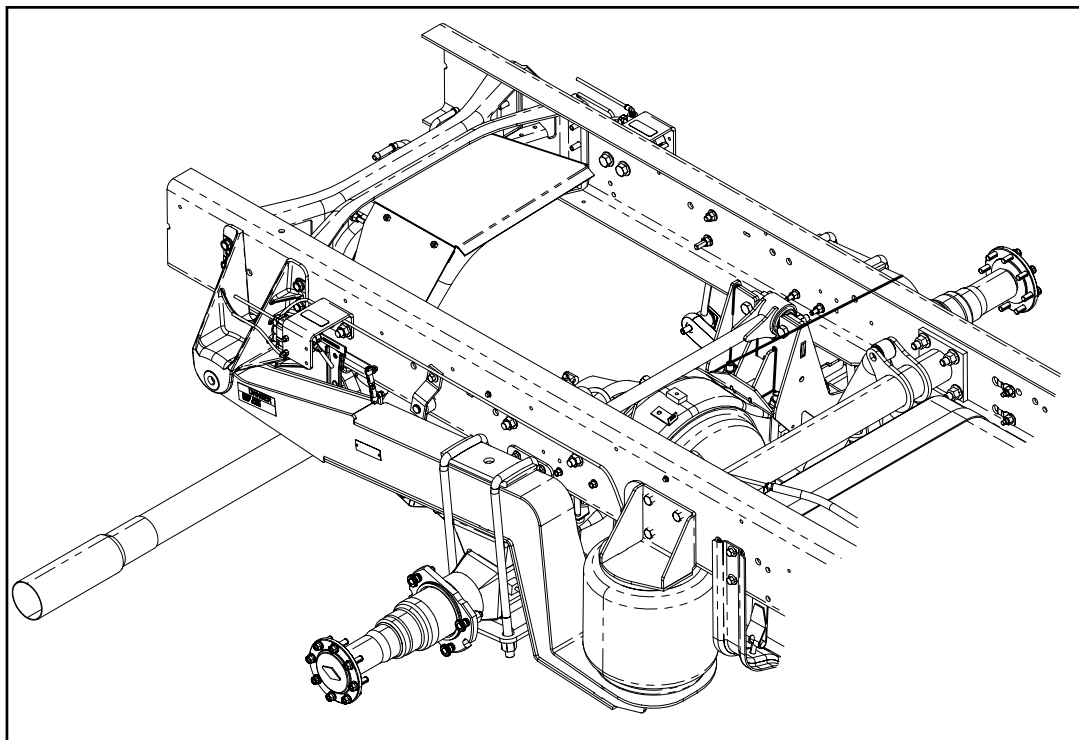




INSTALLATION MANUAL

FORD F53 CHASSIS 2004-NEWER MODELS



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51250-2120

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**QUESTIONS?
CALL CUSTOMER
SERVICE
1-800-222-6283**

PROUDLY INSTALLED BY :

COMPANY : _____

INSTALLER SIGNATURE : _____

DATE : _____

050608
80001131

INSTALLATION INSTRUCTIONS INDEX

- 1.0 INTRODUCTION
- 2.0 DRIVER SIDE DISASSEMBLY
- 3.0 DRIVER SIDE ASSEMBLY
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- 10.0 FINAL INSPECTION & OPERATION
- 11.0 SERVICE & MAINTENANCE

1. INTRODUCTION

IMPORTANT! It is important that the entire installation instructions be read thoroughly before proceeding with suspension installation.



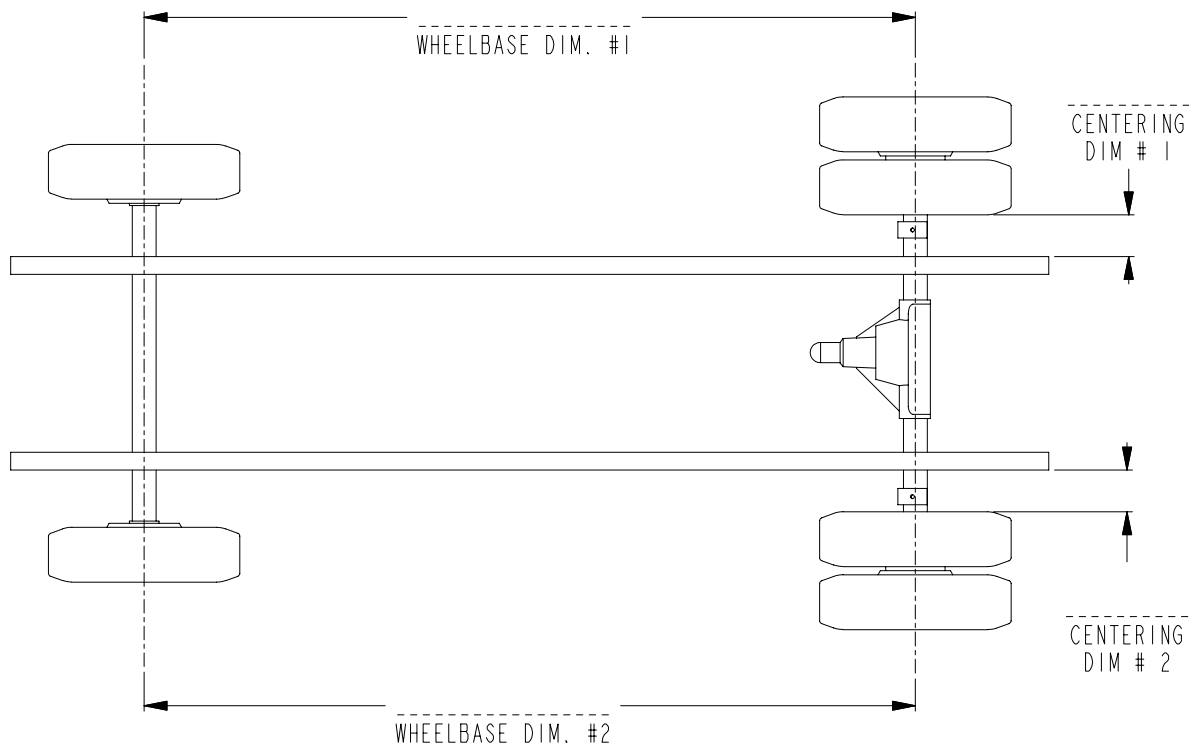
WARNING! A correct installation must result in the suspension and axle being “loaded” within the range specified by axle and suspension manufacturers. Please check vehicle specifications and intended usage to insure axle will be within Gross Axle Weight Rating (GAWR). No alteration of any suspension component is permitted.

PRODUCT INSTALLER RESPONSIBILITIES

- Installer is responsible for installing the product in accordance with Link Mfg. specifications and installation instructions.
- Installer is responsible for providing proper vehicle components and attachments as well as required or necessary clearance for suspension components, axles, wheels, tires, and other vehicle components to ensure a safe and sound installation and operation.
- Installer is responsible for advising the owner of proper use, service and maintenance required by the product and for supplying maintenance and other instruction as readily available from Link Mfg.

PRE-INSTALLATION CHECKLIST

- ❑ Check the vehicle wheel alignment prior to installation to insure no precondition already exists; record the information for verification.
- ❑ Removal of rear wheels will aid in installation.
- ❑ If not using a lift, block the front wheels and apply the emergency brake so the vehicle cannot roll.
- ❑ Jack up the rear frame of the truck in order to unload the rear leaf springs (or use an overhead hoist). Do not lift the wheels off the ground (if not using a lift to install the suspension). Do not jack on the axle itself.
- ❑ Install the suspension in the listed sequence. Install one side of the suspension at a time. First, install the driver side completely, then install the passenger side. Removal of the rear wheels may aid in installation, but it is not necessary.
- ❑ Measure & record the wheelbase and centering dims before beginning installation.



