

OWNERS MANUAL



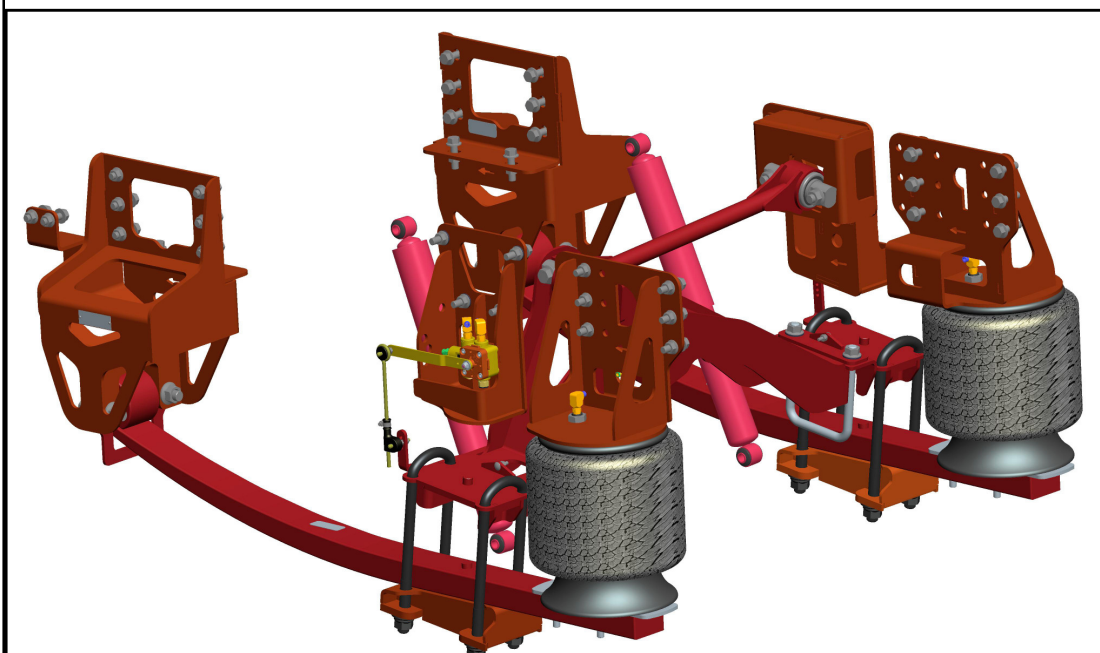
GM C4500/C5500 4X4

17,500-19,500 GVW RANGE

2006-NEWER MODELS

DANA MODEL S110 (13.5K) REAR AXLE

Link Part No. 8M000085



Questions? Contact this Professional Installer :

Company : _____

Phone : _____

Installer : _____ Date : _____

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80001570

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1. INTRODUCTION

NOTE! 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. Link Mfg. Is not responsible for damages from improper installation or operations beyond design capability. Link Mfg. In its sole discretion shall determine whether or not any product is defective or otherwise covered by warranty.

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 suspension to vehicle attachments.
- ❑ Installer is responsible for assuring necessary clearance for vehicle and suspension components, such as axle, wheels, tires, and air springs to ensure safe operation.
- ❑ Installer is responsible for advising the owner of proper use, service and required maintenance, and for supplying maintenance and other instruction supplied by Link Mfg.

SAFETY SYMBOLS, TORQUE SYMBOL, and NOTES

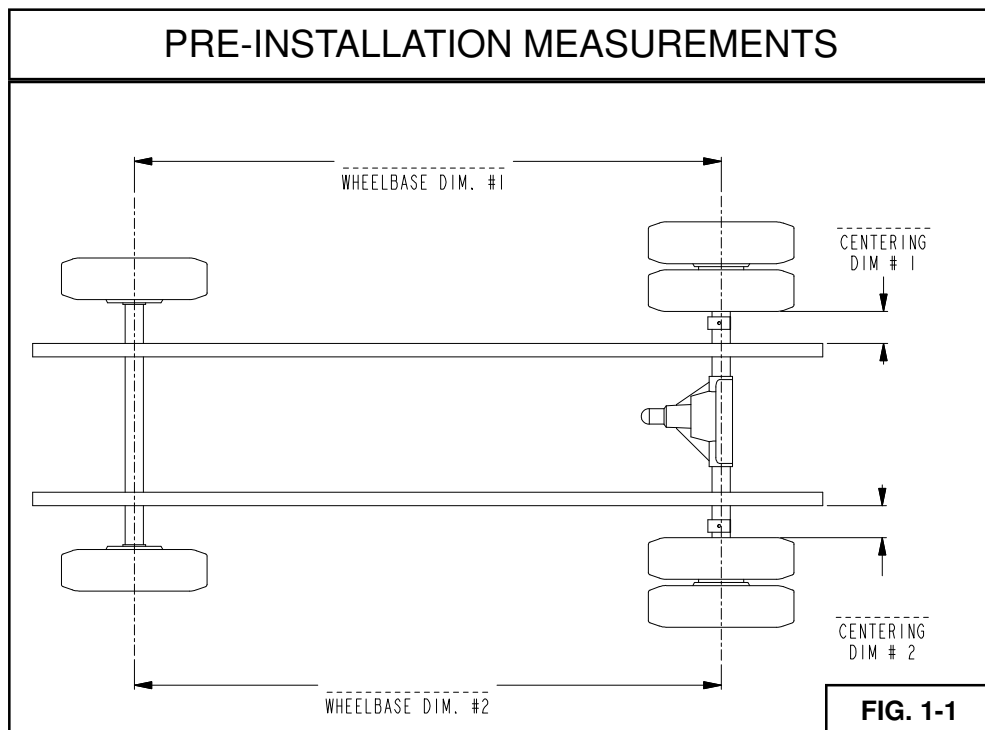
	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.		The torque symbol alerts you to tighten fasteners to a specified torque value.
 WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.	NOTE:	A Note provides information or suggestions that help you correctly perform a task.
 CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.		The electrical symbol indicates the presence of electric shock hazards which, if not avoided, may result in injury to personnel or damage to equipment.
CAUTION	CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.	 <p>Proper tightening of U-Bolt nuts and mounting nuts are required for proper operation. Need for proper Torque value is indicated by wrench symbol and values will be found in Table 10-1 in the Final Assembly section of the instructions. Failure to maintain proper torque can cause component failure resulting in accident with consequent injury.</p>	

INSTALLATION NOTES:

- ❑ Drilling of frame holes may be required for installation of the suspension, depending on the vehicle's fuel tank option. Air control system mounting will require drilling of holes into the frame at the location of the installer's choice.
- ❑ When installing the UltraRide suspension on the GM chassis, please reference the appropriate sections of the GM Service Manual for additional requirements.

PRE-INSTALLATION CHECKLIST

- ❑ Check the vehicle wheel alignment prior to installation to insure no precondition already exists; record the information for verification.
- ❑ Measure the wheelbase and axle centering dimensions before beginning installation. Record the information below in Fig 1-1.
- ❑ Remove the attached body, if necessary. Remember to disconnect all electrical connections to the body, and fuel filler tube, before removing the body. The installation may also be completed using a lift to raise the vehicle. If using a lift, chassis body removal may not be necessary. Removal of rear wheels will aid in installation. *Refer to GM Document 812944 and 827666.*
- ❑ When installing the suspension without using a lift:
 - ❑ Block the front wheels (both sides, front and rear of tire) and apply the emergency brake so the vehicle cannot roll.
 - ❑ Jack up the rear frame of the chassis in order to unload the rear leaf springs (or use an overhead hoist).
 - ❑ Do not lift the wheels off the ground.
 - ❑ Do not jack on any part of the axle.
- ❑ Install the suspension in the sequence listed in this instruction manual. Install one side of the suspension at a time. First, install the driver side completely, then install the passenger side.



2. DRIVER SIDE DISASSEMBLY

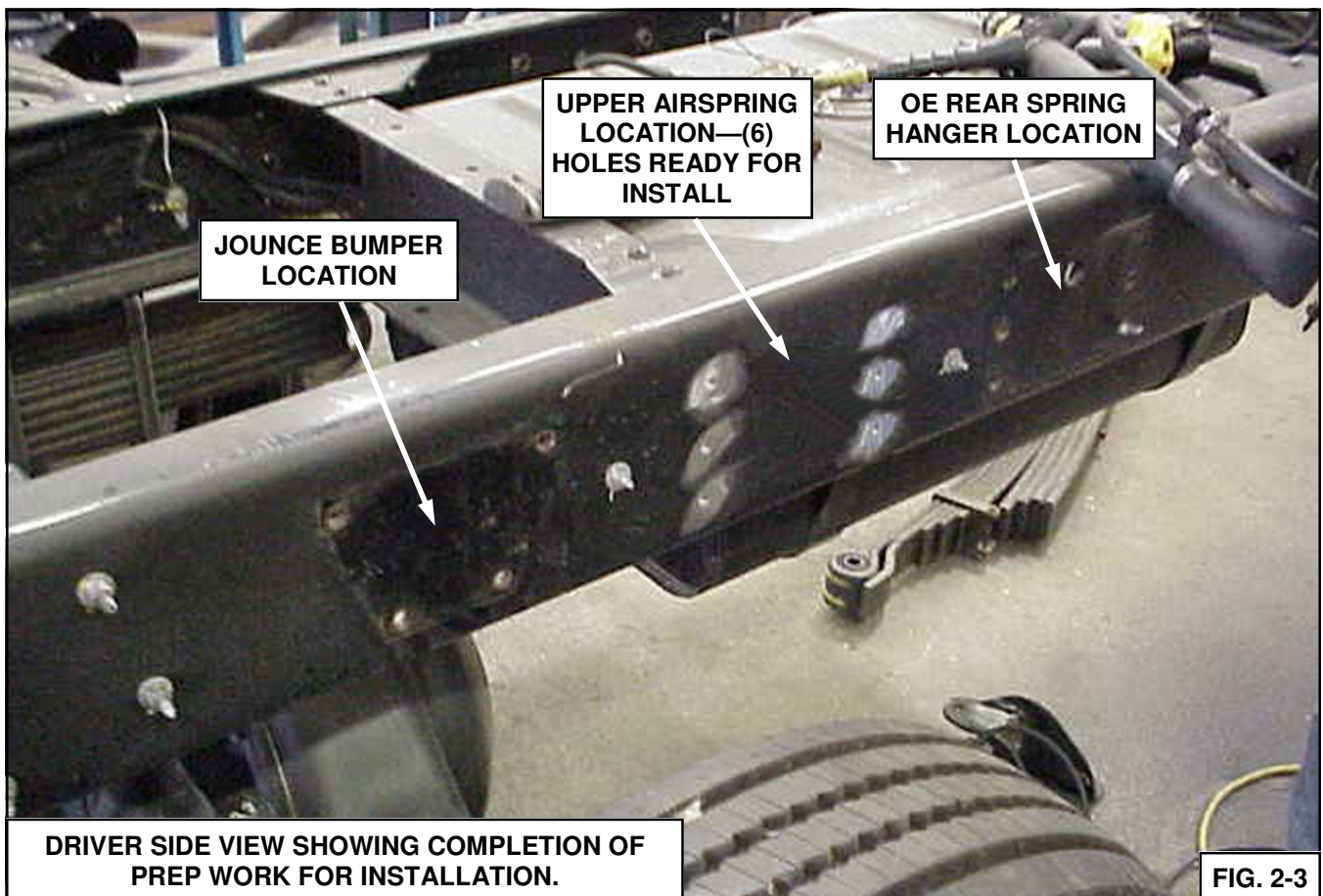
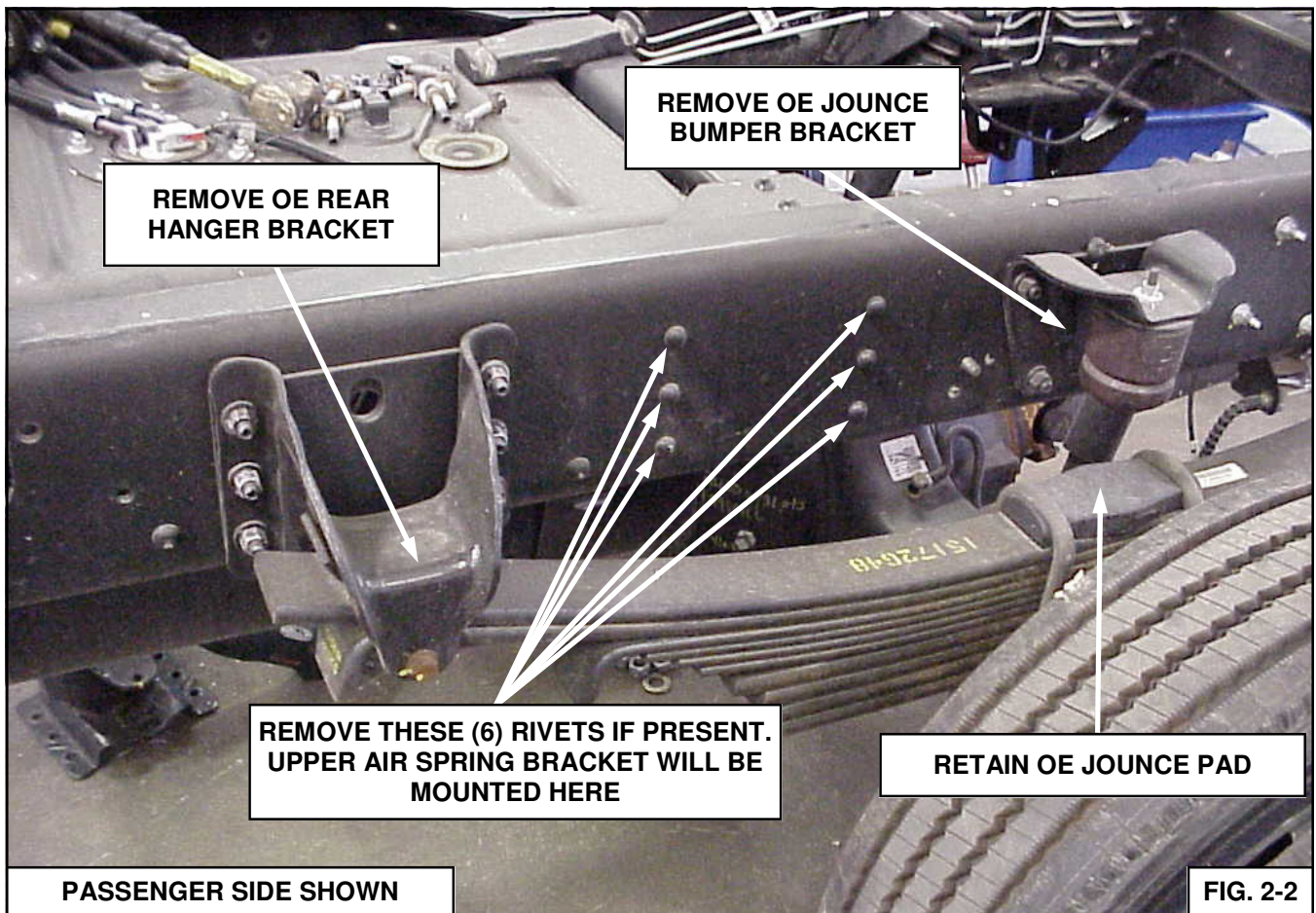
Note: Keep All Original Equipment Components that are removed, some will be re-used later.

