

Wheel Direction Sensor System Operation and Installation Manual

Operation of the *Reverse-A-Matic™* System

The *Reverse-A-Matic™* System (*R-A-M*) is a standalone device designed to automatically control the backup lights and alarm and to activate a lift or steer axle. The *Reverse-A-Matic™* module and sensor are to be installed on a trailer and require no manual input from the driver of the vehicle to operate.

Features

Automatically Senses when the trailer is reversing and:

- Turns on the trailer backup lights.
- Activates the trailer backup alarm system.
- Engages the trailer locking pin to secure a steer axle for straight operation.
- Operates the trailer lift axle for ease of maneuvering.
- Can activate a dome light inside the trailer while stopped.
- Requires NO MANUAL CONTROL from the cab or from the driver.

Reverse Detection

The *Reverse-A-Matic™* System (*R-A-M*) will activate two outputs after detecting eight inches of movement of the truck in reverse. One output will automatically raise a lift axle and/or lock a steer axle. The other output will activate a backup alarm system and lights.



Backup Lights and Alarm System

The backup lights and alarm will remain on whenever the trailer is moving in reverse. The backup lights and alarm will automatically turn off five seconds after the truck has stopped, or if the truck has moved 6 feet forward. The output for the backup lights and alarm is the yellow wire.

Lift / Steer Axle

The lift axle will remain up and/or a steer axle shall remain locked until the truck has moved 100 feet forward without stopping. Once the lift axle is down and the steer axle is unlocked, they shall remain disengaged whenever traveling forward. The lift axle will lower when power is disconnected from the trailer or when the ignition is turned off. The output for axle control is the brown wire.

Auxiliary Functions

The Lift Axle output may also be used as an automatic light switch to light either a dock light or to illuminate the right and left side of the trailer suspension for night visibility. The lights will turn off whenever travelling forward.

Fuse

The power input to the *R-A-M* Module is fused with an automatic reset fuse. The fuse is rated for 5 amps of continuous current with a maximum peak output of 9 amps.

Specifications Sheet

<i>Reverse-A-Matic™</i> System Electrical Characteristics		Units
Supply Voltage	12	Volts
Maximum Supply Voltage	24	Volts
Minimum Supply Voltage	9	Volts
Reverse Voltage	-24	Volts
Supply Current, No Output	50	MA
Normal Output Current	5	Amps
Maximum Output Current	9	Amps
Operating Temperature Range	Min	Max
Sensor	-40 °C	+150 °C
Module	-40 °C	+85 °C
Storage Temperature	-40 °C	+85 °C
Operations – Revolutions of a Wheel		
Reverse Activation – ON	1/16	Rev
Forward - Alarm Deactivation – OFF	½	Rev
Forward – Axle Release – OFF	9	Rev
Maximum Time ON for Alarm After Vehicle Stopped	5	Seconds
Environment Design	J1455	
Minimum Wheel Speed	0.3	Km/h
Maximum Wheel Speed	200	Km/h

Mounting Instructions for the *Reverse-A-Matic™* System (*R-A-M*)

The *R-A-M* unit and installation kit consists of a sensor block, sensor, barrel clip, mounting screws, and a control module. The control module must be connected to the sensor. The control module wiring must be connected to the constant power blue wire, the white ground wire and to a backup alarm system, and to the lift axle solenoid and/or steer axle pin control solenoid referred to as the axle control.

Mounting of the *R-A-M* system may require welding the sensor block to the axle, drilling holes for the control unit, soldering and running wires to the steer axle solenoid and to a backup alarm and/or lights.

1. The *R-A-M* directional sensor must be mounted on the left-hand side of the trailer (driver's side).

2. Do not mount the *R-A-M* direction sensor on a lift axle.
3. The *R-A-M* sensor should be mounted on one of the two tandem axles. The axle must have an ABS brake exciter ring (forward axle preferred). The block fits 7.05" or 7.64" Diameter rings.
4. Disconnect the 7 pin plug (J-560 Connector) from the tractor.
5. Remove the tires and brake drum from the hub following proper safety procedures and wear safety glasses.
6. Select a spot on the axle to weld the sensor block near the exciter ring so there is sufficient room to mount the sensor into the block from behind.
7. Locate the sensor block near the ABS exciter ring. It should be at least 45 degrees away from an ABS sensor, if an ABS sensor is present on the axle being used.
8. The sensor hole must be in line with the center of the exciter ring teeth. The block is designed to fit both ring sizes, if it is too high or too low then turn the block over and recheck the alignment.
9. The block should be parallel to the ring and approximately 0.125 inches away maximum. It is best to insert a fiber spacer between the block and the ring for the correct spacing during welding.
10. Clamp the block in place for welding. **NOTE:** The barrel clip and sensor should not be in the block when welding.



