



# RACK & PINION CONVERSION KIT

## 82-92 CAMARO 3RD GEN



PART NUMBER:  
**FR372KTPWNC**



**IF YOU HAVE ANY QUESTIONS  
CONTACT US AT:**  
**TECH-SUPPORT@FLAMINGRIVER.COM**  
**OR CALL: (440) 826-4488**

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PN: 103386 REV: A

## INSTRUCTIONS LAYOUT

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### FOR YOUR SAFETY:

Disconnect battery cables and ensure that the vehicle is properly supported by jack stands.

### IMPORTANT NOTES:

- A front end alignment is necessary after installation.
- Flaming River recommends that you use synthetic or high grade power steering fluid.

### KITS & ASSOCIATED SECTIONS

Throughout these instructions, there are multiple sections that call out a specific kit that should be used for that section. These kits are included in your product box and should only be used once the Kit # is referred to in the instructions.



**KIT #1**  
CRADLE KIT INSTALLATION



**KIT #2**  
STEERING LINKAGE PREPARATION  
& STEERING LINKAGE CONNECTIONS



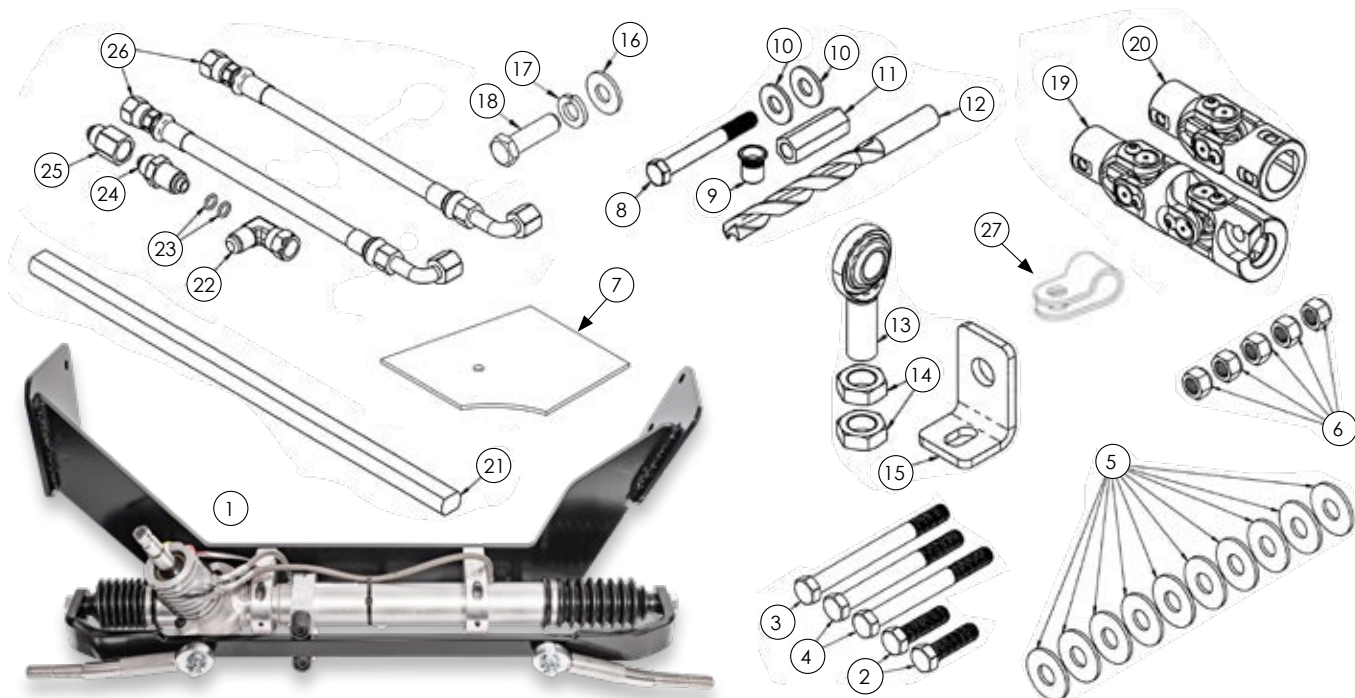
**KIT #3**  
FLUID LINES INSTALLATION

### WARRANTY DISCLAIMER: FLAMING RIVER'S LIMITED WARRANTY

Flaming River® warrants its products to be free from defects in material and workmanship for a period of one (1) year after the date of purchase, except that: All steering columns are warranted for a period of three (3) years from the date of purchase. The Big Switch (part number FR1005) is warranted for a period of three (3) years from the date of purchase, provided that it is not mounted with a steel bracket and provided further that it is adequately protected from environmental conditions. All electrical products other than the Big Switch are warranted for a period of ninety (90) days from the date of purchase. Flaming River's® warranty liability is limited to the replacement of defective products. Flaming River® is not liable for any labor costs associated with any warranty claim, or for any incidental or consequential damages. Improper installation, abuse, racing, and/or modification of the products voids this warranty. No warranty of merchantability or fitness for a particular purpose is made by Flaming River® with respect to any of its products. Warnings and Recommendations It is the customer's responsibility to determine the suitability of a given Flaming River® product for the customer's uses. Likewise, it is the customer's responsibility to install a Flaming River® product. Contact the vehicle manufacturer whenever installing a switch to confirm the appropriateness of using such a switch and the recommended placement of the switch on the vehicle. Use qualified chassis specialists for the installation of all steering related components. Be aware that the installation of certain Flaming River® products may adversely impact a manufacturer's warranty with respect to certain vehicles and other manufactured goods. Flaming River will repair or replace any product found to be defective in material or workmanship. Improper installation, abuse, racing and/or modification VOID WARRANTY. Flaming River® is not responsible for any labor costs associated with any warranty.