1. With weight taken off the rear springs, as noted in pre-installation checklist, remove the rear bolts from the **rear leaf spring hanger bracket**. Remove the bolts from the **front spring hanger bracket**. **DO NOT** re-use the fasteners that mount the hanger bracket, or the leaf spring itself. New fasteners are provided, and must be used to achieve proper clamp load on the hanger. See Figure 2-1. *Refer to GM Documents 800862 and 1202795. Keep OE components, as some of them will be re-used for the installation of the UltraRide suspension.*
2. Remove existing U-bolts that attach the axle to the leaf spring. After this is done, axle, spring, hanger, and other components will be loose. Remove only the leaf spring from the axle, **DO NOT** re-use existing fasteners such as the U-bolts or nuts, as new fasteners are provided.
3. Remove OE Cast Iron Spring Axle Seat from axle, this will be re-used in the assembly. See Figure 2-4 for details.

Note! If truck has C5V042 option the fuel tank will not be in this location, but will be mounted further back on the truck. Use corresponding holes in upper air spring brackets to accommodate this.

4. Grind/remove the rivets/bolts that connect the aft of axle cross-member to the frame. This cross-member will be located 9.72 inches aft of the axle centerline. (See Figure 2-2 for location of these rivets).
5. Remove the OE shock absorbers and retain the mounting fasteners for later use.
6. Remove the OE jounce bumper bracket from the frame. These Frame holes will be shared with new Jounce Bumper Brackets, and Passenger Side Lateral Control Bracket. Keep the OE Jounce bumper, and OE Jounce bumper pad, as these components will be reused later.
7. Remove the OE Stabilizer bar if present, as it is not required with the UltraRide suspension.





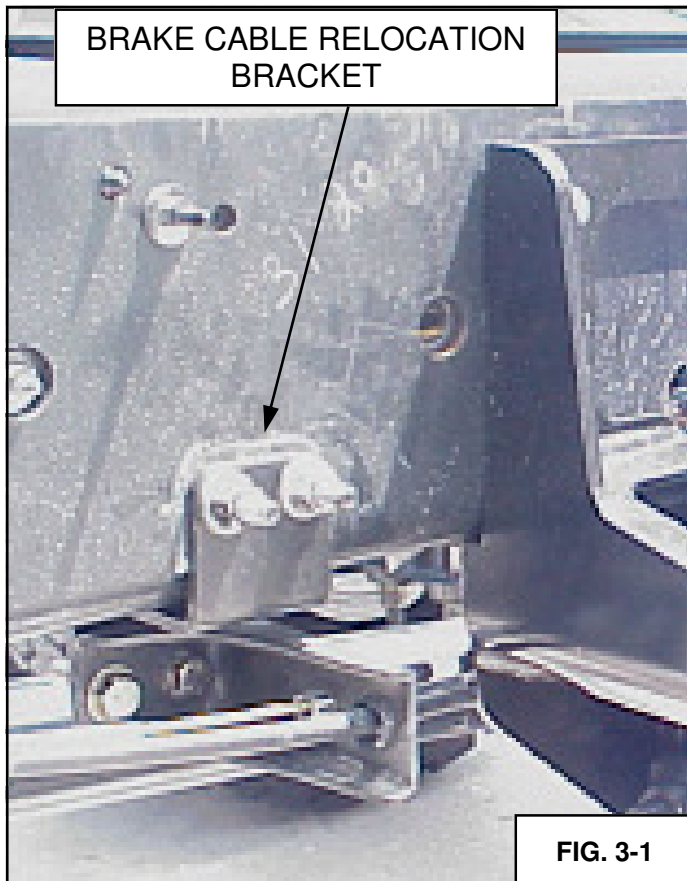
3. DRIVER SIDE ASSEMBLY

1. Review Figures in Section 3 & Parts List/Drawing (Section 10) to acquaint yourself with the various parts of the UltraRide suspension. Assemble Components Loosely as described below, torque later in Section 7.

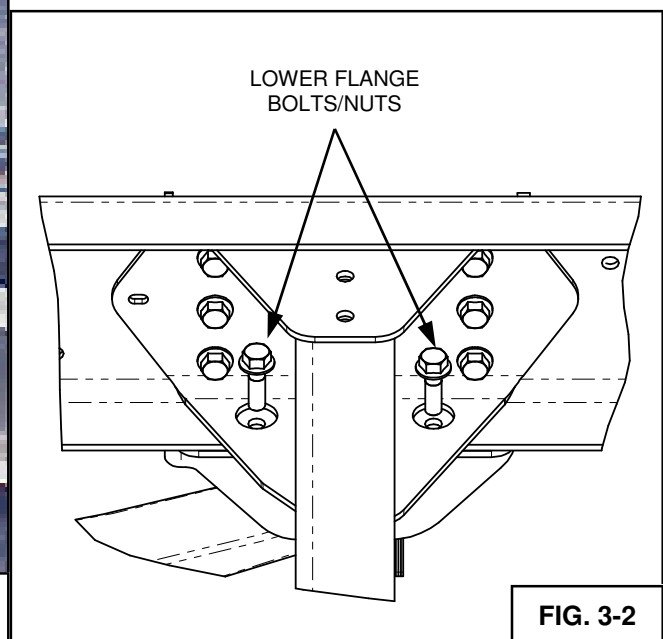


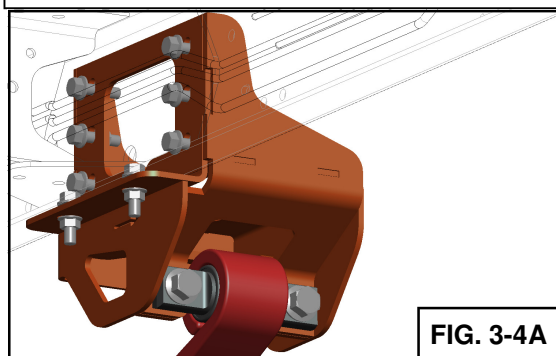
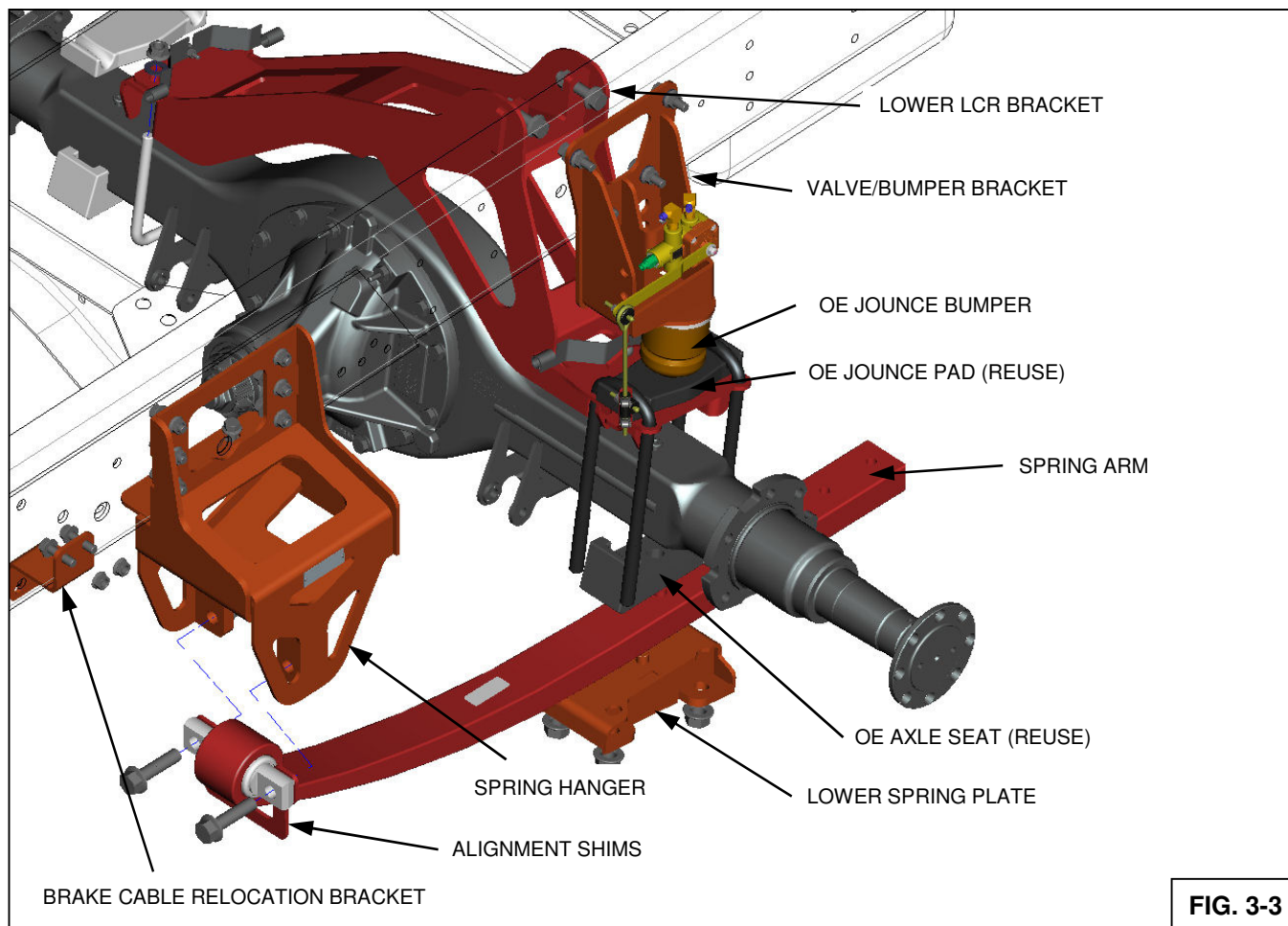
IMPORTANT! When tightening fasteners, do not use a high-speed air wrench. The heat generated between the nut and bolt threads may cause the nut to seize.

