



**ARIES  
C-SERIES  
PARTS AND SERVICE MANUAL**



## Contact Information

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Please have the following information at hand before calling:

Vehicle make

Model

Year

Unit number

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## Overview

C-Series rail gear is hydraulically actuated rail gear. The hydraulic and mechanical systems are very simple. The hydraulic system consists of a hydraulic power pack and hydraulic actuator. The hydraulic power pack has an integral fluid reservoir and electric directional valve. The hydraulic actuator is a rotary type and has a counterbalance valve attached to it. The counterbalance valve prevents the actuator from turning while not under pressure from the power pack. The gear also has mechanical locks front and rear to prevent the rear from falling due to a hydraulic failure while in the road position, this is redundant to the counterbalance valve.

The suspension consists of splined shaft embedded in an elastomer, attached to this splined shaft is the wheel arm which carries the stub axle/hub/rail wheel. The clock position of the wheel arm on the splined shaft determines the load carried by the rail wheels.

The gear is actuated from inside the cab of the truck by a pair of momentary switches to raise and lower the gear.

## Operation

### Safety and Tips for Safe Operation on Road

- Before road travel always ensure the rail gear is fully raised and the locks are properly engaged. Make sure the steering lock is disengaged.
- The steering and braking characteristics of your vehicle will be different due to the rail gear. If you are driving the vehicle for the first time familiarize yourself with the steering and braking by driving the vehicle in a safe place before taking the vehicle on the road.
- Be aware that your vehicle may have reduced ground clearance due to the rail gear.
- Approach and departure angles may be different due to the rail gear. This will affect the way you approach dips, ditches, inclines and other surface irregularities.
- Do not use the rail gear as a hitch for towing vehicles or dragging objects. Use the correct hitch points on the vehicle frame.

### Safety and Tips for Safe Operation on Rail

- Traction is very limited while on rail. Acceleration and braking must be done smoothly. Pay attention to the speedometer, it will over speed if the road wheels are slipping on the rail. Traction is further reduced when the rail is wet or snow/ice covered.
- Max speed on rail is 45 MPH, crew cabs max is 30MPH.
- Recommended speed through a crossing is 5 MPH.
  - Be aware that flange ways can fill with dirt and gravel and cause the rail wheel flange to move on top of the rail.
- Traveling through spring-rail frogs, spring switch or self-guarded frogs, require you to **STOP** before moving through
  - If possible, someone should remain on the ground to guard against derailment and direct the track car operator through the spring side of the frog.
- Recommended speed in reverse is 10 MPH Max. Be aware of engine temperature while in reverse...overheating may result from decreased airflow through the radiator.
- Do not exceed the speed limits imposed by the railroad for your type of vehicle. Remember that the recommended maximum speed is for first class track in good condition. Actual track conditions will determine the safe operating speed, which in many cases will be lower than the maximum speed.

- Ensure that all necessary vehicle warning lights, strobe lights, flags and other required safety items are working and in place before operating on track.
- When on rail do not operate cranes, aerial baskets, grab booms or other similar equipment unless their stabilizer legs are properly engaged with the ground. Severe damage to the rail gear or the vehicle frame will result.
- Sound horn when approaching road crossings.
- Do not steer on track...steering lock must be engaged.
- Watch for individuals on or around the track.
- Check your tire pressure...improperly inflated tires will seriously affect the load carrying capacity and directional control of the vehicle.
- Watch for debris on the track. Even small obstructions could cause a derailment.
- Watch for overhead wires above or alongside the track.
- Watch for obstructions alongside the track. If in doubt do not proceed until you have checked clearances on your vehicle.

## **Placement of Vehicle on Rail**

1. Find a suitable road crossing to position the vehicle on rail. If necessary, set up cautionary devices to ensure safety.
2. Position the vehicle with the road wheel tires on the rails, and the rail wheel flanges positioned centrally above the railhead. Backing into position is usually easier.
3. Put the vehicles transmission in park or neutral. Set the parking brake.
4. Start the auxiliary hydraulic power source.
5. The rear will be placed on rail first.
  - a. Raise the rail gear up a bit to relieve the pressure on the lock hook, or locking pin depending on application.
  - b. Pull the t-handle for the lock to swing the hook out of the way, or remove the pin.
  - c. Lower the rail gear into position on the rail.
  - d. Release the T-handle for the lock, or replace the lock pin.
6. Check the alignment of the front rail wheels with the track...it might be necessary to adjust the position of the vehicle.
7. The front rail gear will now be lowered.
  - a. Raise the rail gear up a bit to relieve the pressure on the pin lock.
  - b. Remove the lock pin and put into the storage position.
  - c. Lower the rail gear.
8. Engage the steering lock.
9. Drive the vehicle forward and backward a few yards to check vehicle's operation and brakes.
10. Vehicle is now ready for rail travel.

