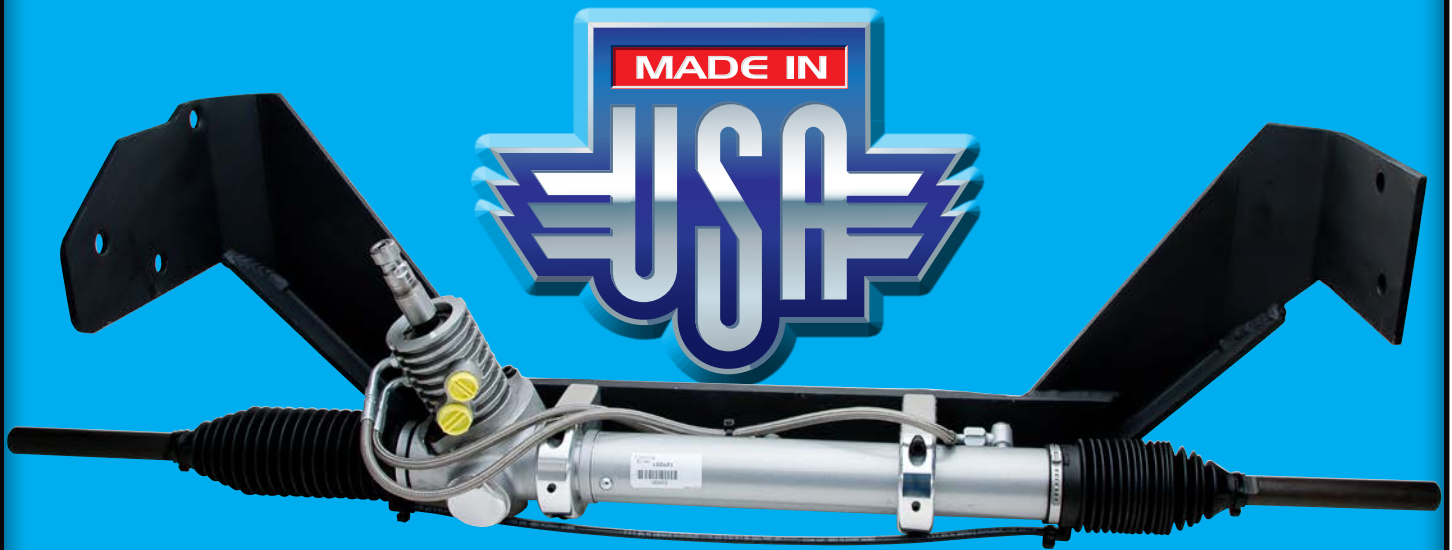




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800-648-8022

*68-74 Nova*  
*Rack and Pinion*  
*Conversion Kit*



**For safety, disconnect battery cables and ensure that vehicle is properly supported by jack stands.**

**NOTE: Hoses (FR1610) and Pump Mounting Brackets (FR1612 Small Block/FR1613 Big Block) sold separately and not included in this kit.**

**68-74 Nova Outer Tie Rod Ends Part # ES381R or ES381RL must be used with this rack and pinion kit. (Must purchase separately from local or online auto parts supplier)**

**Before paint or powder coating of the rack and pinion cradle system we recommend that you prefit the system to ensure proper fit.**

**NOTE: A front end alignment is necessary after installation.**

**NOTE: The use of Flaming River Small Block Headers may be necessary with use of the Power Rack and Pinion System. Part No. FR50001 (Uncoated) or FR50001C (Coated)**

**NOTE: Flaming River Recommends that you use synthetic or high grade power steering fluid.**

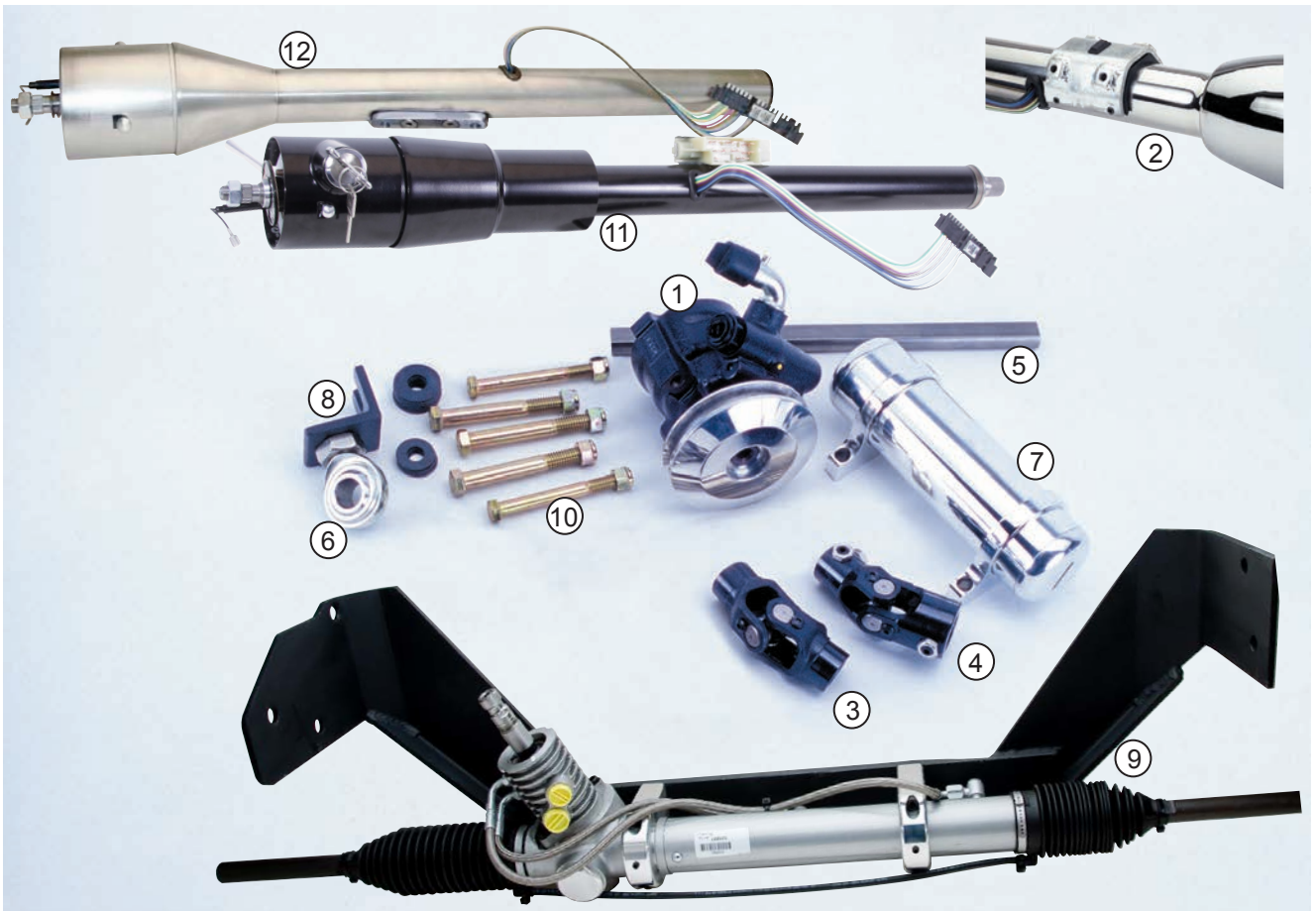
Kit Inventory .....	pg 3
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**WARRANTY DISCLAIMER: Flaming River's® Limited Warranty**

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.