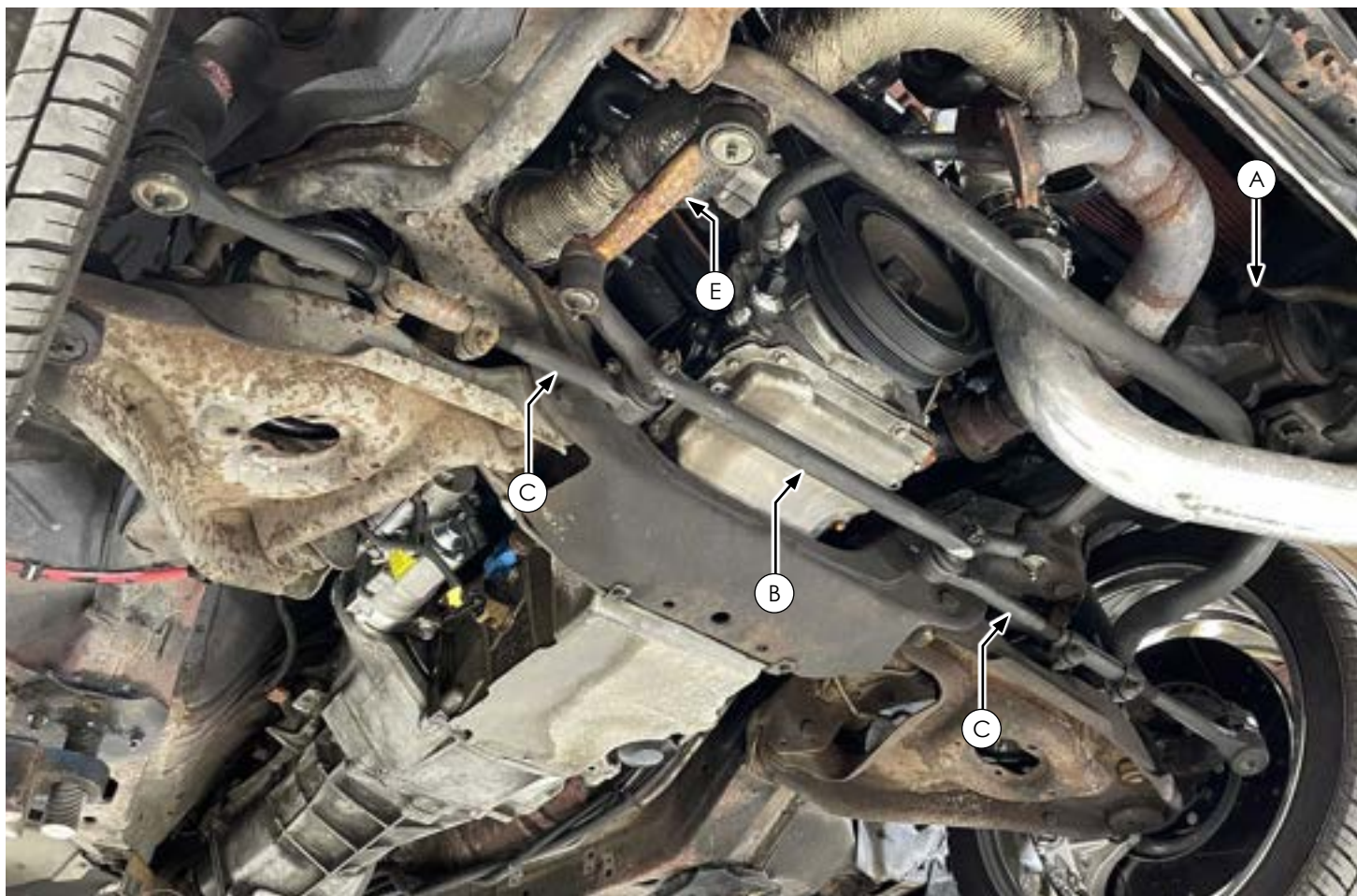
## BILL OF MATERIALS

ITEM NO.	PART NO.	DESCRIPTION	QTY
1	104092	POWER RACK & CRADLE	1
KIT #1 - PN: 104118			
2	BOLT-7/16-14X1.5	7/16-14 GRADE 8 BOLT 1.5" LONG	2
3	BOLT-7/16-14X4.5	7/16-14 GRADE 8 BOLT 4.5" LONG	1
4	BOLT-7/16-14X4	7/16-14 X 4.00" HEX BOLT	2
5	WASH-7/16"	7/16 FLAT WASHER	10
6	NUT-7/16-14	NYLOCK LOCK NUT 7/16-14	5
KIT #2 - PN: 104116			
7	104099	CAMARO DRILL TEMPLATE	1
8	100722	3/8-16 X 3.00 HEX BOLT	1
9	104113	RIVET 3/8-16 NUT	1
10	WASH-3/8"	3/8 FLAT WASHER	2
11	104121	HEX SPACER	1
12	104119	17/23 DRILL BIT	1
13	FR1810	HEIM JOINT .75 X 3/4-16	1
14	100206	3/4-16 HEX JAM NUT	2
15	104097	CAMARO BEARING BRACKET	1
16	WASH-5/16"	5/16 FLAT WASHER GRADE 8 EQU	1
17	LOCKWASH-3/8"	SPLIT LOCK WASHER 3/8"	1
18	BOLT-3/8-16X1.25	3/8-16 X 1.25" HEX BOLT	1
19	FR2807	U-JOINT 3/4 DD X FR POWER CHROME MOLY	1
20	FR1934	U-JOINT 1"DD X 3/4DD CHROME MOLY	1
21	FR1851-16	3/4" DD SHAFT 16" LENGTH	1
KIT #3 - PN: 104117			
22	FR6C6X-S	HOSE FITTING 3/8 SWIVEL 90 DEGREE	1
23	101357	FITTINGS O-RINGS	2
24	FRM16X6AN	M16 X 1.5-AN 6 STRAIGHT	1
25	103737	M16 X 1.5-AN 6 STRAIGHT FITTING	1
26	HOSEKITCAMARO	POWER STEERING FLUID HOSES	2
27	104098	P-CLIP	1





