2011 ARIES LIGHT DUTY
PARTS AND SERVICE MANUAL

Contact Information

For parts and service please contact:

Auto Truck
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Bartlett, IL 60103

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Fax: 630-860-5631
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Please have the following information at hand before calling:

Vehicle make
Model
Year
Unit number

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Overview

ARIES LIGHT DUTY rail gear is hydraulically actuated rail gear. The hydraulic and mechanical systems are very simple. The hydraulic system actuates the cylinders to raise or lower the railgear. The gear has mechanical locks front and rear to prevent the gear from falling due to a hydraulic failure while in the road position.
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.

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 forward speed on rail is determined by your railroad's work rules and environmental conditions. Not to exceed 45MPH
- Recommended speed through a crossing is determined by your work rules. Not to exceed 5MPH
- 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.

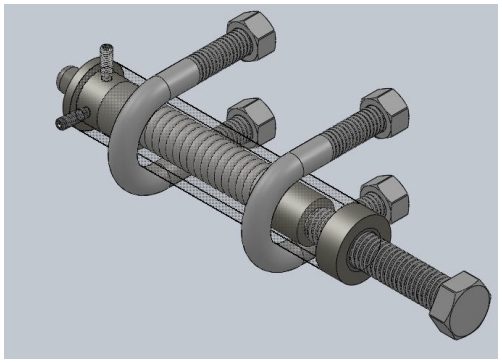
Placement of Vehicle on Rail

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 in park or neutral. Set the parking brake.
4. Turn on the "Equipment Power " switch to energize the pump.
5. Lower the rear rail gear into position on the rail.
6. Check the alignment of the front rail wheels with the track…it might be necessary to adjust the position of the vehicle.
7. Once the front is positioned centrally over the railhead lower the front gear.
8. Check to make sure all four rail wheels are positioned on the rail properly before moving.
9. Engage the steering lock.
10. Drive the vehicle forward and backward a few yards to check vehicle's operation and brakes.
11. 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. Raise the front gear first.
4. Raise the rail gear into the road position. Note the unit has an automatic mechanical lock pin on Front and Rear units in the "Raised" position only.
5. Raise the rear rail gear
6. Turn off the "Equipment Power" switch.
7. Disengage the steering lock.
8. The vehicle is now ready to be driven on the road.

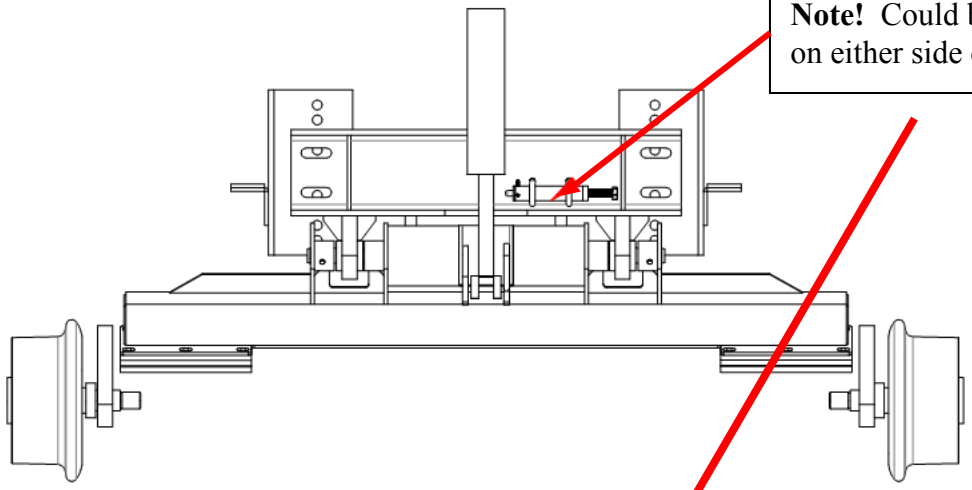
LOCK PIN LOCATIONS



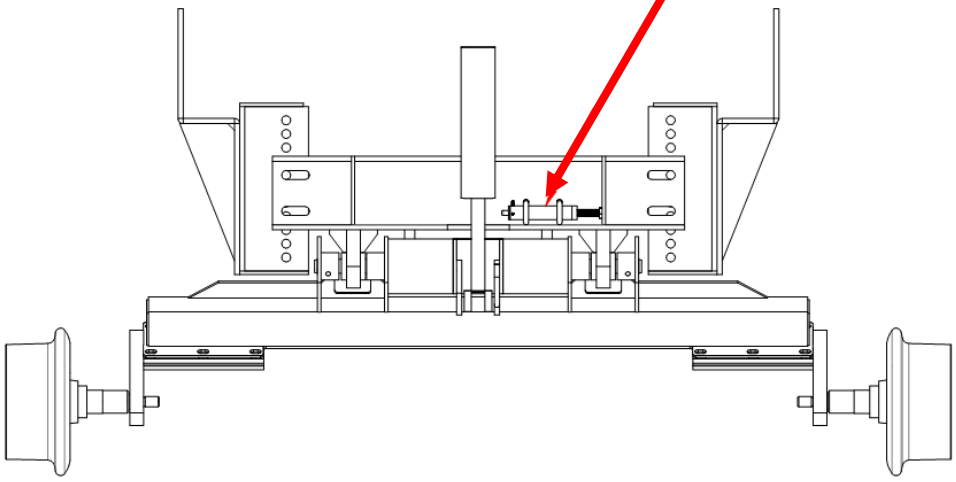
02811PBF
LOCKING ASSEMBLY;
RAILGEAR

Front Gear

Automatic Locking pins
Note! Could be located on either side of channel



Rear Gear



Alignment and Adjustment

Setting Rail Pressure
It is important the rail pressure is set within the limit of safe operation, too little rail pressure can lead to derailing and too much rail pressure can cause premature tread and suspension wear.

Rail Pressure can be set by two methods, Preload and by Scale. For Preload, (4) ¾" shims and a protractor are required. For Scale, a bottle jack with pressure gage are required.

Rail Pressure should be checked before putting your vehicle on track and if you have changed the weight of your truck by adding or subtracting equipment and/or tools.

Adjustments
Both the front and rear channels can be positioned vertically by loosening the 4 mounting bolts. It is suggested to scribe marks on brackets before loosening in order to preserve the horizontal position of the gear.

The angle of the suspension arms can be changed by moving it on the splined shaft. The shaft has a 60 - tooth spline giving 6 degrees per tooth of adjustment or about ½" vertical. Keep in mind that changing suspension angle may require other adjustments to clear body work.

The suspension will not provide proper ride if angles exceed 45 degrees below horizontal, the optimum ride for an empty vehicle is 25 degrees.