Item No.	Part No.	Description	Qty	Kit #
1	FRPMP5B-V	Power Steering Pump w/ V-Belt Pulley	1	FR367PW & FR368PW
2	FR20300	Stramp Clamp	1	FR368PW
3	FR2807	FR Power X 3/4" DD Universal Joint	1	FR367PW & FR368PW
4	FR1934	1" DD X 3/4" DD Universal Joint	1	FR367PW & FR368PW
5	FR1851-10	10" Length of 3/4" DD Shaft	1	FR367PW & FR368PW
6	FR1810	Zinc 3/4" Support Bearing	1	FR367PW & FR368PW
7	FR1614	Power Steering Fluid Reservoir	1	FR367PW & FR368PW
8	BK10300	Support Bearing Bracket	1	FR367PW & FR368PW
9	101387	Power Rack and Mounting Cradle Assembly	1	FR367PW & FR368PW
10	100232	Installation Hardware Kit	1	FR367PW & FR368PW
11	FR30010	Tilt Key Steering Column	1	FR368PW
12	FR21020	Tilt Non-Key Steering Column	1	FR367PW

*1968-74 Nova  
Cradle and Shaft  
Assembly Power*



## Additional Installation Products

### HIGH OUTPUT ALTERNATORS



Die Cast w/Chrome Housing  
FR1108C 170 Amp  
FR1109C 240 Amp

### STEERING WHEELS



Black Waterfall Style Shown  
with Embossed Flaming River Logo  
FR20150

### SHOCKS



FR70040  
Front

FR70049  
Rear

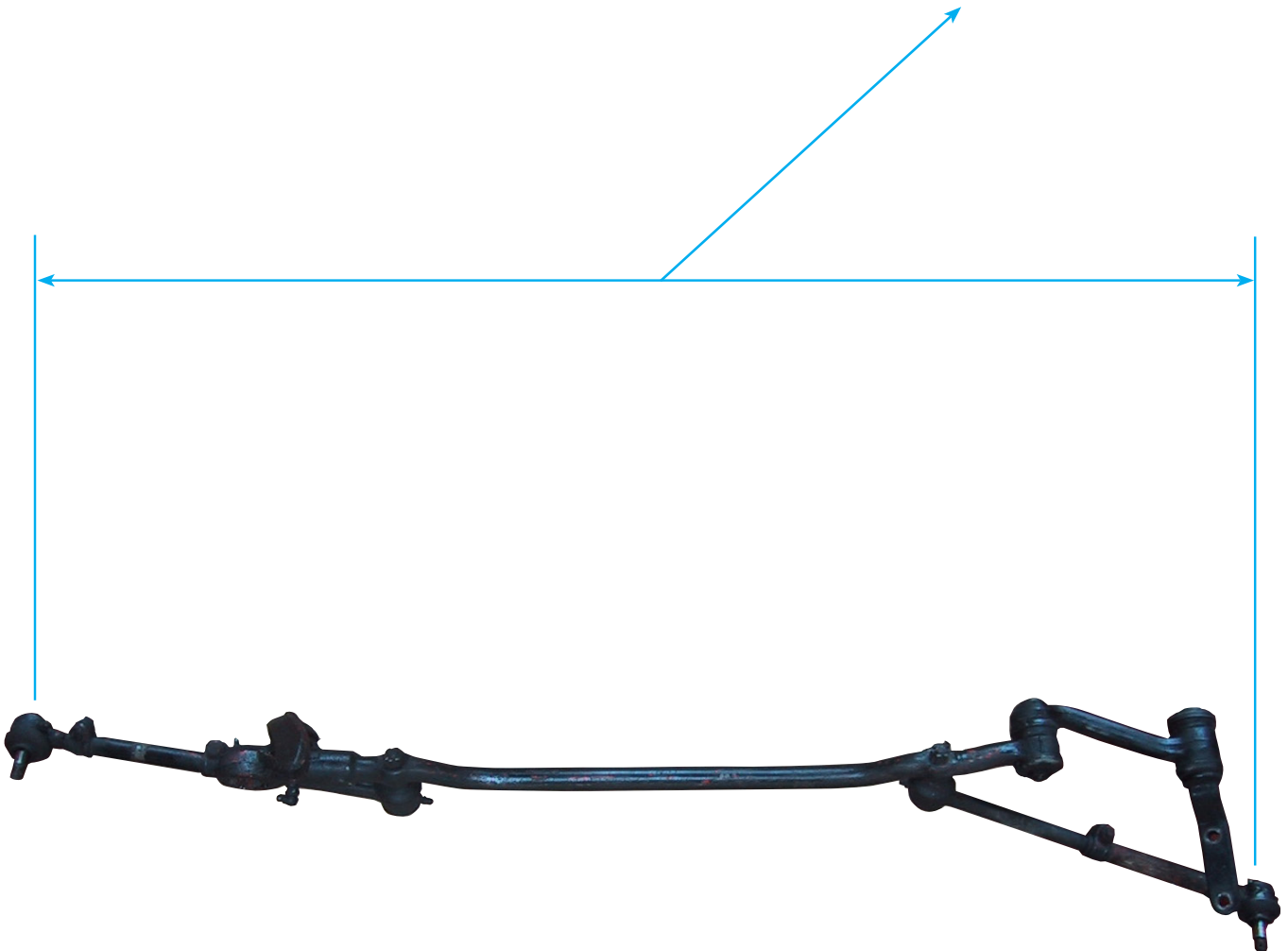
### BATTERY DISCONNECT SWITCHES

250 Amp Big Switch  
FR1044



# *Removing Original Steering System*

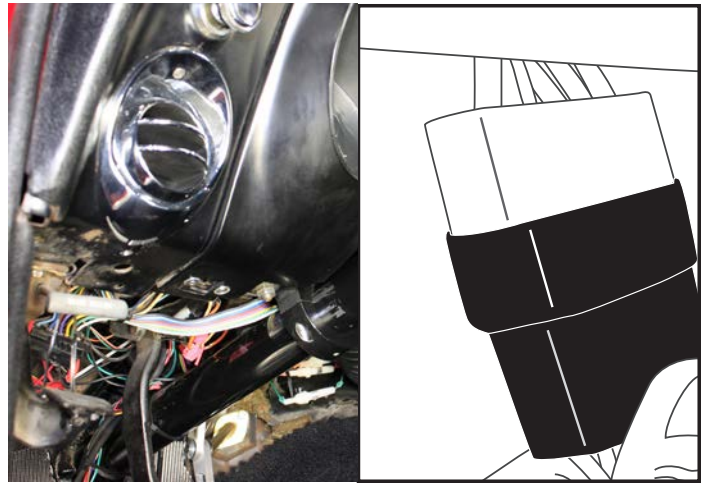
