2001 DRIVE AXLES

Electronic Locking Differentials - Land Cruiser, LX470, Tacoma & 4Runner

DESCRIPTION & OPERATION

NOTE: This article also applies to Lexus LX470. For LX470, refer to Land Cruiser, unless otherwise indicated.

The electronic locking differential system is designed to be used only when wheel spin occurs in a ditch or on a slippery or uneven surface. The indicator light will blink when switch is turned on as system completes locking operation. After the differential is locked, the light will stop blinking and remain on. On vehicles with manual transmission, it may be necessary to depress the clutch pedal, push the differential lock switch and slowly release the clutch pedal. On vehicles with automatic transmission, accelerate slightly to engage differential lock.

When the differential lock control switch is off, the differential lock actuator is not activated. The differential lock sleeve (which is meshed to the differential case) is not engaged with the spider gear. The differential will operate as a conventional limited slip differential.

When the differential lock control switch is on, the differential lock actuator slides the differential lock sleeve into the spider gear. The differential case and side gear are locked by the sleeve to provide differential (positive traction) control.

The sliding of the differential lock sleeve is accomplished by an electric motor. The motor is operated by the 4WD control unit in response to signals from the rear differential lock switch and from other switches and sensors. See **Fig. 1** , **Fig. 2** or **Fig. 3** . The motor is built into the rear differential lock actuator.

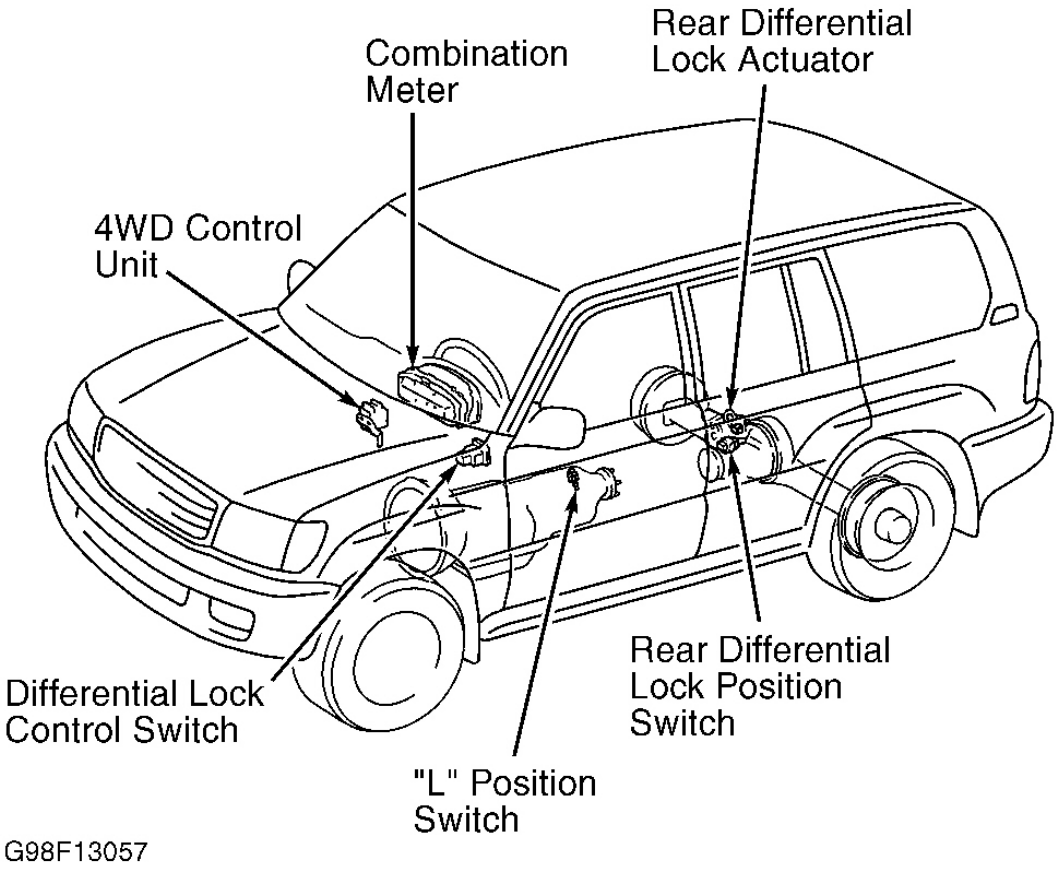


Fig. 1: Locating Electronic Locking Differential System Components (Land Cruiser)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

