

# PRODEMAND

YMMS: 1989 Ford Bronco II  
Engine: 2.9L Eng  
VIN:

Mar 7, 2021  
License:  
Odometer:

## ANTI-LOCK BRAKE SYSTEM

### 1989 BRAKES Ford Motor Corp. Anti-Lock Brake System

#### DESCRIPTION & OPERATION

The Rear Anti-Lock Brake System (RABS) is designed to prevent the vehicle from skidding due to rear brake lock-up. This is done by controlling the amount of hydraulic fluid pressure to the rear wheel cylinders. The system consists of 2 warning lights, computer module, an electro-hydraulic valve, speed sensor and an exciter ring. See Fig 1 .

As the vehicle is moving, the speed sensor mounted on the rear axle signals the computer module. This is done by the speed sensor generating an AC frequency signal as the teeth on the exciter ring, located on the differential case, passes by the speed sensor probe. When the brake pedal is depressed the control module senses drop in vehicle speed.

If computed rate of deceleration indicates lock-up is occurring, the control module activates the electro-hydraulic valve, located on the left frame rail, which closes the internal isolation valve. If the speed sensor signal still indicates lock-up occurrence, the control module activates the dump solenoid which bleeds off brake fluid pressure. When the control module determines that a lock-up condition no longer exists, all valves and solenoids open, allowing the brake system to return to normal operation.

#### TESTING

**NOTE:** ALWAYS disconnect positive battery cable before measuring resistance on RABS system. Always check connectors for dirty or corroded terminals before condemning circuit.

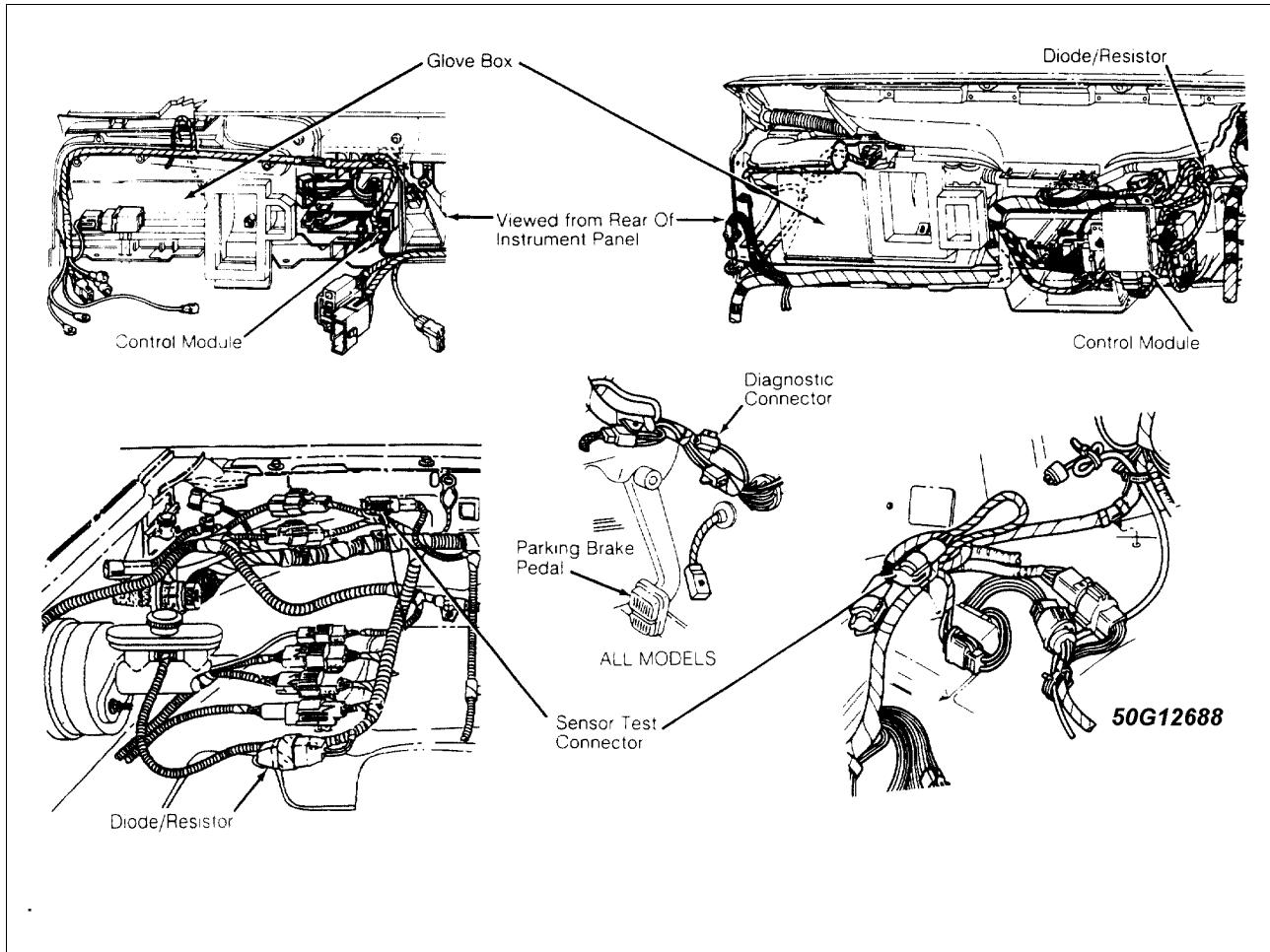
Rear Anti-Lock Brake System has a self-test capability. There are 2 warning lights, located on instrument panel, to inform driver of malfunction. Red warning light indicates low fluid level, parking brake on or low vacuum (diesel models). When control module detects a malfunction, the anti-lock brake system becomes inoperative and the Yellow warning light will come on. Both lights should come on for approximately 2 seconds when ignition is turned on or when cranking engine.