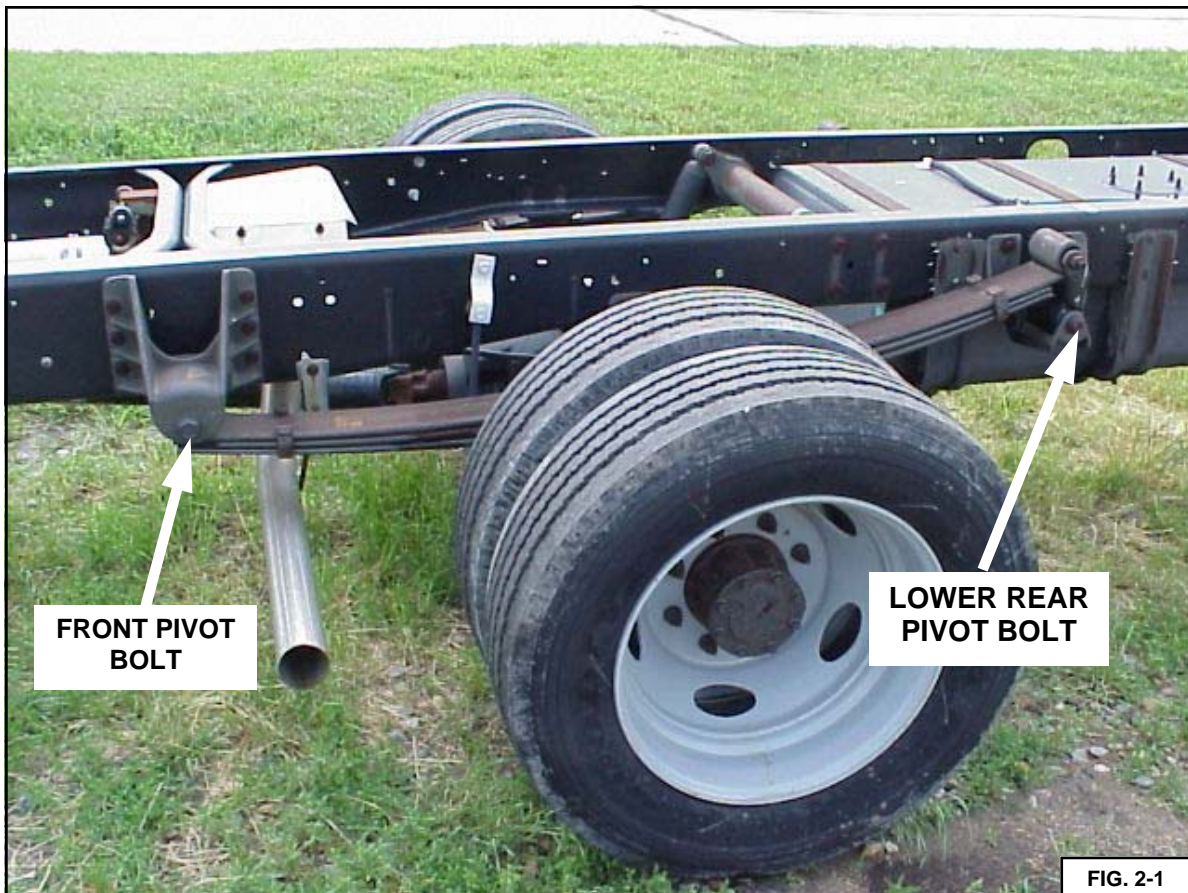
2. DRIVER SIDE DISASSEMBLY

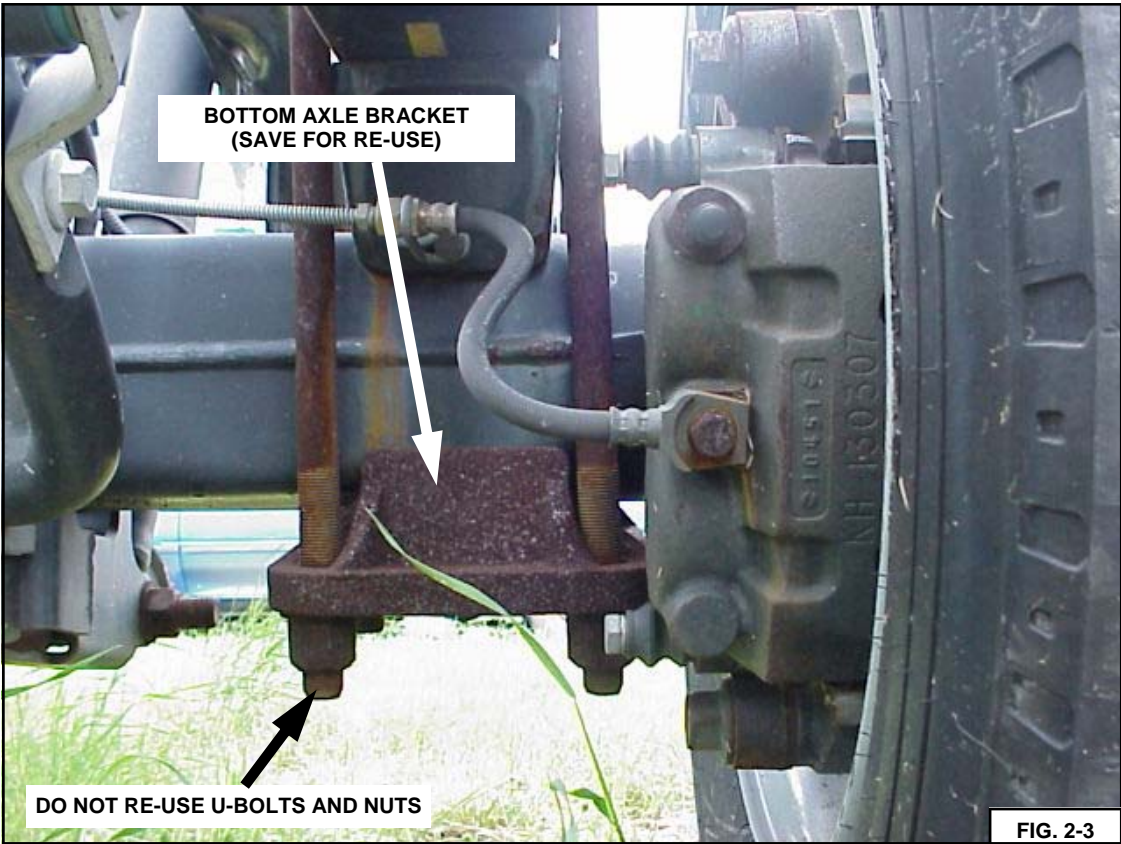
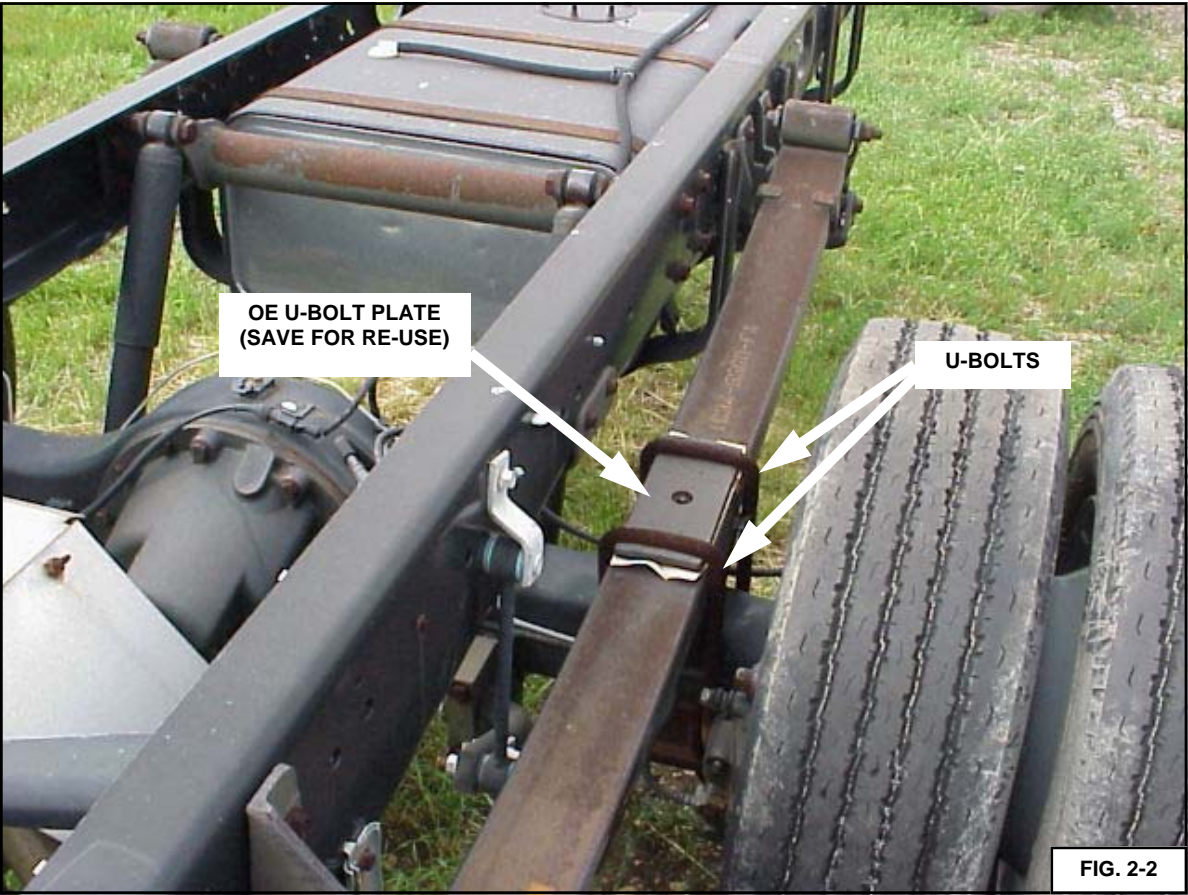
1. With weight taken off the rear springs, as noted in pre-installation checklist, loosen and remove the front and lower rear leaf spring pivot bolts. See Figure 2-1. **IMPORTANT!** Retain the **front pivot bolt & nut** for reuse.



CAUTION: Be careful that the leaf spring does not spring out of its hanger, or off the frame.

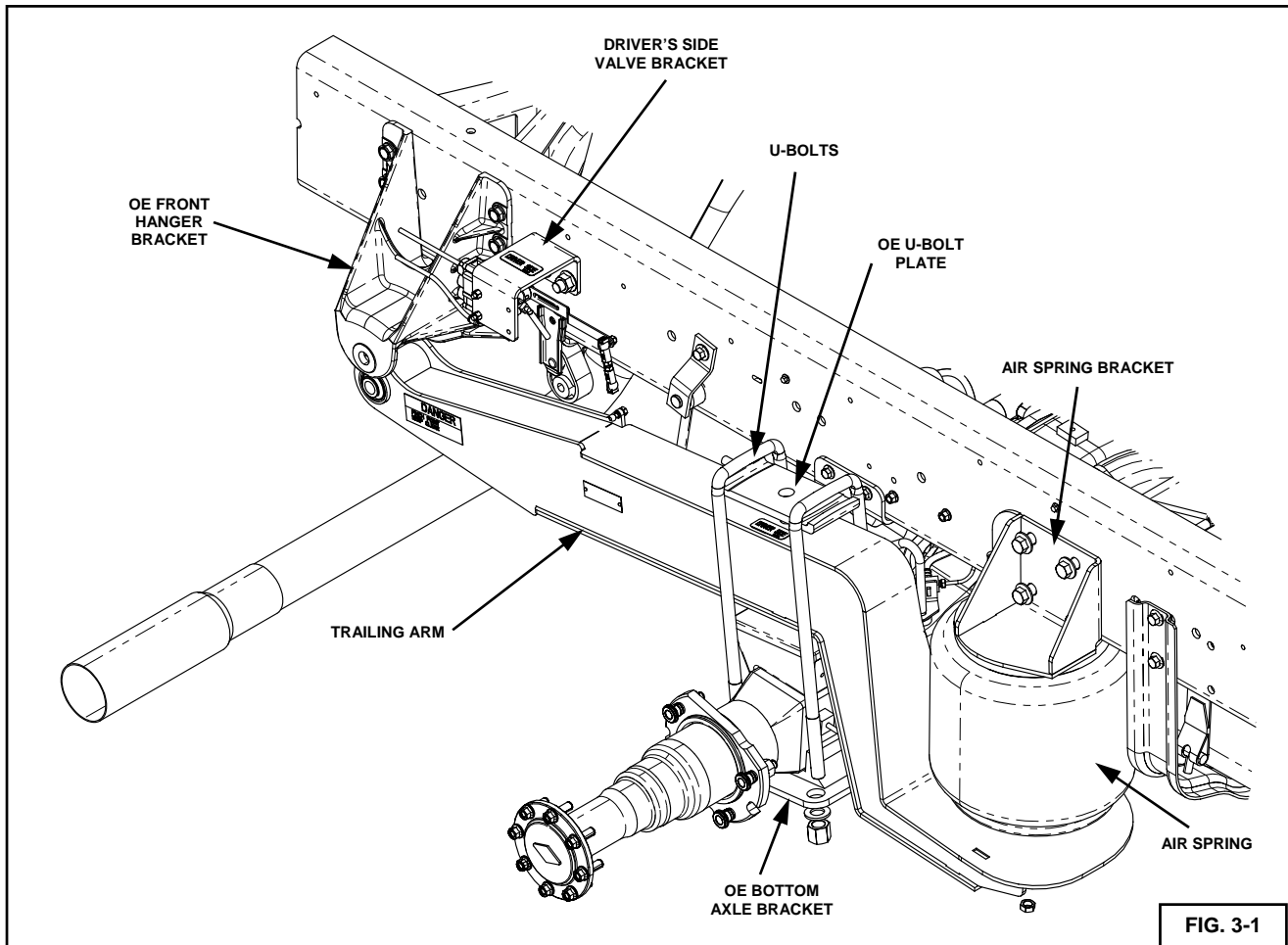
2. Remove the **leaf springs** by loosening and removing the U-bolts. See Figures 2-2 & 2-3. **IMPORTANT!** Retain the **OE U-bolt plate** and **bottom axle bracket** for reuse.





