

INSTALLATION OF HYDRAULIC KIT FOR PUMP OPERATION 2019 AND UP INTERNATIONAL CV515/CHEVY SILVERADO 4500-6500 CREW CAB

SAFETY PRECAUTIONS

If any installation problems are encountered, please call G&B Specialties for technical assistance before continuing with the installation process.



- Failure to heed to any of the following warnings could result in severe bodily injury and/or equipment damage.
- Read and understand this manual completely before attempting installation of the equipment.
- Installation instructions provided below only address the RAFNA railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Before performing any work under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.
- Do not start the vehicle with the power steering hoses disconnected. Reconnect all hoses and secure the power steering cooler if the vehicle is started.
- Beware of all pinch points on the railgear and keep all parts of the body clear.
- When routing hydraulic hoses, ensure that the hoses do not contact any sharp edges or hot surfaces.
- When routing electrical wires, ensure that the wires do not contact any sharp edges or hot surfaces.
- All wire connections are to be soldered and heat shrink sealed to prevent further corrosion related problems.
- All wires must be covered with protective cable loom.
- Ensure all removed components are given to the vehicle owner after the installation of the railgear. These components must be re-installed if the railgear is removed from the vehicle.
- Always disconnect the vehicle's battery when welding on the vehicle or railgear in order to protect the vehicle's electrical system.

INSTALLATION OF HYDRAULIC KIT W/ PUMP

The following procedure details the installation of the hydraulic kit. The items required for this installation are listed in Table 1.

Table 1: Hydraulic Kit Installation Parts (K-H49RFRR001)

Part Number	Description	Qty
R-20477	Railgear Hydraulic Pump	1
R-20478	Rear Operating Valve	1
R-20479	Front Operating Valve	1
R-31590	Toggle Switch	2
R-31591	Boot	2
CO-130G	"Railgear Pump" Decal	2
R-20450	Pump Support Plate	2
R-20451	Pump Plate	1
R-20452	Pump Support	1
R-20453	Brake Support	1
R-20454	Spacer	4
R-20484	Box Assy, Pump Protection	1
R-4574B	Brake Pump Mounting Spacer	1
R-23202	1/4" Quick Connect Coupler	2
R-23204	1/4" Quick Connect Plug	2
R-23206	1/4" Dust Cap	2
R-23208	1/4" Dust Plug	2
R-056	Emergency Hand Pump	1
H-990KIT-082	1/4" Male JIC to 3/8" Male ORB	2
	1/4" Male JIC to 1/4" Male JIC Tee	9
	1/4" Male JIC to 1/2" Male ORB	15
	1/4" JIC Female to 1/4" JIC Male, 90 Swivel	20
	Hydraulic Hose 14" Long	2
	Hydraulic Hose 16" Long	4
	Hydraulic Hose 20" Long	4
	Hydraulic Hose 33" Long	2
R-990KIT-459	Screw, 5/16" X 2 3/4" UNC Gr. 8 Z/Y	6
	Washer, 5/16" SAE Flat Z/Y	12
	Nut, 5/16" Gr. 8 Nylock Z/Y	6
	Screw, 3/8" X 1 1/4" UNC Gr. 8 Z/Y	11
	Washer, 3/8" SAE Flat Z/Y	18
	Washer, 3/8" Lock Washer Z/Y	4
	Nut, 3/8" Gr. 8 Nylock Z/Y	7
	Screw, 1/2" X 2 1/2" UNC Gr. 8 Z/Y	4
	Washer, 1/2" SAE Flat Z/Y	8
	Nut, 1/2" Gr. 8 Nylock Z/Y	4

1. Working at the rear step on the Driver's Side, locate the two 12mm bolts and remove. We will be re-using these bolts. (Figure 1) (Photo 2)
2. Install the Pump Plate Supports (R-20550) using the bolts that were just removed. Bolts do not have to be torqued at this time as we must mark and drill the mating holes for the lower portion of the supports. (Figure 2)
3. Ensure the Pump Plate Supports are parallel with the step's mounting bracket and mark holes to drill. (Figure 2)
4. Use a 17/32" drill bit or adequate to allow for a 1/2" bolt to pass through and drill marked holes on the step's mounting bracket.
5. Place Spacers (R-20454) under the Pump Plate Supports and lay the Pump Plate (R-20451) on top of the Support Brackets. Used supplied 1/2" x 2 1/2" bolts and associated hardware to fasten the Pump Plate to the Support Brackets and step bracket. (Figure 3)
6. Install the Pump Support (R-20452) Bracket using the supplied 3/8" x 1 1/4" bolts and associated hardware. (Figure 4)
7. Install Hydraulic Pump (R-20477) on Pump Plate by using the supplied 3/8" x 1 1/4" bolts, flat washers, and lock washers to fasten. (Figure 5)
8. Install the front and rear control valves in an easily accessible location. Ensure that there will be enough room for the operator to stand safely out of the way of moving parts. Brackets will need to be fabricated for mounting. Photo 1 below shows suggested front mounting position. Rear will vary and depend on the box/bed and what is going on the vehicle.
9. Install all appropriate fittings and install/fabricate all appropriate hoses as shown on the included hydraulic schematics. (Figure 6)
10. Ensure that none of the hoses contact any sharp edges or hot surfaces. Secure these hoses in place when needed. Ensure that there is enough slack in the hoses for the railgear to function.
11. Install the dash switch and "Railgear Pump" decal in a convenient location on the dash.
12. The pump has two wires connected to it: (Reference Figure 7)
 - a) One white and one black wire each with ring terminals on the ends.
13. Using suitable 14 gauge wire, cable loom, connectors, solder and heat shrink tubing:
 - a) Lengthen the white wire if required and connect it from the pump to the switching terminal on the railgear pump solenoid.
 - b) Lengthen the black wire if required and connect it from the pump through the firewall to the load terminal on the dash switch.
 - c) Connect another length of black wire from the power terminal on the dash switch through the firewall to the in-line fuse.

- d) Connect another length of black wire from the in-line fuse to the power terminal on the solenoid.
- e) Connect another wire from the ground terminal on the dash switch to a suitable ground location on the vehicle.