#### YELLOW LIGHT OFF & DOES NOT SELF-CHECK

1. Ensure control module connector is fully engaged. If not, engage connector and retest system. If connector is engaged, disconnect battery. Unplug control module connector. Measure resistance between connector pin No. 4 and ground. See Fig 3 .
2. If resistance is one ohm or more, check for open circuit between pin No. 4 and ground. If resistance is less than one ohm, reconnect battery. Turn ignition on. Check voltage at connector pin No. 7. If voltage is 9 volts or more, replace control module.

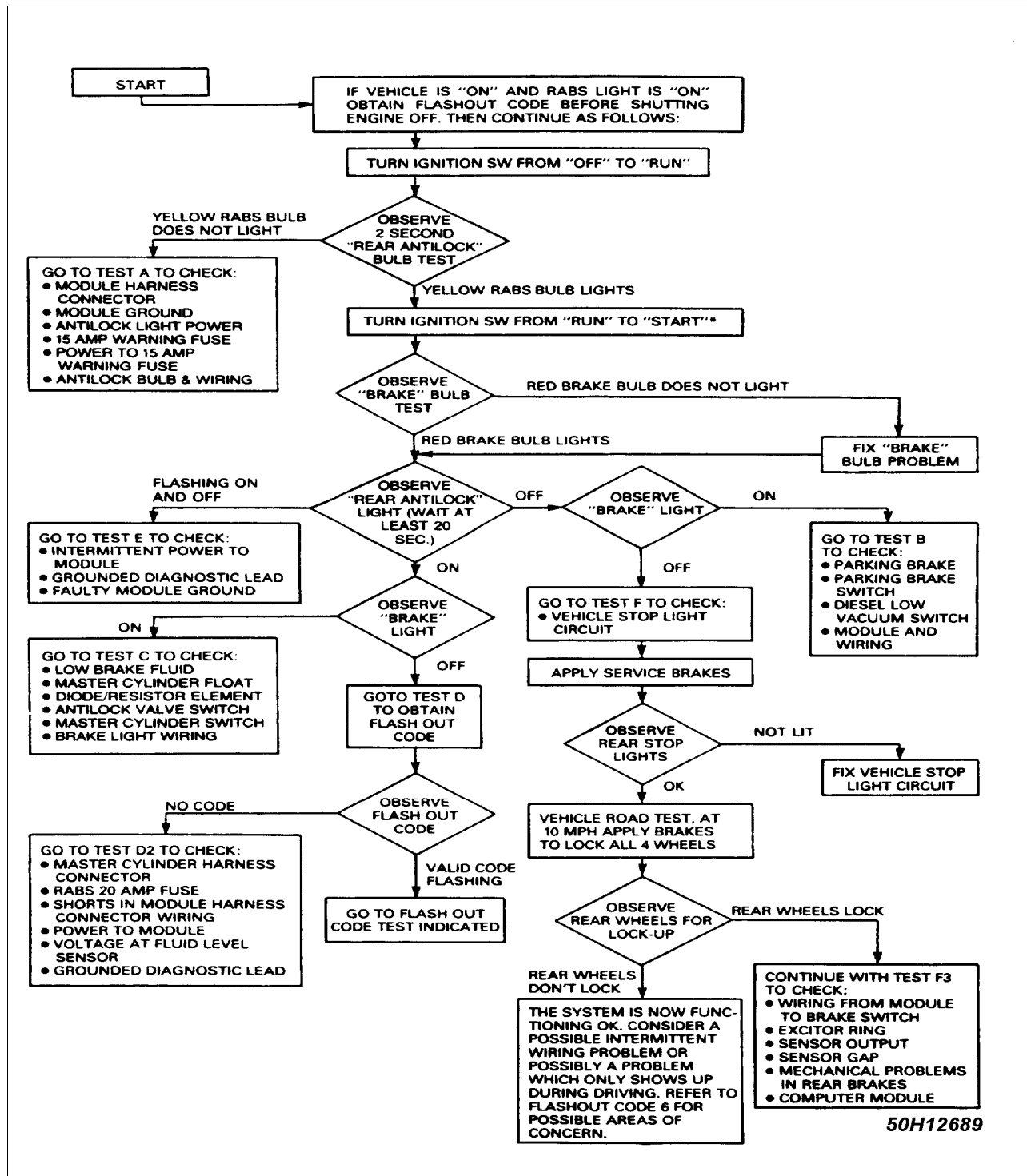
3. If voltage is less than 9 volts, check Yellow ABS light 15-amp fuse. If fuse is bad, check for short between fuse and warning lights. Replace fuse and retest system. If fuse is okay, check voltage at fuse. If voltage is less than 9 volts, check fuse panel or vehicle electrical system.
4. If voltage is 9 volts or more, check warning light bulb. If bulb is bad, replace bulb and retest system. If bulb is okay, repair open in wiring between warning light fuse and control module connector pin No. 7.