## **Removal of Vehicle from Rail**

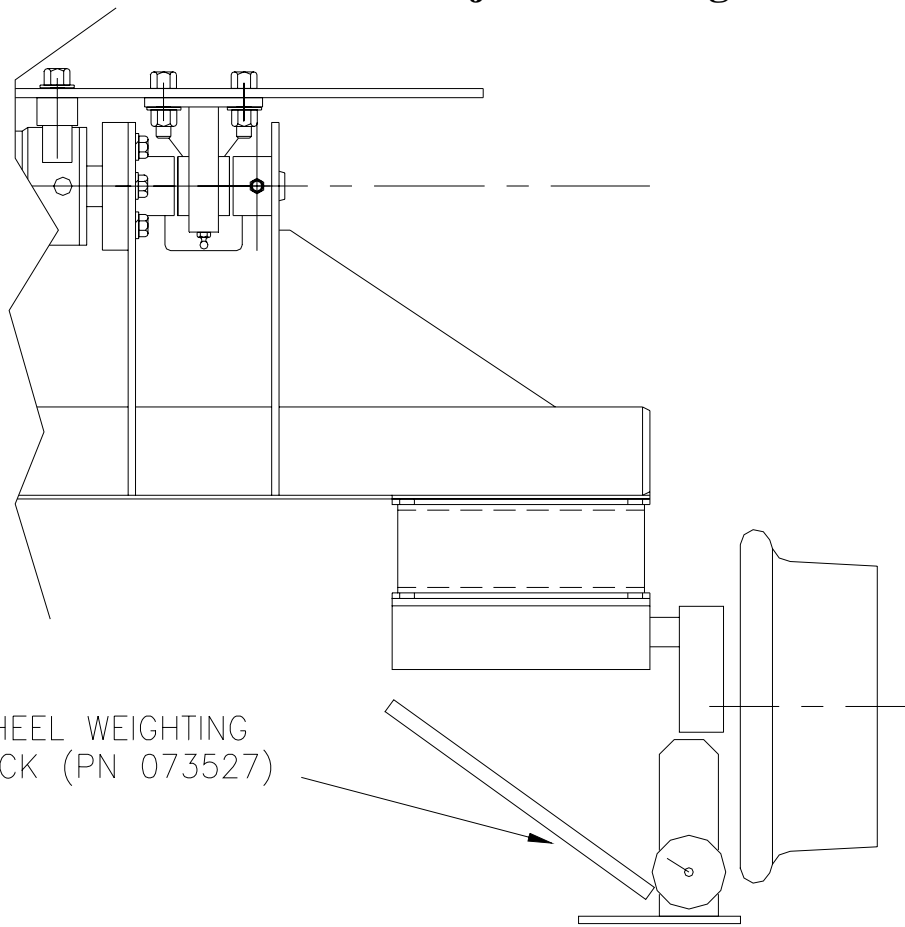
1. Find a suitable road crossing to remove the vehicle from the rail.
2. Put the vehicle's transmission in park or neutral. Set the parking brake.
3. Start the auxiliary hydraulic power source.
4. The front will be raised first.
  - a. Raise the rail gear into the road position.
  - b. Place the lock pin into the locked position.
5. The rear will now be raised.
  - a. Raise the rail gear
  - b. Depending on the application, either the hook lock will automatically swing out of the way of the raising rail gear and swing into locking position, or the lock pin will need to be replaced.
6. Disengage the auxiliary hydraulic power source.
7. Disengage the steering lock.
8. The vehicle is now ready to be driven on the road.

## Alignment and Adjustment

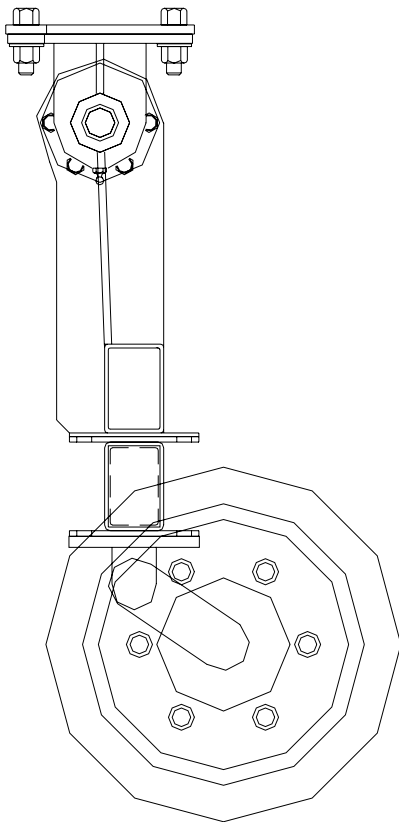
The alignment needs to be performed on a clean level solid surface. Position the vehicle on either 2x4s or a piece of steel channel so that all road wheels are approximately 1.5” higher than the surrounding floor level. Make sure that the 2x4s are long enough to support both the rail wheels and truck tires.