3. DRIVER SIDE ASSEMBLY

1. Review Figure 3-1 & Figure 11-1 to acquaint yourself with the various parts of the UltraRide suspension.
2. Assemble the Suspension Arm to the axle using (2) 3/4" UNF X 4.25 X 17.25 U-Bolts, (4) 3/4" washers, (4) 3/4" UNF nuts, and the original OE top plate and bottom axle bracket. Make sure the arm/axle locating pin is properly inserted into the mating hole on the axle pad and that the bottom side of the arm rests evenly on the axle pad. (Torque the nuts to 260 FT-LBS)
3. Attach the arm pivot bushing to the Front Hanger Bracket using the original 20mm bolt and nut. (Torque **later** to 300 FT-LBS.)
4. Loosen the (4) 16mm shock mount crossmember bolts and bolt the Air Spring Bracket to the frame using the same bolts and nuts. Torque to 200 FT-LBS.
5. Bolt the Air Spring to the Suspension Arm using (1) 1/2 UNC JAM NUT. Make certain the air spring is not twisted or creased after tightening the nut. (Torque to 25-35 FT-LBS.)
6. Attach the Driver's Side Valve Bracket to the frame using (2) 5/8" X 1-1/2" UNC Flange Bolts and (2) 5/8" UNC Flange Nuts. (Torque to 100-130 FT-LBS.)



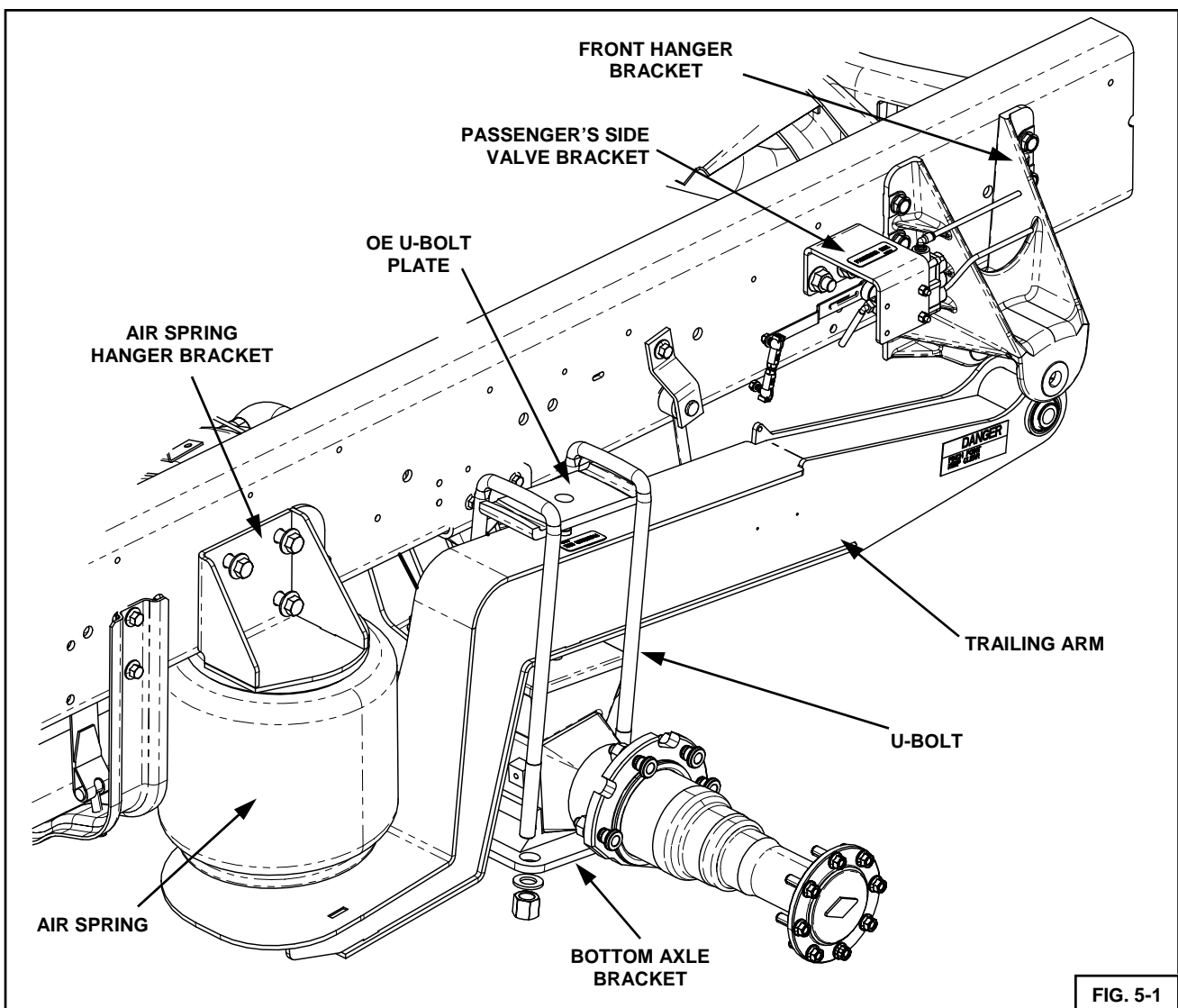
4. PASSENGER SIDE DISASSEMBLY

1. Repeat Section 2 for the passenger's side of the truck.

5. PASSENGER SIDE ASSEMBLY

1. Repeat Section 3 for the passenger's side of the truck.

Double-check all fasteners for proper torque. Check all clearance points and all alignments. See Figure 5-1 for details.



6. LATERAL CONTROL ROD

AXLE BRACKETS INSTALLATION

1. Place the Lateral Control Rod Axle Bracket on the top of the axle on the passenger side. Make sure the end touches the axle perch block. (See Figure 6-1).
2. Bolt the Axle bracket to the axle using (1) 5/8" UNF X 9.50" u-bolt, (1) 5/8" UNF X 6.25" u-bolt, (4) 5/8" UNF Flange nuts, and the supplied U-Bolt Saddle. Ensure that the u-bolt saddle fits under and around the axle to give the long u-bolt a flat mounting surface. (Torque to 185-235 FT-LBS.)
3. Using the supplied clips on the front side of the axle bracket, route the brake line through these clips and away from any other objects. (See Figure 6-2).
4. Attach the Driver's Side bumper plate to the axle using (1) 5/8" UNF X 6.25" u-bolt and (2) 5/8" UNF Flange nuts. (See Figure 6-3.) (Torque to 100-130 FT-LBS.)

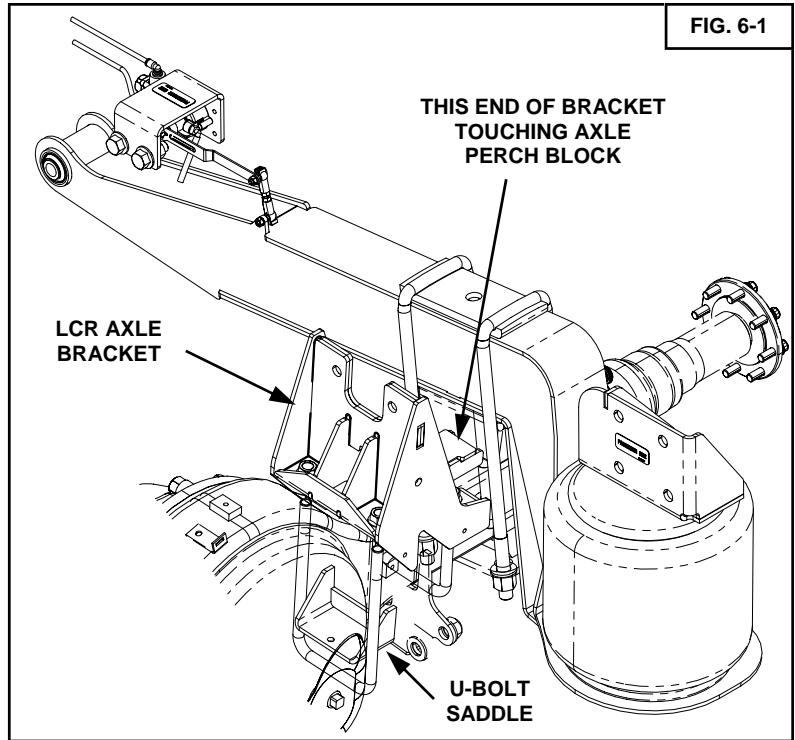


FIG. 6-1

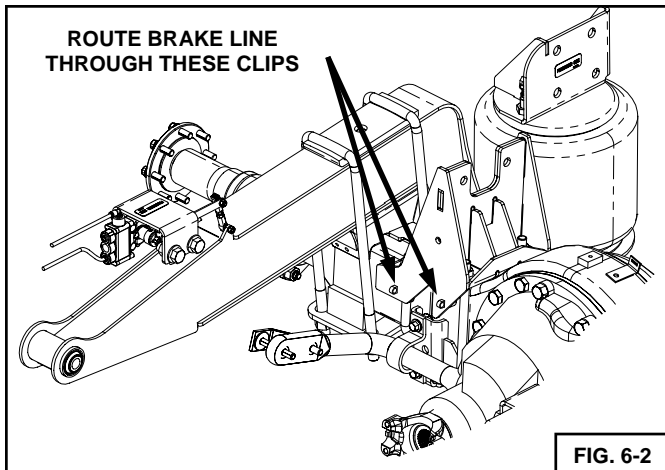


FIG. 6-2

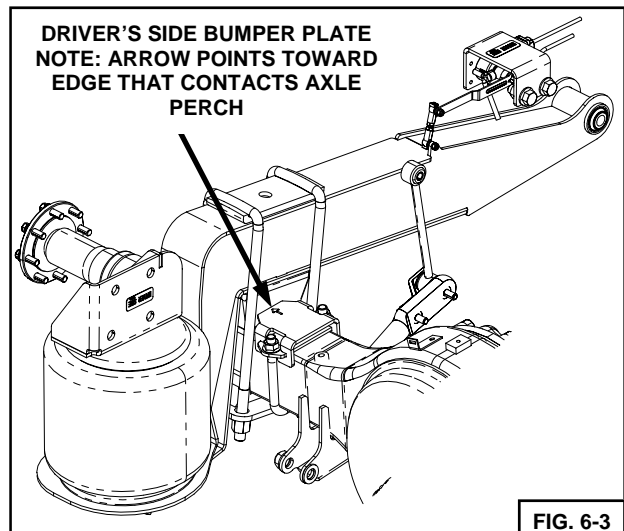


FIG. 6-3

7. LATERAL CONTROL ROD

FRAME BRACKET INSTALLATION

1. On the Driver side, install the Lateral Control Rod Frame Bracket using (2) 5/8" X 1-1/2" UNC Flange Bolts and (2) 5/8" UNC Flange Nuts (Torque to 185-235 FT-LBS.) Reuse the 10mm OE bumper plate bolts and nuts to attach the bottom portion of the bracket to the frame (Torque to 40 FT-LBS). (See Figure 7-1)



CAUTION: Make sure fuel lines do not contact the bracket, which could cause the lines to fail and leakage to occur.