## FACTORY STEERING SYSTEM REMOVAL



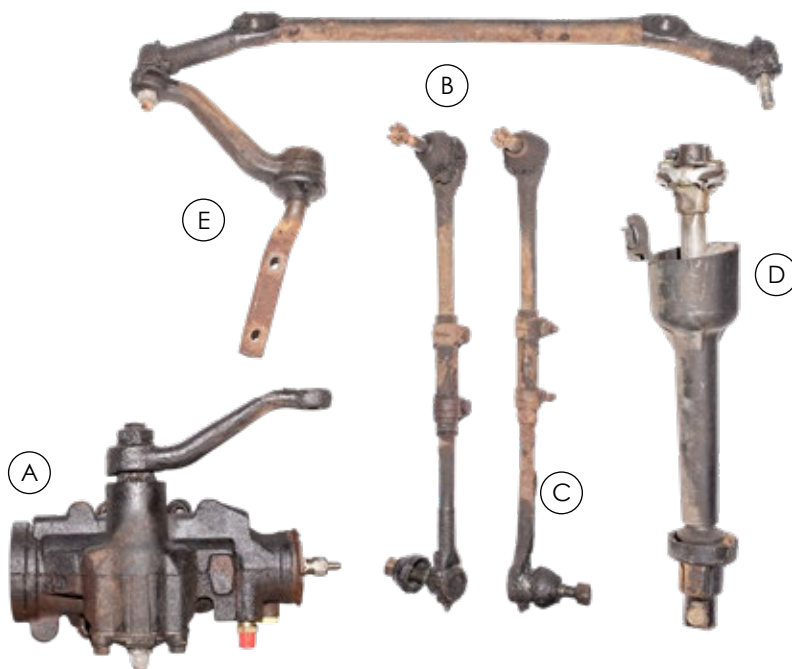
**STEP 1:** Remove the center link **(B)** from the inner tie rod end attachment points. Then remove idler arm **(E)** from the chassis.

**STEP 2:** From the engine bay, remove the pinch bolt securing the steering shaft **(D)** to the steering gearbox **(A)**. Collapse the steering shaft as needed and slide it off the gearbox and steering column connection points.

**STEP 3:** Disconnect the power steering pressure and return lines from the gearbox **(A)** and then remove the bolts securing the steering gearbox to the chassis and carefully lower the gearbox from the vehicle.

**STEP 4:**

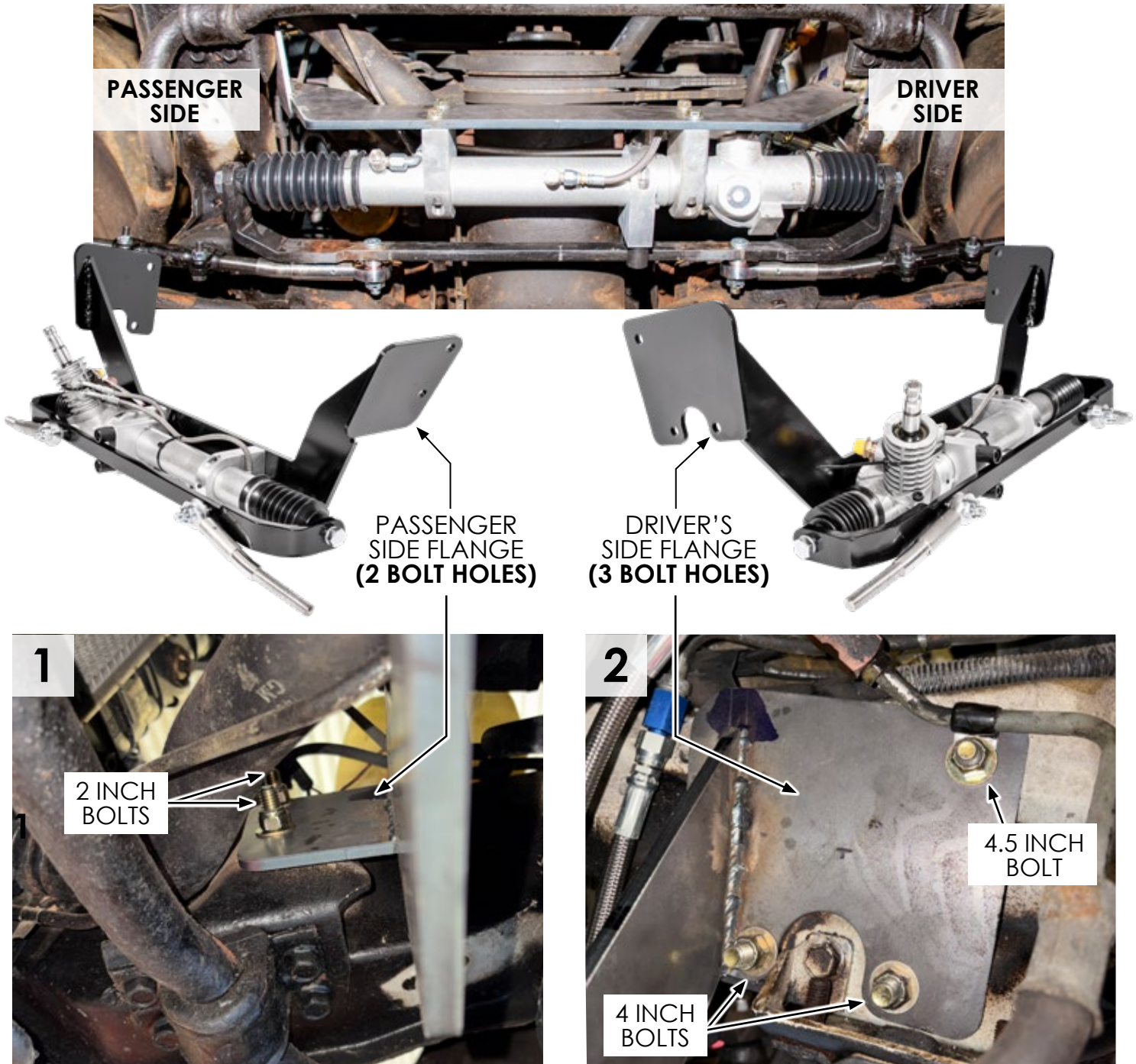
Remove both inner tie rod ends **(C)** from the passenger and driver side. Keep the adjustment sleeves and outer tie rod ends attached to both the passenger and driver side as these will be used when installing the new rack and pinion cradle kit.