Fig 1: Control Module, Diode/Resistor & Diagnostic Connector Loc.



Courtesy of FORD MOTOR CO.

Fig 2: RABS Trouble Shooting Chart



Courtesy of FORD MOTOR CO.

**RED LIGHT ON, YELLOW LIGHT OFF & DOES SELF-CHECK**

1. Turn ignition on. Release parking brake pedal. If Red light goes off, road test vehicle. With vehicle stopped, apply and release parking brake a few times.
2. If Red light comes on during road test or light never went out, unplug parking brake switch connector. If Red light goes out, adjust or replace parking brake switch. If Red light remains on,

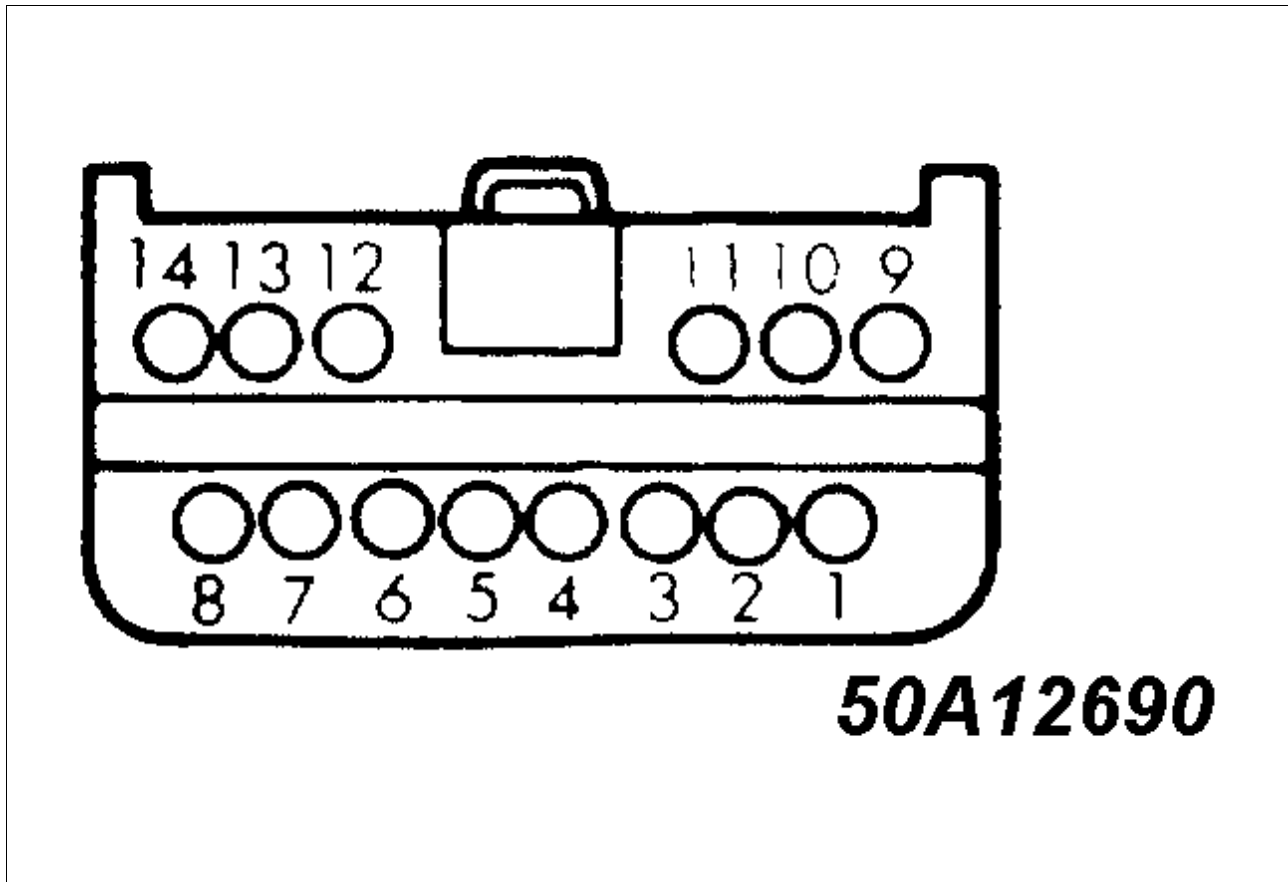
unplug vacuum switch (diesel engines). If light goes off, repair vacuum pump. On all engines, if light remains out unplug control module connector.

3. If Red light goes off, replace control module. If Red light remains on, check for shorted wiring between Red light and diode/resistor. Diode/resistor is located in wiring harness on left front fender on Bronco II and Ranger. On Bronco and F Series, diode resistor is located behind instrument panel.

## **YELLOW & RED LIGHTS ON STEADY**

1. Check master cylinder fluid level. If fluid level is low, refill reservoir and retest system. If fluid level is okay, remove cap from master cylinder. Carefully push down on float in reservoir. If float does not move downward, replace master cylinder reservoir. Retest system. If float moves downward, reinstall master cylinder cap.
2. Turn ignition on. Apply and release parking brake. If both lights go off, replace diode/resistor. Diode/resistor is located in wiring harness on left front fender on Bronco II and Ranger. On Bronco and F Series, diode resistor is located behind instrument panel. If both lights stay on, remove parking brake switch and low vacuum switch (if equipped) connectors.
3. If both lights go off, replace diode/resistor. If both lights stay on, attempt to retrieve trouble code. See RETRIEVING TROUBLE CODES in this article. If trouble code is retrieved, go to appropriate code. If both lights are still on steady, turn ignition off.
4. Unplug fluid level sensor connector, at master cylinder. Connect a jumper wire between sensor connector terminals. Turn ignition on. If both lights go off, replace master cylinder reservoir. If both lights stay on, turn ignition off.
5. Unplug control module connector. Turn ignition on. If both lights go off, replace control module. If both lights stay on, check for short in fluid level and parking brake switch wiring. Repair short in wiring and retest system.

Fig 3: Control Module Pin Locations



Courtesy of FORD MOTOR CO.

