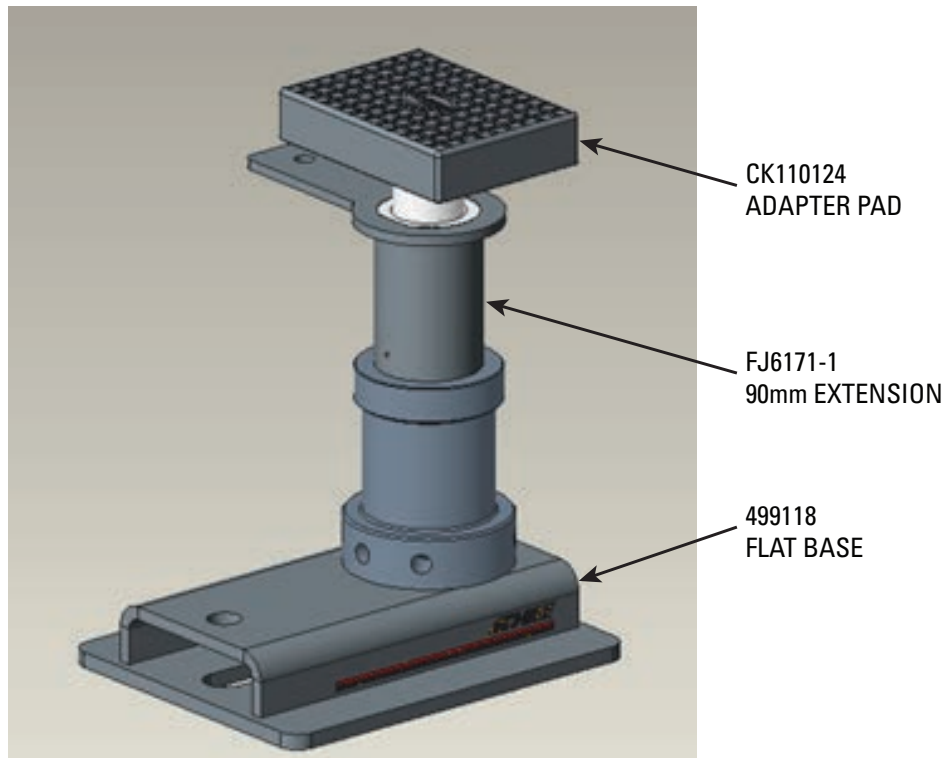
POSSIBLE HOLDING  
LOCATIONS IN FRONT  
CRADLE

HOLDING LOCATION  
IN FRONT OF CENTER  
SECTION

HOLDING LOCATION  
IN REAR OF CENTER  
SECTION

POSSIBLE HOLDING  
LOCATIONS IN REAR  
CRADLE

## Center Section Base Mounting



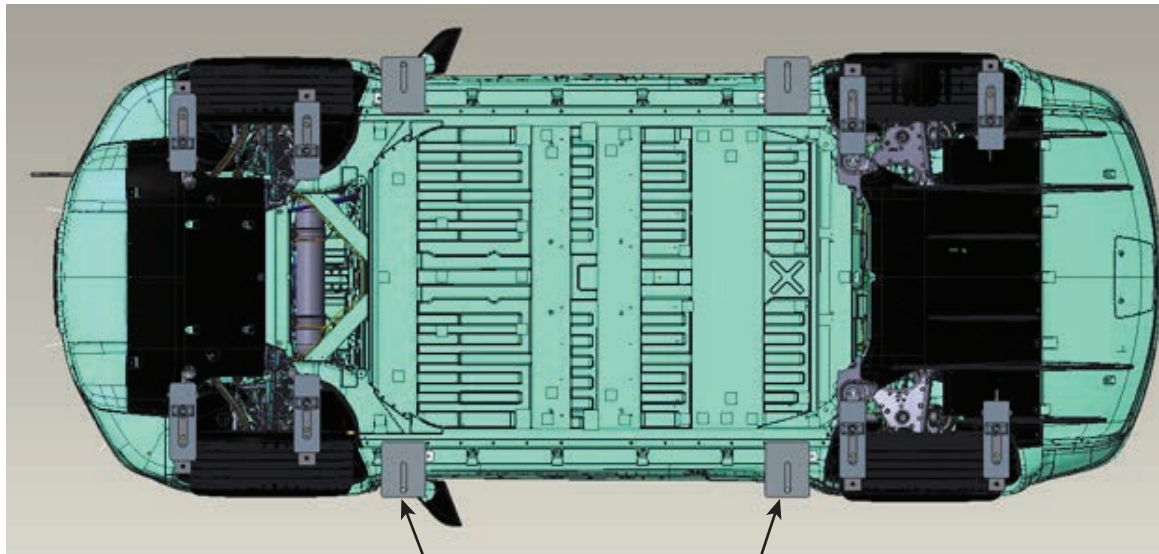
Setting a level datum for Center Section:

1. Assembly Base (499118), 90mm Extension (FJ6171-1), and Adapter Pad (CK110124) .
2. Adjust Adapter Pad height 333mm (13-1/8") to establish level datum.
3. Assembled Base Stand will be placed in each corner of Center Section of vehicle.
4. Final adjustments to raise or lower is achieved by rotating handle.



## Center Section Jacking Points

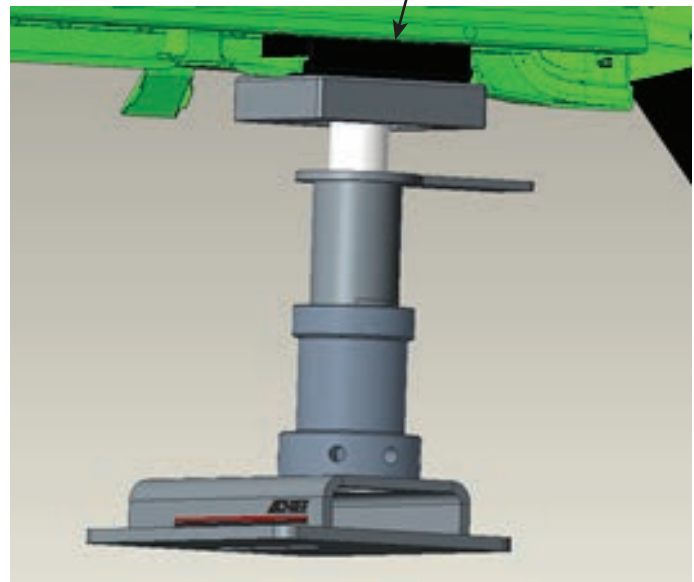
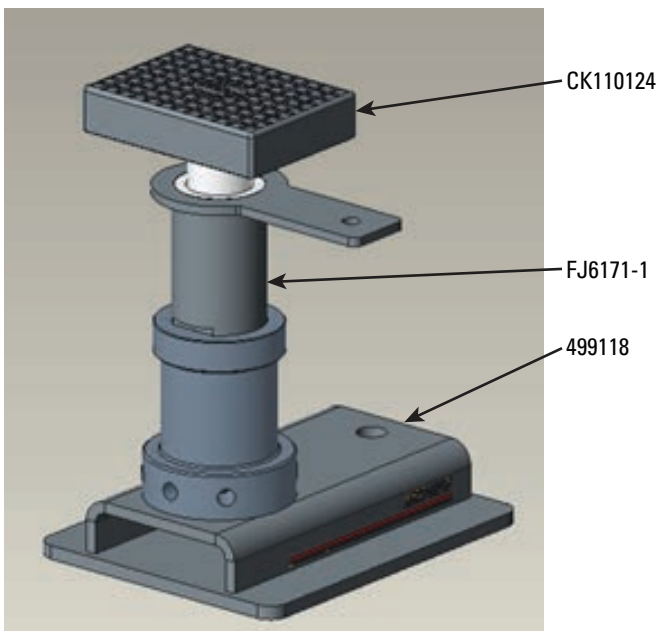
1. Locate four (4) Jacking Points on underside of vehicle.
2. Place Base Stands at each Jacking Point located in Center Section of vehicle.
3. Confirm Base Stand Assembly is adjusted to 333mm (13-1/8") to maintain a level datum for placing fixtures.
4. After Stands are placed in each corner of Center Section Jack Points, lower vehicle onto pads and confirm vehicle is at a level datum.
5. Continue to place fixture as required.



FRONT JACKING POINTS

REAR JACKING POINTS

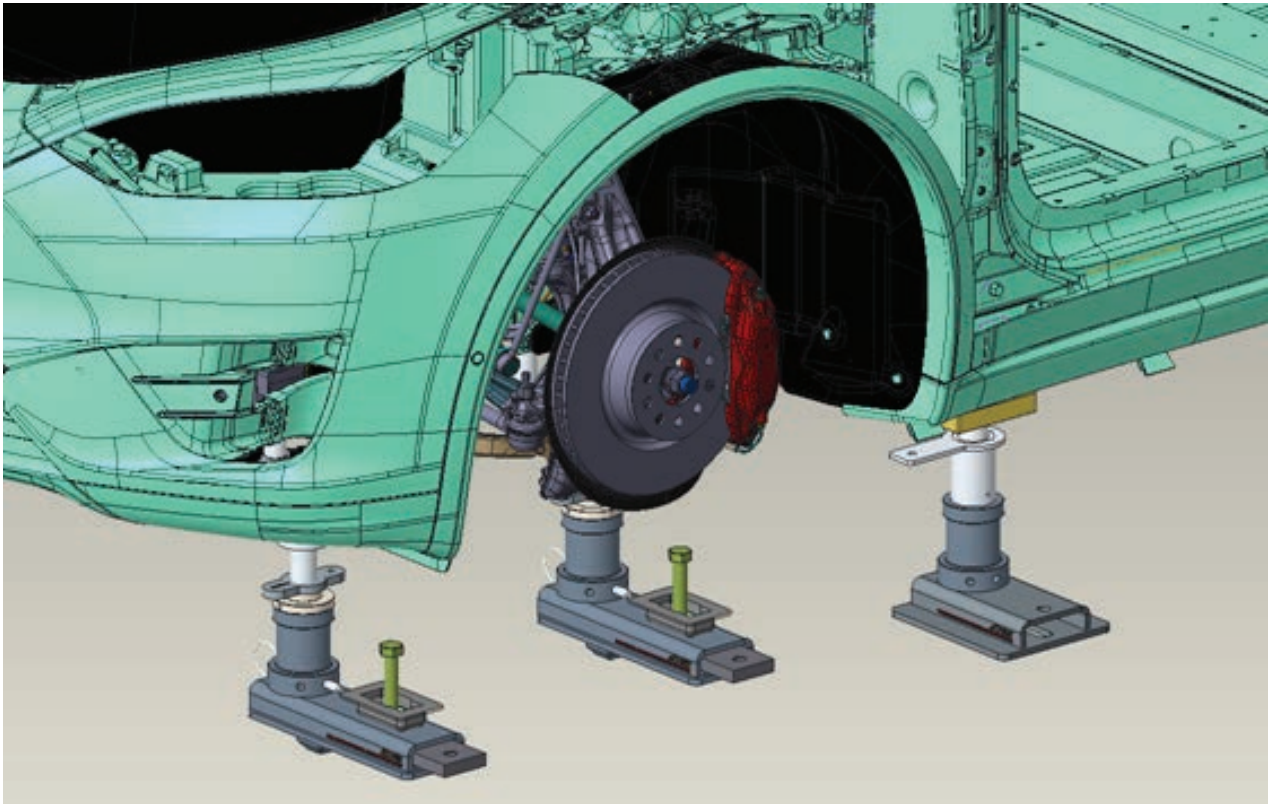
TYPICAL JACKING POINT  
SUPPLIED BY VEHICLE  
MANUFACTURER



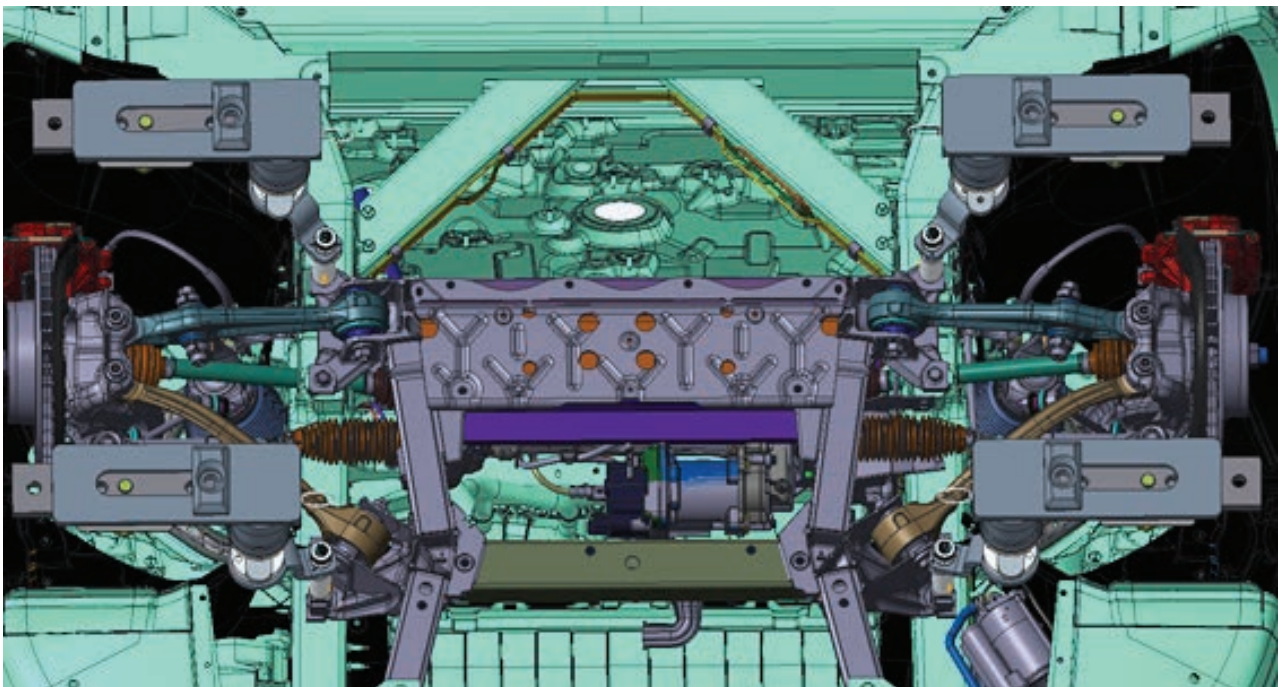
## Front Suspension Mounting Locations

On the front section, additional holding can be located on the cradle bolts without main parts removed. With removal of the front bumper cover and absorber, holding can be located at the end of the rail.