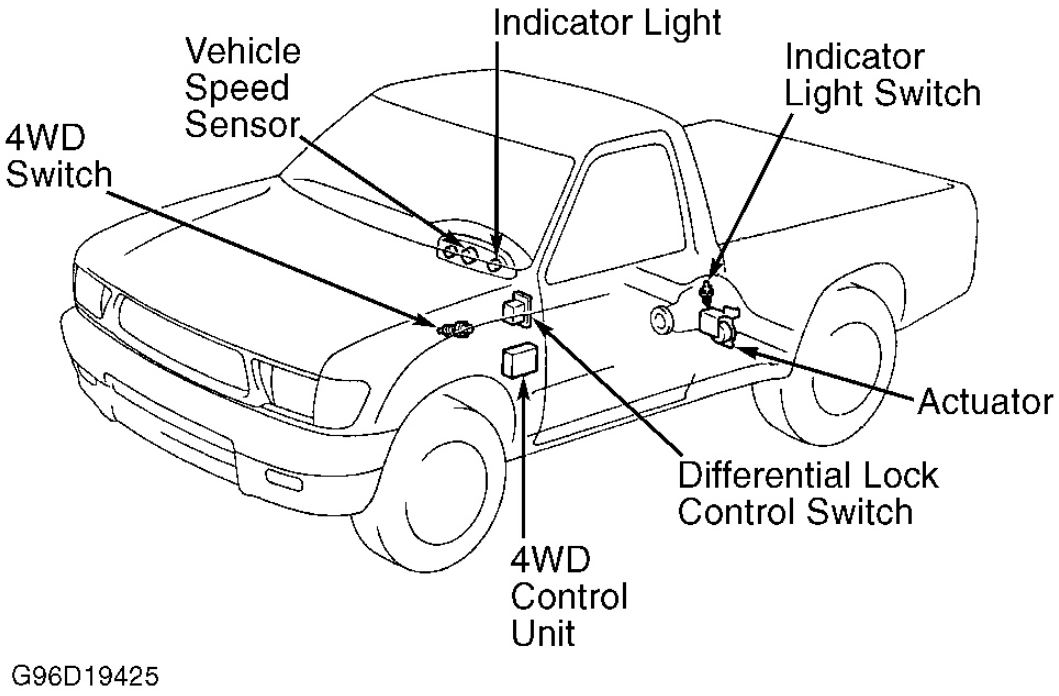


Fig. 2: Locating Electronic Locking Differential System Components (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

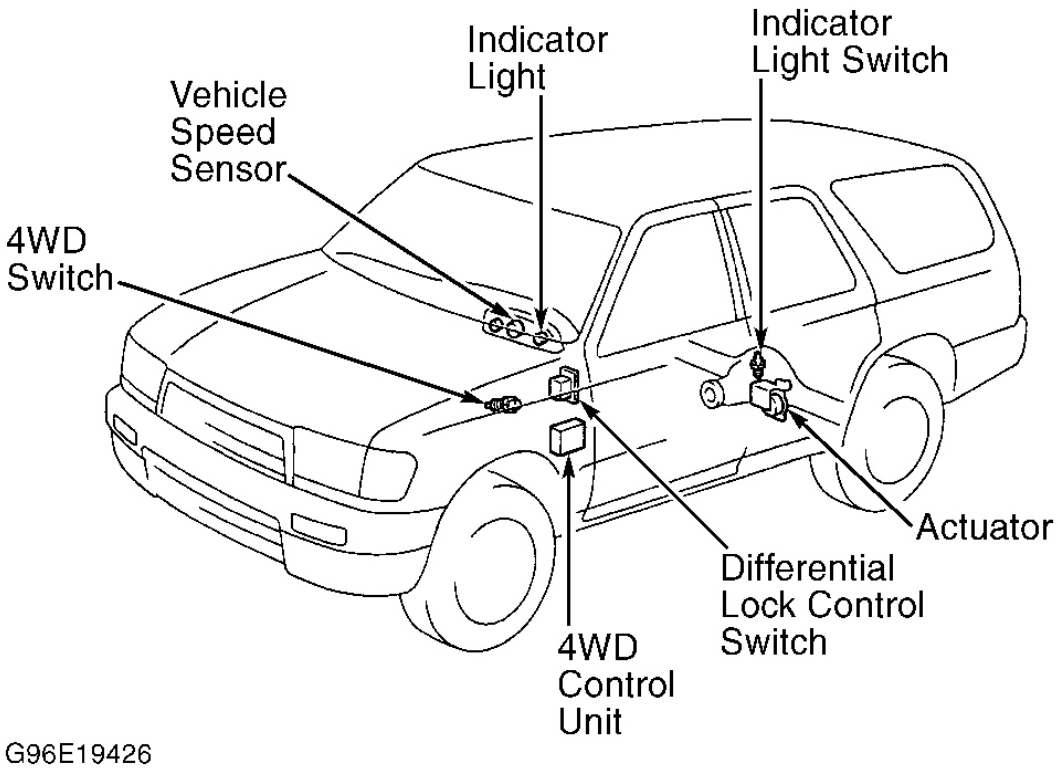


Fig. 3: Locating Electronic Locking Differential System Components (4Runner)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TROUBLE SHOOTING

NOTE: Before performing trouble shooting procedures, ensure 4WD mode is set. When switching differential from free to lock, the indicator light will blink if the gears of the differential lock sleeve are not engaged. If this occurs, rotate tires by applying power to the differential. When the differential locks, the indicator light will illuminate continuously.