Checking Rail Pressure
Checking rail pressure is best checked on rail (simulated or actual), it can be checked on flat concrete surface but if done this way it will require an additional 1.00" under the vehicle tires to account for the guide wheel flanges.
Setting the rail pressure is done by pre-loading the suspension by placing the truck on shims and setting the guide wheels to contact the track, the pre-load is set. The empty vehicle (with driver) is set for ¾" of pre-load. This amount of pre-load corresponds to the required minimum load of 350 lbs.

<u>To check for proper minimum rail pressure:</u>

- Make sure the truck is in the lightest condition that it will be used on rail. This is best done with a person in the driver's seat.
- Place the vehicle on rail with the vehicle's tires on ¾" shims.
- Verify that the guide wheels are in contact with the rail. The contact should be light, using both hands you should be able turn the wheel against the rail, if you can't, you may have the pressure too high.
- If the guide wheels are not in contact, your rail pressure is too low. Measure the gap between the rail wheel and the rail.

<u>If the rail pressure is too high:</u>

- Shim the truck up another ½"
- If the guide wheels are still in contact with the rail, you can adjust the angle of the suspension arms upward by one 6-degree spline. See the adjustments section for details. You can continue to add ½" shims to determine how many 6-degree adjustments to make.

If the rail pressure is too low:

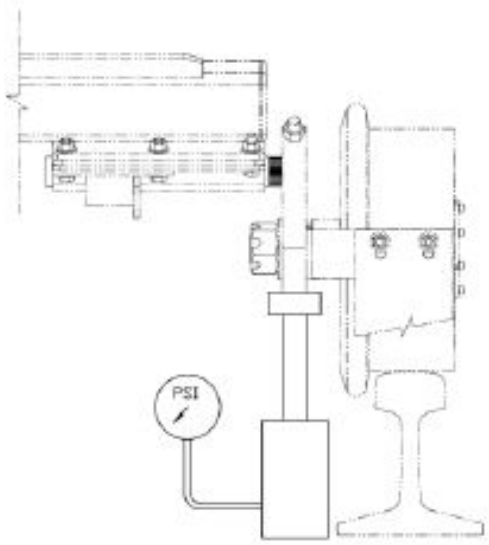
- If the gap is greater than ½" you should adjust the suspension arm downward by one 6-degree spline per ½", you should round up to insure adequate pressure.

If the rail pressure is different from right to left:

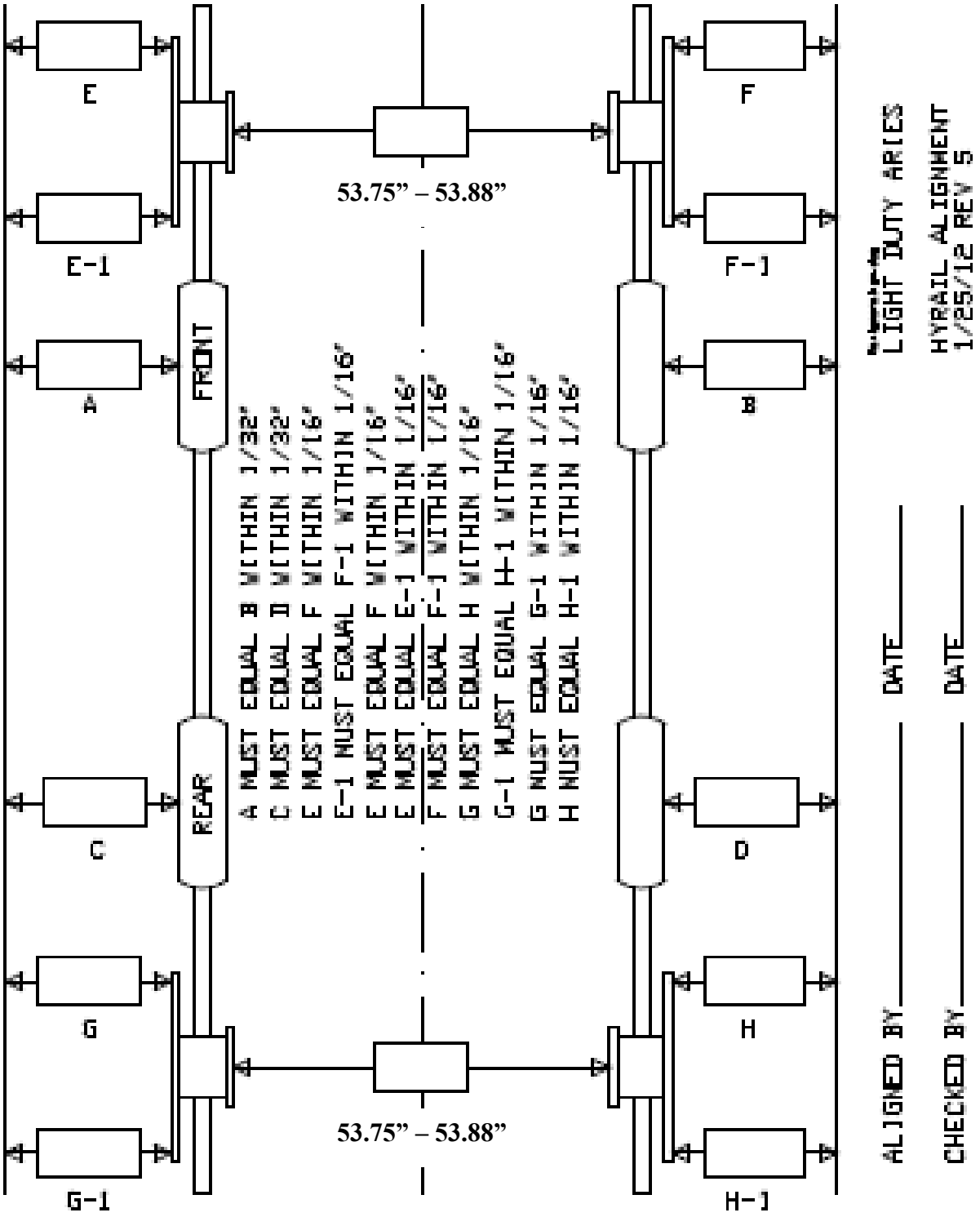
- Sometimes the pressures are not even from right to left, make sure the load in the vehicle is not the cause before adjusting the rail gear.
- Spacers under the suspension can be used to address problems with asymmetrical rail pressure.
- Moving the mounting channel can also address this condition.
- If the difference is in the order of ½", you can use the suspension arm adjustments to correct this.