### Left Front Parts On

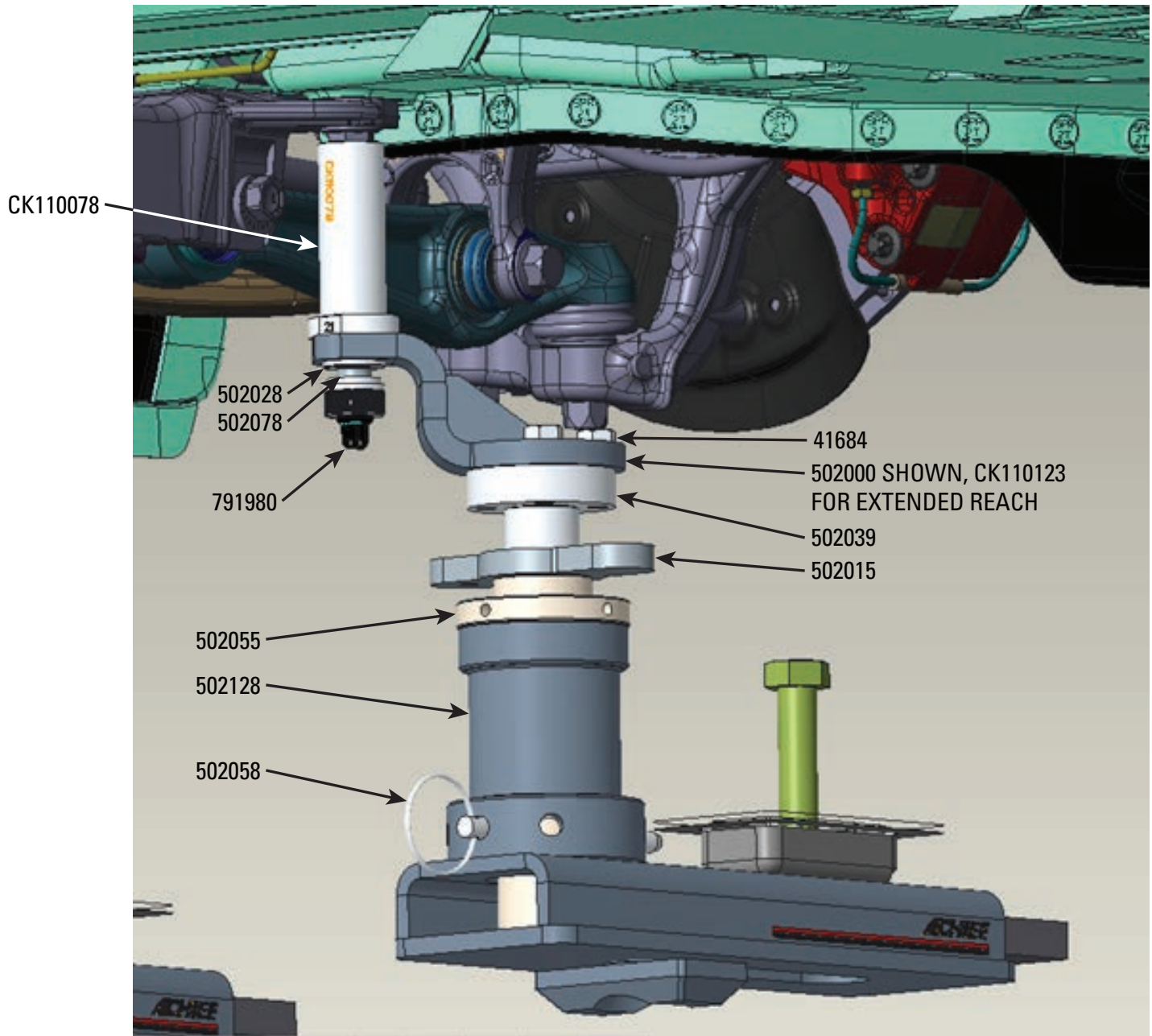


### Bottom View Parts On



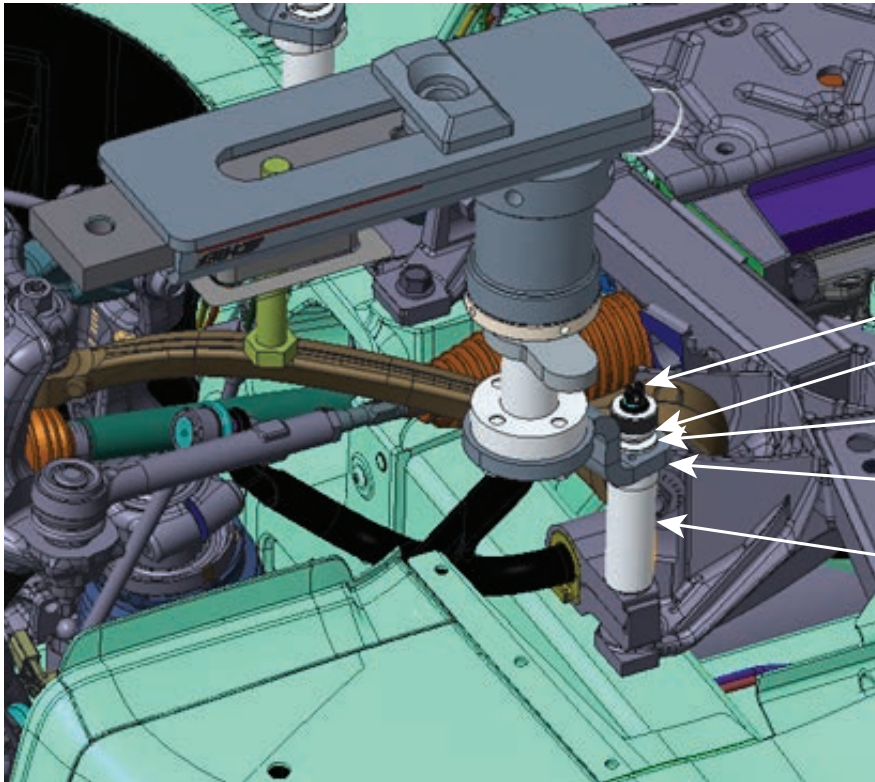


## Front Cradle Rear Attaching Bolts

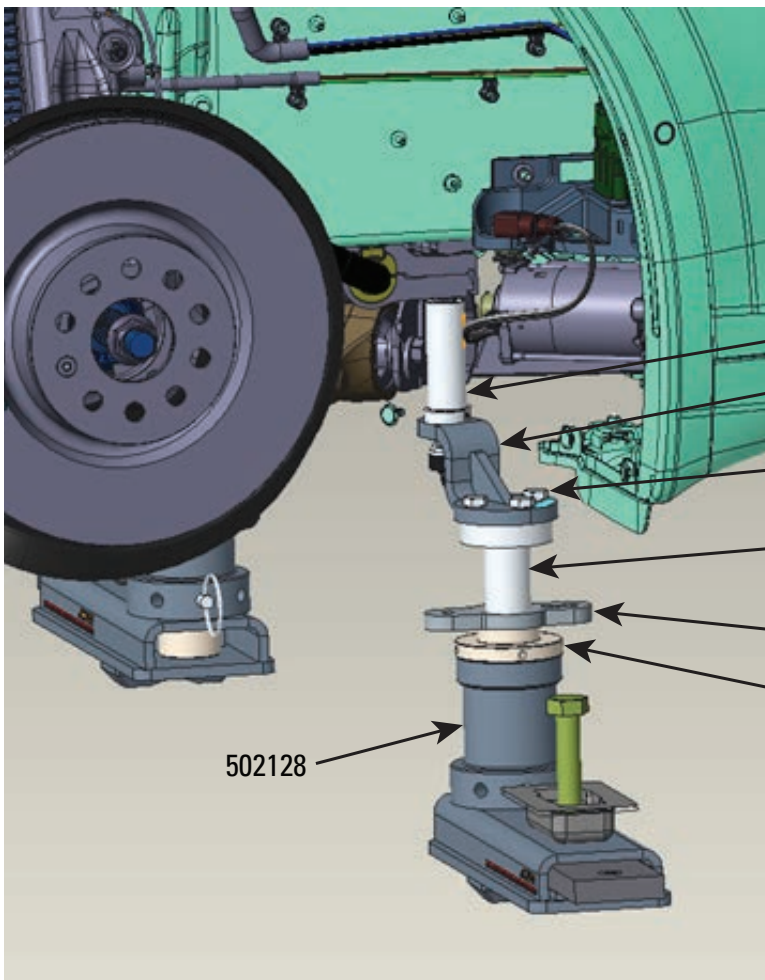




## Front Cradle Front Attaching Bolts



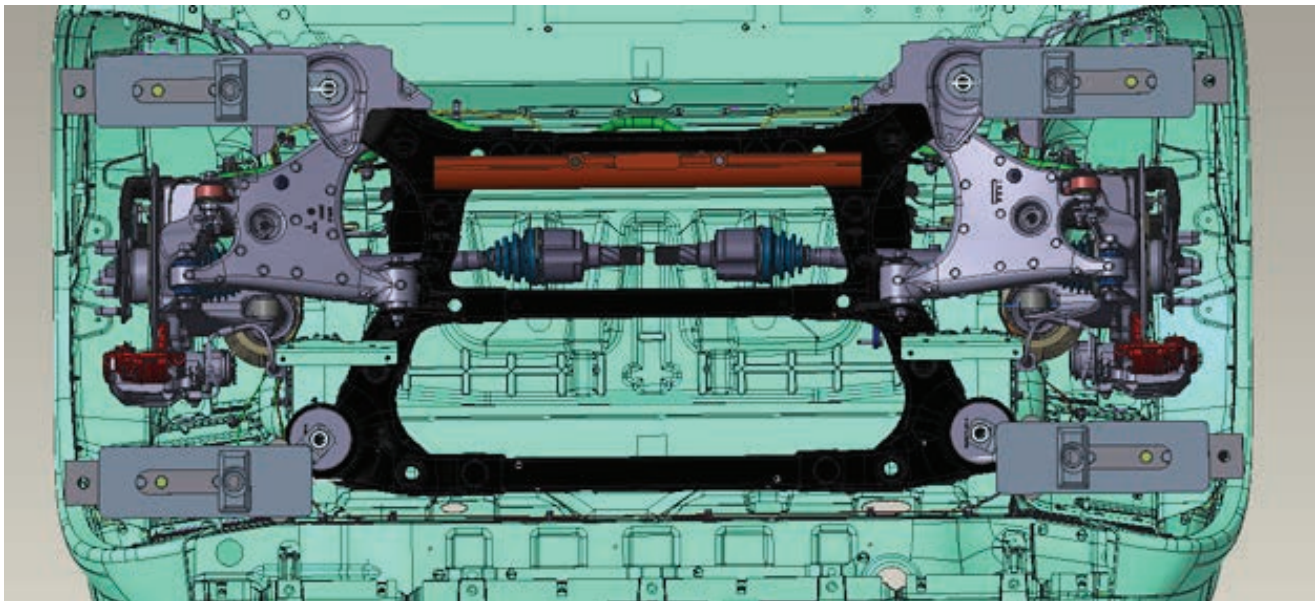
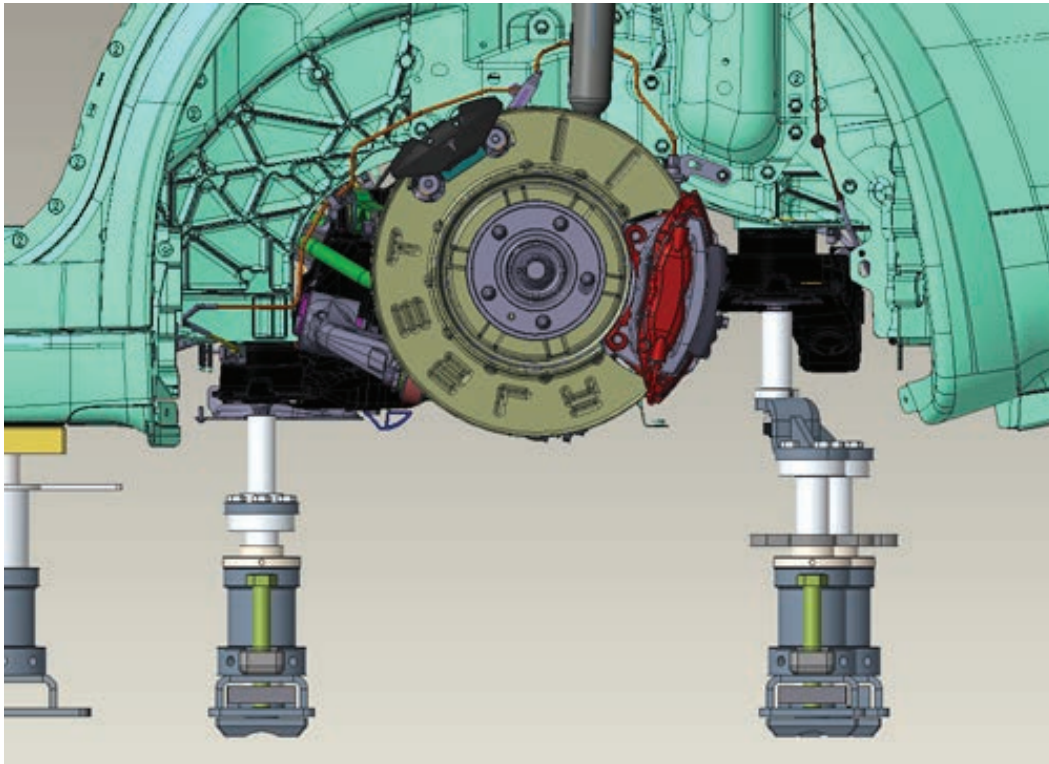
- 791980
- 502078
- 502028
- 502000 SHOWN, CK110123  
FOR EXTENDED REACH
- CK110109



- CK110109
- 502000 SHOWN, CK110123  
FOR EXTENDED REACH
- 41684
- 502039
- 502015
- 502055
- 502128

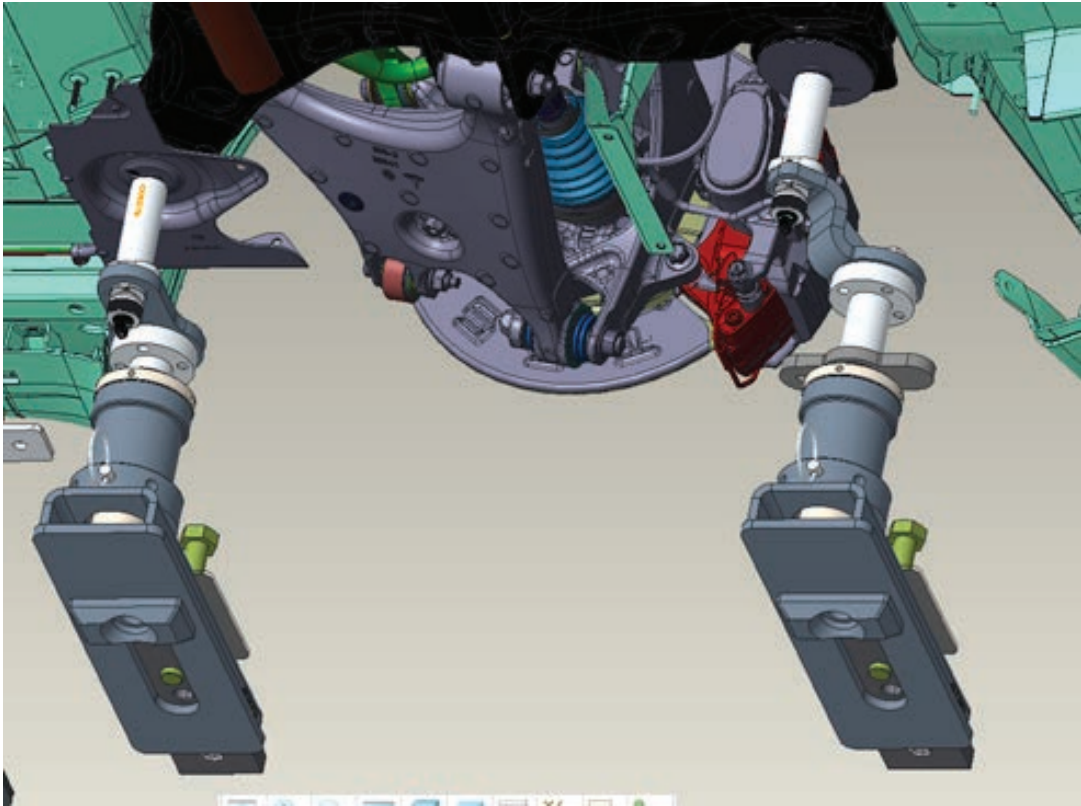
## Rear Suspension Mounting Location

On the rear section additional holding can be located on the rear suspension bolt locations front or rear without main parts removal. With removal of the rear bumper cover and absorber, holding can be located at the end of the rail.