2. Unbolt Parking brake cable from driver's side of frame, and remount using the supplied PARKING BRAKE CABLE RELOCATION BRACKET. This will offset the cable under the frame to allow for clearance from the FRONT HANGER. See Fig. 3-1.
3. Loosely fasten the FRONT HANGER to the frame using (8) 1/2 x 1 3/4 UNC FLANGE BOLTS and (8) 1/2 UNC TOP LOCK FLANGE NUTS, supplied with kit. **Two of these fasteners are to be used in the bottom flange of the frame rail. (Shown in Fig. 3-4)** Drilling is required if the holes are not present in the frame flange. Orient all fasteners with nut on outside of frame. Torque Later.
4. Place LOWER LATERAL CONTROL ROD BRACKET onto axle as shown in Fig. 3-3.
5. Loosely fasten the SPRING ARM to the FRONT HANGER using (2) 3/4 X 3 UNC FLANGE BOLTS, AND (2) 3/4 UNC FLANGE NUTS. Mount the SPRING ARM to the Front Side of the FRONT HANGER, placing 3 ALIGNMENT SHIMS between the mating surfaces as shown in Fig. 3-3 and 3-4. Torque Later.
6. Remove the OE AXLE SEAT from the top of the axle, and relocate it to the bottom of the axle in the orientation shown Fig. 3-3.
7. With front of the SPRING ARM loosely fastened, raise the rear of the SPRING ARM so that all components are aligned into position. Be sure that all locating pins are aligned with their respective holes. A jack or stand may be necessary to raise and hold components in place.



Before tightening of U-Bolts ensure that spring arm and U-bolts are properly aligned with the axle and axle seats as shown in Fig. 7-1.





FRONT HANGER AND SPRING ARM MOUNT DETAIL
NOTE: SPRING ARM MOUNTED TO FRONT SIDE OF HANGER

8. Place the OE JOUNCE BUMPER PAD onto the LOWER LCR BRACKET, and drop (2) U-BOLTS down through the LOWER LCR BRACKET, and the LOWER SPRING PLATE, shown in Fig. 3-3.
9. Loosely attach using (4) M20 Free Spinning Lock Nuts. Torque the U-bolts later in a Criss-Cross pattern. See Fig. 7-1. Torque Later. Place 5/8 UNF U-BOLT up from axle through LOWER LATERAL CONTROL ROD BRACKET, and fasten loosely with (2) 5/8 UNF NUTS and (2) 5/8 HARDENED WASHERS.
10. Loosely fasten the VALVE/BUMPER BRACKET and REAR AIRSPRING HANGER, to the frame using (10) 1/2 X 1 3/4 UNC FLANGE BOLTS. Orient all fasteners with nut on outside of frame. See Fig. 3-3 and Fig. 3-4 for details. Torque Later.
11. Attach the AIRSPRING OFFSET PLATE to the AIRSPRING USING (2) 1/2 UNC FLAT HEAD SCREWS. Attach the AIRSPRING OFFSET PLATE to the spring arm using (2) 1/2 JAM NUT and (2) 1/2 WASHER. See Fig. 3-4b for details.



WARNING! Route the all brake lines/cables away from airspring and other moving components.

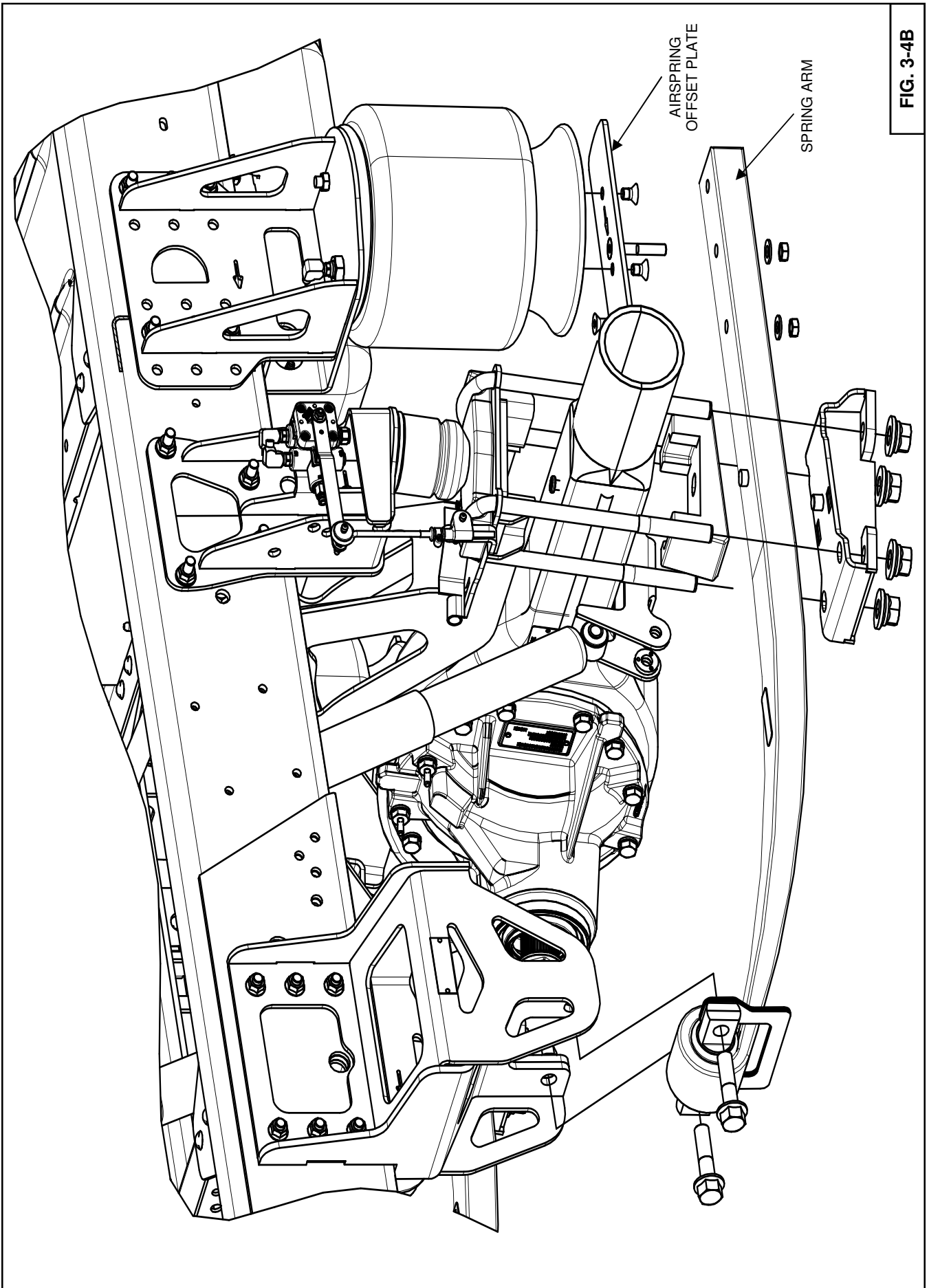
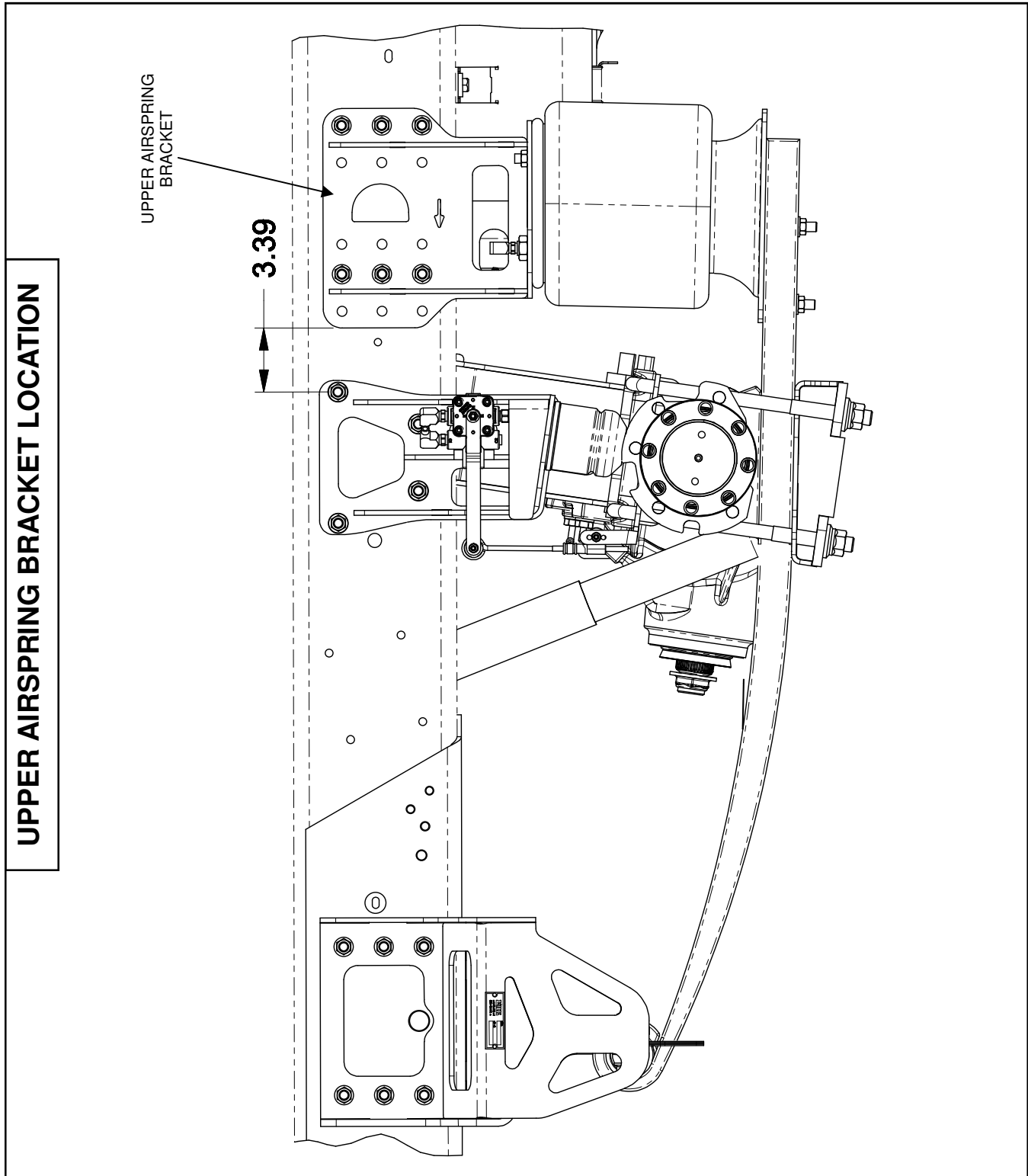


FIG. 3-4B

12. With Airspring attached to Spring Arm, locate the Upper Airspring Bracket onto the Frame Rail. This bracket has multiple hole patterns to accommodate various fuel tank options. Illustration below shows location of Upper Airspring Bracket. With Bracket in shown position, align with corresponding hole pattern on frame rail. See Fig. 3-5 for Details.
13. With Upper Airspring Bracket in position, install (6) 1/2 x 1 3/4 UNC FLANGE BOLTS and (6) 1/2 UNC TOP LOCK FLANGE NUTS, supplied with kit. If less than (6) holes are present, drilling will be required for the remaining holes. Orient all fasteners with nut on outside of frame. Torque Later. **Note: Airspring should be relatively vertical when in correct position, upper and lower mount plates should not have large offset in any direction.**



4. PASSENGER SIDE DISASSEMBLY

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

5. PASSENGER SIDE ASSEMBLY

1. Repeat Section 3 for the passenger's side of the vehicle. See Fig. 5-1.
2. Place UPPER LATERAL CONTROL BRACKET to the inside of the frame rail, with attached fasteners protruding from inside of frame. Place VALVE/BUMPER BRACKET onto these same fasteners and loosely attach using (4) 1/2 UNC FLANGE NUTS.

