



# Installation Instructions

**NOTE! THESE INSTALLATION INSTRUCTIONS ARE INCOMPLETE, FOR FURTHER REFERENCE SEE THE PRINTED COPY INCLUDED WITH THE PRODUCT!**

TRAILER ANTILOCK BRAKING SYSTEM

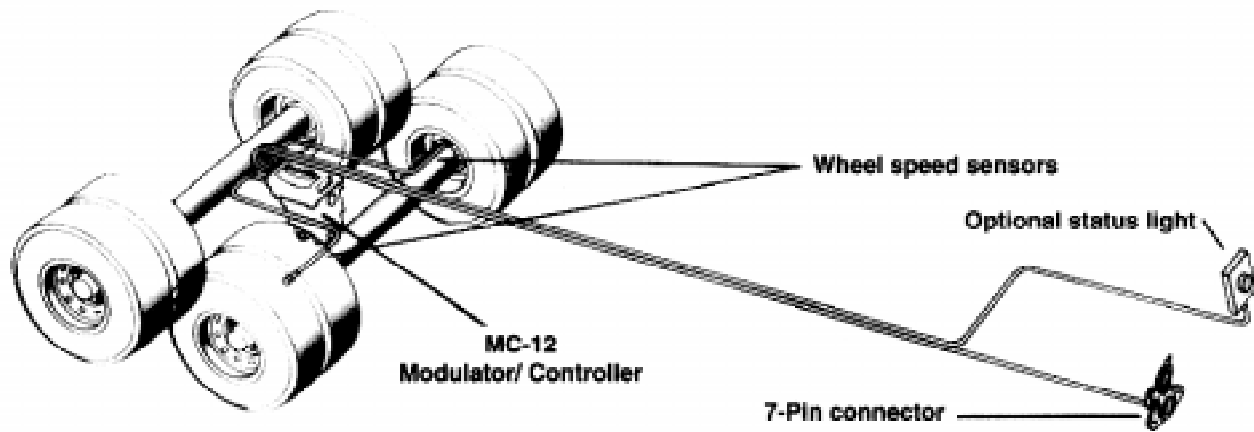


Figure 1: MC-12 Modulator / Controller

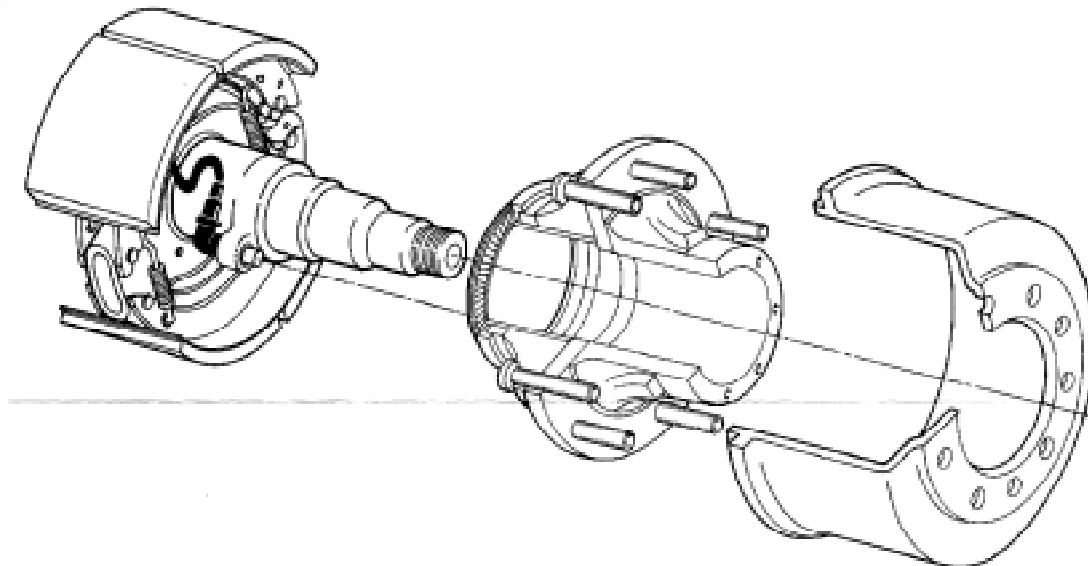
**IMPORTANT! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:**

When working on or around a vehicle, the following general precautions should be observed at all times.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels.
2. Stop the engine when working around the vehicle.
3. If the vehicle is equipped with air brakes, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle.
4. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in manner that removes all electrical power from the vehicle.
5. When working in the engine compartment the engine should be shut off. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated, or electrically charged components.
6. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
7. Never exceed recommended pressures and always wear safety glasses.
8. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
9. Use only genuine Bendix replacement parts, components, and kits. Replacement hardware, tubing, hose, fittings, etc. should be of equivalent size, type, and strength as original equipment and be designed specifically for such applications and systems.
10. Components with stripped threads or damaged parts should be replaced rather than repaired. Repairs requiring machining or welding should not be attempted unless specifically approved and stated by the vehicle or component manufacturer.
11. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.



