

## **R-180 HYDRAULIC KIT W/ MANUAL OPERATING VALVE, STD CONTROLS W/ STANDARD PUMP LOCATION KUBOTA RTV/RTV-X 1140**

### **INSTALLATION 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 Industries 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.
- 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 future corrosion related problems.
- All wires must be covered with protective cable loom.

**\*If using the hydraulic dump bed in conjunction with the railgear, it is important that the rear controls, hoses wiring etc. be installed below the top surface of the rear mounting brackets as shown. Refer to the appropriate section in this manual for further details\***

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## 1.0 INSTALLATION OF HYDRAULIC KIT

### HYDRAULIC KIT CONTENTS

Part Number	Description	Qty
S-003041	Hydraulic Pump	1
R-32118	Pump Mounting Bracket	1
R-31592	Manual Control Valve	2
R-31590	Toggle Switch	2
R-31591	Boot, Toggle Switch	2
CO-106	Dash Switch	1
R-1577	In-Line Fuse 5 Amp	1
CO-130G	"Railgear Pump" Decal	3
CO-130N	"Front Gear Up" Decal	1
CO-130O	"Rear Gear Up" Decal	1
CO-130P	"Front Gear Down" Decal	1
CO-130Q	"Rear Gear Down" Decal	1
R-2868	Locking Cable Holding Collar	1
S-001030	Railgear Operation Decal	2
R-32145A	Single P.O. Check Valve Assy	2
R-2407	Control Valve Mounting Plate, Rear Valve	1
849-FSO-04-04	Hydraulic Adapter	3
849-FSO-04-06	Hydraulic Adapter	1
848-FSO-04-08	Hydraulic Adapter	8
879-FS-04	Hydraulic Adapter	8
HFS2-04	Hose 33" Long	1
HFS2-04	Hose 16" Long	4
R-990KIT-402	1/4" UNC Gr. 8 Bolt x 2.25" Long	4
	1/4" SAE Washer	8
	1/4" Nylock Nut	4
	5/16" UNC Gr. 8 Bolt x 0.75" Long	4
	5/16" SAE Washer	4
	5/16" Lock Washer	4
Not Supplied	2 & 14 Gauge Wire, Terminals, Loom, Etc.	As Req'd
Not Supplied	Hydraulic Hose to Connect Front Controller to Rear, and Controller back to Pump	2

**HYDRAULIC KIT INSTALLATION**

1. The pump is shipped with a hand pump handle, a solenoid, and a rubber terminal boot.
2. Locate and install the solenoid in a convenient location near the vehicle's battery. Ensure that the solenoid's body is electrically grounded.
3. Install all hydraulic fittings and adapters as shown on hydraulic schematic.
4. Position the pump mounting bracket on top of the front railgear mounting bracket as shown. Clamp it in place. Position the pump on top of the pump mounting bracket as shown with the tank towards the front of the vehicle. Ensure the pump will not interfere with any part of the vehicle or railgear components.
5. Once the rear pump mounting bracket position is verified, remove the pump and weld the pump mounting bracket to the front railgear mounting bracket.
6. Reposition and fasten the pump on top of the rear pump mounting bracket with four  $\frac{5}{16}$ " x 0.75" long bolts, four  $\frac{5}{16}$ " lock washers and four  $\frac{5}{16}$ " washers.
7. Route all required hose as shown on the hydraulic schematic.
8. Ensure that none of the hoses contact any sharp edges or hot surfaces. Tie-wrap all hoses securely leaving enough slack for the railgear to function.
9. Install the dash switch and "Railgear Pump" decal in a convenient location on the dash.
10. Using suitable 14 gauge wire, cable loom, connectors, solder and heat shrink tubing:
  - a) Route and install all electrical components as shown on the electrical schematic.
11. Using suitable 2 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 the supplied rubber boot 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.
12. Mount the front and rear control valves as required. It may be necessary to fabricate a bracket to mount the valve in a suitable location. Ensure the control valve is within reach of the railgear locking cable handle and the toggle switch for activating the railgear pump.
13. Ensure that the control valves are mounted so that the controls do not fill with water and freeze. They should also be mounted in a location protected from road spray etc.