Optional Upfitter Switch Installation:

Using suitable 14 gauge wire, cable loom, connectors, solder and heat shrink tubing:

- a) Lengthen the white wire if required and connect it from the pump to the switching terminal on the railgear pump solenoid.
 - b) Lengthen the black wire if required and connect it from the pump to one end of the in-line fuse.
 - c) Connect another length of black wire from the other end of the in-line fuse to the brown wire for the AUX 4 upfitter switch.
14. Using suitable 4 gauge wire, cable loom, connectors, solder and heat shrink tubing:
- a) Connect one wire from the vehicle's battery to the power terminal on the railgear pump solenoid.
 - b) Connect another wire from the load terminal on the solenoid to the power terminal on the pump motor. Use silicone to protect the pump power terminal from shorting out.
 - c) Ensure the pump motor base is properly grounded to the vehicle chassis by connecting a wire from the pump motor base to a suitable ground location on the vehicle. The railgear may not be properly grounded due to paint on the mounting plates or tar on the frame.
15. Ensure all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured with tie-wraps.
16. Ensure all holes in the firewall are sealed and protected with a grommet.
17. Fill the hydraulic system and bleed the air out:
- a) Fill the pump tank with **ESSO Univis Extra** (or equivalent) hydraulic fluid.
 - b) Operate the front railgear up and down briefly to circulate the fluid and bleed the system of air (refer to the Railgear Kit and Hydraulic Kit Operation, Service, and Parts section of this manual for operation instructions).
 - c) Refill the pump tank and repeat the above step until all air is removed from the front hydraulic system.
 - d) Operate the rear railgear up and down briefly to circulate the fluid and bleed the system of air (refer to the Railgear Kit and Hydraulic Kit Operation, Service, and Parts section of this manual for operation instructions).
 - e) Refill the pump tank and repeat the above step until all air is removed from the rear hydraulic system.
 - f) With both front and rear railgear locked in the road position, fill the pump tank to the full line.
18. Follow the Hydraulic System Relief Valve Setting procedure located in the Hydraulic Kit Operating, Service and Parts section of this manual.

19. Test the operation of the controls. Refer to the operation procedure in the Railgear Kit and Hydraulic Kit Operation, Service, and Parts section of this manual.
20. Once pump is fully tested and functioning, install the Emergency Hand Pump (R-056). (Figure 8)
21. Test function of Emergency Hand Pump by rotating the gear to the rail position and use the hand pump to retract the gear to the road position. Test both front and rear.
22. If Rail Gear was ordered with brakes, Install Brake Pump per Brake Installation Manual. (Photo 2)
23. With pump installation finalized, install the Pump Protection Box (R-20484) using the remaining 3/8" hardware found in the kit. (Figure 9)

