



# SPARTAN CHASSIS, INC.

CSB06-350-002A

May, 2006

Page 1 of 2

## CAMPAIGN SERVICE BULLETIN

---

**SUBJECT:** Rear Suspension- 240AR

*Bulletin #CSB06-350-002 is superseded by bulletin #CSB06-350-002A due to a change in the part kit information. Any vehicle repaired under bulletin #CSB06-350-002 will not require additional repair.*

**APPLIES TO:** Certain Fleetwood Revolution LE Coaches Equipped with a Spartan Chassis, and having a VDM (Vehicle Date of Manufacture) of July 11, 2005 through November 21, 2005

**CONDITION:** Air Spring Mounting Angle is Incorrect

**CORRECTION:** Replace spring beams and related hardware components.

**PLEASE READ THE ENTIRE BULLETIN BEFORE PROCEEDING WITH ANY WORK. CONTACT SPARTAN CHASSIS IF THERE ARE ANY CONCERNS WITH THE PROCEDURES CONTAINED IN THIS DOCUMENT.**

### PLEASE NOTE THE FOLLOWING:

- **Inspect air springs for damage. If replacement is necessary, contact Spartan Chassis, Inc. to order the air springs. \***
- **For certain units involved in this campaign, there is a procedure available to replace the dump valve system. Upon initial contact, the Spartan Chassis, Inc. Customer Service Technician will advise if the particular Sales Order (SO) is subject to the dump valve system rework. Order service kit # S-1739-002 once confirmed.**

Technical Service Bulletins are intended for use by Professional Technicians only. They are written to guide Professional Technicians in performing service to vehicles of product specific nature in conjunction with industry standards. Professional Technicians are appropriately trained on industry standards and have the tools and equipment to perform procedures safely and properly.



# SPARTAN CHASSIS, INC.

CSB06-350-002A

May, 2006

Page 2 of 2

## CAMPAIGN SERVICE BULLETIN

---

### PART / SERVICE INFORMATION:

**Labor Time:** 3.0 Hrs.      **Remove and replace spring beams**  
\* **Add:** 1.0 Hr.      **Remove and replace air springs (if required)**

<u>QTY.</u>	<u>Part Number</u>	<u>Description</u>
1	S-1754-001A	Kit- 240AR Air Spring Posture
As needed	81801 or equivalent	Pipe Sealant w/teflon

### **Kit #S-1754-001A Contains:**

<u>QTY.</u>	<u>Part Number</u>	<u>Description</u>
1	K706911	Kit-Tuthill 240AR
1	2435-DD4-001	Ride Height Control Bracket
1	2435-DD4-002	Ride Height Control Bracket
1	CSB06-350-002A	Document Instructions

### INSTRUCTIONS:

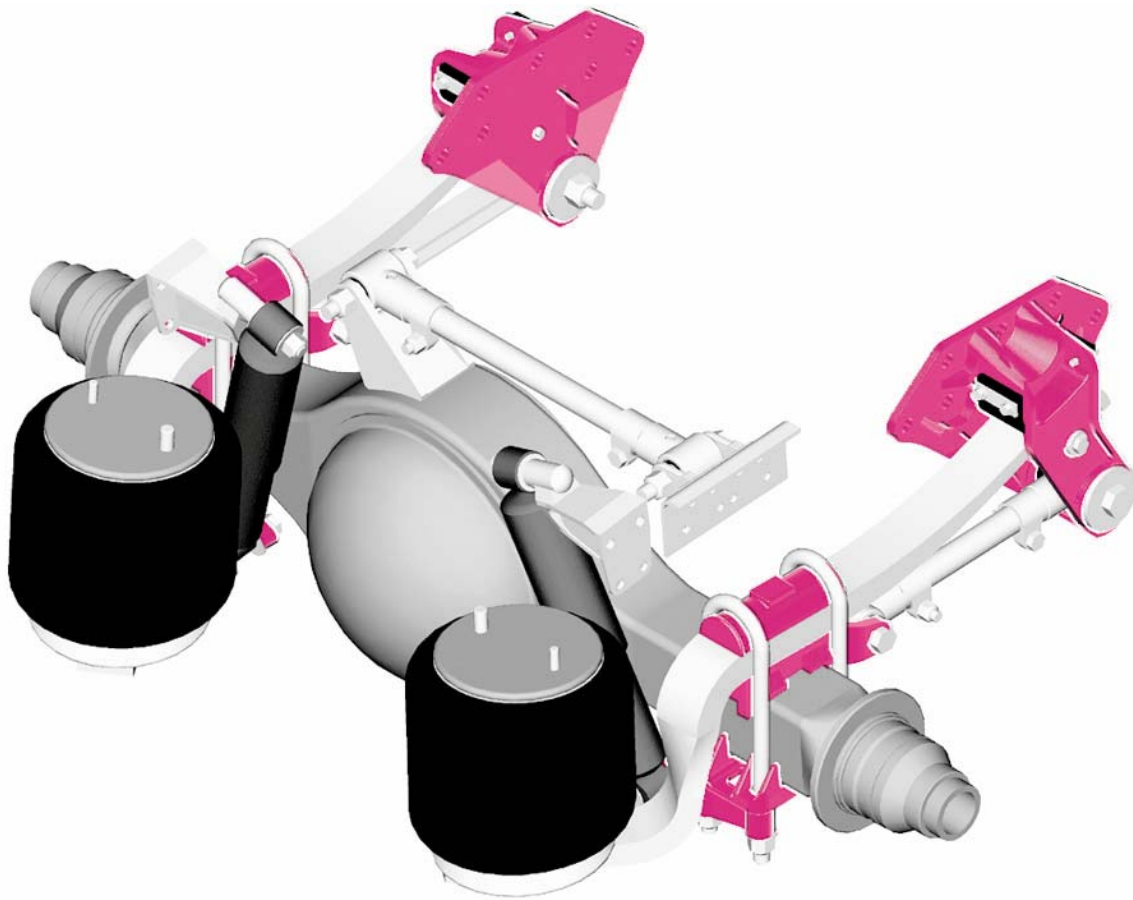
1. Observe all industry safety standards and secure vehicle for replacement of the rear suspension spring beams and air springs.

