



# Installation Instructions

ANTILOCK SYSTEMS USING THE EC-14/MC-14

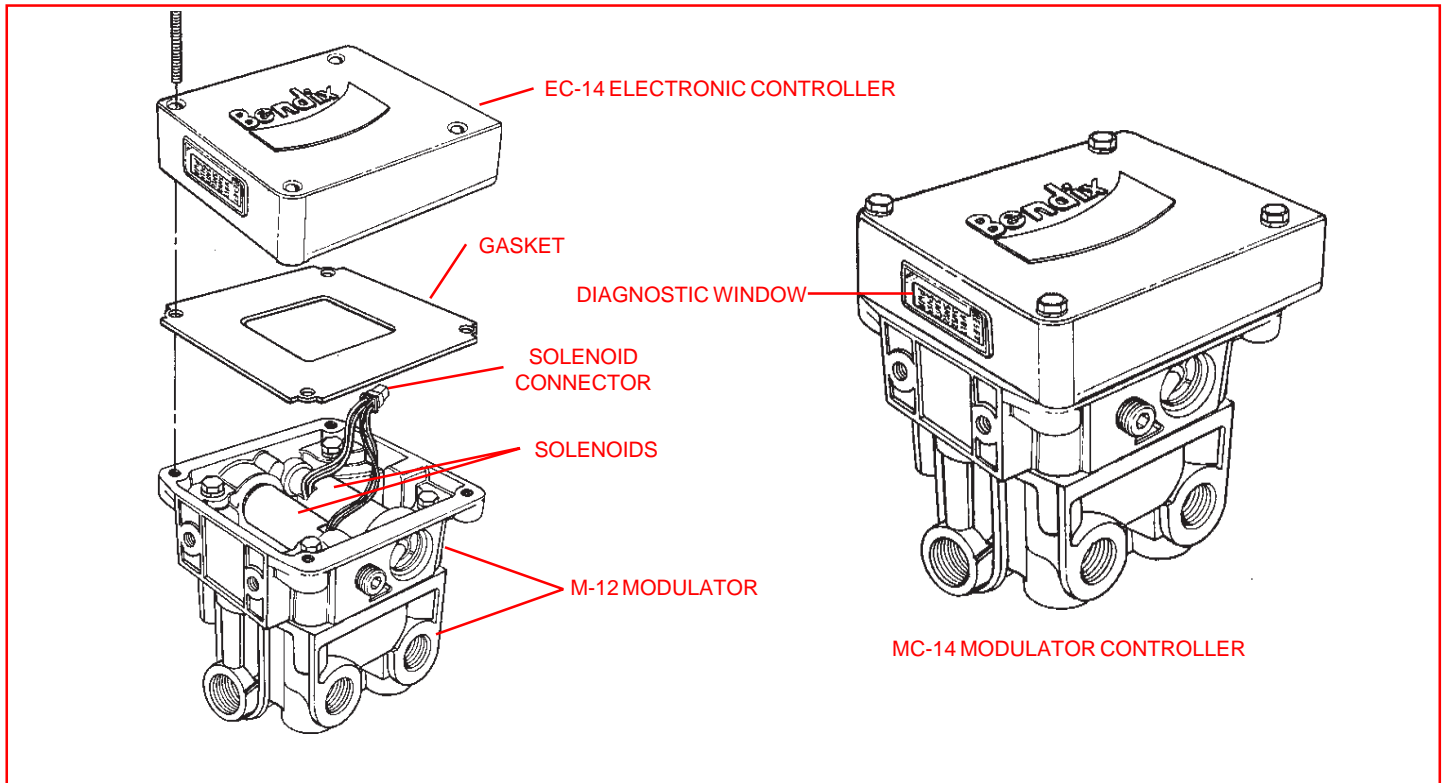


FIGURE 1 EC-14 CONTROLLER AND MC-14 MODULATOR CONTROLLER

## DIAGNOSING AND LOCATING A SYSTEM PROBLEM

### GENERAL

The EC-14 contains self test and diagnostic circuitry that continuously checks for proper operation of the entire antilock system including wiring continuity. A dash lamp, controlled by the EC-14, advises the driver of the condition of the entire antilock system. The condition of specific antilock components is provided to the mechanic by a series of labeled, Light Emitting Diodes (LED's) displayed through a "window" in the EC-14 housing. No special tools or equipment are needed to read or interpret the EC-14 diagnostics window. It should be noted that the EC-14 diagnostics display is separate from the antilock condition lamp on the dash. With this separation, the driver is aware of any problems that occur but is not confused by the diagnostic information.

A special feature of the EC-14 controller is the failure latching and diagnostic system. Intermittent problems, particularly in the wheel speed sensing area can be difficult to diagnose. When the controller senses an erroneous condition, whether in the controller electronics, the modula-

tor or wheel speed sensing areas, it stores the condition in non-volatile memory, disables the antilock function, illuminates the dash mounted antilock condition lamp and the appropriate diagnostic LEDs on the EC-14. The failure condition is truly stored and is not cleared by loss of power to the EC-14. The LEDs will re-light when power is restored and remain illuminated until the failure is corrected. After the actual problem is corrected, maintenance personnel can clear or reset the EC-14 diagnostics by passing a small magnet over the RESET point in the diagnostics window.

### DIAGNOSTIC LEDs

There are nine LEDs plus a magnetically actuated reset switch in the EC-14 diagnostic window. The first five LEDs locate a problem to a specific area of the vehicle while the last four indicate the problem component or its wiring. The LEDs are software driven and are either ON or OFF depending upon their monitor function. (Note: Right and left, front and rear are determined from the driver's seat. Left front is therefore the corner closest to the driver.)

LED	oFRONT	RedLED
LED	oMID	Red LED (SEE NOTE BELOW)
LED	oREAR	RedLED
LED	oRIGHT	RedLED
LED	oLEFT	RedLED
LED	oMOD	RedLED
LED	o SENS	RedLED
LED	o ECU	RedLED
LED	oVOLT	GreenLED
—	RESET	NoLED

NOTE: The MID LED shown in the chart above is not used in the diagnostic process for the EC-14 however it will light when a magnet is placed on the RESET switch in the diagnostic window.

#### “FRONT” LED

This Red LED illuminates and latches ON in order to indicate the location of a problem component or its wiring. It will light in conjunction with either the RIGHT or LEFT LED and the SENS LED when indicating a sensor malfunction. The FRONT LED will also light in conjunction with the MOD LED to indicate that the front modulator (M-21) or its wiring has malfunctioned.

#### “MID” LED

This Red LED is not used in troubleshooting the EC-14 and should light only when a magnet is held on the RESET switch.

#### “REAR” LED

This Red LED illuminates and latches ON in order to indicate the location of a problem component or its wiring. It will light in conjunction with either the RIGHT or LEFT LED and the SENS LED when indicating a speed sensor malfunction. The REAR LED will also light in conjunction with the MOD LED to indicate that the rear modulator (M-12) or its wiring has malfunctioned.

#### “RIGHT” LED

This Red LED illuminates and latches ON in order to indicate the location of a problem component or its wiring. It will light in conjunction with either the FRONT or REAR LED and the SENS LED. THIS LED SHOULD NOT LIGHT when a MOD LED is on.

#### “LEFT” LED

This Red LED illuminates and latches ON in order to indicate the location of a problem component or its wiring. It will light in conjunction with either the FRONT or REAR LED and the SENS LED. THIS LED SHOULD NOT LIGHT when a MOD LED is on.

#### “MOD” LED

This Red LED illuminates and latches ON to indicate a permanent or intermittent open or short circuit in the solenoids of one of the two modulators or the wiring connecting it to the system. The MOD LED will illuminate in conjunction with either the FRONT or REAR LED.