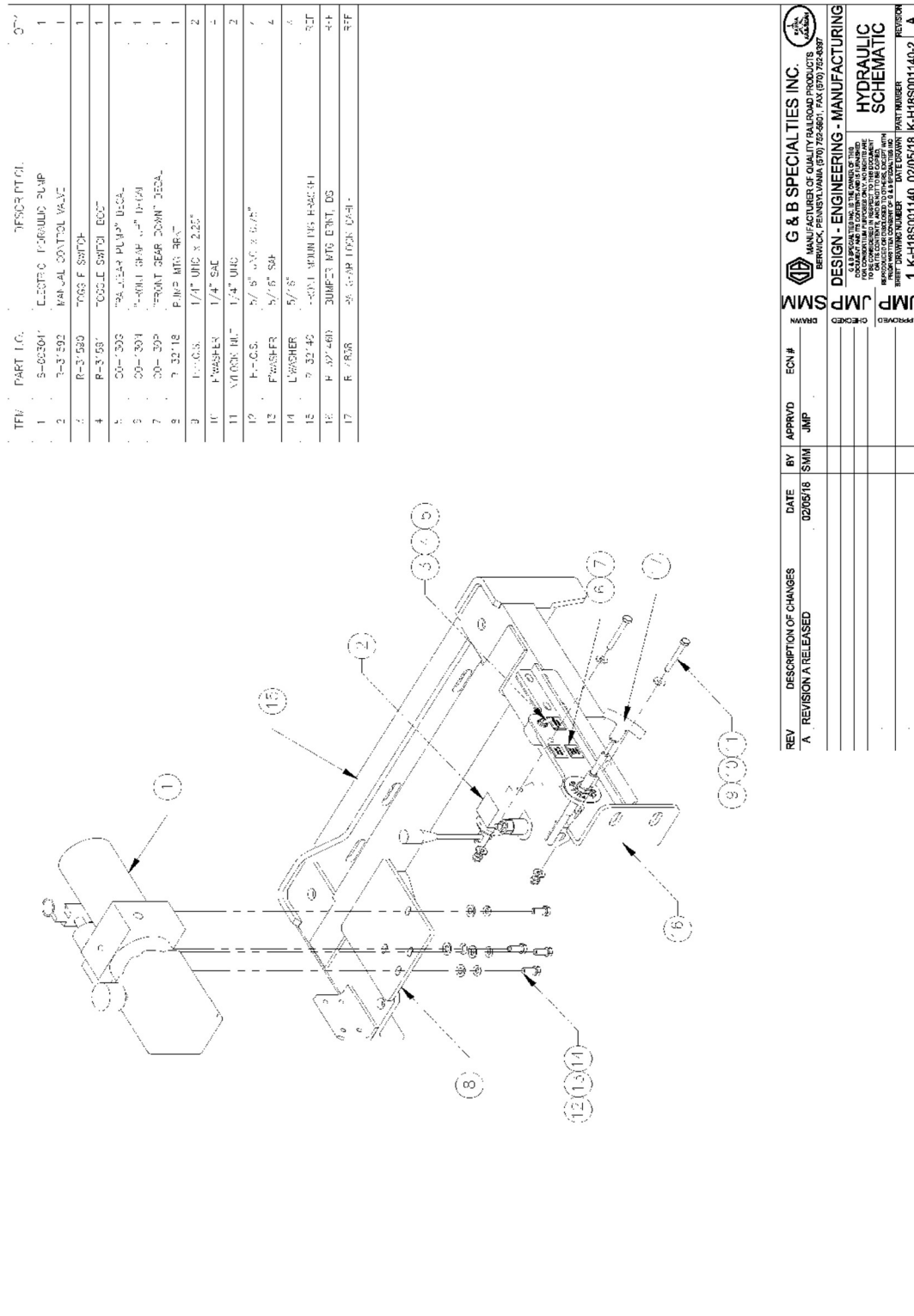
14. Affix the supplied railgear operation decals in a suitable location adjacent to the front and rear control valves.
15. Ensure all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured with tie-wraps.
16. Ensure all holes in the firewall are sealed and 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 manuals 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.
  - 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 detailed in the Hydraulic Kit Service section of this manual.
19. Test the fit of the locking cable holding collar on both the front and rear locking cables. Ensure that the locking cable holding collar keeps the railgear locking pin fully disengaged. Grind the locking cable holding collar or adjust the locking cable handle on the cable to fit if necessary.
20. Test the operation of the controls and emergency pump operation. Refer to the operation procedure in the Railgear Kit manual and Hydraulic Kit Operation section of this manual.
21. Locate and store the hand pump handle and the locking cable holding collar in a secure location in the vehicle cab.