Setting Pressure by scale or bottle jack

Rail gear pressure may also be set by the use of a jack with a pressure gauge, the rail wheel load of each wheel is:



Rail Wheel	Minimum Rail Load (each)	Max Rail Load (each)
Front Rail gear	450 lbs	700 lbs
Rear Rail gear	350 lbs	700 lbs



Form number G199 ATG Light Duty Aries Rail Gear Alignment form

Rail Testing the Vehicle after Alignment

1. The vehicle must be tested on level tangent 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 both front and rear units for general appearance and damage.
Check the hydraulic reservoir for 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 guide wheel equipment alignment. **(See Alignment and Adjustment Section page 7)**
Check guide wheel flanges for wear or damage.
Inspect vehicles wheels, studs, lug nuts and tires for any type of damage or excessive wear.
Check all bolts for tightness. **(See Torque Requirements page 25).**
Check grease zerks for damage and replace as necessary.
Grease all zerks.
Lubricate moving parts, cylinder clevis pins, main pivot pins, locking pins etc.

After First 50 Miles of Receiving Vehicle

At first 50 miles after installation or any time tires are changed or rotated, torque wheel spacer lug nuts and vehicle wheel lug nuts to recommended specifications.
(See Torque Requirements page 25).

After First 50 Track Miles

Torque Guide Wheel Lug Nuts to Recommended specifications
(See Torque Requirements page 25).

Annually

Perform annual inspections as required

12 Months or 9000 On-track Miles

Drain and refill hydraulic fluid.

Recommended Hydraulic Oil

ATF Dexron III

Recommended Pump Pressure Setting

Pre set at 2500 PSI

Replacement Tires and Wheels

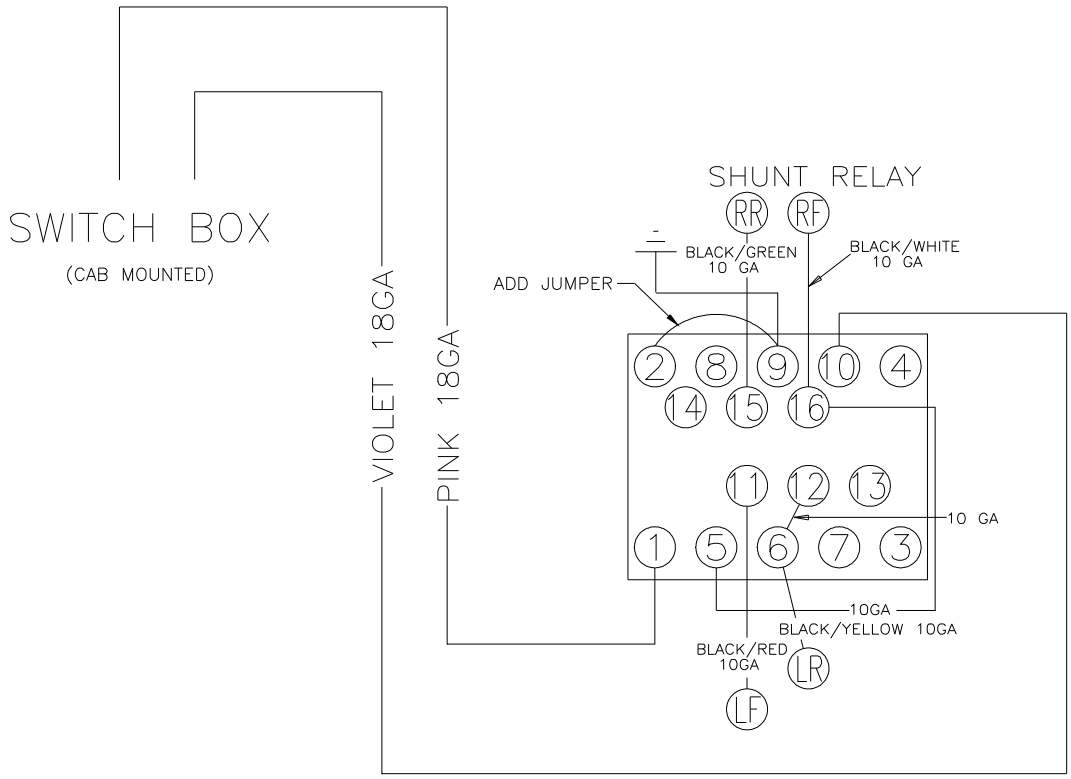
Use only Auto Truck approved replacement rims to ensure proper fit and function.
For wheel torque recommendations.
(See Torque Requirements page 25).

Use **only** Goodyear **245/70R19.5** tires, inflate to **95** PSI (Chevrolet)
Use **only** Goodyear **225/70R19.5** tires, inflate to **95** PSI (Ford)

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 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	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	Vehicle overloaded Hydraulic cylinder rod bent Insufficient lubrication on pivot pin Incorrect pressure relief valve setting Low oil level

SHUNT WIRING DIAGRAM (OPTIONAL)



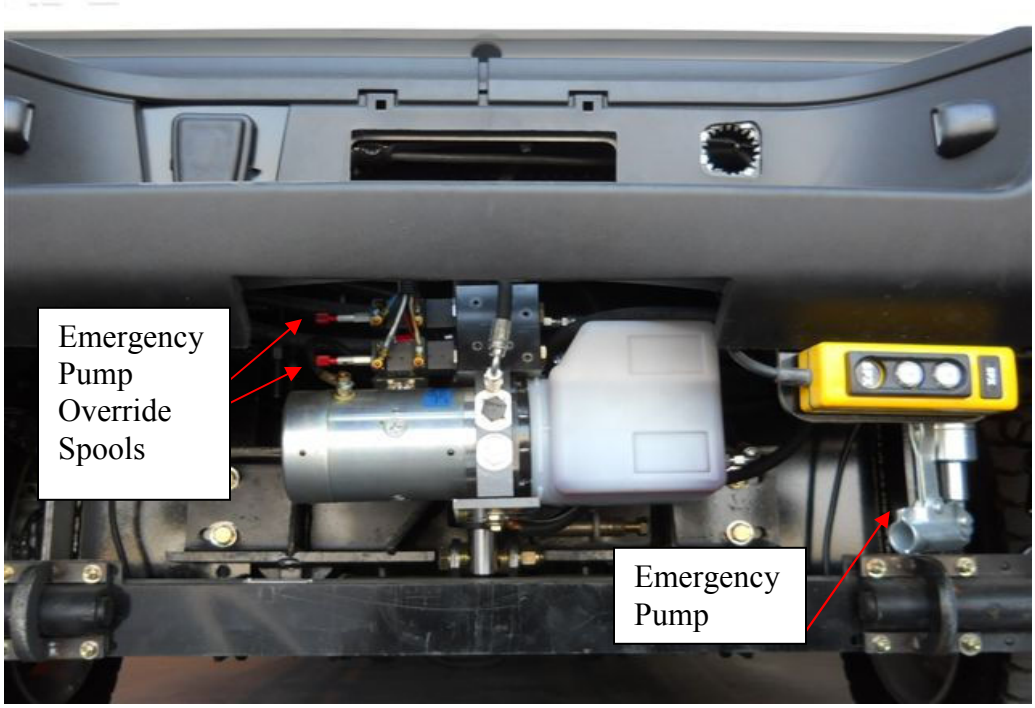
Shunt test: Connect meter between terminals 5 and 11.