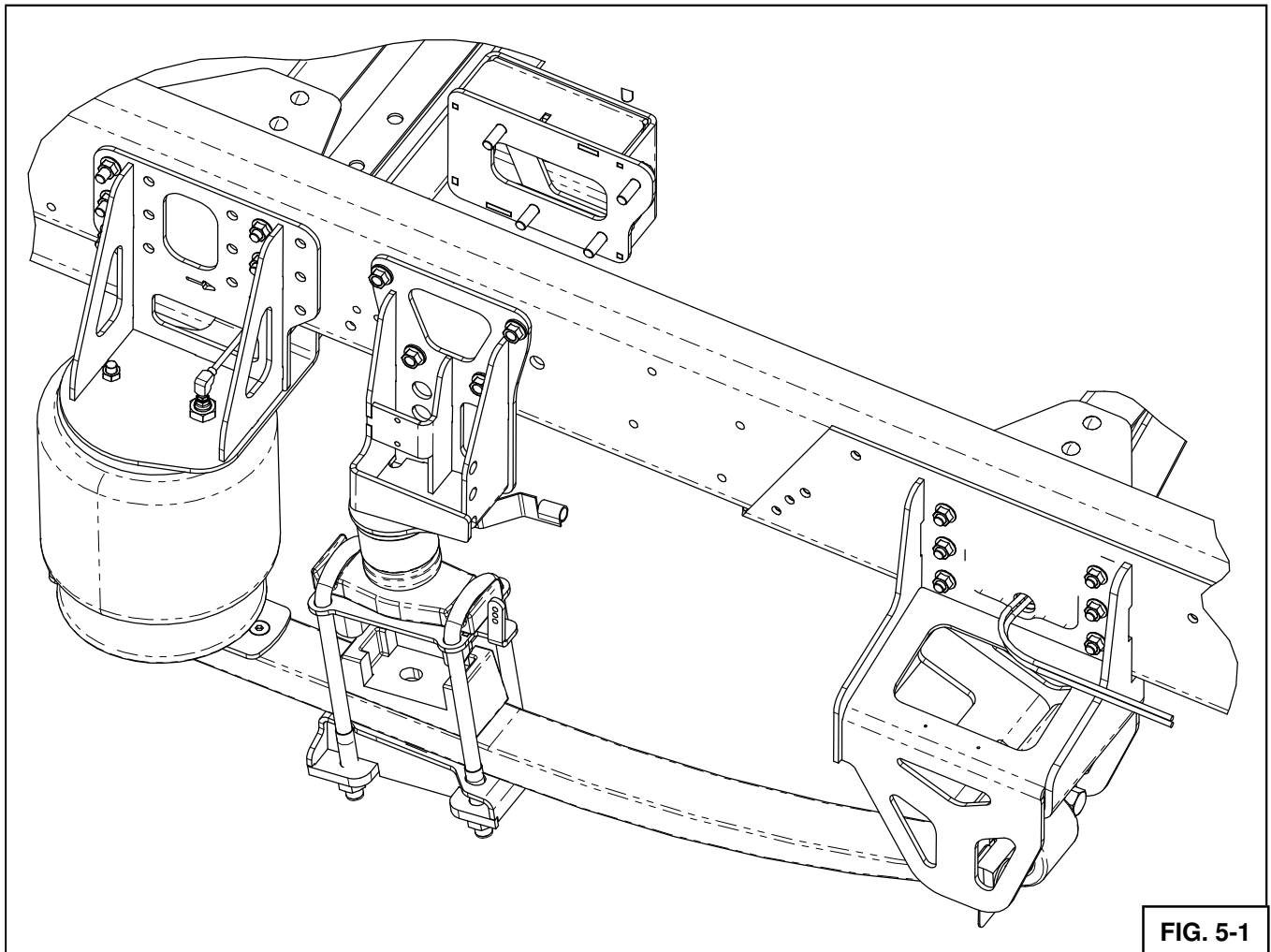


FIG. 5-1

6. LATERAL CONTROL ROD

1. Review Figure 6-1 & Parts List/Drawing (Section 11) to acquaint yourself with the various parts of the UltraRide suspension.
2. Check to make sure that axle itself is centered between the frame rails, by measuring from the outside of the driver and passenger side frame rails to the inside of the wheel hub, or tire.
3. AXLE MOUNTED LATERAL CONTROL ROD BRACKET and UPPER LATERAL CONTROL ROD MOUNT BRACKET have been loosely installed from a previous step.
4. Loosely mount the LATERAL CONTROL ROD between the two sides using (4) 5/8 UNC BOLTS and (4) 5/8 UNC TOP LOCK NUTS. These fasteners will be torqued with others described in Section 7. See Figure 6-1 for details.



WARNING! Inspect Lateral Control Rod and it's mounting brackets for any interference with other components, paying close attention to clearance with any flexible components such as brake and fuel lines, and wiring.

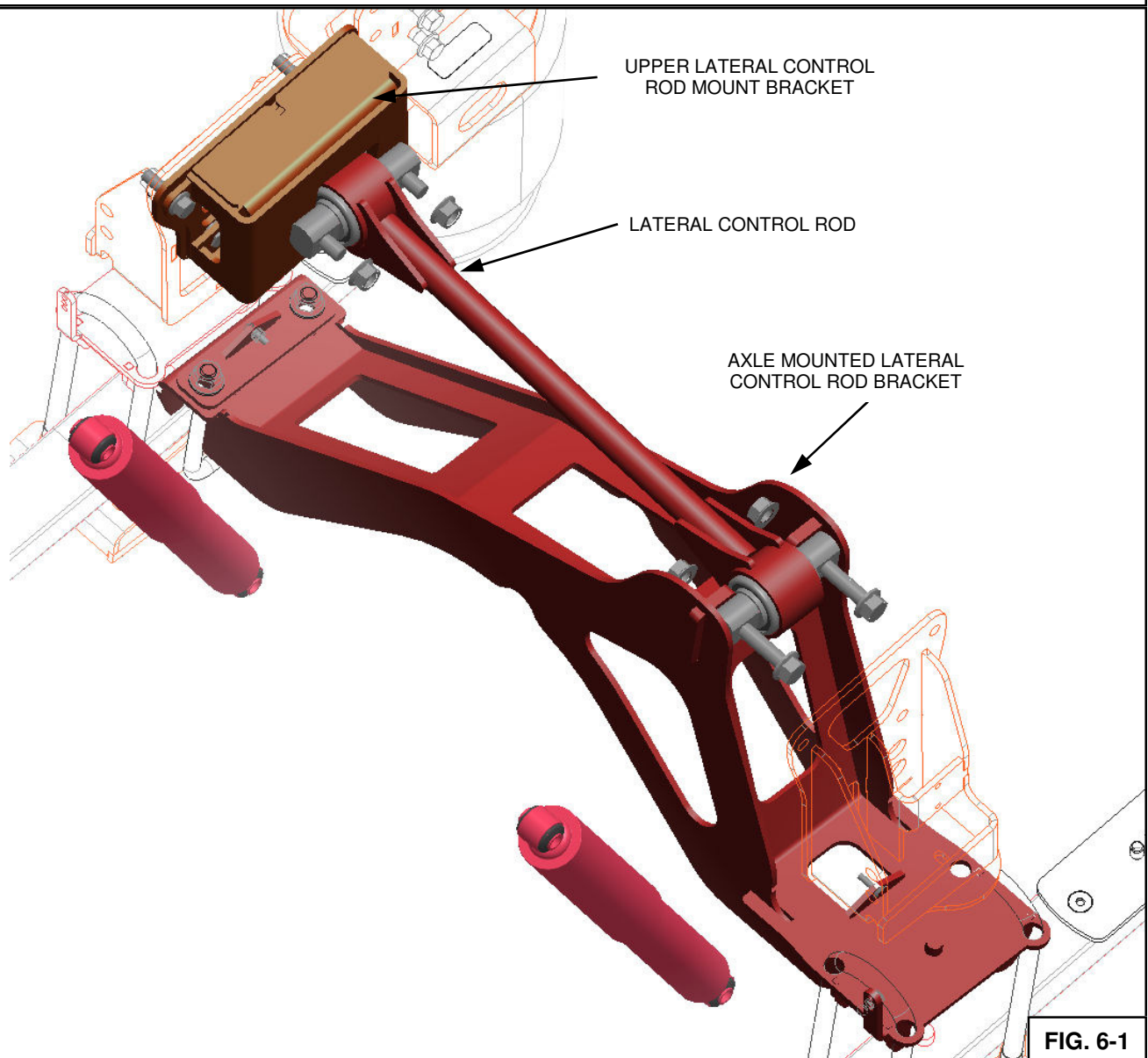


FIG. 6-1

7. FINAL INSTALLATION AND SUSPENSION COMPONENT TORQUING

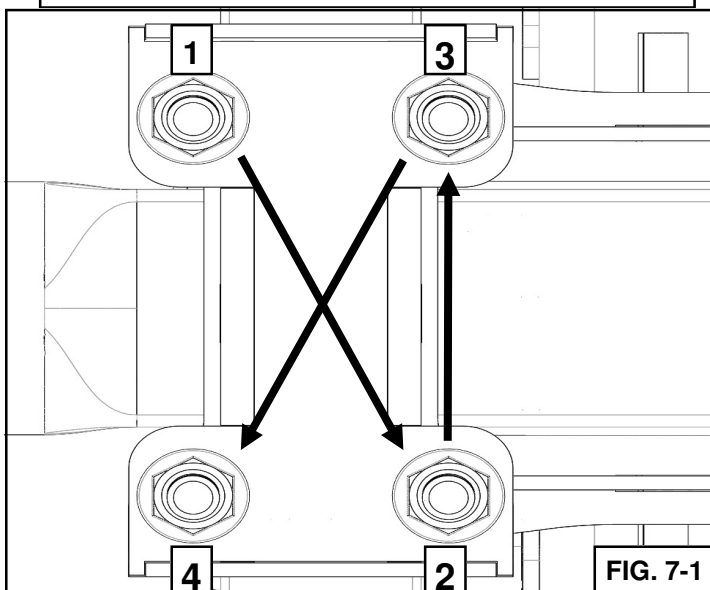
IMPORTANT: Before final torquing of fasteners, adjust the Frame and Axle vertical height until the Frame is at the Ride Height described in Section 10 and 11 and shown in Figure 10-1. Setting the Frame to Ride Height before the Final Torquing assures the Axle and Suspension will not shift when the Suspension is later inflated to Ride Height. Before tightening of U-Bolts ensure that spring arm and U-bolts are properly aligned with the axle and axle seats. See Fig. 7-3, Components should align vertically as shown.

- See Table 10-1 in Section 10 for appropriate Torque values.

