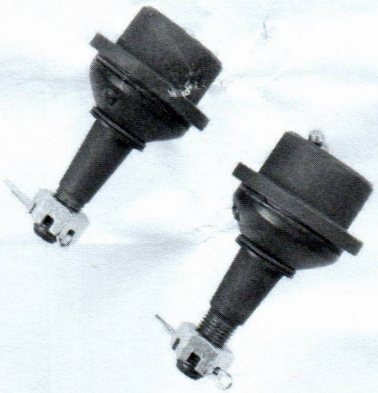
Revisions			
Rev.	Description	Date	Approved
A	Initial Release	8/3/21	R.G.

Jeep JL/JT Ball Joints

Installation Instructions

Applications:
2018+ Jeep Wrangler (JL)
2019+ Jeep Gladiator (JT)



	TITLE: JEEP JL/JT BALL JOINT INSTALL INSTRUCTIONS	
SIZE	DWG NO:	REV
A	4170-INST	A
	SCALE: N/A	PAGE 1 OF 14

Thank you for purchasing the best aftermarket products available for your vehicle. We strongly feel that the parts you are about to install should meet or exceed your expectations for performance. Proper assembly is critical to the performance of these components and the vehicle as a whole. Please take the time to carefully read these instructions and familiarize yourself with the installation procedure before working on your vehicle. If you have any questions PLEASE contact Synergy Manufacturing BEFORE beginning installation. Thanks again for supporting Synergy – enjoy the performance benefits of the best aftermarket products available for your vehicle!

Synergy Manufacturing
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Modifying or otherwise altering vehicle components may cause the vehicle to handle differently than originally designed. It is the driver's responsibility to familiarize themselves with the performance and handling characteristics of the modified vehicle. Vehicles with larger diameter than stock tires must be driven carefully and cannot be expected to perform as stock or meet OEM performance with regard to handling, braking or crash performance. Ensure all replacement components are compatible with vehicle capacities so as not to overload components, especially tires. It is up to the individual to ensure that the vehicle and all components are compatible with the intended vehicle use, including load ratings, road conditions, and driver abilities. Thorough and frequent vehicle inspections are recommended to ensure a safe and reliable state of readiness, especially after off-highway use.

PARTS LIST

4170 Jeep JL/JT Ball Joints		
QTY	**Part Number**	**Description**
1	417001-02	Lower Ball Joint
1	417001-01	Upper Ball Joint
2	N/A	M14X1.5 Zinc Plated Slotted Hex Nut
2	N/A	1/8 x 1.25 Zinc Plated Cotter Pin
2	N/A	1/4-28 Straight Zerk Fitting
4	N/A	1/4-28 Flush Zerk Fitting
1	N/A	Flat Washer, Grade 8, 9/16" SAE

GENERAL NOTES

- These instructions are also available on our website; www.synergymfg.com. Check the website before you begin for any updated instructions and additional photos and videos for your reference.
- Worn front end components can quickly wear out other components. When replacing ball joints, check the condition of the tie rod ends in the steering, the track bar, as well as the suspension bushings; especially if 'death wobble' was ever experienced. Replace all worn components all at once.
- While these ball joints are designed as a lifetime part, they are not maintenance free. The joints require lubrication with fresh grease occasionally. We recommend re-greasing the joints after every 20,000 road miles. If harsh conditions are encountered, such as a dusty, salty, or wet environment, then we recommend re-greasing the joints more frequently.
- Ball joint installation should be done by qualified professionals. Incorrect ball joint installation can cause severe problems and safety issues.
- If non-knurled ball joints are removed from the vehicle, they should be replaced with non-knurled ball joints unless the vehicle has had several replacement sets and the ball joints are no longer a press fit. Installing knurled ball joints into an axle that is brand new or has only had non-knurled ball joints can cause extremely tight steering.

