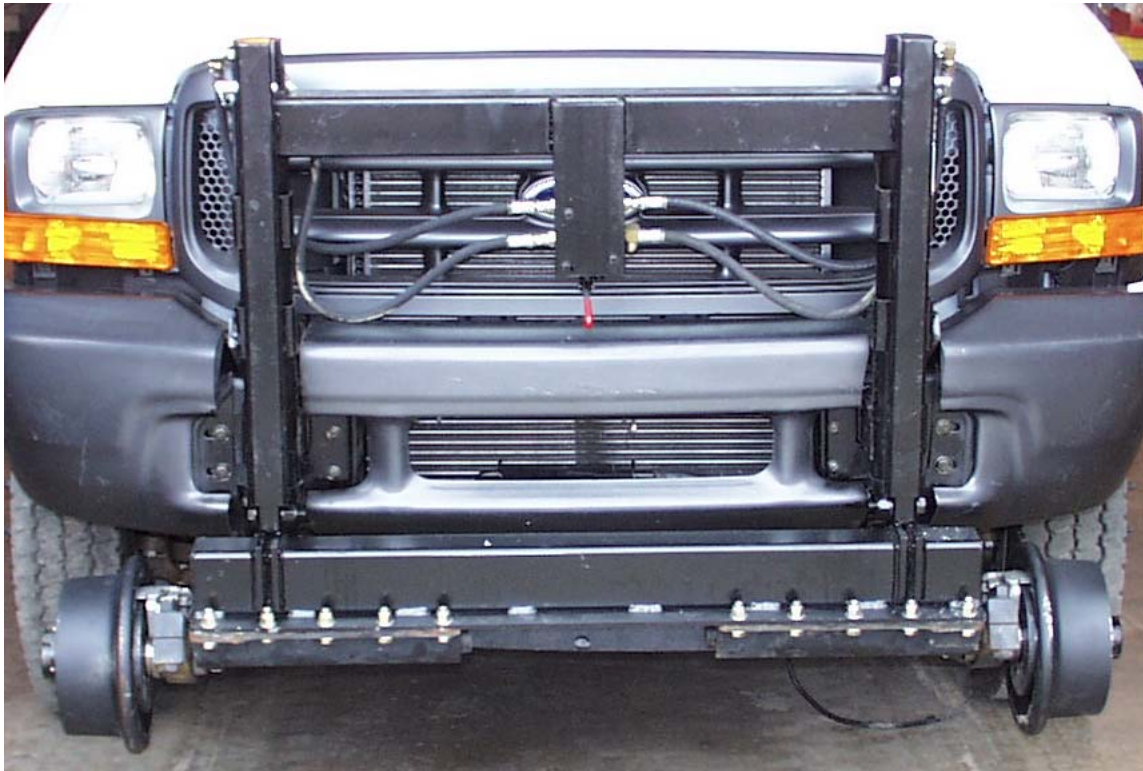




ARIES
FORD F450-F550
PARTS AND SERVICE MANUAL



Contact Information

For parts and service please contact:

Auto Truck
1200 N. Ellis St.
Bensenville, IL 60106

Phone: 630-860-5600

Toll free: 1-877-284-4440

Fax: 630-860-5631

e-mail: parts@autotruck.com

web address: www.autotruck.com

Please have the following information at hand before calling:

Vehicle make

Model

Year

Unit number

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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