1. Set tire pressures to the maximum pressure as listed on the sidewall.
2. Set the guide wheel load (vehicle should be at curb weight).
  - a. Lower and lock the guide wheels in the “rail” position.
  - b. Jack up the guide wheel as shown in the illustration on Page 8. The guide wheel needs to be just off the rail.
    - i. Jack the wheel up, so there is about a 0.25 inch of clearance between the guide wheel and track.
    - ii. Place a piece of paper between the guide wheel and rail.
    - iii. Lower the wheel onto the paper.
    - iv. Slowly raise the wheel.
    - v. Note the pressure reading when the paper can just be removed.
  - c. Check the pressure on the gauge, it should be between 350-400 lbs. With the vehicle loaded, the max guide wheel load is 700lbs.
  - d. If the guide wheel load is not correct, refer to the diagram on the Page 8 to adjust the weight.
3. Adjust track gauge
  - a. Must be done before alignment.
  - b. Track gauge is adjusted by adjusting the position and/or number of washers on the stub axle.
  - c. Gauge is measured from the inside of the rail wheel flanges. For both front and rear wheels the measurement is 53”.
4. Using two (2) standard railroad ties or equivalent, positioned perpendicular to the center line of the vehicle, run a string line down each side of the vehicle. String line should be positioned 6” from the rear wheel rim and parallel from side to side.
5. Measure the dimensions below, referring to the diagram on Page 9. Make adjustments as needed to bring the rail gear into spec. Use the adjustment slots on the suspension frame and spacer washers on the rail wheels to bring the gear into alignment.
6. Tighten and torque the fasteners that were loosened during the alignment process.