**Tuthill Transport Technologies in partnership with Spartan Chassis, Inc. has published a rework procedure to replace the spring beams and air springs.**

**The current revision at the time of bulletin release is Rev. L. attached.**

Technical Service Bulletins are intended for use by Professional Technicians only. They are written to guide Professional Technicians in performing service to vehicles of product specific nature in conjunction with industry standards. Professional Technicians are appropriately trained on industry standards and have the tools and equipment to perform procedures safely and properly.

# 240AR Spring Beam Inspection/Rework Procedures



**Reyco  
Granning**  
SUSPENSIONS



**TUTHILL**  
Transport Technologies

1205 Industrial Park Drive  
Mt. Vernon, Missouri USA 65712  
Tel 417 466-2178 Fax 417 466-3964  
[transport.tuthill.com](http://transport.tuthill.com)

### **Safety Notes and Warnings:**

1. Care must be used when working around air suspensions that may still be pressurized. Before performing work on the air springs, ensure that the air system is completely deflated.
2. Spring beams can be quite heavy, so care must be observed when handling them.
3. Final torques must be applied with a torque wrench to the specified torque value.
4. When applying torques to the u-bolts, torque initially to 25 lb-ft and then torque should be incrementally applied in 100 lb-ft increments in a criss-cross pattern until 400 lb-ft and then to 425 lb-ft. (Figure i)

**WARNING:** Failure to properly torque u-bolts may result in u-bolt or spring beam failure.

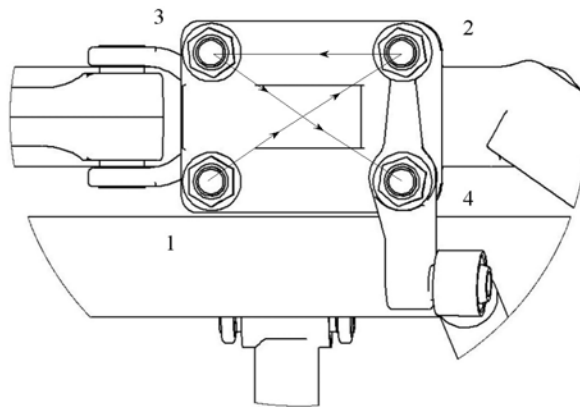


Figure i

5. Tires must be properly chocked prior to performing this repair procedure.

### **Tools Required:**

1. (2) Jack stands with a capacity suitable for supporting the coach
2. Tire chocks

- 3. Ratchet and sockets of the following sizes: 3/4", 1-1/8", 1-5/16", 1-1/2"**
- 4. Torque wrench(s) capable of 25-450 Lb-ft.**

**Parts List:**

Item No.	Where Used	Part No.	Description	Reuse QTY	Discard QTY	New Part QTY
1	Spring	10180500H8B	Bolt, 5/8-18UNF	2	-	-
2	Beam	13677-08	Bushing, Spring Beam	-	2	2
3	Bushing	T2131	Lock Washer, 5/8"	-	2	2
4	Spring Beams	19876-01	Spring Beam, Curb Side	-	1	1
5		19877-01	Spring Beam, Road Side	-	1	1
6		16810-09	Spring Liner	-	2	2
7	Axle Clamp Group	18781-05	Bottom Plate	2	-	-
8		08677-01	Top Plate	2	-	-
9	Shock Lower Mounting	20154-01	Bracket, Lower Shock, Road Side	1	-	-
10		20155-01	Bracket, Lower Shock, Curb Side	1	-	-
11		704021-01	HCV Link	2	-	-
12	Shock Lower Mounting	17354-01	Bolt, 3/4-16 UNF	2	-	-
13		12895-02	Washer, 3/4"	4	-	-
14		14344-01	Lock Nut, 3/4-16 UNF	2	-	-
15		20124-12	Air Spring	2	-	-
16	Axle Clamp Group	16244-01	U-Bolt - 7/8" 13" long	-	2	2
17		15637-01	U-Bolt - 7/8" 15" long	-	2	2
18a		*21738-01	Axle Seat, 4.5 deg	-	-	-
18b		*23358-01	Axle Seat, 2 deg	-	-	-
19		20688-01	Lock Nut, 7/8-14 UNF	-	8	8
20		T7292	Flat Washer, 7/8"	-	8	8
21	Air Spring	706861-01	Lock Nut, 1/2-13 UNC	-	2	2
22	HCV Attachment	1998-MM5	Ride height control bracket	-	2	-
23			HCV Link Rod	2	-	-
24			HCV Link Rod Nut	4	-	-
25		2435-DD4-001	Ride height control bracket	-	-	1
26		2435-DD4-002	Ride height control bracket	-	-	1
27			Air Supply Line	2	-	-
28			Air supply Fitting	2	-	-
29	Air Spring Bracket	10110175FH8Y	5/8" Bolt	4	-	-
30		1011FLN8Y	5/8" Lock Nut	4	-	-
31	HCV	06160150FH8Y	7/16" Bolt	2	-	-
32	Attachment	0616FLN8Y	7/16" lock nut	2	-	-

\*Mountain Master chassis has the 21738-01 axle seat. K2 chassis has the 23358-01 axle seat. Please contact the factory for more information.