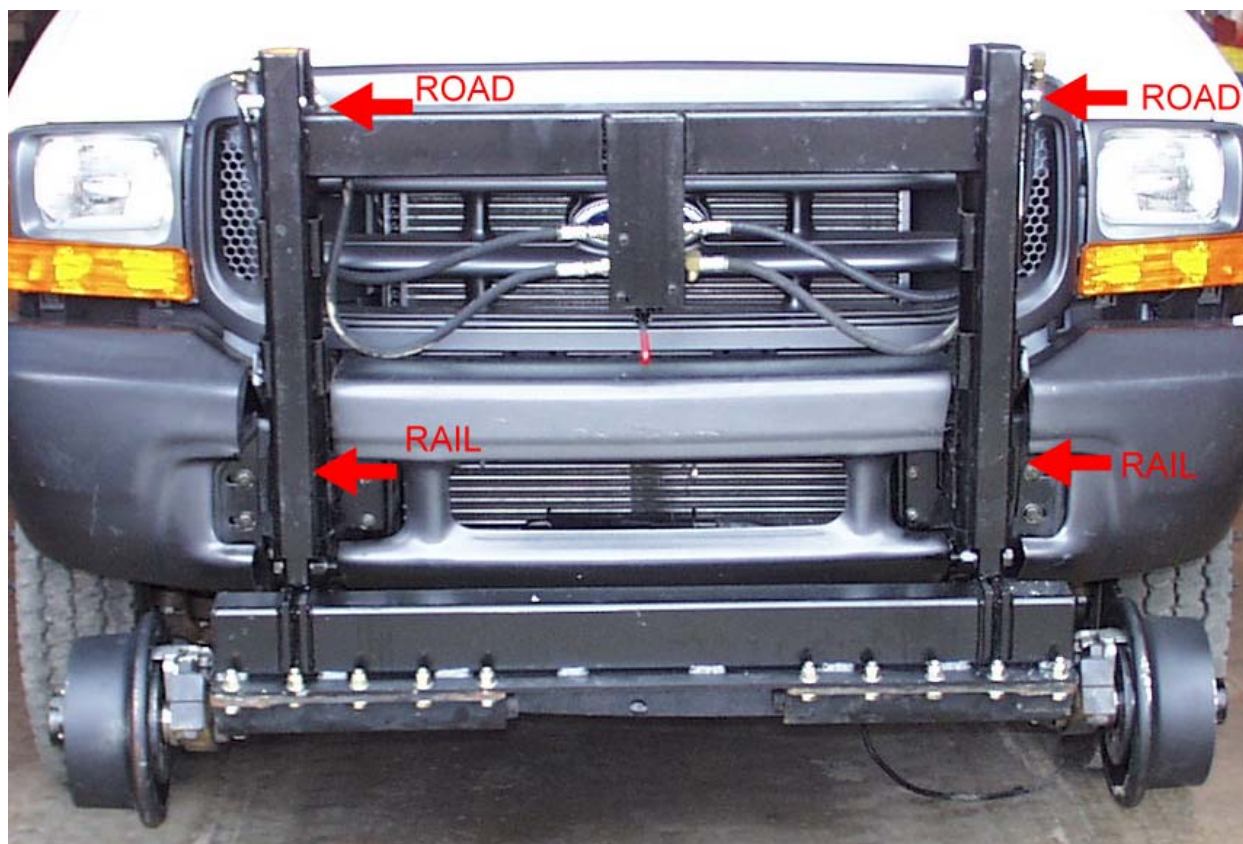
- Traction is very limited while on rail. Acceleration and braking must be done smoothly. Pay attention to the speedometer, it will over speed if the road wheels are slipping on the rail. Traction is further reduced when the rail is wet or snow/ice covered.
- Max speed on rail is 25 MPH.
- Recommended 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.
- Do not steer on track - steering lock must be engaged.
- Sound horn when approaching road crossings.
- 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 vehicle's transmission into park or neutral. Set the parking brake.
4. Engage the PTO hydraulic pump or 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.
 - b. Pull the T-handle for the lock to swing the hook out of the way.
 - c. Lower the rail gear into position on the rail.
 - d. Release the T-handle for the lock.
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 both pins from the upper holes.
 - c. Lower the rail gear.
 - d. Install the lock pins in the lower holes.
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 into park or neutral. Set the parking brake.
3. Engage the PTO hydraulic pump or start the auxiliary hydraulic power source.
4. The front will be raised first.
 - a. Bump the rail gear down a bit to relieve the pressure on the lock pins.
 - b. Remove both pins from the lower holes.
 - c. Raise the rail gear into the road position.
 - d. Insert the lock pins into the upper locking holes.
5. The rear will now be raised.
 - a. Raise the rail gear
 - b. The hook lock will automatically swing out of the way of the raising rail gear and swing into locking position.
6. Disengage the PTO hydraulic pump or auxiliary hydraulic power source.
7. Disengage the steering lock.
8. The vehicle is now ready to be driven on the road.