11. **NOTE:** Do not connect the ground terminal of the welder to the hub, this may cause the welding current to pass through the wheel bearing and damage it. Connect the ground terminal to the axle near the work. (Take special care not to splatter weld or touch the ABS exciter ring with the welder. Use a weld blanket or suitable cover shield.)
12. Weld the sensor block to the axle housing. Make sure it is parallel to the exciter ring when finished.
13. The Block must be protected from corrosion. Apply some anti-seize compound inside the sensor mounting hole.
14. Gently push the barrel clip into the block from the rear until the tabs touch the block. The barrel clip must be installed with the tabs on the inboard side of the sensor block.
15. Gently push the sensor into the sensor clip from the rear. The tab on the sensor must be pointing away from the center of the axle.
16. Push sensor body forward toward the ABS exciter ring. The gap between the teeth on the ring and sensors should not exceed 0.016 inches (.41mm) when finished.
17. Tie wrap the sensor cable safely to the axle, avoid interference with the operation of the brakes and ensure the cable is not strained. Run the cable along the axle and the air brake lines to the slider box. Tie wrap the sensor cables to the air brake lines every 25 to 30 cm (10 to 12 inches).
18. Install the *R-A-M* module on the inside of the lower slider frame rail or suitable location on the slider box. Drill two holes 3.68 mm diameter (0.145") and use the self-tapping screws included or use appropriate mounting hardware.
19. Connect the sensor to the control module. Make sure the connectors fit together properly and are not strained.
20. Run wires from the blue wire and the white wire of the trailer's main harness to the *R-A-M* unit.

A dropout wiring harness is available from Wheel Monitor for connecting the Blue and White wires to the trailers wiring harness. It has male and female weather pack connectors so it can be inserted into the main harness. It is easy to install and will provide bullet connectors for all four wires of the *R-A-M* module and two grounds. PN: WM-DWH-2001 for 1 foot long. PN: WM-DWH-2012 for 12' long.

21. Run wires from a backup alarm and/or an axle control solenoid to the *R-A-M* module as desired.
22. Run all wires along the airline supply (line caddy) to the module.
23. Connect the blue wire to the 12 volt battery supply wire.
24. Connect the white wire to the ground wire. (Do not use the chassis for ground. All components should be grounded to the main ground wire)
25. Connect the yellow wire to a backup alarm and/or backup lights.
26. Connect the brown wire to the axle control solenoid.
27. **Note:** All connections must be watertight. Any wires not used need to be shrink wrapped and taped up.



OPERATIONAL TEST OF *Reverse-A-Matic*™

To test the operation of the *R-A-M* system, perform the following:

1. Connect the 7 pin plug (J-560 Connector) to the tractor.
2. Both *R-A-M* outputs will come on for one second when the unit is powered up. This is an operational test to confirm the unit is functioning properly.
3. Rotate the wheel hub more than one-sixteenth of a revolution in reverse (clockwise) and observe the operation of the backup alarm and the axle control. The lift axle should lift and/or the steer axle should lock.
4. Stop and wait about 5 seconds and observe that the backup alarm turns off while the lift axle control remains on. The backup alarm should turn off 5 seconds after the wheel stops, or if the wheel is rotated one half turn forward.
5. Continue to rotate the hub in reverse (clockwise) and note that backup alarm is active and remains on while the wheel is rotating in reverse.
6. Rotate the hub one half turn forward (counter clockwise) and observe that the backup alarm turns off.
7. Rotate the hub nine continuous revolutions forward (counter clockwise) and observe that the axle control turns off. The lift axle will go down and/or the steer axle will unlock.
8. Document your results. Reinstall the brake drum and tires.

We recommend that a light be installed on the side of the trailer as an axle status indicator to the driver. A side marker lamp may be connected to the *R-A-M* output already connected to the axle control solenoid. The other side of the marker lamp should be connected to ground wire.