#### “SENS” LED

This Red LED illuminates and latches ON to indicate permanent or intermittent failure. The failures indicated are; open or shorted wheel speed sensor, open or shorted wheel speed sensor wiring, wheel speed signal not present or does not conform to design criteria. The SENS LED will illuminate in conjunction with either the FRONT or REAR and either the RIGHT or LEFT LED.

#### “ECU” LED

This Red LED, when illuminated, indicates that the controller itself has failed. It is latched ON for all EC-14 failures except low voltage. For voltages less than 9VDC, this LED illuminates to indicate the controller is inoperative, however when the voltage again exceeds 9VDC the LED will go OUT by itself.

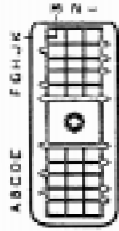
#### “VOLT” LED

This Green LED illuminates and remains ON during vehicle operation to indicate that vehicle power is reaching the controller. If vehicle power is out of range for proper operation (below 10 vdc or above 17 vdc) this LED will flash until power is brought into range. This LED may also flash indicating that a "marginal" low voltage condition existed at the time of an AntiLock event.

#### “RESET”

Beneath the RESET area of the window display is a magnetically sensitive switch that is used to reset the diagnostic system. The device will respond to a magnet which has strength sufficient to lift a three (3) ounce weight. Holding a magnet against the RESET will cause all LEDs to light during the time the magnet is against it.

WIRE HARNESS CONNECTOR  
( TO EC-14 CONTROLLER )



TERMINAL	FUNCTION
1K, 2K	BATTERY POWER
1A, 2A	VEHICLE GROUND (-)
3F	DASH WARNING LAMP
3G	RETARDER DISABLE
2B	BRAKE SWITCH
3A	SERIAL A
3B	SERIAL B
2F	FRONT MODULATOR EXHAUST
2G	FRONT MODULATOR HOLD
1G	FRONT MODULATOR SOURCE (+)
3J	LEFT FRONT SPEED SIGNAL (+)
3H	LEFT FRONT SPEED SIGNAL (-)
2H	RIGHT FRONT SPEED SIGNAL (+)
3K	RIGHT FRONT SPEED SIGNAL (-)
3E	LEFT REAR SPEED SIGNAL (+)
2C	LEFT REAR SPEED SIGNAL (-)
3D	RIGHT REAR SPEED SIGNAL (+)
3C	RIGHT REAR SPEED SIGNAL (-)
1H	NOT USED
1J	NOT USED
1F	NOT USED
1B	NOT USED
1C	NOT USED
1D	NOT USED
2D	NOT USED
2E	NOT USED
1E	NOT USED
2J	NOT USED

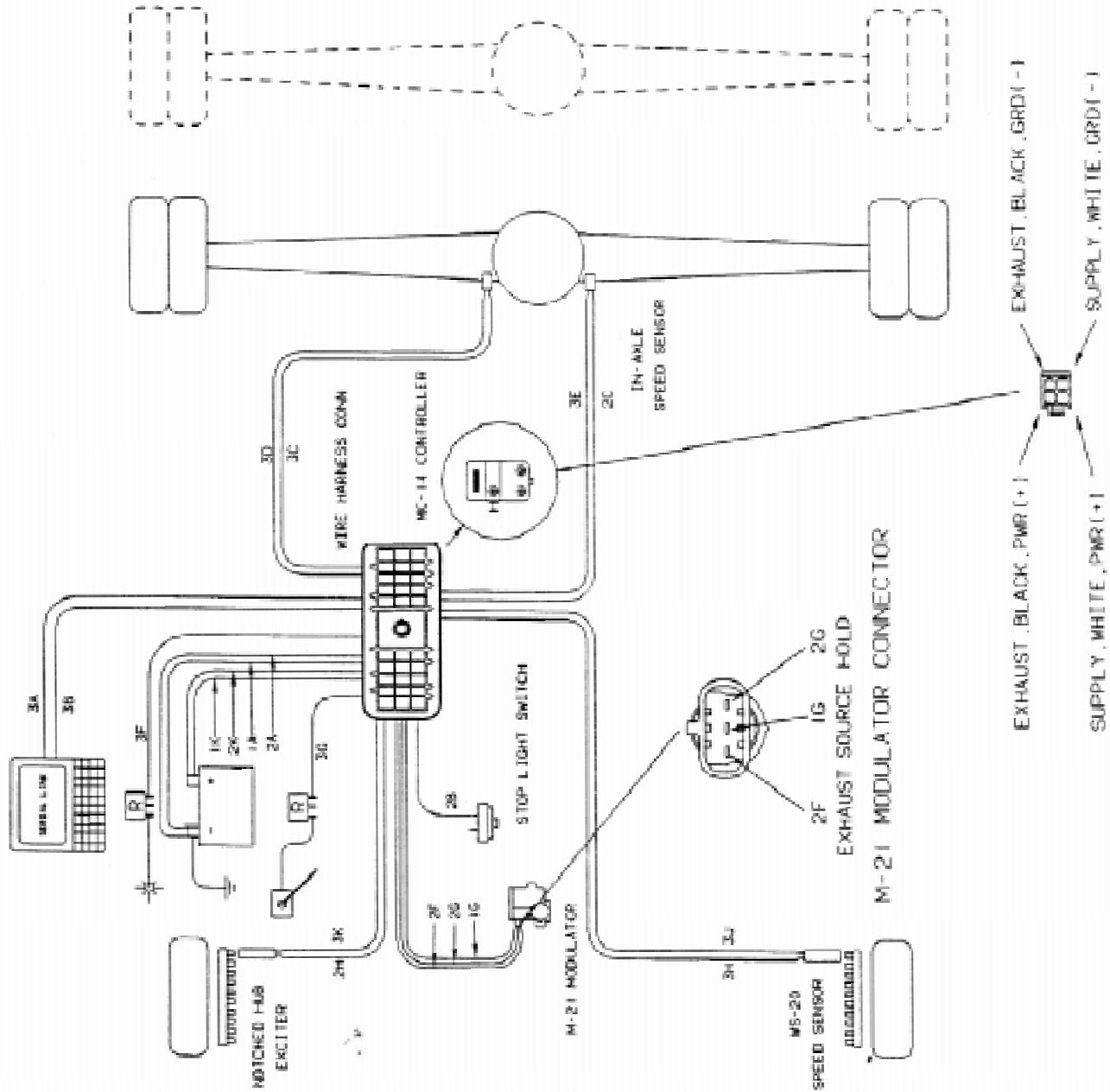


FIGURE 2 WIRING SCHEMATIC FOR EC-14

# TROUBLESHOOTING

## GENERAL

While the EC-14 diagnostic display locates a specific problem area, it is still necessary to confirm whether the problem resides in the component itself or the wiring. Basically the trouble shooting procedure that follows is devoted to narrowing the problem to either the wiring or a specific antilock component.