**\*Ensure that the thermal overload wires are properly spliced/connected as shown\***

**\*It is recommended that a 200 amp fuse be installed to isolate the hydraulic pump from the vehicle electrical system as shown\***

**\*If using the hydraulic dump bed in conjunction with the railgear, it is important that the rear controls, hoses wiring etc...be installed below the top surface of the rear mounting brackets as show. Refer to the appropriate section in this manual for further details\***

**HYDRAULIC SCHEMATIC**



**Figure 1**



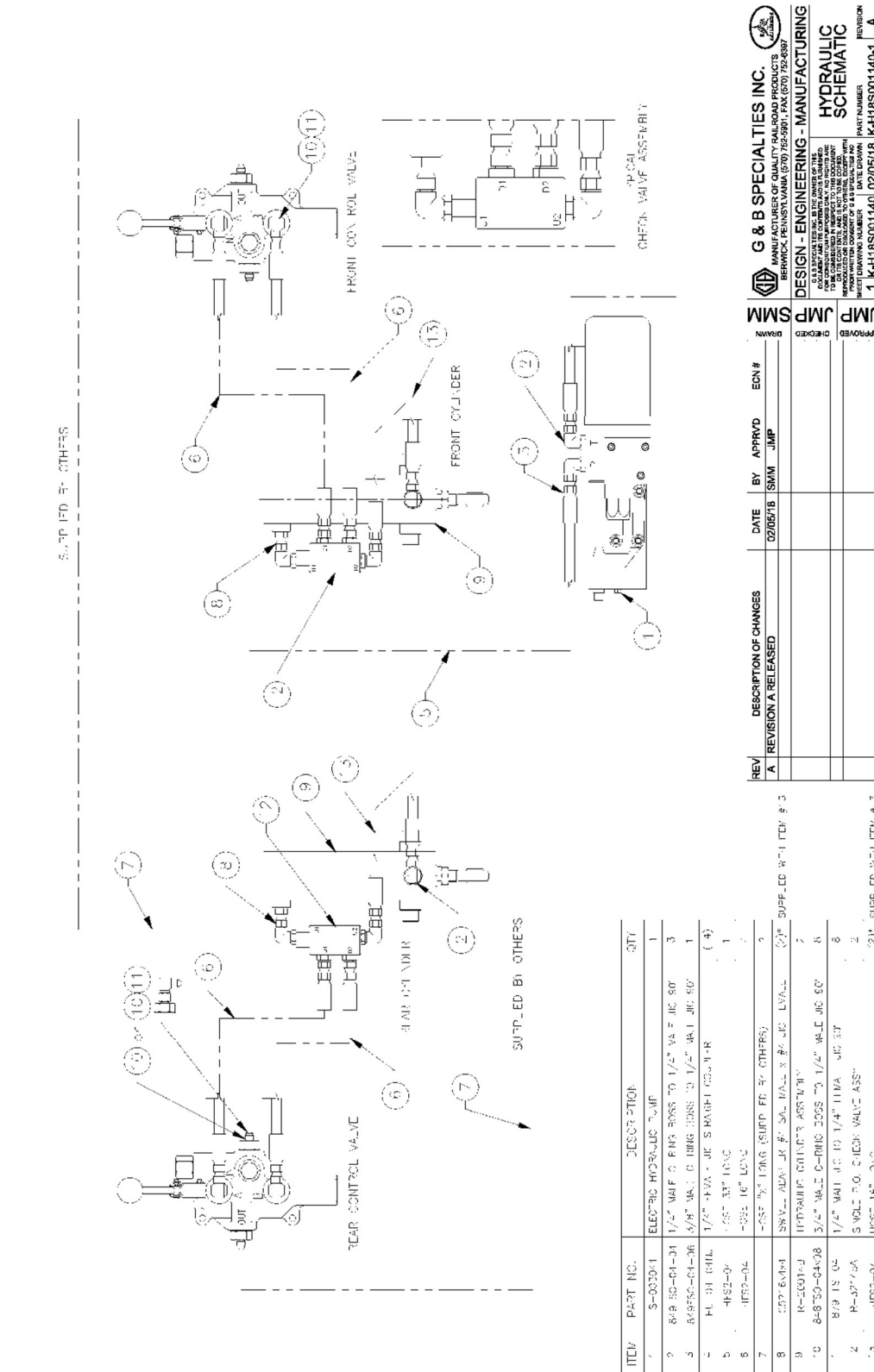
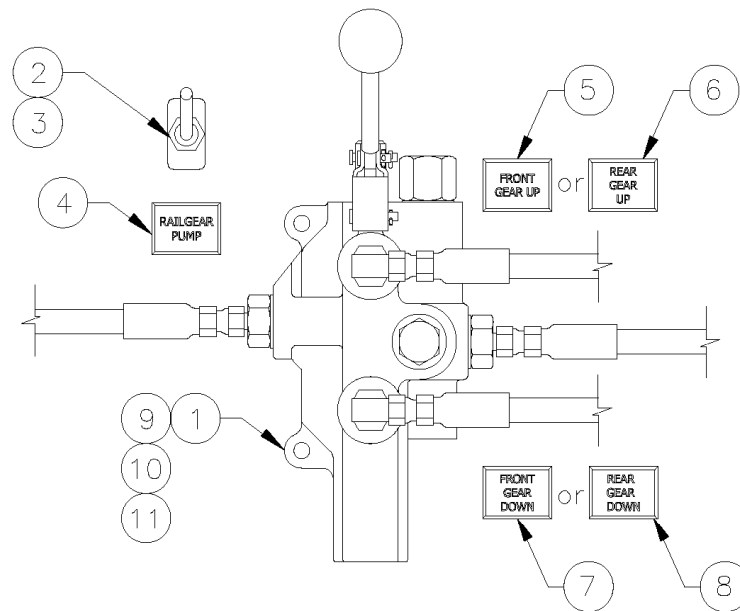


