

INSTALLATION OF R-450 HYDRAULIC KIT W/ PUMP
1999-PRESENT FORD F-450/F-550 ALL MODELS
2008-PRESENT RAM 4500/5550 CHASSIS CAB

INSTALLATION SAFETY PRECAUTIONS

If any installation problems are encountered, please call G&B Specialties, Inc. 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 or operation of the equipment.
- Installation/Operation 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.
- 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.
- Railway company rules governing rail travel must always be observed.
- 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, opening the manifold directional valve manual over-rides 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 or manifold 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 manifold directional valve manual over-rides are in the closed and locked position before starting road or rail travel.
- Ensure the hydraulic pump has been de-energized before starting road or rail travel.

INSTALLATION OF HYDRAULIC KIT W/ PUMP

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

Table 1: Hydraulic Kit Installation Parts

Part Number	Description	Qty
R-060	Railgear Hydraulic Pump	1
R-19048	Control Mounting Plate	2
R-2837	Pump Mounting Bracket	1
CO-106	Dash Switch	1
R-1577	5 Amp In-Line Fuse	1
R-1577-1	5 Amp Automotive Fuse	1
CO-130G	"Railgear Pump" Decal	1
H-990KIT-011	1/4" Male JIC to 3/8" Male O-Ring Boss	4
	1/4" Male JIC to 1/4" Male JIC Tee	2
	1/4" Female JIC Straight Coupler (Installed on hoses)	12
	1/4" Female JIC Coupler 90° (Installed on hoses)	4
	Hydraulic Hose 20" Long	2
	Hydraulic Hose 33" Long	2
	Hydraulic Hose 32" Long	2
	Hydraulic Hose 360" Long	2
R-990KIT-023	3/8" UNC Gr. 8 Bolt x 1" Long	2
	3/8" SAE Washer	2
	3/8" Lock Washer	2

1. Remove the motor solenoid from the pump. Re-install the solenoid retaining screws into the pump to prevent water from entering the pump motor.
2. Install the solenoid in a suitable location under the hood near the vehicle's battery with hardware supplied by the installer. Ensure that the solenoid's body is electrically grounded.
3. Note that the pump is fastened to the pump bracket by two 3/8" fasteners on the bottom of the pump. Align the pump and pump mounting bracket as shown prior to welding and ensure that the pump will not block the vehicle's lights and that the tank end of the pump is accessible to fill. Make sure the emergency hand pump assembly is easily accessible and has clearance to operate through its full stroke.
 - a) Once location is found, weld the pump bracket as shown.
 - b) Paint welds once cool to prevent rusting.
 - c) Fasten the pump to the pump mounting bracket using two 3/8" x 1" long bolts, two 3/8" lock washers and two 3/8" flat washers. Torque the 3/8" fasteners to 40 ft-lbs dry. Do not over torque.
4. Install a 1/4" JIC to 3/8" O-Ring Boss fitting in each of the four pump pressure ports.

5. Connect one 32” long hose between the upper ‘A’ port of the pump and the ‘D1’ port of the front railgear double P.O. check valve. The 90° hose end should be at the pump.
6. Connect one 32” long hose between the upper ‘B’ port of the pump and the ‘D2’ port of the front railgear double P.O. check valve. The 90° hose end should be at the pump.
7. Connect one 33” long hose to the ‘D1’ port of the rear railgear right-hand side single P.O. check valve.
8. Connect one 33” long hose to the ‘D2’ port of the rear railgear right-hand side single P.O. check valve.
9. Connect one 1/4” male JIC to 1/4” male JIC tee fitting to the loose end of each of the two 33” long hoses.
10. Connect one 20” long hose between the ‘D1’ port of the rear railgear left-hand side single P.O. check valve and the tee fitting on the 33” long hose connected to the ‘D1’ port of the rear railgear right-hand side single P.O. check valve.
11. Connect one 20” long hose between the ‘D2’ port of the rear railgear left-hand side single P.O. check valve and the tee fitting on the 33” long hose connected to the ‘D2’ port of the rear railgear right-hand side single P.O. check valve.
12. Connect one 360” long hose to the lower ‘A’ port on the pump. The 90° hose end should be at the pump. Mark the end of this hose “D1”.
13. Connect one 360” long hose to the lower ‘B’ port on the pump. The 90° hose end should be at the pump. Mark the end of this hose “D2”.
14. Route the two 360” long hydraulic hoses to the rear of the vehicle along the left side of the frame and secure in place. Where necessary, fasten the hose to the frame with installer-supplied hose clips and hardware.
15. Connect the end of the hose marked “D1” to the tee fitting connected between the ‘D1’ ports of the rear railgear check valves.
16. Connect the end of the hose marked “D2” to the tee fitting connected between the ‘D2’ ports of the rear railgear check valves.
17. Ensure that none of the hoses contact any sharp edges or hot surfaces. Secure these hoses in place. Ensure that there is enough slack in the hoses for the railgear to function.
18. Install the dash switch and “Railgear Pump” decal in a convenient location on the dash.
19. The pump has two wire harnesses and two wires connected to it:
 - a) One 36’ wire harness for the front railgear with a control box on the end.
 - b) One 36’ wire harness for the rear railgear with a control box on the end.
 - c) One white and one black wire each with ring terminals on the ends.