# Guide Wheel Load Adjustment Diagram.

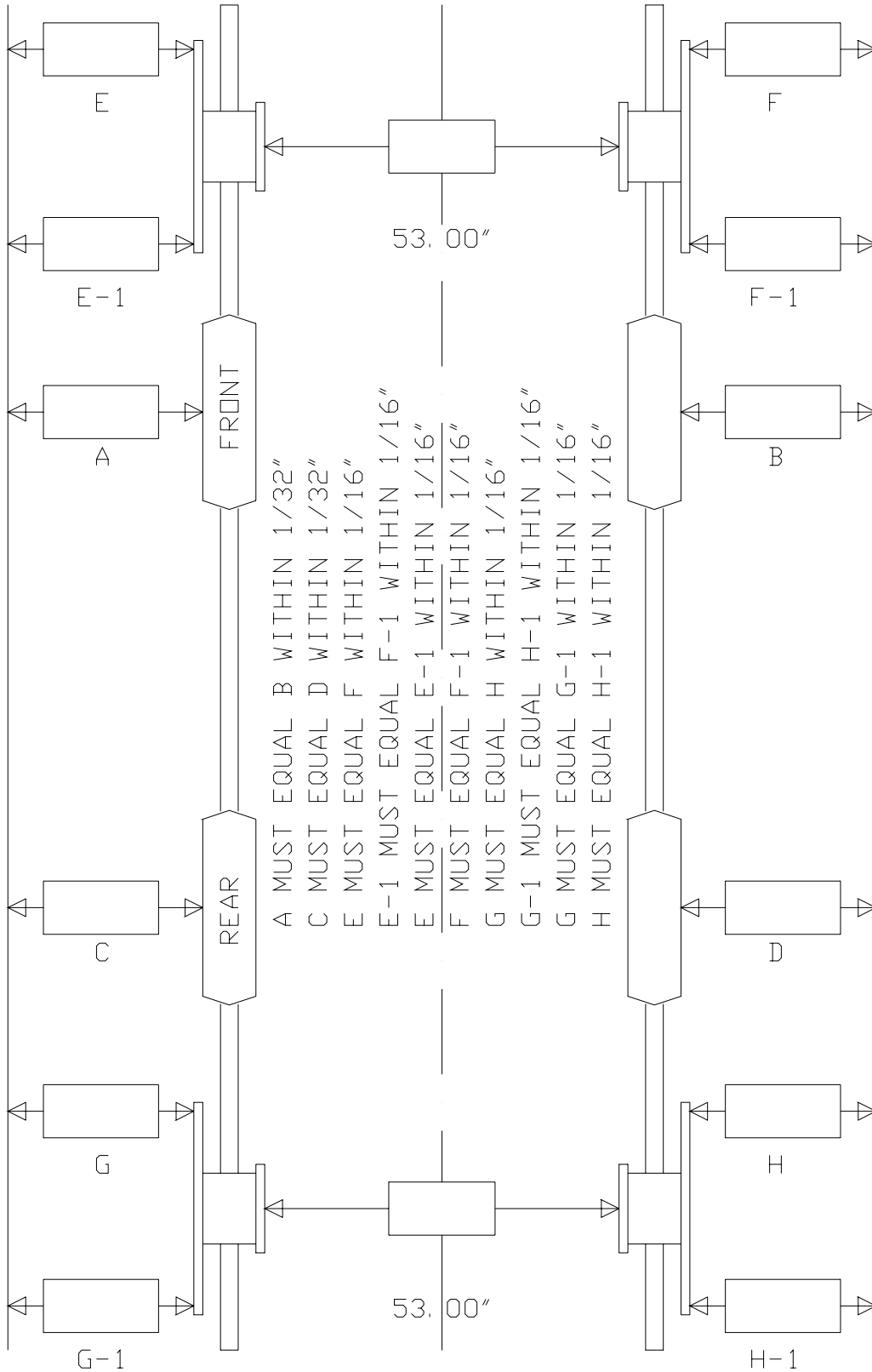


WHEEL WEIGHTING  
JACK (PN 073527)



TO REDUCE WEIGHT ROTATE ARM ON SPLINED  
SHAFT TO MOVE WHEELS UP (AWAY FROM RAIL) ↑

TO INCREASE WEIGHT ROTATE ARM ON SPLINED  
SHAFT TO MOVE WHEELS DOWN (TOWARDS RAIL) ↓



CHASSIS ALIGNED  
 ARIES C-SERIES  
 HYRAIL ALIGNMENT  
 3/18/99 REV 3

ALIGNED BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

## Rail Testing the Vehicle after Alignment

1. The vehicle must be tested on straight level track.
2. Apply a contrasting color of spray paint to the flanges and tread of the guide wheels.
3. Set the vehicle on rail and drive for a short distance at normal operating speed.
4. Stop the vehicle.
5. Look at the guide wheels. On a properly aligned vehicle, the paint should be worn evenly across all the wheels.
6. Looking at the front wheels, if more paint is worn off the left wheel flange than the right the vehicle is said to be “flanging left”, the opposite condition is known as “flanging right”.
  - a. To correct a “flanging right” condition we want to add some toe-in to right wheel. That is to make F a bit greater than F-1 referring to the alignment diagram. Loosen the suspension body to make this adjustment.
  - b. If the gear is “flanging left” we want to add some toe-in to the left wheel. That is to make E a bit greater than E-1 referring to the alignment diagram. Loosen the suspension body to make this adjustment.
7. Repeat beginning at step #2.
8. If there are still alignment issues repeat the rail gear alignment.
9. If the issues are still present after the alignment, the vehicle frame and/or suspension may have problems. Check the rear vehicle wheels looking to make sure the wheels are square to the frame. The rear end of the truck may have to be loosened and shifted back into alignment.

## **Lubrication and Maintenance**

### **Daily**

Check the rail gear for general appearance and damage.

Check the hydraulic fluid level. Add oil as required, the oil should be within ½” of the top of the tank or fill.

Check for hydraulic oil leaks, kinked or damaged hydraulic hoses. Repair leaks and replace hoses as required.

Check that wheels rotate easily and without play in the bearings.

Check condition of rail wheels.

### **Weekly**

Check grease zerks for damage and replace as necessary.

Grease all zerks.

Lubricate moving parts, cylinder clevis pins, main pivot pins, locking pins etc.

### **Monthly**

Check rail wheel lug nut torque.

### **Yearly**

Clean and repack rail wheel bearings.

