

***RAFNA TECHNICAL SERVICE BULLETIN No. 154***

**R-250HD Vertical Front / Rotating Rear Railgear Conversion Standard To  
Full In-Cab Controls**

Issued December 5, 2003

This Technical Service Bulletin provides a procedure to convert the Rafna R-250HD Vertical Front / Rotating Rear Railgear from Standard controls to Full In-Cab controls. This procedure is best carried out in a qualified railgear service center using safe shop practices.

This Technical Service Bulletin also provides an addendum to the standard controls operating procedure that can be used in addition to the operation, parts, and service manual.

Please ensure a copy of this Technical Service Bulletin is left with the vehicle operator.



- **Read and understand this procedure and the operating manual completely before attempting to move the railgear.**
- **Ensure that all rail company safety procedures are followed and never place yourself or others in a dangerous position.**
- **Before anyone goes under the vehicle or railgear, ensure the vehicle engine is turned off, the parking brake is set and the vehicle and railgear are securely supported.**
- **Ensure all body parts and loose clothing are clear of any moving parts of the equipment.**
- **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.**
- **Terminal connections should be coated with dielectric grease to prevent future corrosion related problems.**
- **All wires must be covered with protective cable loom.**
- **When routing hydraulic hoses, ensure that the hoses do not contact any sharp edges or hot surfaces.**
- **Failure to heed to any of the above mentioned warnings or failure to follow the procedure could result in severe bodily injury and/or equipment damage.**

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Replace the Railgear hydraulic system as follows (refer to the Figure 1: Hydraulic Schematic):

1. With the vehicle and railgear securely supported, relieve the hydraulic pressure from the railgear hydraulic system.
2. If the vehicle was originally equipped with an R-060 or R-061 electric hydraulic pump, it can be reused for the Full In-Cab Controls set-up with wiring modifications as noted in the next section.
3. Remove the electric hydraulic pump (if it will not be reused as noted above), operating valves and all the hydraulic adapters, hoses and lock valves from the railgear. Do not remove the hydraulic cylinders themselves or the hydraulic hoses which run from the pump to the rear railgear and from the pump to the front railgear, as they will be used again.
4. Install the new R-059 electric hydraulic pump on the railgear using 3/8" grade 8 fasteners through the holes in the pump mounting bracket. New holes may have to be drilled in the bracket on the railgear to line up with the new pump mounting bracket and to fit the 3/8" fasteners.
5. Following the attached hydraulic schematic and using the supplied hydraulic components, re-plumb the railgear hydraulic system.

If the original R-060 or R-061 electric hydraulic pump is to be reused, the following wiring modifications must be made (refer to Figure 2: R-060 / R-061 Wiring Modification):

1. Two additional 20' wire harnesses must be added to the pump in order to control the pump functions from in the vehicle cab. The installer must supply all necessary components for this modification.
2. Following the attached electric hydraulic pump wiring diagram, modify the pump wiring.
3. If ever a replacement pump must be ordered, order part number R-059 to avoid having to make these modifications again.

Replace the Railgear electrical system as follows (refer to Figure 3: Electrical Schematic):

1. Remove the motor solenoid from the pump. Reinstall the solenoid retaining screws into the pump to avoid water entering the pump motor. Install the solenoid in a convenient location under the hood near to the vehicle's battery with installer supplied hardware. Ensure the solenoid body is properly grounded.
2. Install the in-cab controls in the cab in a convenient location under the dash.
3. Install the circuit breaker under the hood near the previously installed railgear pump solenoid.

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4. The pump has four wire harnesses and four wires connected to it:
  - a) One 3' wire harness for the front railgear with a control box on the end.
  - b) One 35' wire harness for the rear railgear with a control box on the end.
  - c) Two 20' wire harness for the in-cab controls with terminated wires on the end.
  - d) Two white and two black wires each with ring terminals on the ends.
  