20. 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 previously mounted under the hood.
- 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.

21. 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.

22. Route one of the 36' wire harness from the pump along the frame to the rear of the vehicle and secure in place. If necessary, the control box can be removed from and reinstalled on the wire harness to facilitate routing. Fabricate a bracket and mount the rear railgear control box with installer-supplied hardware in a protected vertical position in a suitable location. Ensure the control box is within reach of the railgear locking cable handle.

23. Route the other 36' wire harness from the pump to the front of the vehicle and secure in place. If necessary, the control box can be removed from and reinstalled on the wire harness to facilitate routing. Wire harness can be shortened once mounting location is determined. Fabricate a bracket and mount the front railgear control box with installer-supplied hardware in a protected vertical position in a suitable location. Ensure the control box is within reach of the railgear lock hook handle.

24. Ensure that the control boxes are mounted vertically so that the controls do not fill with water and freeze. They should also be mounted in a location protected from road spray etc.

25. Ensure all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured.

26. Ensure all holes in the firewall are sealed and protected with a grommet.

27. Fill the hydraulic system and bleed the air out:
- a) Fill the pump tank with **DEXRON III** (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 (refer to the Railgear Kit and Hydraulic Kit Operation, Service, and Parts manuals 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.
28. Follow the Hydraulic System Relief Valve Setting procedure detailed in the Hydraulic Kit Operating, Service and Parts Manual.
29. Test the operation of the controls. Refer to the operation procedure in the Railgear Kit and Hydraulic Kit Operation, Service, and Parts manuals.

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	REF	R-450 VERTICAL FRONT	1
2	R-060	R-450 PUMP WITH MANIFOLD	1
3	CO-106	PILOT SWITCH, RED	1
4	R-1577	FUSE HOLDER, CONNECTOR	1
5	R-1577-1	FUSE, 5-AMP	1
6	CO-130G	RAILGEAR PUMP DECAL PLATE	1
7	R-2837	PUMP BRACKET	1
8	R-19048	CONTROL MOUNTING PLATE	1
9	H.H.C.S.	3/8" X 1" LG, UNC, GR.8	2
10	F WASHER	3/8" TYPE A, GR. 8	2
11	LOCK WASHER	3/8" SPLIT LOCK, HVY GR.8	2

REV DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A REVISION A RELEASED	03/17/20	SDB		