TOOLS NEEDED

- Ball Joint Press
- Wrenches and Sockets: 10, 18, 21, 22, 27mm wrenches and sockets, T30 Torx bit, 13mm 12 point socket
- 5mm allen wrench
- Red (high strength) threadlocker

ESTIMATED INSTALLATION TIME:

~ 4-6 Hours

INSTALLATION

1. Park the vehicle on a flat, level surface, or safely raise the vehicle on a lift. Chock the rear wheels, make sure the vehicle is in park or in gear, and set the parking brake. Raise the front end, place the front axle housing on jack stands and remove the front wheels.
2. Remove the Brake line hold down brackets from the rear of the coil bucket (10mm).
3. Unhook the ABS sensor lines from the flexible brake lines. Remove the brake calipers from the knuckles (21mm) and hang them from the frame with caliper hangers or straps of some sort. **See Figure 1.** Do not allow the calipers to hang by the brake lines.

Figure 1. Brake Caliper Carrier Bolts

4. Remove the brake rotor retaining bolt (T30 Torx). **See Figure 2.**

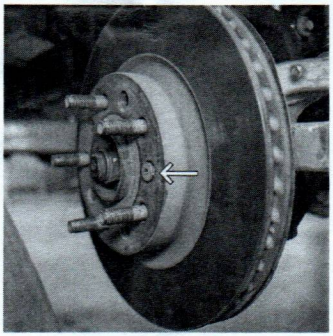


Figure 2. Brake Rotor Retaining Bolt

5. Remove the brake rotor

6. Loosen the ABS sensors by unscrewing the allen head bolt (5mm) and then pulling the sensor carefully up and out. It will not be possible to pull the sensors through the brake backing plates until the unit bearings are removed and the brake backing plates (10mm) can move. **See Figures 3 and 4.**

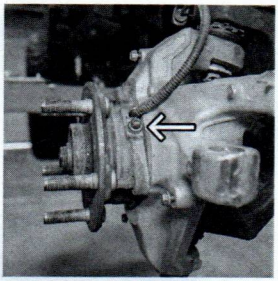


Figure 3. ABS Allen Bolt

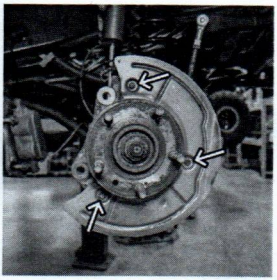


Figure 4. Brake Backing Plate Fasteners

7. The ball joints may be installed without removing the drag link or tie rod. If you would like to remove the drag link and tie rod, do so now.
8. Remove the Front Axle Disconnect motor and collar from the front axle housing. **See Figures 5 and 6.**

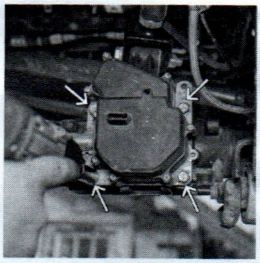


Figure 5. Front Axle Disconnect Motor

Figure 6. Front Axle Disconnect Collar

9. Remove the wheel bearing bolts from the back side of the steering knuckle (12-point 13mm). **See Figure 7.**

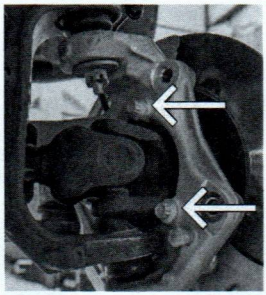


Figure 7. Wheel Bearing/Hub Bolts (x3)

10. With the wheel bearing bolts removed, remove the wheel bearing unit assembly and the axle shaft as one piece. Carefully knock the assembly loose from the knuckle with a soft mallet. Carefully pull the axle shaft out and through the knuckle. Be careful not to damage the brake backing plates.
11. Remove the cotter pins from the old ball joints. Loosen the nuts on the lower ball joints. Remove the nuts from the upper ball joints. Knock the knuckles loose by either striking the knuckle with a ball peen hammer in the area of the ball joint stud taper or using an air hammer. **See Figure 8**. Separate the lower ball joint taper first, then the upper. Remove the nuts and the knuckles. If the tie rod and drag link were not removed, be sure to hang the knuckle so that the tie rod ends and boots are not damaged.