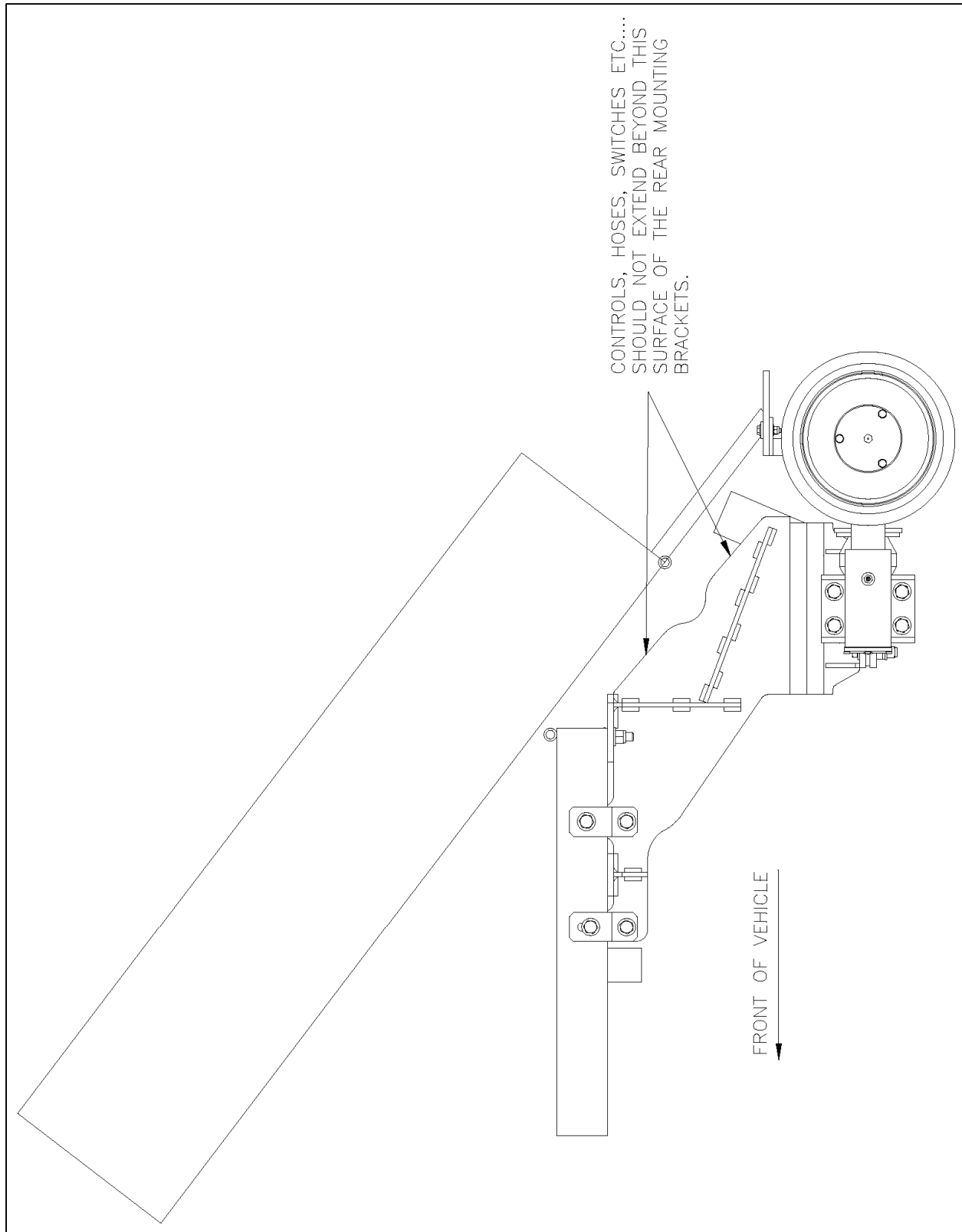
Figure 2

**CONTROL VALVE ASSEMBLY**



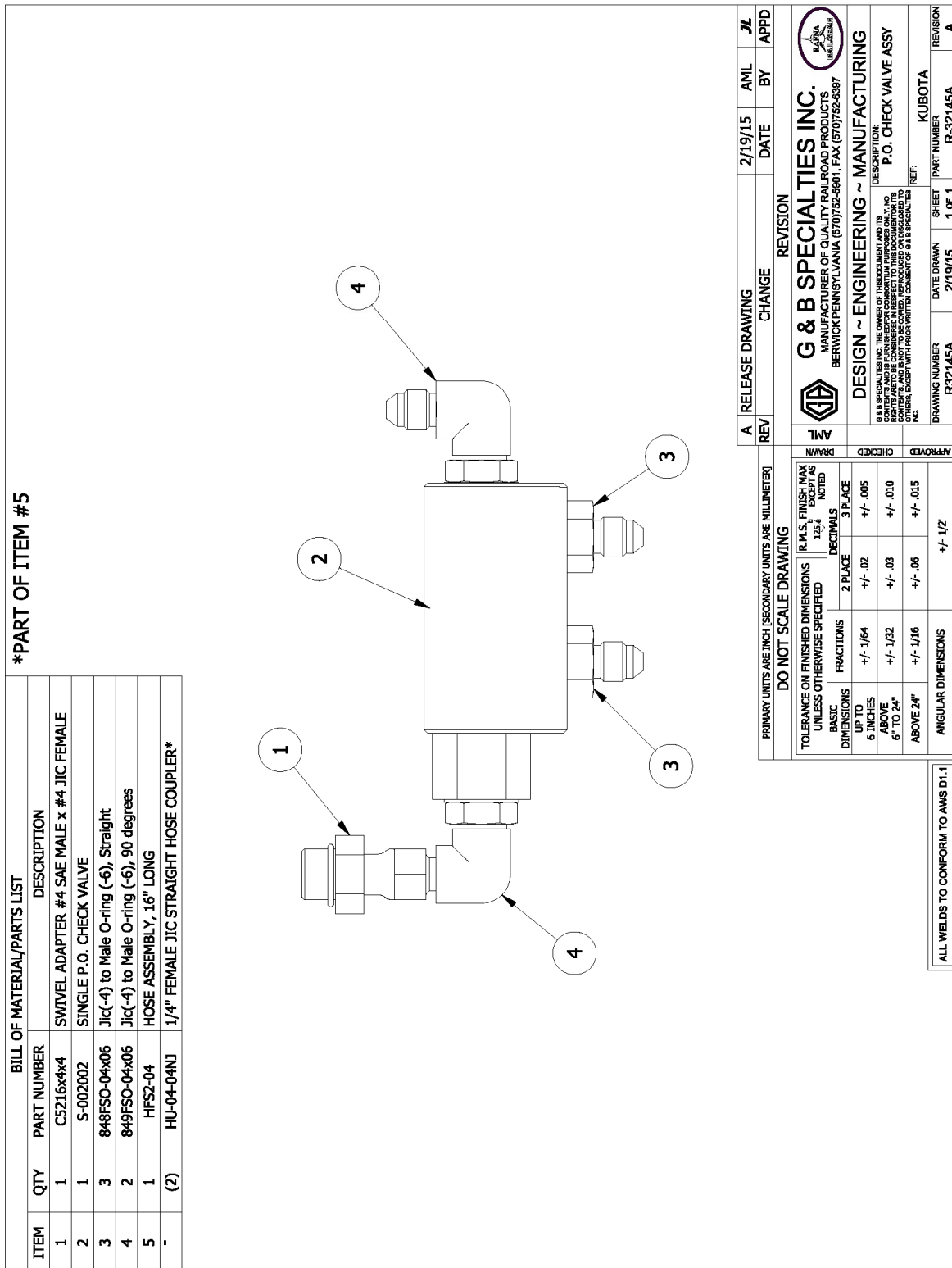
ITEM	PART NO.	DESCRIPTION	QTY
1	R-31592	MANUAL CONTROL VALVE	2
2	R-31590	TOGGLE SWITCH	2
3	R-31591	TOGGLE SWITCH BOOT	2
4	CO-130G	"RAILGEAR PUMP" DECAL	2
5	CO-130N	"FRONT GEAR UP" DECAL	1
6	CO-130O	"REAR GEAR UP" DECAL	1
7	CO-130P	"FRONT GEAR DOWN" DECAL	1
8	CO-130Q	"REAR GEAR DOWN" DECAL	1
9	H.H.C.S.	1/4" UNC x 2.25"	4
10	F'WASHER	1/4" SAE	8
11	NYLOCK NUT	1/4" UNC	4