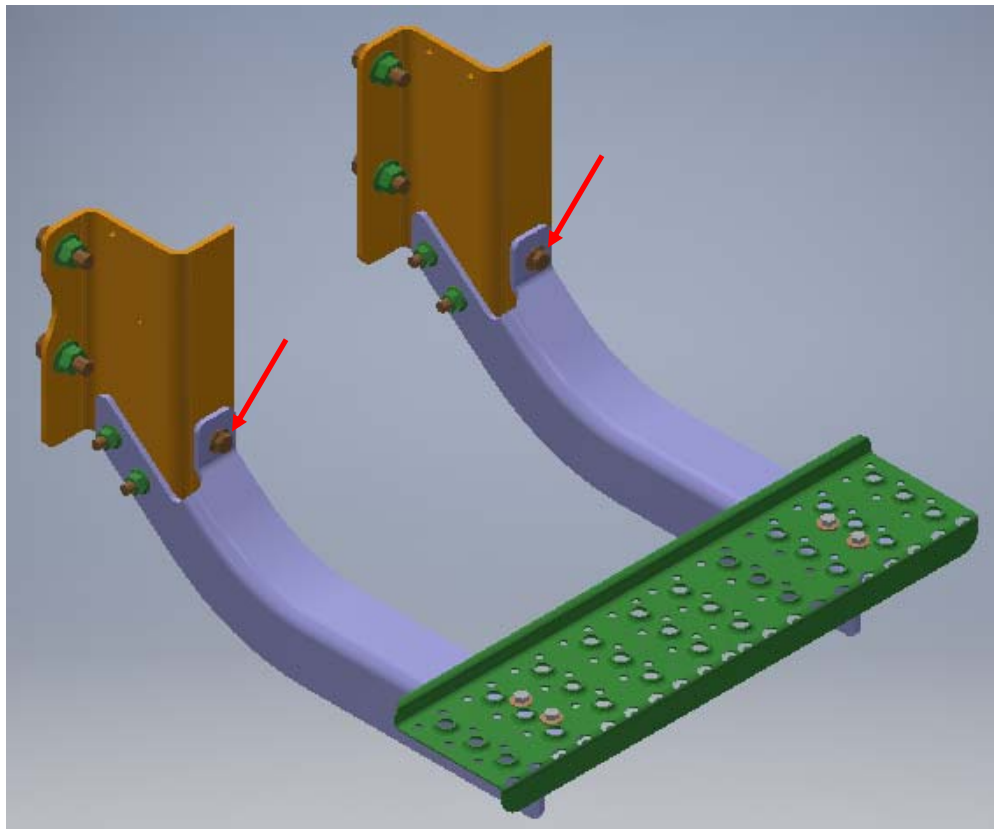


Figure 1: Step Bolts To Be Removed/Re-Used

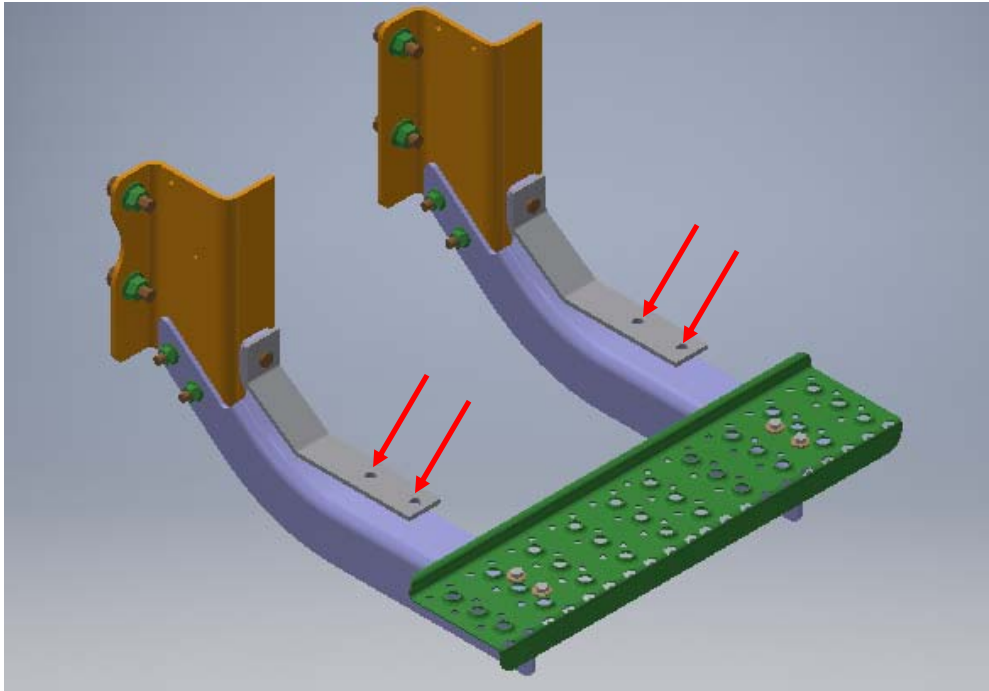


Figure 2: Pump Plate Supports Location

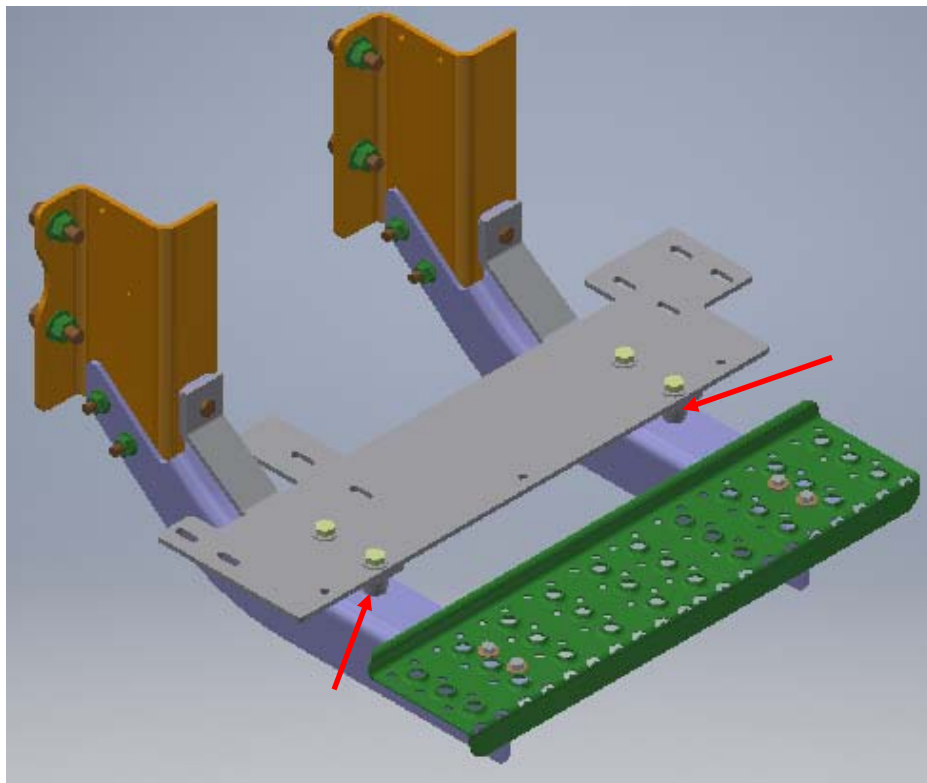


Figure 3: Spacer Location

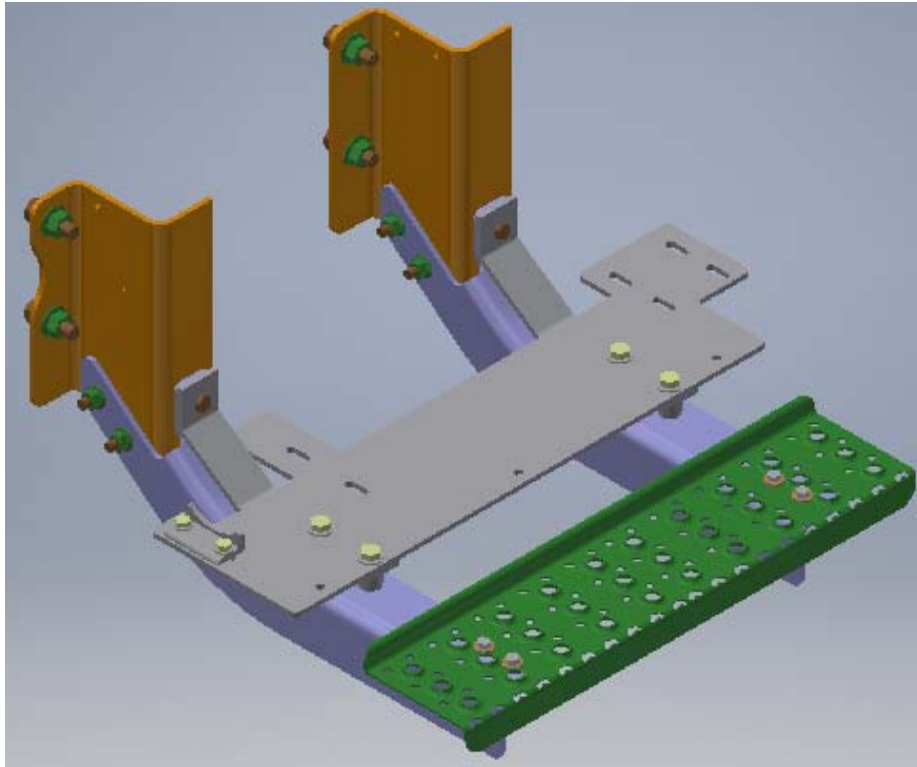


Figure 4: Pump Support Bracket

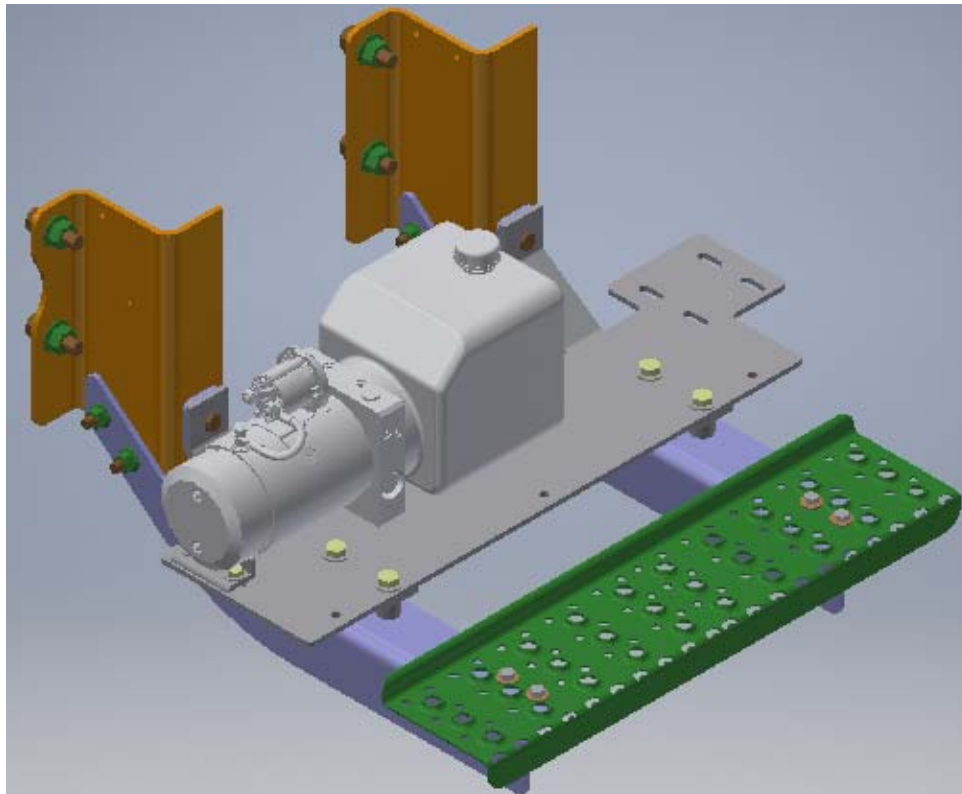
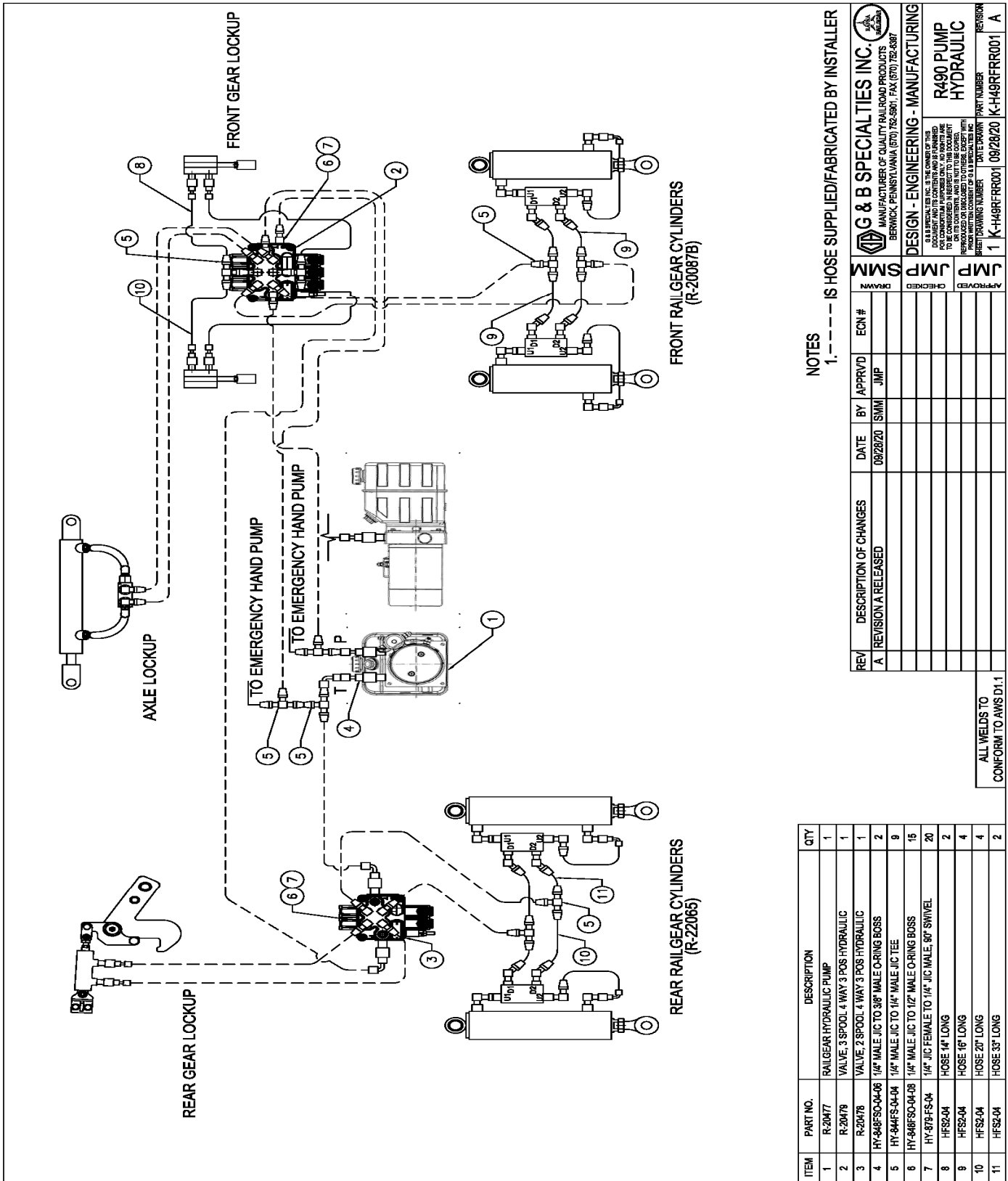


Figure 5: Pump Installation