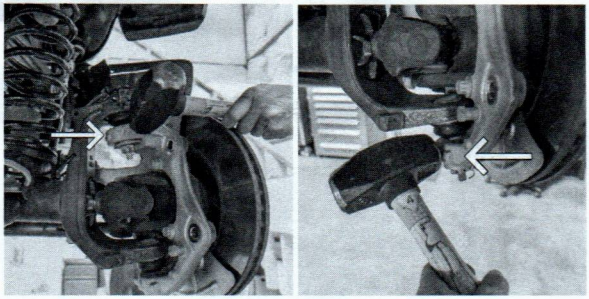


Figure 8. Knuckle Striking Area

12. Remove the 13mm bolt that secures the ABS sensor cable. **See Figure 9**. Hang the cable with the brake caliper, away from the work area.

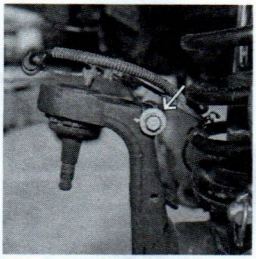


Figure 9. ABS Cable Tab Bolt

13. Remove the dust boots from all the ball joints and wipe up all old grease. First, press out the upper ball joint 'down' out of the housing, then press the lower ball joint 'down' out of the housing. **See Figures 10 and 11.**

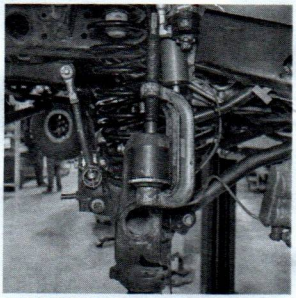


Figure 10. Upper Ball Joint Removal

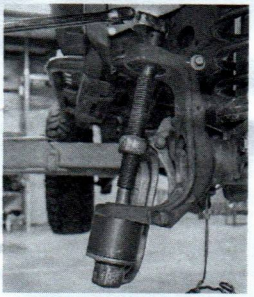


Figure 11. Lower Ball Joint Removal

14. Inspect and clean the knuckle tapers and inner 'C' bores. **See Figure 12**. Ensure they are not deformed and are clean and free of burrs. Damaged parts should be replaced or repaired as necessary.

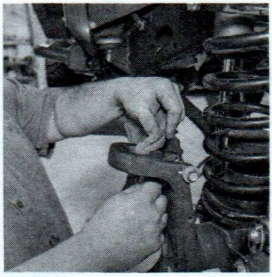
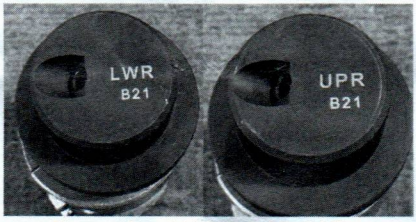


Figure 12. Cleaning Inner 'C' Bores

15. **Identify the upper and lower ball joints. The parts are very similar and it is critical to install them correctly. The upper ball joints are marked "UPR" and have a longer threaded portion (just over 1"), the lower ball joints are marked "LWR" and feature a shorter threaded portion (just over .75"). See Figures 13,14, and 15.**



Figures 13 and 14, Labeled Ball Joints

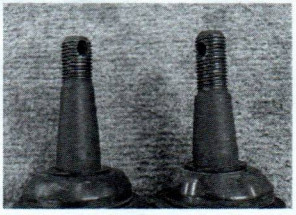


Figure 15, Difference in Threaded Stud Lengths. (Left – Lower, Right – Upper)

16. Orient the Synergy lower ball joints - Depending on the wheel offset, axle trusses and gussets, axle shaft size and other factors, the orientation of the zerk will need to be decided by the installer. We

recommend orienting the zerk fitting so that it is pointing towards the rear of the vehicle, slightly toward center. **See Figure 16.**