Before beginning you must first measure the width of your front end from LEFT outer tie rod end zerk to the RIGHT outer tie rod end zerk to determine the overall width of your front end. Write dimension here for further reference \_\_\_\_\_



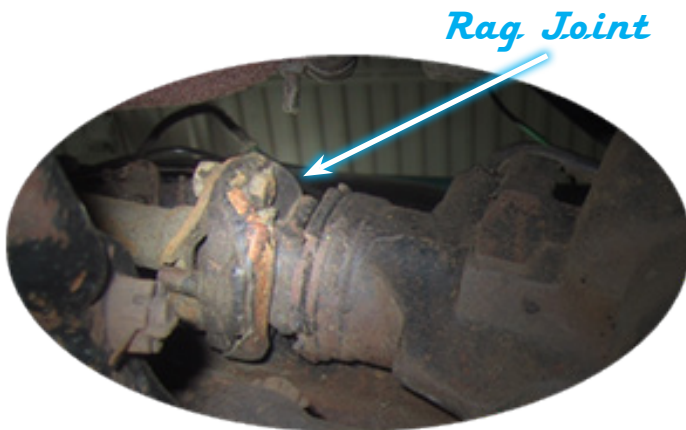
## Original Column Removal

### Color Verification to be completed before disassembly

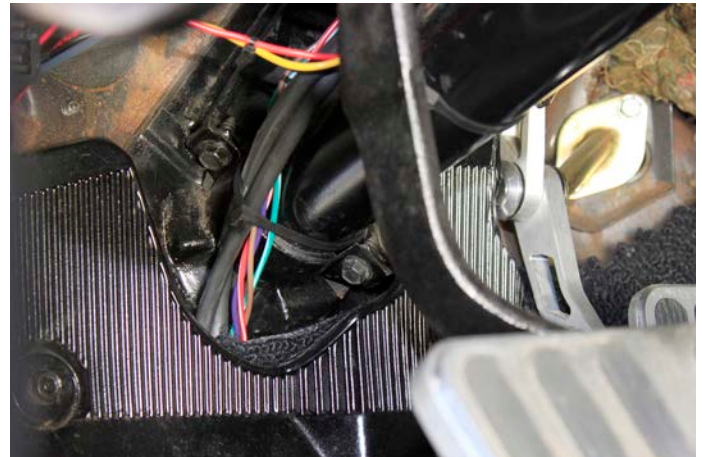
- Brake Light Switch : \_\_\_\_\_
- RR Turn Signal : \_\_\_\_\_
- LR Turn Signal : \_\_\_\_\_
- Turn Signal Power : \_\_\_\_\_
- Hazard Power : \_\_\_\_\_
- RF Turn Signal : \_\_\_\_\_
- LF Turn Signal : \_\_\_\_\_
- Horn : \_\_\_\_\_



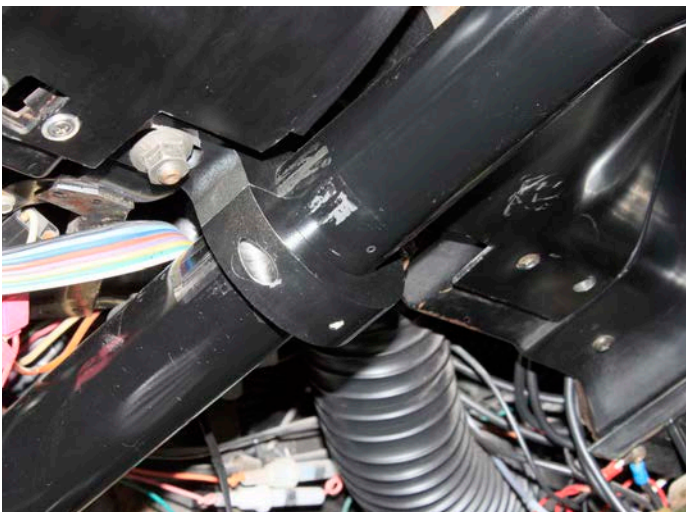
Caution: Before disconnecting your original steering column wiring harness please verify each wire color and function on the worksheet below. Some wire colors may vary from year to year.



1) Remove the pinch bolt that retains the rag joint to the steering box.



2) Remove the bolts that hold the column floor mount to the firewall.

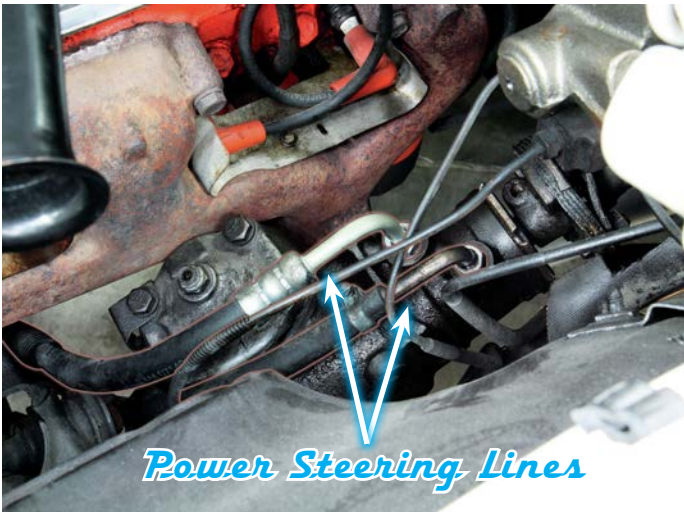


3) Support the column and remove the bolts that retain the under dash mounting clamp.