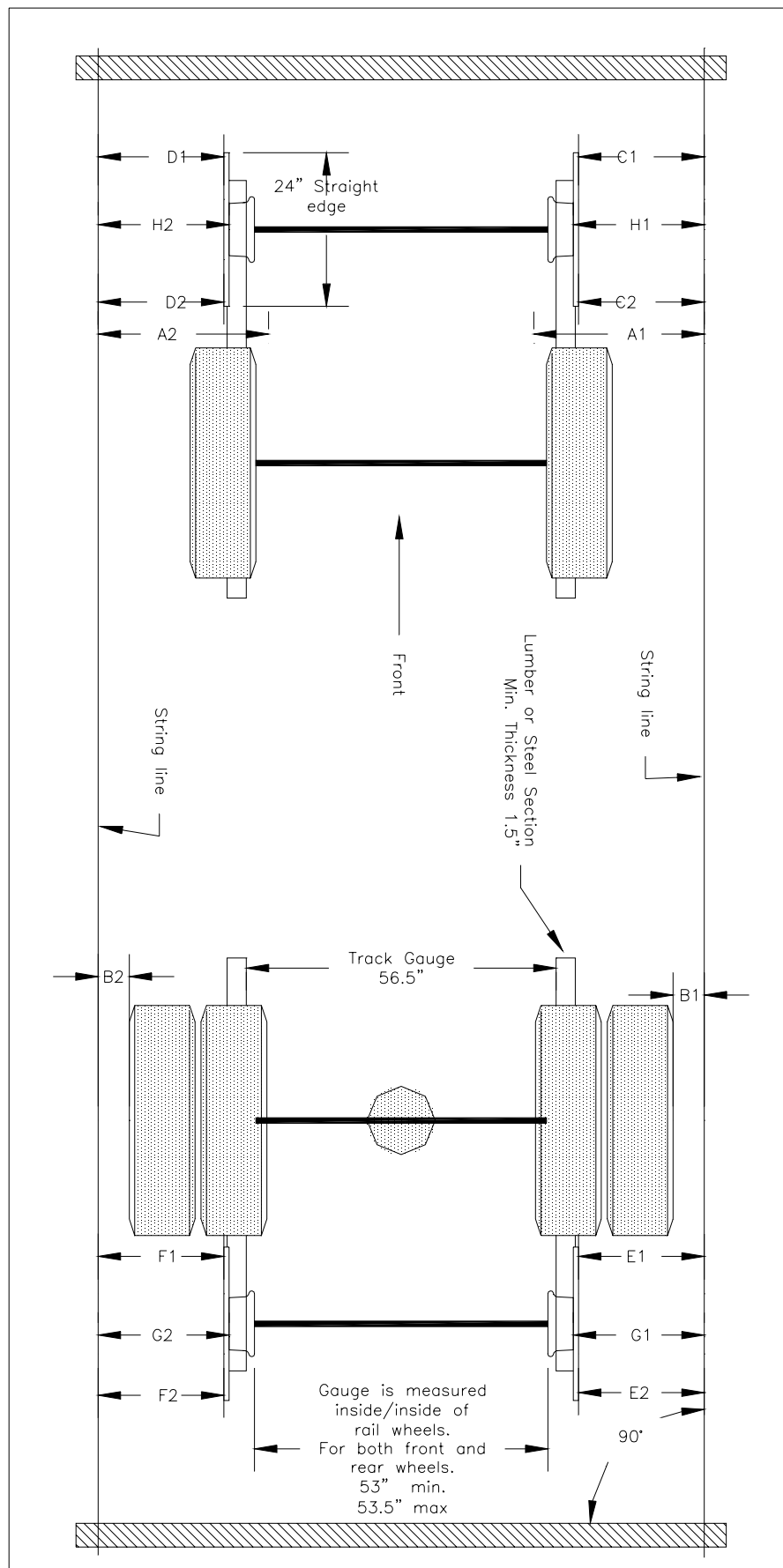
LOCK PIN LOCATIONS

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 position of the rear swing frame.
 - a. Loosen the stop bolt.
 - b. Fully extend the cylinder.
 - c. Adjust the swing frame stop bolts so they contact the swing frame plus ½ turn.
 - d. Tighten the lock nuts.
3. Suspension arms.
 - a. Suspension arms should be set to a horizontal position of $20^{\circ} \pm 5^{\circ}$.
 - b. In the fully lowered position the arms should raise the truck frame by 1.5" maximum (measured at a point no more than 12" from the rail wheel).
4. 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 wheels. For both front and rear wheels 53" Min / 53.5"Max.
5. Using two (2) two standard railroad ties or equivalent, transverse to the vehicle, run a string line down each side of the vehicle. String line should be positioned 6" from the rear wheel rim.
6. Measure the dimensions below, referring to the diagram on the following page. 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.
7. Tighten and torque the fasteners that were loosened during the alignment process.

Dimension Measurement	Max difference	Comment
A1 vs A2	1/16"	Truck frame or spring hanger to string line
B1 vs B2	1/16"	Rear wheel hub to string line
C1 vs C2	1/16" to 1/8" toe-in	Use 2' straight edge across wheel to take measurement
D1 vs D2	1/16" to 1/8" toe-in	Use 2' straight edge across wheel to take measurement
E1 vs E2	1/16" zero toe desired	Use 2' straight edge across wheel to take measurement
F1 vs F2	1/16" zero toe desired	Use 2' straight edge across wheel to take measurement
G1 vs G2	¼"	Center of rail wheel to string line
H1 vs H2	¼"	Center of rail wheel to string line



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. The paint should be worn evenly across all the wheels on a properly aligned vehicle.
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 C1 a bit greater than C2 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 D1 a bit greater than D2 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 truck 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.

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

Check that wheels rotate easily.

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.

12 Months or 9000 On-track Miles

Clean and repack rail wheel bearings.

Drain and refill hydraulic fluid.