**YELLOW LIGHT ON, RED LIGHT OFF**

1. Attempt to retrieve trouble code. See RETRIEVING TROUBLE CODES in this article. If trouble code was retrieved, go to appropriate code. If trouble code cannot be retrieved, ensure master cylinder connector is plugged in fully. If connector is fully plugged in, check RABS 20-amp fuse.
2. If fuse is bad, check for short in wiring between fuse panel and control module connector. If fuse is okay, turn ignition off. Unplug control module. Turn ignition on. If Yellow light remains on, repair short in wiring between Yellow light and control module connector.
3. If light goes off, measure voltage at control module connector pin No. 1 and at pin No. 9. If voltage is less than 9 volts at either pin, repair open circuit between fuse panel and appropriate pin at connector or power source to fuse panel. If voltage is 9 volts or more, measure voltage at control module connector pin No. 2.
4. If voltage is 8 volts or more, go to step 6). If voltage is less the 8 volts, measure voltage at both Purple/White wires on Bronco an F Series or Purple/White wire and at Purple/Yellow wire on all others, at fluid level switch. DO NOT unplug switch connector to check voltage. If voltage is 8 volts or more at one wire but less than 8 volts at other, replace master cylinder reservoir.
5. If voltage is less than 8 volts at both wires, replace diode/resistor or repair open in indicator light power supply wire between fuse panel and instrument panel. Diode/resistor is located in Wiring harness on left front fender on Bronco II and Ranger. On Bronco and F Series, Diode resistor is located behind instrument panel. If voltage is 8 volts or more at both wires, check for

open in Purple/Yellow wire or Purple/White wires.

6. Turn ignition off. Reconnect control module connector to module. Turn ignition on. Measure voltage at Diagnostic connector. If voltage is less than one volt, check for short in Black/Orange wire between diagnostic connector and control module. If voltage is one volt or more, replace control module and retest system.

### YELLOW LIGHT FLASHING & RED LIGHT OFF

1. Turn ignition off. Unplug control modules connector. Turn ignition on. Measure voltage at control module connector pin No. 1 and at pin No. 9. Shake instrument panel harness while measuring voltage. If voltage varies or is less than 9 volts, check for open in wire between fuse panel and connector pin No. 1 and pin No. 9.
2. If voltage is 9 volts or more and is steady, turn ignition off. Disconnect battery. Measure resistance between control module connector pin No. 12 and ground. Shake module harness while measuring resistance. If resistance is less than 100,000 ohms or resistance varies, repair short in Black/Orange wire between diagnostic connector and module connector.
3. If resistance was 100,000 ohms or more and steady. measure resistance between module connector pin No. 4 and ground. Shake module harness while measuring resistance. If resistance is one ohm or more, repair open in Black/White wire between module connector pin No. 4 and body ground. If resistance is less than one ohm and is steady, replace control module.

### LIGHTS OKAY & REAR WHEELS LOCK-UP

1. Ensure stoplights are working properly. If not, repair stoplights and retest. If stoplights are working properly, operate vehicle at approximately 10 MPH. Apply brakes to attempt lock-up of all brakes and observe left rear wheel operation in mirror. If rear wheels do not lock-up, system is operating properly.
2. Intermittent wiring problem may be occurring during normal driving conditions. Go to CODE 6 for testing. If rear wheels lock-up, turn ignition off unplug control module connector. Measure voltage at module connector pin No. 11 while depressing brake pedal. If voltage is less than 9 volts, repair open in Light Green wire between stoplight switch and module connector pin No. 11.
3. If voltage is 9 volts or more, turn ignition off. Remove speed sensor. Check sensor pole end and exciter ring for damage. If damage to component is found, replace damaged component and retest. If components are okay reinstall speed sensor. Raise rear of vehicle and support. Block front wheels. On 4WD models, place transfer case in "2WD" mode.

**CAUTION:** *Use care when working around rotating wheels.*

4. Remove cap from sensor test connector. located in engine compartment. See Fig 1 . Start engine and place transmission in gear. With wheels rotating at 5 MPH, measure voltage between test connector pins.
5. If voltage is less than 650 mV, replace speed sensor and retest system. if voltage is 650 mV or more, or voltage is still low after replacing sensor, turn engine off. Reinstall test connector cap. Remove speed sensor from differential. Measure speed sensor pole height from mounting face

to end of pole piece. Measurement should be 1.07-1.08" (27.2-27.4 mm).

6. If not, replace sensor. Measure distance between top of exciter ring to sensor mounting face on differential. Subtract speed sensor pole height from exciter ring depth measurement. If the difference is more than .050" (1.27 mm) and speed sensor pole height is okay, replace exciter ring. If difference is .050" (1.27 mm) or less, check rear brakes for mechanical problems. If no mechanical problems can be found, replace control module and retest.