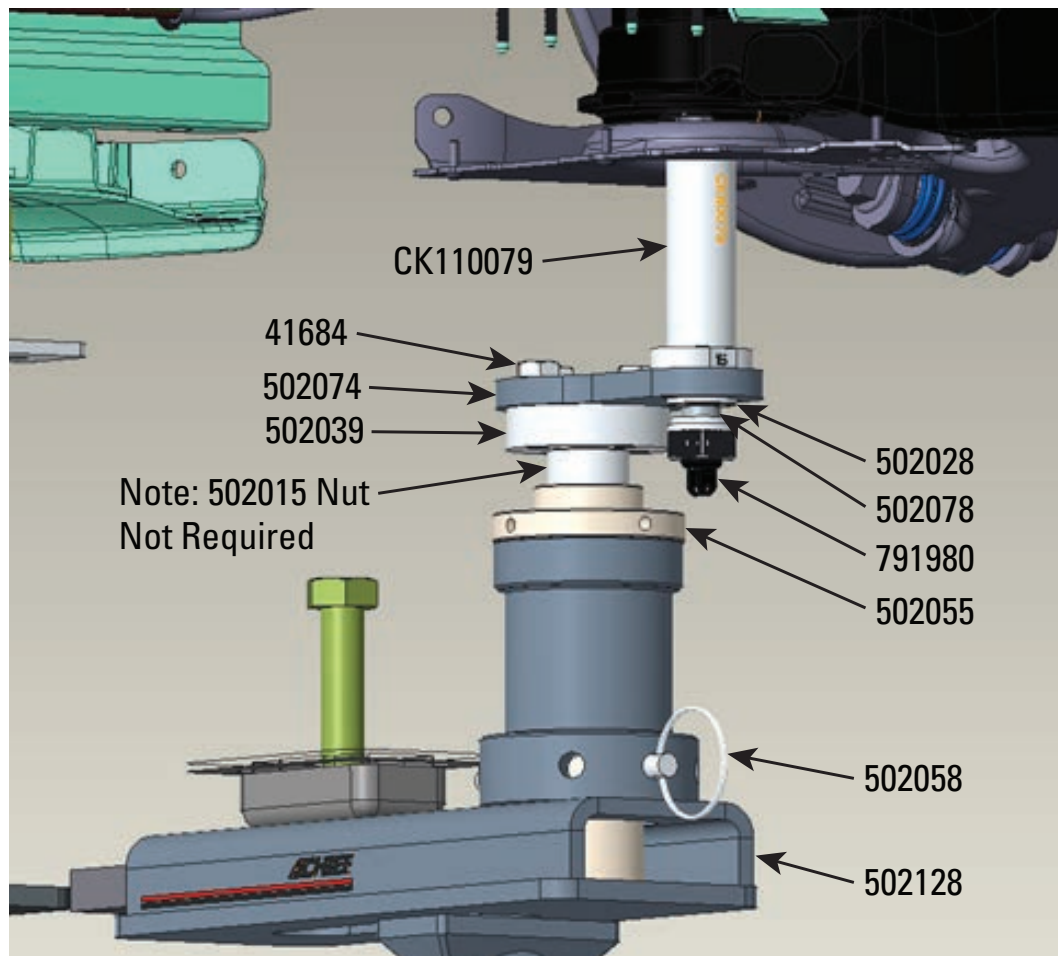




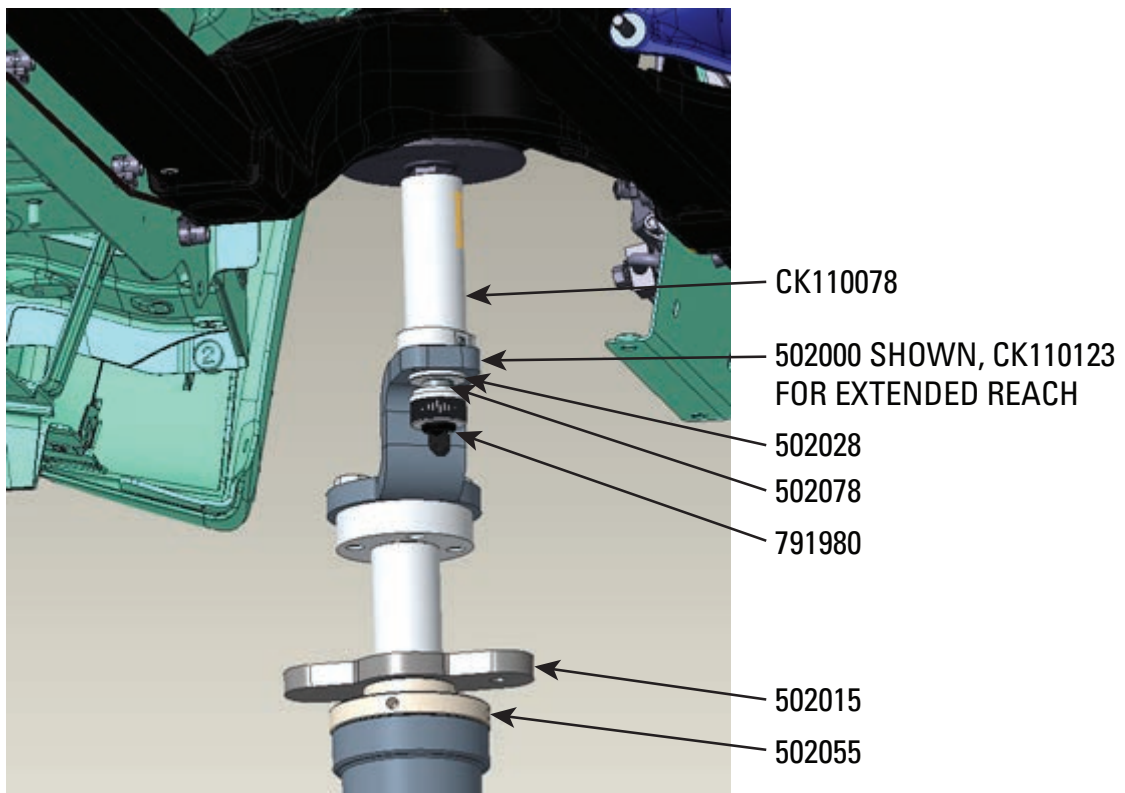
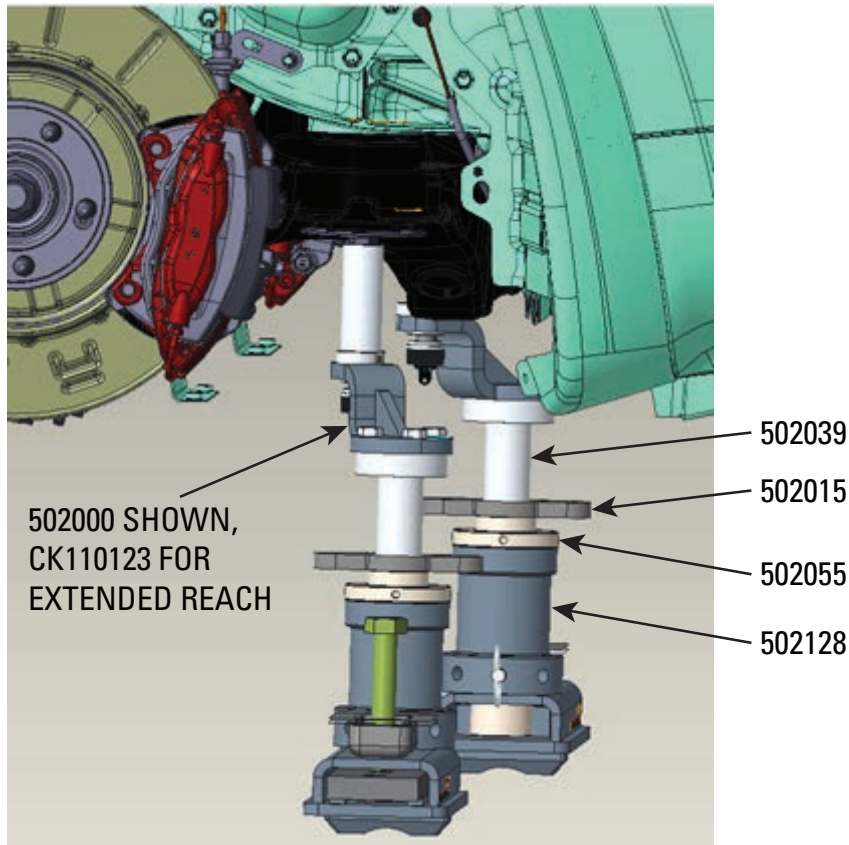
## Rear Suspension Cradle Mounting



## Rear Suspension Front Cradle Mount

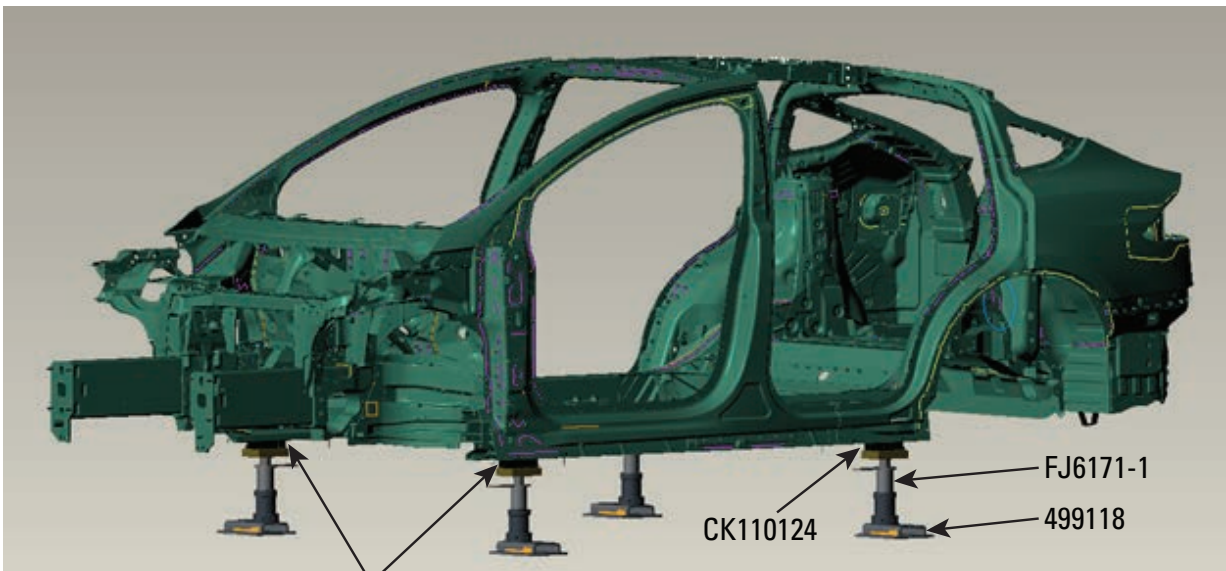
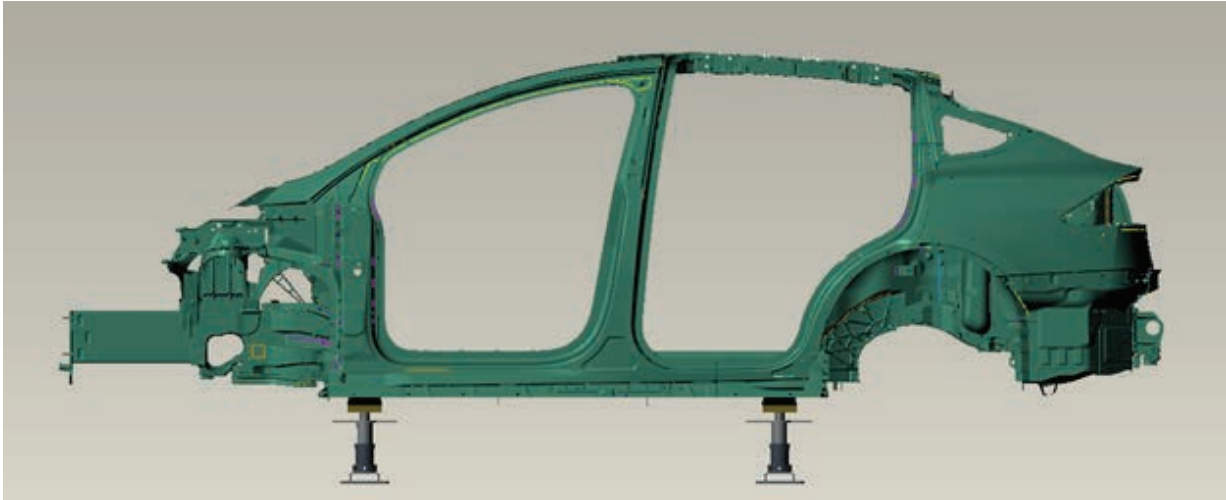


## Rear Suspension Rear Cradle Mount



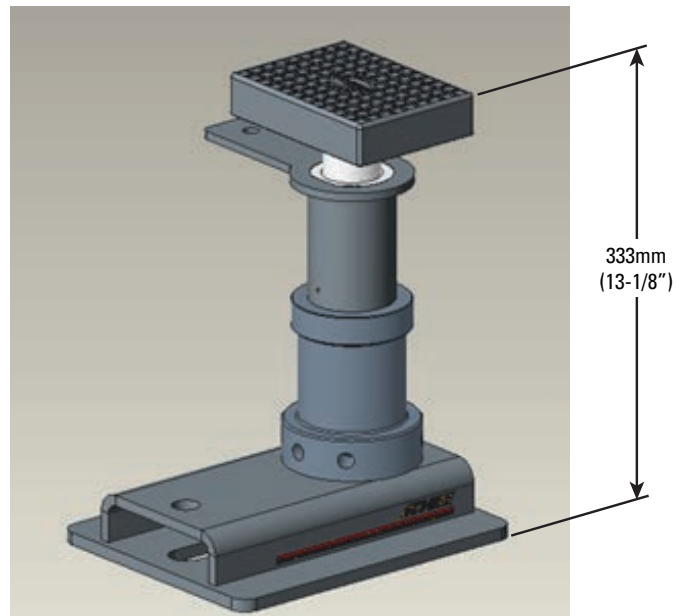
# BIW

## Center Section Base Mounting Locations



Typical jacking point supplied  
by vehicle manufacturer

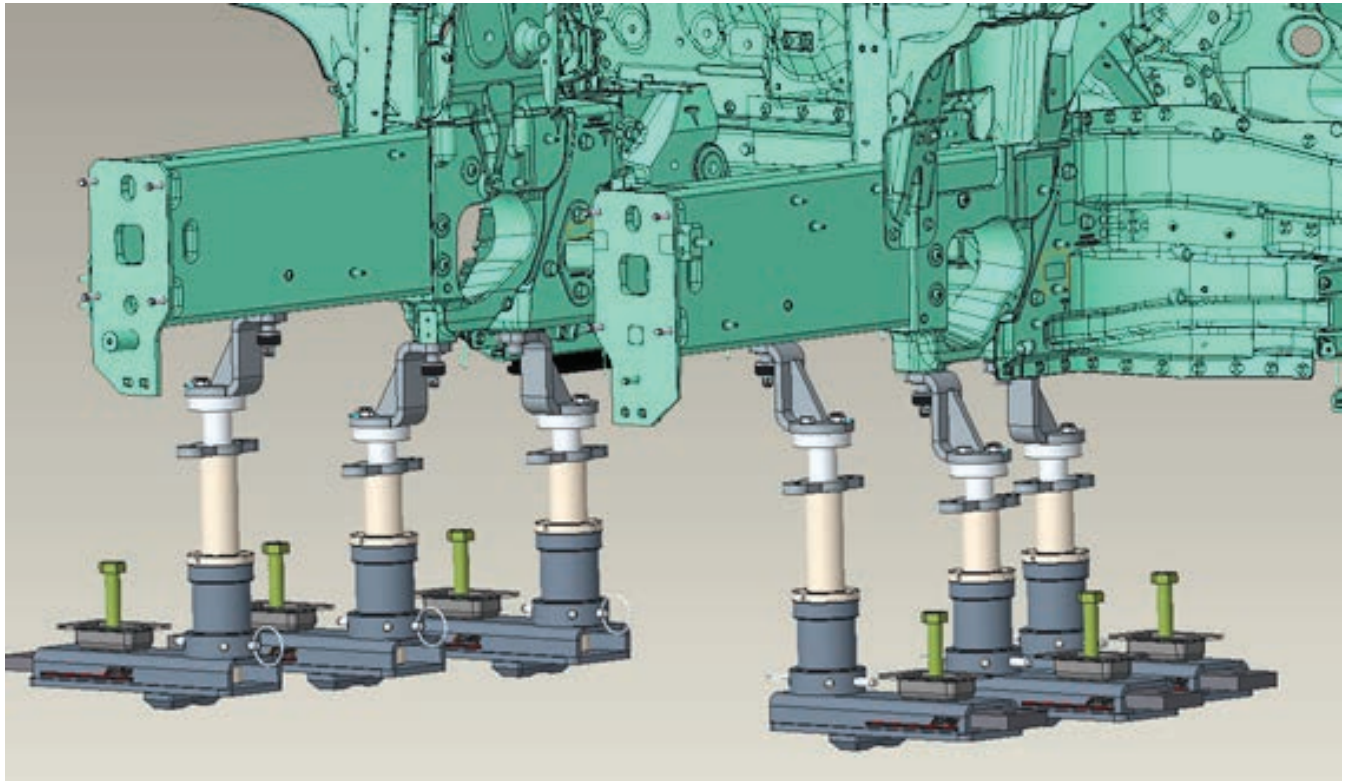
1. Use jacking points provided by vehicle manufacturer as shown.
2. Jack pads and extensions will need to be mounted to anchor stands.
3. Adjust adapter pad height 333mm (13-1/8") to establish level datum.