Typical Trailer AntiLock System



Notched Hub Sensing

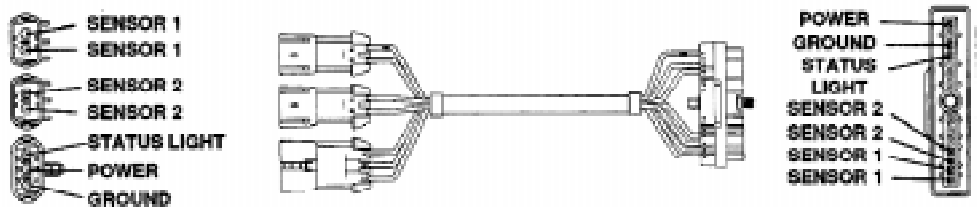


FIGURE 1.  
14 PIN CONNECTOR

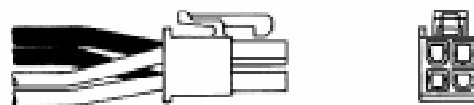


FIGURE 2.  
CONNECTOR LOCATED BETWEEN  
THE EC-12 & M-12 SOLENOID ASSEMBLY

## GENERAL INFORMATION

The Bendix trailer antilock system is designed to improve vehicle stability by reducing wheel lock-up during aggressive braking. Like Bendix tractor antilock, the trailer system can provide single or tandem axle control. The main component can be frame rail or reservoir nipple-mounted, so the system requires no special trailer modifications.

The trailer antilock system consists of the following: MC-12 Modulator/Controller, WS-20 Wheel Speed Sensors, and standardized connectors and wiring. The MC-12 is the main component. It houses the EC-12 Electronic Controller and the M-12 Modulator, which contains solenoids and a standard relay valve.

The EC-12 houses the electronics that regulate the trailer anti lock system. Its internal components are environmentally protected by a self-healing silicone compound. The EC-12 also contains a diagnostic display window and a 14 pin connector.

The EC-12 mounts to the M-12 Modulator with four bolts, and it is internally connected to the solenoids by a four pin connector (Fig. 2). The solenoids are the interface between the EC-12 electronic signals and the pneumatically operated modulator.

Sensors mounted at the wheel end send wheel speed information to the EC-12 through the 14 pin connector (Fig. 1). The sensors are actually A.C. generators. They house magnets, which create a magnetic field. When the field is interrupted by an irregular surface, such as a tone ring, A.C. voltage is produced. The frequency of voltage increases or decreases as wheel speed increases or decreases.

During normal, non-antilock operation, the M-12 inlet solenoid is open, and the exhaust solenoid is closed. In this condition, the M12 functions as a regular R-12 Relay Valve. It receives a control signal from the foot valve, which passes through the open inlet solenoid and into the control cavity of the R-12. The R-12 applies air to the brake chambers in proportion to the control signal.

If wheel lock-up is impending, the EC-12 commands the solenoids to modulate brake chamber pressure on the axles in which the system is installed.

The MC-12 Modulator Controller receives its power from the vehicle's stop light circuit [pin #4 (red) on the standard seven-pin connector]. The power enters the MC-12 Controller at pin A on the 14 pin connector.

System ground (pin #1 on the seven-pin connector) enters the MC-12 at pin C.

Each wheel speed sensor sends the MC-12 its A.C. signal through a pair of wires. The MC-12 receives the signals through pins L-M and N-P on the 14 pin connector. The MC-12 sends its failure signal to the optional status light through pin D.

## FAILURE INDICATION

The optional status light indicates the condition of the trailer antilock system. During initial start-up, when the trailer stop lights are activated, the MC-12 immediately runs a self-check. The status light flashes once and then goes off. Should a problem occur, the antilock system will then automatically disengage and return to normal R-12 relay valve operation.

If the status light comes on and remains on when the trailer stop lights are activated, a system problem has occurred. The EC-12 contains a diagnostic window, which directs the driver to the problem area. The series of LEDs (light emitting diodes) on the EC-12 indicate failures with power, EC-12 controller, wheel speed sensors, M-12 solenoids, or voltage level.

## TROUBLESHOOTING

If the status light remains on after the trailer stop lights have been activated, inspect the diagnostic window for illuminated LEDs. Each LED represents a specific area.

### RED LED INDICATES FAILURE

When the EC-12 senses a failure, the red LED corresponding to the failure mode will illuminate. A failure is stored in memory until the problem is repaired and the EC-12 is reset.

**NOTE:** only the voltage LED resets itself after the condition no longer exists.

Be sure to record a failure before resetting the system. Reset by holding a magnet (capable of picking up 3 ounces) over the RESET location on the diagnostic window. If the LED(s) do not clear during a reset, check all wiring and hardware per the troubleshooting chart. During a reset, all LEDs will illuminate until the magnet is removed.