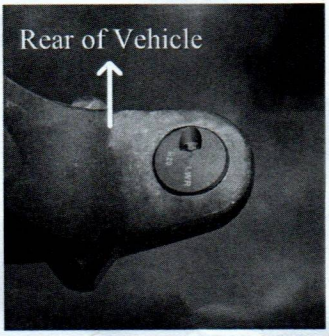


Figure 16. Lower Ball Joint Zerk Orientation

17. Once the lower ball joints are correctly oriented, press the joints into the axle housing. It is critical that the body is pressed in evenly and smoothly. Grease is not necessary but can be used if desired. The joint must sit flat and flush against the lower surface of the inner 'C'.
18. Press the upper ball joints into the axle housing. They are the same size as the lower ball joints, so the same press adapters may be used. The orientation of the zerk fitting on the upper ball joint is not critical, but should not be oriented outward towards the wheel. The joint must sit flat and flush against the lower surface of the inner 'C'.
19. Install the zerk fittings and dust boots onto the ball joints. We recommend using the flush style zerk fitting in the lower ball joint to eliminate clearance issues with aftermarket axle shafts.
20. Note the orientation of the cotter pin holes in the ball joint studs. We recommend aligning the cotter pin holes so that they are perpendicular to the axle, aligned front to back on the vehicle. If the cotter pin holes need to be relocated, spin the ball studs with a pin through the cotter pin hole. This will make cotter pin installation easier. **See Figure 17.**

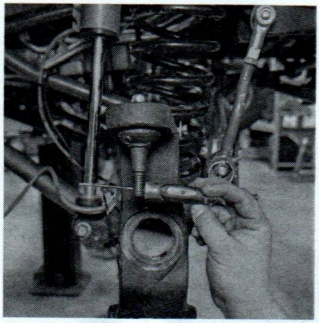


Figure 17. Cotter Pin Alignment Correction

21. Install the steering knuckles. Place the provided washer on the lower ball joint stud and tighten the lower ball joint castle nut slightly (no more than 15 lb-ft). **See Figure 18.**

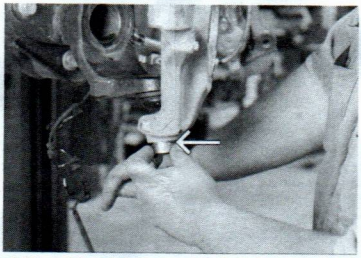


Figure 18. Reinstalled Knuckle with Lower Ball Joint Castle Nut Lightly Tightened

22. Install the tapered bushing into the knuckle. Carefully tap the bushing into place, being very careful not to damage the ball joint stud threads. **See Figure 19.** Do not use the upper ball joint castle nut to install the tapered bushing! Any damage resulting from improper installation of the tapered bushing is not covered by the product warranty. **See Figure 20**

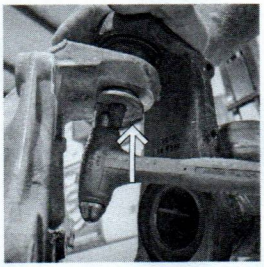


Figure 19. Proper Tapered Bushing Install with Hammer

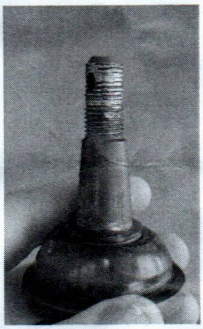


Figure 20. Damage Resulting from Improper Installation of Tapered Bushing

23. Torque the upper ball joint castle nuts to 55 lb-ft with a 7/8" or 22mm socket.
24. Torque the lower ball joint castle nuts to 35 lb-ft with a 7/8" or 22mm socket.
25. Re-check the torque on the upper ball joint castle nut and make sure it is at least 55 lb-ft.
26. Install the cotter pins. If the castle nut slots do not line up with the cotter pin holes, continue to tighten the castle nuts until they align. **See Figure 21.** Never loosen a castle nut to align the cotter pin. If the cotter pin hole is above the top of the castle nut, this is usually an indication that the knuckle taper has been worn out and the knuckles should be replaced.