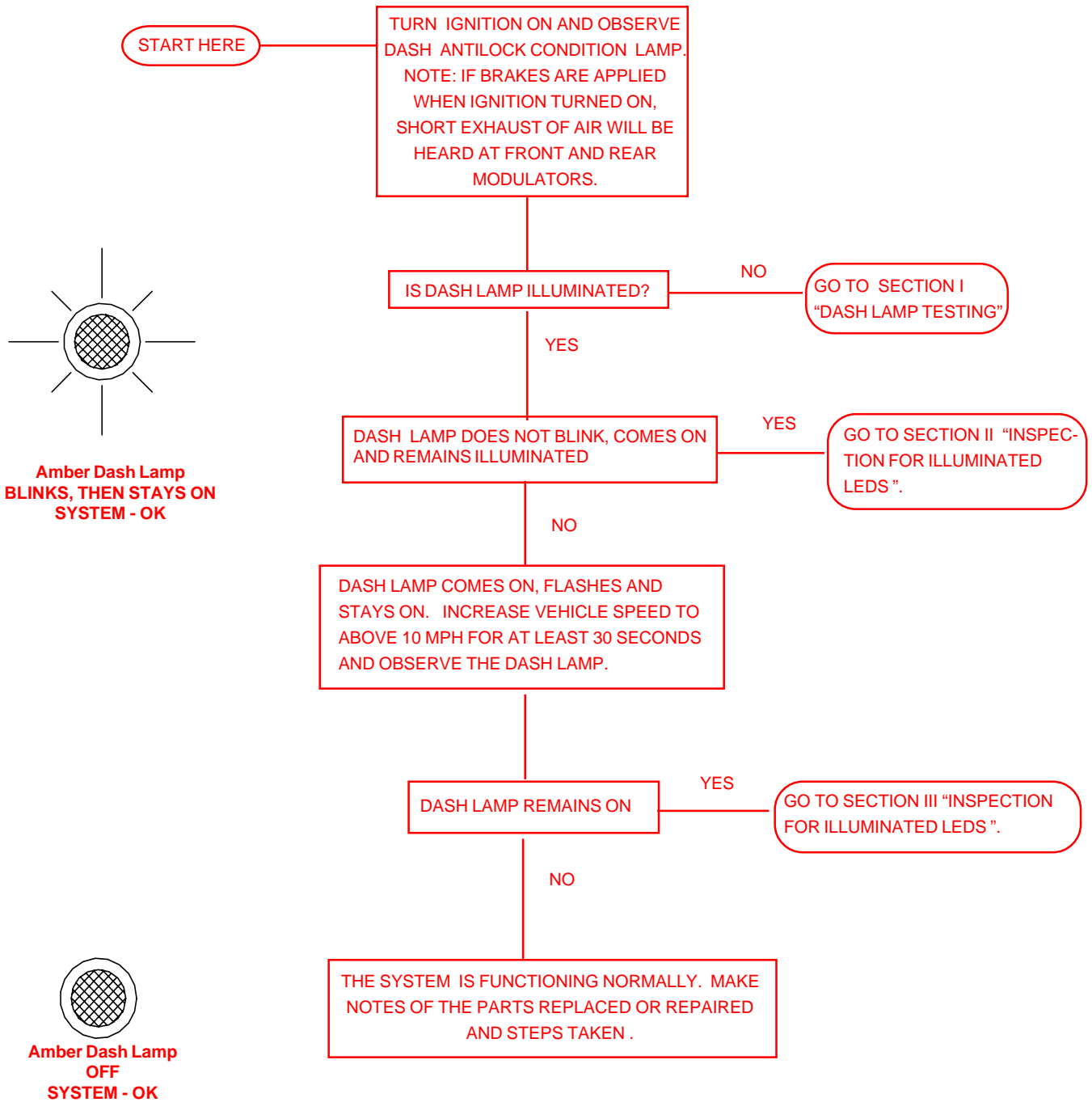
It should be noted however that ALL TROUBLE SHOOTING BEGINS BY OBSERVING THE ANTILOCK CONDITION LAMP ON THE DASH. All trouble shooting should begin by first performing the "Initial Start-up Procedure" and following the directions contained in it.

## IMPORTANT - TROUBLE SHOOTING TIPS

1. All troubleshooting begins by observing the AntiLock condition lamp on the dash. Troubleshooting should begin by first performing the "Initial Start-up Procedure" and following the directions contained in it.
2. The troubleshooting technician should record all findings and the action taken during the troubleshooting process.
3. No voltage or resistance tests are performed into the EC-14. All voltage and resistance tests are performed by beginning at the wire harness half of the connector and moving AWAY from the EC-14 toward an antilock system component (Modulator, Wheel Speed Sensor, etc.)