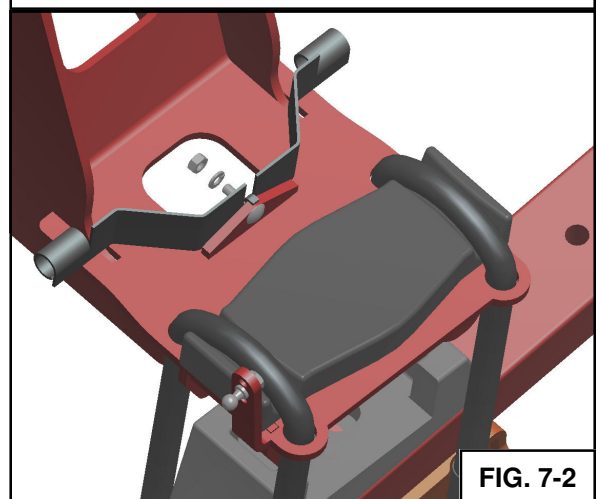
1. Torque all 1/2 UNC FRONT AND REAR HANGER BRACKET Nuts
2. Torque (8) 1/2 UNC VALVE/JOUNCE BUMPER BRACKET nuts.
3. Torque the (8) M20 X 2.5mm AXLE U-BOLT Free Spinning Lock Nuts in a **criss-cross pattern, gradually increasing the tightening torque. Ensure SPRING ARM, AXLE SEATS, and all axle components are properly aligned prior to this.** See Fig. 7-1 for details
4. Torque the (4) 3/4 UNC SPRING ARM FRONT PIVOT Nuts.
5. Torque the (2) 5/8 UNF LOWER LATERAL CONTROL BRACKET NUTS, located at the inner U-bolt.
6. Torque the (4) 5/8 UNC FLANGE NUTS that secure the LATERAL CONTROL ROD.
7. Install new UltraRide tuned SHOCK ABSORBERS using the same orientation as factory with the OE mounting hardware.
8. Re-Mount Parking Brake Cable to LOWER LATERAL CONTROL ROD BRACKET as shown in Fig. 7-2

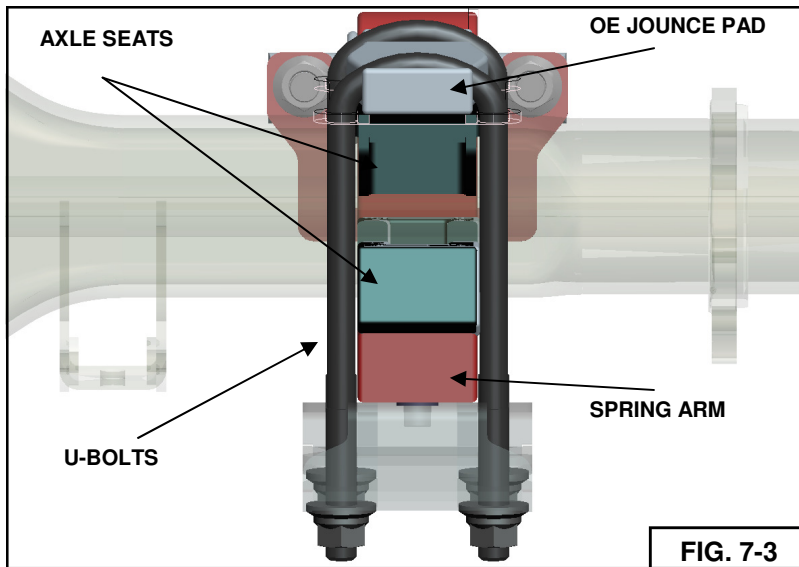
IMPORTANT: Route the all brake cables away from the air spring and other moving components. A PARKING BRAKE CABLE RELOCATION BRACKET has been supplied with kit. This will allow it to clear the DRIVER'S SIDE FRONT HANGER BRACKET. Double check clearance with it, and all other components after complete assembly.

U-BOLT LOCK NUT TORQUE SEQUENCE



**REMOUNT PARKING BRAKE CABLE
AS SHOWN
(BOTH SIDES)**





8. AIR CONTROL SYSTEM ASSEMBLY



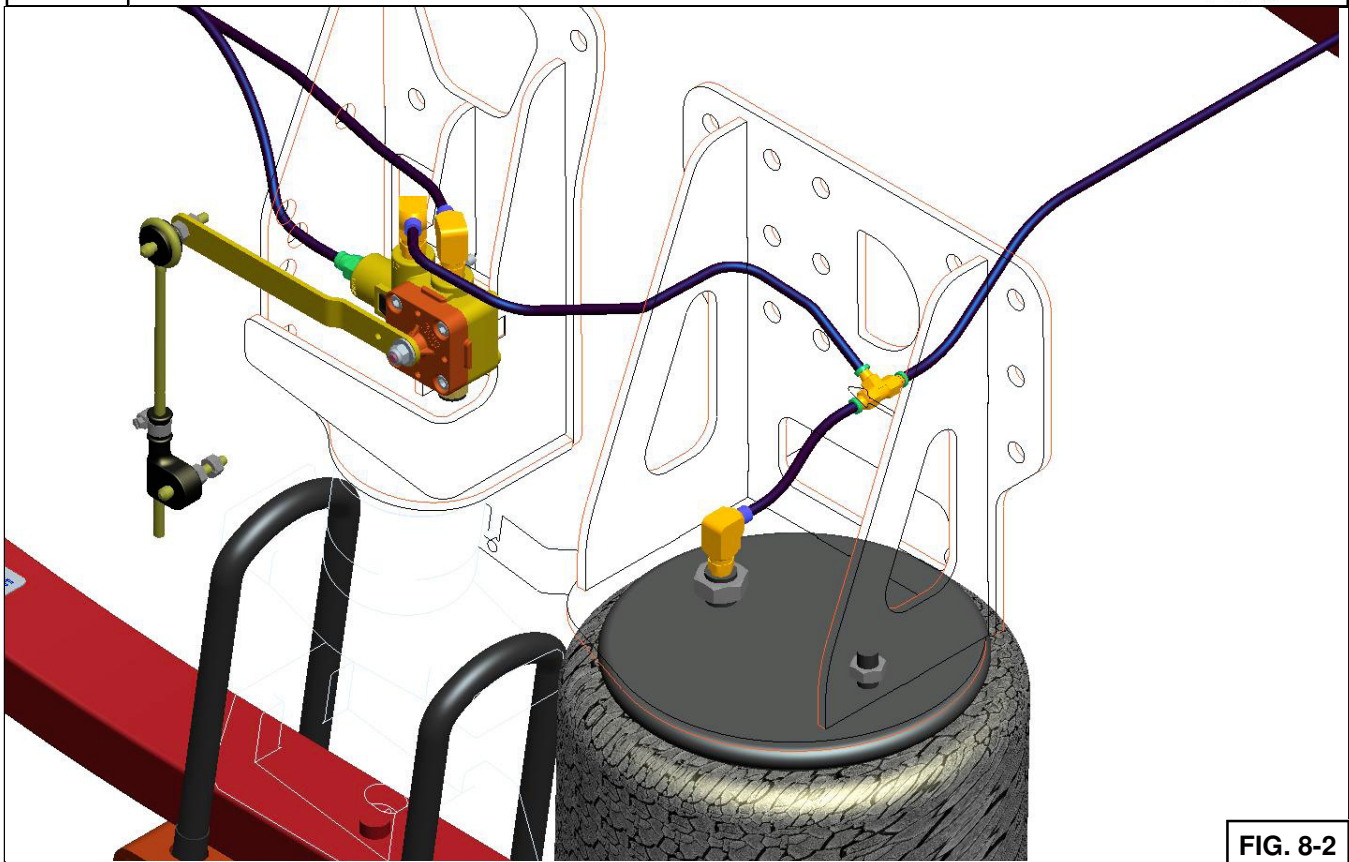
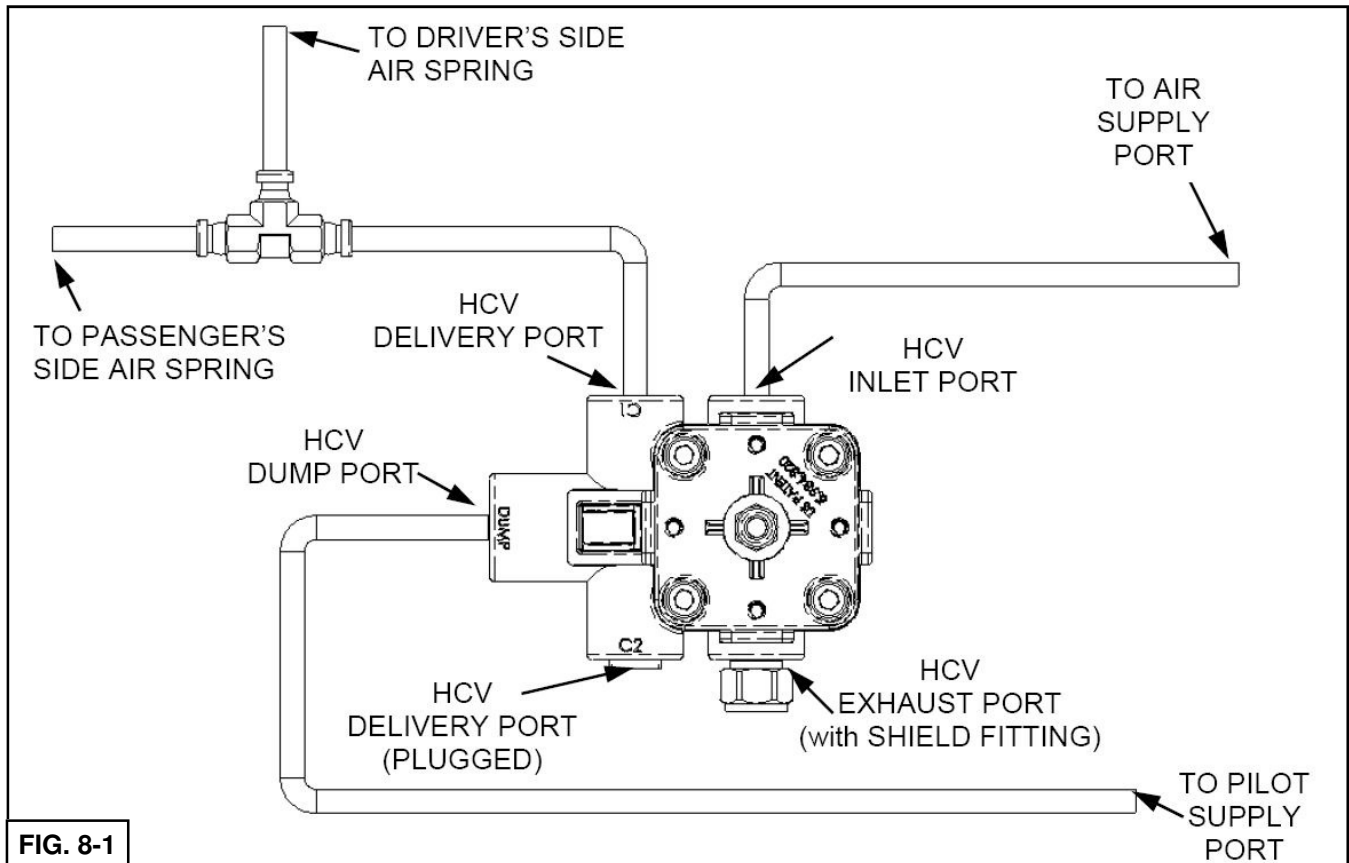
CAUTION! Route all airline away from exhaust, moving parts, and sharp objects. Be careful not to crimp the edges of the tubing, and that when cutting airline use an airline cutter to get assure square cuts. When installing the airline, fully insert into fitting and give a slight pull to seat properly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