Photo 1 : Suggested Valve Mounting Location



NOTES
1. --- IS HOSE SUPPLIED/FABRICATED BY INSTALLER

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	09/28/20	ISMW	JMP	

APPROVED	CHECKED	DESIGN - ENGINEERING - MANUFACTURING
JMP	JMP	
SMW	SMW	

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ITEM	PART NO.	DESCRIPTION	QTY
1	R-20477	RAILGEAR HYDRAULIC PUMP	1
2	R-20478	VALVE, 3 SPOOL, 4 WAY, 3 POS HYDRAULIC	1
3	R-20478	VALVE, 2 SPOOL, 4 WAY, 3 POS HYDRAULIC	1
4	HY-948FSS-04-06	1/4" MALE JIC TO 3/8" MALE O-RING BOSS	2
5	HY-944FSS-04-04	1/4" MALE JIC TO 1/4" MALE JIC TEE	9
6	HY-948FSS-04-08	1/4" MALE JIC TO 1/2" MALE O-RING BOSS	15
7	HY-878-FS-04	1/4" JIC FEMALE TO 1/4" JIC MALE, 90° SWIVEL	20
8	HFS2-04	HOSE 14" LONG	2
9	HFS2-04	HOSE 16" LONG	4
10	HFS2-04	HOSE 20" LONG	4
11	HFS2-04	HOSE 33" LONG	2