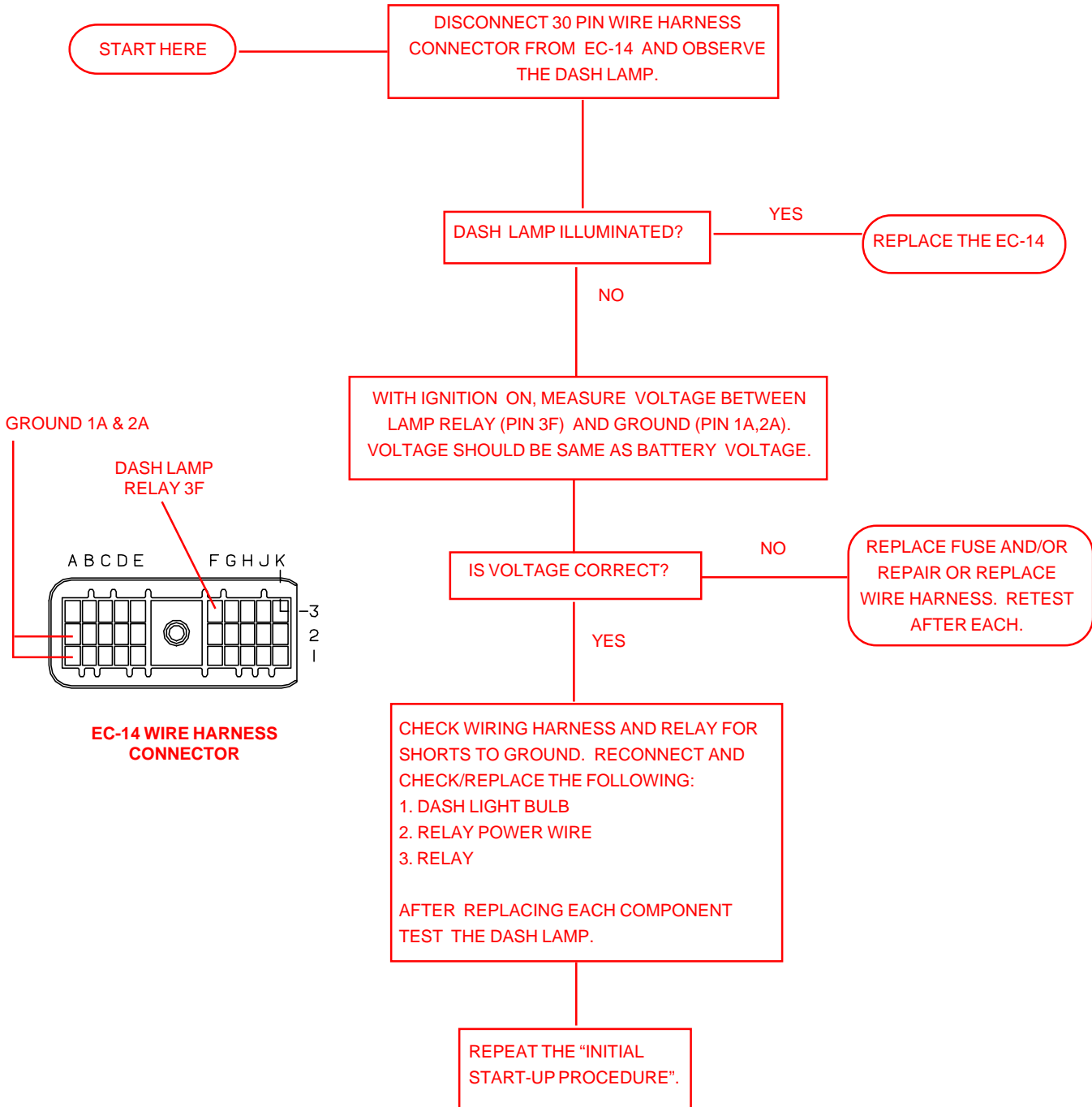
# TROUBLESHOOTING

## INITIAL START-UP PROCEDURE



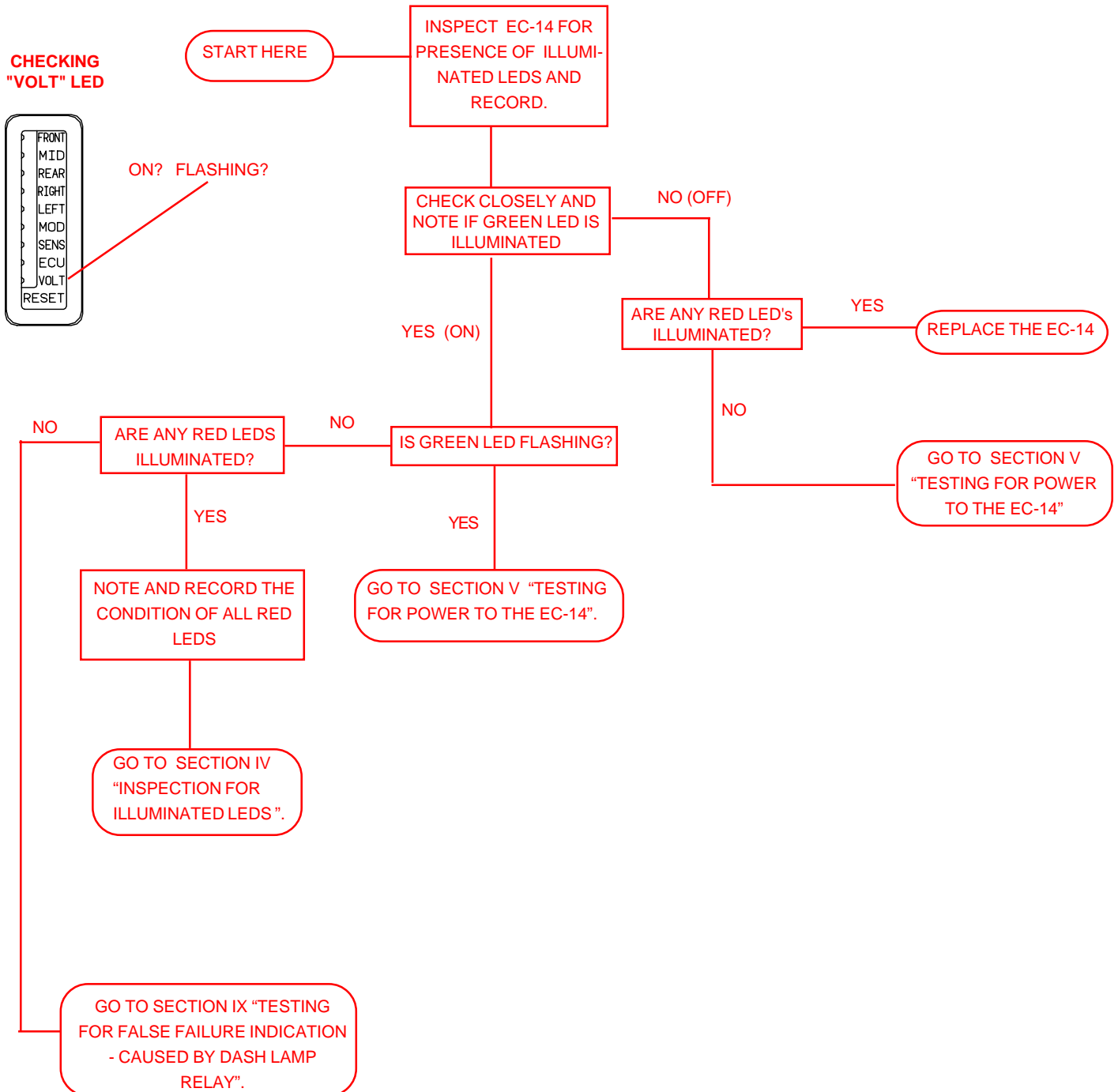
# TROUBLESHOOTING

## SECTION I DASH LAMP TESTING



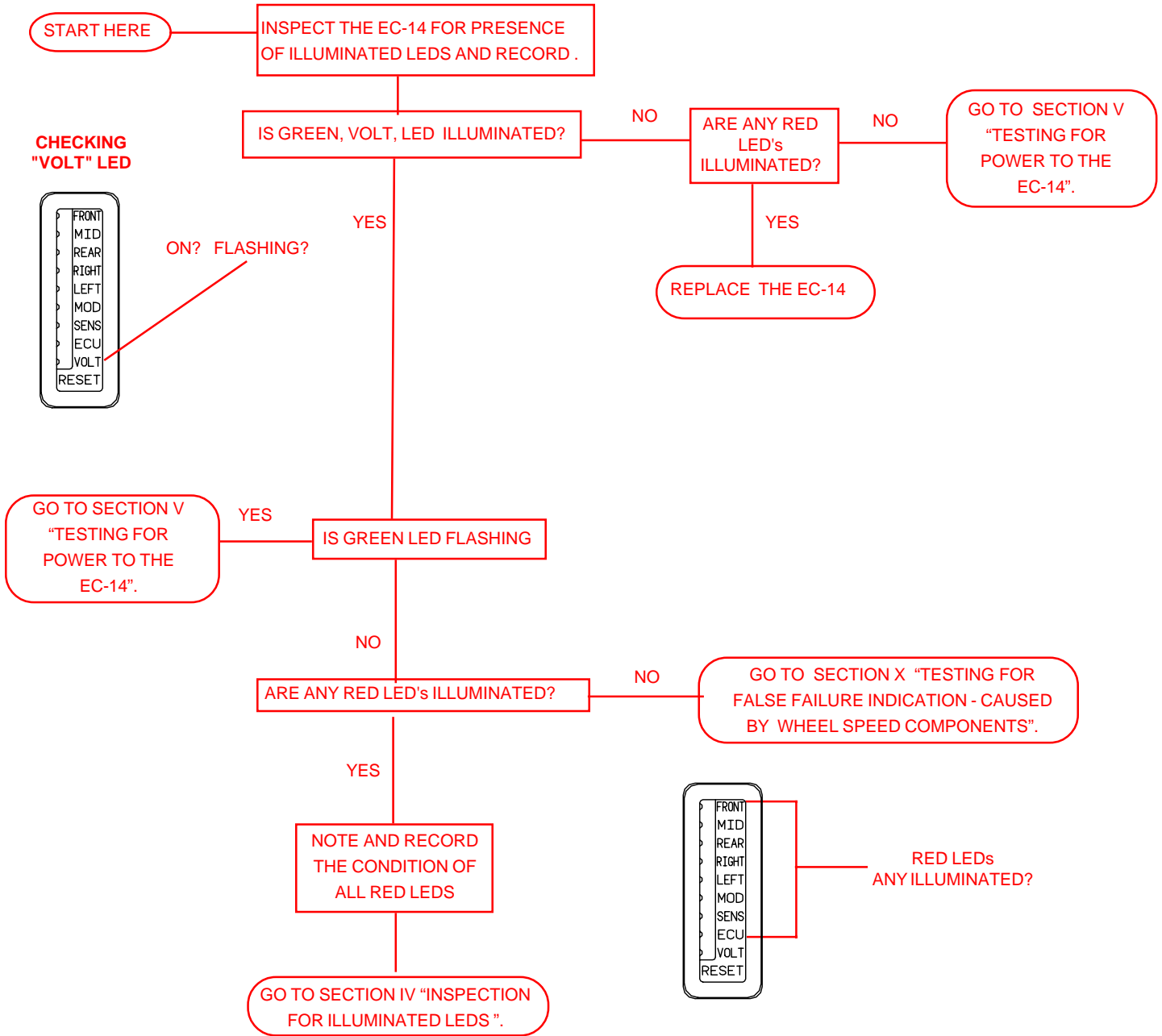
# TROUBLESHOOTING

## SECTION II INSPECTION FOR ILLUMINATED LEDS



# TROUBLESHOOTING

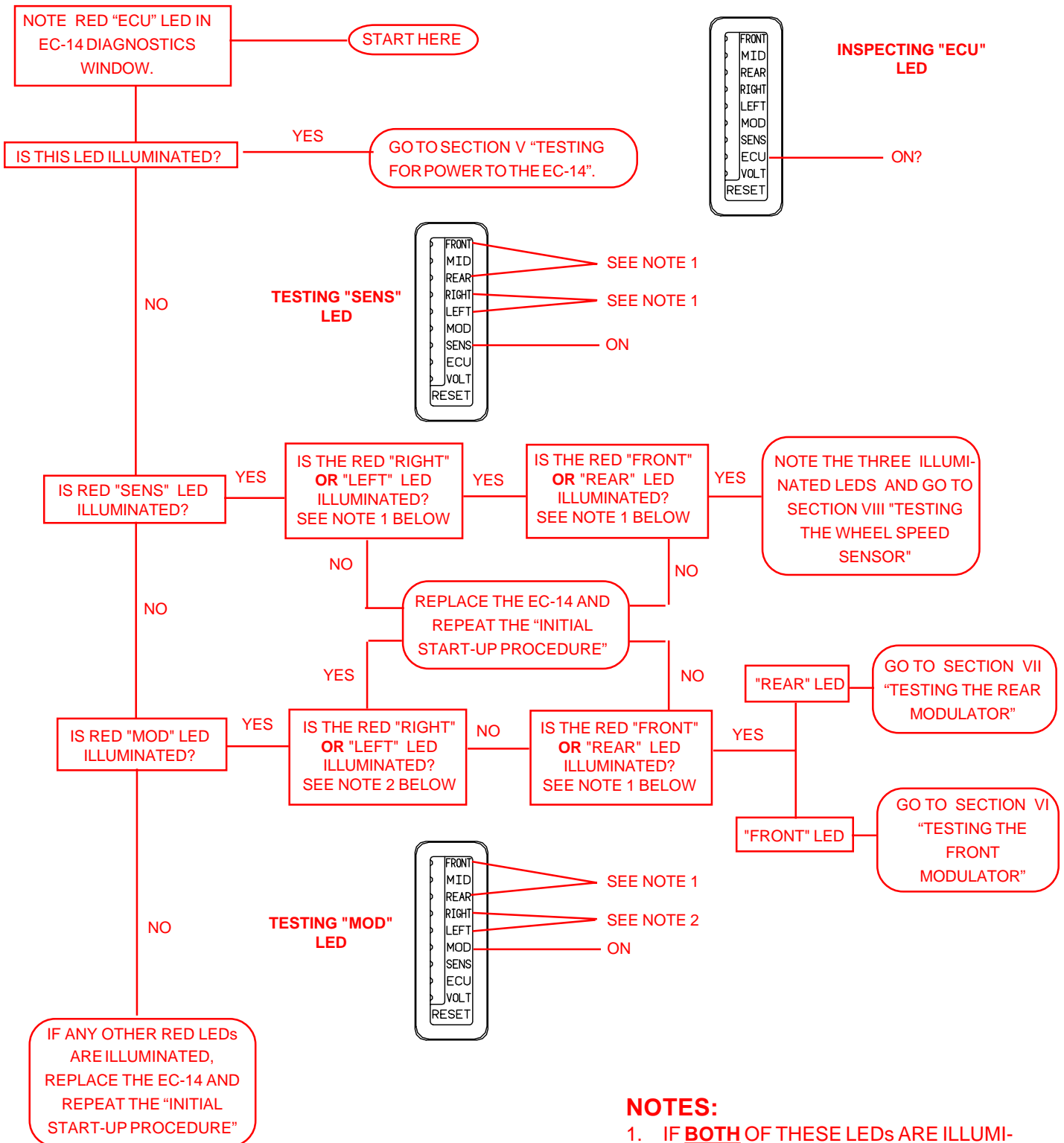
## SECTION III INSPECTION FOR ILLUMINATED LED'S





# TROUBLESHOOTING

## SECTION IV INSPECTION FOR ILLUMINATED LEDs

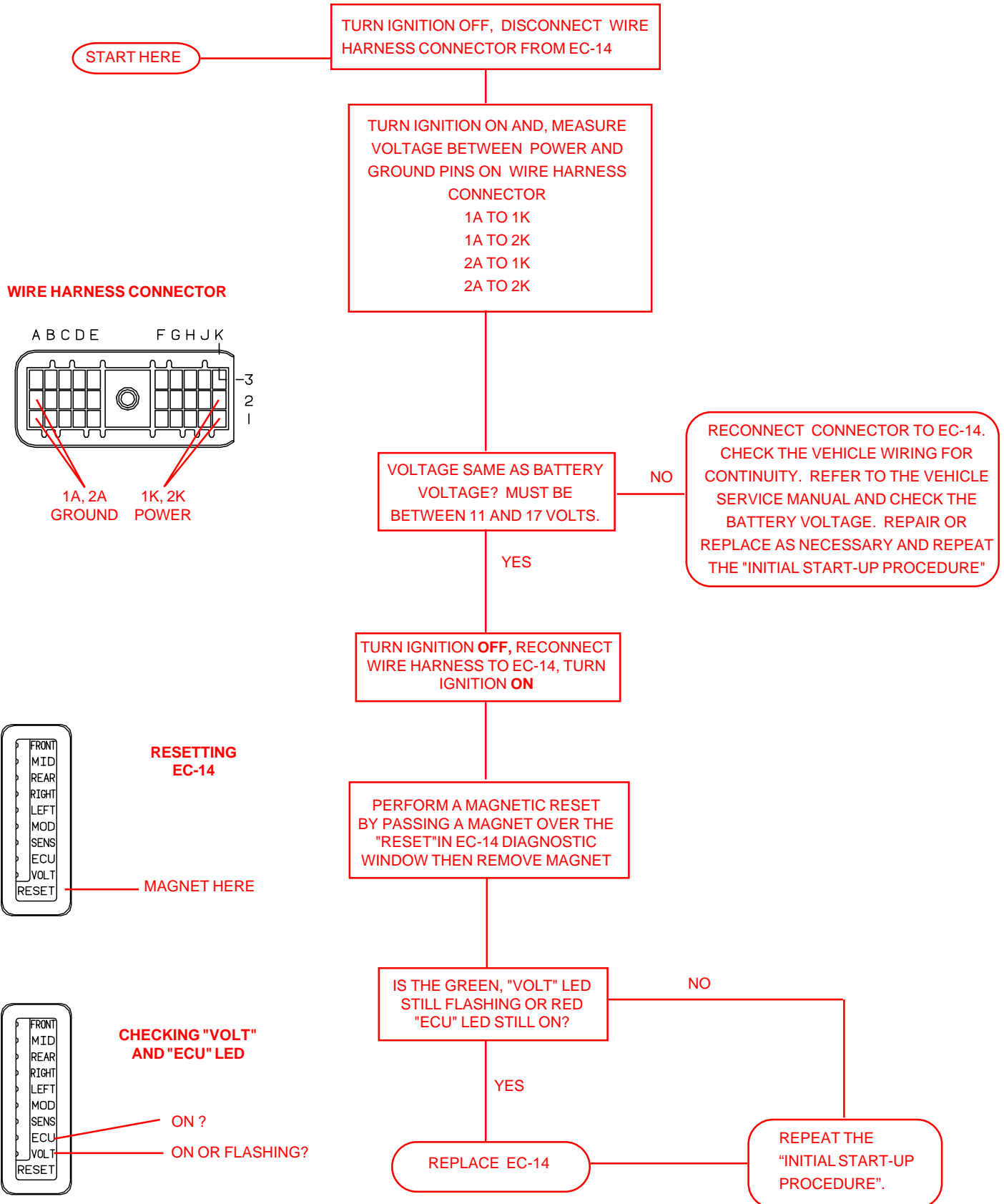


### NOTES:

1. IF **BOTH** OF THESE LEDs ARE ILLUMINATED, REPLACE THE EC-14 CONTROLLER
2. IF **EITHER** OF THESE LEDs ARE ILLUMINATED, REPLACE THE EC-14 CONTROLLER

# TROUBLESHOOTING

## SECTION V TESTING FOR POWER TO THE EC-14



# TROUBLESHOOTING

## SECTION VI A TESTING THE FRONT MODULATOR

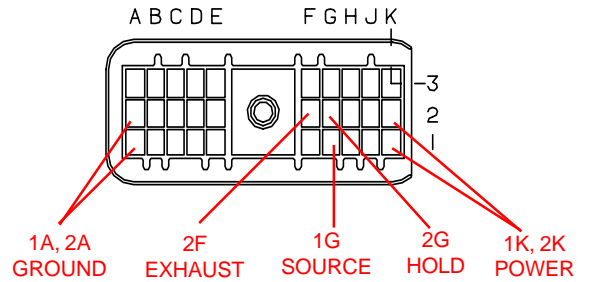
TURN IGNITION OFF. DISCONNECT WIRE HARNESS CONNECTOR FROM EC-14.