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.

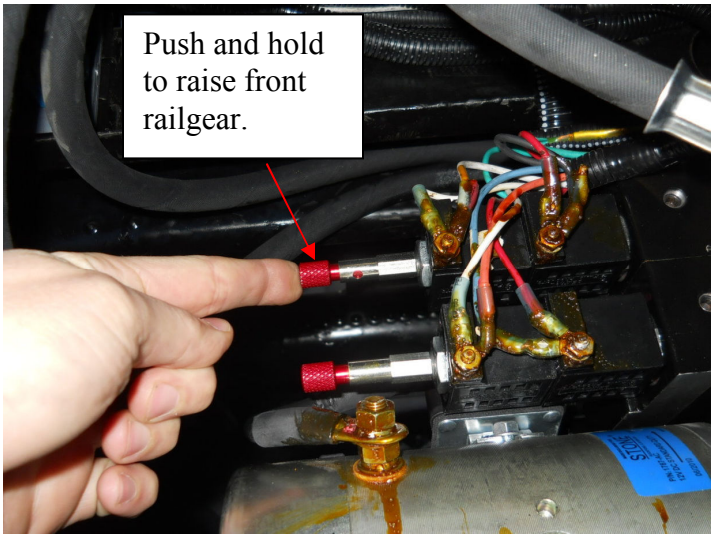
Please refer to the electrical diagram that came with the vehicle for further information on the electrical circuit

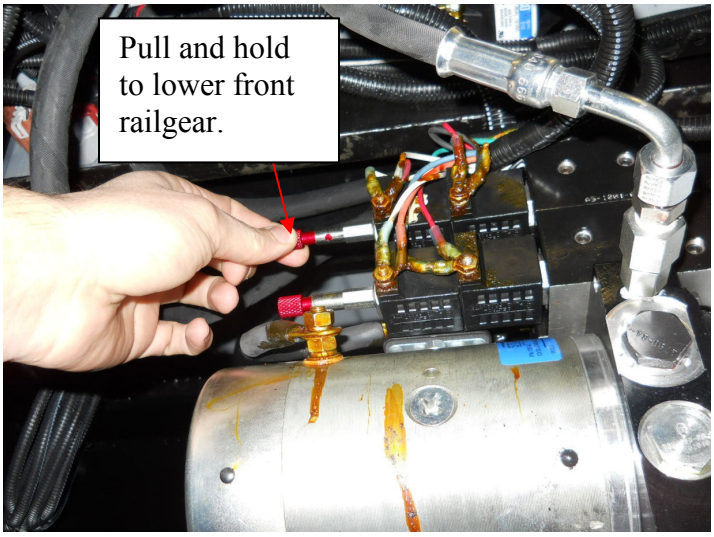
Emergency Pump Operation (Located under rear bumper)

Emergency pump components



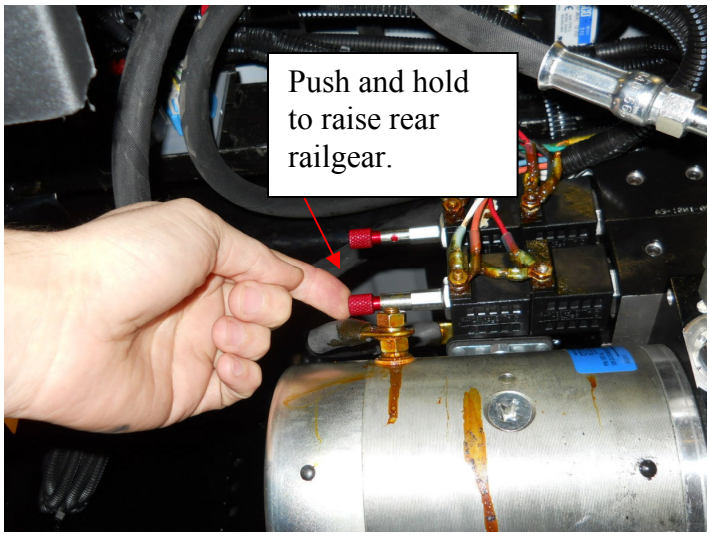
Insert the supplied handle into the emergency pump.

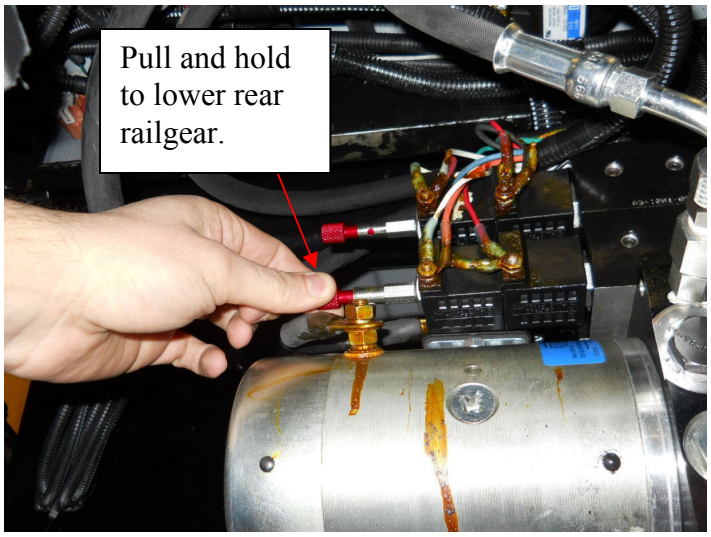




1. To raise the front railgear:
   Push and hold the top red override button in while operating the hand pump.

2. To lower the front railgear:
   If for some reason it is necessary to lower the gear with the emergency pump, pull out and hold the top red override button while operating the hand pump.