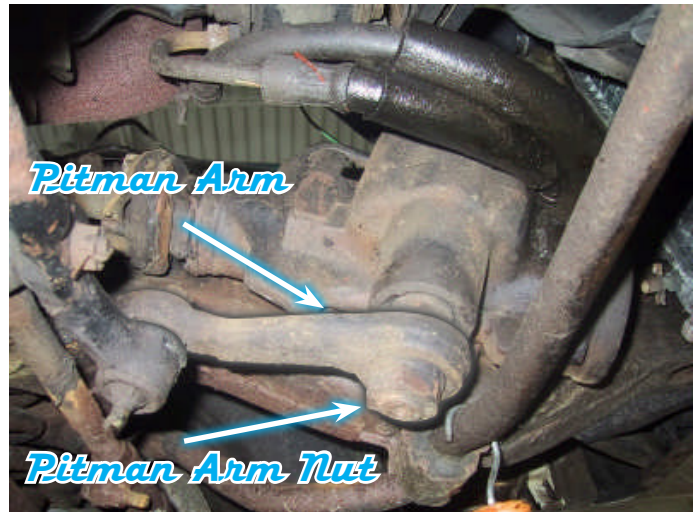


4) Disconnect the column wiring and remove the steering column from the car.

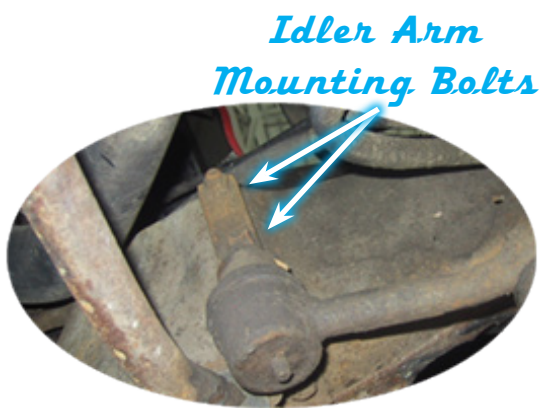
## Steering Box and Linkage Removal



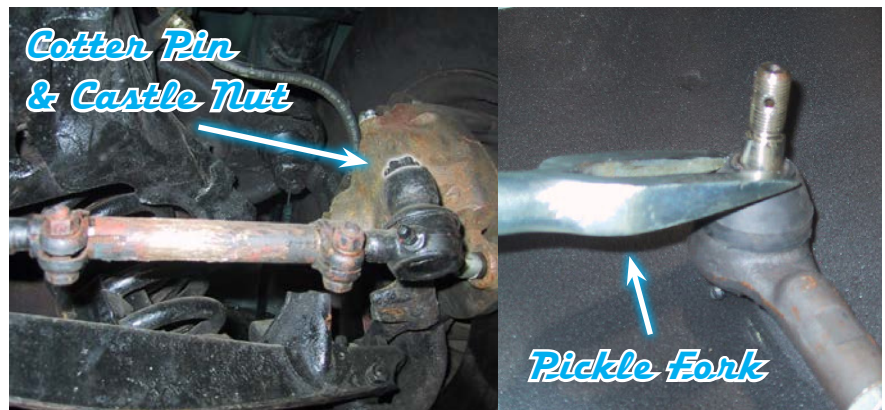
1) If removing a Power Steering Box – disconnect the power steering lines from the steering box, pump and pump brackets. Drain the power steering fluid from the entire system.



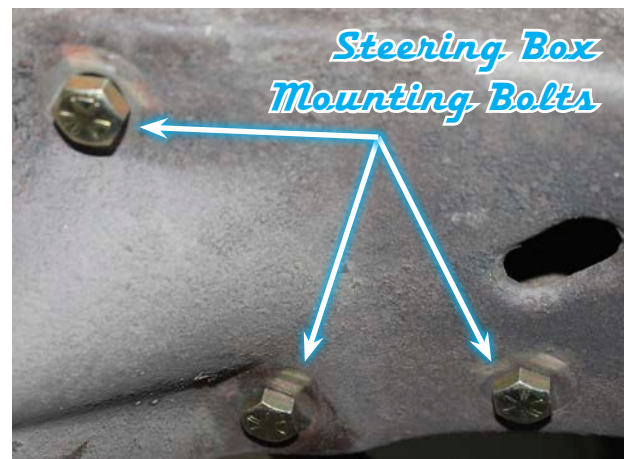
2) Remove the pitman arm from the steering box using a pitman arm puller.



3) Remove the two bolts that retain the idler arm to the frame rail.

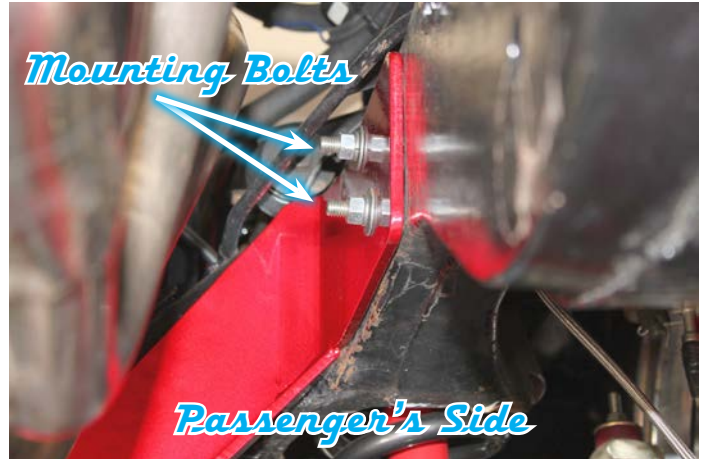


4) Remove the cotter pins and castle nuts, then using a pickle fork separate the outer tie rod ends from the spindles.



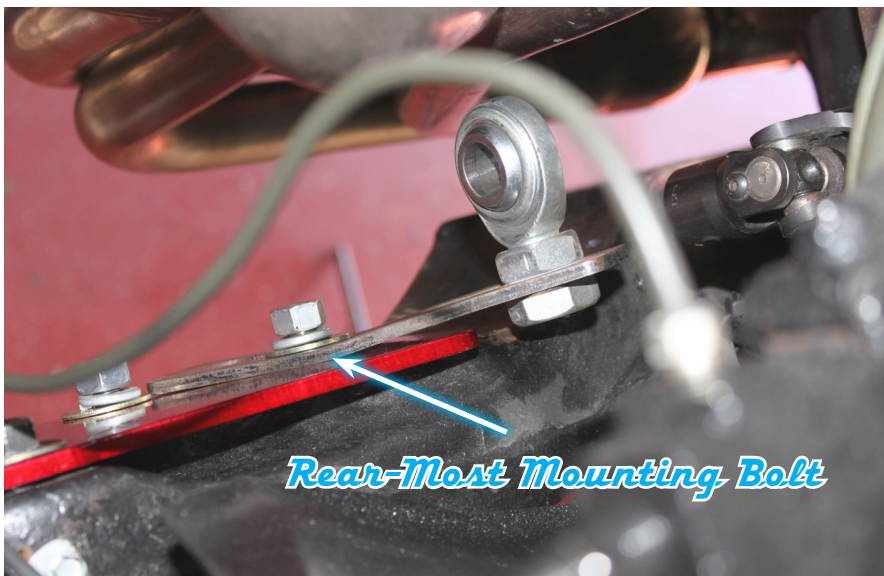
Remove the three bolts that retain the box to the frame rail and remove the box from the car.