## CRADLE KIT INSTALLATION

**NOTE:** THIS SECTION USES THE HARDWARE CONTAINED IN **KIT #1**.



**1.** Hold the cradle in place aligning the **2 BOLT HOLES** on the passenger side. Using the 2 bolts (**ITEM NO: 2**), 4 washers (**ITEM NO: 5**), and 2 Nylock nuts (**ITEM NO: 6**), connect the passenger side cradle mount to the chassis of the Camaro.

**2.** Hold the cradle in place aligning the **3 BOLT HOLES** on the driver side. Using the two 4 inch bolts (**ITEM NO: 4**), the 4.5 inch bolt (**ITEM NO: 3**), 6 washers (**ITEM NO: 5**), and 3 Nylock nuts (**ITEM NO: 6**), connect the driver side cradle mount to the chassis of the Camaro.

**Flaming River recommends not fully tightening the 4.5 inch bolt due to an extra step needed in the Fluid Line Installation section at the end of these instructions.**



## CRADLE KIT INSTALLATION CONTINUED



**3.** Connect the passenger side of the cradle using the factory tie rod sleeve and factory outer tie rod end.



**4.** Connect the driver side of the cradle using the factory tie rod sleeve and factory outer tie rod end.

## STEERING LINKAGE PREPARATION

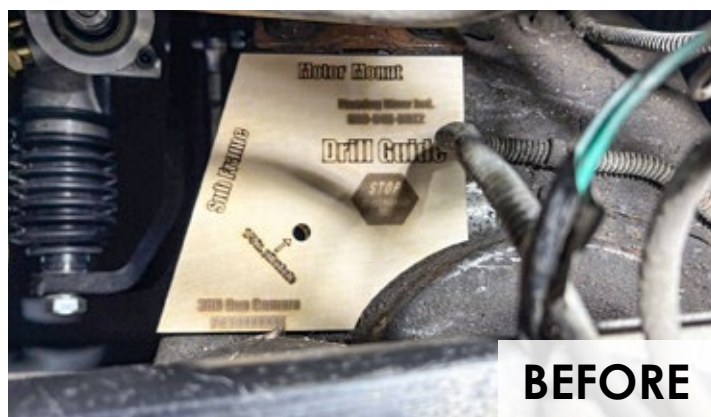
**VIDEO AVAILABLE** →

**NOTE:** THIS SECTION USES THE HARDWARE CONTAINED IN **KIT #2**.

In this section we will be installing a rivet nut into the frame of the 3rd Gen Camaro. To get a better visualization of this process a video walkthrough has been made. To view this walkthrough please scan the QR code to the right. **Please note this process is demonstrated on a piece of steel tubing.**



SCAN ME



**BEFORE**



**AFTER**

The template provided will line up flush to the driver side camaro frame. Once all steps of this section have been complete you will have a securely installed rivet nut used in the next section.