Figure 6: Hydraulic Schematic

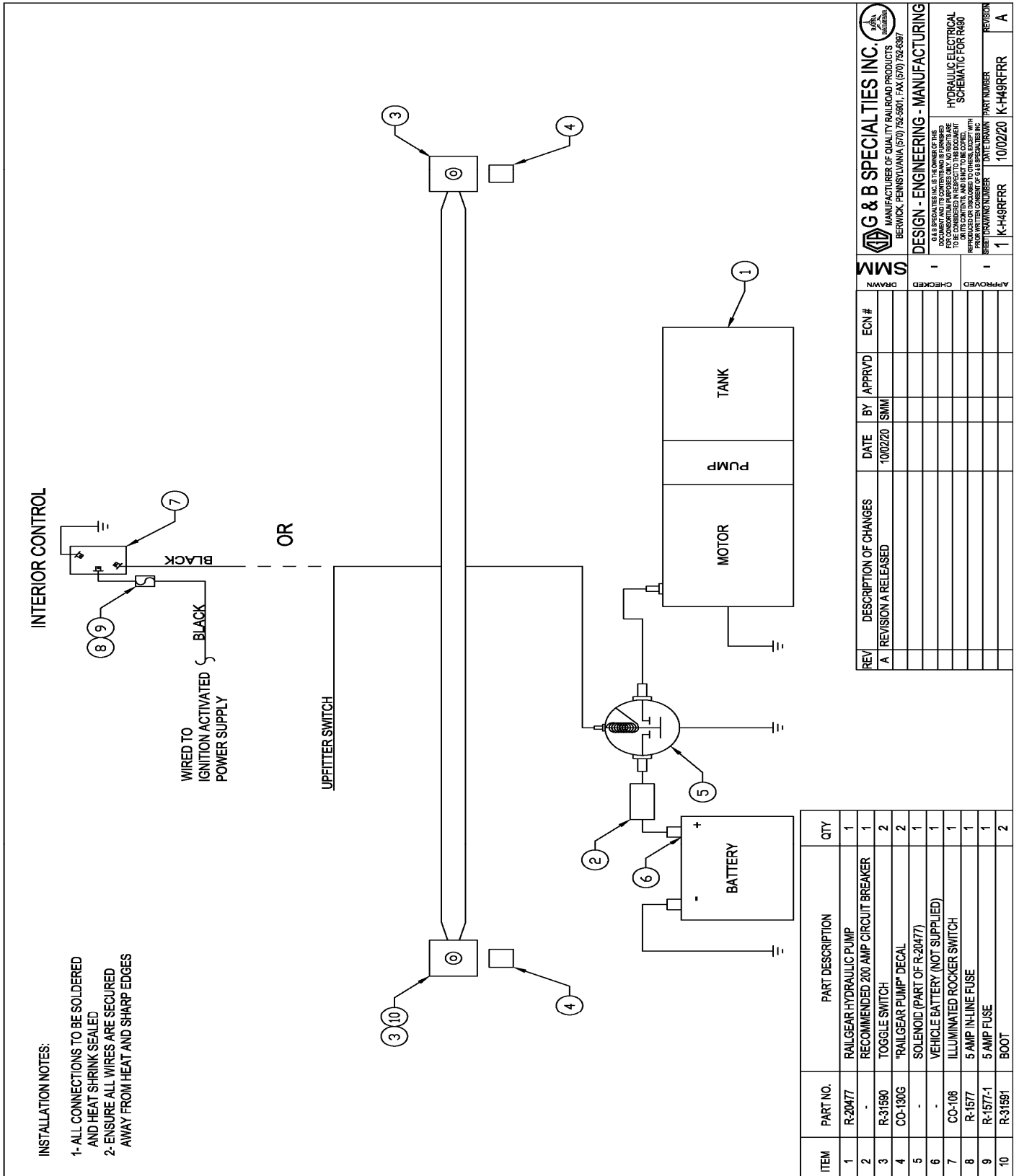


Figure 7: Wiring Schematic

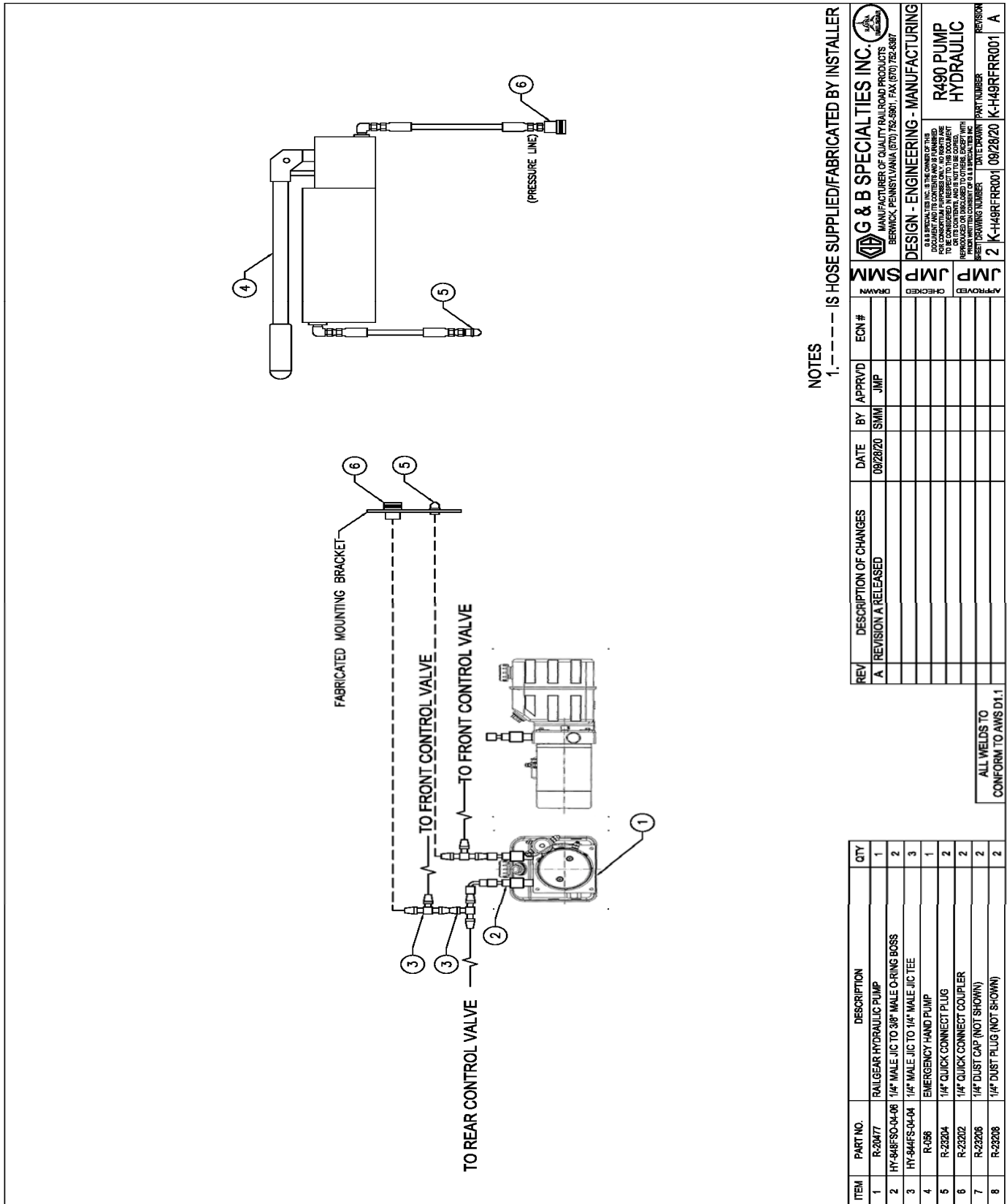


Figure 8: Emergency Hand Pump Install

NOTES
1. --- IS HOSE SUPPLIED/FABRICATED BY INSTALLER

ITEM	PART NO.	DESCRIPTION	QTY
1	R-20477	RAILGEAR HYDRAULIC PUMP	1
2	HY-846FS-04-08	1/4" MALE JIC TO 3/8" MALE O-RING BOSS	2
3	HY-844FS-04-04	1/4" MALE JIC TO 1/4" MALE JIC TEE	3
4	R-088	EMERGENCY HAND PUMP	1
5	R-23204	1/4" QUICK CONNECT PLUG	2
6	R-23202	1/4" QUICK CONNECT COUPLER	2
7	R-23206	1/4" DUST CAP (NOT SHOWN)	2
8	R-23208	1/4" DUST PLUG (NOT SHOWN)	2

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	09/28/20	SMM	JMP	

APPROVED	CHECKED	DESIGNED	DATE DRAWN	PART NUMBER	REVISION
JMP	JMP	JMP	09/28/20	K-H49RFRR001	A

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Photo 2: Hydraulic Pump and Brake Pump Installed