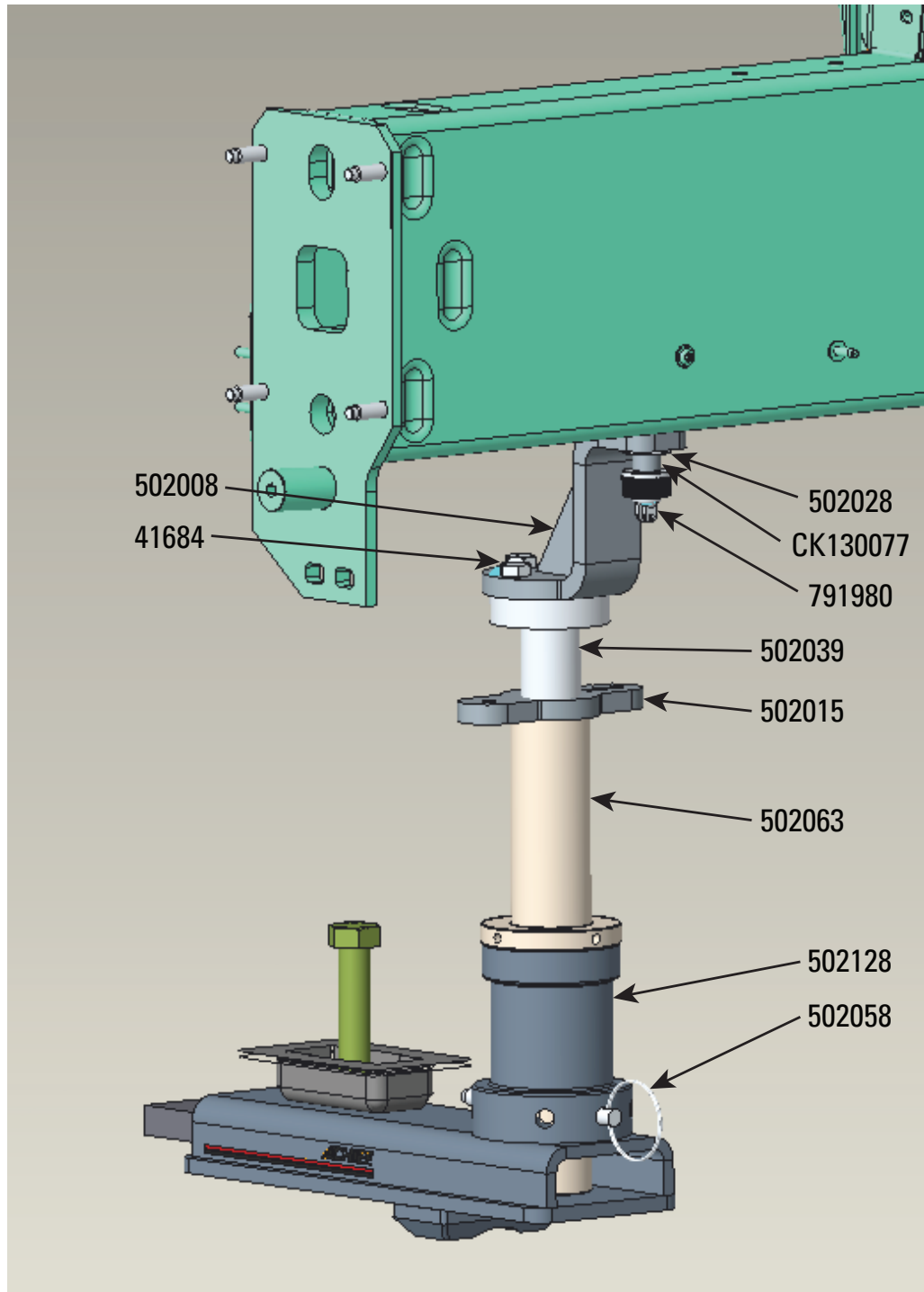


# BIW

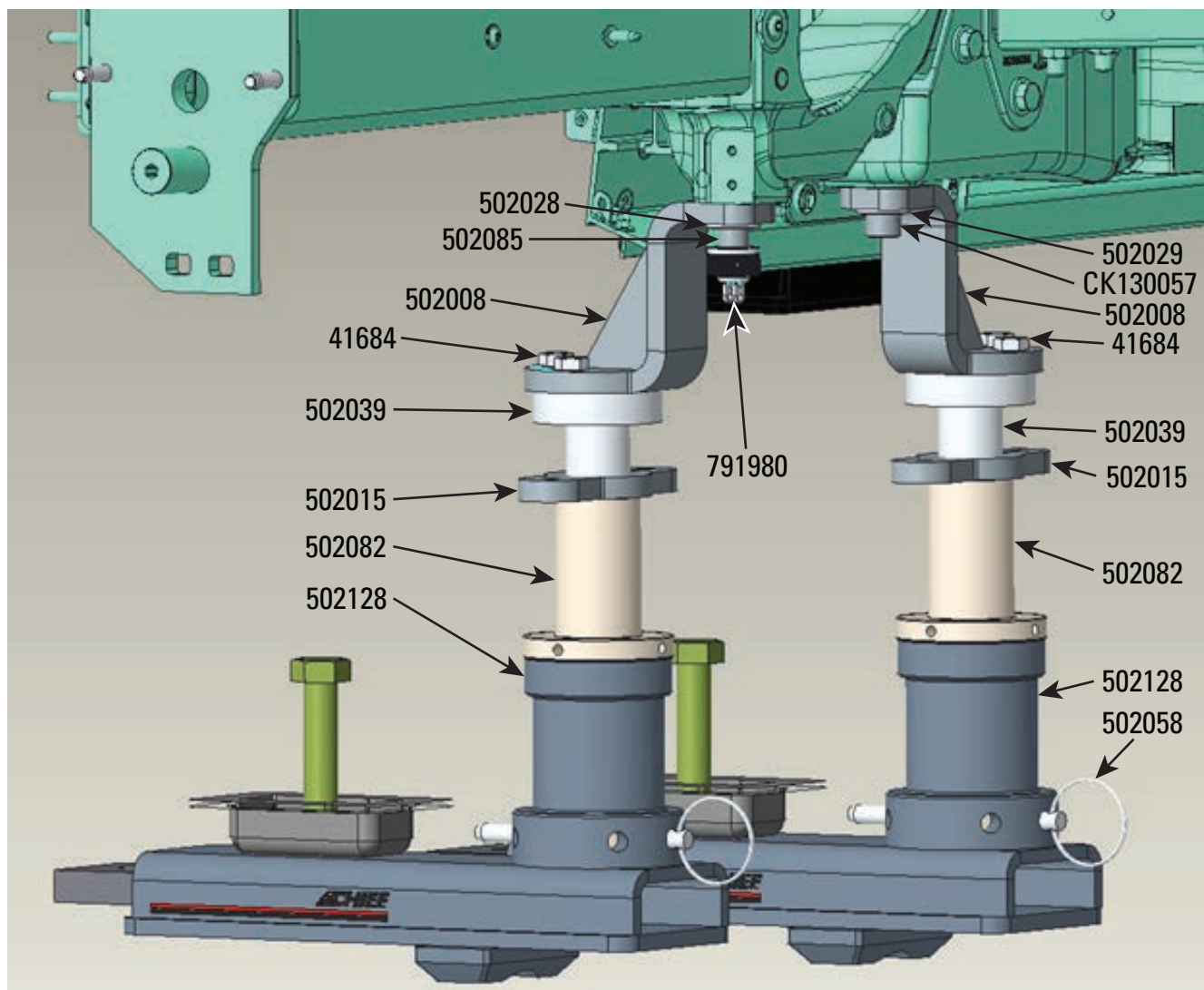
## Front Rail Cradle Mount



## Front Rail Section

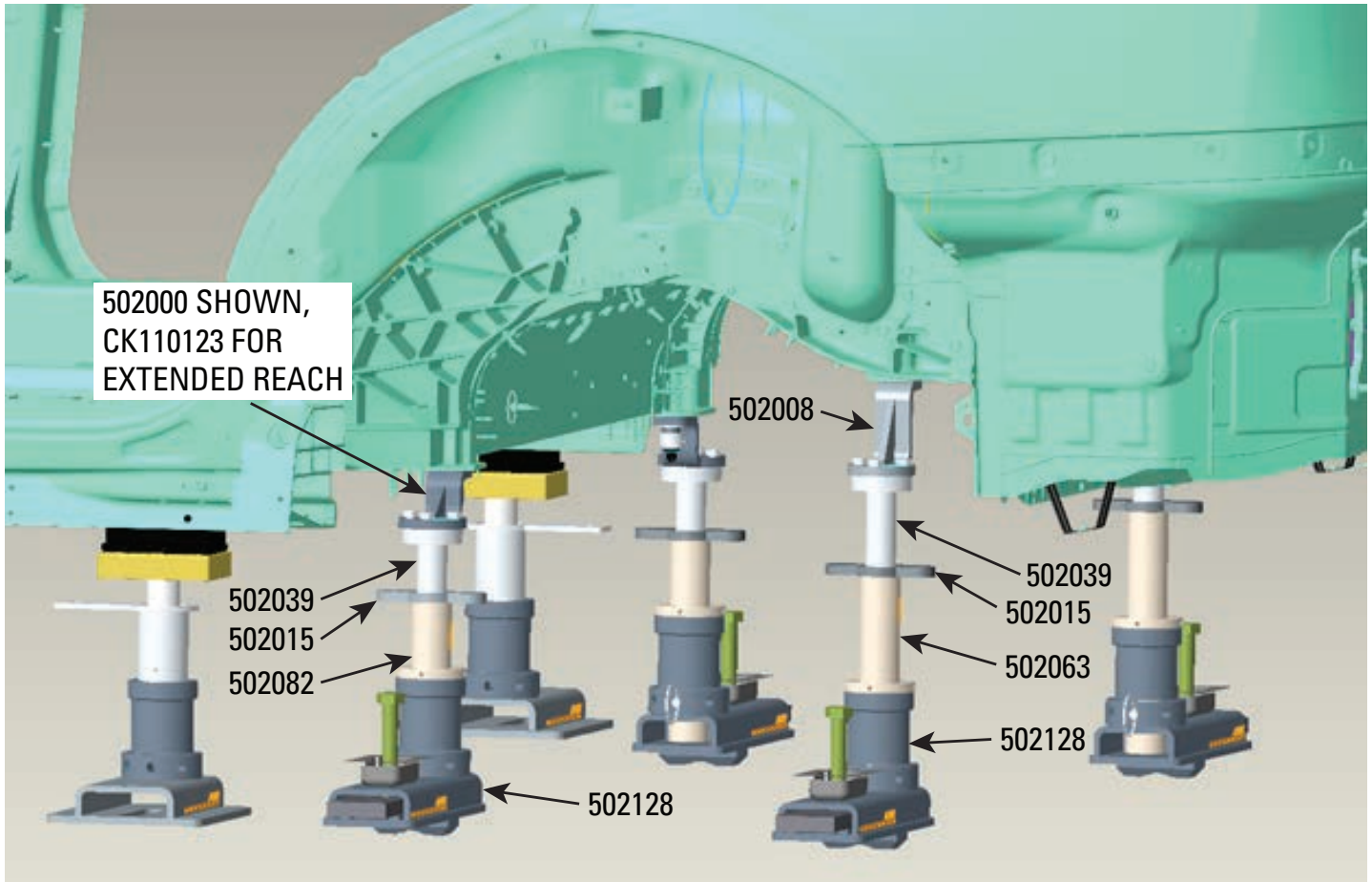


## Front Rail Cradle Mount

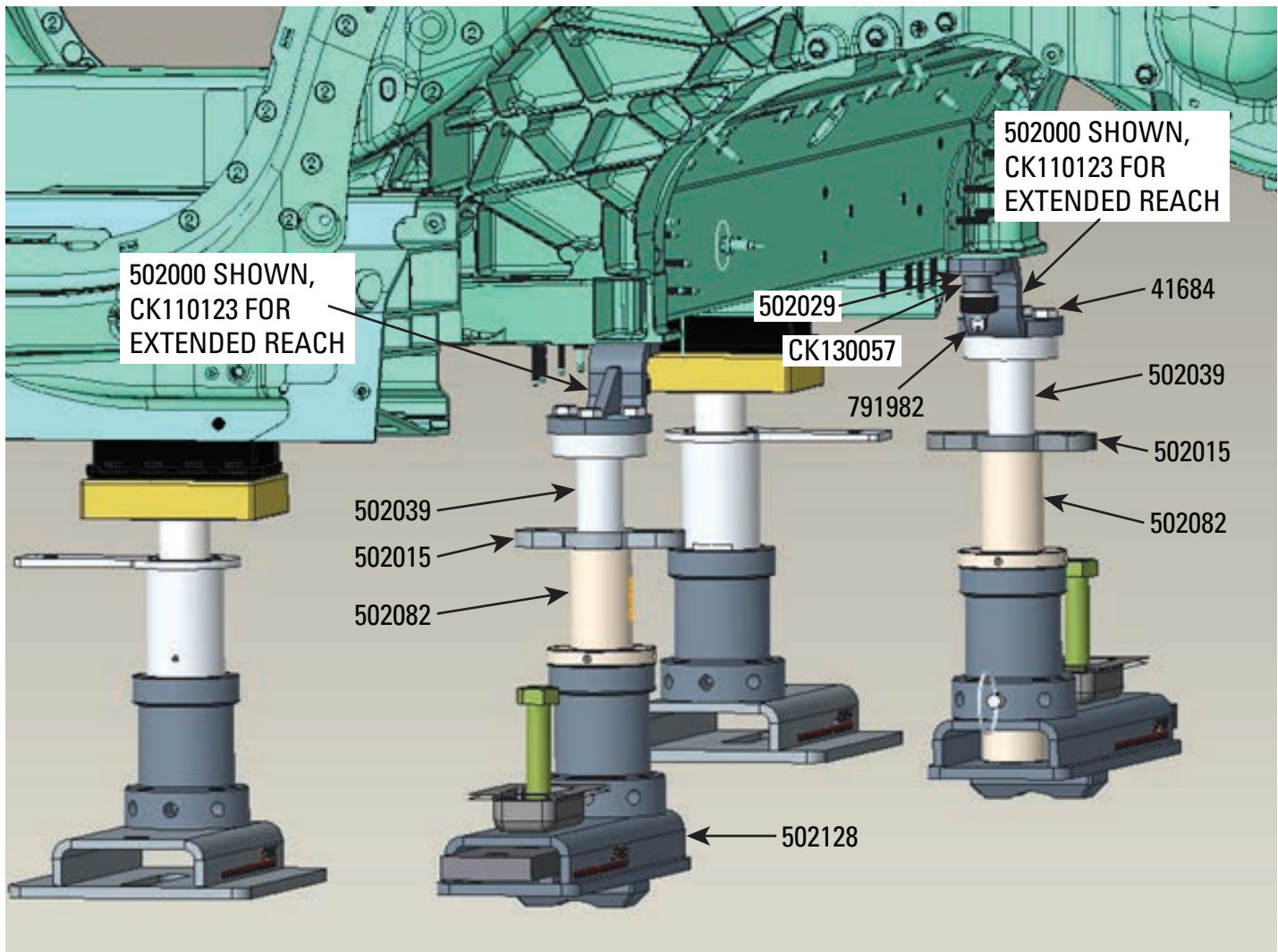




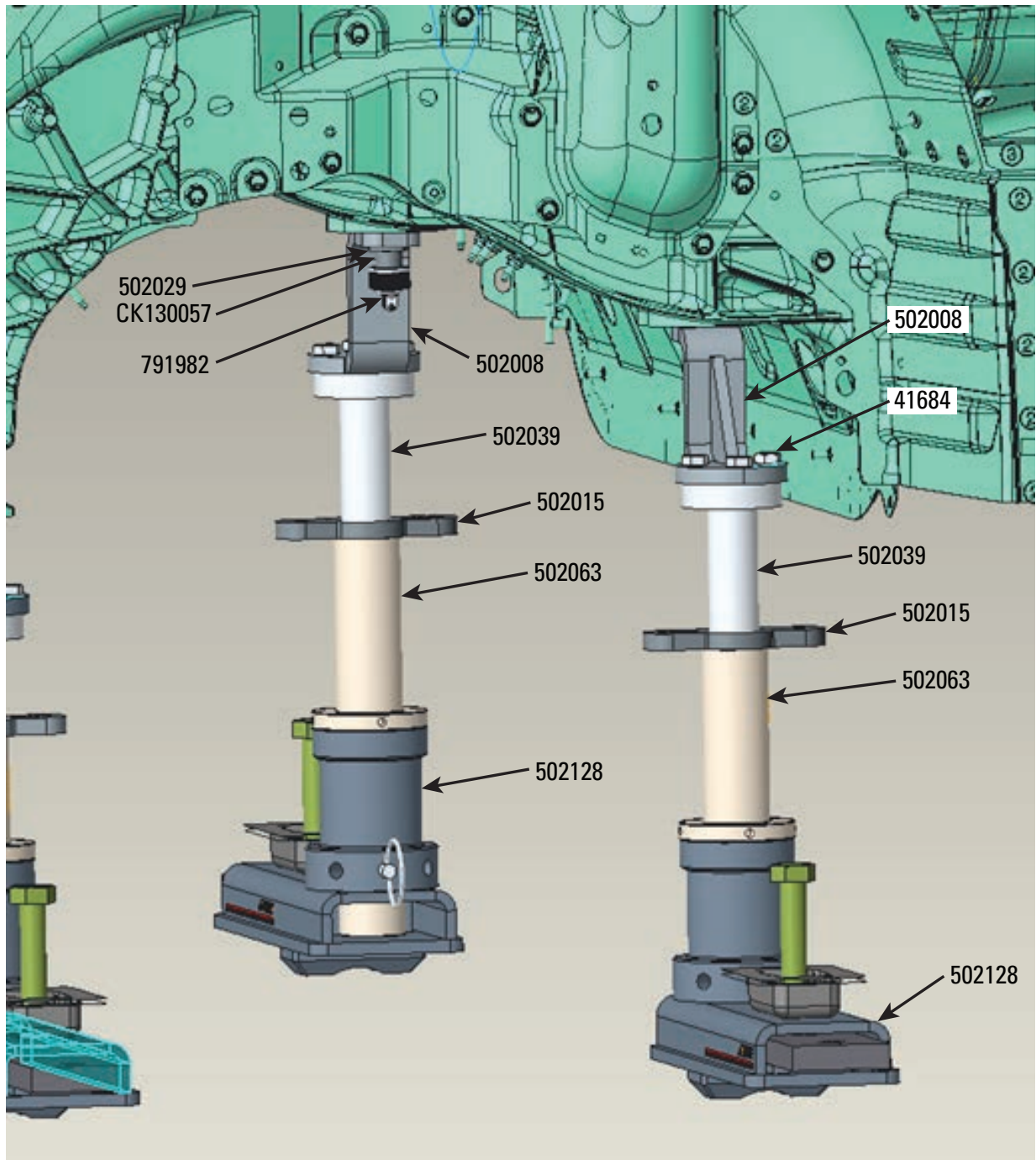
## Rear Suspension Cradle Mounting



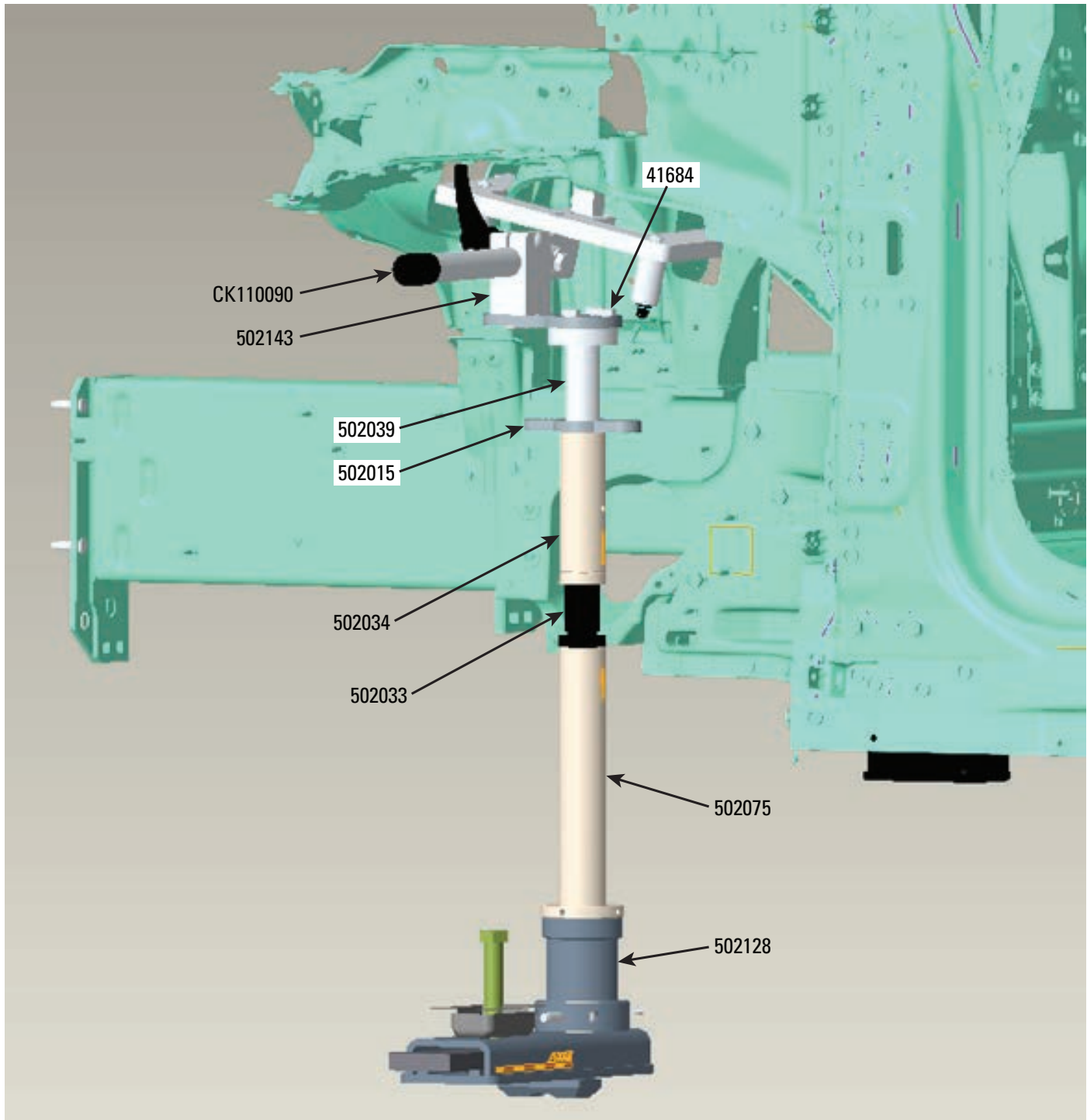