G & B SPECIALTIES INC.
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DESIGN - ENGINEERING - MANUFACTURING

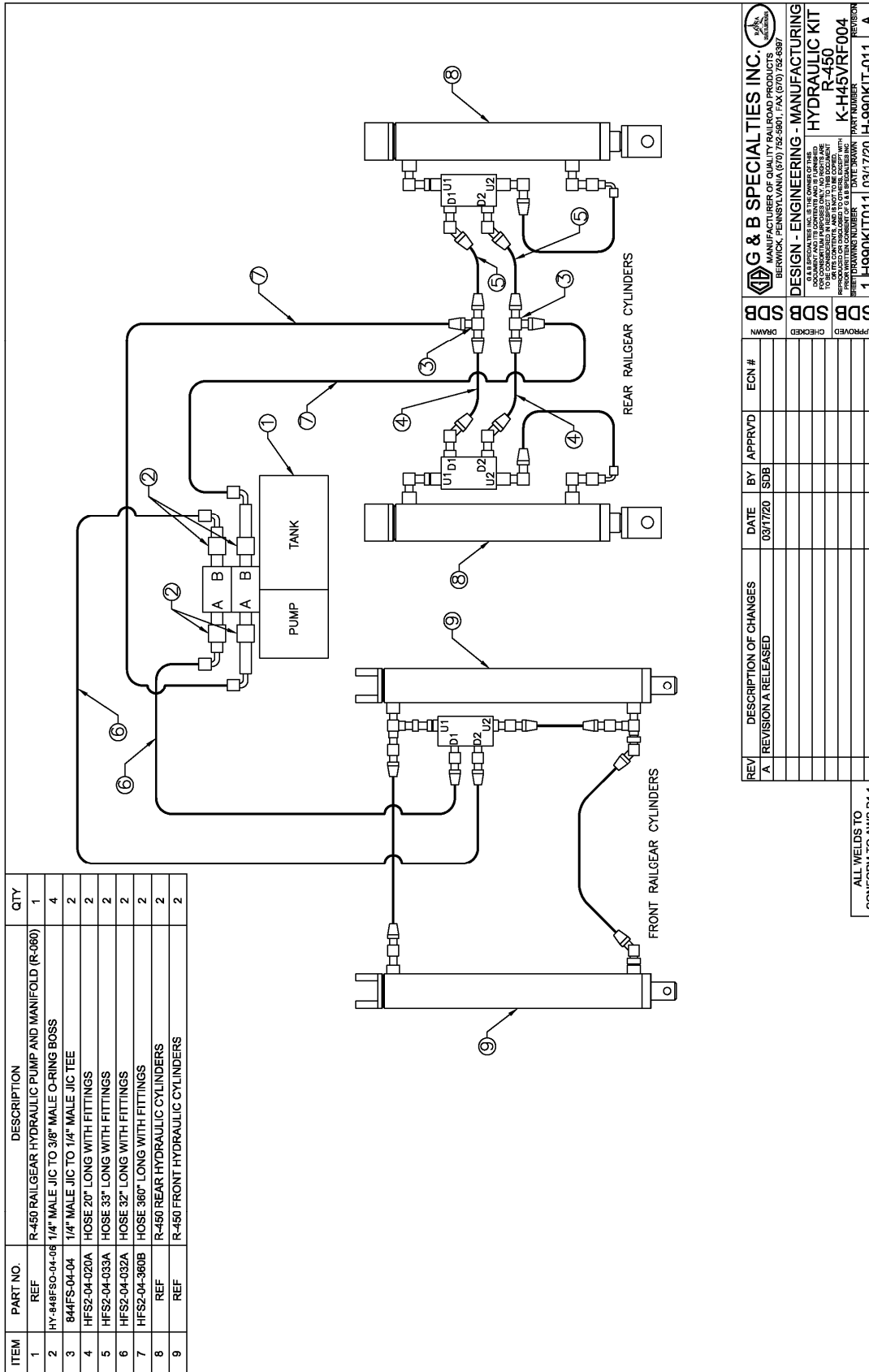
R-450
HYDRAULIC KIT

1 KH45VRF004 03/17/20 K-H45VRF004 E

NOTES:

1. R-060 PUMP COMES ASSEMBLED WITH SOLENOID. DISASSEMBLE IT AND PLUG HOLES IN PUMP WITH HARDWARE. SECURE THE SOLENOID UNDER THE VEHICLE HOOD.
2. HYDRAULIC KIT REF: H-990KIT-011 (NOT SHOWN FOR CLARITY)
3. HARDWARE KIT REF: R-990KIT-023
4. MOUNT IN LOCATIONS DESCRIBED IN MIO-H45VRF004
5. BRACKETS WILL BE WELDED IN THE FIELD AS SHOWN

ALL WELDS TO CONFORM TO AWS-D1.1



REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	ECN #
A	REVISION A RELEASED	03/17/20	SDB		