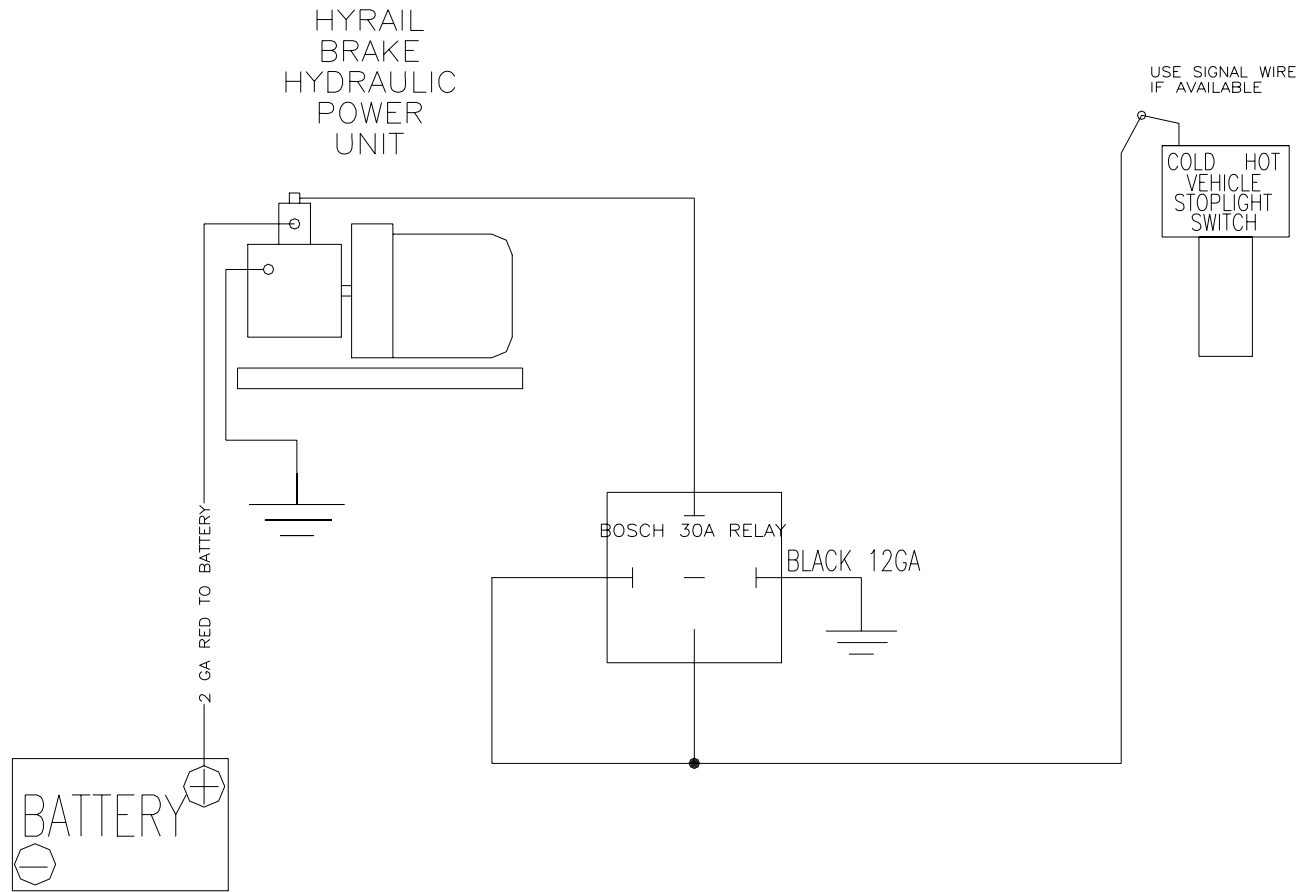
Recommended Hydraulic Oils

Mobil AW32 or equivalent

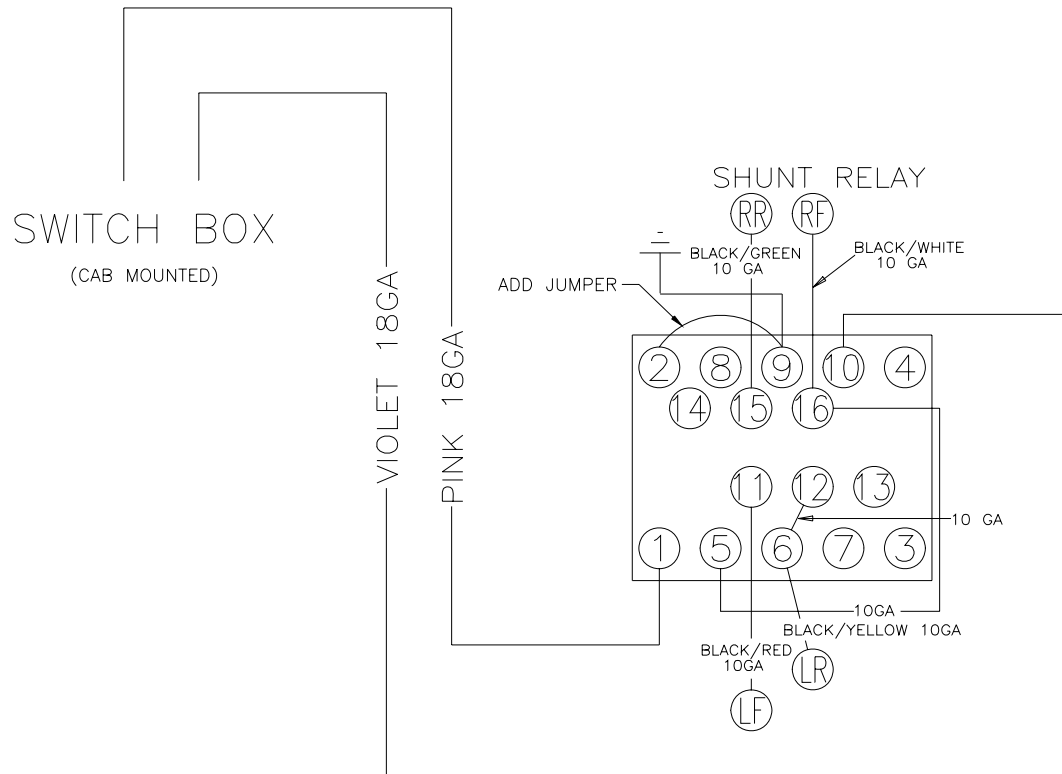
Troubleshooting

Condition	Possible Cause
Hydraulic cylinder movement slow or uneven	Oil viscosity too high Low oil level Slow engine speed (if pump is driven from vehicle gearbox PTO) PTO not engaged Oil flow restricted to pump
Noisy pump, oil foaming, erratic cylinder movement	Air leak on inlet side of pump Worn pump Incorrect oil viscosity Oil restricted to pump 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 Vehicle or rail unit brakes partially applied 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 Hydraulic cylinder rod bent Insufficient lubrication on pivot pin Incorrect pressure relief valve setting Low oil level