## Flaming River Rack and Pinion Cradle Installation



1) Install the rack and pinion cross member by sliding it into place, installing the new hardware using three 7/16" bolts where the gear box was mounted and two 3/8" bolts where the idler arm was located.

2) Push the Rack Mounting Cradle forward against the front cross member. Tighten the front two 7/16" nuts and bolts to 50-65 ft lbs and the 3/8" nuts and bolts to 40 -45 ft lbs.



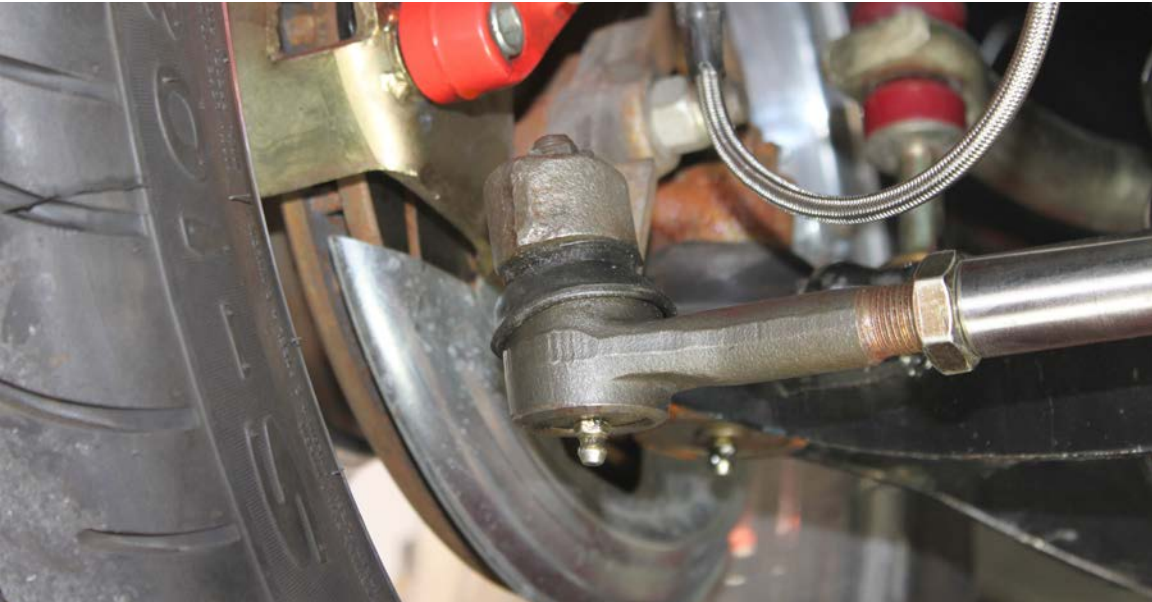
3) Install support-bearing mount onto the rear cradle bolt. (Note: The angle of this mount is set for most applications. Some adjustment may be necessary for the correct angle and u-joint alignment)



## Flaming River Rack and Pinion Cradle Installation (Con't)



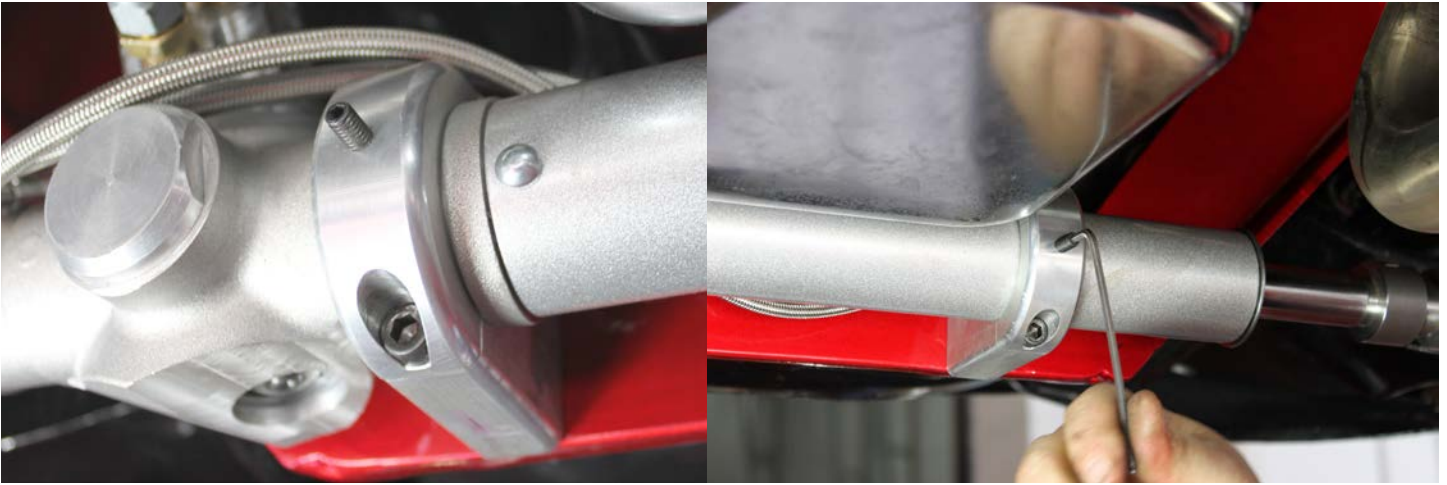
7) Install the outer tie rod ends onto the rack and pinion assembly.