## **TROUBLE CODES**

### **RETRIEVING TROUBLE CODES**

To obtain stored trouble code, momentarily ground diagnostic connector and record number of times light flashes. See Fig 1 . DO NOT turn ignition off before grounding connector or code will be lost. Only the first code stored will appear until that problem is corrected.

#### **CODE 1**

Code 1 is not a valid code. Perform RETRIEVING TROUBLE CODES again. If code 1 appears again, go to YELLOW LIGHT FLASHING & RED LIGHT OFF under TESTING in this article.

#### **CODE 2**

1. Turn ignition off. Disconnect battery. Unplug control module harness connector. Measure resistance between module connector pin No. 13 and ground. If resistance is 6 ohms or less, replace control module and retest system.
2. If resistance is more than 6 ohms, reconnect module connector. Measure resistance between Black/White wire and ground, at electro-hydraulic valve harness connector. If resistance is one ohm or more, repair open in Black/White wire. If resistance is less than one ohm, measure resistance between Pink/Light Green on Black/White wire on Bronco and F Series or Tan wire and Black/White wire on all others at electro-hydraulic valve.
3. If resistance is 6 ohms or less, repair short in Pink/Light Green on Bronco and F Series or Tan wire on all others, between valve and control module. If resistance is more than 6 ohms, replace electro-hydraulic valve and retest.

#### **CODE 3**

1. Turn ignition off. Disconnect battery. Unplug control module connector. Measure resistance between module connector pin No. 8 and pin No. 14 and ground. If resistance is less than 3 ohms, replace control module. If resistance is 3 ohms or more, reconnect module connector.
2. Unplug electro-hydraulic valve connector. Measure resistance between Yellow/Light Green wire and Black/White wire at valve. If resistance is less than 3 ohms, repair open in Yellow/Light Green wire between valve connector and control module. If resistance is 3 ohms or more, replace electro-hydraulic valve.

#### **CODE 4 (BRONCO & F SERIES)**

1. Unplug electro-hydraulic connector. Measure resistance between Light Blue/Red wire at valve and valve body. If resistance is less than 10,000 ohms, replace electro-hydraulic valve.
2. If resistance is 10,000 ohms or more, measure resistance between Light Blue/Red wire and Black/White wire at valve. If resistance is 10,000 ohms or less, replace electro-hydraulic valve. If resistance is more than 10,000 ohms, disconnect battery.

3. Unplug control module connector. Measure resistance between modules connector pin No. 6 and ground. If resistance is 100,000 ohms or more, replace control module. If resistance is less than 100,000 ohms, repair short in Light Blue/Red wire between valve and control module.

#### **CODE 4 (BRONCO II & RANGER)**

1. Unplug electro-hydraulic valve connector. Measure resistance between Light Blue/Red wire terminal at valve connector and valve body. If resistance is less than 10,000 ohms replace electro-hydraulic valve. If resistance is 10,000 ohms or more, check resistance between Light Blue/Red wire terminal and Black/White wire terminal at valve connector.
2. If resistance is more than 26,000 ohms or less than 18,000 ohms, replace electro-hydraulic valve. If resistance is 18,000-26,000 ohms, check resistance between Light Blue/Red wire terminal at valve connector and valve body with hydraulic pressure applied for 30 seconds minimum.
3. If resistance is less than 10,000 ohms, replace electro-hydraulic valve. If resistance is 10,000 ohms or more, check resistance between Black/White wire terminal and ground at valve harness connector. If resistance is one ohm or more, repair open in Black/White wire. If resistance is less than one ohm, reconnect valve connector.
4. Disconnect battery. Unplug control module connector. Measure resistance between pin No. 4 and pin No. 6 at module connector. If resistance is more than 26,000 ohms or lower than 18,000 ohms, repair open or short in Light Blue/Red wire between valve and control module. If resistance is 18,000-26,000 ohms, replace control module.

#### **CODE 5**

1. If code occurs when vehicle is in "4WD" mode only, go to step 2). If code occurs in "2WD" mode, unplug control module. Drive vehicle and make several normal stops to check rear brake operation. If rear brake operates properly, replace electro-hydraulic valve and retest system. If rear brakes lock-up easily or are grabbing, repair rear brake system (mechanical) and retest system.
2. If code occurs in "4WD" mode, unplug control module connector. Turn ignition on. Place transfer case in "4WD" mode. Measure voltage at module pin No. 5. If voltage is less than one volt, replace electro-hydraulic valve. If voltage is one volt or more, repair or replace 4WD indicator switch, located on transfer case.