INDICATOR LIGHTS DO NOT LIGHT UP

Differential Lock Control System Off

Check for blown fusible link or blown DIFF fuse. Ensure bulb, wiring harness, and ground circuit are okay. See **WIRING DIAGRAMS** . Repair circuit(s) or replace components as necessary.

Differential Lock Control System On

Check for blown DIFF or 4WD fuse. Ensure differential lock control switch is okay. Ensure 4WD control unit,

wiring harness, and ground circuit are okay. See **WIRING DIAGRAMS** . Repair circuit(s) or replace components as necessary.

DIFFERENTIAL LOCK DOES NOT OPERATE

Ensure differential lock control switch, actuator(s), and differential carrier are okay. Ensure 4WD control unit, wiring harness, and ground circuit are okay. See **WIRING DIAGRAMS** . Repair circuit(s) or replace components as necessary.

DIFFERENTIAL LOCK DOES NOT RELEASE

Ensure vehicle speed sensor is okay. Ensure 4WD control unit, wiring harness, and ground circuit are okay. See **WIRING DIAGRAMS** . Repair circuit(s) or replace components as necessary.

CIRCUIT TESTS

OVERALL SYSTEM CHECK

1. Ensure indicator light illuminates for 1 or 2 seconds when ignition switch is turned on. Raise and support vehicle, so all 4 wheels can rotate. Start engine and place transfer case shift lever in "L" position on Land Cruiser, L4 position on Tacoma, or 4WD position on 4Runner. On Land Cruiser, turn differential lock control switch to "RR", on all other models turn differential lock control switch on. Ensure indicator light illuminates. Go to next step.
2. If light indicator light is blinking, rotate tires by hand to engage differential gears. Turn differential lock control switch off, and ensure indicator light goes out. Go to next step.
3. Turn differential lock control switch on. Locate 4WD control unit. See **Fig. 1** , **Fig. 2** or **Fig. 3** . With wheels turning at least 5 MPH, measure voltage between 4WD control unit terminals No. 2 and 3 by backprobing connector. See **Fig. 4** . Voltage should be 0.5 volt or less. If voltage is more than 0.5 volts, check wiring harness for short to voltage. See **WIRING DIAGRAMS** . Repair as necessary. Turn differential lock control switch off. Stop engine and lower vehicle.

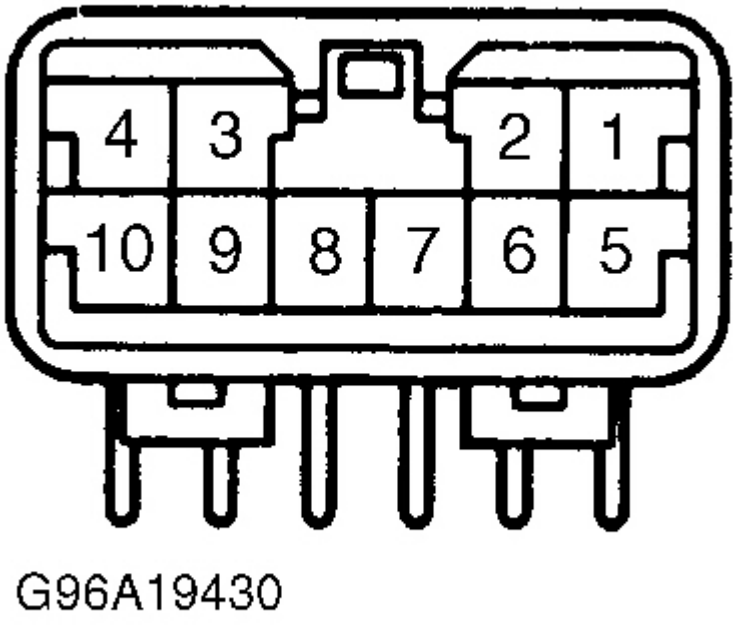
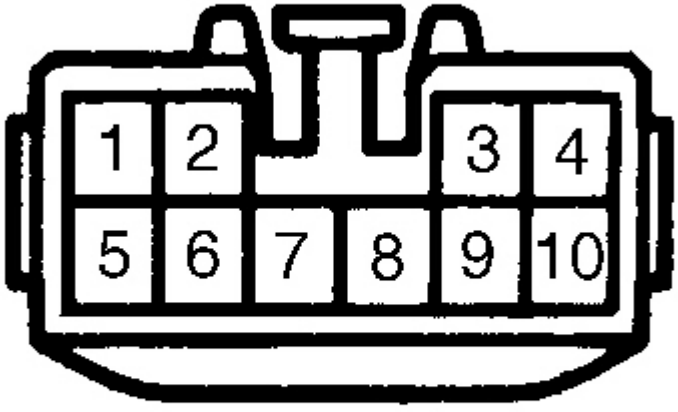