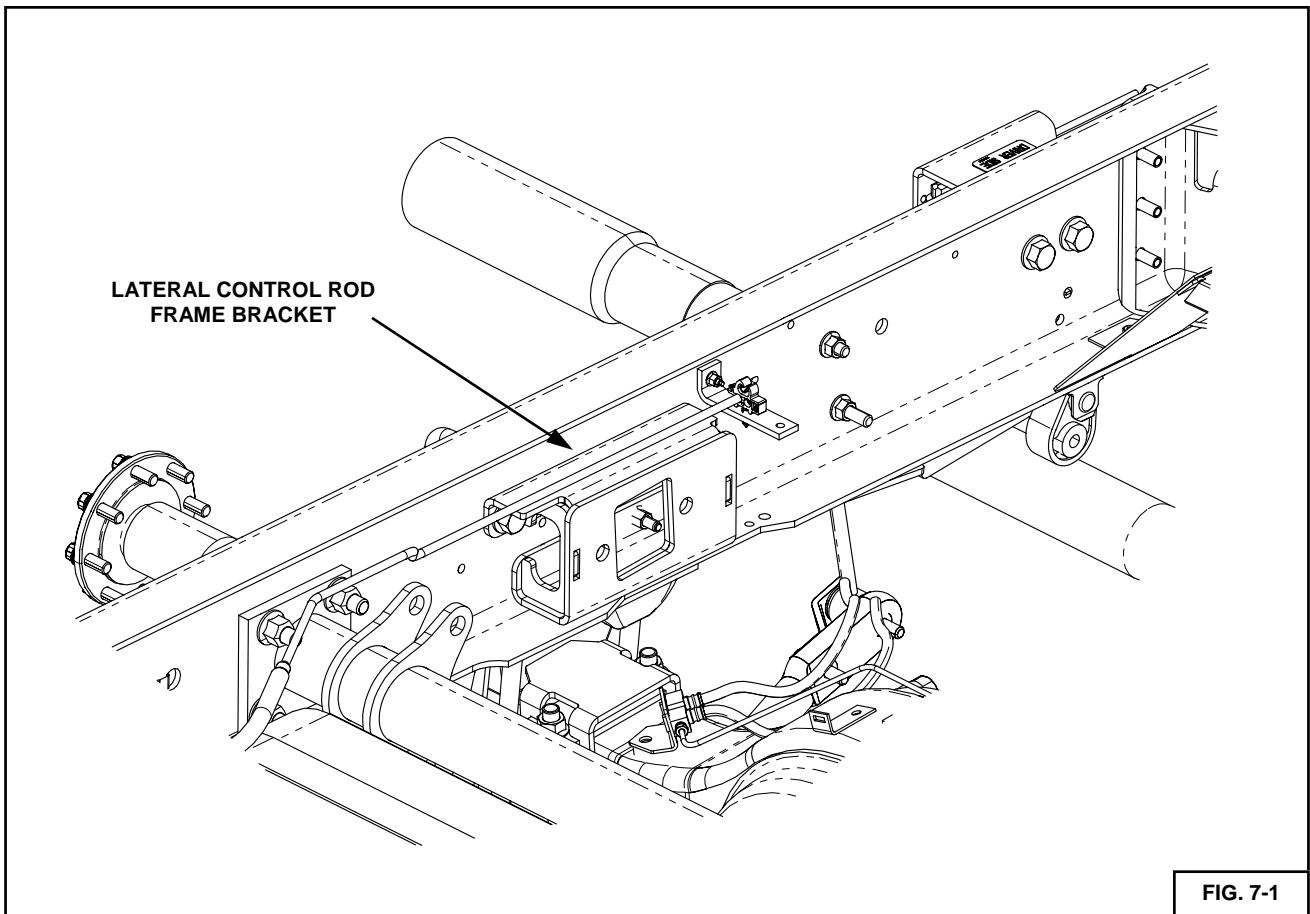
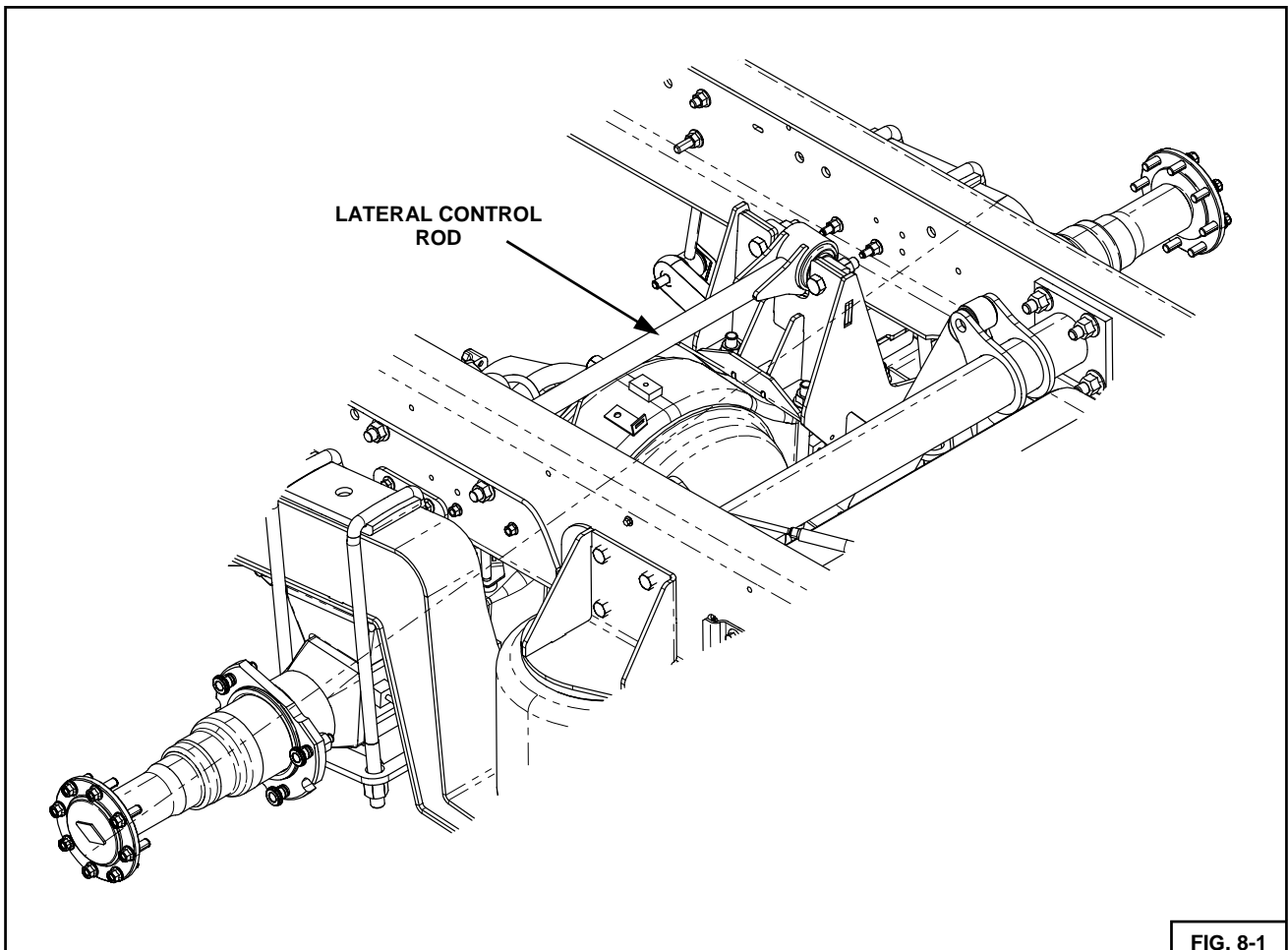


FIG. 7-1

8. LATERAL CONTROL ROD

1. Insert the Lateral Control Rod using (4) 5/8 X 2-3/4" UNF BOLTS and (4) 5/8 UNF TOP LOCK NUTS. (Torque later to 185-235 FT-LBS.)

IMPORTANT: Inspect Lateral Control Rod for any interference with other components, paying close attention to clearance with any flexible components such as brake and fuel lines.



9. AIRLINE CONNECTIONS



CAUTION! Route all airline away from exhaust, moving parts, and sharp objects. Be careful not to crimp the edges of the tubing. When installing the airline, fully insert into fitting and give a slight pull to seat properly and to be sure airline will not pull out.

1. Mount the Air Control Box to the vehicle. Make sure it is mounted as high on the frame as possible to allow for ground clearance below the tank. See the Air Control Kit Installation Instructions packaged with air kit for more details.

2. Route the Airlines as shown in Figures 9-1, 9-2, 9-3, and 9-4.

2.1. Route AIRLINE #1 from the 'MAIN SUPPLY PORT' on the air kit to the 'AIR SUPPLY TEE'.

2.2. Route AIRLINE #5 from the 'AIR SUPPLY TEE' to the 'SUP' port on the driver side height control valve.

2.3. Route AIRLINE #6 from the 'AIR SUPPLY TEE' to the 'SUP' port on the passenger side height control valve.

2.4. Route AIRLINE #2 from the 'PILOT SUPPLY PORT' to the 'DUMP PILOT TEE.'

2.5. Route AIRLINE #7 from the 'DUMP PILOT TEE' to the dump port on the driver side height control valve.

2.6. Route AIRLINE #8 from the 'DUMP PILOT TEE' to the dump port on the passenger side height control valve.

2.7. Route AIRLINE #3 from the 'DEL' port on the driver side height control valve to the driver side air spring.

2.8. Route AIRLINE #4 from the 'DEL' port on the passenger side height control valve to the passenger side air spring.

3. Place supplied Corrugated Loom onto all Airlines. Use supplied Cable Ties and Airline Clips to secure Airline and to keep it away from all hazardous objects.