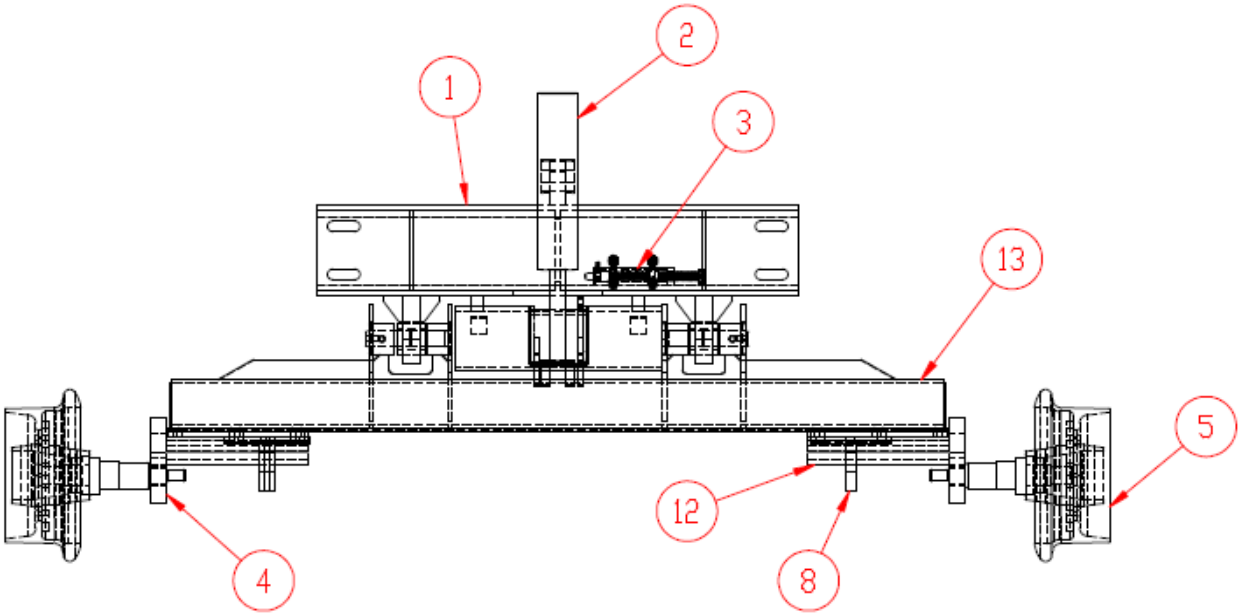


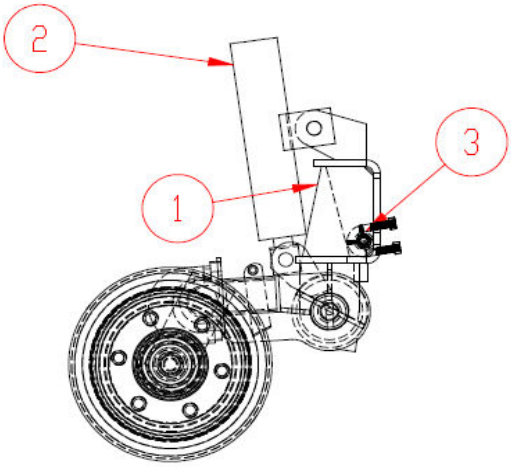


3. To raise the rear railgear:
   Push and hold the bottom red override button in while operating the hand pump.

4. To lower the front railgear:
   If for some reason it is necessary to lower the gear with the emergency pump, pull out and hold the top red override button while operating the hand pump.

PARTS
HYRAIL, PILOT UNIT, FRONT/REAR





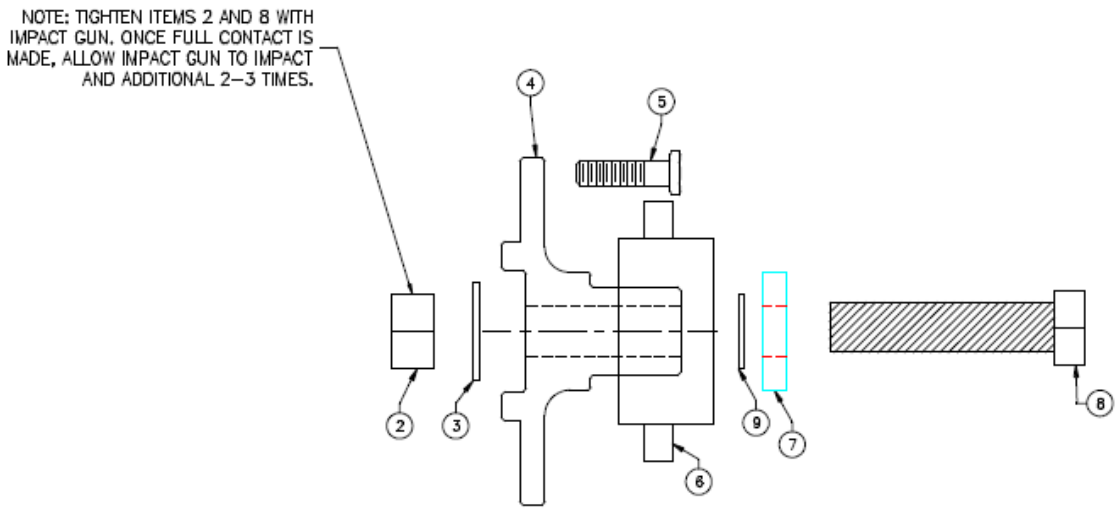
CHEVROLET APPLICATION (Complete set Front/Rear)

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	02811MBF	FIXED FRAME; 2011 REAR; ARIES LD	1
2	D5000598	CYLINDER; 3.00" BORE; 5.75" STROKE	2
3	02811PBF	LOCKING ASSEMBLY	2
4	02835PBF	WHEEL ARM ASSEMBLY	4
5	94235-3	WHEEL; 10.00"; STEEL	4
6	02499CBF	HUB ASSEMBLY	4
1	02811CBF	FIXED FRAME; 2011 FRONT; ARIES LD	1
8	02811QBF	DERAIL SKID; BOLT ON; ARIES LIGHT DUTY	4
9	02835IBF	INSULATOR; SEALED BEARING; BOLT	16
10	02835JBF	INSULATOR; SEALED BEARING; SHAFT	4
11	02835KBF	INSULATOR; SEALED BEARING; FLANGE	8
12	FS7NSA	SUSPENSION BODY	4
13	02811KBA	WELDMENT ASSEMBLY	2

FORD APPLICATION (Complete set Front/Rear)