## Rear Suspension Front Cradle Mount



## Rear Suspension Rear Cradle Mount

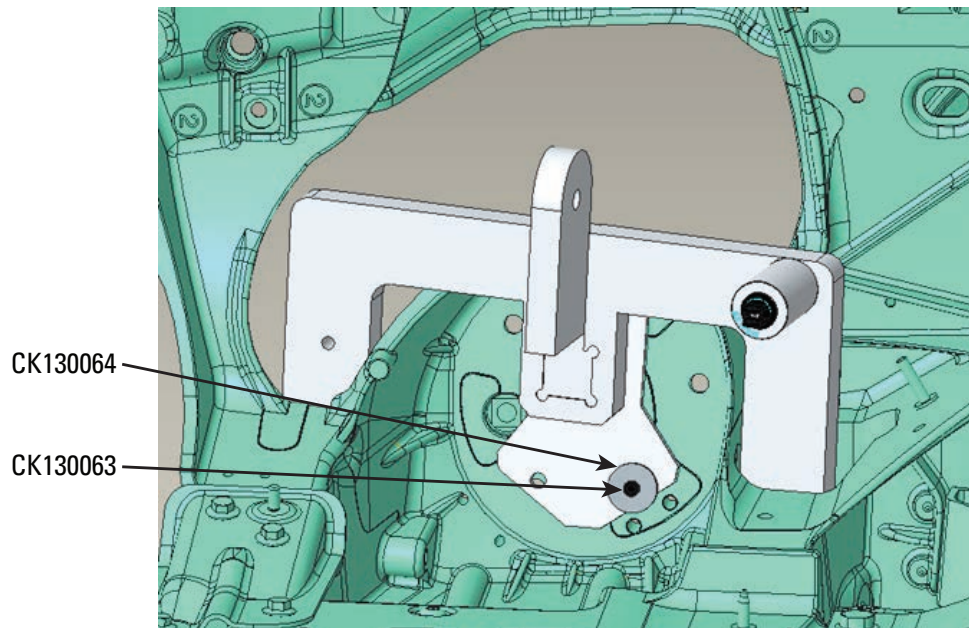


## Front Strut/Upper Control Arm

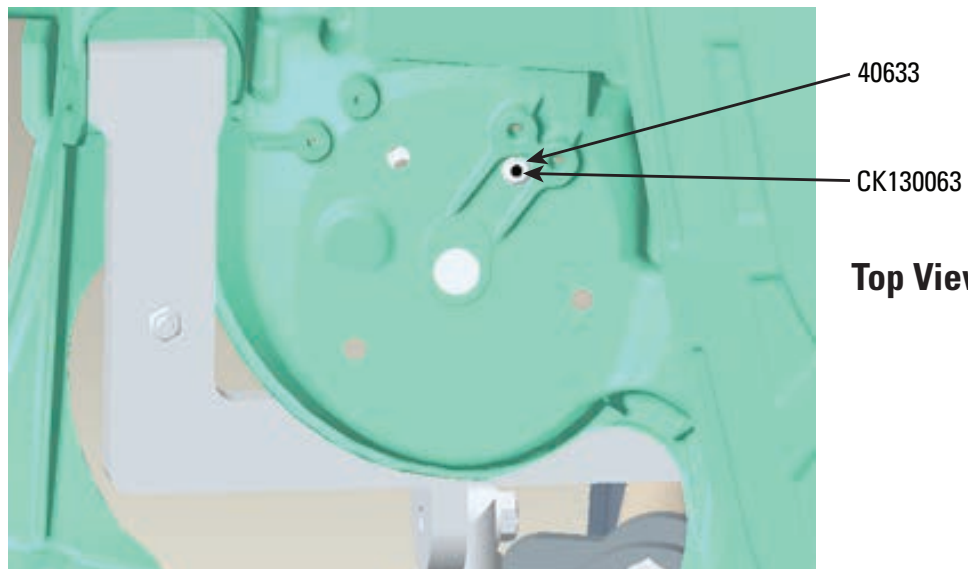




## Front Strut/Upper Control Arm

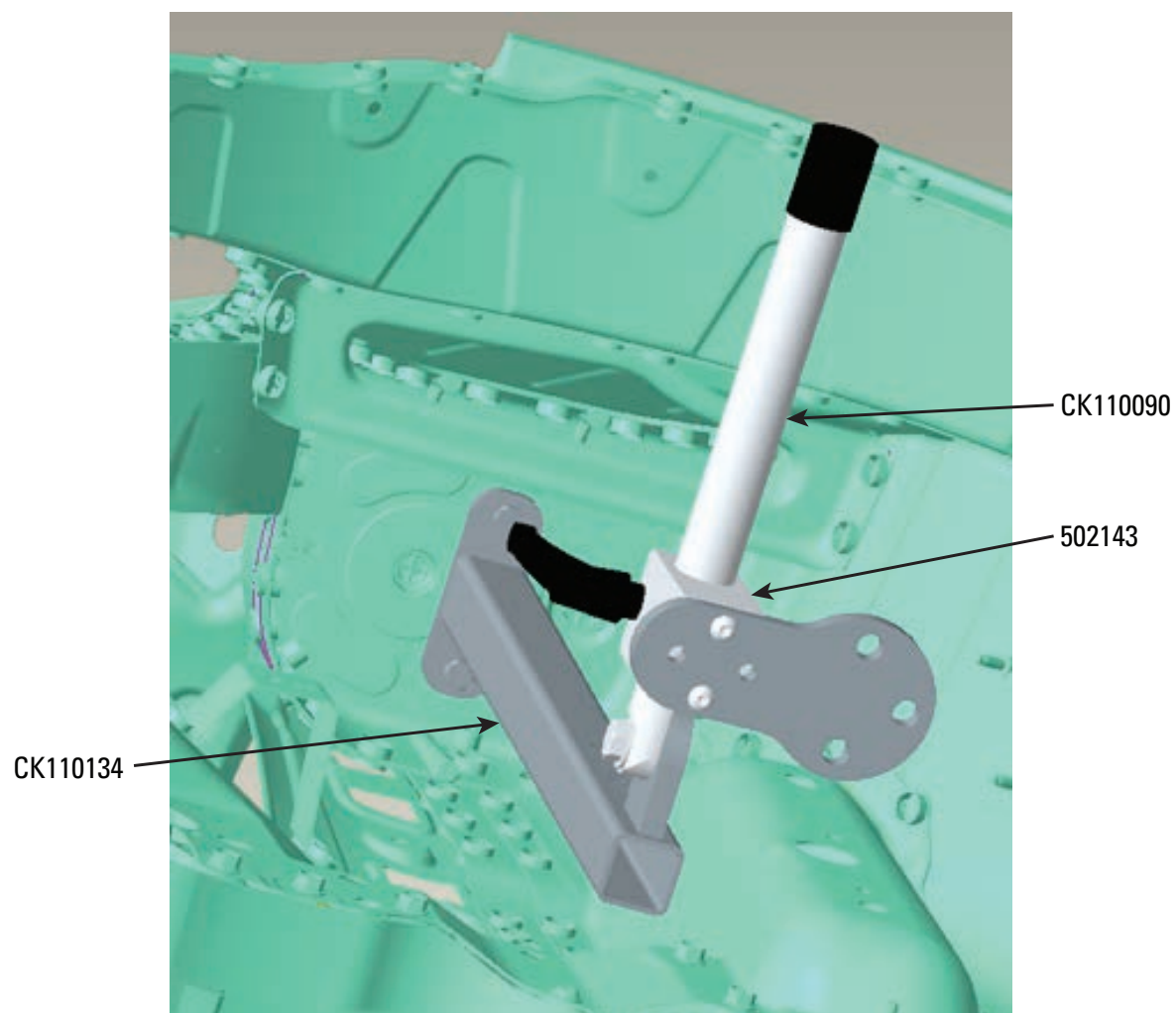
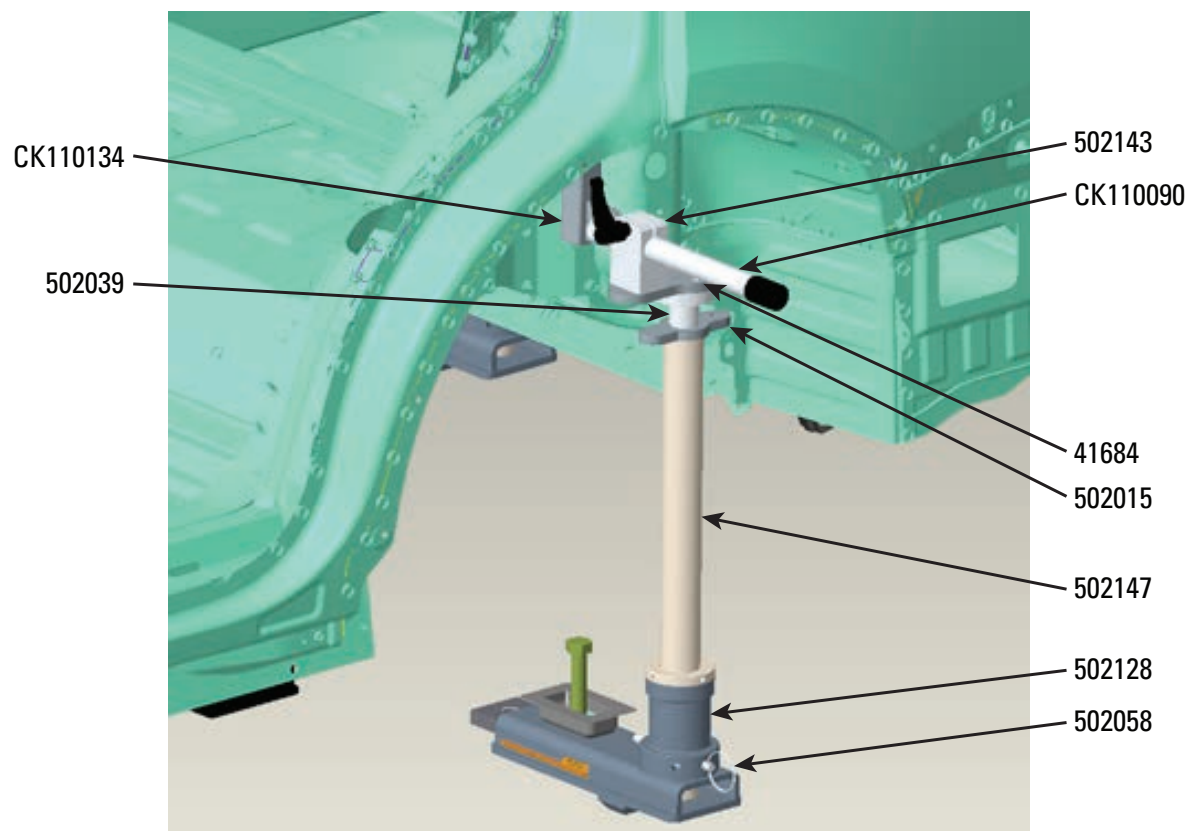