DRIVER SIDE VALVE ASSEMBLY

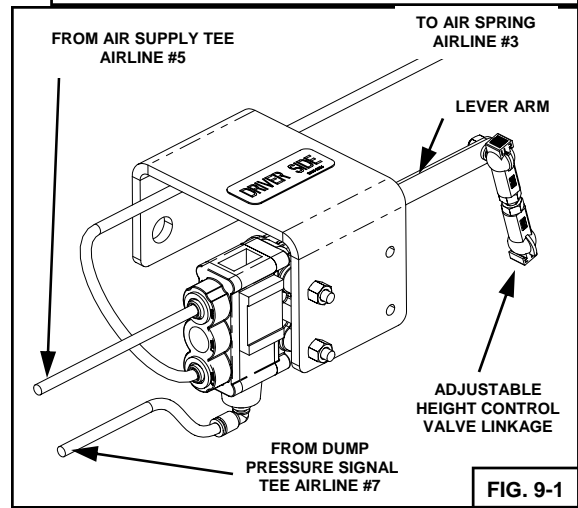


FIG. 9-1

PASSENGER SIDE VALVE ASSEMBLY

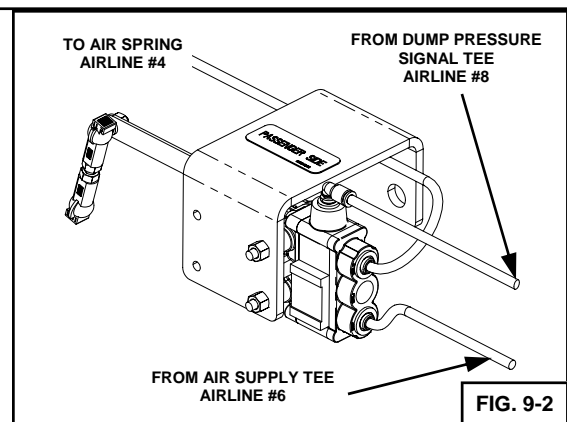


FIG. 9-2

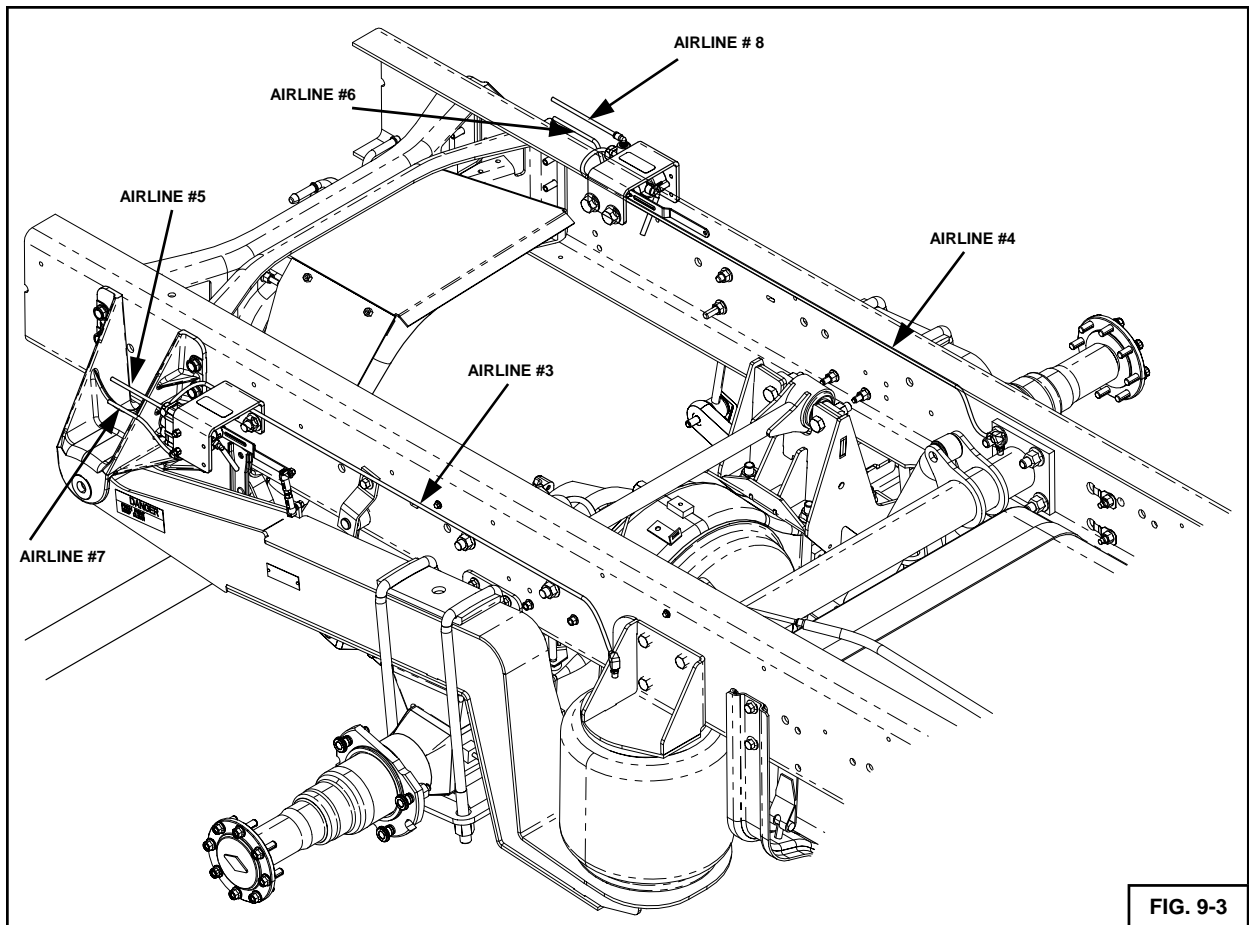


FIG. 9-3

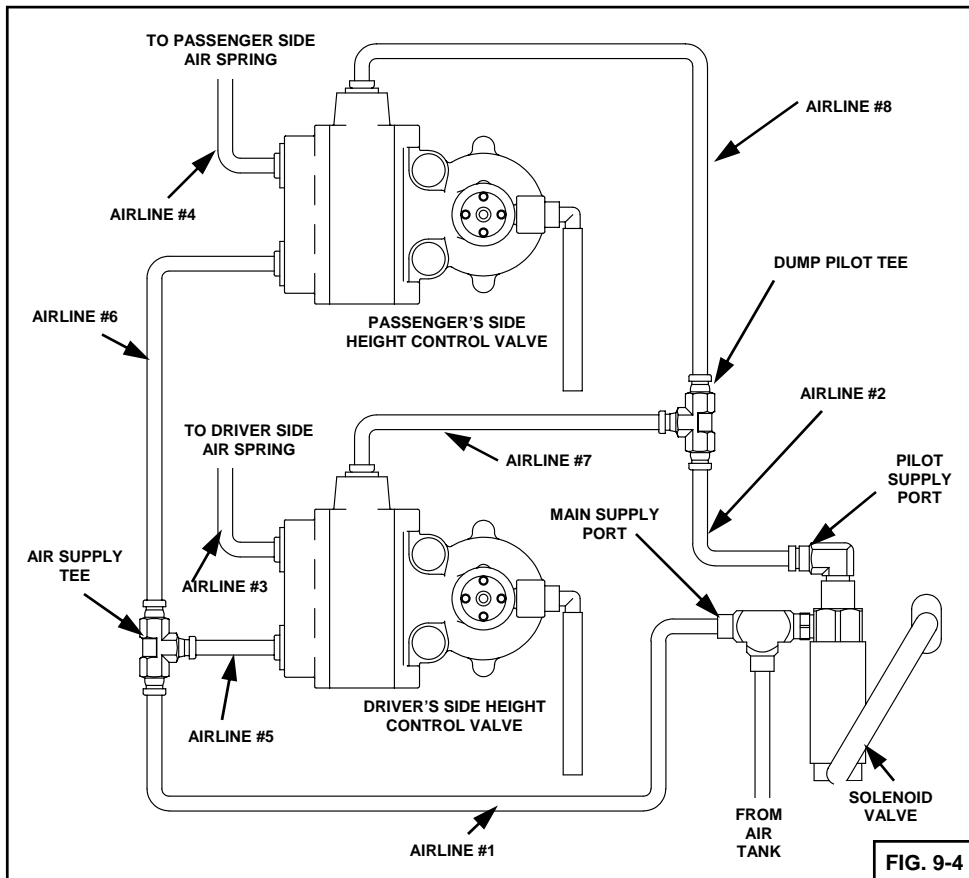
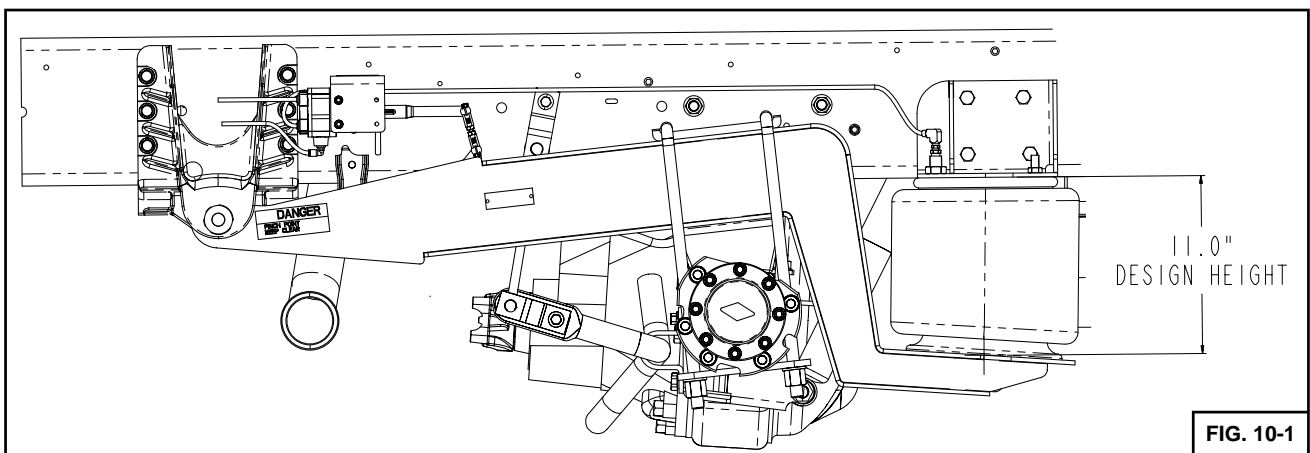


FIG. 9-4

10. FINAL ASSEMBLY, INSPECTION & OPERATION

1. Install new shocks, re-using the original 3/4" shock bolts and nuts. (Torque to 325-420 FT-LBS)
2. Double check all electrical connections and wire routings.
3. Remove all jacks and air system up by either using the fill valve on the air tank or by starting the vehicle and switching the compressor switch to "ON". Note: the maximum allowable pressure in the air tank is 120 psi. It is recommended to fill the air tank using the supplied schraeder valve so that the compressors are not taxed too much by running for a long period of time.
4. Check for proper operation of the height control valves. With one end of the valve linkage disconnected rotate the valve arm down 45°, air should exhaust from the air springs. Rotating the valve arm up 45° should cause the valve to fill the air springs.
5. Measure the "Design Height" of the air springs. The height should be as shown in Figure 10-1, and **measured at the middle of the air spring**. To adjust the design height disconnect one end of the valve linkage and adjust accordingly. Turn the plastic ball end joint to change the length of the linkage (increasing the length will increase the Design Height, and vise-versa). Tighten the lock nuts on the valve linkage when complete. **Set the design height by the following sequence:** 1) deflate the passenger side air bag by disconnecting the linkage from the arm, 2) with the driver side linkage connected, measure the design height and adjust accordingly by the methods mentioned above, 3) once the design height is set for the driver side, repeat the same steps for the passenger side, including deflating the driver side air bag. Once the design height is set, reconnect the linkages. Jostle the suspension up and down and then allow it to come back to design height. Recheck the initial measurement and adjust if needed. **Note: this procedure to set design height can be done when empty or under light load.**
6. Make certain the axle is centered laterally on the frame. If necessary, add shims between the lateral control rod bushings and mount brackets to center the axle. (Torque the lateral control rod bolts to 185-235 FT-LBS)
7. Recheck the air spring design height and repeat step 5 if the design height must be adjusted.
8. Torque the (2) front hanger bushing bolts to 260 FT-LBS.
9. Recheck all fasteners for proper torque.
10. Move the suspension throughout its entire range of motion, by inflating and deflating the air springs to achieve full travel. Check for any interferences with the lateral control rod, axle, shocks, exhaust, frame, brake lines (**especially on the driver side**), fuel lines, etc. Reconnect the valve linkage to the lever.
11. **IMPORTANT!** Check all fittings and airlines for air leaks.

