1970-73 FORD MOTOR CO. SURE TRACK BRAKE SYSTEM

Continental Mark III (1970-71)
Continental Mark IV (1972-73)
Lincoln Continental (1970-73)
Mercury (1972-73)
Thunderbird (1970-73)

▶ CHANGES, CAUTIONS, CORRECTIONS

▶ *1970 & 1973 MID-YEAR PRODUCTION CHANGE NOTE:* Improvements in the Sure Track System were incorporated in production beginning Jan. 15, 1970. References to "Early Type" and "Late Type" apply to components used before and after this date. Note that the control module (included in this 1970 production change) also received a mid-1973 change; differences in these modules will be indicated by identification number stamped on control module case: DD0SA-2B373-B, before Jan. 15, 1970; D2MA-2B373-AA, Jan. 15, 1970 to mid-1973; D3LA-2B373-AA, after mid-1973. *NOTE — Components without an early or late designation were not changed and may be used with any changed components.*

▶ *REAR AXLE LEAKAGE AT SURE TRACK MOUNTING BRACKET:* Rear axle lubricant leakage may be corrected as follows: Remove two nuts and washers securing mounting bracket. Remove bracket and two copper washers. Clean studs and surrounding area. Apply a liberal amount of suitable sealer (B5A-19554-A) to threads of studs. Install new copper washers, flat washers, and stud nuts, and torque to 25-40 ft. lbs.

DESCRIPTION

System is designed to prevent loss of control during emergency or maximum braking condition. To avoid wheel lock-up and resultant skidding with brakes fully applied, system automatically releases and re-applies rear brakes up to four alternating cycles per second. System consists of three major components:

Sensors (Early Type) – Mechanically driven electromagnetic sensors at each rear wheel have steel rings with teeth on their outer diameters, and are pressed on each axle shaft just outboard of the wheel bearing. The teeth rotate past corresponding teeth on the inside diameter of stationary steel rings mounted in the wheel retainers. Ring shaped permanent magnets and coils of wire are also mounted in the retainers. Rotation of the inner ring within the stationary ring generates an alternating current in the wire coil. Two wires connect each sensor to the control module.

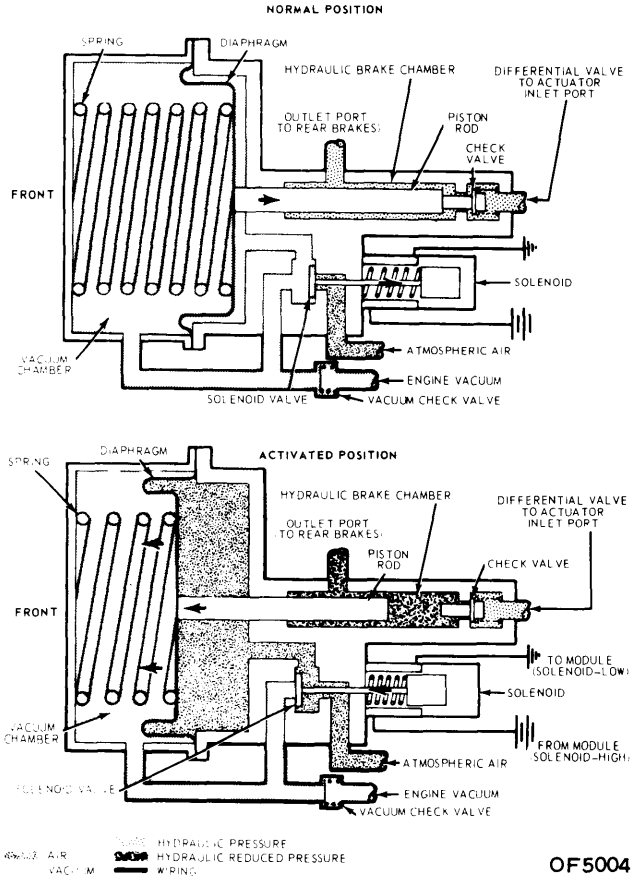
Sensor (Late Type) – Mechanically driven electromagnetic sensor (stator) mounted on rear axle drive pinion bearing retainer housing. Rotor is pressed onto machined outer surface of rear universal joint companion flange, outboard of grease seal. When drive shaft rotates, AC voltage impulses, generated by sensor, are transmitted to module.

Control Module (DDOSA-2B373-B) – Module is composed of solid state electronic components in a sealed container and is connected to speed sensors and to solenoid on actuator. Module operates on electrical impulses received from both rear wheel sensors.