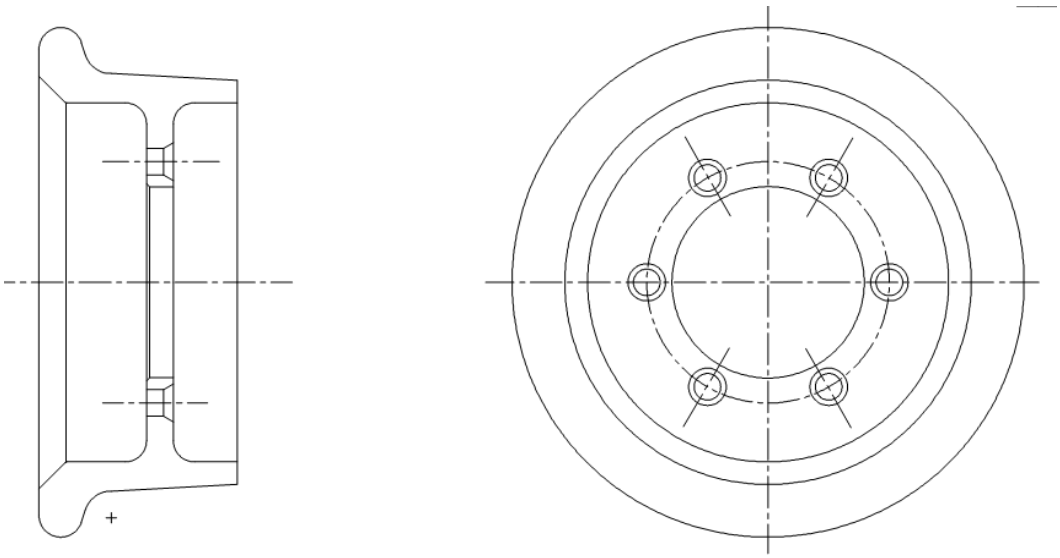
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	02811CBF	FIXED FRAME; 2011 FORD FRT/REAR ARIES LD	2
2	D5000598	CYLINDER; 3.00" BORE; 5.75" STROKE	2
3	02811PBF	LOCKING ASSEMBLY	2
4	02835PBF	WHEEL ARM ASSEMBLY	4
5	94235-3	WHEEL; 10.00"; STEEL	4
6	02499CBF	HUB ASSEMBLY	4
8	02811QBF	DERAIL SKID; BOLT ON; ARIES LIGHT DUTY	4
9	02835IBF	INSULATOR; SEALED BEARING; BOLT	16
10	02835JBF	INSULATOR; SEALED BEARING; SHAFT	4
11	02835KBF	INSULATOR; SEALED BEARING; FLANGE	8
12	FS7NSA	SUSPENSION BODY	4
13	02811KBA	WELDMENT ASSEMBLY	2

02399CDF HUB ASSEMBLY

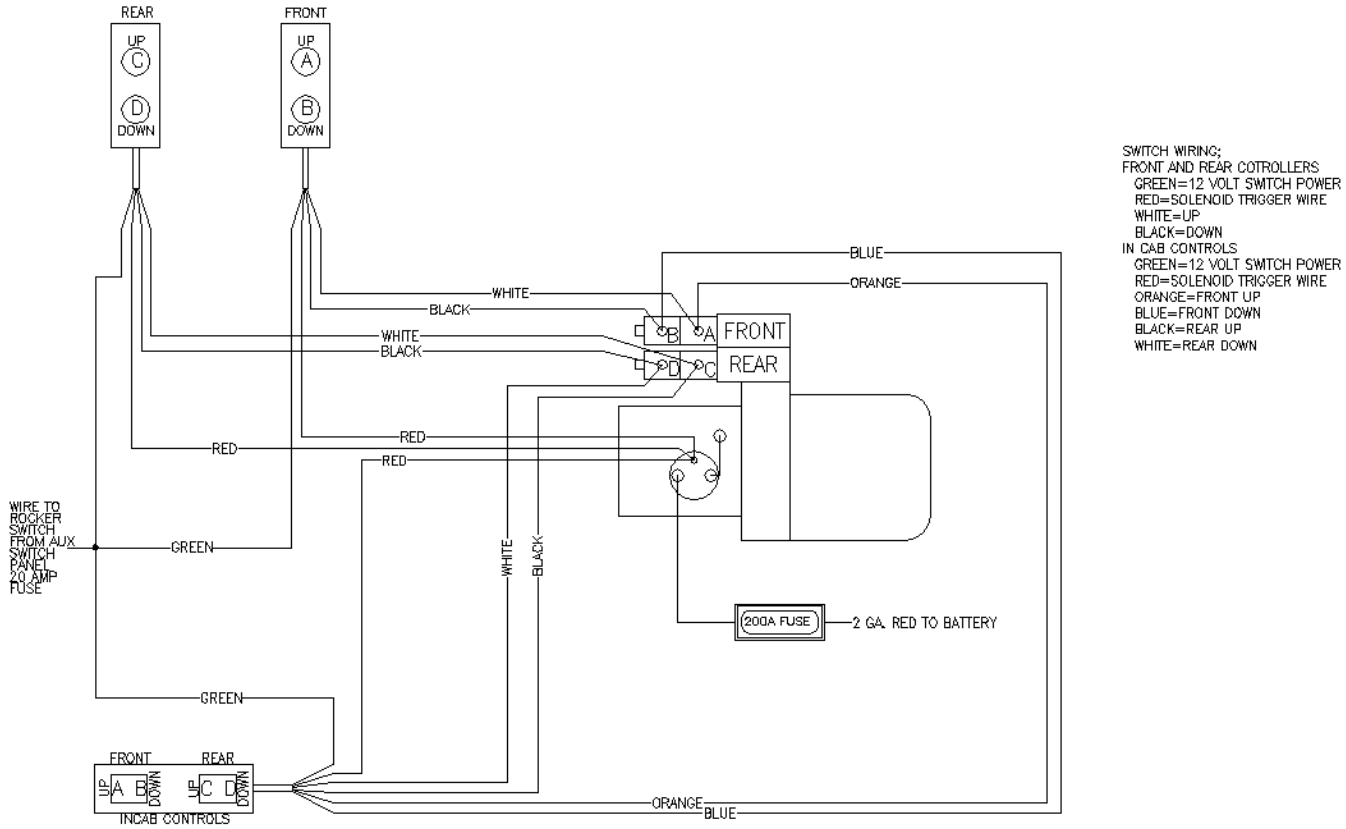


ITEM	PART NO.	DESCRIPTION	QTY
2	90636A089	1" - 8 DEFORMED - THREAD LOCKNUT	1
3	90126A038	1" SAE WASHER	1
4	02499ABF	NTN HUB	1
5	610280	DORMAN STUD; 1/2 - 20 X 1.875	6
6	HUB1322	MOUNTED NTN BEARING	1
7	02499BFBF	NTN - SB EXTRA SPECIAL WASHER	1
8	91257A965	1" - 8 X 5.00" GRADE 8 BOLT	1
9	3088A516	SHIM; 0.125 X 1.00 ID X 1.50 OD	1