START HERE

PROBE CONNECTOR WITH VOLT/OHMMETER AND NOTE THAT PROPER RESISTANCE VALUES ARE OBTAINED FOR MODULATOR BEING TESTED. RESISTANCE VALUES HERE FOR BENDIX M-21 MODULATOR.

HOLD TO SOURCE (2G TO 1G):	READ 3.5 TO 5 OHMS
EXHAUST TO SOURCE (2F TO 1G):	READ 3.5 TO 5 OHMS
EXHAUST TO HOLD (2F TO 2G):	READ 7 TO 10 OHMS
SOURCE TO POWER (1G TO 1K, 2K):	NO CONTINUITY
SOURCE TO GROUND (1G TO 1A, 2A):	NO CONTINUITY

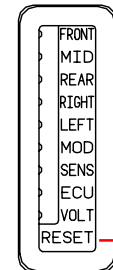
WIRE HARNESS CONNECTOR



ARE RESISTANCE VALUES CORRECT?

YES

INSPECT CONNECTOR AND RECONNECT TO EC-14. TURN IGNITION ON AND PASS MAGNET OVER "RESET" ON EC-14. REMOVE MAGNET AND NOTE REACTION OF RED LEDS.



RESETTING EC-14

MAGNET HERE

NO

GOTO SECTION VI B AND CONTINUE TESTING

ARE ANY RED LED'S ILLUMINATED?

NO

REPEAT "INITIAL START-UP PROCEDURE". IF TESTING HAS RETURNED TO THIS STEP TWICE - REPLACE THE EC-14.

YES

SAME RED LED'S ILLUMINATED?

YES

REPLACE EC-14

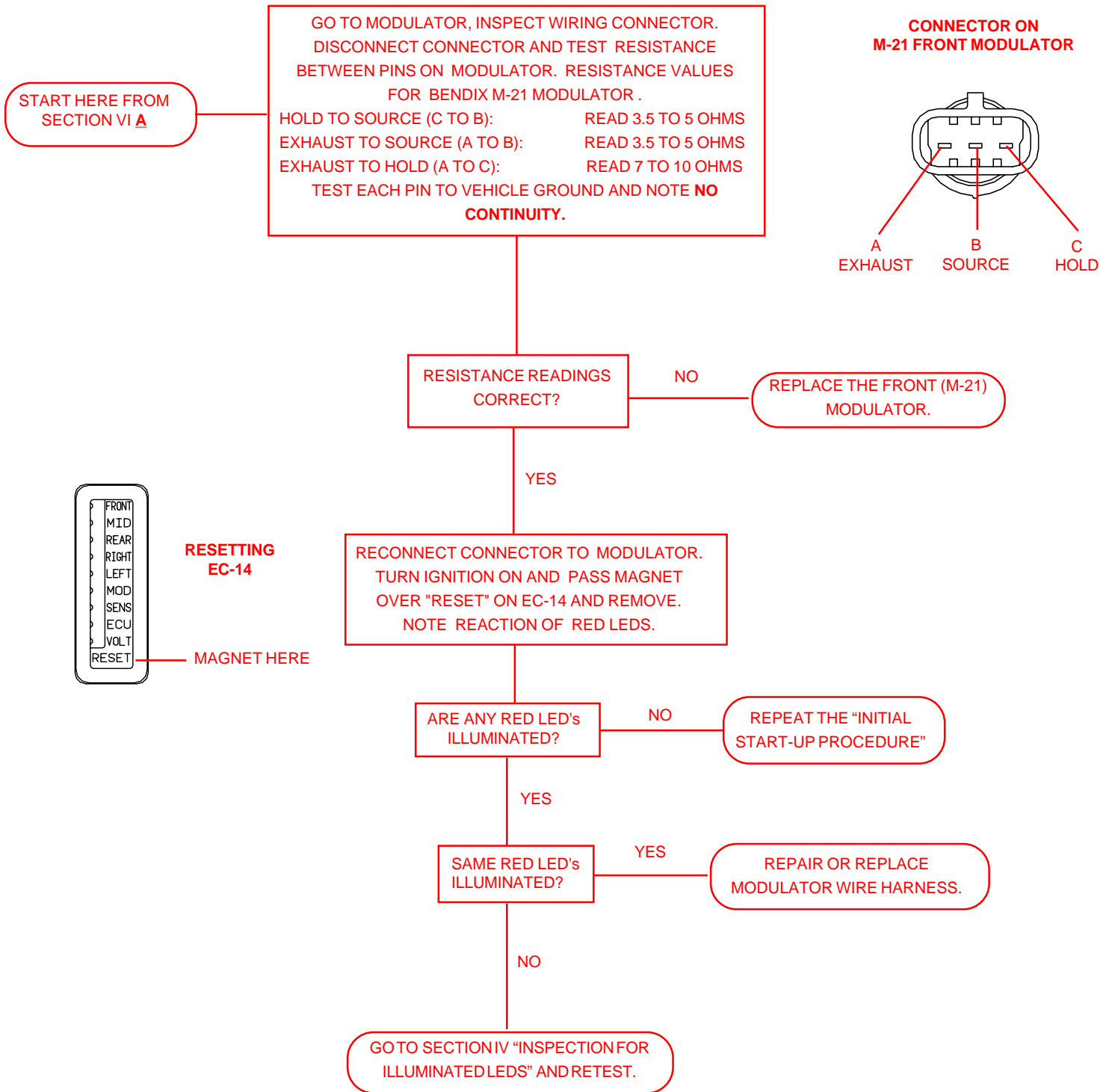
NO

GO TO SECTION IV "INSPECTION FOR ILLUMINATED RED LEDS" AND RETEST.

IF FAILURE PERSISTS, REPLACE THE EC-14.