**Figure 3**



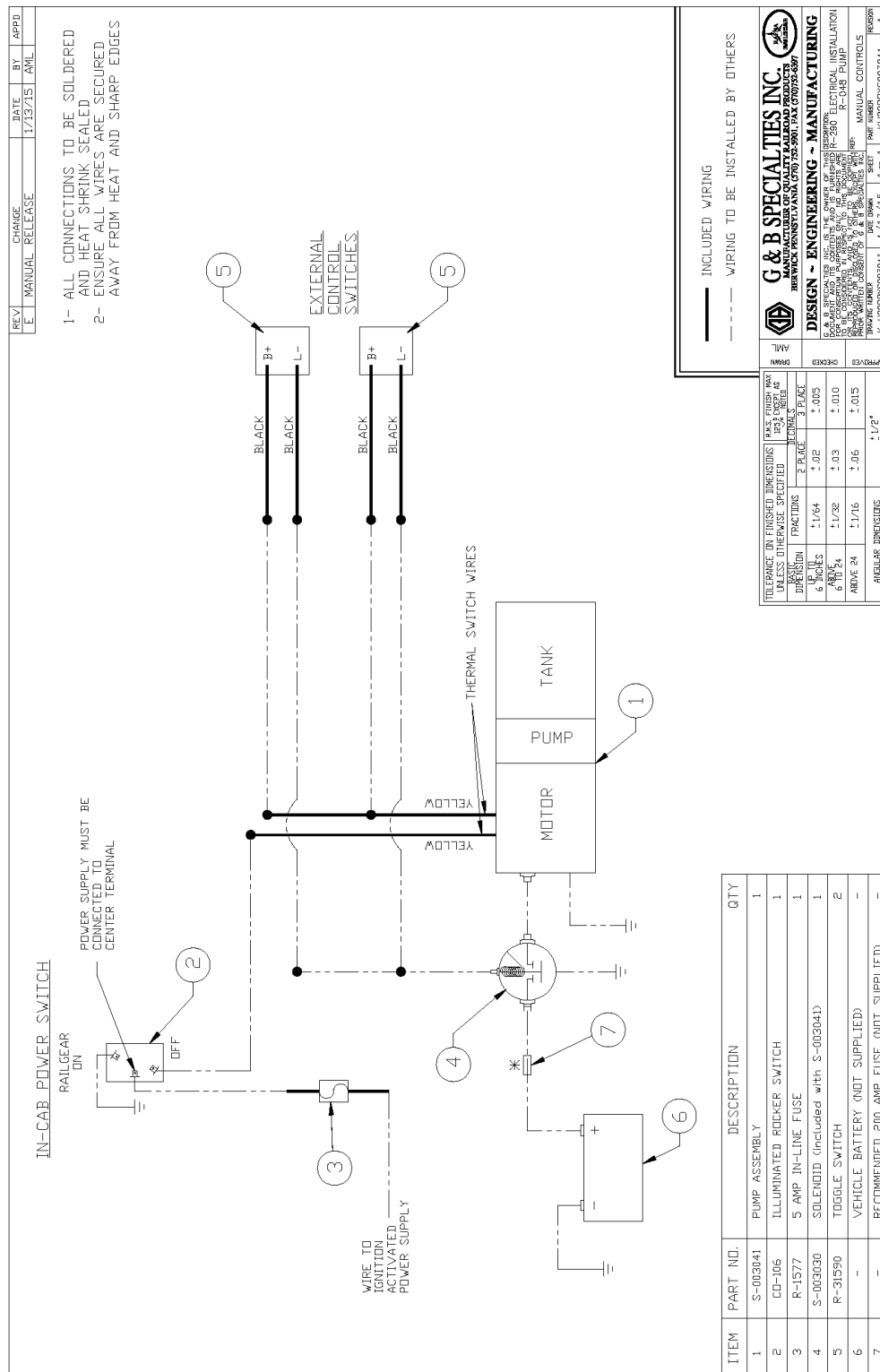
**Figure 4**

**P.O. CHECK VALVE ASSEMBLY**



**Figure 5**

## ELECTRICAL SCHEMATIC



### Figure 6

## 2.0 OPERATION AND SERVICE OF HYDRAULIC KIT (STD) MANUAL OPERATING VALVE

### 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 Industries railgear equipment. Applicable railway company procedures and policies must be adhered to.
- Railway company rules governing rail travel must be observed at all times.
- 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.
- Note that if the railgear is part way retracted or extended, operating the control valve manual may cause the railgear to drop suddenly causing personal injury. Ensure all body parts are clear of the railgear if it should suddenly drop.
- When 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 should fail, have it repaired as soon as possible.
- If the emergency hand pump has been used to raise or lower the railgear, ensure the control valve has been returned to the middle position before starting road or rail travel.
- 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 STANDARD RAILGEAR HYDRAULIC SYSTEM CONTROLS**

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

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 a control valve is activated.
2. The direction of the front or rear railgear movement is selected by selecting the “Up” or “Down” position on the respective control valve located near the railgear. Then activating the pump control switch located near the control valve. At this point the pump should start and the railgear should move in the selected direction.

*The railgear control valves have an integrated detent. This will allow the valve to be locked in the position for up or down motion of the railgear. Select the direction you want the railgear to move by pressing the handle on the valve in that direction. The handle should stay in that position.*