**1.** Using the provided template hole, create a center punch mark on the Camaro frame.

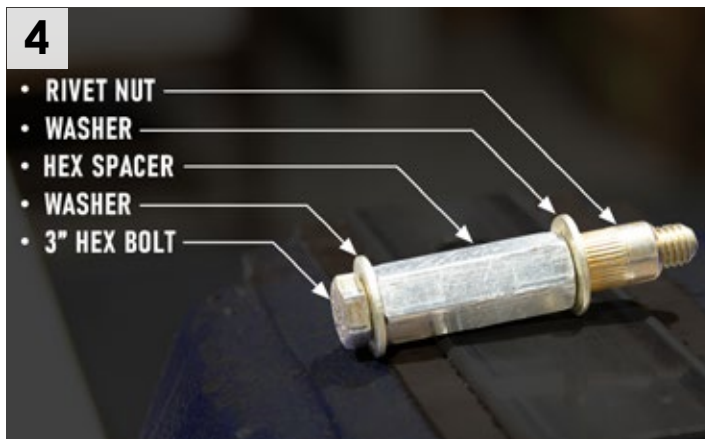


**2.** Use a 1/4" drill bit to create a pilot hole through the frame.

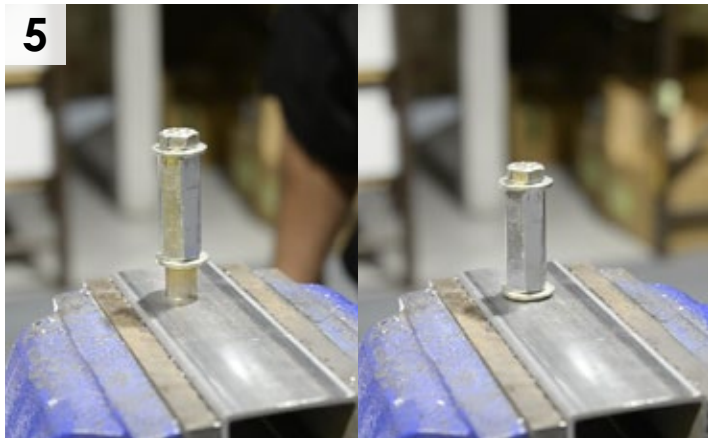
## STEERING LINKAGE PREPARATION CONTINUED



3. Using the provided drill bit in KIT #2, drill through the pilot hole. This new hole will provide a snug fit for the rivet nut. **WARNING:** Do not over ream this hole when drilling as it will not allow the rivet nut to be installed properly



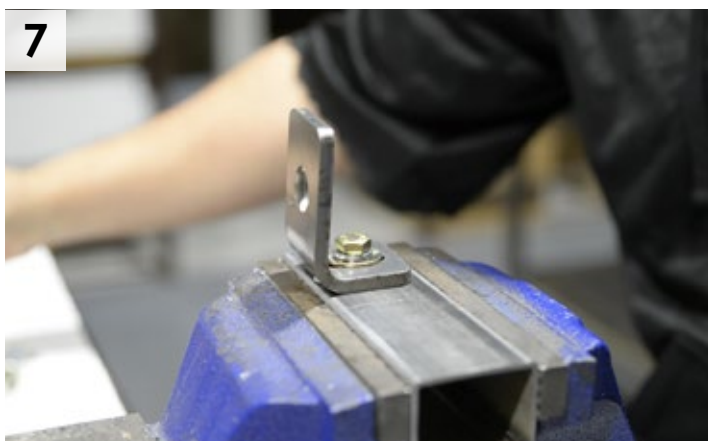
4. Align the provided hardware in KIT #2 in the shown orientation above. This will be used to compress the rivet nut into the frame. Hex bolt (ITEM NO: 8), 2 washers (ITEM NO: 10), hex spacer (ITEM NO: 11), rivet nut (ITEM NO: 19).



5. Firmly pack the rivet nut end into the drilled hole.



6. Use one hand to secure the hex spacer with a 5/8" wrench. With the other hand use an impact drill with a 9/16" socket to compress the rivet nut securely into place.



7. Attach the right angle bracket (ITEM NO: 15) to the frame using the short bolt (ITEM NO: 18), lock washer (ITEM NO: 17), and washer (ITEM NO: 16). Don't firmly tighten this bracket into place until all steering components have been installed.

To get a better visualization of this process a video walkthrough has been made. To view this walkthrough please scan the QR code to the right.