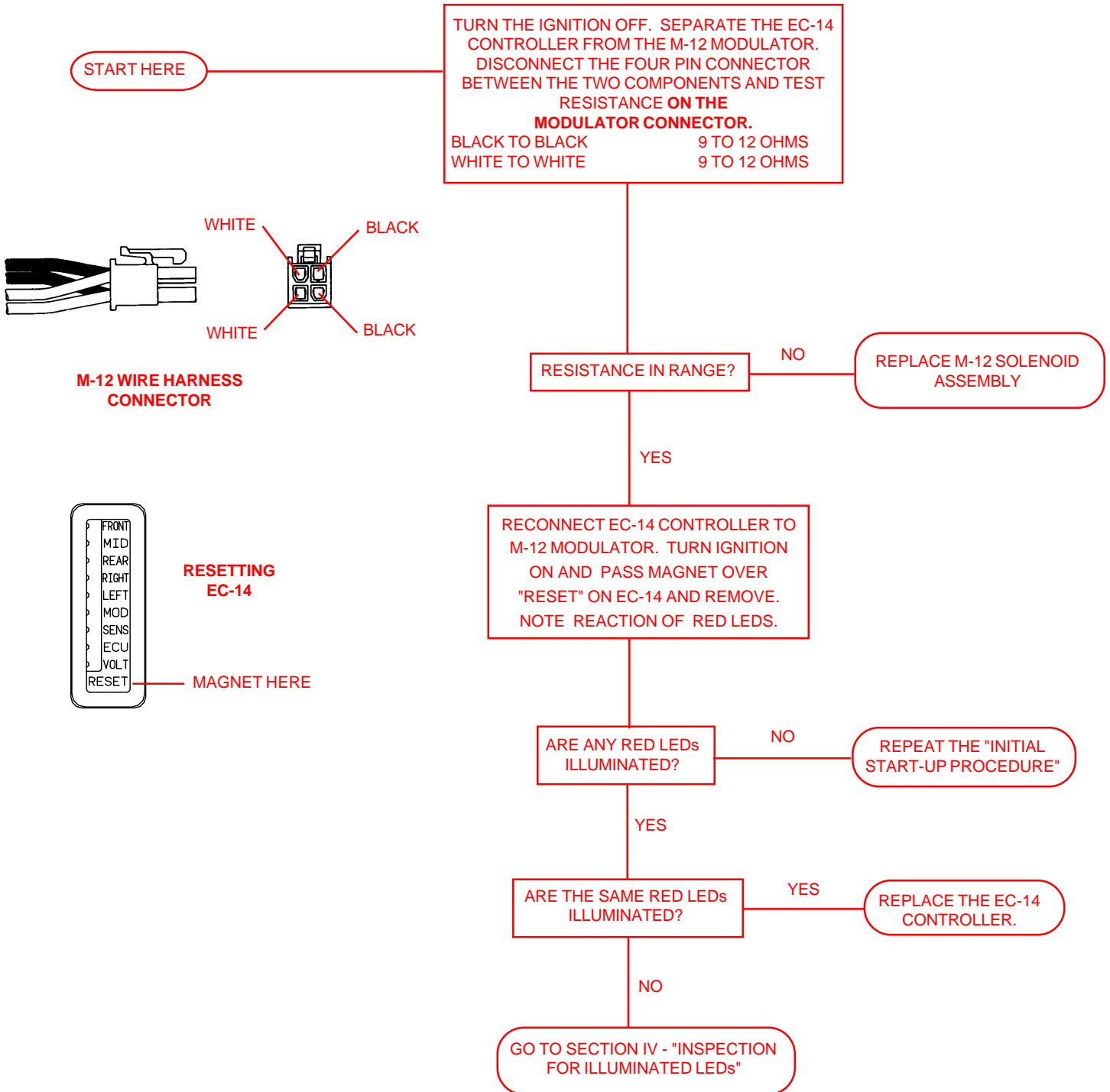
# TROUBLESHOOTING

## SECTION VI B TESTING THE FRONT MODULATOR



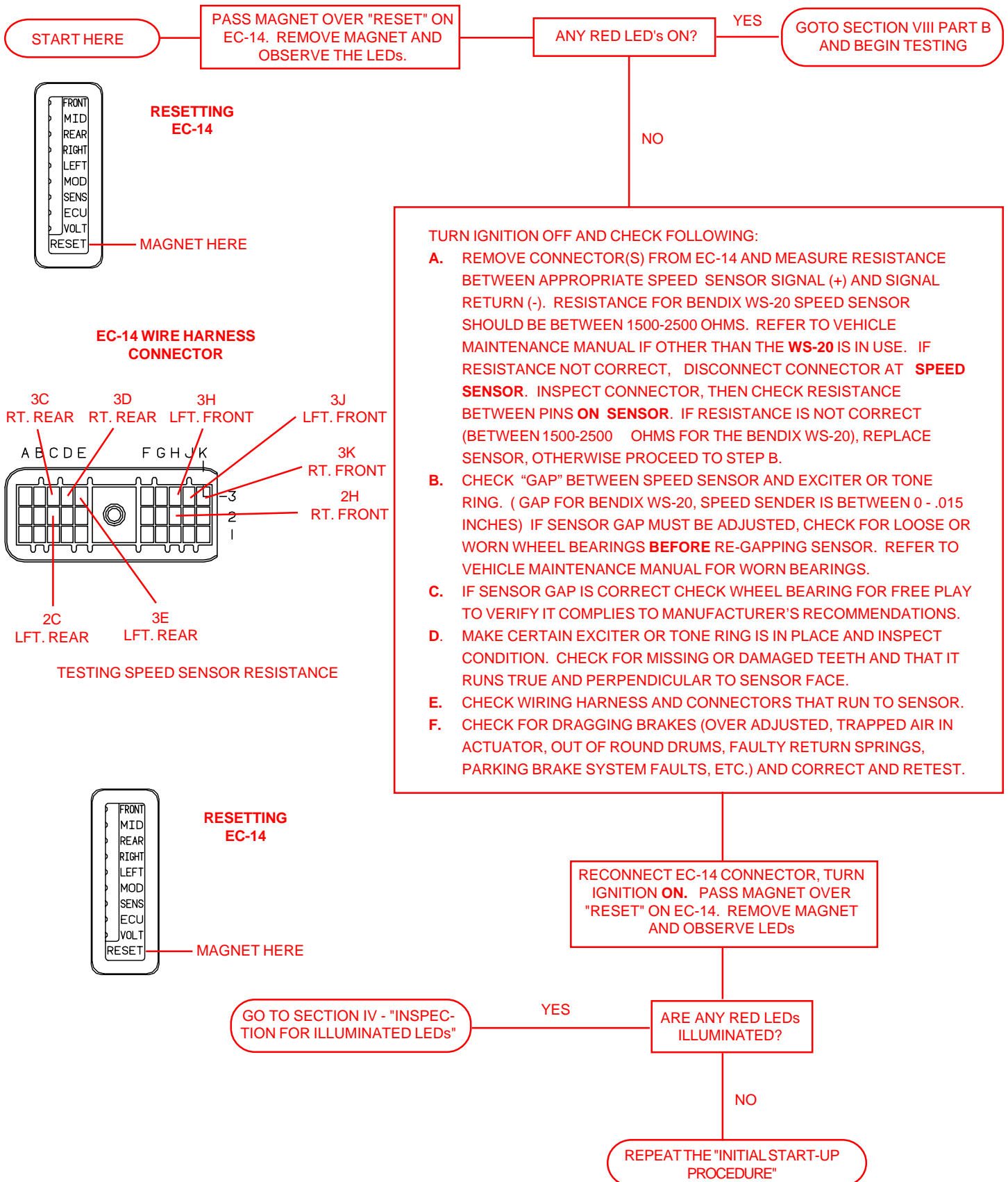
# TROUBLESHOOTING

## SECTION VII TESTING THE REAR (M-12) MODULATOR



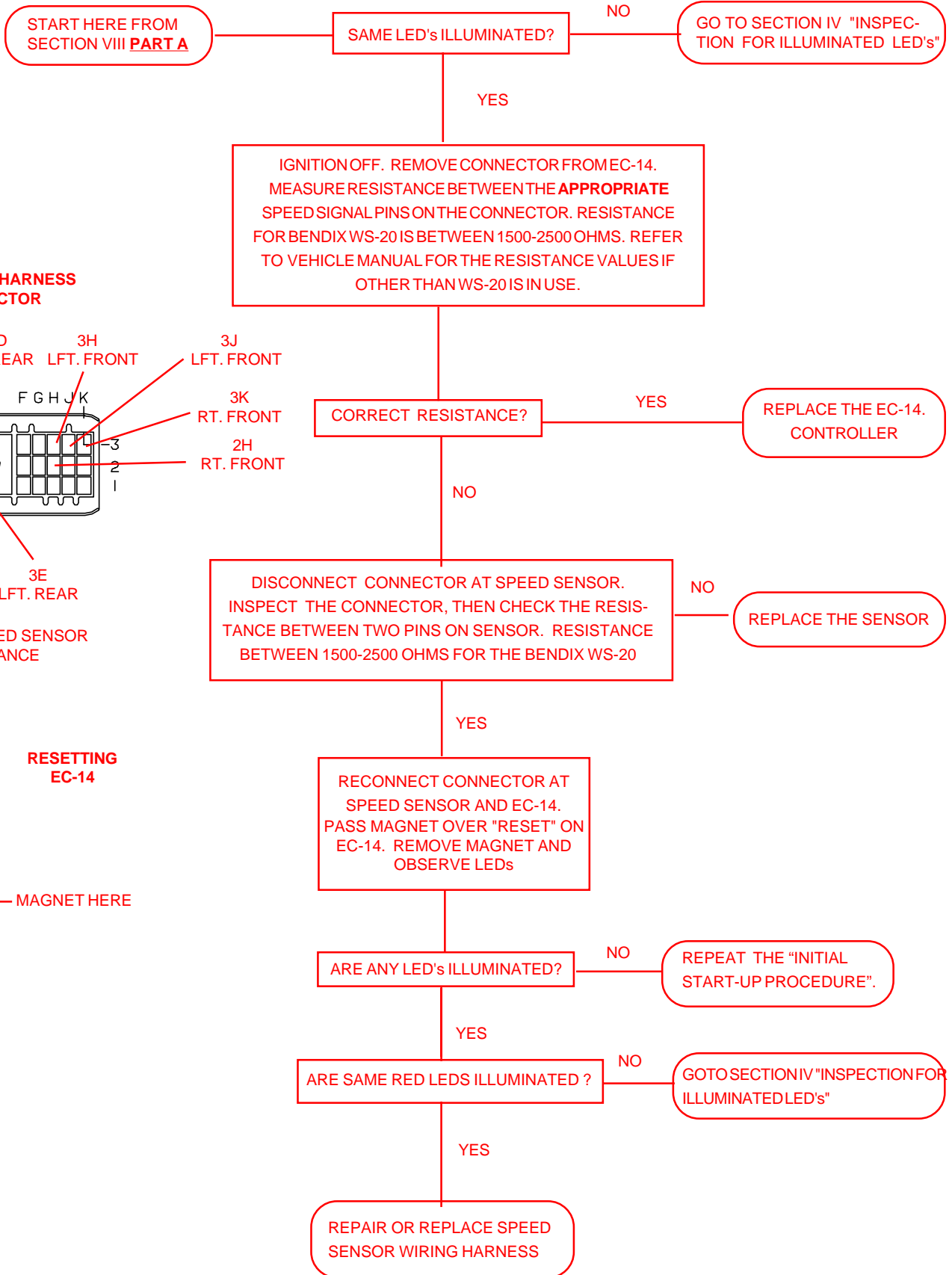
# TROUBLESHOOTING

## SECTION VIII PART A TESTING THE WHEEL SPEED SENSOR

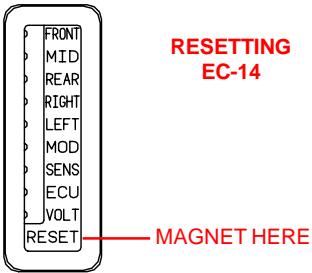
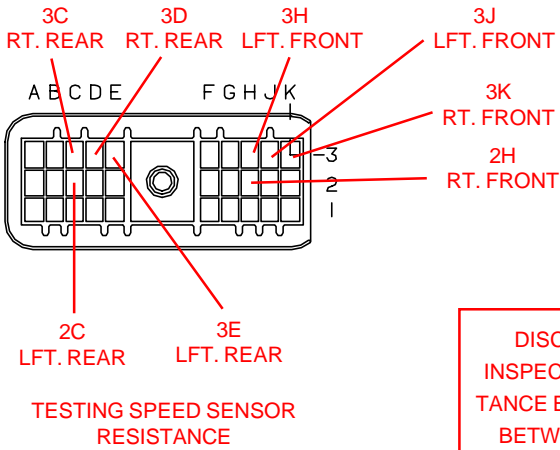


# TROUBLESHOOTING

## SECTION VIII PART B TESTING THE WHEEL SPEED SENSOR



**EC-14 WIRE HARNESS CONNECTOR**

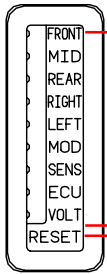


# TROUBLESHOOTING

## SECTION IX

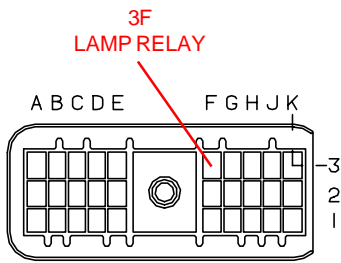
### TESTING FOR FALSE INDICATION CAUSED BY DASH LIGHT RELAY

#### TESTING EC-14 LEDs



ALL LED's ILLUMINATED

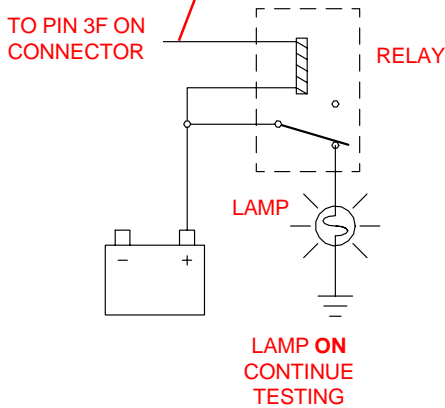
HOLD MAGNET HERE



EC-14 WIRE HARNESS CONNECTOR

#### TESTING THE LAMP RELAY

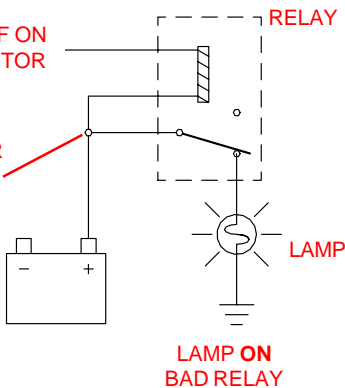
GROUND THIS WIRE AT EC-14 CONNECTOR



#### TESTING THE LAMP RELAY

TO PIN 3F ON CONNECTOR

CHECK FOR POWER HERE



START HERE