**Inspection and Rework Instructions:**

1. Position coach on level surface, level the coach, and chock front tires.
2. Inspect spring beams for grey spring beams. (Figures 1 & 2)



**Figure 1**



**Figure 2**

**If the spring beams are grey in color, they are to be replaced.**



3. Rigidly support rear of vehicle frame with jack stands.
4. Fully deflate the air spring system to allow the jack stands to fully support the vehicle weight.
5. Remove torque arm bush attachment bolt (Item 1) and retain bolt (Item 1) and lock washer (Item 3).
3. Remove bushing (Item 2) from spring hanger. (Figure 3)

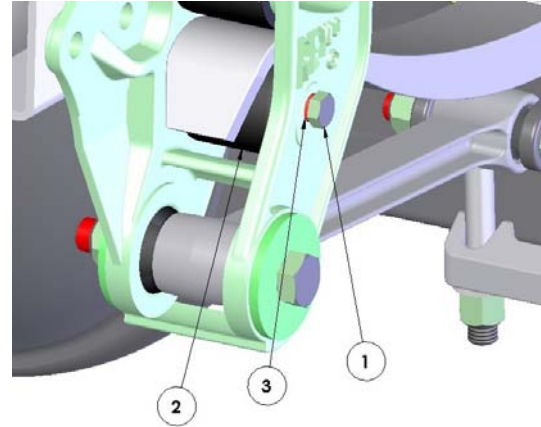


Figure 3

6. Remove height control valve linkage (Item 11). (Figure 4)
7. Remove ride height rod bracket (Item 22) from spring beam (Items 4 or 5). Remove rod attachment pin (Item 23) and nuts (Item 24) from bracket and retain along with bracket attachment bolts and nuts. Discard mounting bracket (Item 22). (Figure 4)
8. Remove the air spring mounting nut (Item 21) and remove the air spring (Item 15) from the spring beam. (Figure 5)

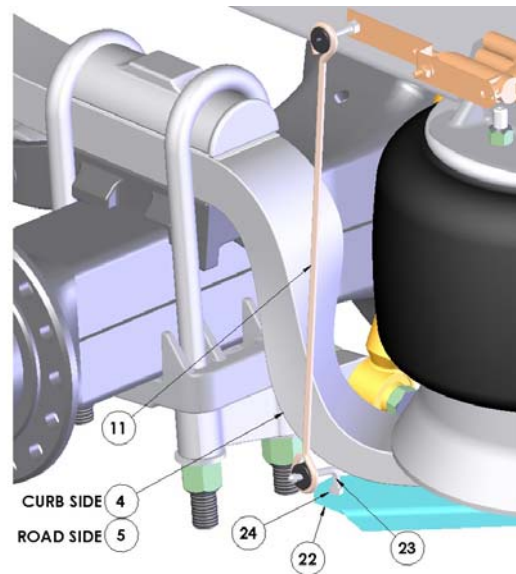


Figure 4

**NOTES:**

- a. Inspect the lower air spring mounting stud and piston for signs of fracture or fatigue.
- b. Replace the air spring if fracture is visible (follow steps 14 through 19).
- c. Inspect air spring for signs of damage.
- d. If air spring doesn't need to be replaced, continue to step 9.

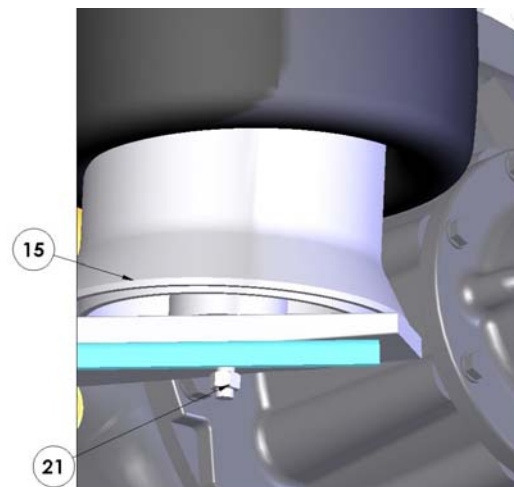
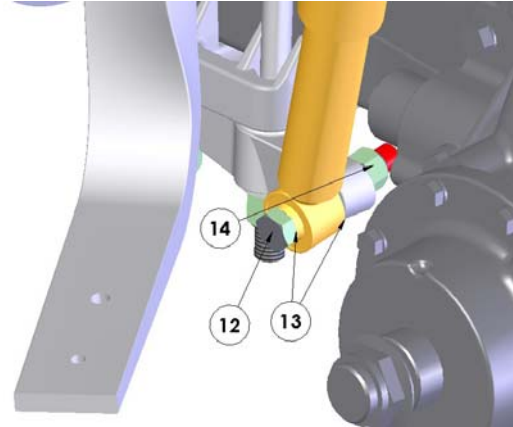