**Bottom View**

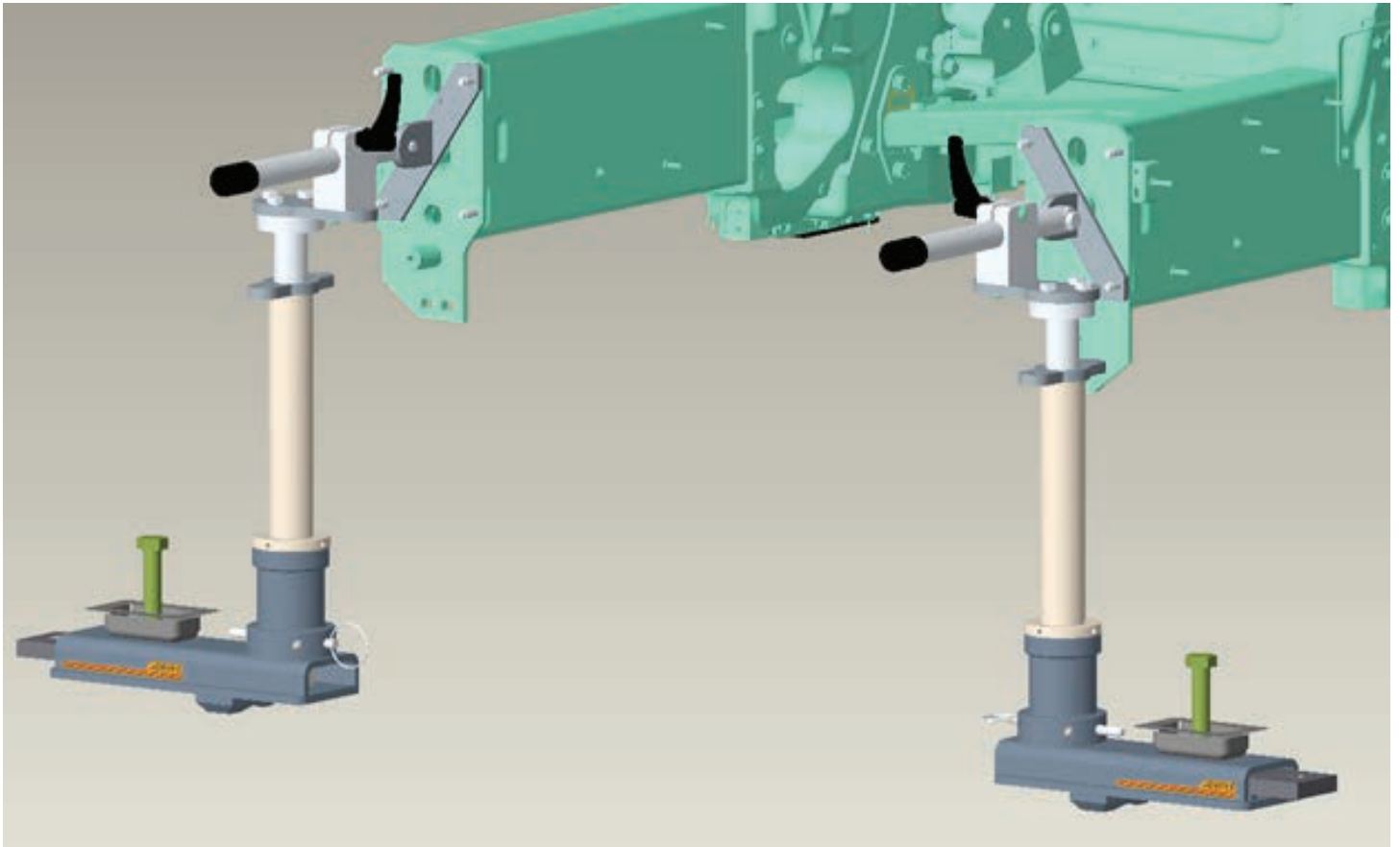


**Top View**

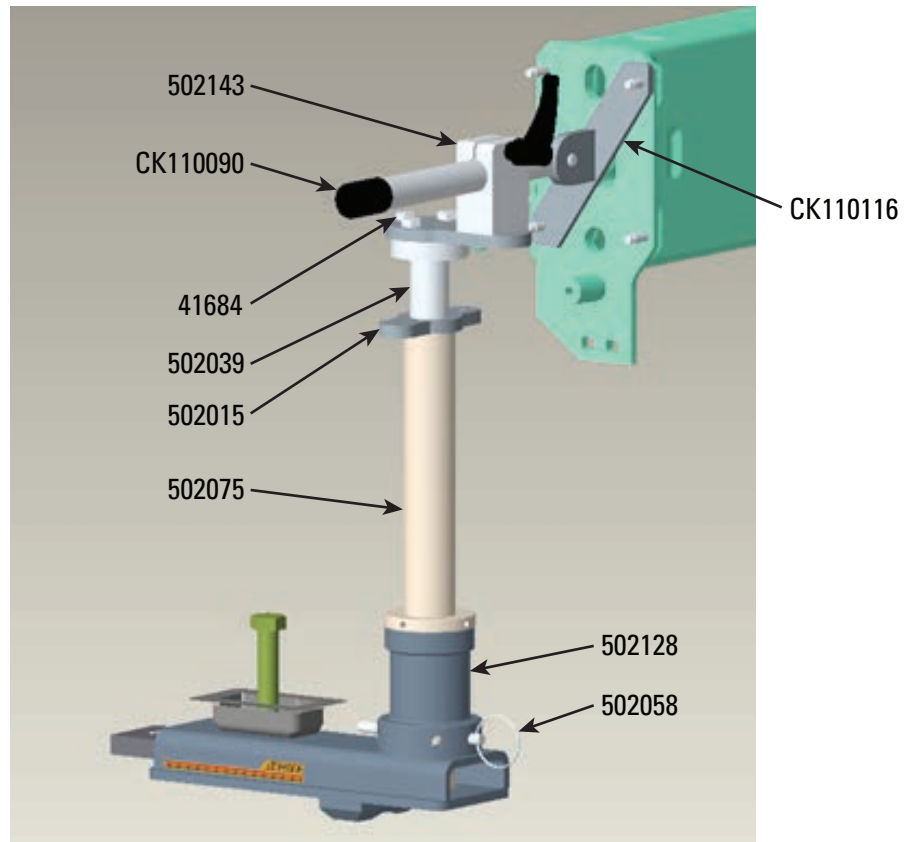
## Rear Strut



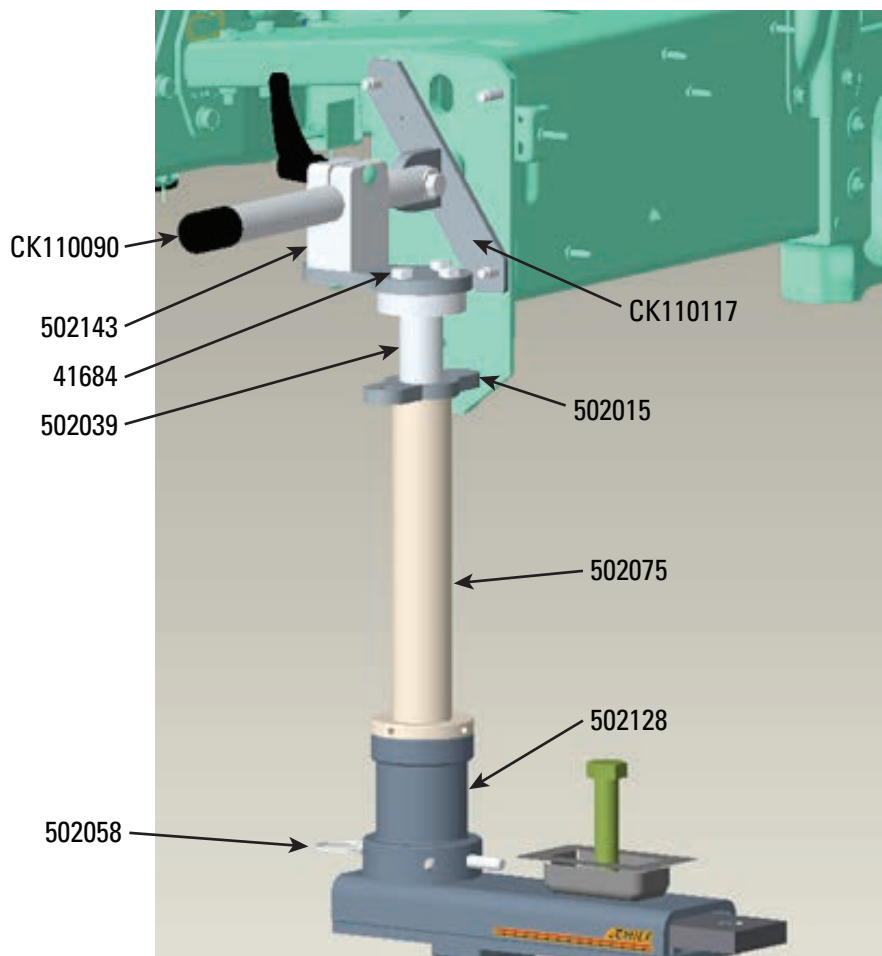
## Front Frame Rail Ends



## Front Right Frame Rail End

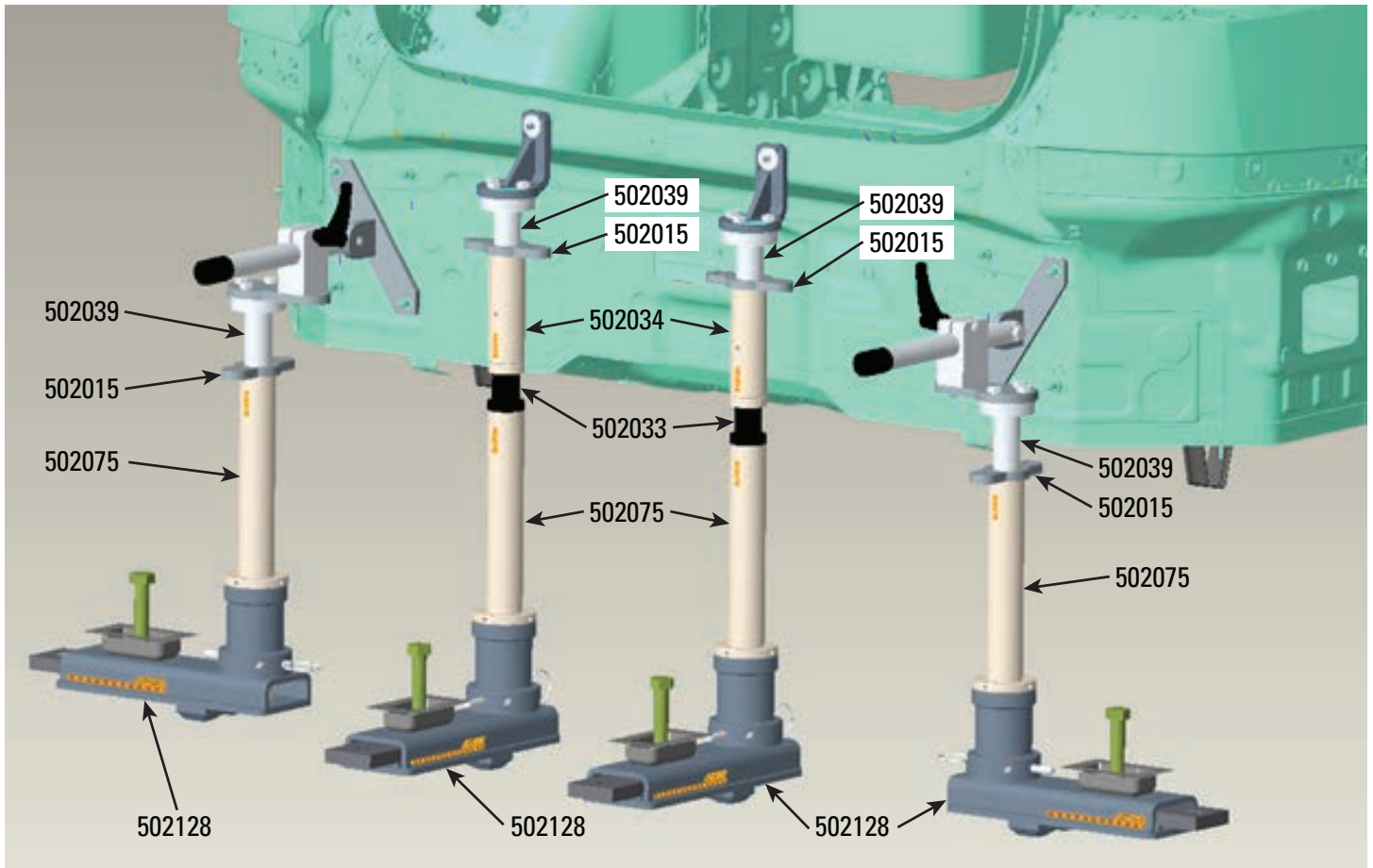


## Front Left Frame Rail End



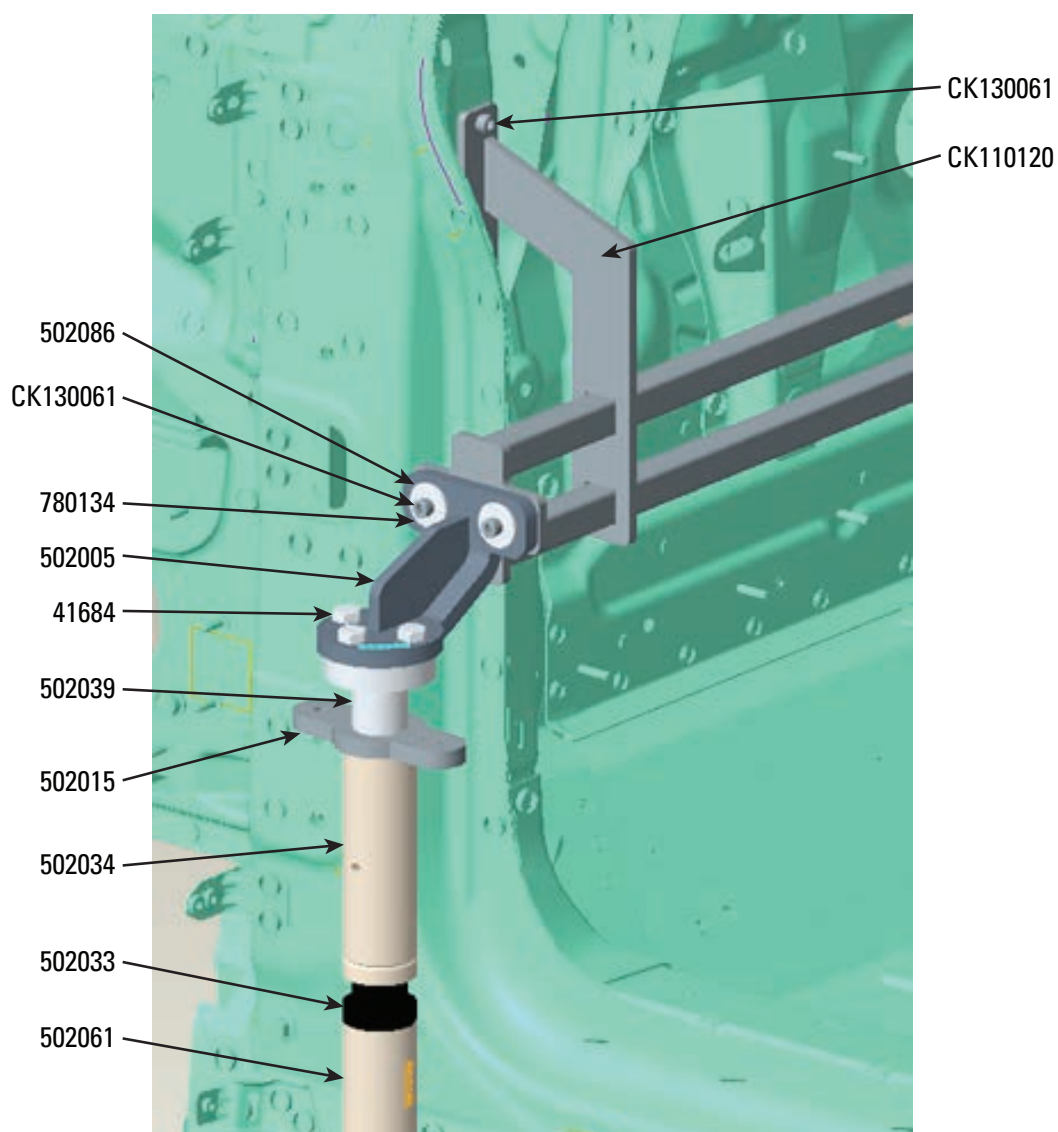