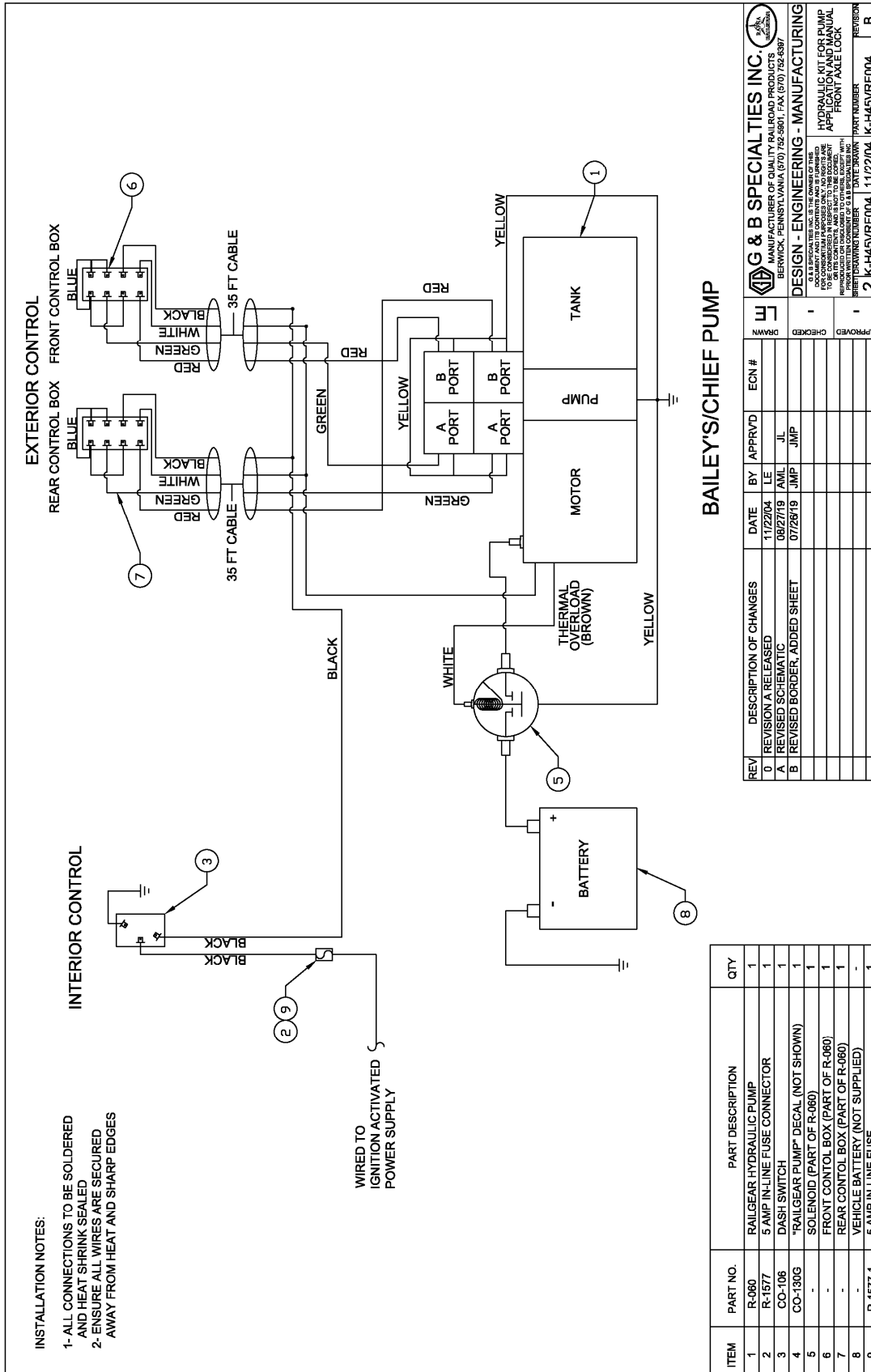
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G & B SPECIALTIES INC.
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BERWICK, PENNSYLVANIA 6707/152-9801, FAX (570) 752-6399

DESIGN - ENGINEERING - MANUFACTURING
HYDRAULIC KIT
R-450
K-H45VRF004

APPROVED: SDB
CHECKED: SDB
DRAWN: SDB

1 H-990KIT011 | 03/17/20 | H-990KIT-011 | A



BAILEY'S/CHIEF PUMP

ITEM	PART NO.	PART DESCRIPTION	QTY
1	R-080	RAILGEAR HYDRAULIC PUMP	1
2	R-1577	5 AMP IN-LINE FUSE CONNECTOR	1
3	CO-106	DASH SWITCH	1
4	CO-130G	"RAILGEAR PUMP" DECAL (NOT SHOWN)	1
5	-	SOLENOID (PART OF R-080)	1
6	-	FRONT CONTROL BOX (PART OF R-080)	1
7	-	REAR CONTROL BOX (PART OF R-080)	1
8	-	VEHICLE BATTERY (NOT SUPPLIED)	-
9	R-1577-1	5 AMP IN-LINE FUSE	1