**\*THE CONTROL VALVE ACTUATING HANDLE MUST BE RETURNED TO THE NEUTRAL (MIDDLE POSITION) AFTER THE GEAR HAS BEEN RAISED OR LOWERED. IF NOT, THE OTHER CONTROL VALVE WILL NOT OPERATE THE OTHER RAILGEAR UNIT. THIS IS DUE TO THE FACT THAT THIS IS A CLOSED LOOP SYSTEM WITH BOTH CONTROL VALVES IN THE LOOP\***

3. To stop the movement of the railgear, release the pump control switch. Return the valve handle to the middle position.
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 buttons should be in-active.

**LOCATION AND OPERATION OF THE HYDRAULIC PUMP EMERGENCY HAND PUMP**

If the railgear hydraulic system should fail such that the railgear does not respond from working the control valves on the front and / or rear, then the emergency hand pump system may be used to place the vehicle on rail or remove the vehicle from rail. Follow the standard operation procedure (as detailed in the Railgear Kit Operation, Service and Parts Manual) except substitute the following steps when the procedure requires raising or lowering of the railgear.

1. Remove the hand pump handle from storage and insert the handle into the hand pump located on the body of the hydraulic pump.
2. The railgear control valves have an integrated detent. This will allow the valve to be lock in the position for up or down motion of the railgear. Select the direction you want the railgear to move by pressing the handle on the valve in that direction. The handle should stay in that position.
3. Remove the locking cable holding collar from storage. It can be slipped in between the locking cable handle and the locking cable bulkhead fitting to hold the locking cable in the disengaged position.
4. Pump the emergency hand pump handle to move the railgear. It will require 30 to 50 full strokes to fully raise or lower each railgear.
5. Return the control valve handle to the middle position.
6. Remove and store the locking cable holding collar and the hand pump handle.
7. Ensure the railgear lock pins are fully engaged as required by the procedure.



### 3.0 SERVICE OF HYDRAULIC KIT

The hydraulic kit must be serviced regularly to avoid damage to the equipment.