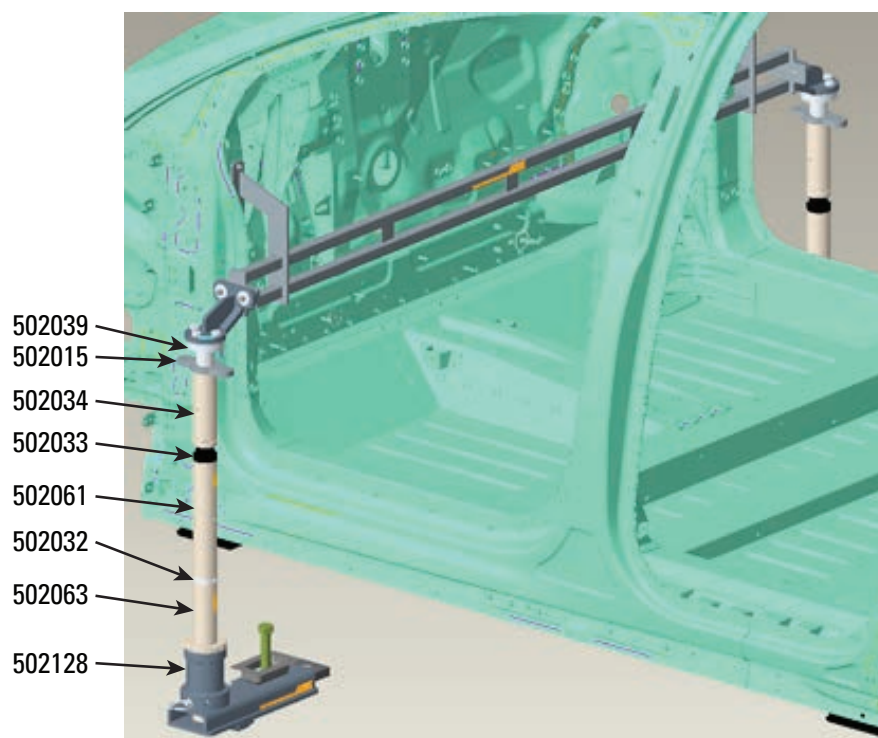


## Rear Skirt / Frame Rail Ends

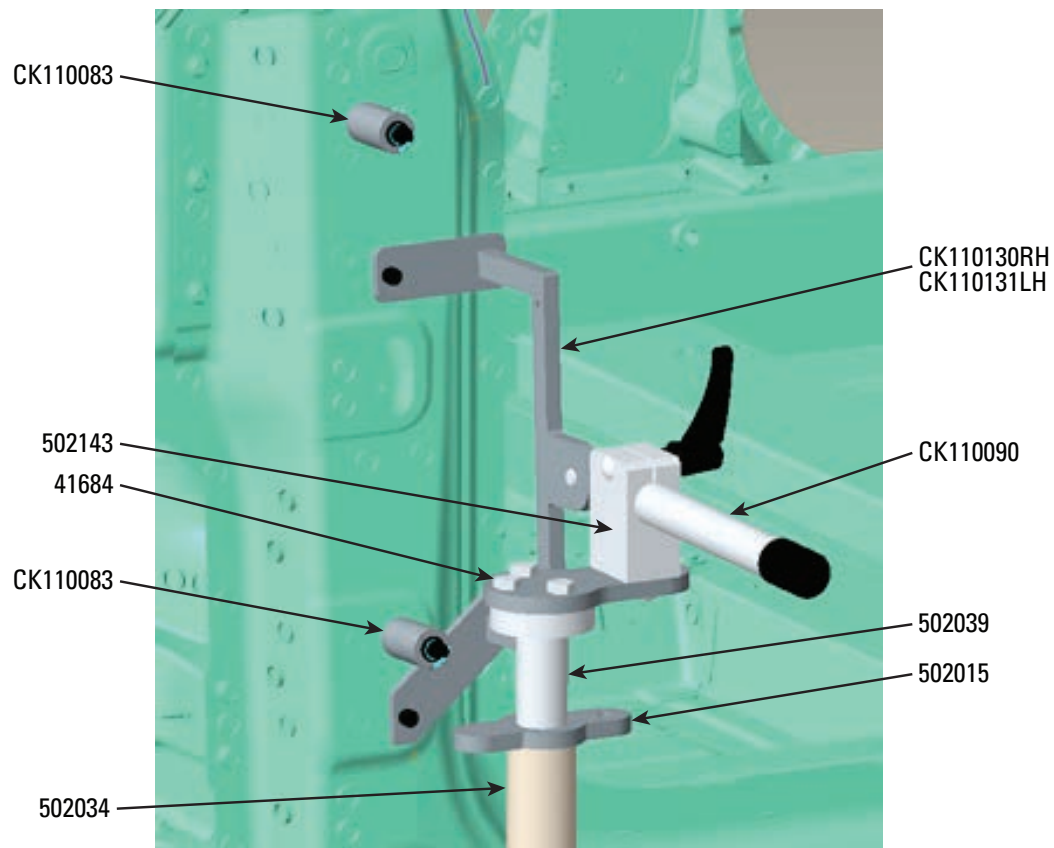
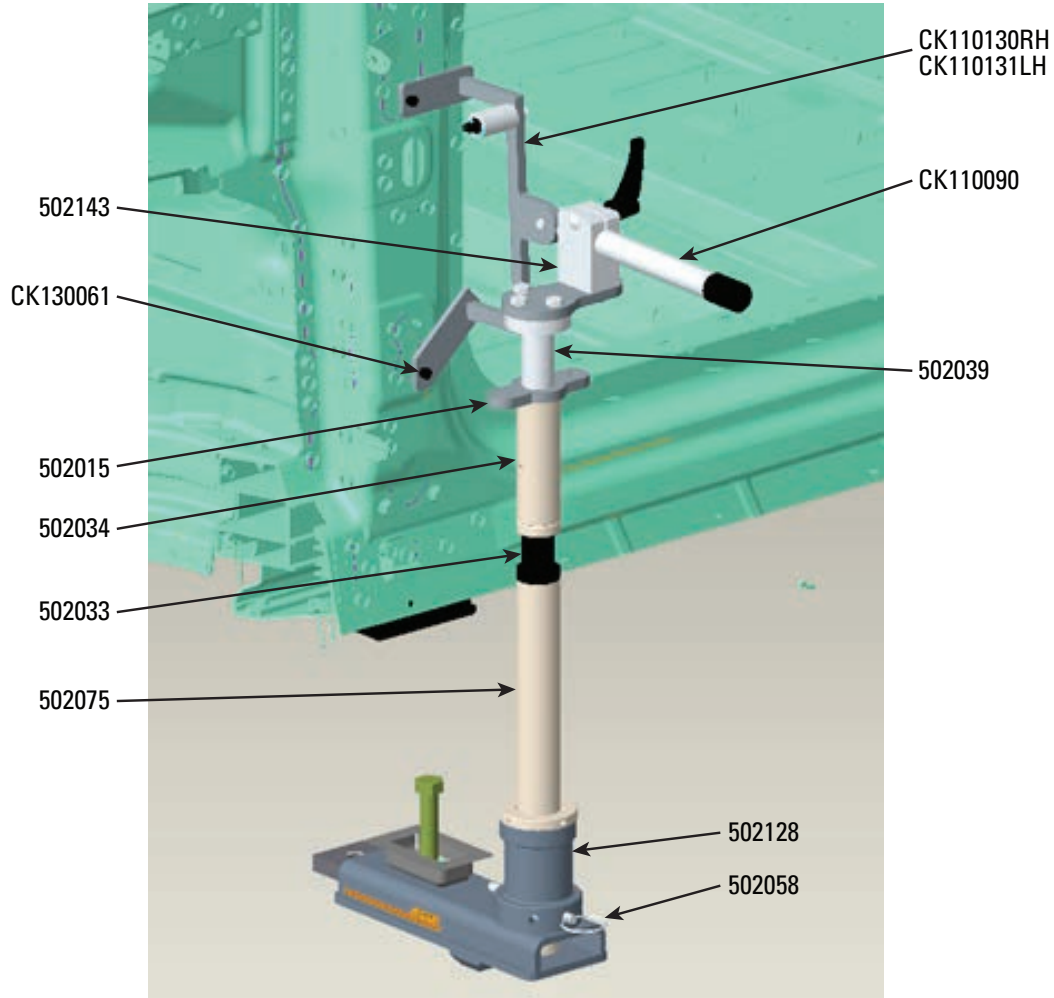


[illegible]

## A-Pillar Inner Rail

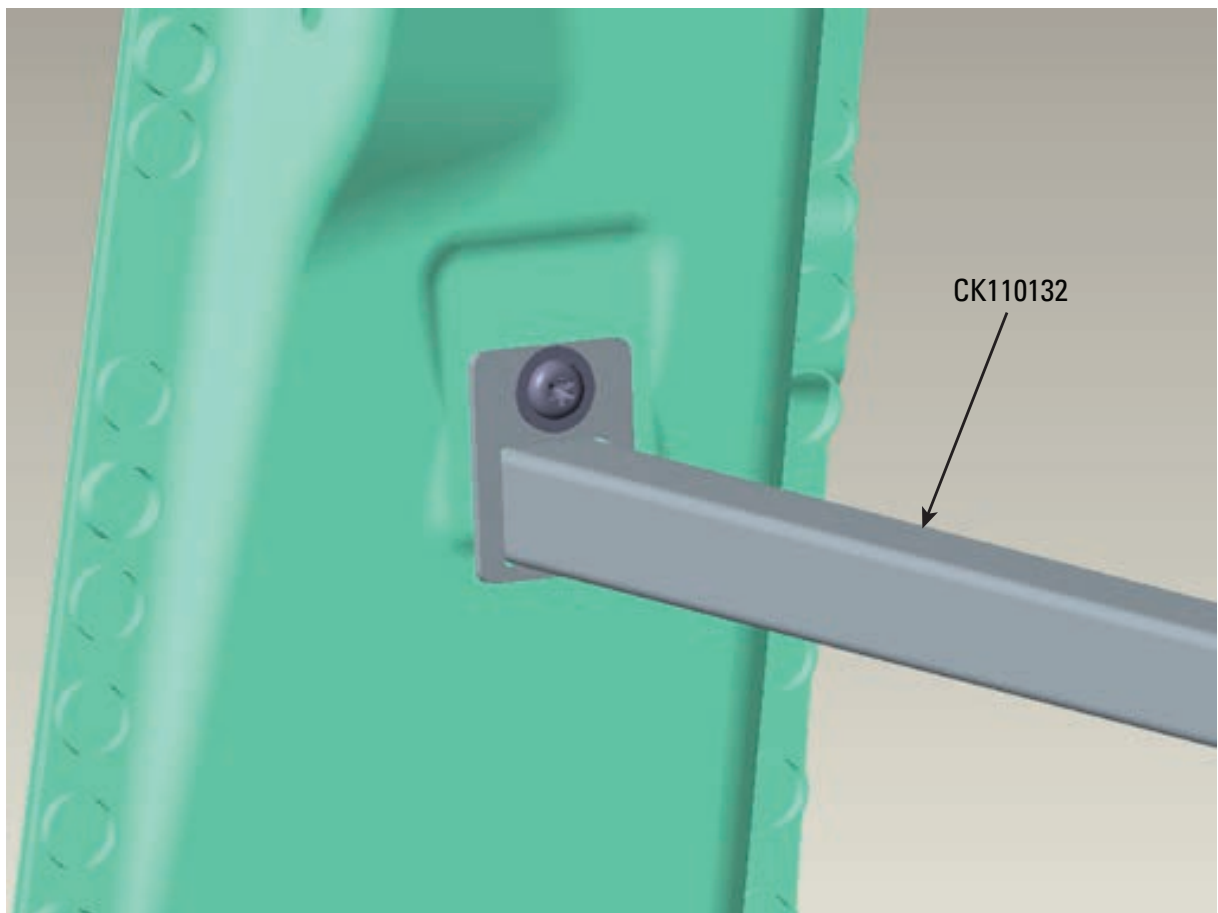
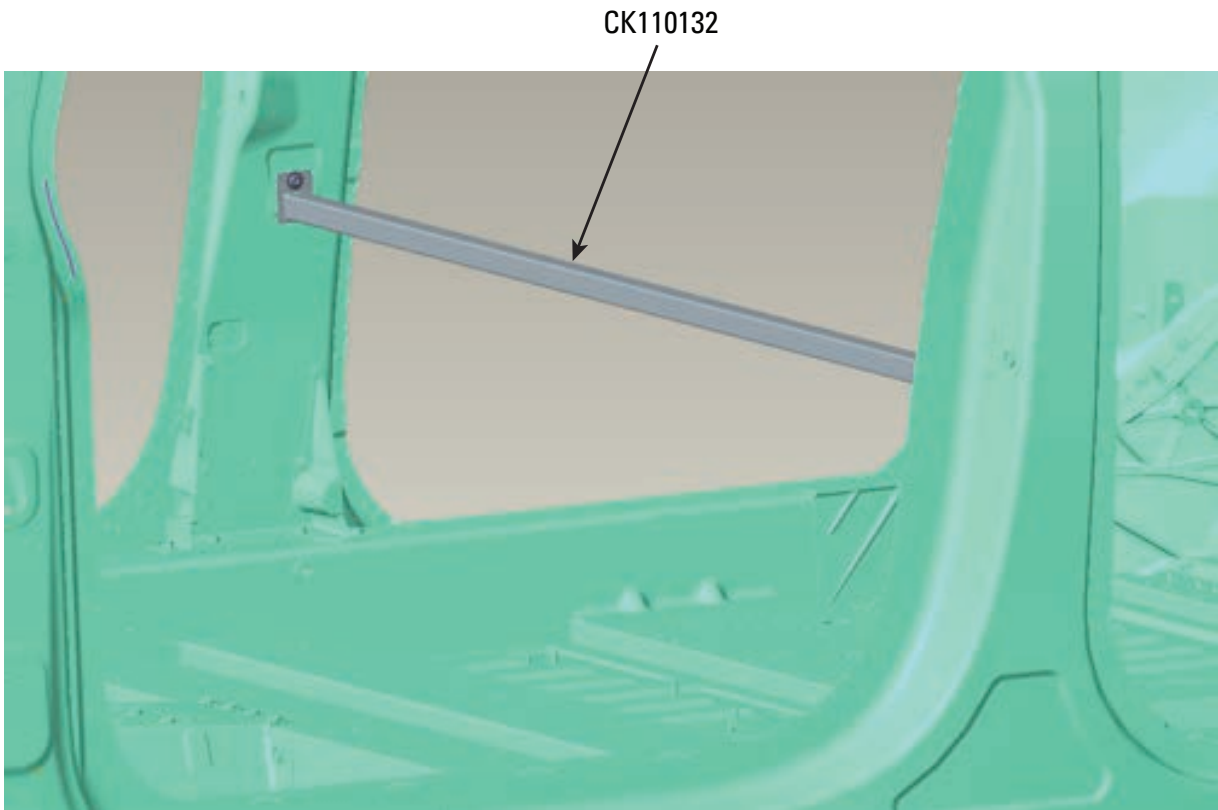