TROUBLE SHOOTING

If the unit did not operate as described the Operation and Test section of this document, then check the installation.

Quick Check

If both the backup alarm and the axle control turn on for one second when the trailer was powered up, then the *R-A-M* module is working. Check the sensor alignment (see next page). If only one output turned on, then check the electrical connections.

Check Electrical Connections

1. Check that all connections are sound and are made to the correct locations. Ensure the sensor cable connector is pushed all the way into its mating connector coming from the control unit.
2. To check the input power, disconnect the connectors on the blue and white wires. Measure the voltage from blue to white coming from the Trailer, It should be around 9 to 16 volts D.C. If it is correct, reconnect the wires.
3. If one of the backup alarm or the lift axle/steer axle control is not functioning, then the wiring may not be correct. Disconnect the output control bullet connector and measure the voltage while the unit is re-tested. The output should be 9 to 16 volts D.C. If it is correct, then the wiring or connections are incorrect. Also insure that the backup alarm, lights and lift/steer axle are functioning properly.
4. If the lift axle/steer axle control is not functioning, check the air supply to the lift axle and/or to the pin lock.

Check Sensor Alignment

1. The sensor may need to be re-aligned. Check to make sure the sensor is centered on the ABS exciter ring. If it is too high or too low then the sensor will not be able to read the teeth on the ring.
2. Check the Gap between the sensor and the exciter ring, it should be between 0.004 inches (.11mm) and no more than 0.016 inches (.41mm).
3. If the wheel or the bearings have excessive wheel play, then the sensor may not be able to read the teeth on the ABS exciter ring. If so, an inspection of the wheel bearing should be performed. Check and reset bearing pre-load if required.
4. The sensor tab should be pointing away from the center of the axle. If it is not, then rotate it and check operation of the unit again.
5. If the unit is still not functioning then rotate the sensor 15 degrees counter clockwise and check operation of the unit again.
6. If the unit is still not functioning then rotate the sensor back. Rotate 15 degrees clockwise and check operation of the unit again. Repeat with 30 degrees of rotation if required.
7. If after following this installation and trouble shooting guide, and the unit is still not functioning properly, please call Wheel Monitor at 1-(905)-641-0024. Ask for a service technician and we will be pleased to assist you further.

Servicing Maintenance

A visual examination of the sensor, the sensor mounting, all electrical connections and the control module should be performed on the *Reverse-A-Matic*™ wheel direction sensing system on a regular basis. An operational test of the unit should be performed and documented every three months.

***Reverse-A-matic*™ SYSTEM INSTALLATION**

Figure 1 *Reverse-A-Matic*™ Module Location

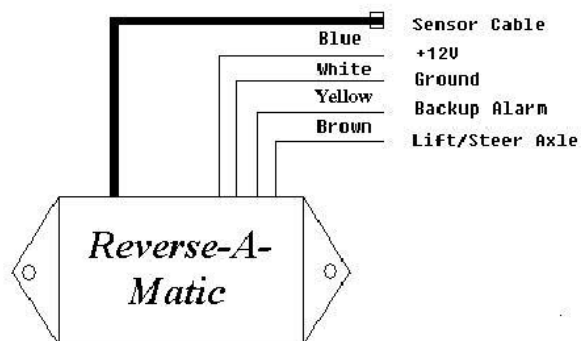
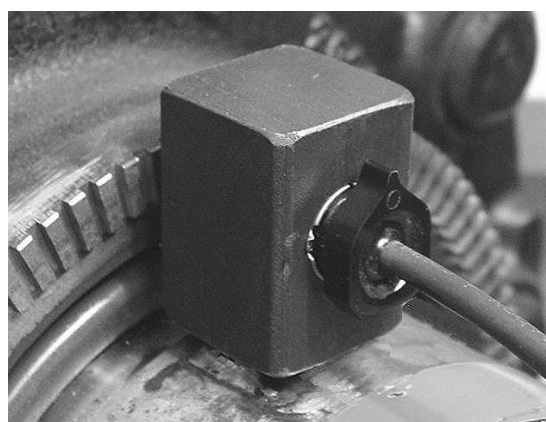
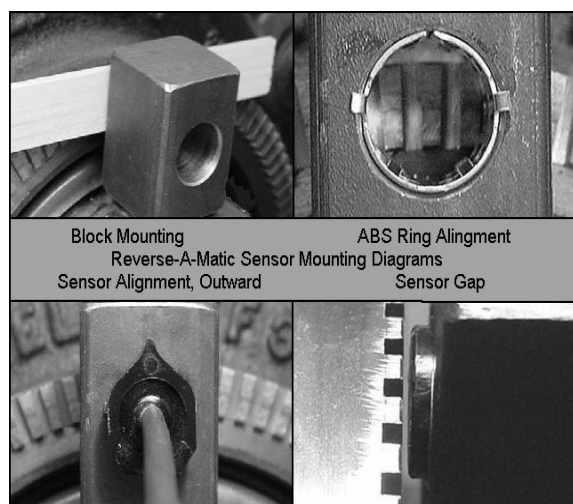
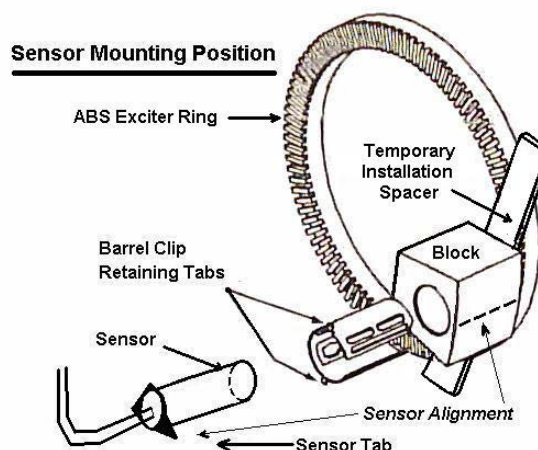