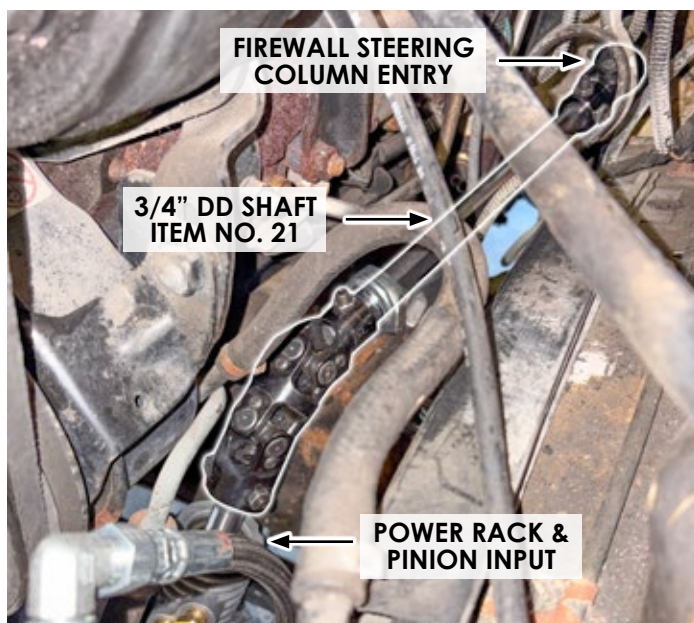
SCAN ME

**Please note this process is demonstrated on a piece of steel tubing.**

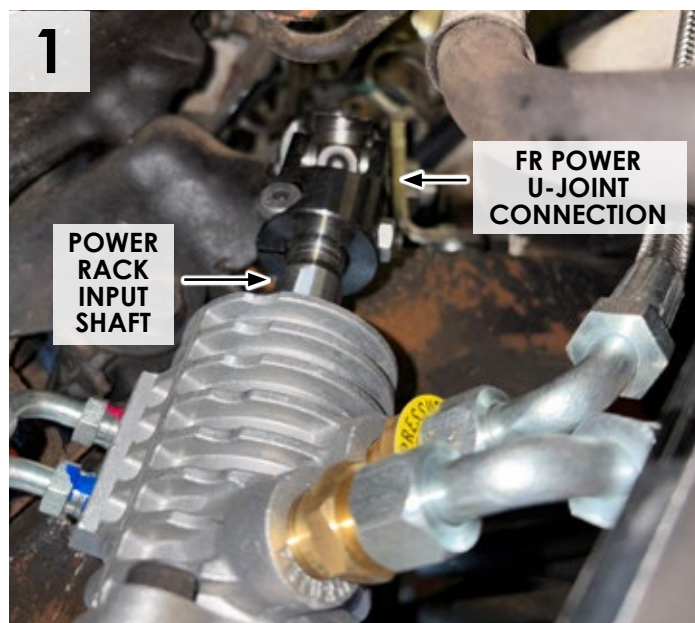


## STEERING LINKAGE CONNECTIONS

**NOTE:** THIS SECTION USES THE HARDWARE CONTAINED IN **KIT #2**.



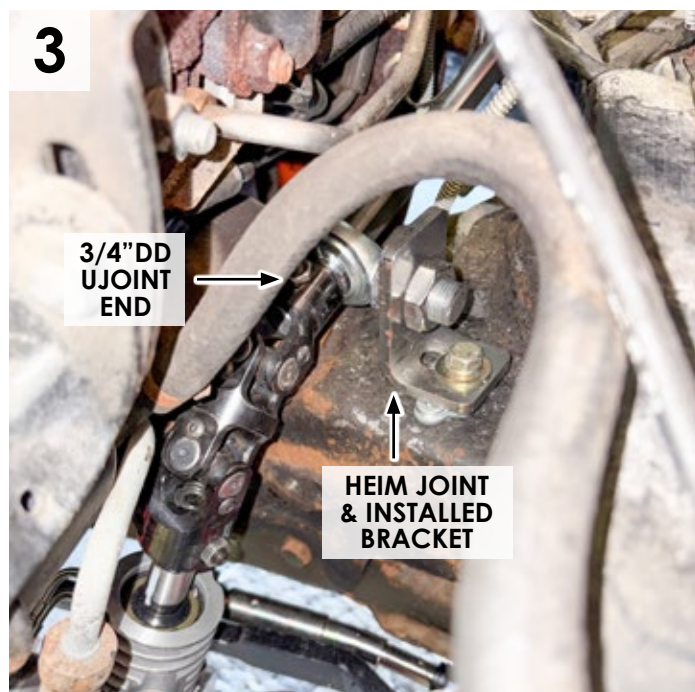
This section describes connecting the input of the power rack and pinion to the steering column entry from the Camaro's firewall.



**1.** Using the double U-Joint (**ITEM NO. 19**), attach the FR POWER connection end to the input shaft of the power rack & pinion. Tighten the corresponding screw to secure the U-joint firmly in place on the rack & pinion input.



**2.** Connect the 1"DD end of the U-joint (**ITEM NO: 20**) to the output end of the steering column coming through the firewall.



**3.** Using the bracket installed in the Steering Linkage Preparation section, install the heim joint (**ITEM NO: 13**) at a right angle using the 2 jam nuts (**ITEM NO: 14**). **NOTE:** Do not fully tighten this joint as it will need to be somewhat loose when the 3/4" DD shaft is installed.



## STEERING LINKAGE CONNECTIONS CONTINUED



**4.** Flaming River recommends using a wooden dowel rod to measure the length of shaft needed in-between the installed U-Joints.

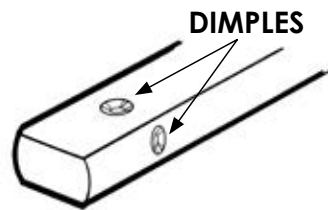
### IMPORTANT NOTE:

A dimple can be created on the shafts using a 1/4" drill bit as shown in the figure to the right. This process of creating dimples provides more security when locking the shaft into place in the complete steering system.

**Without dimples the shaft can potentially slide out of the U-joints**

### SET SCREW RETENTION

For added security, it is strongly recommended to apply a small dab of red threadlocker (Loctite® 271 or equivalent) to the U-joint set screw after the dimples have been created on the steering shaft. This helps prevent loosening due to vibration and steering load over time. Ensure the set screw is properly seated against the shaft dimple before the threadlocker cures. Allow adequate cure time per the threadlocker instructions prior to vehicle operation.



### STEP 5: CUTTING DOWN PROVIDED SHAFT

Once the measurement is acquired using the wooden dowel rod in between the U-joints, you will need to cut to length the 3/4" DD shafting (**ITEM NO. 21**) provided in KIT #2. The provided shaft is 16" inches in length but needed length for your steering linkage installation will most likely be a couple inches shorter.

### STEP 6: MARKING THE SHAFT FOR DIMPLE IMPLEMENTATION

With the shaft cut to the appropriate length, install the 3/4" shaft from the steering column U-Joint, through the heim joint, and into the double U-joint attached the rack and pinion input. Be sure to tighten down the U-Joint set screws.