Before placing the vehicle back into service, it should be road tested to verify proper antilock system operation. The system can be tested by making an aggressive trailer stop from a vehicle speed of 20 mph. When an aggressive stop is made, solenoid pulsation creates an audible burst of air, which can be heard from outside the trailer.

## TROUBLESHOOTING INFORMATION

Upon completion of each component replacement or test, perform the status light indication test.

**NOTE:** The status light is an optional feature in the trailer antilock system. If no status light is present, the diagnostic LEDs should be checked periodically. As a minimum, check the LEDs during any routine inspection.

## STATUS LIGHT INDICATION TEST

When the trailer brakes are actuated, the warning light will react under one of the following conditions:

- A. The light flashes once and goes off. System is functioning properly.

B. The light does not come on.

1. If the trailer stop lights go on when the trailer brakes are actuated, but the antilock warning light does not blink, proceed to step 3.
2. If the trailer lights do not go on, the EC-12 is not receiving a trailer stop light signal. The trailer stop lights receive a signal from the tractor stop light switch. Make sure the switch is functioning properly. Check the contact points for pits or wear.
3. Check the diagnostic window for a green LED. If no green LED is illuminated, the EC-12 is not receiving power. Check the voltage between pins A and C of the 14 pin connector. Make sure the wires between the seven pin connector and the 14 pin connector are not frayed or damaged.

If the green LED is on, check the status light itself. Make sure it is not burned out or damaged. Make sure it is properly grounded and properly connected to pin D on the 14 pin connector.

C. The light does not blink but comes on and remains on.  
Proceed to the LED diagnostic test.

#### LED DIAGNOSTIC TEST

If the status light indicates a failure in the system (by constant illumination), examine the diagnostic window for an illuminated LED.

#### DIAGNOSTIC WINDOW DISPLAY

1. The voltage LED (volt) will illuminate when power to the MC-12 falls outside the acceptable range of 9-18 volts. This LED will illuminate only when the condition exists. If MC-12 voltage returns to an acceptable range, the LED will turn off.
  - a. MC-12 (trailer stop light) power below 9 volts.
    1. Low battery.
    2. Stop light wire to/from seven pin connector damaged or not correct gauge. Check wire, and check pin four on the seven pin connector.
    3. Ground wire to/from seven pin connector damaged or not correct gauge. Check wire, and check pin one on seven pin connector.
  - b. MC-12 (trailer stop light) power above 18 volts.
    1. Tractor regulator malfunctioning. Battery overcharging.
    2. Connected to a 24 volt system.
2. The modulator LED (MOD) will illuminate when solenoid resistance exceeds the acceptable ranges. It can also illuminate if excessive electrical spikes are present in the power line. Record indicated failure and perform a reset.
  - a. Modulator LED turns off.
    1. Intermittent connection between EC-12 and M-12. Check the four pin connector.
    2. Excessive electrical spikes in power supply line. Check trailer wiring and tractor electrical system.
  - b. Modulator LED remains on.
    1. Check connection between EC-12 and M-12. At the 4 pin connector, measure resistance across both pairs of wires. (black-black and white-white) Resistance should be 9.5-11.5 ohms. Measure resistance of each pin to the metal housing of the EC-12. Resistance should be greater than 1 mega ohm. (No continuity.)
      - a. Resistance correct. Replace EC-12.
      - b. Resistance incorrect. Replace M-12.
3. Sensor LEDs (SNS1 or SNS2) illuminate when sensor resistance exceeds the acceptable range. Sensor LEDs may also illuminate if sensor output is below the required level due to excessive gap between the sensor and the tone wheel. Record indicated failure and perform a reset.
  - a. Sensor LED turns off.
    1. Intermittent short or open wheel speed sensor. Check cable assembly for frayed wires or cracked insulation. Inspect sensor for damage.
    2. Wheel sensor gap exceeds specification. Adjust gap to within requirement.
    3. Missing or damaged tone wheel. Replace tone wheel.
  - b. Sensor LED remains on. If only one sensor LED is illuminated, the problem sensor must be identified. Disconnect one of the sensor connectors from the cable assembly (Fig. 1). Then examine the diagnostic window. If only one LED remains on, the problem sensor was disconnected. If another sensor LED illuminates, a good sensor was disconnected.
    1. Shorted or open wheel speed sensor. Check sensor resistance between its two contacts. Resistance must be above 1,000 ohms and below 10,000 ohms. If sensor does not meet this requirement, replace it and perform a reset.
    2. Shorted or open cable assembly. Replace the assembly and perform a reset.
4. The controller LED ("CONT") will illuminate if excessive electrical spikes are present in the power line. It will also illuminate if the EC-12 is malfunctioning. Record indicated failure and perform a reset.
  - a. Controller LED turns off.
    1. Excessive electrical spikes are present in the power line. Examine electrical connections and monitor vehicle voltage.
  - b. Controller LED remains on.
    1. Power MC-12 on and off, and perform a reset. If controller LED remains on, replace EC-12 and perform a reset.