5. Using suitable 14 gauge wire, cable loom, connectors, solder and heat shrink tubing:
  - a) Remove the ring terminals from the white wires, and connect them together. Lengthen them as required to reach from the railgear pump to the switching terminal (Terminal A) on the railgear pump solenoid previously mounted under the hood.
  - b) Remove the ring terminals from the black wires, and connect them together. Lengthen them as required to reach from the railgear pump, through the firewall to the load terminal on the 'Railgear Pump' dash switch.
  - c) Terminate and connect another length of black wire from the power terminal of the 'Railgear Pump' dash switch through the firewall to the "Aux" terminal on the circuit breaker previously mounted under the hood.
  - d) Terminate and connect another black wire from the "Bat" terminal on the circuit breaker to the power terminal (Terminal B) on the railgear pump solenoid.
  - e) Terminate and connect another wire from the ground terminal on the 'Railgear Pump' dash switch to a suitable ground location on the vehicle.
  
6. Using suitable 4 gauge wire, cable loom, connectors, solder and heat shrink tubing:
  - a) Terminate and connect one wire from the vehicle's battery to the power terminal (Terminal B) on the railgear pump solenoid.
  - b) Terminate and connect another wire from the load terminal (Terminal C) on the solenoid to the power terminal (Terminal D) on the railgear pump motor. Use silicone to protect the power terminal from shorting out.
  - c) Ensure the railgear pump motor base is properly grounded to the vehicle chassis by connecting a wire from the railgear 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 and tar on the frame.
  
7. Route the 35' wire harness from the railgear pump along the frame to the rear of the vehicle and secure in place with tie-wraps. 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.
  
8. Route the 3' wire harness from the railgear pump to the front of the vehicle and secure it in place with tie wraps. If necessary, the control box can be removed from and reinstalled on the wire harness to facilitate routing. Install the control box on the mounting bracket on the front railgear where supplied. If no bracket is supplied on the railgear, fabricate a bracket to mount the control box. Fasten the front railgear control box with installer-supplied hardware in a protected vertical position to the rear side of the mounting bracket.

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9. 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.
10. Route the two 20' wire harnesses from the pump through the firewall to the in-cab controls. Connect the wires to the switches on the in-cab controls as shown in the electrical schematic. Wire splices with terminated ends will need to be fabricated.
11. Ensure all wires and terminals are soldered, heat shrink sealed, enclosed in protective cable loom and secured with tie-wraps.
12. Ensure all holes in the firewall have been grommeted and sealed.

**Modify the rear railgear mechanical lock system:**

1. With the rear railgear securely supported, remove the complete rear railgear locking system including the lock pin, spring, cable and any hardware.
2. Use the supplied large quick release pin through the same lock pin guide in order to safely lock the railgear in either the road or rail position.
3. A chain link could be added to the quick release pin in order to prevent loss when not in use. If this is done, ensure the quick release pin is not free to swing and damage the railgear or other components.

**Modify the front railgear mechanical lock system:**

1. The front railgear uses two hooks to lock the railgear axle in the road position. A small quick release pin has been supplied with this kit. A hole must be drilled through the lock hook mounting plates so that the small quick release pin can be inserted to prevent the lock hooks from engaging the railgear axle.
2. Ensure the hole is large enough for the quick release pin to be easily inserted yet tight enough so that the quick release pin's detent keeps it securely in place.
3. A chain link could be added to the quick release pin in order to prevent loss when not in use. If this is done, ensure the quick release pin is not free to swing and damage the railgear or other components.

**Operation of the Full In-Cab Controls Railgear:**

The operating procedures in the manual can be followed except:

When placing the vehicle on rail, prior to approaching the rail crossing, the rear railgear quick release pin must be removed and the front railgear lock hooks must be disengaged and locked out of the way using the front quick release pin. The railgear can then be operated from inside the cab or from the front or rear control boxes.