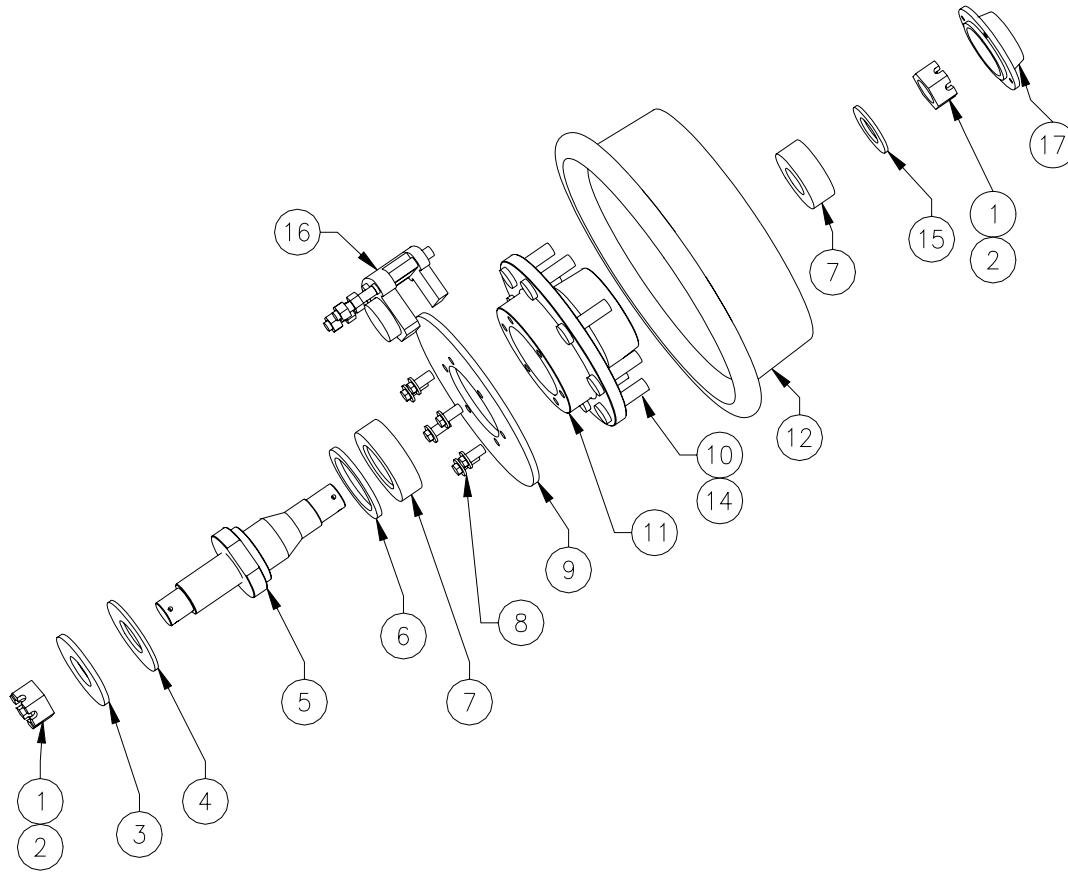
HYDRAULIC BRAKE WIRING DIAGRAM



SHUNT WIRING DIAGRAM (OPTIONAL)