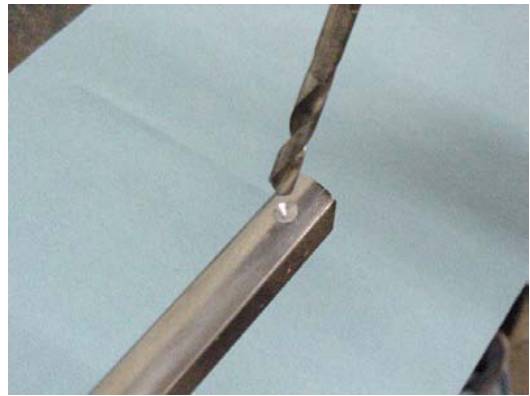
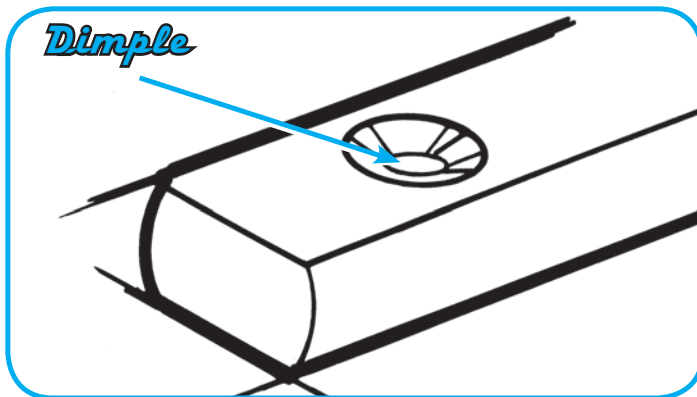
8) To install the outer tie rod ends, you must load the front suspension. (Securely placing jack stands under the lower control arms and lowering the car onto the jack stands accomplishes this.) Install the outer tie rod ends into the spindle and tighten the castle nuts to 30-40 ft lbs. Make sure to install cotter pins into the castle nut and tie rod end and bend the tabs over for security.

Note: The new Flaming River Rack and Pinion has been centered in its travel from the factory. If the rack becomes off center it will turn more in one direction than the other. When performing the front end alignment, adjust your toe by rotating the inner ends only. You may have to re-center the steering wheel. To re-center the steering wheel: remove the wheel and adapter from the column and re-install in the straight position.

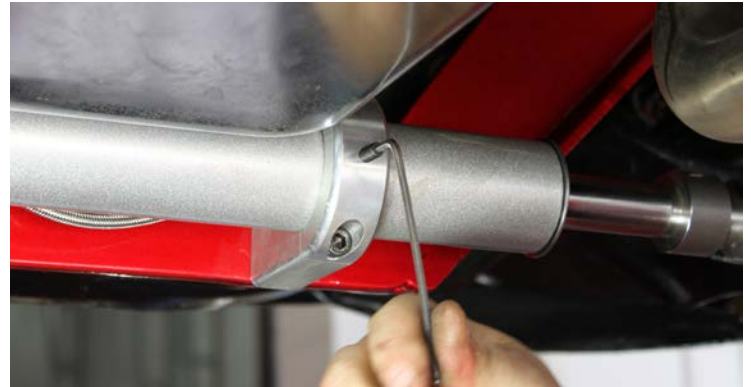
## Universal Joint System



1) Loosen the set screws in the rack mounting blocks. This will allow you to adjust the pinion angle for proper u-joint alignment.



2) We recommend the use of  $\frac{3}{4}$ " wood dowel rod to mock up the steering shaft to obtain the correct length. Install your shaft kit and snug each set screw so that it will leave a mark in the shafts. Remove shaft and dimple each setscrew mark using a  $\frac{1}{4}$ " drill bit. (As shown above.)



3) Re-install the shafts using red loc-tite thread locker on the set screw threads. Tighten each set screw to 25 ft. lbs. Tighten all lock nuts securely. We recommend that you inspect set screws periodically for tightness. Re-tighten the set screws on the rack mounting blocks to hold the pinion angle in place.

Note: Make certain that all bolts are tightened on the entire system

# *Flaming River Column Installation*



**FR21020 Included  
with Kit FR367PW**

**FR30010 Included  
with Kit FR368PW**

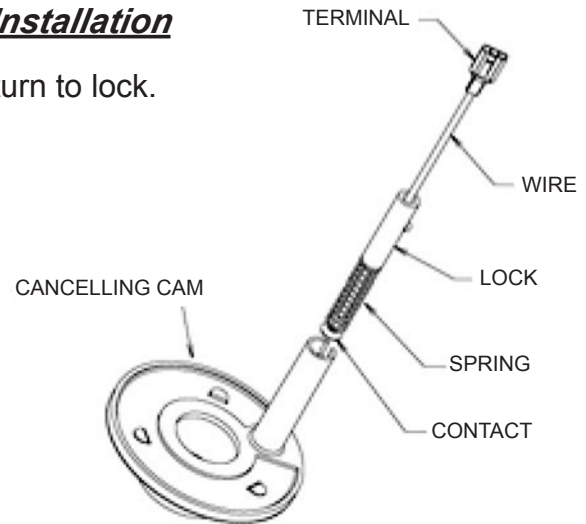
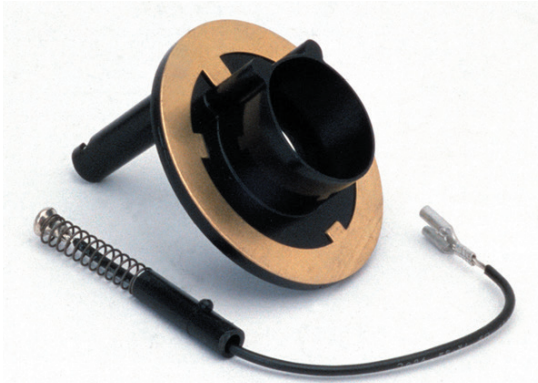
- 1) Position the floor mount to the bottom of the steering column, do not fully tighten the mount until the column is in its final position.
- 2) Install the column in the vehicle and install the strap clamp (Key Column) or original dash mount (Non-Key Column) in order to hold the column in place. Next re-adjust floor mount to fit snug to the floor and make any final adjustments before tightening all the clamps.
- 3) Connect the wiring adapter to your vehicle wiring harness.

**FR20030 Strap Clamp  
Included with kit  
FR368PW**

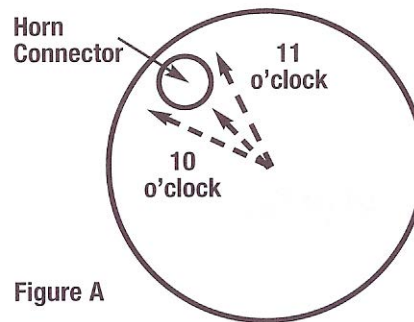


## Steering Wheel Installation

1) Install horn contact kit into canceling cam tube and turn to lock.