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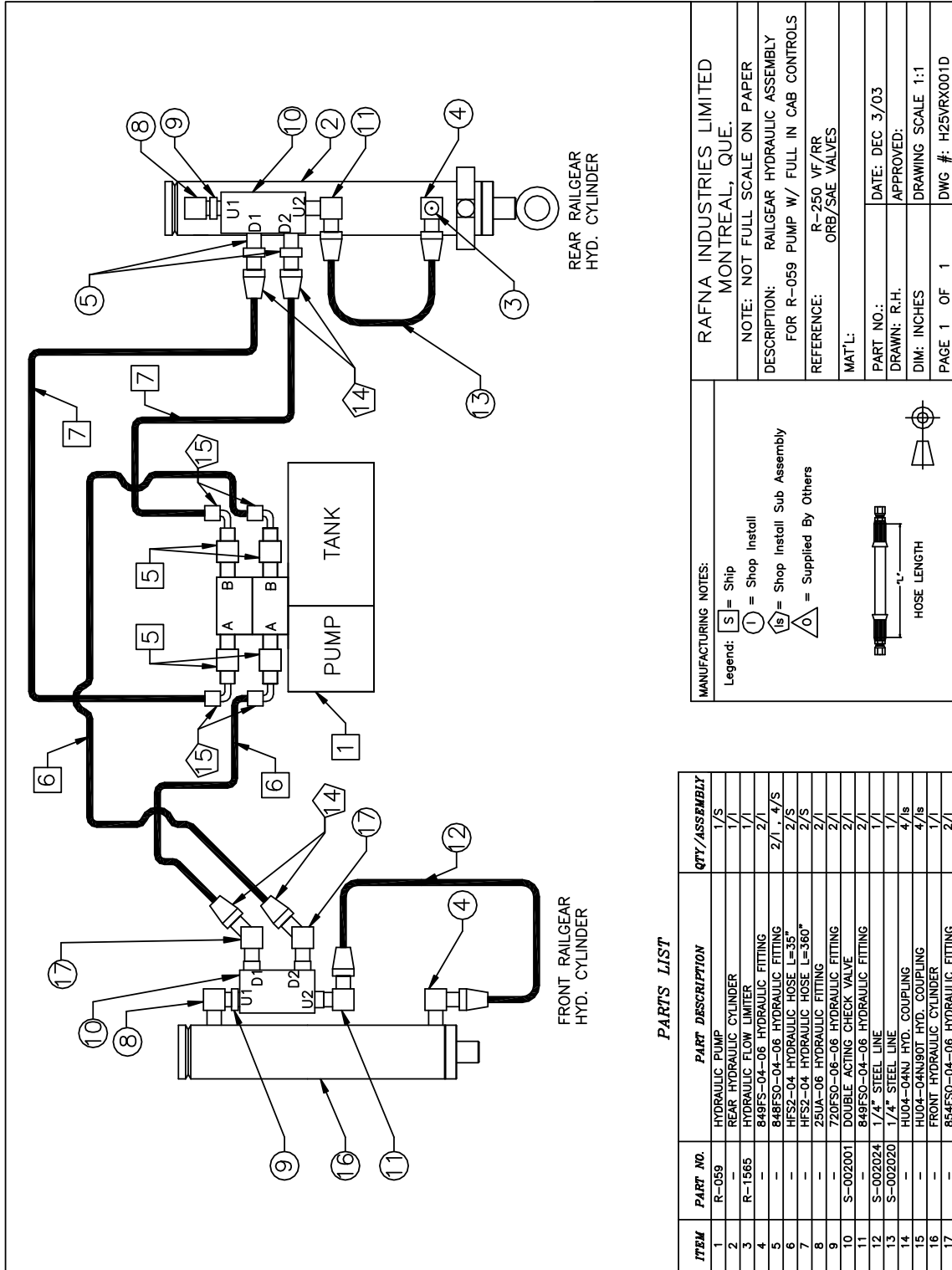
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When removing the vehicle from rail, the railgear can be operated from inside the cab or from the front or rear control boxes. Once the vehicle is cleared from the rails, insert the rear railgear quick release pin to lock the rear railgear in road position and remove the front quick release pin so that the front railgear hooks engage the front railgear axle, locking the front railgear in road position.