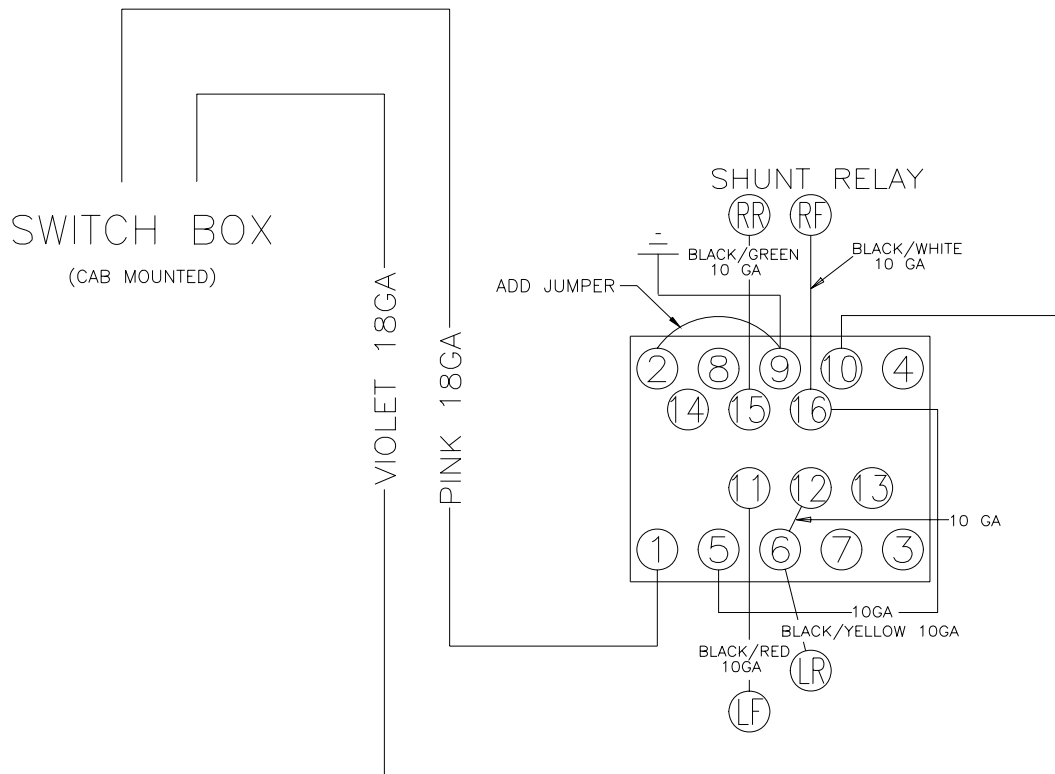
### **Recommended Hydraulic Oils**

Automatic transmission fluid (ATF) Type Dexron II

## Troubleshooting

<b>Condition</b>	<b>Possible Cause</b>
Hydraulic actuator movement slow or uneven	Oil viscosity too high Low oil level
Noisy pump, oil foaming, erratic actuator movement	Worn pump Incorrect oil viscosity Low oil level
Overheating	Incorrect oil viscosity Worn pump Restriction in hydraulic line Incorrect pressure relief valve setting
Rail guide wheels flanging to one side	Rail guide wheels out of alignment Damaged pivot arm or rail wheel axle
Vehicle leaning to one side	Load not balanced, overloaded to one side Suspension body damaged Vehicle suspension damaged
Insufficient rail gear ground clearance when in the road position	Locks not properly engaged. Overloaded vehicle
Vehicle derails	Rail gear out of alignment Vehicle speed is excessive Track gauge incorrect Vehicle out of alignment Rail wheels worn or damaged Tire air pressure incorrect
Rail gear doesn't lower or raise	Lock pins or hook engaged Vehicle overloaded Insufficient lubrication on pivot pin Incorrect pressure relief valve setting Low oil level

## SHUNT WIRING DIAGRAM (OPTIONAL)



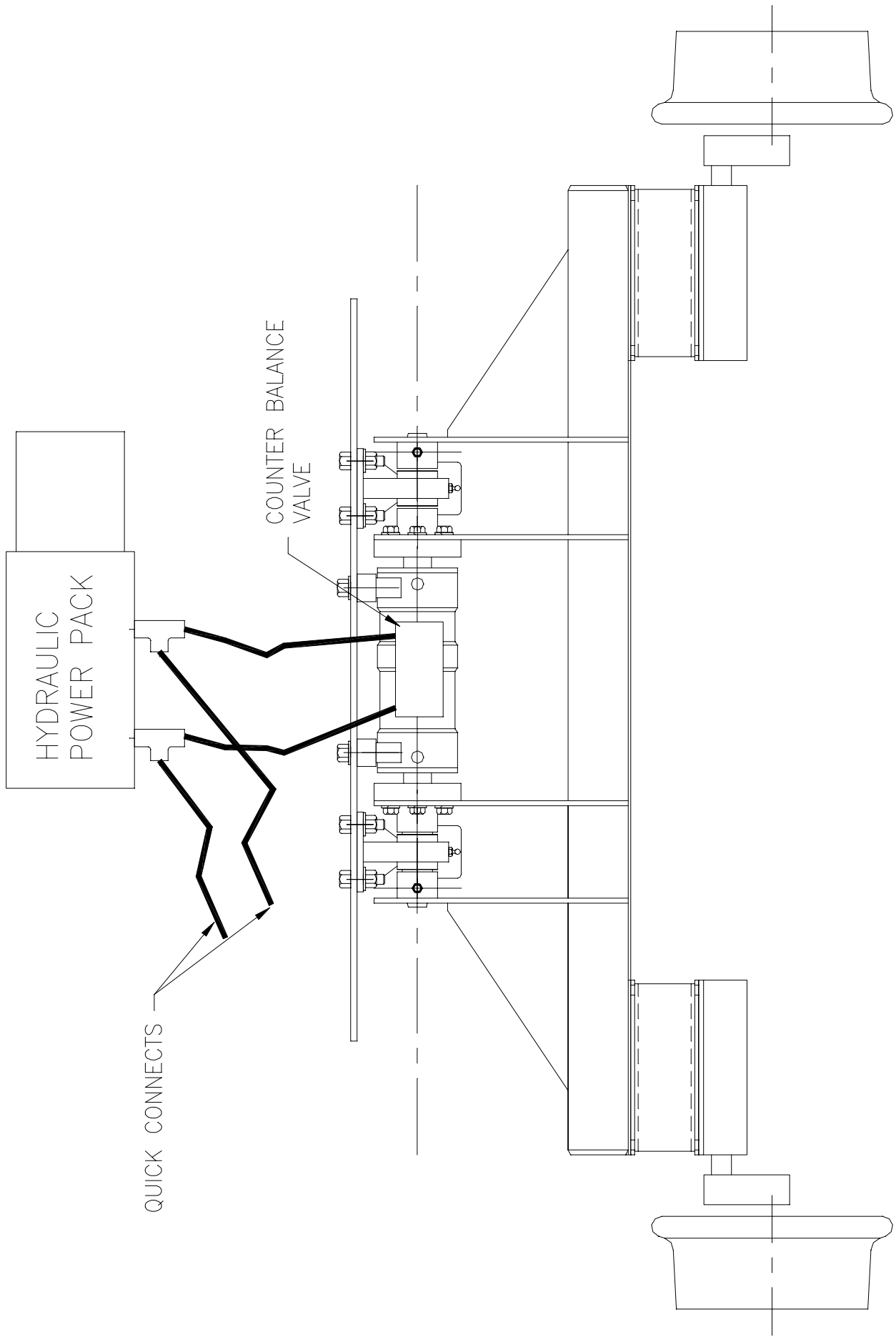
### Shunt test:

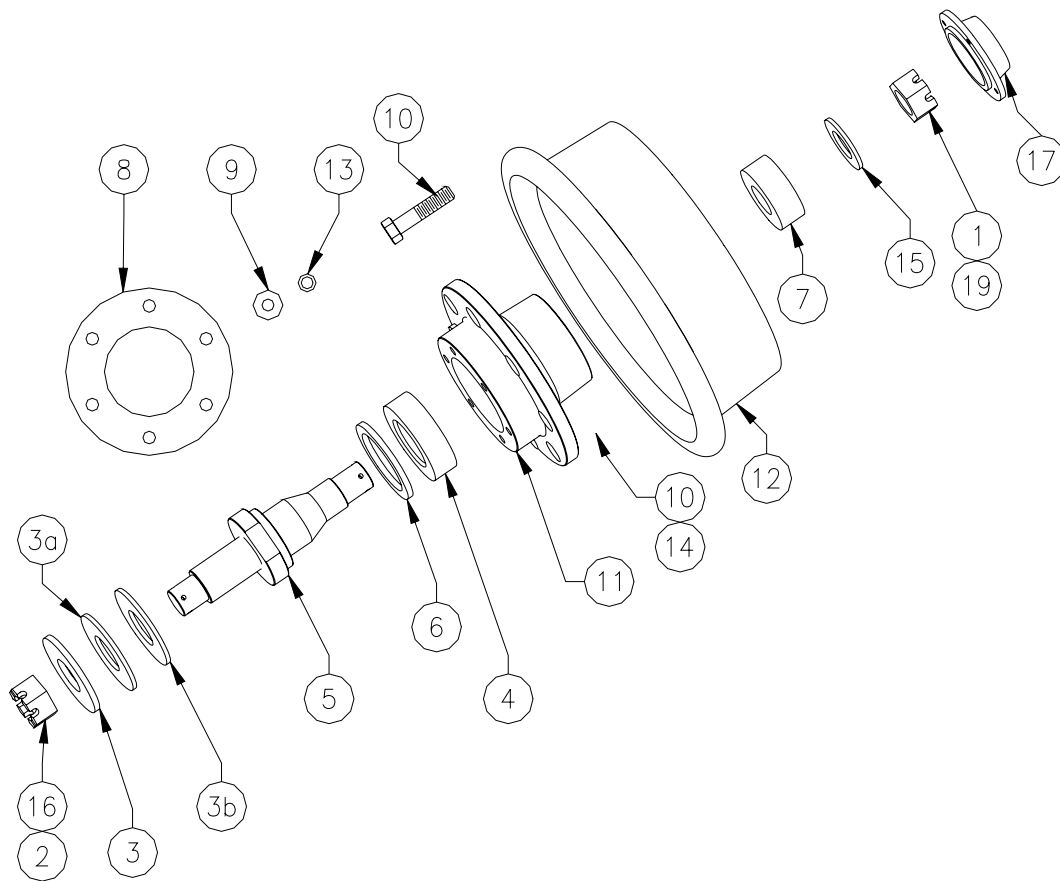
**Connect meter between terminals 5 and 11.**

1. Ignition key is off and shunt rocker switch is off-truck should be shunting with less than 3 ohms resistance.
2. Ignition key is on and shunt rocker switch is on-truck should be shunting with less than 3 ohms resistance.
3. Ignition key is on and shunt rocker switch is off-truck is not shunting and the ohmmeter should read an open circuit or infinity.