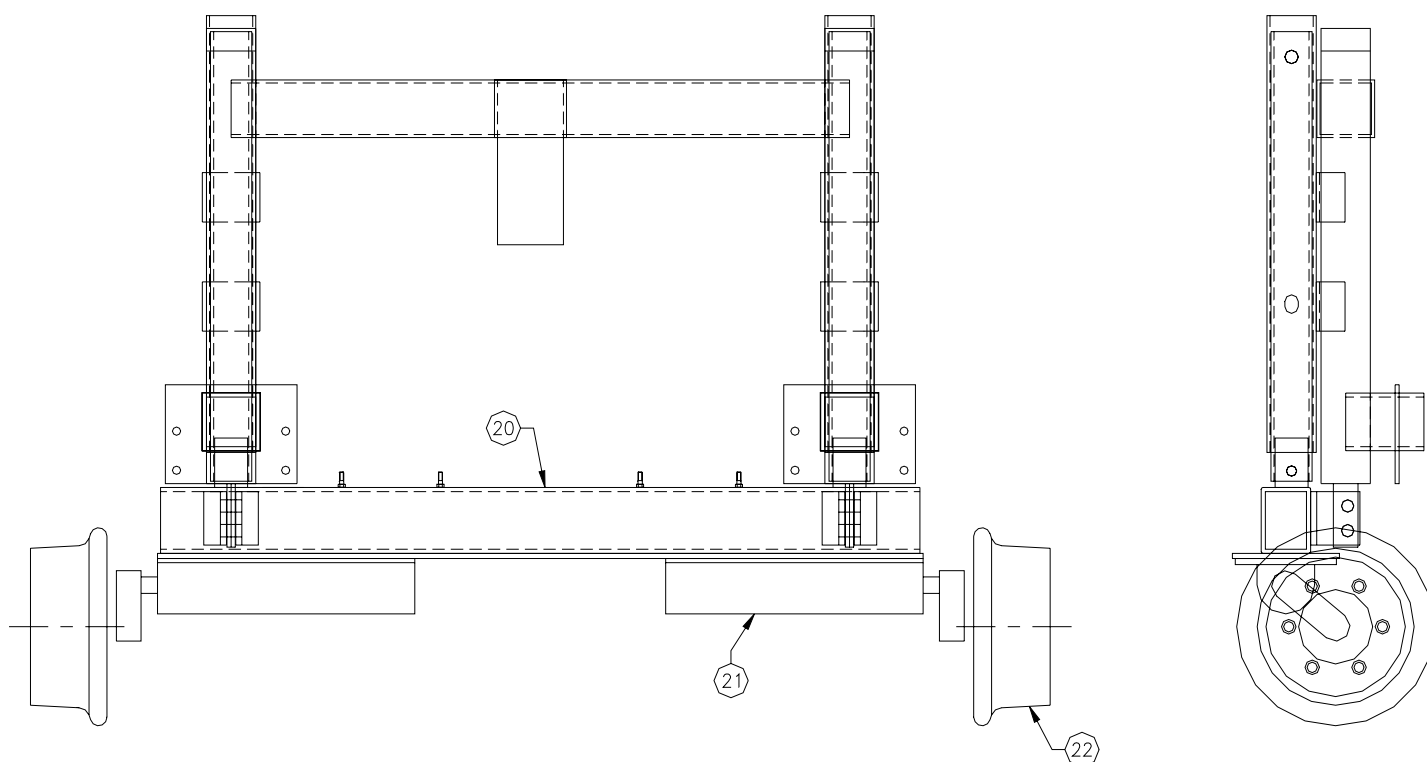
Parts Diagrams



TYPICAL WHEEL ASSEMBLY

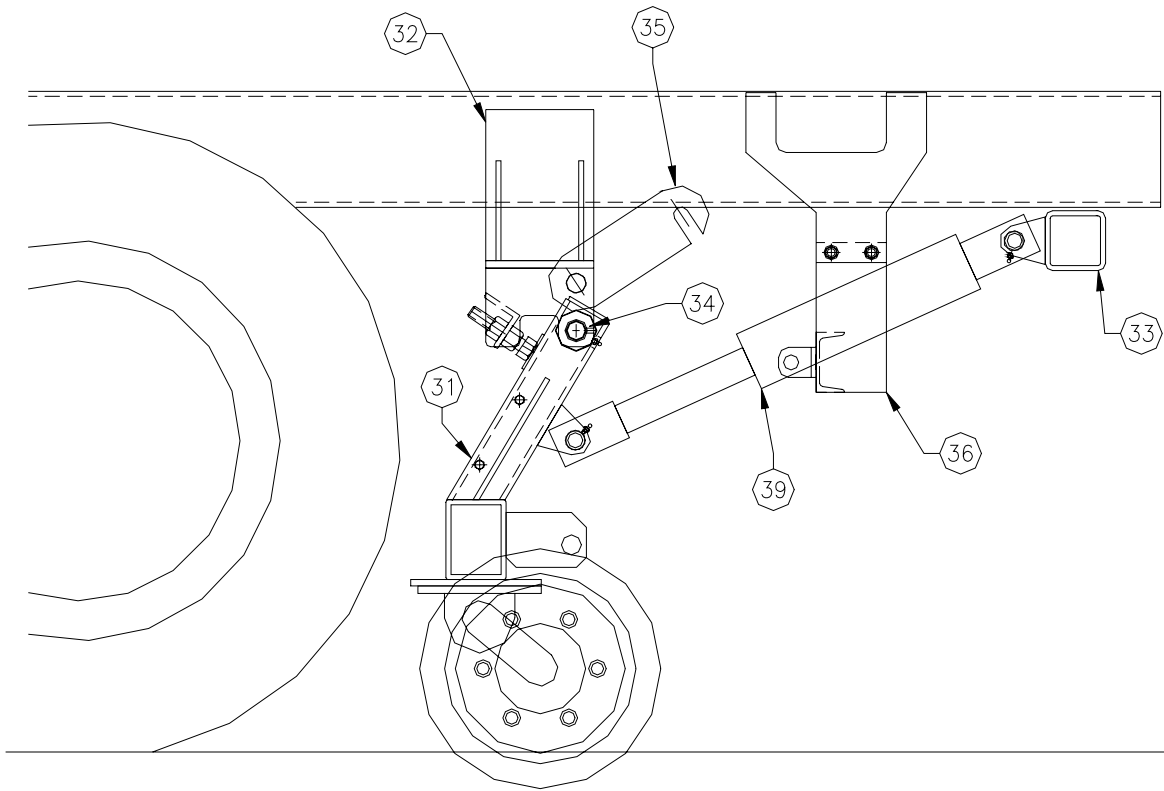
ITEM	PART NUMBER	DESCRIPTION	QTY
1	95153	NUT; SPINDLE	8
2	800262	COTTER PIN	8
3	95111-1	AXLE SPACER; 1/8" THICK; CHAMFER	4
4	95111-2	AXLE SPACER; 1/8" THICK; NO CHAMFER	8
4a	95111-3	AXLE SPACER; 3/16" THICK; NO CHAMFER	8
5	94077-6	STUB AXLE	4
6	19664	SEAL; DOUBLE LIP	4
7	95137	BEARING ROLLER TAPERED	8
8	M10X25	SCREW CAP; M10 X 25mm	
8a	WLM10M21	LOCK WASHER; M10	
9	1255	ROTOR; DISC; FOR 10" WHEEL	4
10	610281	STUD; WHEEL;	24
11	94095	HUB	
12	94235	WHEEL; RAIL; 10"; 6-HOLE	4
14	611051	NUT; WHEEL	24
15	95136	WASHER; SPINDLE	8
16	0012417	CALIPER; BRAKE; PASSENGER SIDE	2
16a	0012418	CALIPER BRAKE; DRIVER SIDE	2
16b	9812419	BRAKE PAD KIT	
17	95123	HUBCAP	4
17a	95123G	GASKET HUBCAP	4