HOLD MAGNET ON EC-14 RESET AND NOTE ALL LED'S ILLUMINATED.

ARE ALL LED'S ILLUMINATED?

NO

REPLACE THE EC-14

YES

REMOVE MAGNET FROM EC-14, TURN IGNITION OFF AND DISCONNECT THE WIRING HARNESS CONNECTOR FROM EC-14. TURN IGNITION ON, GROUND LAMP RELAY WIRE PIN 3F AND NOTE DASH LAMP REACTION.

DASH LAMP OFF?

YES

REPLACE THE EC-14

NO

TURN IGNITION OFF AND CHECK CONTINUITY OF WARNING LAMP WIRE BETWEEN EC-14 WIRING HARNESS CONNECTOR PIN 3F AND TERMINAL ON LAMP RELAY

IS CONTINUITY DETECTED?

NO

REPAIR OR REPLACE WIRE HARNESS, RECONNECT EC-14 WIRE HARNESS AND REPEAT THE "INITIAL START-UP PROCEDURE"

YES

RECONNECT THE EC-14 WIRE HARNESS CONNECTOR AND CHECK FOR VEHICLE POWER AT THE LAMP RELAY COIL.

IS POWER DETECTED?

NO

CHECK DASH WIRING AND CONNECTORS, AND CONSULT THE VEHICLE MANUAL FOR TROUBLE SHOOTING INFORMATION. REPAIR OR REPLACE AS NECESSARY AND REPEAT THE "INITIAL START-UP PROCEDURE".

YES

REPLACE THE RELAY AND REPEAT "INITIAL START-UP PROCEDURE".



# TROUBLESHOOTING

## SECTION X TESTING FOR FALSE INDICATION CAUSED BY WHEEL SPEED COMPONENTS