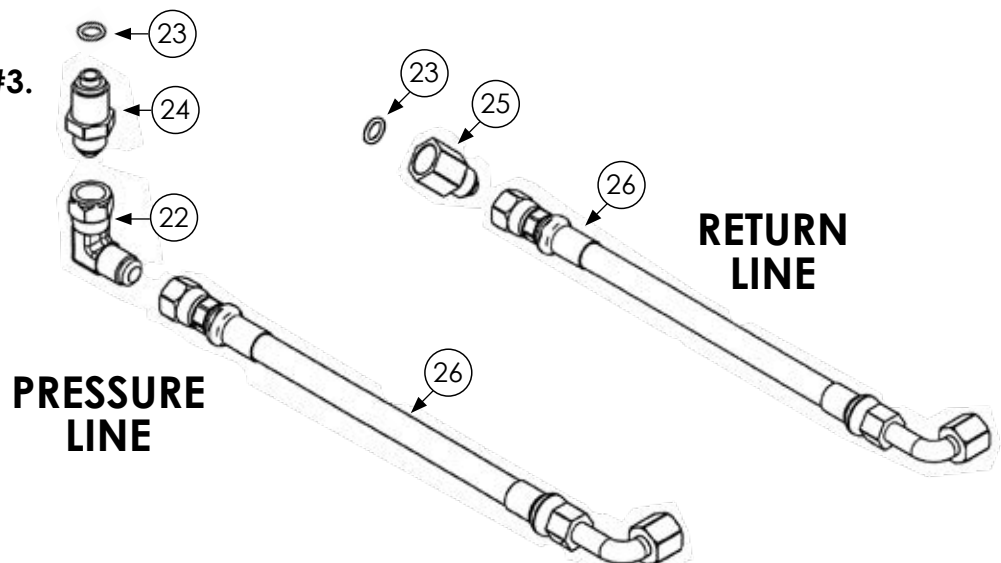
Flaming River **STRONGLY** recommends that once this process is complete, leaving the u-joints attached to the steering column and rack and pinion input, remove the steering shaft and create "dimples" where the set screws have marked the shaft.

## FLUID LINES INSTALLATION

**NOTE:** THIS SECTION USES THE HARDWARE CONTAINED IN **KIT #3**.

The power steering fluid lines that will be installed are shown to the right in a disassembled format. The circled numbers next to them correspond to the **ITEM NO.** located on the **BILL OF MATERIALS** page (page 3).

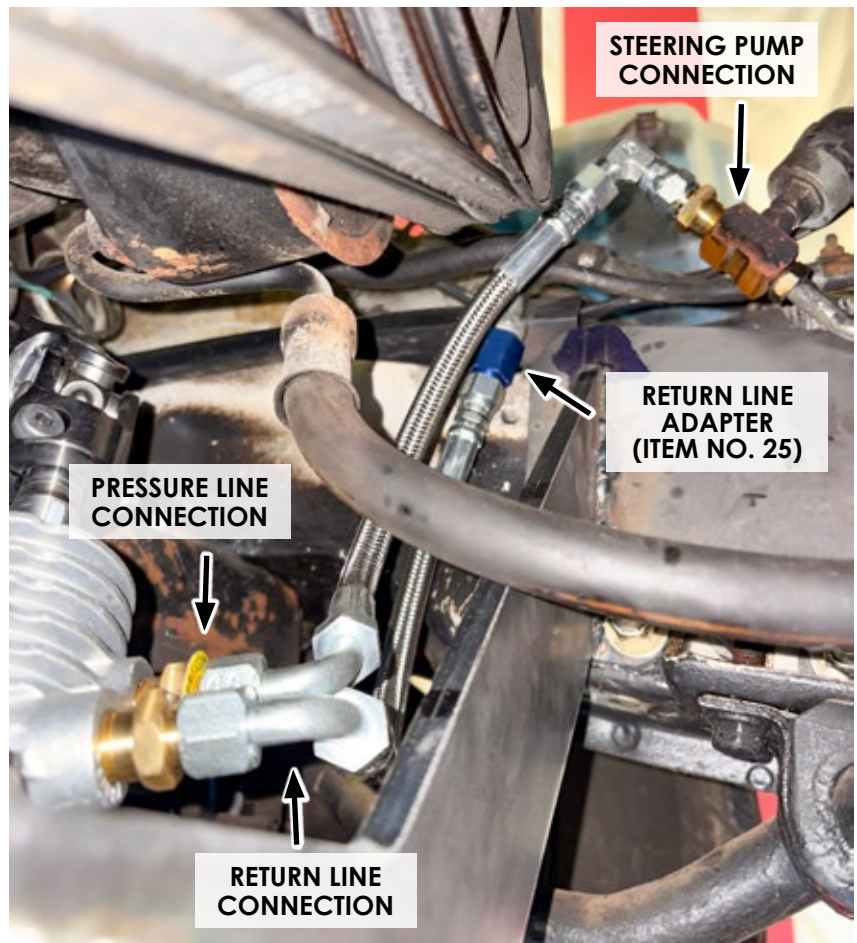
**NOTE:** Prior to connecting your new hoses, flush your power steering pump and hoses with clean power steering fluid