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

**Table 1: Recommended Service Schedule**

Service Required	Initial 100 km (62 Miles) of road and/or rail use	Daily	Weekly	Monthly
Inspect hydraulic kit fasteners (re-torque if required)		✓		
Inspect all hydraulic fittings and hoses for leaks and wear.		✓		
Check oil in hydraulic reservoir. (fill with railgear raised if req'd)				✓
Check emergency hand pump and manifold over-ride operation				✓

#### HYDRAULIC SYSTEM RELIEF VALVE SETTING

This system is equipped with one relief valve located on the railgear pump body next to the emergency hand pump. 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 “P” port of 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 2 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:
  - a) 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.

## 4.0 PARTS OF HYDRAULIC SYSTEM

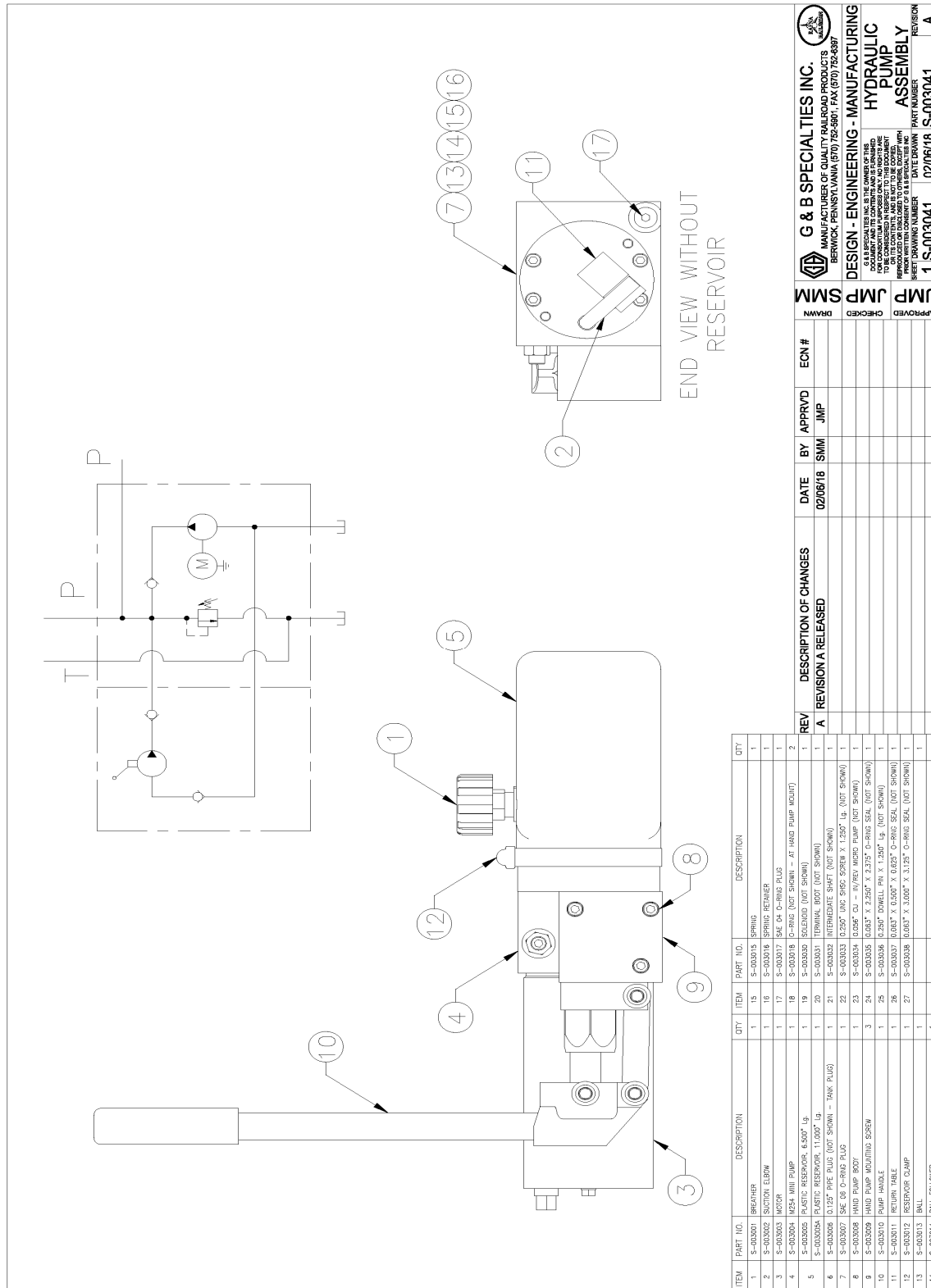


Figure 7