Figure 5

**9. Remove lower shock bolt (Item 12), flat washers (Item 13), and nut (Item 14). Retain for re-assembly. (Figure 6)**

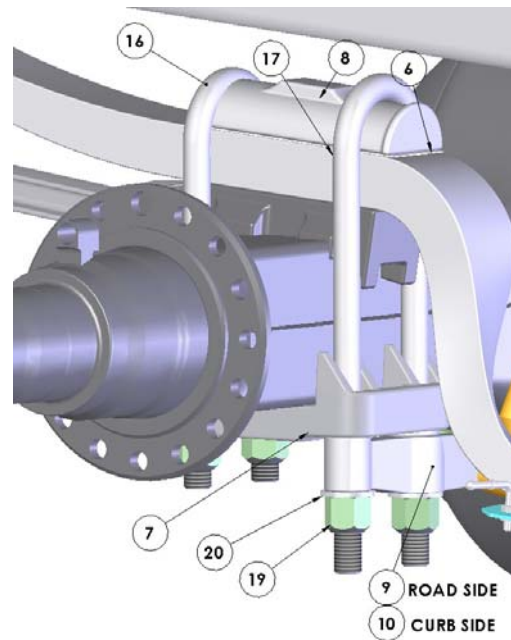


**Figure 6**

**10. Remove and discard U-bolt nuts (Item 19) and flat washers (Item 20) (4 each per side).**

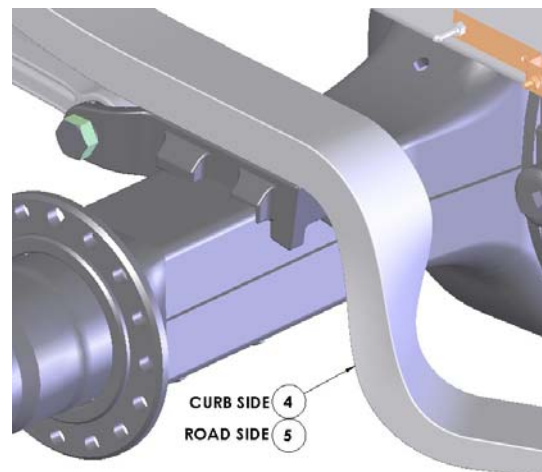
**11. Remove lower shock bracket (Item 9 or 10) and bottom plate (Item 7).**

**12. Remove U-bolts (Items 16 & 17 - 2 each side), top plate (Item 8), and spring liner (Item 6). Discard U-bolts. (Figure 7)**



**Figure 7**

**13. Raise spring beam (Item 4 or 5) to disengage locating dowel then slide spring beam out of spring hanger. (Figure 8)**

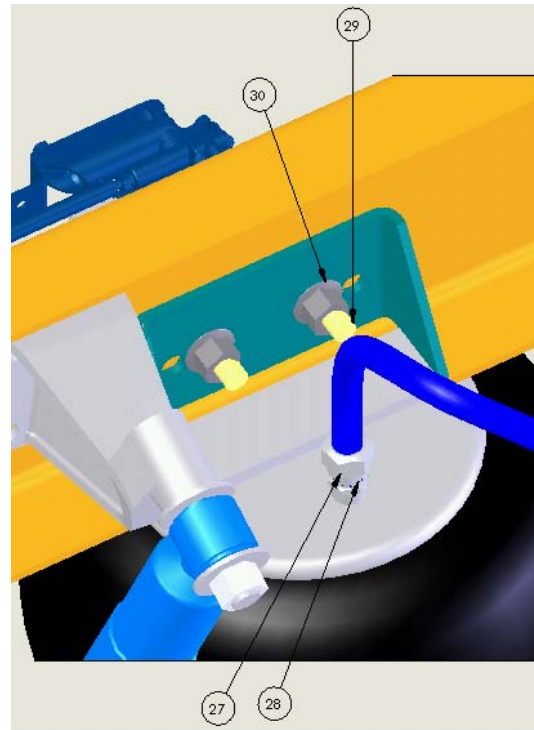


**Figure 8**



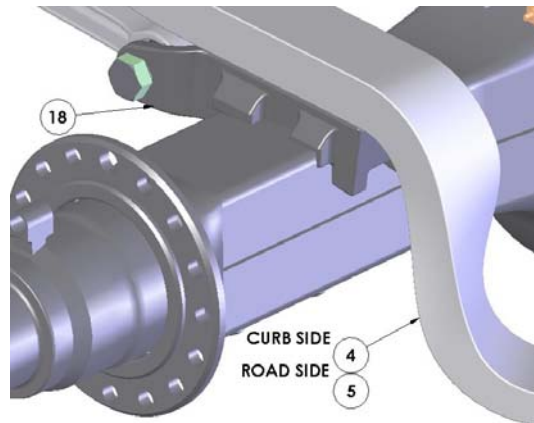
### **Air Spring Replacement**

14. Loosen air supply line (Item 27) at the top of the air spring.
  15. Remove air line fitting (Item 28) from air spring and retain fitting.
  16. Remove bolts mounting air spring bracket to frame rail. Retain bolts (Item 29) and nuts (Item 30).
  17. Loosely mount new air spring to frame rail.
  18. Install new air spring fitting using adequate pipe sealant on fitting prior to installation.
  19. Attach air line to fitting and tighten.
- (Figure 9)



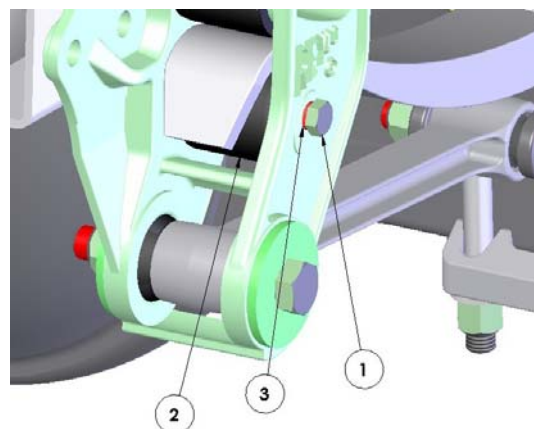
**Figure 9**

20. Install new spring beam (Item 4 or 5) by sliding spring beam into hanger and centering on axle seat (Item 18). Ensure that spring dowel is seated into axle seat.
- (Figure 10)



**Figure 10**

21. Install new spring beam bushing (Item 2), new lock washer (Item 3), and bolt (Item 1). Spring beam bushing bolt torque: 70-80 ft-lbs.
- (Figure 11)



**Figure 11**

22. Place spring liner (Item 6) and top plate (Item 8) on top of spring beam.
23. Install *new* u-bolts (Items 16 & 17 – 2 each side) over top plate.
24. Install bottom plate (Item 7).
25. Install lower shock bracket (Item 9 or 10)
26. Install *new* u-bolt washers (Item 20 – 4 each side).
27. Install *new* u-bolt lock nuts (Item 19 – 4 each side) (Figure 12)