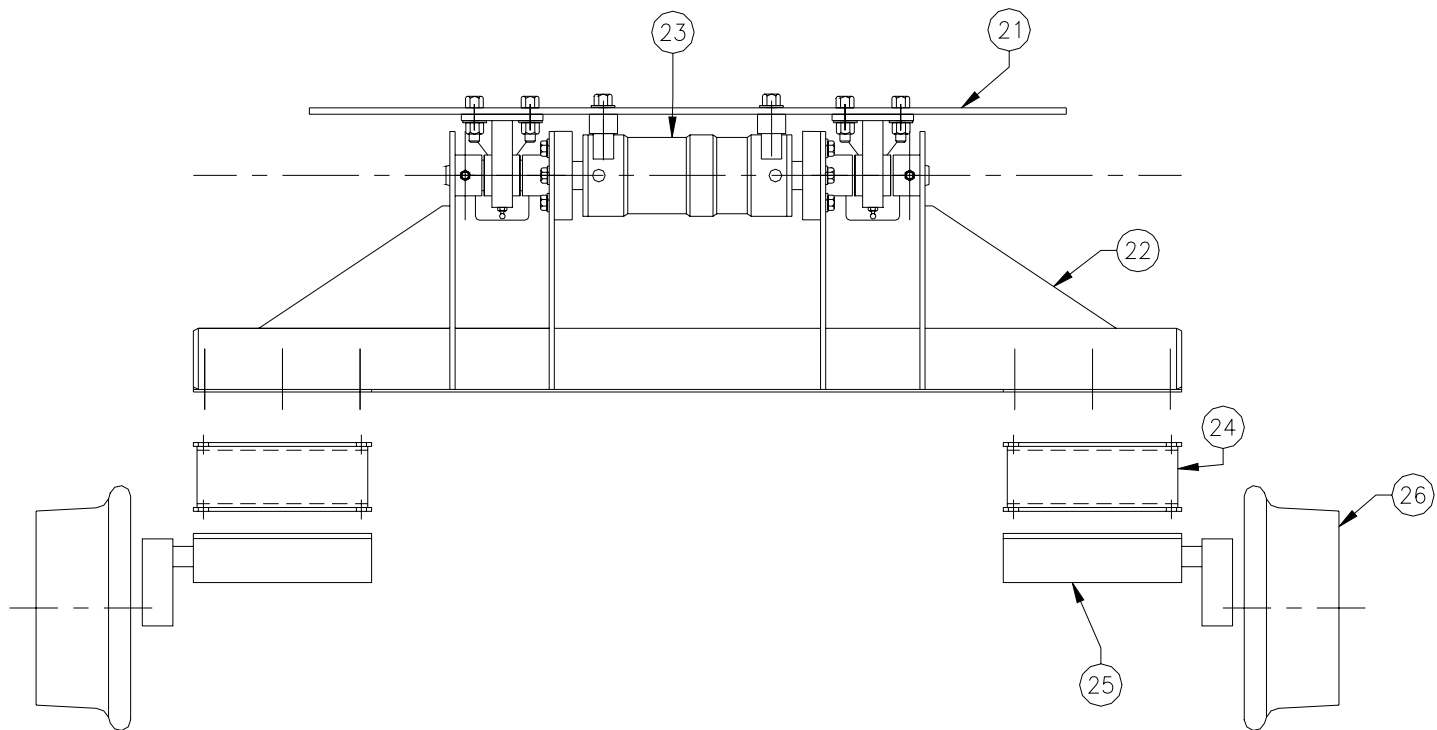
**Please refer to the electrical diagram that came with the vehicle for further information on the electrical circuit.**