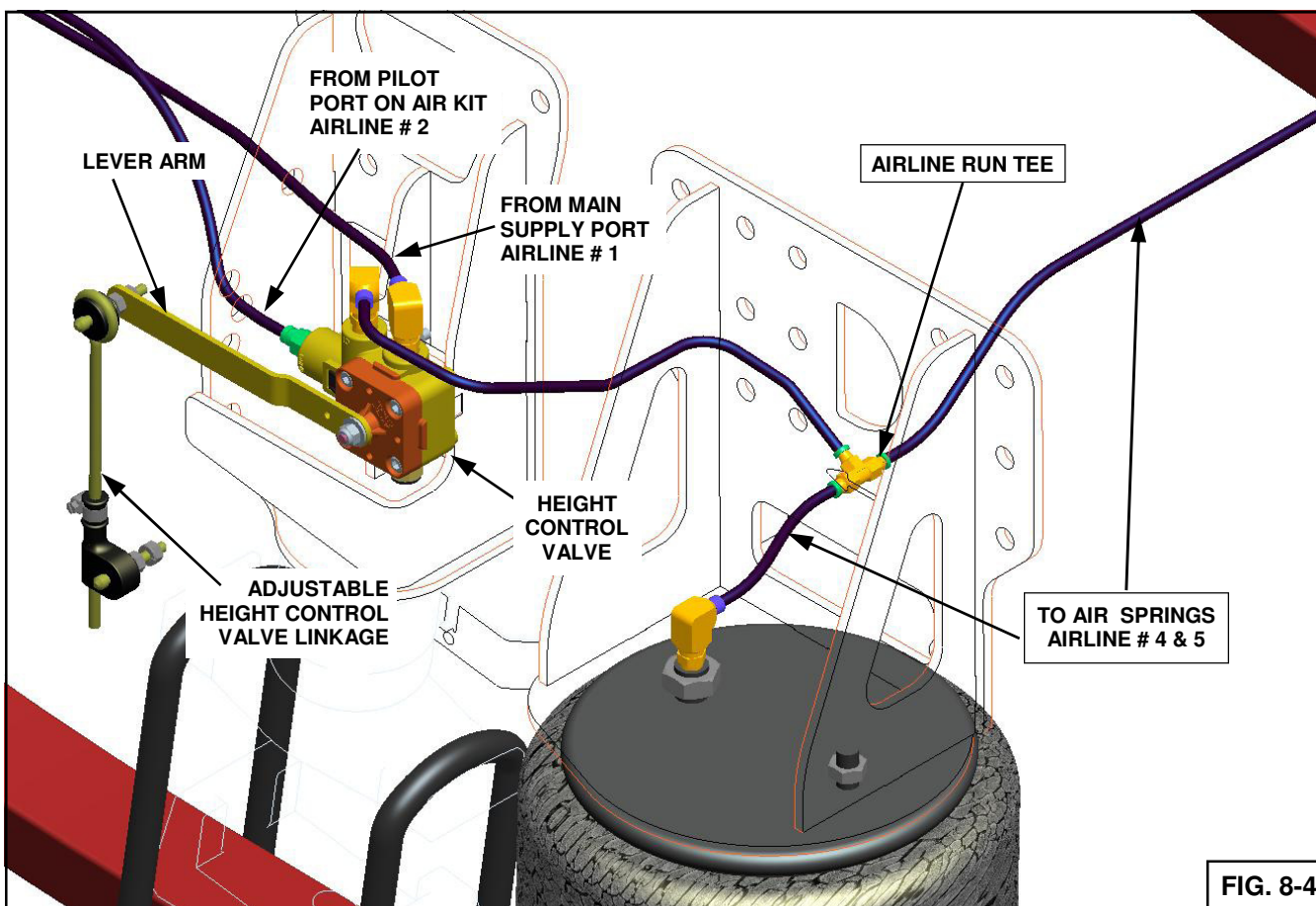
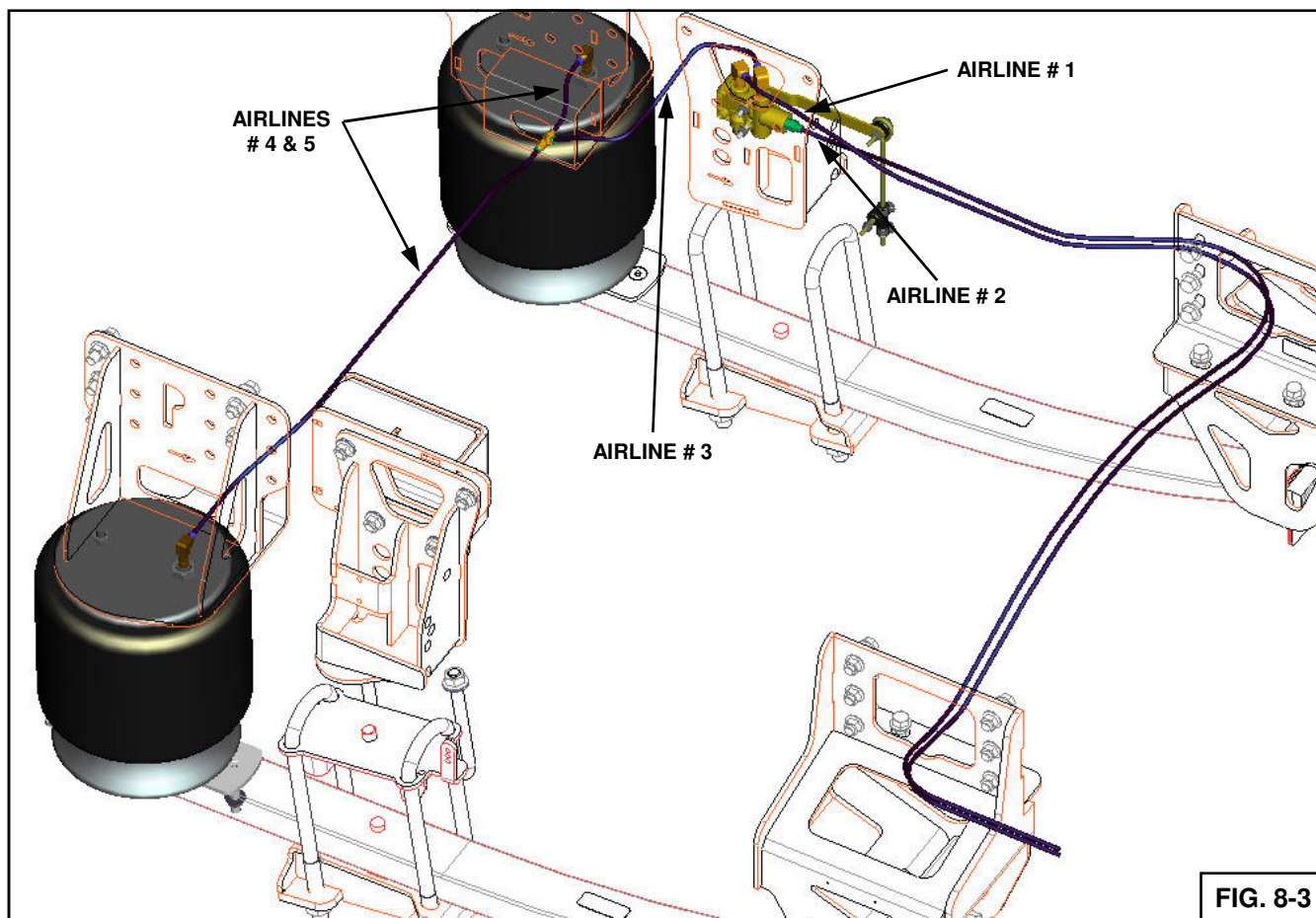
1. **Note:** The installer must find an appropriate location to install the UltraRide Air Control System. (4) frame holes will need to be drilled. If installing on the frame underneath the cab, make sure it is mounted as high on the frame as possible to allow for ground clearance below the air tank. If the system will be mounted to the inside of the frame, a mounting bracket is required (Link Mfg. Part 80001515).



1. Use (4) 5/16 X 1 3/4 UNF FLANGE BOLTS and (4) 5/16 UNF TOPLOCK FLANGE NUTS to fasten the Air Control Box to the frame, placing the RUBBER ISOLATORS between the box and frame (See Table 10-1 for appropriate Torque). The back of the Air Control Kit must not contact any bolts protruding from the frame, to properly isolate the Air Kit from the chassis. For additional information, see **AIR CONTROL KIT OWNERS MANUAL**.
2. Route the main airlines, #1 through 5, as shown in Figures 8-1, 8-2, & 8-3.
 - 2.1. Route **AIRLINE 1** from the supply "I/E" port of the HEIGHT CONTROL VALVE to the MAIN SUPPLY PORT of the AIR RESERVOIR SOLENOID.
 - 2.2. Route **AIRLINE 2** from the "DUMP" port in the HEIGHT CONTROL VALVE to the PILOT SUPPLY PORT of the AIR RESERVOIR SOLENOID.
 - 2.3. Route **AIRLINE 3** from the delivery "C1" port of the HEIGHT CONTROL VALVE to the RUN TEE, then route **AIRLINE 4 & 5** to each AIR SPRING.
3. Place supplied Corrugated Loom onto all airlines. Use supplied cable tie clips to secure airline and to keep it away from all hazardous objects such as tires and exhaust.
4. Install the Valve Linkage onto the Lever Arm and Axle Mount Plate. See Fig. 8-4. Suspension height will be set later.

AIR CONTROL KIT AIR CONTROL SCHEMATIC





9. ELECTRICAL SYSTEM



CAUTION! All wiring should be routed and secured neatly to avoid any functional or visual issues. Under hood and under-body wire routings should be clear of sharp edges (3/4 inches minimum) and direct sources of heat (4 inches minimum). Wiring should not be routed through wheel well areas where it may be damaged by tire or road debris, and it should not be routed over the exhaust system. Wiring should not contact the brake lines or fuel lines. Disconnect the battery cables before servicing any electrical components. See *GM Documents 173237 and 173165. Refer to the GMT560 Best Practices Manual for more information on tying into electrical components.*

1. Refer to **AIR CONTROL KIT OWNERS MANUAL** for further details on electrical system installation and parts list.



TORQUE TABLE (Table 10-1)

LOCATION	FASTENER	TORQUE
FRAME MOUNTED FRONT HANGER	1/2 UNC NUTS	100 FT-LBS
FRAME MOUNTED UPPER AIR SPRING BRACKET	1/2 UNC NUTS	100 FT-LBS
FRAME MOUNTED LATERAL CONTROL ROD BRACKET	1/2 UNC NUTS	100 FT-LBS
AXLE MOUNTED LATERAL CONTROL ROD BRACKET	5/8 UNF FLANGE NUTS (U-BOLT)	150 FT-LBS
LATERAL CONTROL ROD	5/8 UNC FLANGE NUTS	160 FT-LBS
AIR SPRING BOTTOM	1/2 UNC NUTS	30 FT-LBS
SPRING ARM AXLE LOCATION	M20 LOCK NUTS (U-BOLT)	315 FT-LBS
FRONT SPRING ARM PIVOT BOLTS	3/4 UNC NUTS	275 FT-LBS
SHOCK ABSORBER	NUTS	60 FT-LBS
AIR CONTROL BOX	5/16 UNF NUTS	20 FT-LBS