12. **IMPORTANT!** During servicing, check tightness of all fasteners and for any air system leaks. Immediate corrective action should be taken if malfunctions occur.
13. After all final checks are complete, it is recommended to complete a full four-wheel alignment and drive line angle check. The pages following the installation instructions describe the proper method for checking driveline angles. Note: improper driveline angles may have a detrimental effect on ride, u-joints, and transmission. If any driveline vibration (or out of spec. angle measurement) occurs, use factory axle seat shims to modify driveline angle.
14. If the suspension has the Kneeling Option, moving the switch "ON" to Dump will exhaust all air from the air springs and lower the rear of the vehicle approximately 3-4 inches. Air springs will inflate when the switch is returned to the "OFF" position. **WARNING: Do not drive the vehicle while the Dump Switch is on and the air springs are deflated.**
 - ❑ The UltraRide Chassis Air Suspension is fully automatic in controlling the height of the chassis. No manual intervention to control air pressure or ride height is needed during the course of operation.
 - ❑ The Compressor Switch must be on for the compressors to operate. During difficult starting circumstances, (i.e. extremely cold weather) it is recommended to turn the compressor switch off until the vehicle is running, so it will not draw current from the battery.
 - ❑ The Low Pressure Warning Light indicates a severe drop in tank pressure (below 60 psi). Immediate corrective action should be taken to determine the cause of air loss. Compressor switch should be turned off if Low Pressure Warning Light is on, and remains on even after the compressors have run for a normal period of time. **NOTE:** The Low Pressure Warning Light could come on briefly when the "Dump" feature is being used.
 - ❑ It is important to release any moisture contained within the air tank on a daily basis (See Air Kit Installation Manual for details). Not releasing the moisture on a regular basis will cause the drain valve to not operate properly.



11. SERVICE & MAINTENANCE

The UltraRide suspension needs no lubrication and little maintenance. The following components should be checked at the time the truck is being serviced. However, immediate corrective action should be taken if a serious malfunction occurs. See Exploded Assembly on the following pages for details.

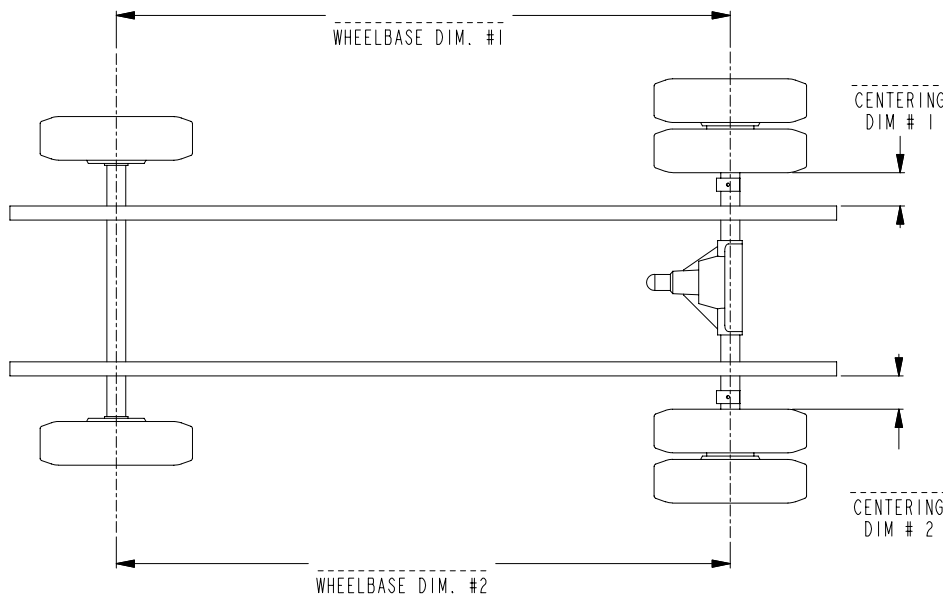


CAUTION! If maintenance or service is to be done on the air system, be sure to drain **all** air from system. Serious injury could occur if components are removed while system is full of air.

Note: It is important to release any moisture contained within the air reservoir on a daily basis. This can be done by pulling on the cable attached to the drain valve. Not releasing the moisture on a regular basis will cause the drain valve to not operate properly, and may cause the valve to malfunction. Excess moisture in the system can also cause premature failure of other components including the air tank itself.

INSTALLATION & MAINTENANCE CHECK LIST

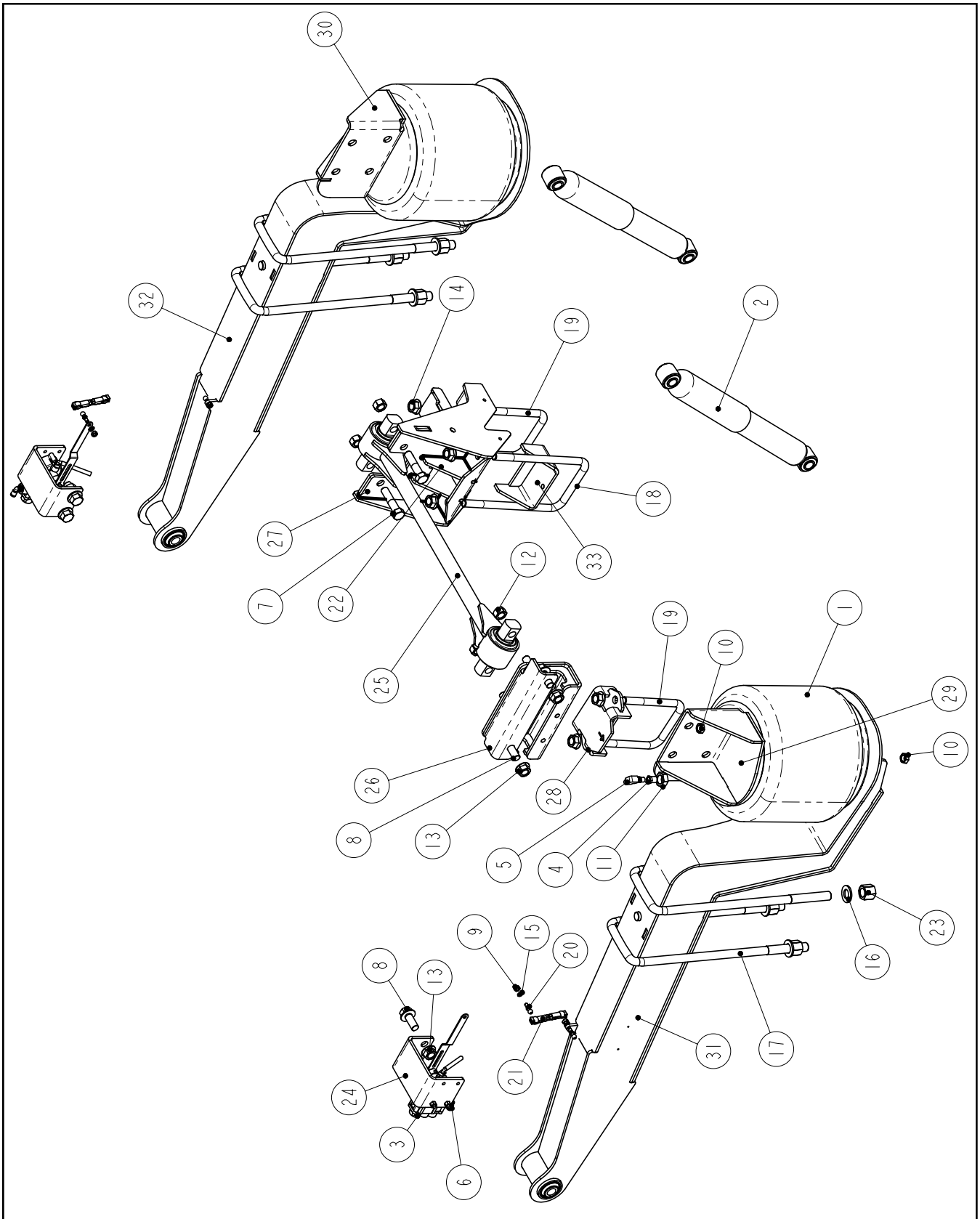
- Check and document OE rear axle alignment
- Air spring bottom nut (1/2"): Torque 25-35 FT-LBS
- Frame air spring bracket bolts (16mm): Torque 200 FT-LBS
- Lateral control rod nuts (5/8"): Torque 185-235 FT-LBS
- Front hanger bushing nuts (20mm): Torque 300 FT-LBS
- Axle u-bolt nuts (3/4"): Torque 260 FT-LBS
- Set Design Height to 11.0 inches
- Verify suspension function via dump and reinflation
- Check for air leaks and system integrity
- Check clearances throughout suspension motion range
- Check driveline angle
- 4 wheel alignment