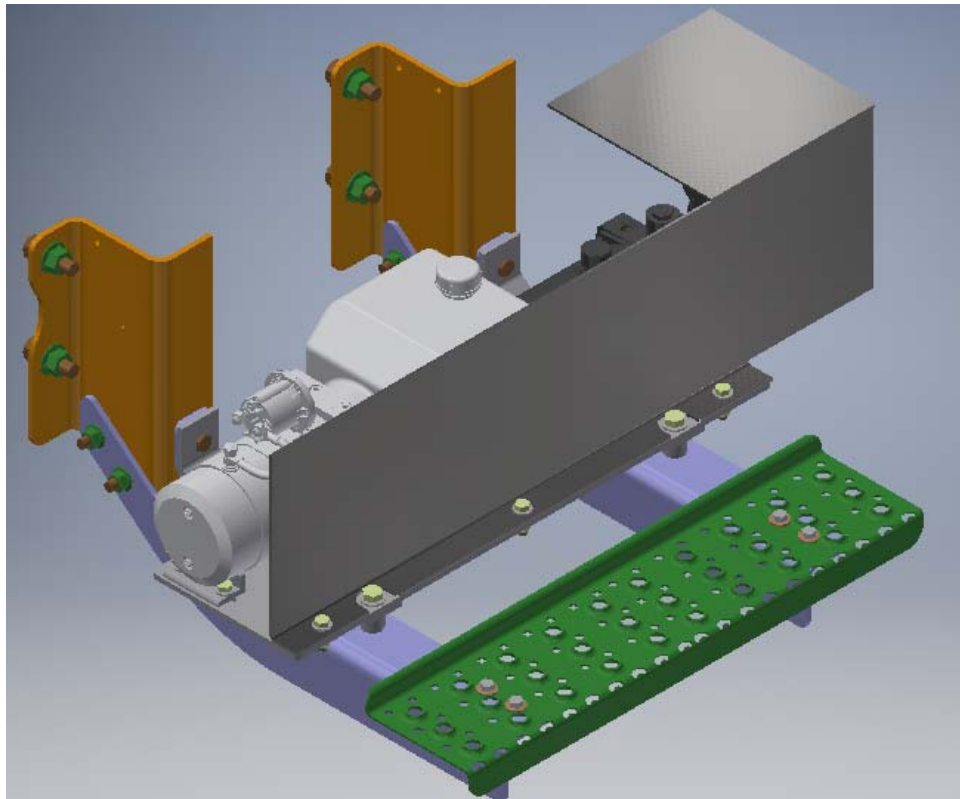


Figure 9: Pump Protection Box Installed

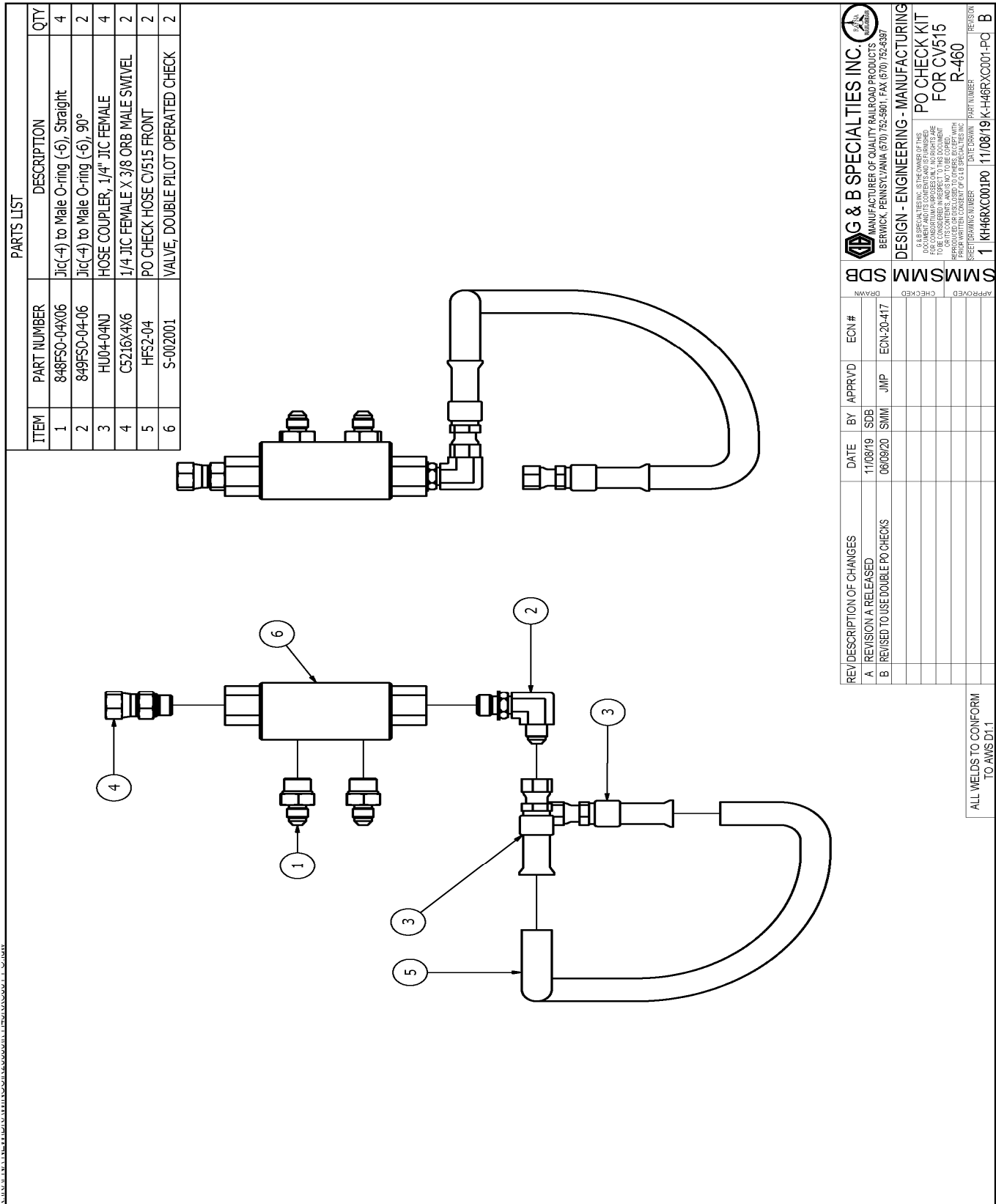


Figure 10: PO Check Valve Kit For Cylinders

OPERATION, SERVICE & PARTS OF R-490 HYDRAULIC KIT FOR PUMP 2019 AND UP INTERNATIONAL CV515/CHEVY SILVERADO 4500-6500

OPERATION, SERVICE & PARTS SAFETY PRECAUTIONS

If any operating, service or parts problems are encountered, please call G&B Specialties, Inc. for technical assistance.



- Failure to heed to any of the following warnings could result in severe bodily injury and/or equipment damage.
- Read and understand this manual completely before attempting operation of the railgear equipped vehicle.
- Operating instructions provided below only address the RAFNA railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Railway company rules governing rail travel must always be observed.
- Before performing any work under the vehicle or railgear, ensure the engine is turned off and the parking brake is set.
- Ensure all body parts and loose clothing are clear of any moving parts of the railgear. Be aware of all pinch points.
- If operating the railgear using the emergency hand pump, ensure that the correct manual valve over-ride is open for the desired railgear (front or rear) and desired direction of operation (raise or lower).
- Do not use the emergency hand pump to raise and lower the railgear on a routine basis. If the hydraulic pump or manifold should fail, have it repaired as soon as possible.
- Ensure the hydraulic pump has been de-energized before starting road or rail travel.

OPERATION OF HYDRAULIC KIT

With the hydraulic kit installed on this vehicle, it may be operated as normal.

Never operate the vehicle if the Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating Front or Rear (GAWR), or the wheel or tire load ratings are exceeded.

Refer to the Railgear Kit Operation, Service and Parts manual for information on the mechanical operation, service and parts of the railgear.

Location and Operation of the Railgear Hydraulic System Controls:

The railgear hydraulic system consists of a hydraulic pump, a front control lever and a rear control lever.

1. The railgear hydraulic pump must be energized prior to use by turning on the respective dash switch. At this point the dash switch light should come on but the pump should not run and the railgear should not move until the toggle switch near the respected valve is activated and control lever operated.
2. The direction of the front or rear railgear movement is selected by pushing the lever or pulling the lever on the respected valve located near the railgear while engaging the toggle switch which calls for the pump to energize. At this point the pump should start and the railgear should move in the selected direction.
3. To stop the movement of the railgear, move the lever back to the neutral position or leave go of the toggle switch killing power to the pump.
4. The pump must be de-energized after use by turning off the respective dash switch. At this point the pump should not be able to run and the control levers should be in-active.

SERVICE OF HYDRAULIC KIT

The hydraulic kit must be serviced regularly to avoid damage to the equipment. Table 2 below provides the Recommended Service Schedule and Table 3 provides Standard Fastener Torque Values.

The recommended oil for the railgear hydraulic system is **DEXRON III** or equivalent. In extremely cold weather areas/seasons, **ESSO Unavis J13** or equivalent may be used.