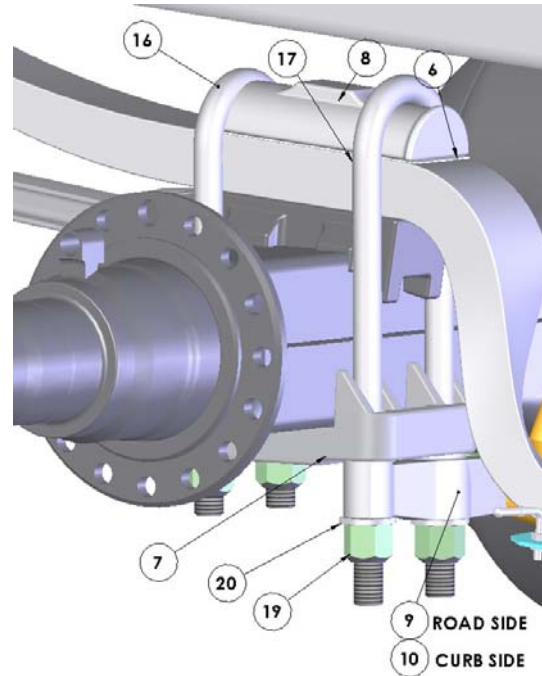


Figure 12

28. Install ride height rod pin (Item 23) and nuts (Item 24) into new ride height rod mounting brackets (Item 25 or 26). Torque to 35-40 in-lbs. (Figure 13)

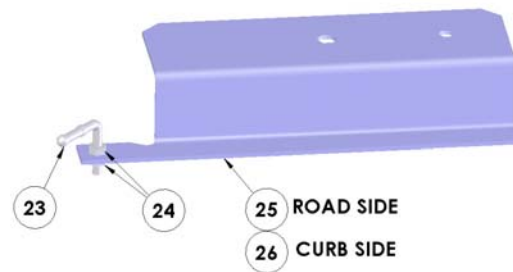


Figure 13

29. Install ride height rod bracket on top of spring beam using retained attachment bolt (Item 31) and nut (Item 32). (Figure 14)

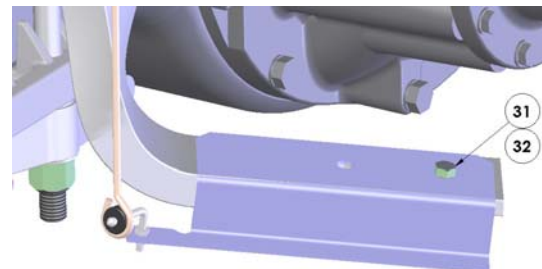
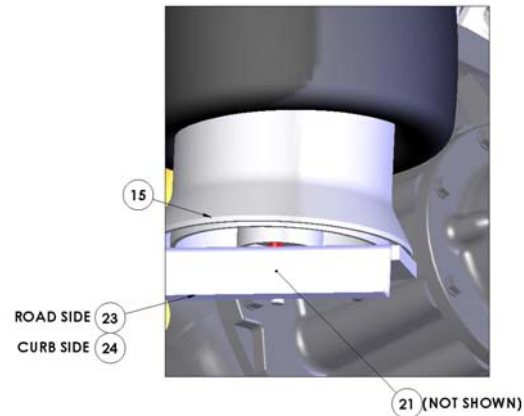


Figure 14

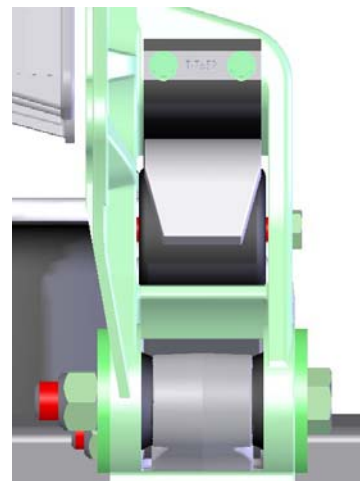
**30. Install air spring (Item 15) onto the spring beam. Install *new* air spring mounting lock nut (Item 21) and torque to 25 to 30 ft-lbs (Figure 15)**



**Figure 15**

**31. Install lower shock bolt (Item 12), washers (Item 13), and nut (Item 14). Torque to 150-175 ft-lbs (See Figure 6)**

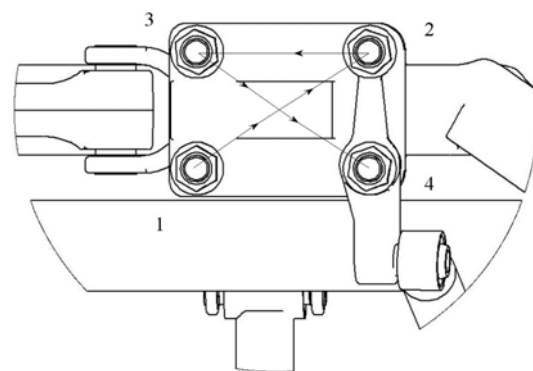
**32. Center spring beam in hanger (Figure 16) and tighten U-bolt nuts in a criss-cross pattern. (Figure 17)**



**Figure 16**

**33. Torque U-bolts to 400-425 ft-lbs as shown in Figure 17.**

*Note: When applying torques to the u-bolts, torque initially to 25 lb-ft and then torque should be incrementally applied in 100 lb-ft increments in a criss-cross pattern until 400 lb-ft and then to 425 lb-ft. (Fig. 17)*



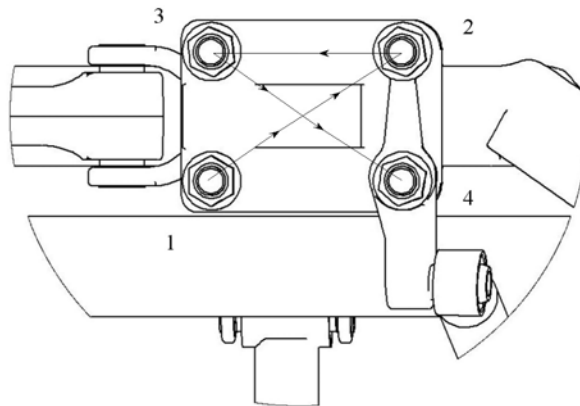
**Figure 17**

34. Install height control valve linkage. (Figure 14)
35. Inflate suspension and check ride height. Follow provided procedure for checking and setting ride height. (Document DC130 (see pages 11-16))
36. Torque air spring-to-frame mounting brackets to 70-80 ft-lbs.
37. Verify that spring beams are still centered in the spring hangers.