UltraRide – FORD F53 PARTS LIST

| ITEM | PART NUMBER | DESCRIPTION | 8M000057 QTY |
|------|-------------|--|-----------------|
| 1 | 1103-0505 | SPRING-AIR | 2 |
| 2 | 1210-0512 | SHOCK ABSORBER | 2 |
| 3 | 13010062 | VALVE-CONTROL, HEIGHT | 2 |
| 4 | 1302-2014 | REDUCER, 1/8 F-NPT 1/4 M-NPT | 2 |
| 5 | 1302-5090 | ELBOW, 1/4 TB 1/8 M-NPT, PUSH-IN DOT | 2 |
| 6 | 1302-5499 | ELBOW, 1/4 TB 1/4 PTC, PUSH-IN DOT | 2 |
| 7 | 140D-2022 | 5/8 X 2 3/4 UNF HEX CAP SCR (GR 8) O&P | 4 |
| 8 | 141A-2012 | 5/8 X 1 1/2 UNC FLANGE BOLT (GR 8) O&P | 6 |
| 9 | 1470-0800 | 1/4 UNC HEX NUT (GR B) | 4 |
| 10 | 1474-1600 | 1/2 UNC HEX JAM NUT | 4 |
| 11 | 1475-2402 | 3/4 UNF HEX JAM NUT, O&P | 2 |
| 12 | 1477-2006 | 5/8 UNF HEX TOP LOCK NUT (GR C) O&P | 4 |
| 13 | 1480-2003 | 5/8 UNC TOP LOCK FL NUT (GR G) | 6 |
| 14 | 1480-2005 | 5/8 UNF TOP LOCK FL NUT (GR G) O&P | 6 |
| 15 | 1485-0800 | 1/4 LOCK WASHER | 4 |
| 16 | 1488-2402 | 3/4 SAE HARDENED WASHER | 8 |
| 17 | 14950032 | U-BOLT, 3/4-16 UNF, 4.25 X 17.25 | 4 |
| 18 | 14950033 | U-BOLT-SQUARE, 5/8 UNF, 5.06 X 10.00 | 1 |
| 19 | 14950034 | U-BOLT-SQUARE, 5/8 UNF, 4.50 X 6.25 | 2 |
| 20 | 1500-0224 | BALL-PIVOT, THREADED | 4 |
| 21 | 1500-0234 | LINKAGE-VALVE, HEIGHT CONTROL (2.50) | 2 |
| 22 | 1500-0302 | CLIP-LATCHING | 2 |
| 23 | 1506-0002 | 3/4 UNF HEX HIGH NUT | 8 |
| 24 | 80001278 | MOUNT - BRACKET, VALVE | 2 |
| 25 | 800M0092 | LATERAL CONTROL ROD | 1 |
| 26 | 800M0093 | BRACKET-MOUNT, LCR, UPPER | 1 |
| 27 | 800M0094 | BRACKET-MOUNT, LCR | 1 |
| 28 | 800M0095 | BRACKET-BUMPER, AXLE | 1 |
| 29 | 810M0038 | BRACKET - AIR SPRING | 1 |
| 30 | 810M0039 | BRACKET - AIR SPRING | 1 |
| 31 | 820M0017 | ARM-TRAILING | 1 |
| 32 | 820M0018 | ARM-TRAILING | 1 |
| 33 | 840M0002 | SUPPORT - U-BOLT | 1 |

UltraRide – FORD F53



UltraRide - TROUBLE SHOOTING GUIDE

| COMPONENT | POSSIBLE PROBLEM | CORRECTIVE ACTION | TORQUE | | | | | | | | | | | | |
|--|---|---|---|--------------|----------------|----------------|---------------------|------------|-----------|------------|------------|------------|------------|------------|------------|
| Airlines | Air leaks | Replace airline | Fully inserted (pull back to seat properly); push on colette to release | | | | | | | | | | | | |
| Fittings | Air leaks | Remove fitting and apply fresh joint compound. Reinstall fitting, but Do Not Over tighten. Do not use Teflon tape. | Threaded into: <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Metal</td> <td style="text-align: center;">Plastic</td> </tr> <tr> <td style="text-align: center;">15 Ft. Lbs.</td> <td style="text-align: center;">Hand Tight + 1 Turn</td> </tr> </table> | Metal | Plastic | 15 Ft. Lbs. | Hand Tight + 1 Turn | | | | | | | | |
| Metal | Plastic | | | | | | | | | | | | | | |
| 15 Ft. Lbs. | Hand Tight + 1 Turn | | | | | | | | | | | | | | |
| Air Springs | A. Improper height B. Air leakage | A. Adjust valve linkage to maintain proper air spring height. B. Replace air spring. | Size <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">3/8</td> <td style="text-align: center;">Metal</td> <td style="text-align: center;">Plastic</td> </tr> <tr> <td></td> <td style="text-align: center;">25 Ft. Lbs</td> <td style="text-align: center;">4 Ft. Lbs</td> </tr> <tr> <td style="text-align: center;">1/2</td> <td style="text-align: center;">28 Ft. Lbs</td> <td style="text-align: center;">10 Ft. Lbs</td> </tr> <tr> <td style="text-align: center;">3/4</td> <td style="text-align: center;">30 Ft. Lbs</td> <td style="text-align: center;">10 Ft. Lbs</td> </tr> </table> | 3/8 | Metal | Plastic | | 25 Ft. Lbs | 4 Ft. Lbs | 1/2 | 28 Ft. Lbs | 10 Ft. Lbs | 3/4 | 30 Ft. Lbs | 10 Ft. Lbs |
| 3/8 | Metal | Plastic | | | | | | | | | | | | | |
| | 25 Ft. Lbs | 4 Ft. Lbs | | | | | | | | | | | | | |
| 1/2 | 28 Ft. Lbs | 10 Ft. Lbs | | | | | | | | | | | | | |
| 3/4 | 30 Ft. Lbs | 10 Ft. Lbs | | | | | | | | | | | | | |
| Height Control Valve | Air spring(s) will not inflate when weight is added to the chassis. OR Air spring(s) will not deflate when weight is removed from the chassis. | A. Inspect valves to insure drive bearing notch is located correctly. The driver side valve notch on "SUPPLY" port side of valve, passenger side on "SUSP" port side. If not, loosen lever screw (but do not remove completely) and pull lever loose from drive bearing, rotate drive bearing until the drive bearing notch is in the correct position and re-secure lever by tightening lever screw. See Fig. 11-3 & 11-4 for orientation details B. Replace valve. | 1/4 Mount Fasteners 10 Ft. Lbs. Bearing Screw 40-50 In. Lbs. | | | | | | | | | | | | |
| Shock Absorber | Insufficient damping effect | Replace shocks | 45 Ft. Lbs. | | | | | | | | | | | | |
| Lateral Control Rod | A. Loose nuts on lateral control rod bolts B. Worn bushings | A. Tighten securely to clamp the inner sleeve. B. Replace lateral control rod. | 185-235 Ft. Lbs. | | | | | | | | | | | | |
| Compressor | A. Doesn't turn on B. Doesn't turn off | A. Check all electrical connections between the dash controls, switches, accessory power wire, and air control box. Verify power to the compressor relay, and through other electrical systems as listed. If power to relay exists, compressor switch is turned "ON", and the Compressor Pressure Switch operates properly, replace Compressor Relay, circuit board, or the compressor. B. Replace Compressor Pressure Switch or the compressor. | 15 Ft. Lbs. | | | | | | | | | | | | |
| Compressor Pressure Switch | A. Loose terminal connections B. Doesn't turn compressor on C. Air leaks | A. Tighten securely. B. Verify operation of switch by placing a jumper wire between connections 130 & 140 on the circuit board (see Fig. 11-5). If compressor does not operate, check other potential components. If compressor runs, replace Compressor Pressure Switch. C. Remove switch and apply fresh joint compound. Reinstall switch, but Do Not Over-tighten. Do not use Teflon tape. | 15 Ft. Lbs. | | | | | | | | | | | | |
| Low Pressure Warning Switch | A. Loose terminal connections B. Doesn't turn warning light on (i.e. when tank is empty) C. Air leaks | A. Tighten securely. B. Verify operation of switch by placing a jumper wire between connections 110 & 120 on the circuit board (see Fig. 11-5). If warning light does not turn on, check other potential components. If warning light turns on, replace Low Pressure Switch. C. Remove switch and apply fresh joint compound. Reinstall switch, but Do Not Over-tighten. Do not use Teflon tape. | 15 Ft. Lbs. | | | | | | | | | | | | |
| Electrical System | A. No power to the Air Control Box B. Circuit breaker will not reset C. No power to dash controls | A. Make sure cable connections to the battery are tightened securely and are not severely corroded. Make sure nothing has cut the wiring harness and caused an electrical short. Replace wire harness. B. Make sure that the wire harness or circuit board is not shorting out. Replace circuit breaker. C. Secure connection between the main wire harness and dash control wire harness. Check connections between the dash control switches and the wire connectors. Verify power from the accessory wire by connecting test light between the <i>white & black</i> color wires on the wire harness (key must be in ignition and turned on or to the accessory position). If no power, replace wire harness. If power exists, replace "key hot" relay. If no power, check the circuit board for burned up electrical trace. Replace circuit board. | | | | | | | | | | | | | |
| Dash Switches (Compressor & Dump function) | A. Switches do not operate properly B. Light in switch is burned out | A. Check all electrical connections between the dash control switches and the electrical harness. Replace switch. B. Replace switch. | | | | | | | | | | | | | |

FORD F53 ULTRARIDE SERVICE & MAINTENANCE GUIDELINES

The UltraRide suspension needs no lubrication and little maintenance. However, immediate corrective action should be taken if a serious malfunction occurs.



CAUTION! If maintenance or service is to be done on the air system, be sure to drain all air from the system. Serious injury could occur if components are removed while system is full of air.

PRODUCT OWNER RESPONSIBILITIES

- ❑ Owner is solely responsible for pre-operation inspection, periodic inspections, maintenance, and use of the product as specified in the particular LINK MFG. instructions available by product model, except as provided in this warranty, and for maintenance of other vehicle components. Of particular importance is the re-torque of fasteners including axle u-bolts, torque rod bolts and track rod bolts. This re-torque must be performed within 90 days of the suspension being put in service.
- ❑ Owner is responsible for “down time” expenses, cargo damage, and all business costs and losses resulting from a warrantable failure.

Note: It is important to release any moisture contained within the air reservoir on a **daily basis**. This can be done by pulling on the cable attached to the drain valve. Not releasing the moisture on a regular basis will cause the drain valve to not operate properly, and may cause the valve to malfunction. Excess moisture in the system can also cause premature failure of other components including the tank itself.

CHECK AT EVERY VEHICLE SERVICE INTERVAL:

- ❑ Check Design Height $\pm\frac{1}{4}$ "
- ❑ Check for air leaks around fittings
- ❑ Check air filter; replace if necessary

CHECK AFTER EVERY 10,000 MILES:

- ❑ Front hanger nuts (9/16"): Torque 160-172 FT-LBS
- ❑ Frame air spring bracket nuts/lateral control rod frame mount nuts (7/16"): Torque 53-70 FT-LBS
- ❑ Front hanger bushing nuts (3/4"): Torque 300-320 FT-LBS
- ❑ Axle bracket lateral control rod u-bolt nuts (5/8"): Torque 185-235 FT-LBS
- ❑ Axle u-bolt nuts (5/8"): Torque 185-235 FT-LBS

CHECK AFTER EVERY 30,000 MILES:

- ❑ Lateral control rod nuts (5/8"): Torque 130-170 FT-LBS
- ❑ Air spring bottom bolt (3/8"): Torque 25-35 FT-LBS
- ❑ Air control mount nuts (5/16"): Torque 15-20 FT-LBS
- ❑ Change motor brushes on heavy-duty compressor
- ❑ Check arm pivot bushings and lateral control rod bushings for wear; replace if worn

Next 3 pages taken from Ford MVE Ship Thru Guide.