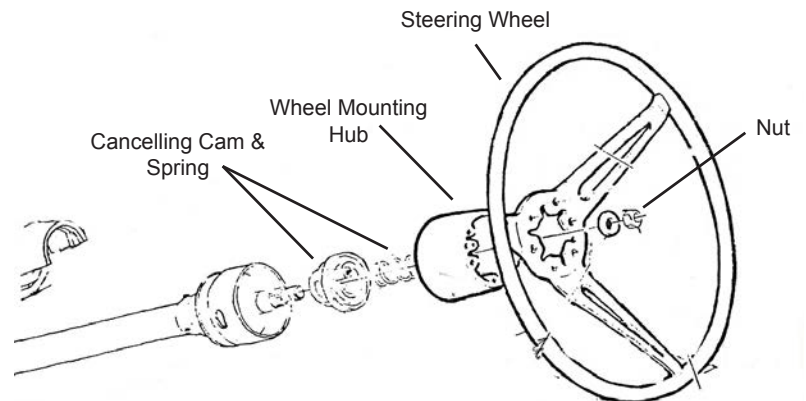


2) Be sure Rack and Pinion is in the center position before starting install of steering wheel. Align steering wheel adapter so that the canceling cam hole is at approx the 11 o'clock position and that one of the steering wheel mounting holes is at the 12 o'clock position. (After 1st test drive, it may be necessary to re-center wheel)



3) To install the wheel adapter run the horn contact wire through the hole for the canceling cam and place the adapter on to the splined column shaft.

4) Tighten the adapter-retaining nut securely until the adapter is approximately 1/16" away from the column shroud. (Overtightening can cause wheel to rub)



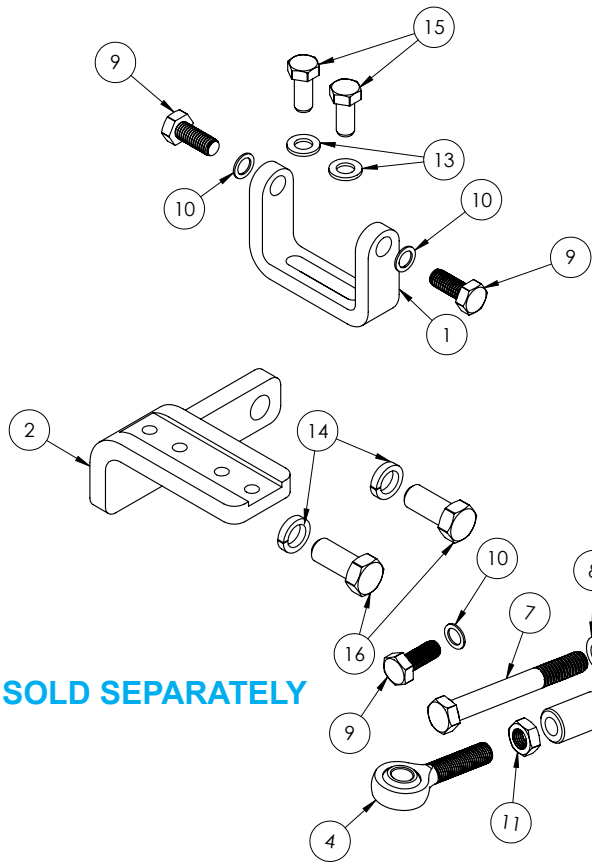
### Flaming River Column Wiring

<u>Wiring Circuit</u>	<u>Pin Location</u>	<u>Column Wiring Color</u>
Brake Light Switch	P	White
Right Rear Turn Signal	N	Dark Green
Left Rear Turn Signal	M	Yellow
Turn Signal Power	L	Purple
Hazard Power	K	Brown
Right Front Turn Signal	J	Dark Blue
Left Front Turn Signal	H	Light Blue
Horn	G	Black

### **Color Verification to be completed before disassembly**

- Brake Light Switch : \_\_\_\_\_
- RR Turn Signal : \_\_\_\_\_
- LR Turn Signal : \_\_\_\_\_
- Turn Signal Power : \_\_\_\_\_
- Hazard Power : \_\_\_\_\_
- RF Turn Signal : \_\_\_\_\_
- LF Turn Signal : \_\_\_\_\_
- Horn : \_\_\_\_\_

# FR1613 Big Block Chevy Power Steering Pump Bracket



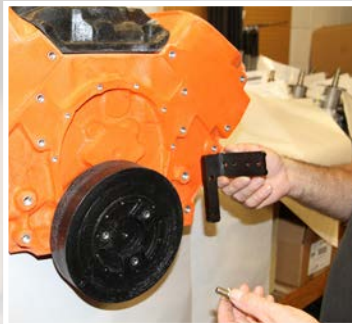
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	100633	BRACKET, MOUNT PUMP PS
2	1	100649	BRACKET, MOUNT PUMP-MOTOR SB
3	1	100667	HEIM JOINT, END ROD 3/8-24 RH
4	1	100668	HEIM JOINT, END ROD 3/8-24 LH
5	1	100720	SPACER, ADJ 0.62 X 2.52 W/ 3/8-24 RH-LH
6	1	100721	SPACER, 0.392 X 0.62 X 1.00 ALUM
7	1	100722	BOLT, 3/8-16 X 3.00 HEX HD GR8
8	1	100723	WASHER, FLAT 0.39 X 0.62 X .05
9	3	100724	BOLT, M8 X 1.25 X 20 HEX HD GR10.9
10	3	100725	WASHER, FLAT 0.32 X 0.47 X .04
11	1	100728	NUT, 3/8-24 JAM LH
12	1	100729	NUT, 3/8-24 JAM RH
13	2	100730	WASHER, FLAT 0.32 X 0.57 X .06
14	2	100732	WASHER, LOCK SPLIT 7/16 HIGH COLLAR
15	2	102725	SCREW, 5/16-18 X .75 HEX HD GR8
16	2	BOLT-7/16-14X1	BOLT, 7/16-14 X 1.00 HEX GR8

**SOLD SEPARATELY**



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## Power Steering Pump Installation/Big Block Chevy



Install L-shaped bracket (2) on engine with bolts (16) and lockwashers (14) supplied



Install pump bracket (1) to L-shaped bracket (2) with bolts (15) and washers (13) supplied



Install pump to bracket (1) using bolts (9) and washers (10) supplied

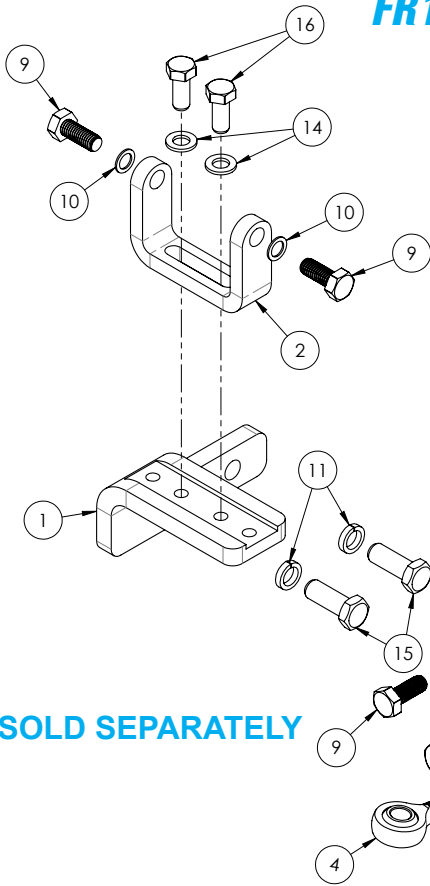


Install adjuster to pump using bolt (9) and washer (10) supplied



Remove upper water pump bolt. Install spacer (6) and adjuster with bolt (7) and washer (8) supplied