**FOLLOW ON PROCEDURE:**

1. U-bolts must be retorqued after 1,000 - 3,000 loaded miles.
  - a. When applying torques to the u-bolts, torque initially to 25 lb-ft and then torque should be incrementally applied in 100 lb-ft increments in a criss-cross pattern until 400 lb-ft and then to 425 lb-ft. (Figure 18)

**WARNING:** Failure to properly torque u-bolts may result in u-bolt or spring beam failure.



**Figure 18**



# SUSPENSION

DC 130

## 12.2.1 Ride Height

As manufactured, a chassis with an air suspension has the ride height preset. However, when bodywork and/or equipment is installed to the chassis, the additional weight, and distribution of that weight, may affect the ride height. In addition, it is possible with some suspensions that the ride height may become inadvertently altered during shipping. Incorrect ride heights can adversely affect ride quality, driveline angle, and wheel alignment. Wheel alignment information is located in section 4.0 of this manual.

The Body/Equipment Company is responsible for checking and adjusting the ride height prior to shipping a completed vehicle. The ride height must also be set correctly before performing an alignment.

The following preparations to the vehicle are necessary before checking/adjusting ride height.

- ◆ Vehicle must be on a level surface.
- ◆ The vehicle must be correctly loaded and balanced close to weight capacity (refer to weight distribution requirements in the General Information / Compliance section).
- ◆ Set the tire pressure for each tire based on the actual load on each axle of the completed vehicle as stated by the tire manufacturer. It will be necessary to know the loaded axle weights for the front and any rear axles. As manufactured, the tire pressures for a chassis are set to the maximum pressure as stated on the tire sidewall.
- ◆ The air system must be fully charged. To achieve a fully charged system:
  - ◆ Deplete air in the system through repeated application of the brake pedal

until the air gauges read approximately 60 psi.

- ◆ Start and run engine until the air dryer purges, which indicates a fully charged system. The air gauges should read between 120 and 140 psi.
- ◆ Chock front tires.
- ◆ Release the parking (spring) brake.
- ◆ "Dump" the air suspension by activating the dash-mounted switch, leveling the jack system, or disconnecting the height control rod from the valve arm or suspension.

Exhaust air from all air springs until vehicle is in full jounce position.

- ◆ Reconnect linkage if necessary.
- ◆ Measure the ride height. If adjustments to the height control valves are made, repeat dumping of the air suspension and measure the ride height following the instructions in the next section.

### 12.2.1a Measuring and Adjusting Ride Height

Refer to the illustrations at the end of this section and follow the appropriate instructions to adjust the ride height control valve(s).

- ◆ The ride height on the drive and steer axles must be set/verified before measuring/adjusting the ride height on a tag axle.



# SUSPENSION

DC 130

## Drive and Steer Axles

- ♦ Ride height control valve illustrations for *drive and steer axles*:
  - ♦ SUSP-1; Instructions For Measuring Ride Height
  - ♦ SUSP-2; Typical Neway / Hadley Height Control Valves
  - ♦ SUSP-3; Single Neway w/IFS
  - ♦ SUSP-4; Two Neway Valves w/IFS
- ♦ Locate the height control valve(s) and adjust as required. A typical full-air suspension vehicle will have two height control valves on one axle, while having an additional height control valve on a second axle.

An axle equipped with two height control valves should have the valves adjusted first (leveling the vehicle from side-to-side). The axle with one height control valve should be adjusted secondary to the axle with two height control valves.

- ♦ A properly adjusted ride height control valve will be in its neutral/center position (no air flowing through valve) when the vehicle is at its proper ride height. The actuation arm/horizontal rod will be in a generally horizontal position.
- ♦ When all adjustments are complete for both the drive and steer axle, verify that the ride height adjustments are within specification and within .25" from side-to-side. Contact Spartan Chassis if these specifications cannot be achieved.

## Tag Axle

- ♦ The ride height is self-adjusting.



**MEASURE RIDE HEIGHT ON THE AXLE WITH TWO HEIGHT CONTROL VALVES FIRST. FOLLOW PROCEDURE #1. FOR AXLES WITH ONE HEIGHT CONTROL VALVE, MEASURE AT THE SIDE OF THE VEHICLE CLOSEST TO THE HEIGHT CONTROL VALVE LOCATION.**