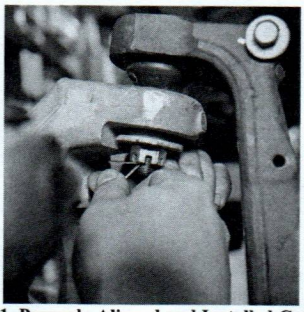


Figure 21. Properly Aligned and Installed Cotter Pins

27. Re-install the unit bearing/hub/axle shaft assembly. Be careful when installing the axle shafts to not damage the inner axle seals and ensure the splines line up in the differential. We recommend cleaning all the hub bolts with brake cleaner and a wire brush, and then using high strength threadlocker on installation. Carefully thread the ABS sensors through the brake backing plates. Torque unit bearing/hub bolts to 75 lb-ft. **See Figure 22.**

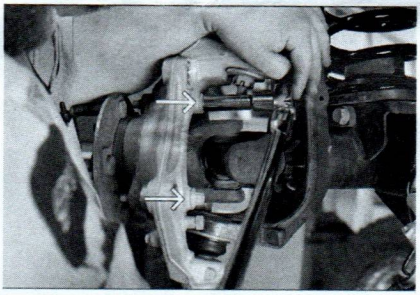


Figure 22. Unit Bearing/Hub Bolt Install

28. Re-install the Front Axle Disconnect collar and motor. **See Figure 23.**

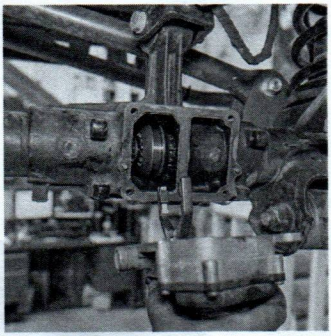


Figure 23. Front Axle Disconnect Motor Reinstallation

29. Re-install the ABS sensors. Torque to 5 lb-ft.
30. Re-install the tie rod and drag link if removed.
31. Re-install the brake rotors and calipers. Torque the brake rotor screw to 15 ft-lb. We recommend cleaning all the brake caliper bolts with brake cleaner and a wire brush, and then using high strength thread locker on installation. Tighten caliper mounting bolts to 148 lb-ft. **See Figure 24.**

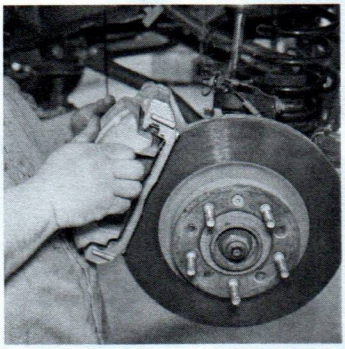


Figure 24. Brake Caliper Installation

32. Synergy ball joints come pre-greased. If you are going to grease them after installation use no more than one 'pump' of grease from a grease gun. We recommend Synergy Lithium Complex Extreme

Pressure grease. If this is not available, be sure to use an extreme pressure grease designed for metal on metal joints.

33. Re-install wheels and tires and torque lug nuts to 130 lb-ft.

Torque Table	lb-ft
Wheel studs	130 lb-ft
Caliper Bolts	148 lb-ft
Rotor Screws	15 lb-ft
Hub and Bearing Bolts	75 lb-ft
Upper Ball Joint	55 lb-ft
Lower Ball Joint (Initial)	15 lb-ft
Lower Ball Joint (Final)	33 lb-ft
Wheel Speed Sensor Bolt	5 lb-ft
Rotor Shield	8 lb-ft
Brake line Bracket	18 lb-ft
Front Axle Disconnect Actuator Bolts	13 lb-ft
Front Axle Disconnect Skid bolts	31 lb-ft

Installation is Complete