01975ABF	caliper mounting bracket	2
h43504-2	brake hose	2
M6X12	HUB CAP BOLT	4

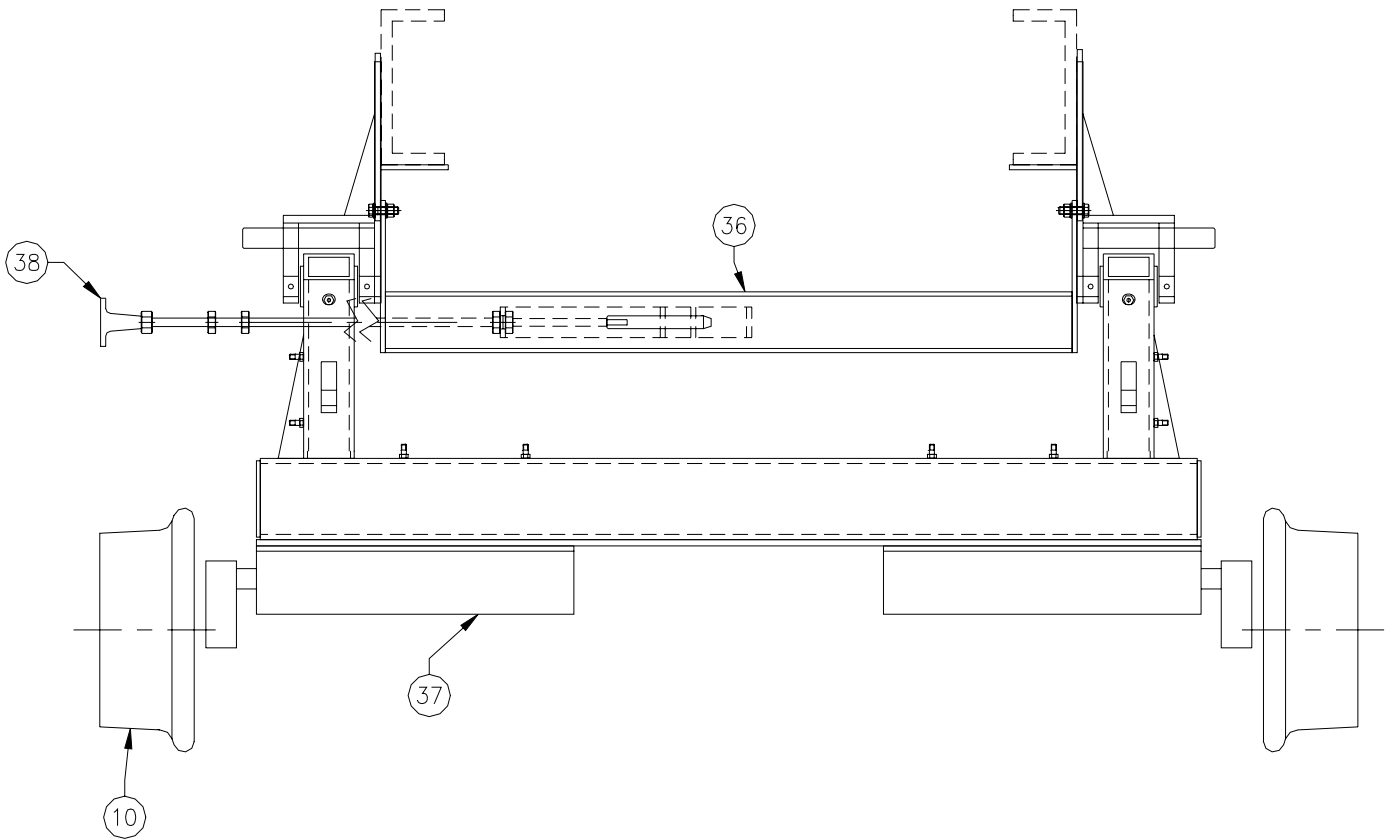


Front and Side View of Front Attachment

ITEM	PART NUMBER	DESCRIPTION	QTY
20	02032FBF	SWING FRAME	
21	FS21NSA	SUSPENSION BODY	4
22	94232	WHEEL; RAIL; 10"; 6-HOLE	4
	98320a765	LOCK PIN; FRONT	2
	VDM64HPCYL	HYDRAULIC CONTROL VALVE; FRONT ONLY	1
	VDM64HPMOT	HYDRAULIC CONTROL VALVE; REAR ONLY	1

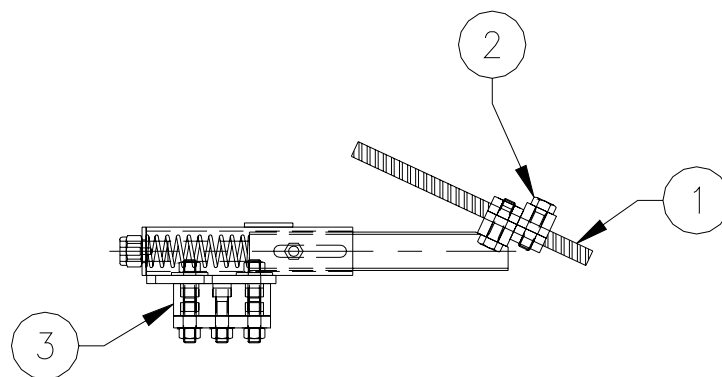


Side View of Rear Attachment



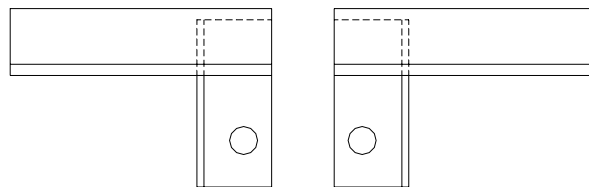
Rear View of Rear Attachment

ITEM	PART NUMBER	DESCRIPTION	QTY
30			
31	02089DBF	SWING FRAME	1
32	02089BBF	PIVOT BRACKET (SPECIFY DRIVER OR PASSENGER)	2
33	02089CBF	REAR CYLINDER MOUNTING BRACKET	1
34	02018MBF	PIN; PIVOT	2
35	02089PBF	REINFORCEMENT LINK	2