REV	DESCRIPTION OF CHANGES	DATE	BY	APPRVD	EON #	FRM
0	REVISION A RELEASED	11/22/04	LE	JL		
A	REVISED SCHEMATIC	08/27/19	JMPL	JL		
B	REVISED BORDER, ADDED SHEET	07/28/19	JMP	JMP		

APPROVED	CHECKED	DATE	PART NUMBER
		11/22/04	K-H45VRF004

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OPERATION OF R-450 HYDRAULIC KIT W/ PUMP
1999-PRESENT FORD F-450/F-550 ALL MODELS
2008-PRESENT RAM 4500/5550 CHASSIS CAB

OPERATION SAFETY PRECAUTIONS

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- 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 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, opening the manifold directional valve manual over-rides 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 or manifold 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 manifold directional valve manual over-rides are in the closed and locked 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 (PUMP)

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 box and a rear control box.

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 button is depressed.
2. The direction of the front or rear railgear movement is selected by pushing the “Up” or “Down” button on the respective control box located near the railgear. At this point the pump should start and the railgear should move in the selected direction.
3. To stop the movement of the railgear, release the depressed button.
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.

SERVICE OF HYDRAULIC KIT

The hydraulic kit must be serviced regularly to avoid damage to the equipment. Table 1 below provides the Recommended Service Schedule and Table 2 provides Standard Fastener Torque Values.

The recommended oil for the railgear hydraulic system is **DEXRON III** or equivalent. In extremely cold weather areas/seasons, **Tellus S4 VX32** 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				✓

Table 2: 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 “B” 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:

- 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.

PARTS OF HYDRAULIC KIT

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	S-309690	MOTOR	1
2	S-309691	BODY VALVE BLOCK	1
3	S-309692	HAND PUMP BLOCK	1
4	S-309693	CONTROL BLOCK	1
5	S-309605	HAND PUMP ASSEMBLY	1
6	S-309652	CHECK VALVE (INTERNAL)	1
7	S-309606	RELIEF	1
8	S-309653	4 WAY 3 POSITION SOLENOID VALVE	2
9	S-309654	SOLENOID	1
10	S-309655	GEAR PUMP	1
11	S-309694	COUPLING (INTERNAL)	1
12	S-309680	TANK	1
13	S-309657	HEX BOLT	3
14	S-309658	HEX BOLT WITH SPRING WASHER	4
15	S-309659	HEX BOLT WITH SPRING WASHER	2
16	S-309615	LONG BOLT	2
17	S-309660	BOLT	2
18	S-309623	CABLE COVER	1
19	S-309624	CABLE COVER	2
20	S-309614	O-RING	4
21	S-309613	O-RING	1
22	S-309661	RESPIRATOR ASSEMBLY	1
23	S-309621	IRON PLUG	4
24	S-309662	PLASTIC PLUG (FOR SHIPPING ONLY)	4
25	S-309663	OIL PIPE	1
26	S-309664	FILTER	1
27	S-309617	OIL RETURN PIPE	1
28	S-309665	SUCTION OIL PIPE	1
29	S-309612	MAGNET	1
30	S-309634	CONTROL BOX ASSEMBLY (SHEET 2)	2
31	S-309667	CABLE, BLACK (18", SHEET 2)	1
32	S-309668	CABLE, WHITE (18", SHEET 2)	1
33	S-309669	CONNECTING CABLE (12", SHEET 2)	1
34	S-309627	HAND PUMP OPERATING ROD	1
35	S-309628	ROD COVER	1
36	S-309638	CABLE GLAND (SHEET 2)	2

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DESIGN - ENGINEERING - MANUFACTURING

BAILEY R-060
HYDRAULIC PUMP
PARTS BREAKDOWN

DATE DRAWN: 03/18/20
PART NUMBER: R060
REVISION: C

REV DESCRIPTION OF CHANGES
A REVISION A RELEASED
B UPDATED PART NUMBERS
C UPDATED PUSH BUTTON PART NUMBER

DATE BY APPRVD
03/18/20 SDB SWM
07/15/20 SWM SWM
08/19/20 SWM SWM

ALL WELDS TO CONFORM TO AWS D1.1

NOTES:
1. SEE SHEET 2 FOR HYDRAULIC SCHEMATIC AND ELECTRICAL CONNECTION INSTRUCTIONS
2. TO BE USED WITH BAILEY PUMPS ONLY