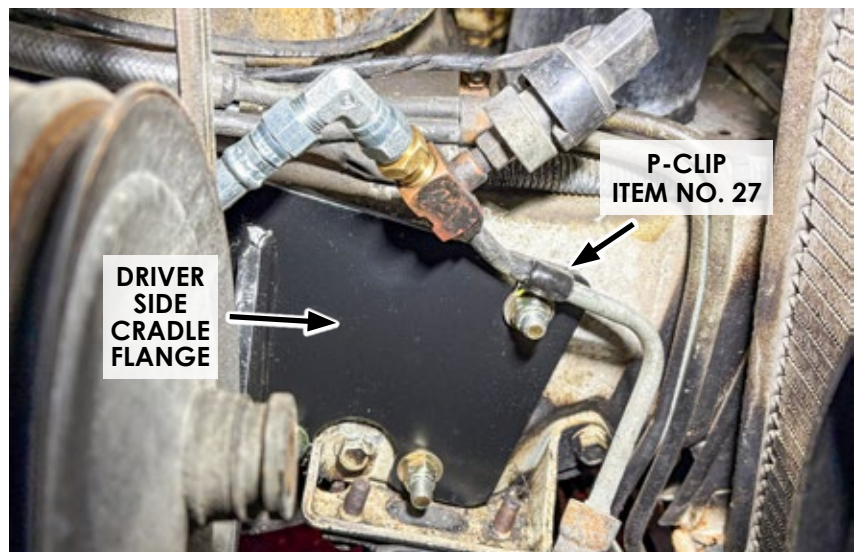
## FLUID LINES INSTALLATION CONTINUED

1. Connect Pressure Line hose from the steering pump connection to the top Pressure Port on the power rack using the supplied pressure line fitting labeled "PRESSURE". Make sure that an O-RING is added to the fitting shown by **FIGURE 1**.
2. Connect Return Line hose from rack & pinion (bottom port) using the supplied fitting, to the Factory Power Steering cooler line using supplied adapter (**ITEM NO. 25**). Make sure that an O-RING is added to the fitting shown by **FIGURE 1**.
3. Once hoses have been installed, follow this correct bleeding procedure for power rack & pinion systems on the next page.

**FIGURE 1:**



4. Once the hoses are installed, it's likely that the pressure line that connects to the steering pump is loosely floating in the engine bay. Included in your kit is a P-Clip (**ITEM NO. 27**) that should be installed inline with the upper bolt of the driver side cradle kit flange. This will secure the pressure line into place.



## IMPORTANT INFORMATION:

- Make sure that all hoses are connected to the proper location. Reversing the power steering lines will cause damage to the valve that is not covered by the Flaming River Warranty.
- Always use clean, new power steering fluid during installation.
- Only use Flaming River fittings during installation. Use of other fittings will damage this product and void the product warranty.
- Never use sealant on the threads of the Pressure and Return Fittings





## CORRECT BLEEDING PROCEDURE

### FLAMING RIVER RACK & PINION SYSTEMS



**PRESSURE**  
14MM X 1.5

**RETURN**  
16MM X 1.5

Make sure that all hoses (FR1610) are connected to the proper location. Reversing the power steering lines will cause damage to the valve that is not covered by the manufacturer's warranty.

All hose connections must be tight. (Loose connections might not leak but could allow air into the system)

**IMPORTANT**  
**POWER STEERING FLUID**  
**USE CLEAN, NEW POWER STEERING FLUID ONLY.**

### PROCEDURE

1. TURN IGNITION OFF.
2. RAISE FRONT WHEELS OFF THE GROUND.
3. TURN THE STEERING WHEEL FULL LEFT.
4. FILL FLUID LEVEL TO "FULL COLD" LEVEL OR IF USING REMOTE RESERVOIR "1" OVER INNER TUBE.
5. WITH ASSISTANT CHECKING FLUID LEVEL AND CONDITION, TURN STEERING WHEEL LOCK TO LOCK AT LEAST **20 TIMES**.
6. WHILE TURNING WHEELS CHECK FLUID LEVEL CONSTANTLY.

**NOTE:**  
ON SYSTEMS WITH LONG RETURN LINES OR FLUID COOLERS, TURN STEERING WHEEL LOCK TO LOCK AT LEAST **40 TIMES**.

TRAPPED AIR MAY CAUSE FLUID TO OVERFLOW. THOROUGHLY CLEAN SPILLED FLUID TO ALLOW FOR LEAK CHECK.

**NOTE:**  
NO BUBBLES ARE ALLOWED.

FOR ANY SIGN OF BUBBLES, RECHECK CONNECTIONS THEN REPEAT STEP 5.

7. START ENGINE, WITH ENGINE IDLING, MAINTAIN FLUID LEVEL. REINSTALL CAP.
8. RETURN WHEELS TO CENTER. LOWER FRONT WHEELS TO THE GROUND.
9. KEEP ENGINE RUNNING FOR TWO (2) MINUTES.
10. TURN STEERING WHEEL IN BOTH DIRECTIONS.

#### VERIFY:

- SMOOTH POWER ASSIST
- NOISELESS OPERATION
- PROPER FLUID LEVEL
- NO SYSTEM LEAKS
- PROPER FLUID CONDITION
  - NO BUBBLES, NO FOAM, NO DISCOLORATION

11. IF ALL PROPER CONDITIONS APPLY, BLEEDING IS COMPLETE
12. IF ANY PROBLEM REMAINS SEE "SPECIAL CONDITIONS".

### SPECIAL CONDITIONS:



#### FOAM OR BUBBLES IN FLUID

Fluid must be completely free of bubbles. In step 5, be alert to periodic bubbles that could indicate a loose connection or leaky O-Ring seal in either the return hose or pressure hose.

#### DISCOLORED FLUID (MILKY, OPAQUE, OR LIGHT TAN COLOR)

Switch ignition off. Wait two (2) minutes. Recheck hose connections. Repeat steps 7-10. If condition still exists, replace and check a possible cause:

- Return hose clamps
- Return hose o-ring
- Pressure hose o-ring
- Gear cylinder line o-rings

Fill system and repeat bleed procedure for each possible cause. Repeat steps 7-10 to verify whether noise has been eliminated.



#### PUMP WHINE OR GROAN

With engine running, recheck hoses for possible contact with frame body or engine. If no contact is found, follow either method below to cool down fluid and re-pressurize system.

#### METHOD 1:

Normal Cool Down  
Switch engine off.  
Wait for system to cool.  
Install reservoir cap.

#### METHOD 2:

Partial Fluid Replacement  
Switch engine off. Use a suction device to remove fluid from the reservoir. Refill with cool, clean fluid. Install Reservoir cap.

After either method of cooling, start engine and allow engine to reach normal operating temperature. If noise persists, remove and replace power steering pump. Repeat bleed procedure following pump replacement.

#### WARRANTY DISCLAIMER:

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