36	02155EBF	LOCK ASSEMBLY	1
37	FS21NSA	SUSPENSION BODY	2
38	FS100-04329-0048	T HANDLE LOCK CABLE 48" LONG	1
39	BMC2007CB90-SPL	HYDRAULIC CYLINDER	2
40	02104BBF	PIN; LOCK	2

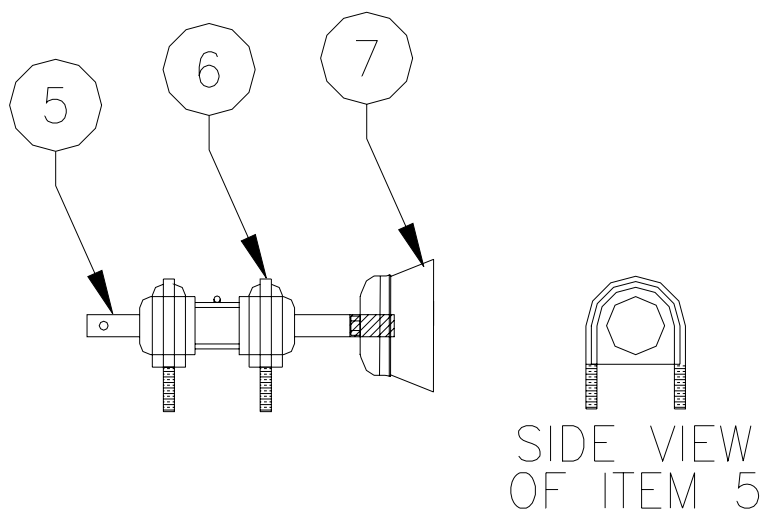


Shunt (Optional)

ITEM	PART NUMBER	DESCRIPTION	QTY
1	WR1/2X8	SHUNT WIRE CABLE SOLD EACH	16PCS
2	182501-11	PAIR OF WIRE BLOCKS; ONE THREADED ONE NOT	2
3	182501-10	PLASTIC INSULATOR BLOCK	16
4	02183DBF	CURB SIDE SHUNT BRACKET	1
5	02183CBF	STREET SIDE SHUNT BRACKET	1



Shunt Bracket



CUP BRUSH STYLE SHUNT

5	01589CDF	CUP BRUSH SHUNT	1
6	UB1PA	CLAMP AND INSULATOR	2
7	3ACO8	CUP BRUSH	1

NOTE: QTYS LISTED ABOVE ARE PER SHUNT.

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 as per the torque sheet unless the Body Manufacturer or the component supplier states otherwise.