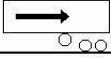
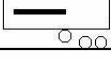
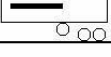
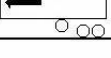
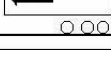
Figure 2 Sensor Mounting

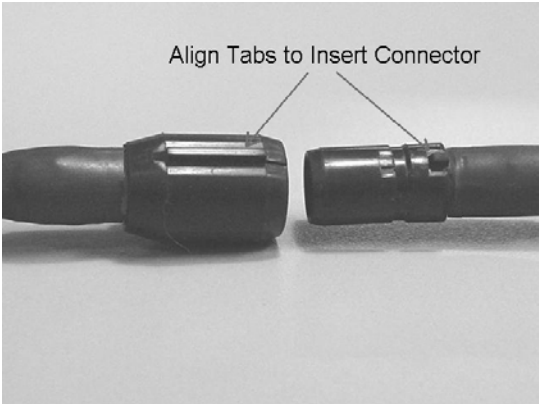


Sensor Block And Sensor (RAM2055)

FUNCTIONAL DIAGRAM

Reverse-A-Matic™ System Function Chart

Direction of Truck & Trailer	Lift Axle Status / Steer Axle Locking Pin Status	Reverse Warning Device & Lights
Forward 	Lift Axle Down Pin is Unlocked	Backup Lights & Alarm OFF
Reverse 8" 	Lift Axle Up Pin is Locked	Backup Lights & Alarm ON
Stop 	Lift Axle Up Pin is Locked	Backup Lights & Alarm ON
Stop 5 Seconds 	Lift Axle Up Pin is Locked	Backup Lights & Alarm OFF
Forward 	Lift Axle Up Pin is Locked	Backup Lights & Alarm OFF
Forward 100 Feet 	Lift Axle Down Pin is Unlocked	Backup Lights & Alarm OFF