Control Module (D2MA-2B373-AA) – Essentially similar to earlier module; however, this type operates from the signal of the single pinion-mounted speed sensor. *NOTE — This module may be used as replacement for earlier type.*

Control Module (D3LA-2B373-AA) – Mounted near glove box (Lincoln, T-Bird, Mark IV) or under front passenger seat (Mercury), this module has ability to detect an open sensor circuit, an open actuator solenoid circuit, and an excessively long module output pulse to the solenoid. The brake warning light will come on four to six seconds after any of the above occurrences, causing the Sure Track System to become inoperative and normal braking operation to occur. *NOTE — This module may be used as replacement for either earlier type; hovever, do not replace this module with earlier components.*

Actuator – Attached to bracket on inside of right front frame rail, under toe board. It is similar in appearance to power brake booster and consists of three parts: a chamber divided by vacuum-suspended diaphragm, a hydraulic cylinder connected to diaphragm, and solenoid connected electrically to control module.



CROSS SECTION DIAGRAM OF ACTUATOR

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OPERATION

AC voltage impulses generated by sensor are transmitted to module. Module receives signals in form of current and continually monitors drive shaft speed. When signals drop abruptly below pre-determined level due to rapid deceleration (maximum braking), module sends electrical signal to actuator solenoid to release and re-apply rear brakes. Cycle occurs up to four times per second until vehicle speed drops to about four miles per hour or brakes are released by driver.

Actuator (Normal Position) – The solenoid valve spring holds solenoid valve against atmospheric air port and prevents air from entering vacuum chamber. Front side of diaphragm draws vacuum, and vacuum goes past solenoid valve to rear side of diaphragm. The spring holds diaphragm rearward. Rear brakes are connected through actuator hydraulic brake chamber, and function normally when actuator is in normal position (with port check valve held open by actuator piston rod). *See illustration.*

Actuator (Activated Position) – When electrical signal from module energizes actuator solenoid, solenoid valve moves to close vacuum passage to rear side of diaphragm. Rear side of diaphragm is then vented to atmosphere, resulting in a pressure imbalance to diaphragm which moves it forward. The hydraulic chamber piston rod moves forward and brake chamber check valve closes. Volume of the pressure chamber is increased, reducing line pressure and releasing rear brakes. *NOTE – With actuator in activated position, rear brakes are isolated from rest of system.* As brakes are released, drive shaft revolutions increase and module stops electrical signal and de-energizes solenoid. Solenoid valve returns to its normal position, vacuum is restored to rear side of diaphragm, and diaphragm is moved rearward. Brake chamber piston rod moves back in the pressure chamber, brake chamber check valve opens and rear brake pressure is re-applied (normal position). *See illustration.*

MALFUNCTION INDICATOR

A time delay switch mounted on actuator will cause system power supply fuse to blow and brake warning light to come on if diaphragm remains in forward position for more than 60 seconds. Also, warning light will come on should fuse blow for other reasons or a power supply system malfunction. Control circuit solenoid is functioned through one cycle each time ignition key is turned to ON position. When cycle occurs, an audible click and cycling sound may be heard.

TESTING

FUNCTIONAL TEST

If determined that difficulty is in the Sure Track Brake System, engine idle speed, vacuum level and standard brake system must be verified to be within limits of service specifications before proceeding with standard testing. *NOTE – A road test should be made ONLY when operator is CERTAIN that brakes will stop vehicle.* The following test of anti-skid control and hydraulic system will determine if system is operating and should be made after repairs, to verify correct system operation.

1) Turn ignition key ON. Listen for solenoid click and actuator cycling sound.

2) Position vehicle on hoist and raise rear wheels to clear floor. Start engine and warm up until normal operating temperature is reached.

3) Place transmission in DRIVE, and accelerate to approximately 25-30 MPH.

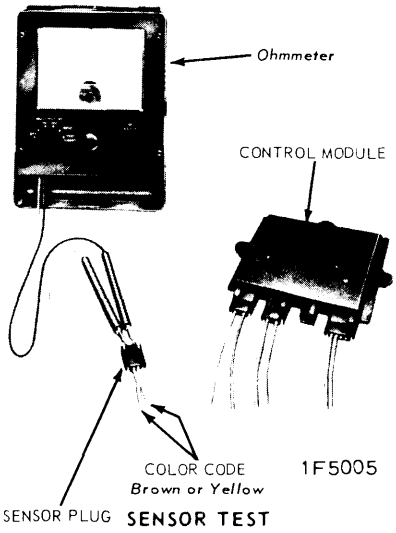
4) Apply brakes quickly and firmly and observe rear wheels. If Sure Track Brake System is functioning properly, it will cycle 5 or 6 times or until brake pedal is released.