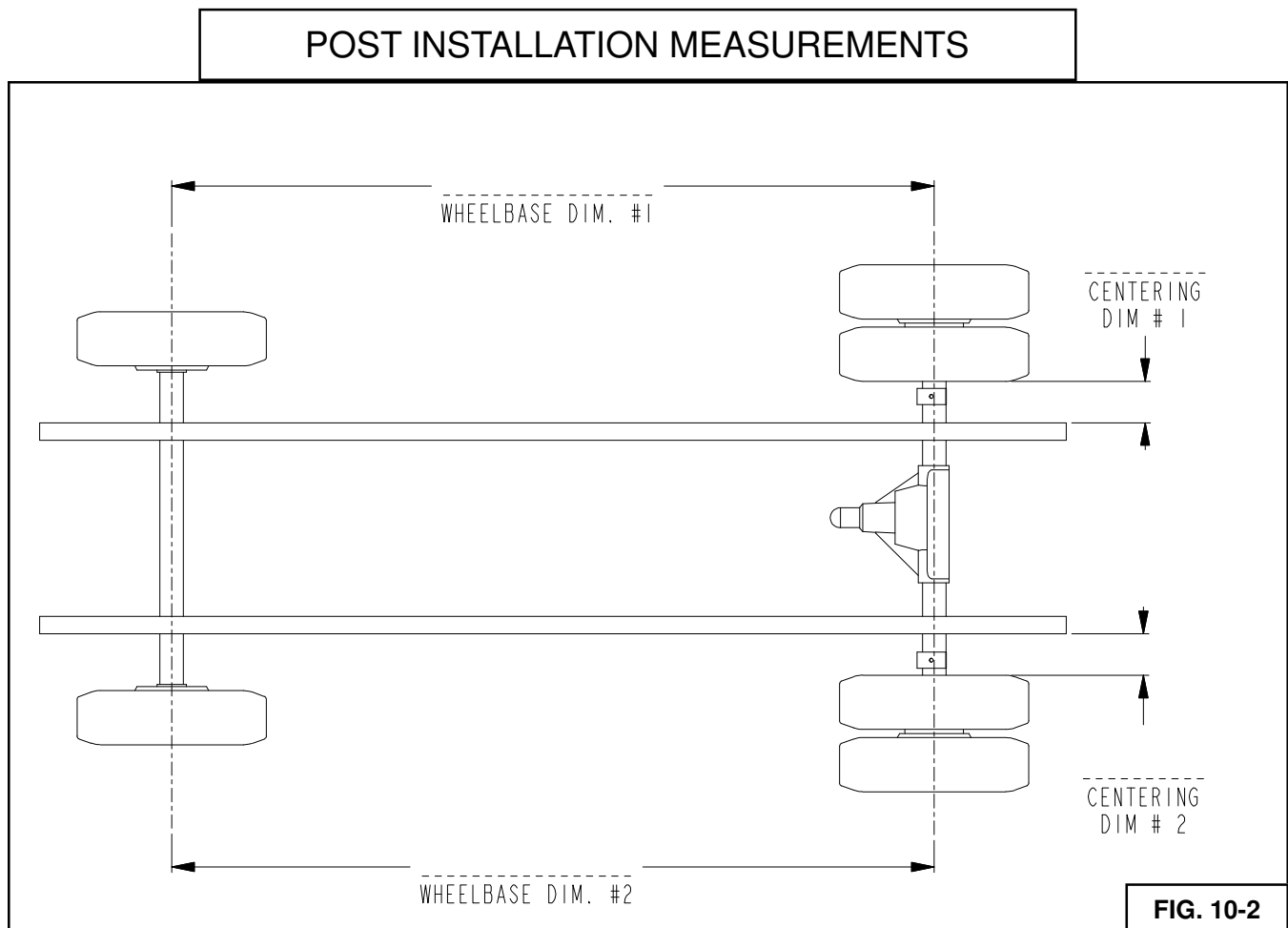
10. FINAL ASSEMBLY AND INSPECTION

1. Double check all electrical connections and wire routings for proper connection and safe location.
2. Remove all jacks and fill the air system by either using the service fill valve on the air tank or by starting the vehicle and allowing the compressor fill the system. Using the service fill valve to fill the air reservoir to 120 psi is the recommended method. The maximum allowable tank pressure is 150 psi.
3. Check for proper operation of the height control valve. 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.
4. Disconnect the Valve Linkage and 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.
 - 1) Minimum clearance between the exhaust and air spring is 3 inches, unless a heat shield is used.
 - 2) Minimum clearance between the tire and air spring is 1.5 inches.
 - 3) Minimum clearance between the exhaust and any suspension hard point (such as the Lateral Control Rod) is 1.0 inch throughout the suspension's entire range of motion.
5. Measure the "Design Height" of the air springs. The design height must be *measured at the middle of the air spring (from the side)*, and should be set to the value in Fig 11-1. If the design height needs adjustment, set the design height using the following sequence:
 - 1) Deflate the air spring(s) by disconnecting one end of the linkage from the valve arm, and rotating the valve arm counter-clockwise.
 - 2) Loosen the lock nuts and adjust the length of the linkage (Increasing the length will increase Design Height, and vise-versa). Reattach the linkage.
 - 3) Allow chassis to come up to ride height, and allow enough time for truck height to settle. Re-adjust linkage and measure until correct design height is reached. Jostle the suspension up and down and allow it to come back to design height and re-measure for verification. Tighten the clamp on the valve linkage when complete.
6. Double check that all fasteners are tightened to the specified torque given in Table 10-1. A good practice is to use a paint marker to mark each fastener across the nut and bolt threads as it is tightened. This practice gives a visual check later that all fasteners were properly tightened.
7. **IMPORTANT!** Check all fittings and airline connections for air leaks by squirting with soap/water mixture or other leak checking fluid.
8. Reinstall the chassis body (if applicable).
9. 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.

10. Kneeling (Dump) Operation: Moving the Dump switch to the “ON” position 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.

FINAL ASSEMBLY AND INSPECTION CHECKLIST

- ☐ Check and document OE rear axle alignment
- ☐ Set Design Height to **12.10** inches at airspring as shown in Fig. 11-1
- ☐ Verify suspension function via dump and re-inflation
- ☐ Check for air leaks and system integrity
- ☐ Check clearances throughout suspension motion range
- ☐ Check driveline angle (see end of instructions)
- ☐ 4 wheel alignment, as recommended by chassis manufacturer
- ☐ After installation measure and record wheelbase and centering dims below (Fig. 10-2)



11. OPERATION & MAINTENANCE

The UltraRide® suspension needs no lubrication and little maintenance. The following components should be checked at the time the vehicle is being serviced. However, immediate corrective action should be taken if a serious malfunction occurs. See the Parts List Drawing on following page for details.



WARNING! 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.

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.
- ❑ 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 Low Pressure Warning Light indicates a severe drop in tank pressure (below 60 psi). If the light stays on for a significant period of time, corrective action should be taken to determine the cause of air loss or system malfunction. **NOTE:** The Low Pressure Warning Light could come on briefly when the “Dump” feature is being used.
- ❑ If not using an automatic drain valve, it is important to release any moisture contained within the air tank on a **daily** basis. This is done by pulling on the attached release cable for approximately 5 seconds. See Air Control Kit Owners Manual for location of this cable. Not releasing the moisture on a regular basis will cause the drain valve to not operate properly.

DAILY SERVICE:

- ❑ Release any moisture in air tank by pulling on air release cable.



CAUTION! Do not operate the vehicle while the Dump Switch is on and the air springs are deflated. **This may damage the air springs and suspension components.**

CHECK AT EVERY VEHICLE SERVICE INTERVAL:

- ❑ Check Design Height $\pm 1/4$ ".
- ❑ Check for air leaks around fittings.
- ❑ Check air compressor filter and replace annually.
- ❑ Visually check Valve/Linkage Hardware for Function and that components/fasteners are intact.

CHECK AFTER THE FIRST 1000 MILES:

- ❑ Recheck & tighten any loose fasteners.
- ❑ Check for any loose or worn components.

CHECK AFTER EVERY 30,000 MILES:

- ❑ Check arm pivot bushings and lateral control rod bushings for wear; replace if worn