Table 2: Recommended Service Schedule

Description		Daily	Weekly	Monthly	Every 6 Months
1	Inspect hydraulic kit fasteners (re-torque if required)				✓
2	Inspect all hydraulic fittings and hoses for leaks and wear.		✓		
3	Check fluid level in pump reservoir (fill with railgear raised if req'd)				✓

Table 3: Standard Fastener Torque Values

Fastener Size	Fastener Torque Value (ft-lbs) Dry
1" UNC Gr. 8 Fasteners	250
¾" UNC Gr. 8 Fasteners	175
⅝" UNC Gr. 8 Fasteners	150
½" UNC Gr. 8 Fasteners	100
⅜" UNC Gr. 8 Fasteners	40
¼" UNC Gr. 8 Fasteners	12

HYDRAULIC SYSTEM RELIEF VALVE SETTING

This system is equipped with one relief valve located on the railgear pump body. This relief valve protects the entire hydraulic system from over pressurization. The relief valve will require adjustment at installation and if ever there appears to be inadequate hydraulic pressure to operate the railgear.

1. Disconnect the hydraulic hose from the upper "P" port on the pump.
2. Install a hydraulic pressure gauge (up to 3000 PSI) between the disconnected hydraulic hose and the pump port. The pressure gauge will indicate the relief valve setting when the pump is loaded.
3. Following the procedure in the Railgear Kit Operation, Service and Parts manual, raise the front railgear completely and continue to raise the railgear so that the hydraulic cylinder creates a load on the pump by trying to "dead-head". The pressure reading on the pressure gauge should climb to 1800 PSI.
4. If the pressure is not correct, release the railgear controls and adjust the relief valve on the pump accordingly. Loosen the lock nut and turn the setscrew in to increase the pressure or out to decrease the pressure. Re-check the pressure.
5. Once the correct pressure on the pump relief valve is obtained, ensure the lock nut on the relief valve is tightened. Release the pressure in the system and remove the pressure gauge. Re-connect all hydraulic hoses.
6. Ensure the railgear is properly raised as per the Railgear Kit Operation, Service and Parts manual.

ELECTRICAL SYSTEM TROUBLESHOOTING

The following basic test can be performed to check the integrity of the railgear electrical system.

Should the railgear pump fail to operate, first check the fuse or the circuit breaker and all wiring for shorts, then the following test can be performed to verify the integrity of the pump motor and pump solenoid.

1. Pump motor test:

- a) Connect one end of a 14-gauge shunt wire to the pump motor power terminal and touch the other end to the battery positive terminal.
- b) The pump motor should run upon touching the shunt wire.
- c) If the pump does not run, the pump is not properly grounded, or the pump motor is defective.
- d) If the pump motor runs, test for a defective solenoid.

2. Solenoid test:

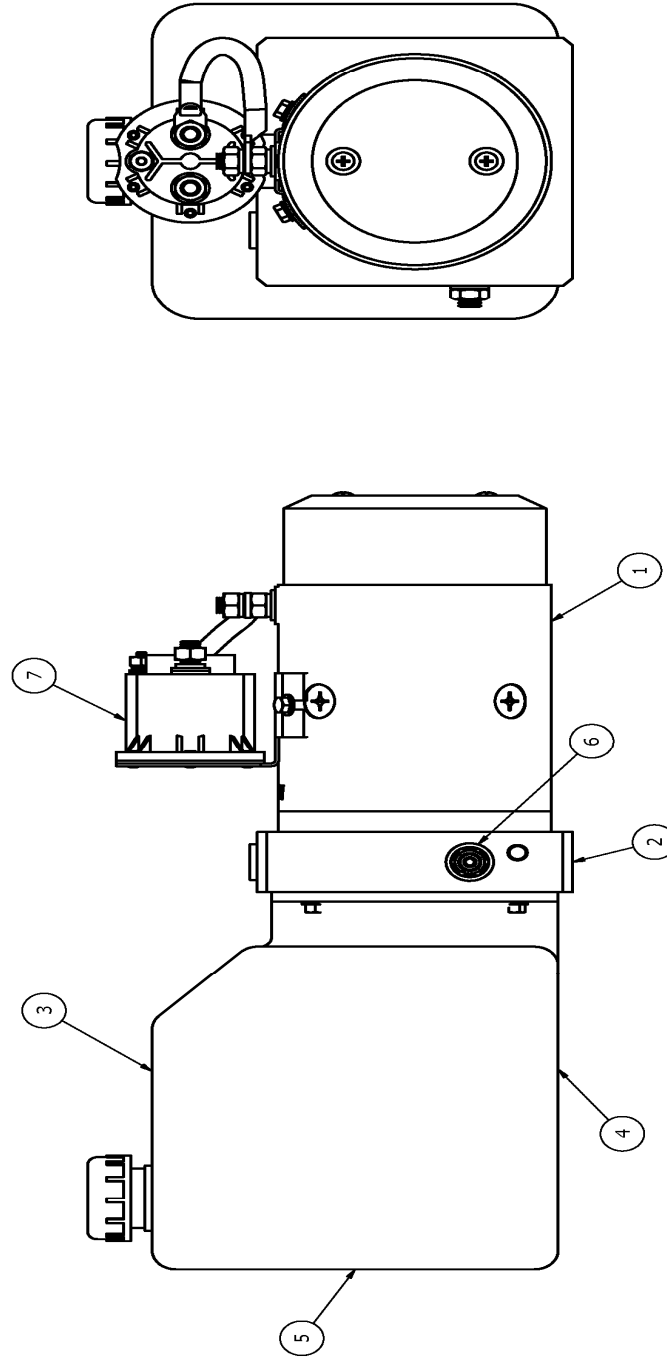
- e) Connect one end of a 14-gauge shunt wire to the switching terminal on the solenoid and touch the other end to the battery positive terminal. If the pump does not operate the solenoid is not properly grounded or it is defective. If the pump operates, the problem lies with the fuse/circuit breaker, wiring and/or switches.

Should the pump start running immediately following turning on the respective dash switch, the following tests can be performed to help locate the problem.

1. Disconnect the wire from the switching terminal on the solenoid. If the pump continues to run, then the solenoid is defective.
2. Check all wiring and switches for shorts and / or loose terminals.

PARTS OF HYDRAULIC KIT

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	S-309195	12V DC MOTOR	1
2	S-309109	MANIFOLD	1
3	S-253208	RESERVOIR TANK (1 GAL)	1
4	S-309118	PUMP GEAR	1
5	S-309153	SUCTION FILTER	1
6	S-309139	RELIEF VALVE	1
7	S-309601	SOLENOID	1



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APPROVED	CHECKED	DATE DRAWN	PART NUMBER	REVISION
JMP	JMP	10/05/20	R-20477	A
SMM	SMM			
SMM	SMM			

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R490
HYDRAULIC PUMP

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Figure 7: R-20477 Parts Breakdown