CAUTION
Insert Connector with care

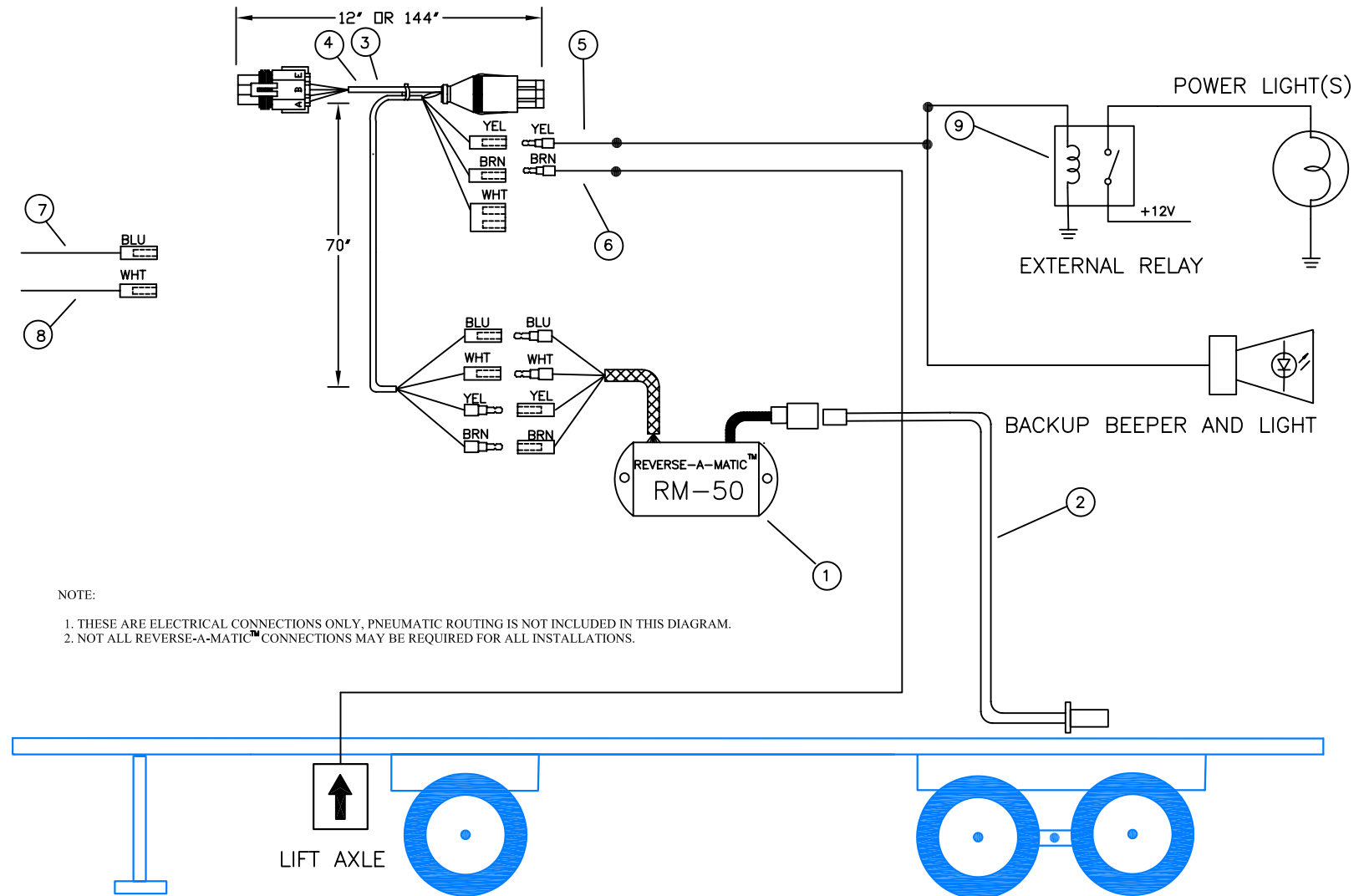


Reverse-A-Matic™ with Power Harness



Part Number 200587

See Wiring Diagram for more details



ITEM	PART#	DESCRIPTION	REMARK
1	AS PER QUOTE	RM50 REVERSE-A-MATIC™	
2	200512-SENSOR	RAM2053 REVERSE-A-MATIC™ SENSOR	
3	200514	SHORT POWER HARNESS 12" (4 WIRE)	OPTIONAL
4	200515	LONG POWER HARNESS 12' (4 WIRE)	OPTIONAL
5	200580	MALE BULLET YELLOW-17"	OPTIONAL
6	200581	MALE BULLET BROWN-17"	OPTIONAL
7	200585	FEMALE BULLET BLUE-17"	OPTIONAL
8	200586	FEMALE BULLET WHITE-17"	OPTIONAL
9	200578	EXTERNAL RELAY MODULE	NOT INCLUDED
10			
11			
12			

Title			
REVERSE-A-MATIC™ RM50 SYSTEM WIRING DIAGRAM			
Size	Number	Revision	
Letter	WMRAM4043-001	Rev. A	
Date: Dec 15th, 2005		Sheet of 1	
File: RM50-System-Wiring-Diagram.dwg		Drawn By: T. Wang	