## A-Pillar Outer

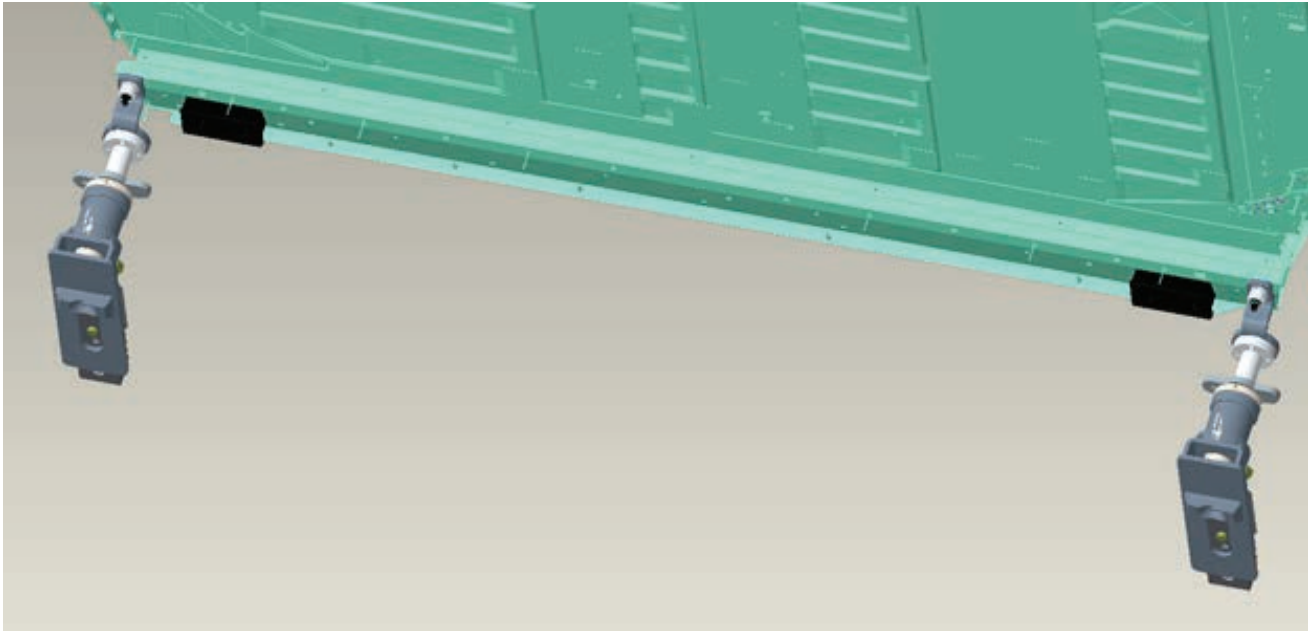




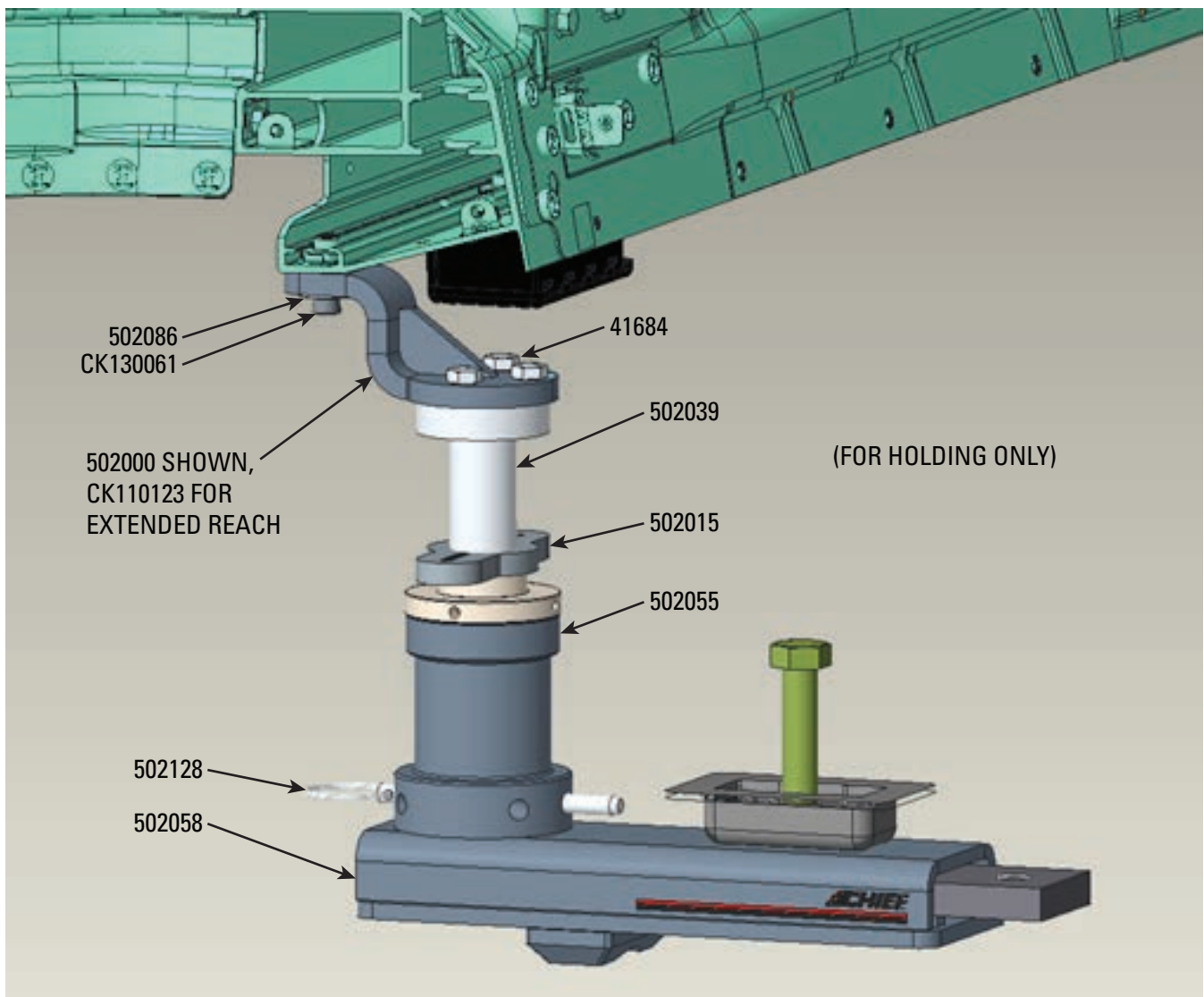
## Inner B-Pillar



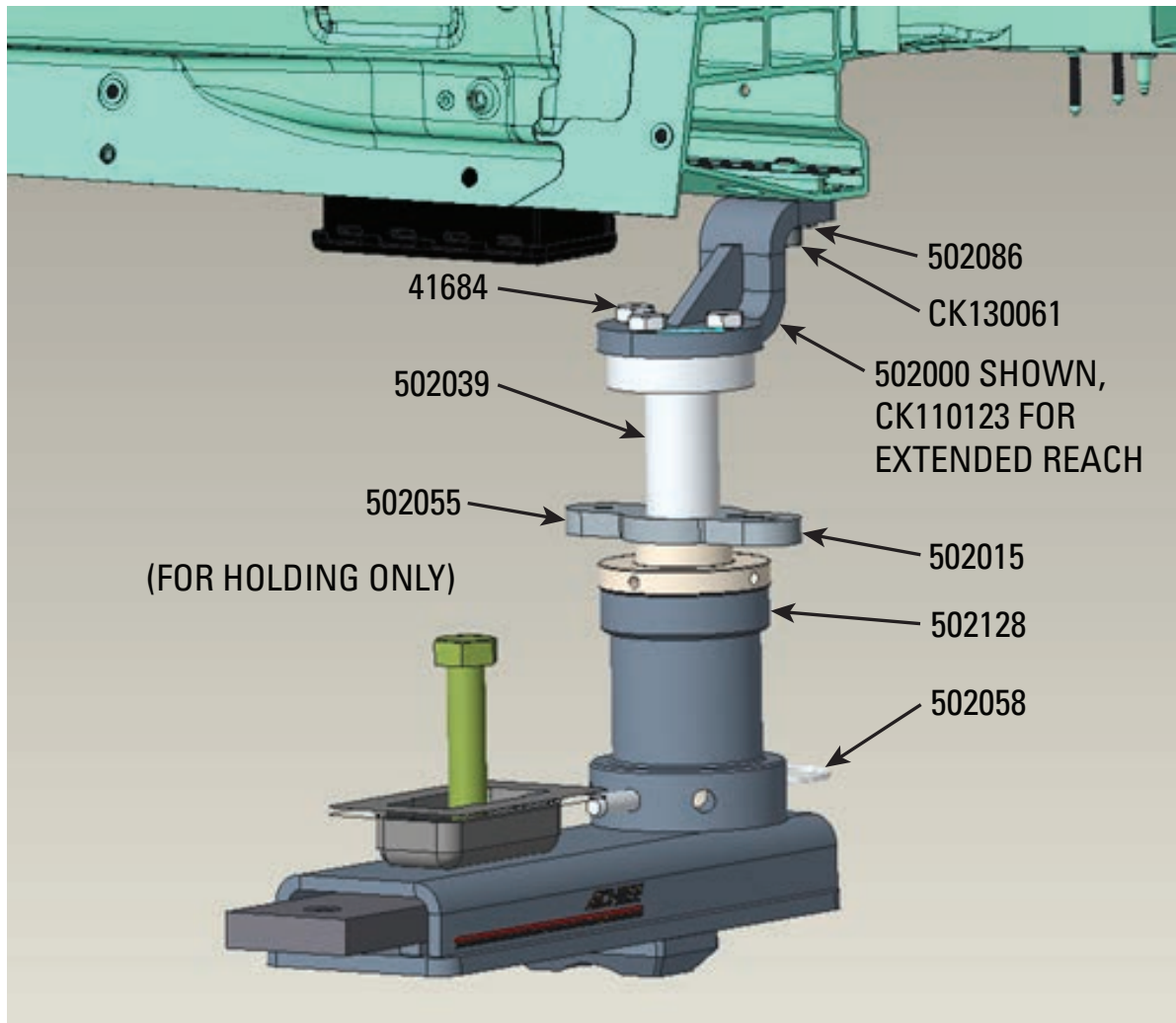
## Underside Inner Rocker



## Front Inner Rocker



## Rear Inner Rocker



# Model X Measuring in Genesis

The Model S vehicle specification in the Chief Genesis application was generated directly from Tesla CAD data files. The specification represents the vehicle in a level position, when supported at least 8 points (2 front, 4 center, and 2 rear locations).

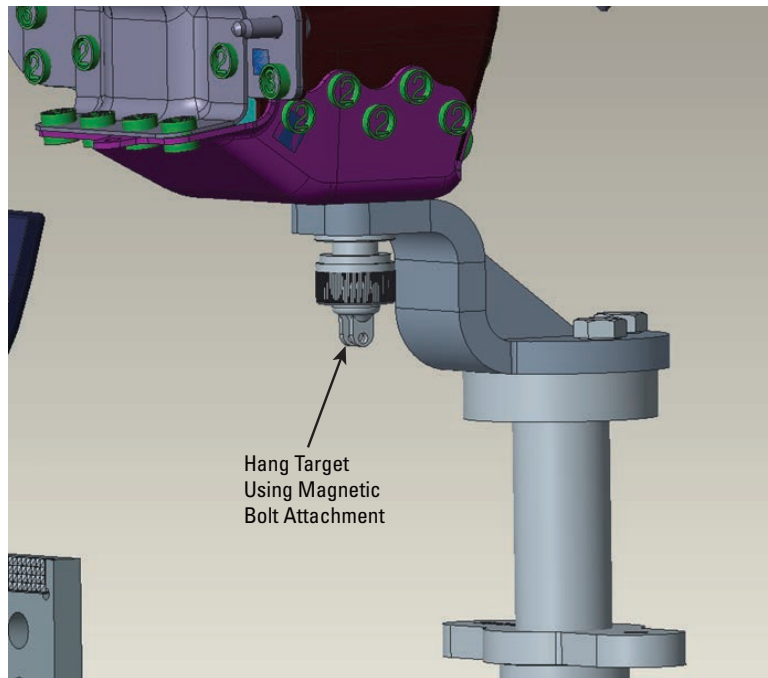
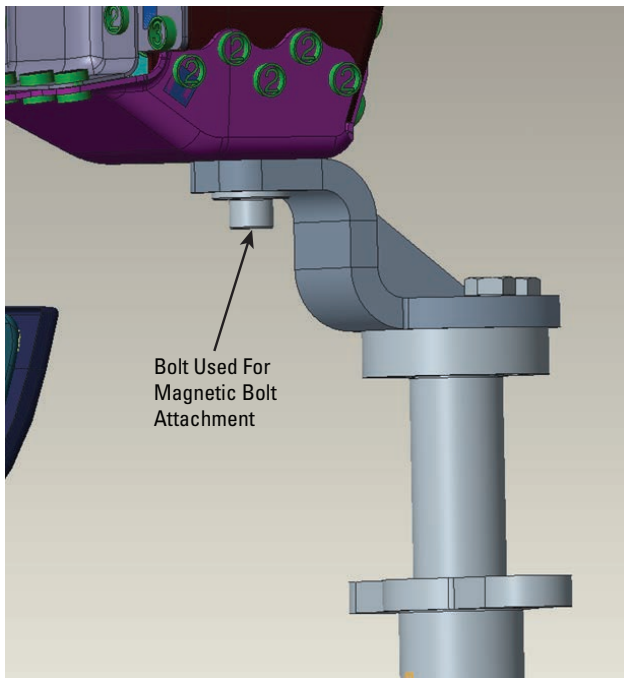
The Model S can be measured for inspection purposes when supported only in the 4 center section holding points. In this case, with a fully assembled vehicle, the front section measuring points may show 3-5mm of sag versus the level vehicle spec. Less sag will appear in the rear section.

To level out the sag from a fully assembled vehicle, front and rear fixtures can be built up to the holding points. The fixtures can then be raised using the turnbuckle adjustment detailed in the "Planning and Setup" section at the front of this manual, until the front and rear measuring points are level to the specification.

Always refer to OEM repair procedures for proper repair guidelines. **IMPORTANT** The Model X must not be subjected to pulling forces.

## Measuring from Fixtures

For underbody measurement points, targets may be hung from bolt as shown.













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