Guideline - Driveline Angles

After vehicle build is complete, the driveline angles must meet the following "rules", both at unloaded, and fully-loaded, vehicle attitudes.

Rule #1: The NET OPERATING ANGLE, at any individual joint, must be at least 1/2 degree, and not to exceed 3 degrees. The net operating angle at any individual joint on an F Super Duty (F250, F350, F450, or F550) must not exceed 4 degrees. The preferred maximum angle is 2 degrees.

The NET OPERATING ANGLE (e) at any one joint is the combination of the joint angles in both the side view and the plan (top) view. This NET OPERATING ANGLE (e) equals:

By example, using Figure 1:
The NET OPERATING ANGLE at JOINT - A = (ea) =

The NET OPERATING ANGLE at JOINT - B = (eb) =

The NET OPERATING ANGLE at JOINT - C = (ec) =

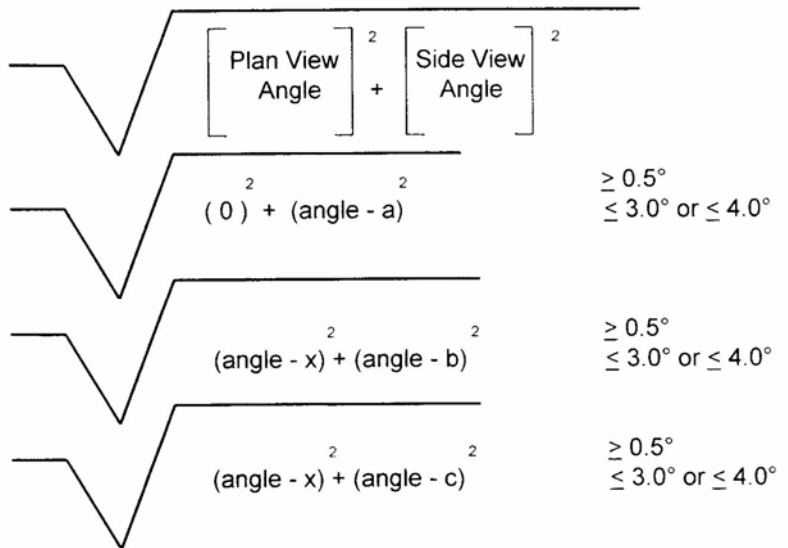
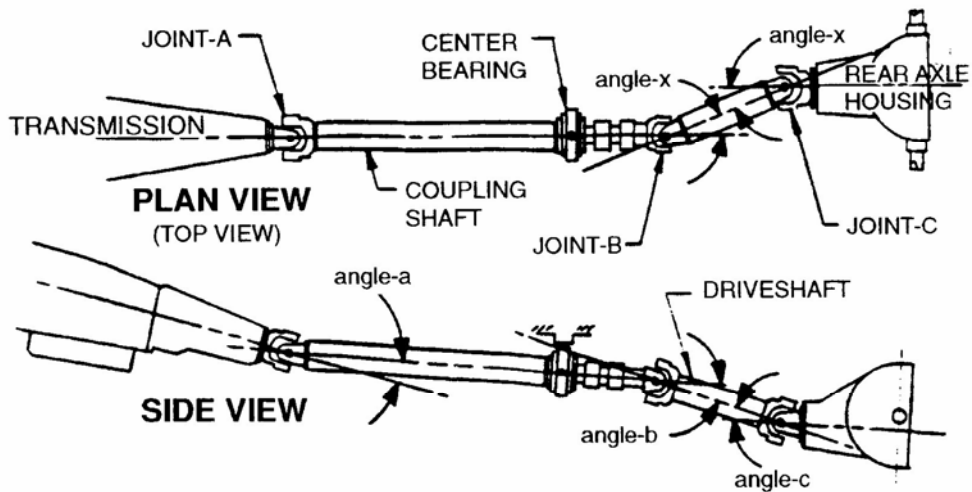
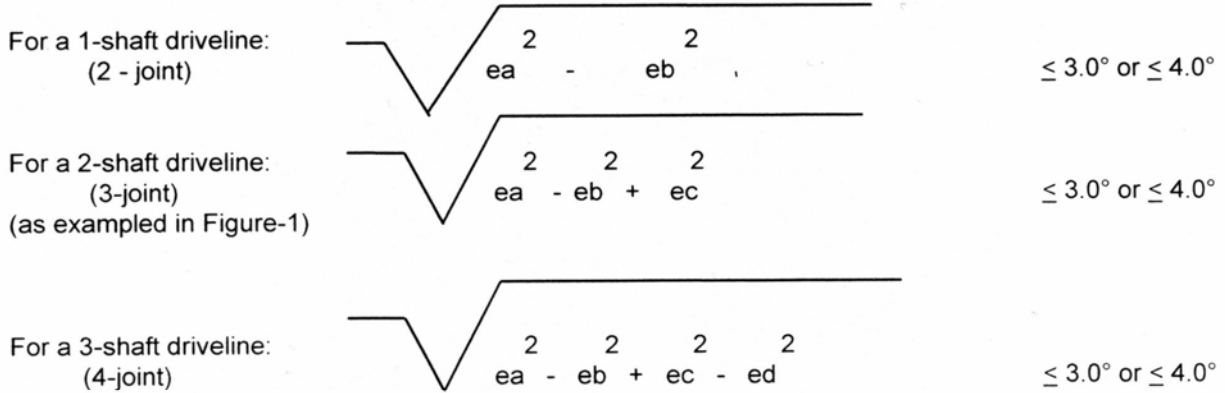


Fig. 1



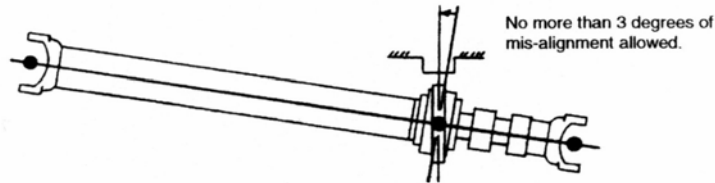
Guideline - Driveline Angles (Continued)

Rule #2: The combination of NET OPERATING ANGLES, throughout the whole driveline, **must** "cancel". It is preferred that the NET OPERATING ANGLES at either end of a shaft be within 1 degree of each other. However, at a minimum, the following formulas must be satisfied for sufficient "cancellation" to occur:

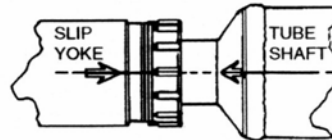
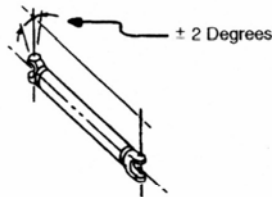


Rule #3: The center bearing mounting bracket, surrounding the rubber insulator, must be **90 ± 3 degrees** to the center bearing. In other words, no more than 3 degrees of mis-alignment can be absorbed by the rubber surrounding the center bearing. See Figure 2.

Fig. 2



- A. Ensure that u-joints are in-line to within ± 2 degrees.
- B. Ensure matching alignment arrows between slip yoke and tube shaft



Observe alignment arrows stamped on parts. If there are no alignments marks, then add them before disassembly to ensure proper phasing alignment of shaft and yoke.

GUIDELINE - DRIVELINE COMPONENT PHASING

MINIMUM UNIVERSAL JOINT OPERATING ANGLE:

A slight angle is required to prevent universal joints from brinelling. Therefore, a minimum operating angle of ½ degree is required.

MAXIMUM UNIVERSAL JOINT OPERATING ANGLE:

Universal joint operating angles can be quite high, sometimes as high as 12 degrees. But to get a vehicle to operate successfully above 3 degrees often requires larger universal joints, double cardan or constant velocity joints, or restrictions on operating speed. A reduction in universal joint life becomes noticeable when they are operated at more than 3 degrees if precautions are not taken. That having been stated, the F Super Duty series of trucks (F250, F350, F450, and F550) can tolerate angles up to 4 degrees. However, maximum angles of 2 degrees are preferable for all vehicles.

Two shafts connected with a single cardan joint and turning at a constant speed with no joint angle, have no angular acceleration that could cause a vibration. When there is an angle between them and the input shaft is turning at a constant speed, the driven shaft is forced to continuously accelerate and decelerate, twice per revolution, creating a vibration. If the speed changes are small, the vibration is not objectionable. The guidelines in this appendix limit driveline angular acceleration to a maximum of 400 radians per second per second. This is the requirement for all Ford light trucks. (SAE specifies 500.) Some modified drivelines have been measured at over 11,000 radians per second per second causing driveline failures at very low mileage.

DRIVELINE ANGLE MEASUREMENT:

Driveline angle measurements should be made with the vehicle supported by the tires and resting on a level surface. Avoid hoisting a vehicle by the frame since this will distort the chassis enough to make any measurements inaccurate.

MATCH MOUNTING DRIVESHAFTS TO THE REAR AXLE:

Runout is measured on OEM rear axle input shafts and the maximum measurement is marked with a yellow dot on the yoke or pilot bearing flange. The OEM driveshafts are also marked with a yellow dot on the "light" side. When the parts are assembled, the marks are aligned to aid the overall system balance. Vehicle modifiers should look for these dots and maintain this match when the drivetrain is reassembled after modification. Remanufactured or modified driveshafts should also have their "light" sides matched to the yellow dot.

DRIVELINE VIBRATION DAMPERS:

Driveline vibration dampers are sometimes added to driveshafts or axles to reduce noise, vibration, and harshness (NVH). If the chassis has these devices when it is received, they should be retained on the modified chassis.

USE OF DOUBLE CARDAN UNIVERSAL JOINTS FOR GREATER DRIVE ANGLES:

In general, the use of these joints can allow increased drive angles up to as much as 8 degrees. However, when used at the rear of a coupling shaft a double cardan universal joint will prevent cancellation from occurring at the forward end of the shaft. Therefore the single cardan joint must still be maintained at less than 3 degrees (or 4 degrees for the F Super Duty series).

GENERAL COMMENTS:

It is good practice, for any chassis that will have a driveline modification, to measure and record the driveline angles in each of the following conditions for later comparison.

- a. The chassis as first received from Ford (note that the drive angles may not conform exactly to this bulletin in this incomplete condition).
- b. The completed vehicle, unloaded.
- c. The completed vehicle loaded to GVWR with maximum front GAWR.
- d. The completed vehicle loaded to GVWR with maximum rear GAWR.