ELECTRICAL TESTS

Electrical power is provided to anti-skid control system when ignition is turned ON. Circuit protection is provided by a 3 Amp. fuse located in fuse panel (Lincoln, T-Bird, Mk IV), or in-line (Mercury). *CAUTION – To prevent damage to control module, do not use fuse of higher rating than 3 Amp. (8AG3).* The following tests are made using an ohmmeter which must be calibrated to scale being used in each test.

Sensor Test (Early Type) – Using the special tool *(see illustration)*, remove sensor plugs **C** and **E** from the module. Connect the ohmmeter to the two contacts of first one and then the other plug. Resistance should be 1600-3200 ohms. Connect the ohmmeter between chasis ground and one of the two contacts of one sensor lead plug. Resistance should be infinite. Repeat check with ohmmeter connected to each contact in both sensor plugs. If resistance is within limits on all four contacts, replace the module. If resistance is not within limits on all four contacts, disconnect the sensor lead plugs from the sensors and repeat the resistance checks at the sensor plug connectors. If resistance is within specifications, problem is in wiring harness between sensors and module. If resistance is not within specifications, replace the sensor(s).

Sensor Test (Late Type) – Using the special tool *(see illustration)*, remove sensor plug **C** from the module. Connect the ohmmeter to the two contacts of the sensor plug. Resistance should be 2400-3200 ohms. Connect the ohmmeter to chassis ground and first one and then the other contact in the sensor plug. In each case, resistance should be infinite. If resistance is within limits, replace module. If resistance is not within limits, disconnect sensor lead plug from the sensor at the rear axle pinion housing. Repeat resistance checks at the sensor plug connector. If resistance is within limits, problem is in wiring harness between sensor and module. If resistance is not within limits, replace the sensor.



SENSOR TEST

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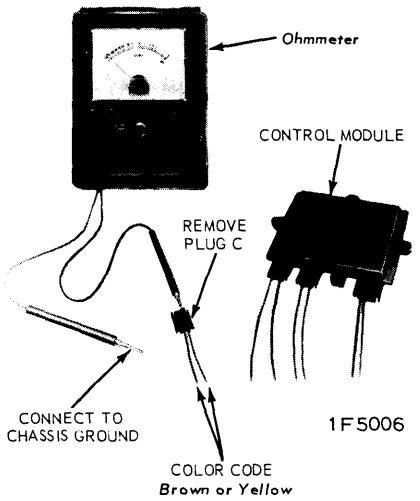
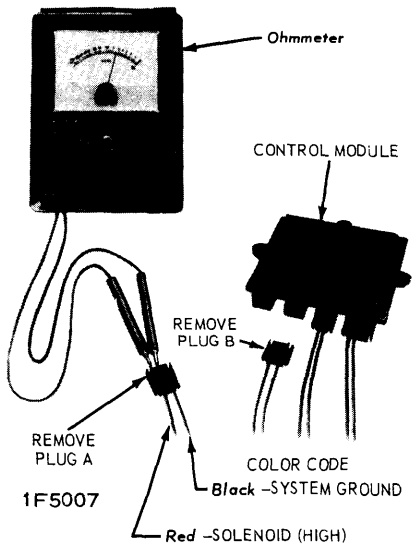
Sensor Leakage Test – Connect an ohmmeter between chassis ground and one of the two contacts of sensor lead plug *(See illustration)*. Resistance should be infinite. Repeat check with ohmmeter connected to other sensor contact. If resistance is not within limits on both checks, disconnect sensor lead plug from sensor at rear axle pinion housing. Repeat resistance checks at sensor plug connector. If the resistance is within specifications, problem is in wiring harness between sensor and module.



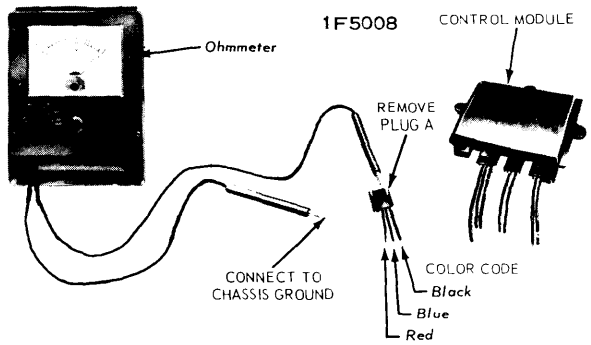
SENSOR LEAKAGE TEST

Solenoid Circuit Test – Remove plugs A and B from module *(See illustration)*. Connect ohmmeter between solenoid (high) and solenoid (low) plug contacts. Resistance should be 6+2 ohms. If lower than 4 ohms, inspect solenoid wires for a grounded condition. If wiring is satisfactory, replace actuator assembly. If resistance is higher than 8 ohms, inspect solenoid wiring for an open condition. If wiring is satisfactory, replace actuator assembly.