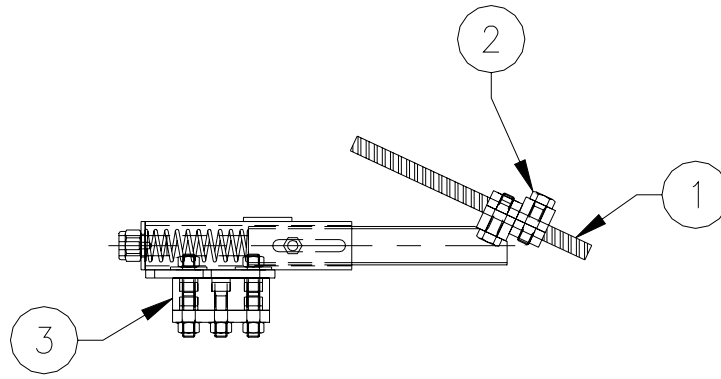




ITEM	PART NUMBER	DESCRIPTION	QTY
1	95135	NUT; SPINDLE	4
2	800262	COTTER PIN; 3/16 x 2.5" LONG	4
3	95111-1	AXLE SPACER; 1/8" THICK; CHAMFER	
3a	95111-2	AXLE SPACER; 1/8" THICK; NO CHAMFER	
3b	95111-3	AXLE SPACER; 3/16" THICK; NO CHAMFER	
4	26823	BEARING; INNER CUP	4
4a	26884	BEARING; INNER CONE	4
5	94077-5	AXLE	4
6	F12771	SEAL; DOUBLE LIP	4
7	1930	BEARING; OUTER CUP	4
7a	1987	BEARING; OUTER CONE	4
8	F12765	INSULATING SPACER	4
9	90177	INSULATING WASHER; 1.25OD X 0.50ID	24
10	F12762	STUD; WHEEL;	24
11	112496	HUB	4
12	77179	WHEEL GUIDE; RUBBER TREAD	4
13	90176	INSULATING WASHER; 0.75OD X 0.50ID	24
14	F12764	NUT; WHEEL	24
15	95136	WASHER; SPINDLE	4
16	F2845	NUT CASTLE; 3/4-16	4
17	F18397	HUB CAP	4
18	72897	1/2 x 3/16 WASHER	4
19	F1094	COTTER PIN; 3/16 x 1.5" LONG	4



ITEM	PART NUMBER	DESCRIPTION	QTY
21	02260ABF	FRONT; CHEVY; HD2500; 2001 MODEL YEAR	1
	02260BBF	REAR; CHEVY; HD2500; 2001 MODEL YEAR	1
	02237CBF	REAR; FORD; F-350; PICK-UP BED TAKE OFF	1
	02237ABF	REAR; FORD; F-350; CAB CHASSIS	1
	02237BBF	FRONT; FORD; F-350	1
22	1159-1 (01894YDF)	SHORT SWING FRAME	1
	1160-1 (01894ZDF)	LONG SWING FRAME	1
23	HP15KKIT	COUNTER BALANCE VALVE	1
	HS10KSFT180DA	ACUTATOR; ROTARY	1
24	11605	SPACER; 1.875" THICK	2
	11605-1	SPACER; 2.375" THICK	2
	11607 (11605-2)	SPACER; 3.375" THICK	
25	FS7NSA	SUSPENSION BODY; #6	4
26		SEE PREVIOUS PAGE	
27			



**SIDE VIEW OF SHUNT**

ITEM	PART NUMBER	DESCRIPTION	QTY
	182501-3	SHUNT ASSEMBLY NON-INSULATED	1
	182501	SHUNT ASSEMBLY INSULATED	1
1	WR1/2X8	SHUNT WIRE CABLE SOLD EACH	16
2	182501-11	PAIR OF WIRE BLOCKS; ONE THREADED AND ONE NOT	4
3	182501-10	PLASTIC INSULATOR BLOCK	1
4	95140R	RAIL SWEEP/SHUNT BRACKET	1

**Misc Parts**

ITEM	PART NUMBER	DESCRIPTION	QTY
.	H67701	HAND PUMP	.
.	073527	WHEEL WEIGHING JACK	.
.	02406LBF	BUMPER BRACKETS AND LOCK TABS	.
.	HBF-4	BREATHER CAP, 1/4" NPT	.
.	131380-2	BUMPER (CUT TO LENGTH)	.

### FASTENER TORQUES – GRADE 8 “WET”

Note: Wet is defined as any lubricant or plating present on either fastener or part to which it is attached.

<u>Fastener Size</u>		<u>Torque (ft-lbs.)</u>
Fraction	Decimal	
1/4 - 20	.250 - 20	10
1/4 - 28	.250 - 28	10
5/16 - 18	.313 - 18	20
5/16 - 24	.313 - 24	20
3/8 - 16	.375 - 16	30
3/8 - 24	.375 - 24	30
7/16 - 14	.438 - 14	50
7/16 - 20	.438 - 20	60
1/2 - 13	.500 - 13	80
1/2 - 20	.500 - 20	90
9/16 - 12	.563 - 12	110
9/16 - 18	.563 - 18	130
5/8 - 11	.625 - 11	160
5/8 - 18	.625 - 18	180
3/4 - 10	.750 - 10	280
3/4 - 16	.750 - 16	310
7/8 - 9	.875 - 9	450
7/8 - 14	.875 - 14	500
1 - 8	1.00 - 8	680
1 - 12	1.00 - 12	750
1 - 14	1.00 - 14	760

*Note:*

*All critical mounting hardware using Grade 8 fasteners will be tightened to the proper torque specification per the torque sheet unless the Body Manufacturer or the component supplier states otherwise.*