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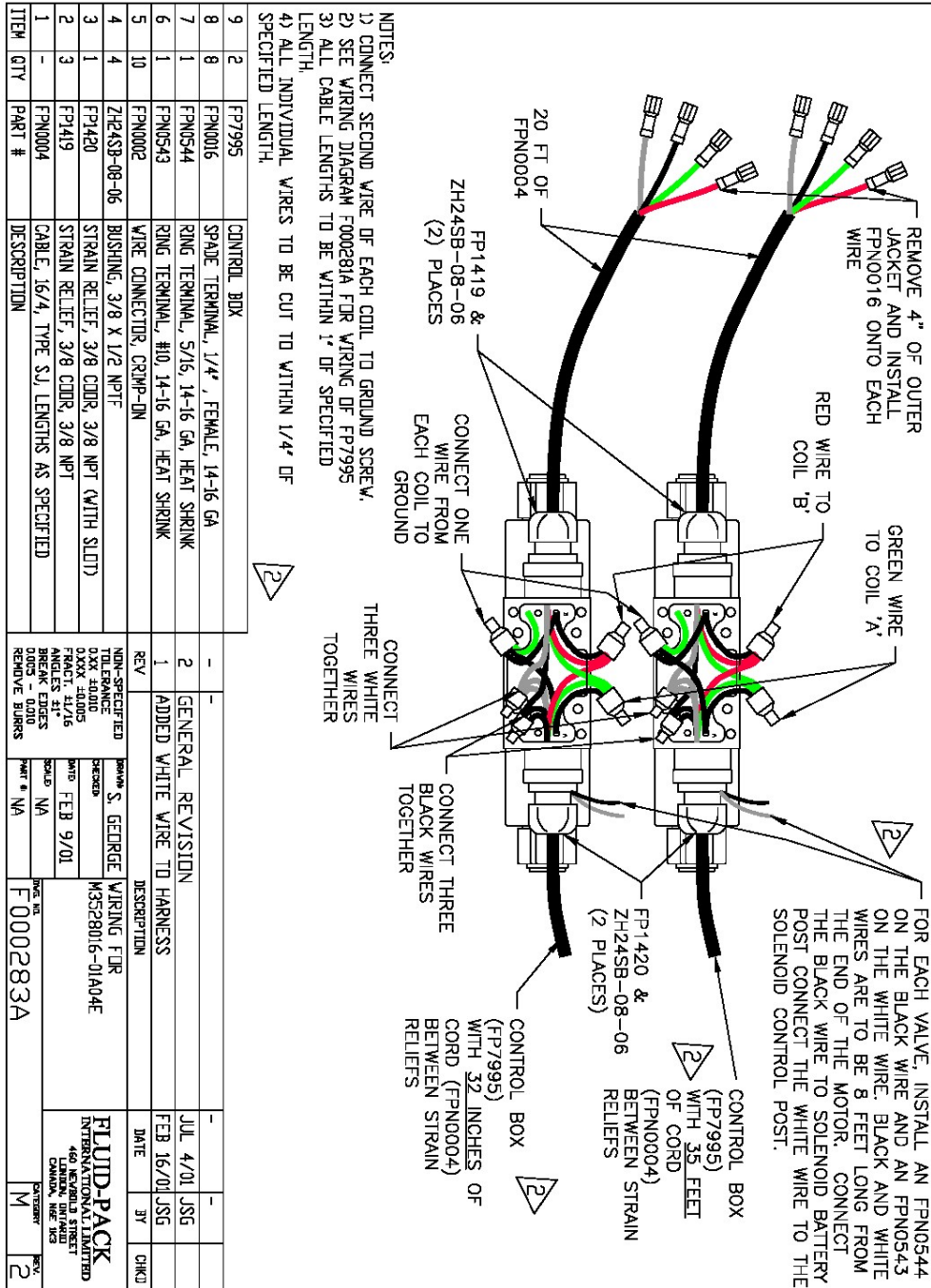
Figure 1: Hydraulic Schematic



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Figure 2: R-060 / R-061 Wiring Modification





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Figure 3: Electrical Schematic