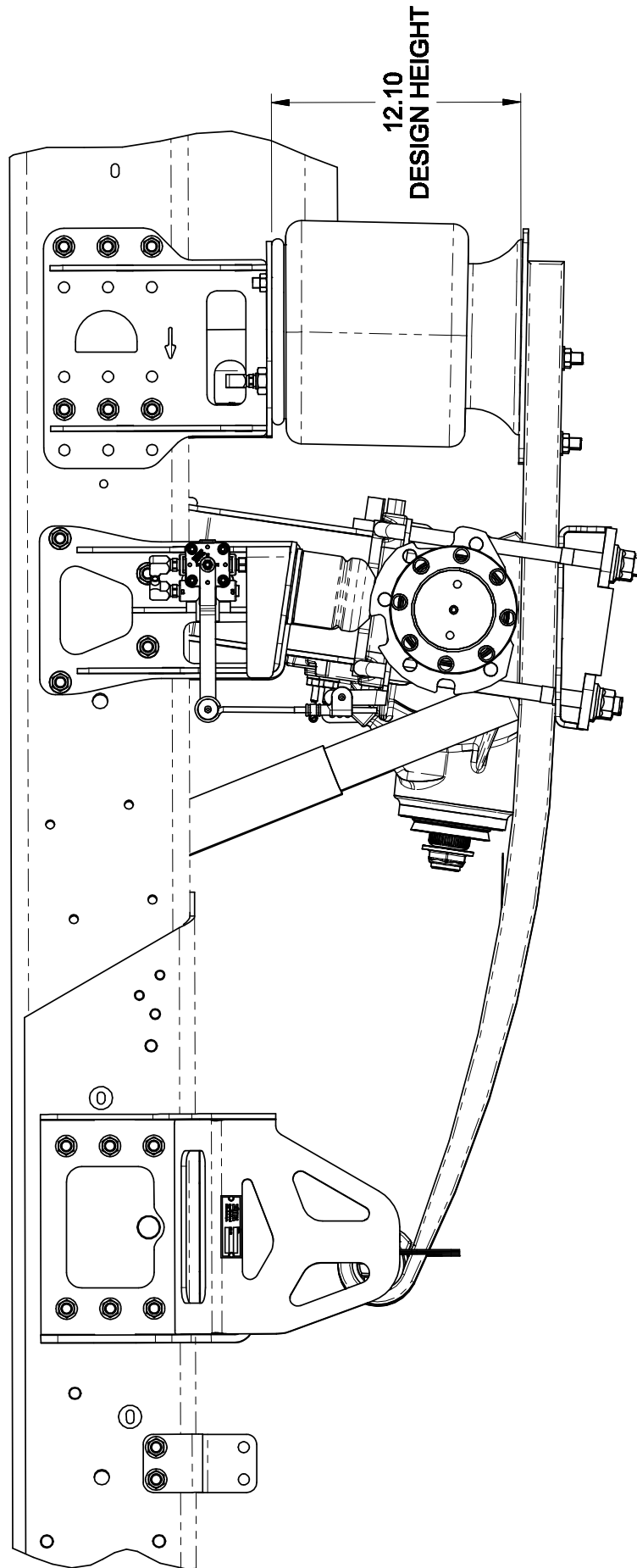


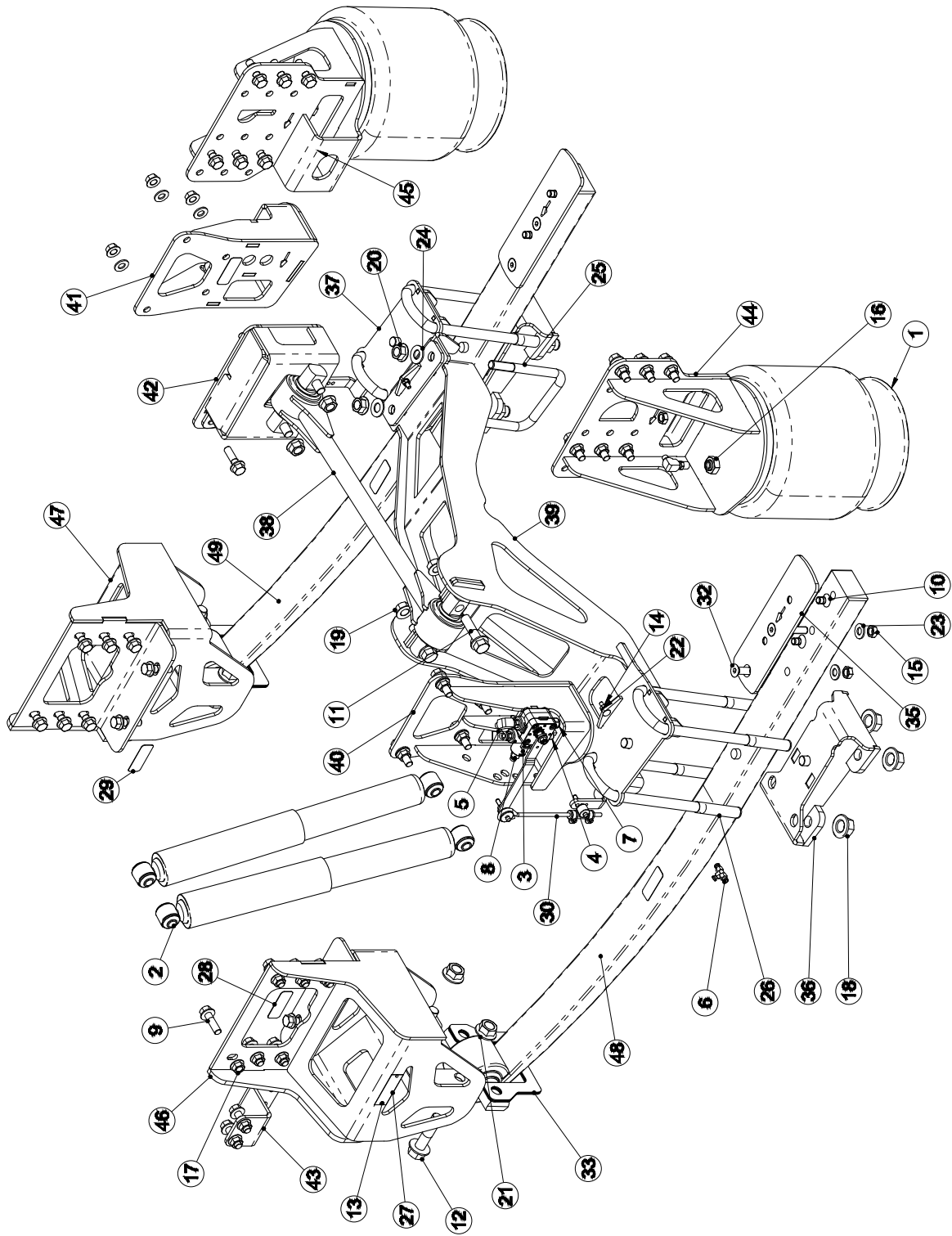
FIG. 11-1

UltraRide® – GMC 4500/5500 4X4

PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	11030507	SPRING-AIR	2	26	1495-0038	U-BOLT, M20 X 2.50, 79 X 315	4
2	1210-0522	SHOCK ABSORBER	2	27	1500-1305	TAG-SERIAL, CABMATE	1
3	13010064	VALVE-CONTROL, HEIGHT	1	28	1500-1324	LABEL-IDENTIFICATION, DRIVER SIDE	3
4	1302-2077	AIR FTG/PLUG (1/4 NPT)	1	29	1500-1325	LABEL-IDENTIFICATION, PASS. SIDE	3
5	1302-5091	ELBOW, 1/4 TB 1/4 M-NPT, PUSH-IN DOT	4	30	15000327	LINKAGE-VALVE, HEIGHT CONTROL, BARKSDALE	1
6	1302-5563	UNION TEE, 1/4 TB, PUSH-IN	1	31	1505-0023	HARNES-WIRE, PIG-TAIL	1
7	1302-9974	MUFFLER-EXHAUST, 1/4 M-NPT	1	32	1506-0431	1/2 X 3 UNF SOC FLAT CSK HD CAP SCREW	2
8	13025046	CONNECTOR, 1/4 TB 1/4 M-NPT	1	33	80001420	SHIM-SPRING ARM	6
9	1411-1614	1/2 X 1 3/4 UNC FLANGE BOLT (GRADE 8)	35	34	80001570	MANUAL-INSTALLATION, ULTRA RIDE	1
10	1417-1606	1/2 X 3/4 UNC SOC FLAT CSK HD CAP SCREW	4	35	800M0135	PLATE-ADAPTER, AIRSPRING	2
11	141A-2020	5/8 X 2 1/2 UNC FLANGE BOLT (GR 8) O&P	2	36	800M0150	PAD-U-BOLT, LOWER	2
12	141A-2424	3/4 X 3 UNC FLANGE BOLT (GR 8) O&P	4	37	800M0151	AXLE PAD-FABRICATED	1
13	1455-0404	#4 X 1/4 DRIVE SCREW	2	38	800M0152	LATERAL CONTROL ROD	1
14	1470-0800	1/4 UNC HEX NUT (GR B)	4	39	800M0154	BRACKET-MOUNT, LCR, LOWER	1
15	1475-1600	1/2 UNF HEX JAM NUT	6	40	800M0156	BRACKET-MOUNT, JOUNCE BUMPER	1
16	1475-2402	3/4 UNF HEX JAM NUT, O&P	2	41	800M0157	BRACKET-MOUNT, JOUNCE BUMPER	1
17	1480-1604	1/2 UNC TOP LOCK FL NUT (GR G) O&P	38	42	800M0158	BRACKET-MOUNT, LCR, UPPER	1
18	15060451	M20 X 2.5, CLASS 10, FREE SPINNING LOCK NUT	8	43	810M0043	BRACKET-RELOCATION, BRAKE CABLE	1
19	1480-2004	5/8 UNC TOP LOCK FL NUT (GR G) O&P	4	44	810M0085	BRACKET-AIR SPRING, UPPER, DR	1
20	1480-2005	5/8 UNF TOP LOCK FL NUT (GR G) O&P	2	45	810M0086	BRACKET-AIR SPRING, UPPER, PASS	1
21	1480-2404	3/4 UNC TOP LOCK FL NUT (GR G) O&P	4	46	810M0088	HANGER-PIVOT, FRONT, DR	1
22	1485-0800	1/4 LOCK WASHER	4	47	810M0089	HANGER-PIVOT, FRONT, PASS	1
23	1488-1602	1/2 SAE HARDENED WASHER	12	48	820M0030	SPRING ARM-GM 4500/5500, 11K, 13.5K & 15K	1
24	1488-2002	5/8 SAE HARDENED WASHER	2	49	820M0031	SPRING ARM-GM 4500/5500, 11K, 13.5K & 15K	1
25	1495-0019	U-BOLT-SQUARE, 5/8 UNF, 4.75 X 6.75	1				

UltraRide[®] – GMC 4500/5500 4X4



***UltraRide* -TROUBLE SHOOTING GUIDE**

COMPONENT	POSSIBLE PROBLEM	CORRECTIVE ACTION
Airlines	Air leaks	Replace airline
Fittings	Air leaks	Remove fitting and apply fresh joint compound. Reinstall fitting, but Do Not Over tighten. Do not use Teflon tape.
Air Springs	A. Improper height B. Air leakage	A. Adjust valve linkage to maintain proper air spring height. B. Replace air spring.
Height Control Valve	Air spring(s) will not inflate when weight is added to the chassis. <div style="text-align: center;">OR</div> Air spring(s) will not deflate when weight is removed from the chassis.	A. Inspect valve/s to ensure it is oriented correctly. Check that the airlines and fittings are assembled to their correct ports. See Section 8 for details. B. Replace valve.
Shock Absorber	Insufficient damping effect	Replace shocks
Lateral Control Rod	A. Loose nuts on lateral control rod bolts B. Worn bushings	A. Tighten securely. B. Replace lateral control rod.

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 a GM C4500/C5500 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:

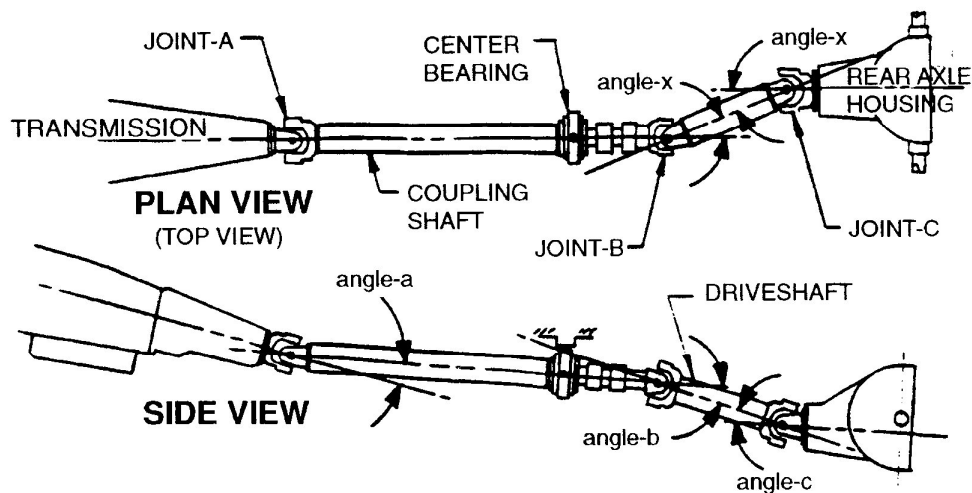
By example, using Figure 1:
The NET OPERATING ANGLE at **JOINT - A** = (ea) =

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

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

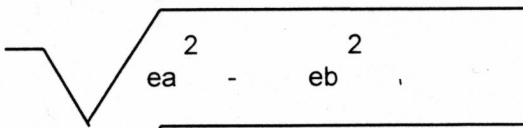
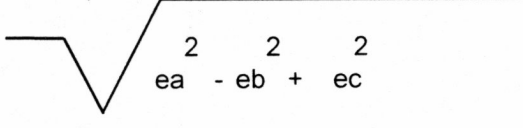
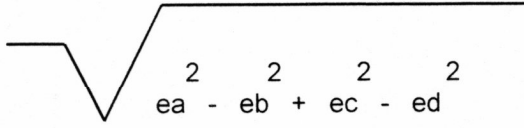
$$\begin{array}{l}
 \left[\begin{array}{c} \text{Plan View} \\ \text{Angle} \end{array} \right]^2 + \left[\begin{array}{c} \text{Side View} \\ \text{Angle} \end{array} \right]^2 \\
 \hline
 (0)^2 + (\text{angle} - a)^2 \quad \geq 0.5^\circ \quad \leq 3.0^\circ \text{ or } \leq 4.0^\circ \\
 \hline
 (\text{angle} - x)^2 + (\text{angle} - b)^2 \quad \geq 0.5^\circ \quad \leq 3.0^\circ \text{ or } \leq 4.0^\circ \\
 \hline
 (\text{angle} - x)^2 + (\text{angle} - c)^2 \quad \geq 0.5^\circ \quad \leq 3.0^\circ \text{ or } \leq 4.0^\circ
 \end{array}$$

Fig. 1



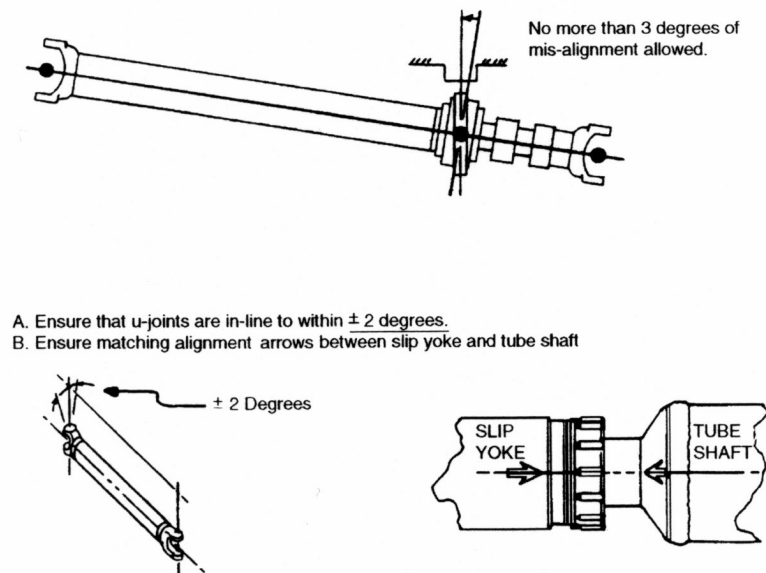
Guideline - Driveline Angles (Continued)

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:

For a 1-shaft driveline: (2 - joint)		$\leq 3.0^\circ \text{ or } \leq 4.0^\circ$
For a 2-shaft driveline: (3-joint) (as exemplified in Figure-1)		$\leq 3.0^\circ \text{ or } \leq 4.0^\circ$
For a 3-shaft driveline: (4-joint)		$\leq 3.0^\circ \text{ or } \leq 4.0^\circ$

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



Observe alignment arrows stamped on parts. If there are no alignment 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 1/2 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 GM C4500/C5500 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 Chevrolet 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 shown with a dot or other marking on the yoke or pilot bearing flange. The OEM driveshafts may also be marked with indicative marking 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 alignment marks and maintain this match when the drivetrain is reassembled after modification. Remanufactured or modified driveshafts should also have their "light" sides matched to the mark on the yoke or pilot bearing flange.

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.

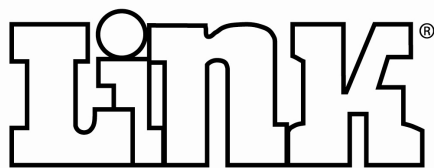
USE OF DOUBLE CARDAN UNIVERSAL JOINTS FOR GREATER DRIVE ANGLES:

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 GM C4500/C5500).

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.



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