#### **CODE 6**

1. Turn ignition off. Disconnect battery. Measure resistance between control module connector pin No. 3 and pin No. 10, while shaking wiring harness between speed sensor and module connector. If resistance is not 1000-2000 ohms and steady, repair short or open in Light Green/Black wire and Red/Pink wire between speed sensor and control module.
2. If resistance is 1000-2000 ohms and steady, remove speed sensor. Check sensor pole for metal chips. If metal chips are present, disassemble differential and replace exciter ring. If no metal chips are present, check exciter ring for damaged teeth. Replace exciter ring (if necessary).
3. If exciter ring is okay, reconnect all connectors and battery. Remove cap from sensor test connector, located in engine compartment, See Fig 1 . Raise and support vehicle. Start engine.
4. With rear wheels rotating at 5 MPH, measure voltage between test connector pins. If voltage is 650 mV or more and steady, replace control module. If voltage is less than 650 mV and/or is



erratic, replace speed sensor and retest system.

## **CODE 7**

1. Turn ignition off. Unplug electro-hydraulic valve connector. Measure resistance between Pink/Light Green on Bronco and F Series or Tan wire on all others and Black/White wire at valve. If resistance is less than 3 ohms, replace valve. If resistance is 3 ohms or more, disconnect battery.
2. Unplug control module connector. Measure resistance between module connector pin No. 13 and ground. If resistance is 20,000 ohms or more, replace control module. If resistance is less than 20,000 ohms, repair short in Pink/Light Green on Bronco and F Series or Tan wire on all others, between electro-hydraulic valve and control module.

## **CODE 8**

1. Turn ignition off. Unplug electro-hydraulic valve Connector. Measure resistance between Yellow/Light Green wire and Black/White wire at valve. If resistance is less than one ohm, replace electro-hydraulic valve. If resistance is one ohm or more, disconnect battery.
2. Unplug control module connector. Measure resistance between module connector pin No. 8 and ground, and pin No. 14 and ground. If resistance is 20,000 ohms or more, replace control module. If resistance is less than 20,000 ohms, repair short in Yellow/Light Green wire between valve and control module.

## **CODE 9**

1. Turn ignition off. Unplug speed sensor connector, at sensor. Measure resistance between sensor pins. If resistance is 2500 ohms or more, replace sensor. If resistance is less than 2500 ohms, disconnect battery. Reconnect speed sensor connector. Unplug control module connector.
2. Measure resistance between module connector pin No. 3 and pin No. 10. If resistance is less than 2500 ohms, replace control module. If resistance is 2500 ohms or more, repair open in Light Green/Black wire or Red/Pink wire between speed sensor and control module. If wiring is defective, High Flex Wire (E6EB-14488-AA) MUST be used.

## **CODE 10**

1. Turn ignition off. Unplug speed sensor connector, at sensor. Measure resistance between sensor pins. If resistance is 1000 ohms or less, replace sensor. If resistance is more than 1000 ohms, disconnect battery. Unplug control module connector.
2. Measure resistance between module connector pin No. 10 and ground. If resistance is less than 20,000 ohms, repair short in Red/Pink wire between speed sensor and control module. If wiring is defective, High Flex Wire (E6EB-14488-AA) MUST be used.
3. If resistance is 20,000 ohms or more, measure resistance between module connector pin No. 3 and pin no. 10. If resistance is 20,000 ohms or more, replace control module. If resistance is less than 20,000 ohms, repair short in Light Green/Black wire or Red/Pink wire between speed sensor and control module. If wire is defective, High Flex Wire (E6EB-14488-AA) MUST be used.

## **CODE 11**

1. Depress brake pedal and check stoplight operation. If stoplights do not operate, repair stoplight

circuit and retest system. If stoplights operate properly, turn ignition off. Unplug control module connector. Measure voltage at module connector pin No. 11 while depressing brake pedal.

2. If voltage is less than 9 volts, repair open in Light Green wire between stoplight switch and control module. If voltage is 9 volts or more, check 4-way flasher, turn signal and cruise control (if equipped) circuits for feedback or short.