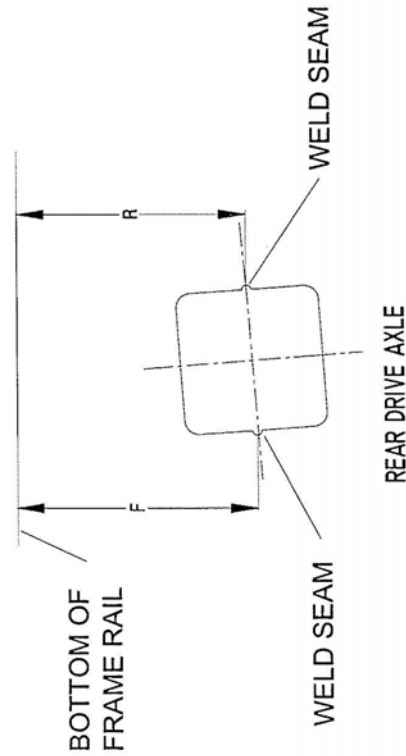
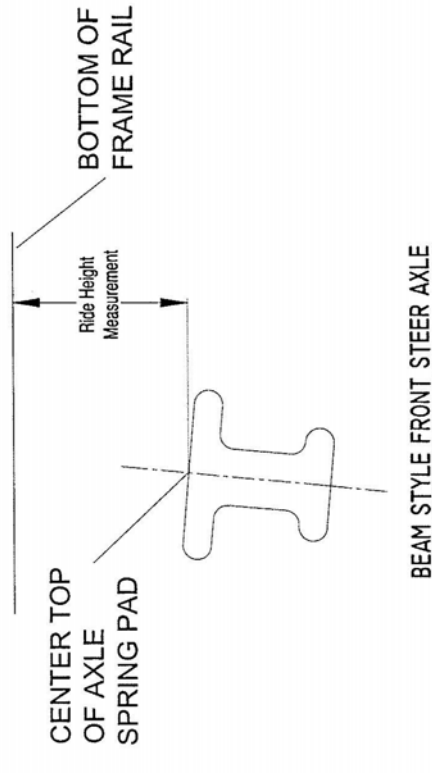
**FRONT AXLE RIDE HEIGHT MEASUREMENT** - As defined, the front ride height is the distance between the bottom of the frame rail and the centerline of the axle spindle.

1. To correctly measure beam style front axle ride height, measure the distance between the bottom of the frame rail and the center of the top of the front axle spring pad. Do this for each side. The measurement should be within 0.25" from side-to-side and within the stated specification. If the measurements are not within specification, proceed with the adjustment procedure for the specific height control valve application.

To correctly measure IFS ride height, refer to Illustration #SUSP-4. Measure the distance between the center of the upper shock mount bolt and the center of the lower shock mount bolt as shown. Do this for each side. The measurement should be within 0.25" from side-to-side and within the stated specification. If the measurements are not within specification, proceed with the adjustment procedure for the specific height control valve application.

**REAR AXLE RIDE HEIGHT MEASUREMENT** - As defined, the rear ride height is the distance between the bottom of the frame rail and the centerline of the axle housing.

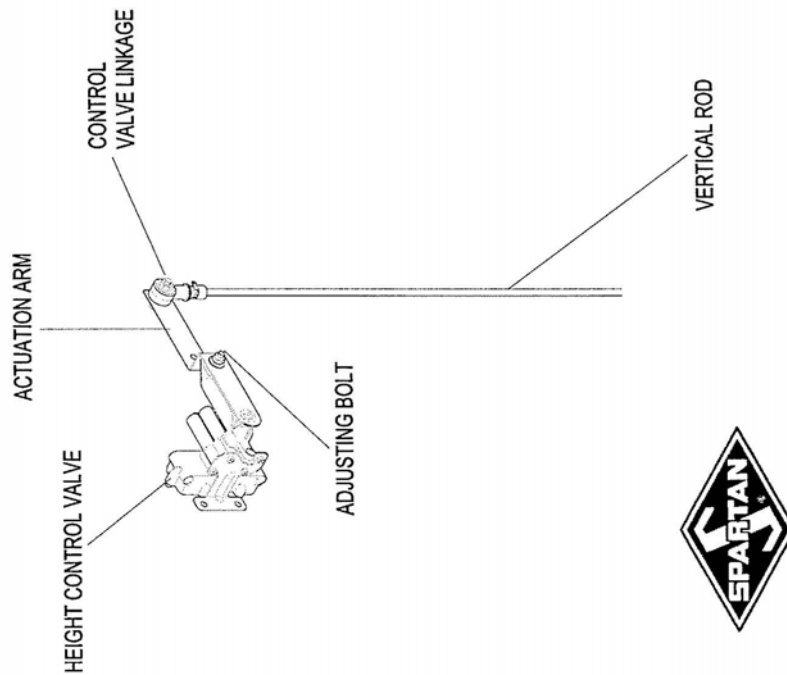
1. To correctly measure rear axle ride height, measure the distance between the bottom of the frame rail and the weld seam at the forward side of the axle housing. Record this as value 'F'. Measure the distance from the bottom side of the frame rail to the weld seam at the rearward side of the axle housing. Record this as value 'R'. Add value 'F' to value 'R' and divide the sum by 2. The result should be within the specification as stated in Appendix E. If the result is not within specification, proceed with the adjustment procedure for the specific height control valve application. Do this for each side. The measurement should be within 0.25" from side-to-side and within the stated specification. If the measurements are not within specification, proceed with the adjustment procedure for the specific height control valve application.



## INSTRUCTIONS FOR MEASURING RIDE HEIGHT



## Height control valve adjustment procedures for Hadley or Neway valves controlling the ride height of a beam style front steer axle or a rear drive axle.



### Axle with TWO height control valves:

1. Based on the measurements taken, determine which valve requires adjustment.
  2. Deflate the air spring **opposite** the side requiring adjustment by disconnecting the control valve linkage (at either end) and rotating the actuation arm downward.
  3. At the control valve requiring adjustment, loosen adjusting bolt on actuation arm.
  4. Rotate the actuation arm as necessary (up or down) to achieve specified ride height. Before taking adjusted ride height measurement, wait 30 seconds for suspension to 'settle' after adjustment.
- NOTE:** A Neway valve has a built-in delay of 6-10 seconds before the valve responds to arm movement.
5. With ride height adjusted to proper specification, tighten the adjusting bolt on the actuation arm (torque 24-48 LBS. IN.)
  6. Reconnect the vertical rod on the opposite side, which had been disconnected in step #2.
  7. Repeat steps 2 thru 6 if necessary on the opposite side of vehicle.
  8. After all adjustments, measure ride height to verify proper specification. The measurements from side-to-side should be within 0.25". If for any reason specifications cannot be met or maintained, contact Spartan Motors.