# FR1612 Small Block Chevy Power Steering Pump Bracket



ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	100632	BRACKET, MOUNT PUMP-MOTOR SB
2	1	100633	BRACKET, MOUNT PUMP PS
3	1	100667	HEIM JOINT, END ROD 3/8-24 RH
4	1	100668	HEIM JOINT, END ROD 3/8-24 LH
5	1	100720	SPACER, ADJ 0.62 X 2.52 W/ 3/8-24 RH-LH
6	1	100721	SPACER, 0.392 X 0.62 X 1.00 ALUM
7	1	100722	BOLT, 3/8-16 X 3.00 HEX HD GR8
8	1	100723	WASHER, FLAT 0.39 X 0.62 X .05
9	3	100724	BOLT, M8 X 1.25 X 20 HEX HD GR10.9
10	3	100725	WASHER, FLAT 0.32 X 0.47 X .04
11	2	100726	WASHER, LOCK SPLIT 3/8 HIGH COLLAR
12	1	100728	NUT, 3/8-24 JAM LH
13	1	100729	NUT, 3/8-24 JAM RH
14	2	100730	WASHER, FLAT 0.32 X 0.57 X .06
15	2	100779	SCREW, 3/8-16 X 1.00 HEX HD GR8
16	2	102725	SCREW, 5/16-18 X .75 HEX HD GR8

**SOLD SEPARATELY**



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## Power Steering Pump Installation/Small Block Chevy



Install L-shaped bracket (1) on engine with bolts (15) and lockwashers (11) supplied



Install pump bracket (2) to L-shaped bracket (1) with bolts (16) and washers (14) supplied



Install pump to bracket (2) using bolts (9) and washers (10) supplied



Install adjuster to pump using bolt (9) and washer (10) supplied

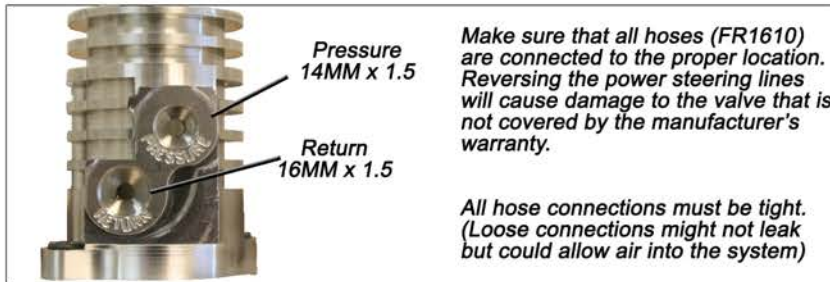


Remove upper water pump bolt. Install spacer (6) and adjuster with bolt (7) and washer (8) supplied



# Instruction Bulletin #1021

## Correct Bleeding Procedure for Flaming River Power Rack & Pinion Systems.



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.

- 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.
- 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.
- 11) If all proper conditions apply, bleeding is complete.
- 12) If any problem remains see "Special Conditions".

Verify:  
Smooth power assist  
Noiseless operation  
Proper fluid level  
No system leaks  
Proper fluid condition  
No bubbles, no foam,  
no discoloration.

**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.

### 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:

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. It is the customer's responsibility to determine the suitability of a given Flaming River® product for the customer's uses. 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.

**Additional Installation Accessories (Sold Separately)**

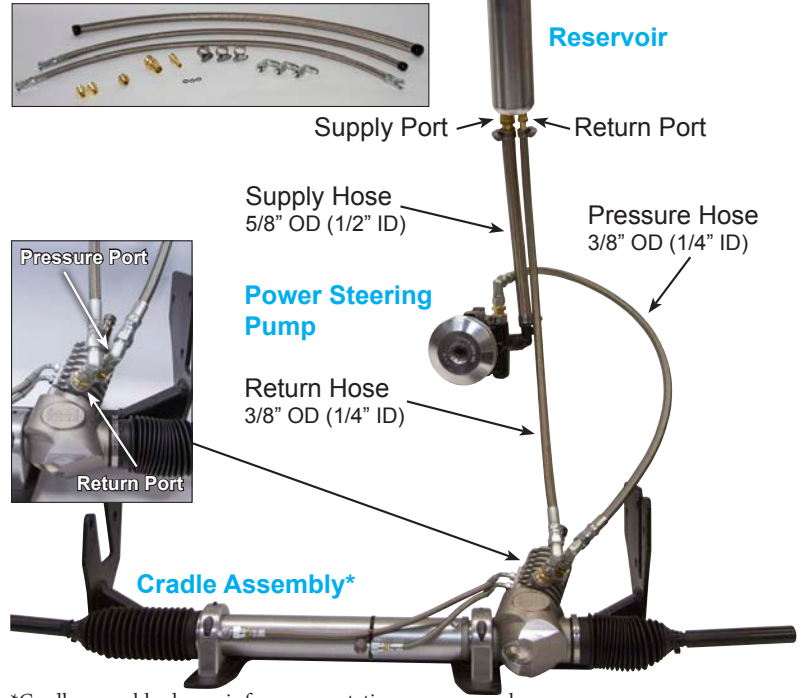


Ultra Angle Exhaust Headers FR50001C



Power Steering Hose Kit FR1610

**FR1610 Hose Kit Routing**



\*Cradle assembly shown is for representation purposes only



If not using our hose kit, we recommend purchasing the FR1632 Pressure and Return fittings kit. If you have any questions regarding connecting alternate hose kit to Flaming River Cradle Assembly, please call 1-800-648-8022.

In order to ensure the best customer experience possible, we've created a Customer Satisfaction Survey to gather important feedback about different facets of our business. We would appreciate it if you could please take a couple of minutes to fill out this survey about your experience.

The results of the survey will be used to improve and gather feedback about customer service, technical and sales support, order processing and fulfillment, manufacturing, and new product development.



Upon completing the survey, you will be issued a discount coupon code to be used on your next online purchase at [www.flamingriver.com/survey](http://www.flamingriver.com/survey).



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