## **CODE 12**

Check brake fluid level. If fluid level is okay, replace control module, if fluid level is low, refill fluid and check for leaks.

## **CODES 13, 14, 15 & 16**

These codes should not occur. Recheck flashing sequence. If codes continue to occur, replace control module and retest system.

## **WIRING DIAGRAMS**

Fig 4: Bronco &amp; F Series Rear Anti-Lock Brake System

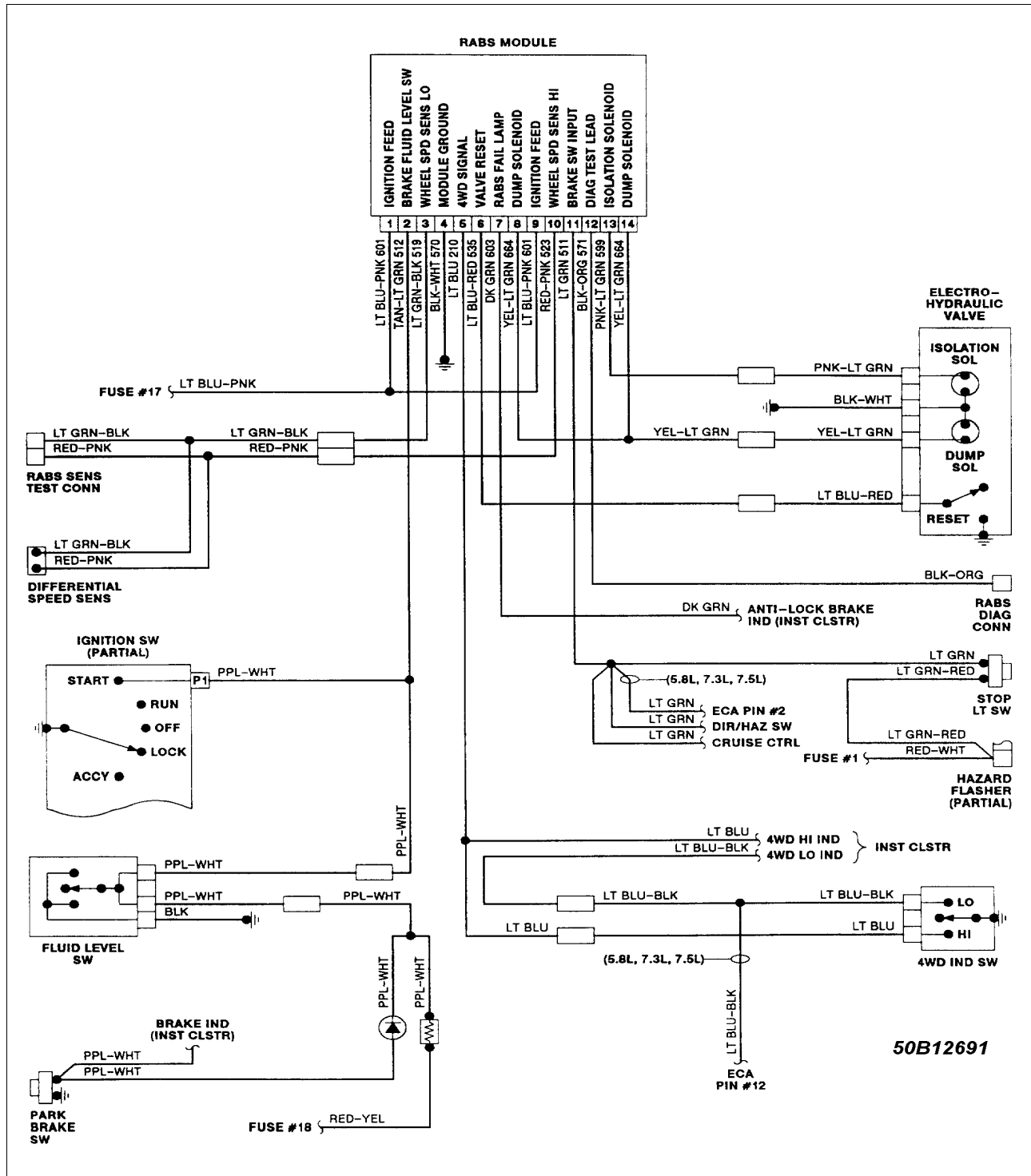


Fig 5: Bronco II &amp; Ranger Rear Anti-Lock Brake System