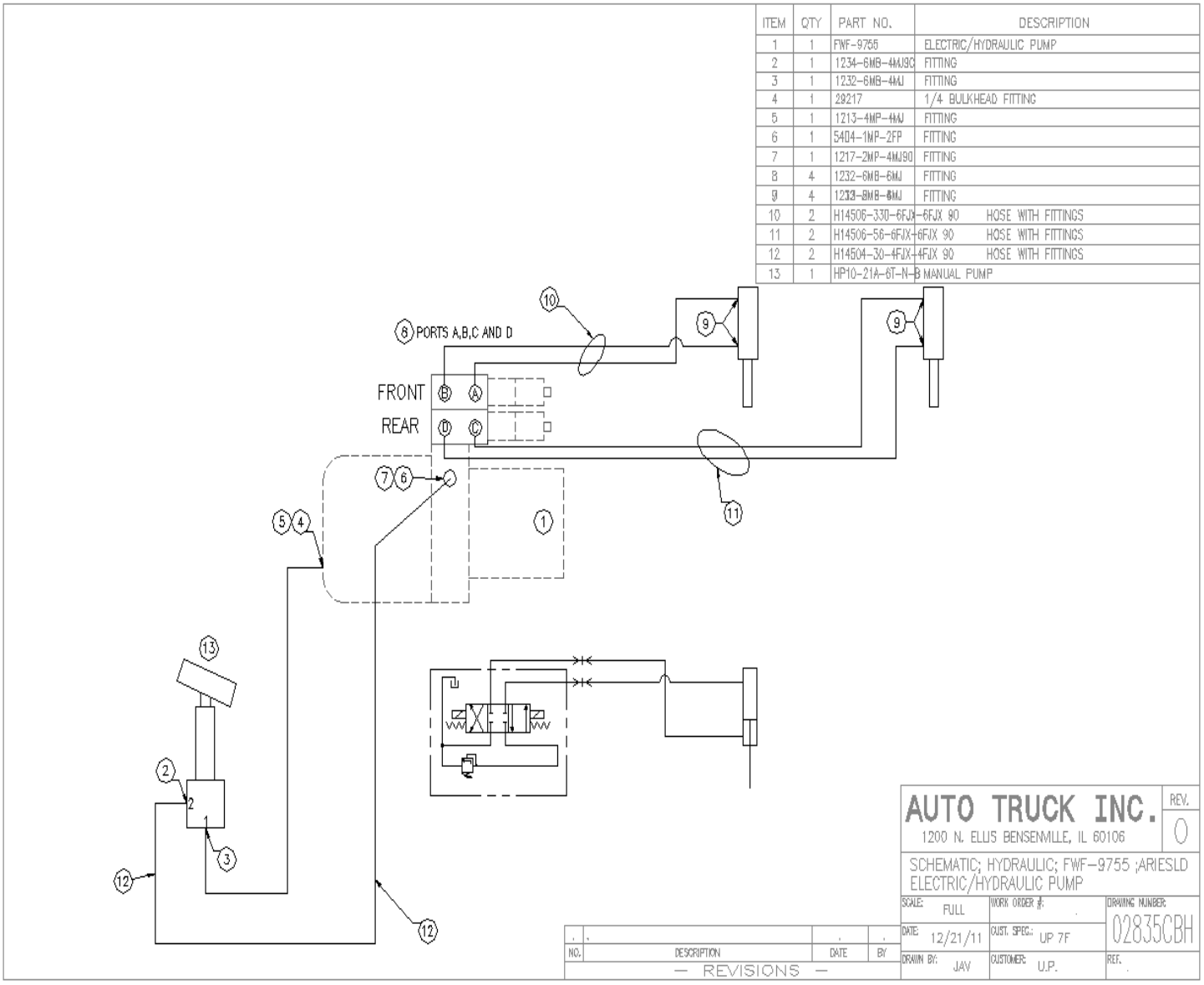
94235-2 WHEEL 10”



ELECTRICAL DRAWING PUMP ASSEMBLY



HYDRAULIC SCHEMATIC FOR ELEC/HYD PUMP SYSTEM

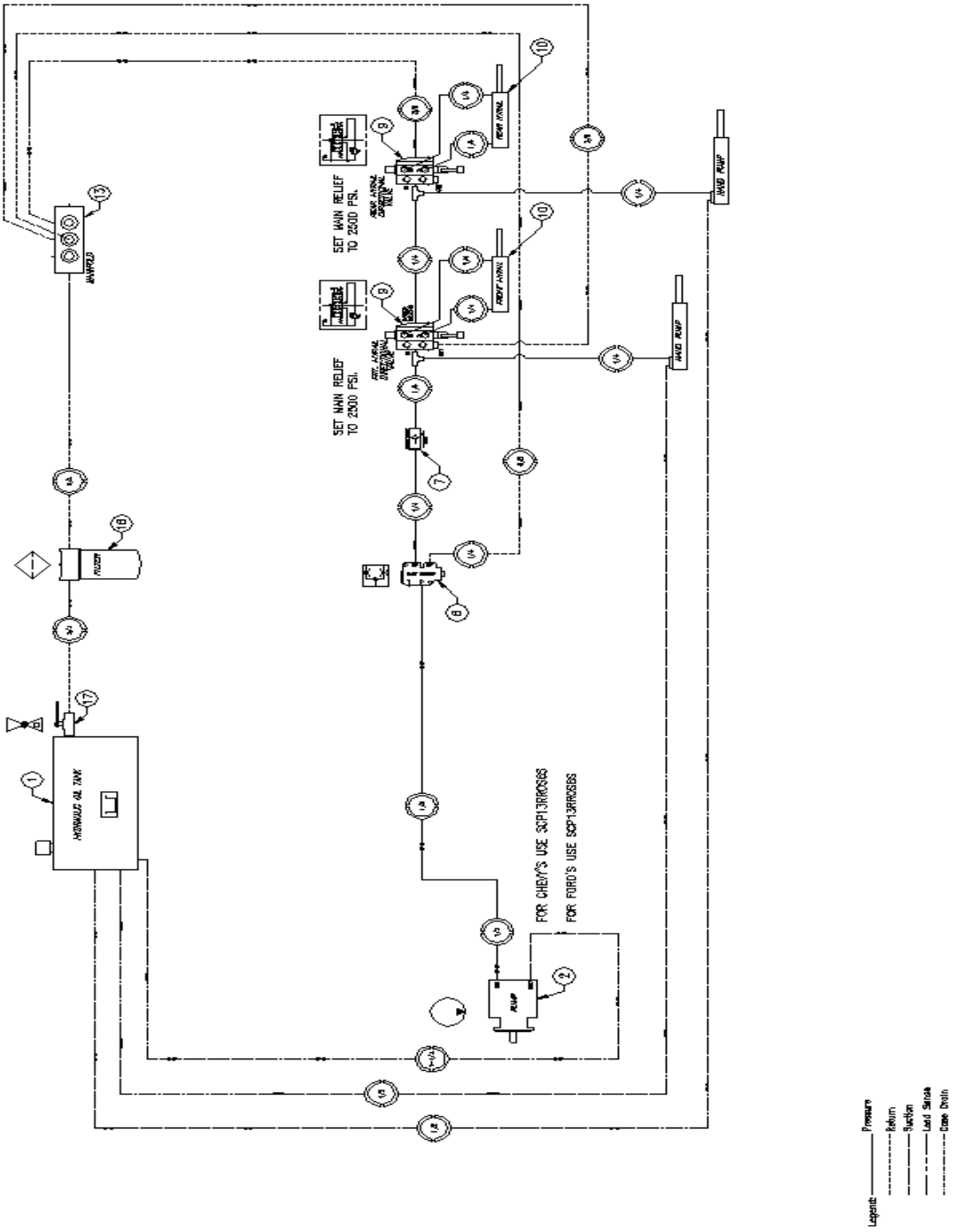


Note! FWF-9755 Power Unit consist of the following parts:

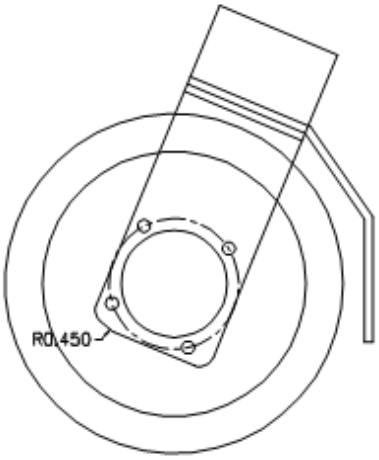
Qty	Part No.	Description
2	4499-AC	Front/Rear Pendant Controller
1	3000457	Interior Pendant Controller
1	8060-CC	Reservoir Breather
1	1611-AA	Suction Filter
1	3608-AC	Poly Tank
1	4795-AA	Solenoid
2	EF-1142	Valve Coils
1	K-40	Seal Kit for Pump

PTO DRIVEN HYDRAULIC SCHEMATIC

ITEM	QTY	PART NO.	DESCRIPTION
1	1	SEE WORK ORDER	HYD. TANK
2	1		UNDERHOOD PUMP; 13GPM
4	1	UC3920	PRESSURE GAGE; 0 – 5000 PSI
6	1	RD4123	FLOW DIVIDER; 3GPM CONSTANT
7	1	C4000S	3/8" CHECK VALVE
9	2	VDM64HPMOT	SINGLE SECTION DIRECTIONAL VALVE
10	1	ARIESLDCHEV	ARIES LIGHT DUTY HYRAIL
13	1	C10038	RETURN MANIFOLD
16	1	FSP1071EDNN	RETURN FILTER



GREASE GUARD OPTION

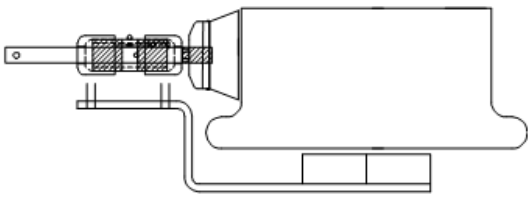


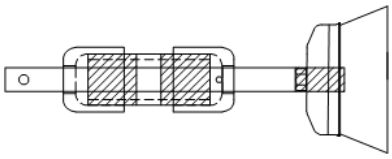
02836LBF GREASE GUARD

02645VBF RUBBER SWEEP
02836RBF BOLTING STRIP BRKT

SHUNT OPTION

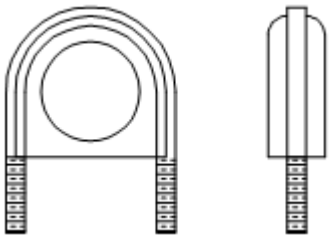
01589CDF SHUNT ASSY; SPRING LOADED





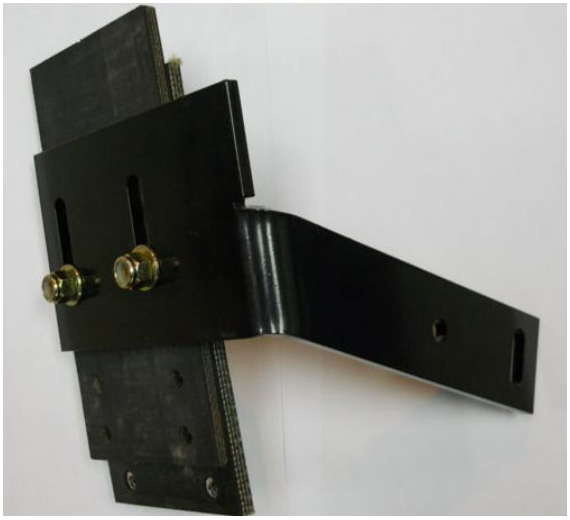
02835OBF SHUNT BRKT
01589CDF SHUNT ASBY

UB1PA - CLAMP; PIPE; CUSHIONED



SWEEP OPTION

02645VBF RUBBER SWEEP
02836GBF SWEEP MTG BRKT



BOLT TORQUE REQUIREMENTS

Guide Wheel lug nut torque (1/2 – 20 x 1.875 Stud) **90 ft. lbs**

Bearing Flange Bolts (10mm-1.25 x 55mm) **41 ft. lbs**

Wheel Arm Spline Bolt (1/2 – 20) **90 ft. lbs**

Suspension Body Mounting Bolts (3/8 – 16) **30 ft. lbs**

Main Frame Mounting Bolts (5/8 – 11) **160 ft. lbs**

Pivot Pin Retaining Bolts (5/16 – 18) **20 ft. lbs**

CHEVROLET WHEEL SPACERS

Wheel spacer lug nuts (Chevrolet Inner 14mm studs) **140 ft. lbs**

Vehicle wheel lug nuts (Chevrolet Outer 14mm studs) **140 ft. lbs**

FORD WHEEL SPACERS

Wheel spacer lug nuts (Ford Inner 14mm studs) **165 ft. lbs**

Vehicle wheel lug nuts (Ford Outer 20mm studs) **300 ft. lbs**

WARNING!

- NEVER USE ANTI-SEEZE ON LUG NUTS OR WHEEL STUDS.
- NEVER USE IMPACT WRENCH TO TIGHTEN LUG NUTS, ALWAYS HAND TIGHTEN AND CHECK WITH TORQUE WRENCH.
- LOOSE LUG NUTS CAN LEAD TO METAL FATIQUE AND ULTIMATELY TO FAILURE OR BROKEN STUDS.
- INFORM TIRE SHOP THAT THIS VEHICLE MAY BE EQUIPPED WITH TPMS SENSORS TO PREVENT POSSIBLE DAMAGE.

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.

Fastener Size		Torque (ft-lbs.)
Fraction	Decimal	
¼ - 20	.250 - 20	10
¼ - 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
½ - 13	.500 - 13	80
½ - 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
¾ - 10	.750 - 10	280
¾ - 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.