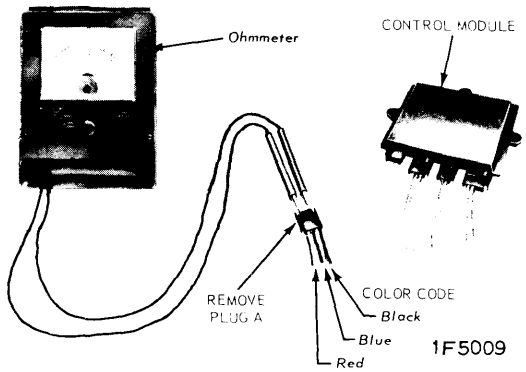
SOLENOID CIRCUIT TEST

System Ground Test – Remove plug A from module *(See illustration)*. Connect ohmmeter between system ground plug sleeve (black) and chassis ground. If ohmmeter reading is less than one ohm, replace module and recheck system for normal operation. If reading is greater than one ohm, replace or repair system ground wire.



SYSTEM GROUND TEST

Solenoid Leakage Test – Connect ohmmeter between system ground plug sleeve (black) and solenoid high (red) *(See illustration)*. If ohmmeter reading is below 1000 ohms, actuator coil or solenoid high (red) is shorted to ground.



SOLENOID LEAKAGE TEST

Adjustments

No adjustments or repairs are to be performed on the anti-skid control system. Replace damaged or worn parts.

DIAGNOSIS & TROUBLE SHOOTING (BRAKE WARNING LIGHT ON)

Actuator Cycles On Start-Up, But Not During Maximum Braking Condition – Module or sensor malfunction. Perform "Sensor Test".

System Will Not Cycle Down to 10 MPH – Faulty sensor assembly and/or sensor wire. Perform "Sensor Test".

Fuse Burns Out & Actuator Does Not Cycle – Actuator wiring, actuator or module faulty. Perform "Solenoid Test".

Fuse Does Not Burn Out & Actuator Does Not Cycle - Loose or broken connection in module plug leads; replace any broken leads and crimp sleeves at ends of module leads in plugs **A** and **D**. Faulty module or loose ground connection; perform "System Ground Test". Module component malfunction; replace module and perform functional test. Actuator component malfunction; replace actuator and perform functional test.

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Intermittent Brake Warning Light Or System Cycles While Driving On Rough Road – Broken wire or loose connection in sensor cable(s). Perform "Sensor Test".

No Rear Brakes – Faulty module; remove plug **A** from module, if problem is corrected, replace module. Faulty actuator or hydraulic leak; replace actuator or repair hydraulic leak.

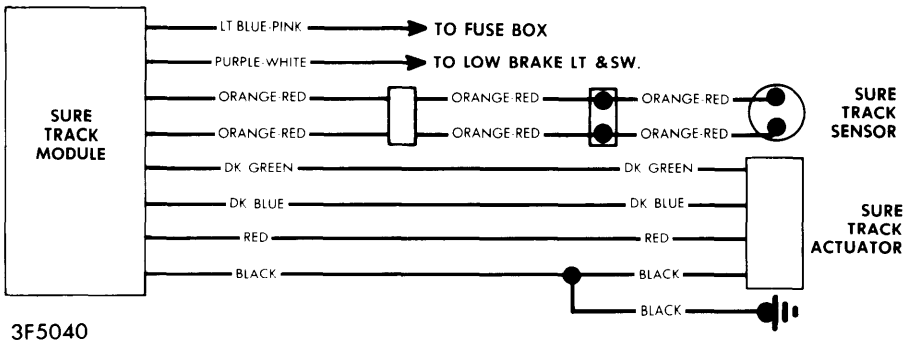
DIAGNOSIS & TROUBLE SHOOTING (BRAKE WARNING LIGHT OFF)

System Operates During Normal Braking Condition – Loose connection. Broken or grounded wiring. Module failure.

Fuse Burned Out & Actuator Does Not Cycle – Loose or broken connection in module plug leads. Faulty module or loose ground connection; perform "System Ground Test". Module component failure; replace module and perform functional test. Actuator component failure; replace actuator and perform functional test.

No Rear Brakes – Faulty module; remove plug **A** from module, if problem is corrected, replace module. Faulty actuator; replace actuator.

Actuator Cycles Slowly During Maximum Braking Condition – Plugged actuator air filter or pinched actuator air or vacuum hose. Faulty actuator; replace actuator.



FORD SURE TRACK WIRING DIAGRAM