### Axle with ONE height control valve:

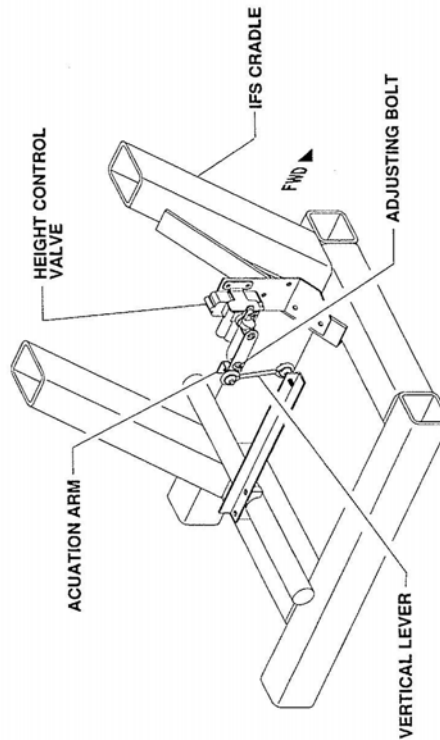
1. Loosen adjusting bolt on actuation arm (based on the measurements taken on the side of the vehicle closest to the height control valve).
  2. Rotate the actuation arm as necessary (up or down) to achieve specified ride height. Before taking adjusted ride height measurement, wait 30 seconds for suspension to 'settle' after adjustment.
- NOTE:** A Neway valve has a built-in delay of 6-10 seconds before the valve responds to arm movement.
3. With ride height adjusted to proper specification, tighten the adjusting bolt on the actuation arm (torque 24-48 LBS. IN.)
  4. After adjustment, measure ride height to verify proper specification. If for any reason specification cannot be met or maintained, contact Spartan Motors.

## TYPICAL NEWAY / HADLEY HEIGHT CONTROL VALVES

## ILLUSTRATION #SUSP-2



# Height control valve adjustment procedure for a single Neway height control valve controlling the ride height of an IFS (Independant Front Suspension).



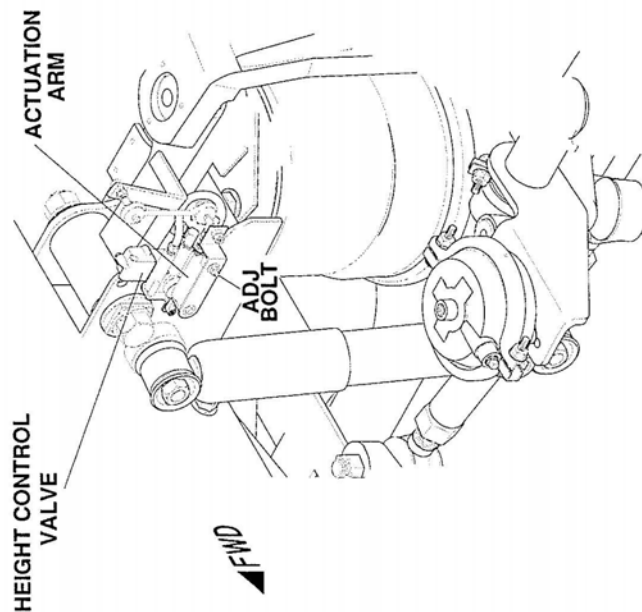
1. At the control valve, loosen adjusting bolt on actuation arm.
  2. Rotate the actuation arm as necessary (up or down) to achieve specified ride height. Before taking adjusted ride height measurement, wait 30 seconds for suspension to 'settle' after adjustment.
- NOTE:** The Neway valve has a built-in delay of 6-10 seconds before the valve responds to arm movement.
3. With ride height adjusted to proper specification, tighten the adjusting bolt on the actuation arm (torque 24-48 LBS. IN.)
  4. After all adjustments, measure ride height to verify proper specification. The measurements from side-to-side should be within 0.25". If for any reason specifications cannot be met or maintained, contact Spartan Motors.

## TYPICAL NEWAY HEIGHT CONTROL VALVE - SINGLE VALVE W/IFS

### ILLUSTRATION #SUSP-3

SUSP Rev. 07/15/02

Body Builders Manual



# Height control valve adjustment procedure for two height control valves controlling the ride height of an IFS (Independent Front Suspension).

1. Based on the measurements taken, determine which valve requires adjustment.
2. Deflate the air spring opposite the side requiring adjustment by disconnecting the control valve linkage (at either end) and rotating the actuation arm downward.
3. At the control valve requiring adjustment, loosen adjusting bolt on actuation arm.
4. Rotate the actuation arm as necessary (up or down) to achieve specified ride height. Before taking adjusted ride height measurement, wait 30 seconds for suspension to 'settle' after adjustment.

NOTE: The Newway valve has a built-in delay of 6-10 seconds before the valve responds to arm movement.

5. With ride height adjusted to proper specification, tighten the adjusting bolt on the actuation arm (torque 24-48 LBS. IN.).
6. Reconnect the vertical rod on the opposite side (disconnected in step #2)
7. Repeat steps 2 thru 6 if necessary on the opposite side of vehicle.
8. After all adjustments, measure ride height to verify proper specification. The measurements from side-to-side should be within 0.25". If for any reason specifications cannot be met or maintained, contact Spartan Motors.

## TYPICAL NEWAY HEIGHT CONTROL VALVE - 2 VALVES W/IFS

## ILLUSTRATION #SUSP-4