Fig. 4: Identifying 4WD Control Unit Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIFFERENTIAL LOCK CIRCUIT

1. Ensure battery voltage is 10-14 volts. Disconnect 4WD control unit connector. Turn ignition on and go to next step.
2. Check differential lock actuator circuit. Using an ohmmeter, measure resistance between 4WD control unit wiring harness connector terminals No. 2 and 3. See **Fig. 5** . Resistance should be less than 100 ohms. If resistance is less than 100 ohms, go to next step. If resistance is more than 100 ohms, go to step 9 .
3. Check ground circuit. Check that there is continuity present between 4WD control unit wiring harness connector terminal No. 7 and ground. If continuity is present, go to next step. If there is no continuity, go to step 9 .
4. Check vehicle speed sensor circuit. Check continuity between 4WD control unit wiring harness connector terminal No. 10 and ground. Move vehicle slowly (at least 5 MPH). A pulse of continuity should exist for each 15.8" (401 mm) of movement. If continuity is as specified, go to next step. If continuity is not as specified, go to step 9 .
5. Check DIFF fuse circuit. Turn ignition switch on. Measure voltage between 4WD control unit wiring harness connector terminal No. 5 and ground. If battery voltage is not present, check and replace fuse as necessary. If fuse is okay, go to step 9 . If battery voltage is present, go to next step.

6. Check differential lock indicator switch circuit. With ignition switch and indicator light on, measure voltage between 4WD control unit wiring harness connector terminal No. 1 and ground. No voltage should be present. With ignition switch on and indicator light off, measure voltage between terminal No. 1 and ground. Battery voltage should be present. If voltage is as specified, go to next step. If voltage is not as specified, go to step 9 .
7. Check position switch circuit. With ignition switch on and transfer case shift lever in "N" or "H" position, measure voltage between 4WD control unit wiring harness connector terminal No. 8 and ground. No voltage should be present. With shift lever in "L" position on Land Cruiser, "L4" on Tacoma, or 4WD on 4Runner, battery voltage should be present between terminal No. 8 and ground. If voltage is as specified, go to next step. If voltage is not as specified, go to step 9 .
8. Check differential lock control switch circuit. With ignition switch on and differential lock control switch on, measure voltage between 4WD control unit wiring harness connector terminal No. 4 and ground. Battery voltage should be present. With ignition switch on and differential lock control switch off, no voltage should be present. If voltage is as specified, go to step 10 . If voltage is not as specified, go to next step.
9. Check components and wiring harness. Check appropriate component (if necessary). See **COMPONENT TESTS** . Replace components as necessary. If corresponding component is okay, check harness and connectors for damage, corrosion or pins pushed out. Repair or replace as necessary and retest system.
10. Turn ignition off. Connect 4WD control unit connector. Turn ignition on. Place transfer case shift lever in "L" position. Measure voltage at 4WD control unit by backprobing connector. See **Fig. 4** . With differential lock control switch in specified positions, measure voltage between specific connector pins. See **TESTING DIFFERENTIAL LOCK CONTROL OPERATION** table. If voltage is not as specified in the table, replace 4WD control unit.



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Fig. 5: Identifying 4WD Control Unit Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TESTING DIFFERENTIAL LOCK CONTROL OPERATION

Measure Between Terminals No. (1)	Control Switch Position	Specified Voltage
8 & 7		
Land Cruiser	(2)	10-14
Tacoma & 4Runner	(2)	0.5 Or Less
1 & 7	On	0.5 Or Less
3 & 2	Off & On	(3) 10-14
2 & 3	On & Off	(3) 10-14

(1) Connect voltmeter positive lead to first terminal listed, and negative lead to second terminal.

(2) With 4WD shift lever in "L"position on Land Cruiser, "L4" on Tacoma or 4WD on 4Runner.

(3) Voltage is 0.5 volts or less, then present for about one second, then drops down to 0.5 volt or less.

COMPONENT TESTS

DIFFERENTIAL LOCK ACTUATOR

Raise and support vehicle. Using a spare heater main relay, connect it as shown. See **Fig. 6** . Rotate rear tire and ensure differential lock has occurred. If differential does not lock, replace actuator.

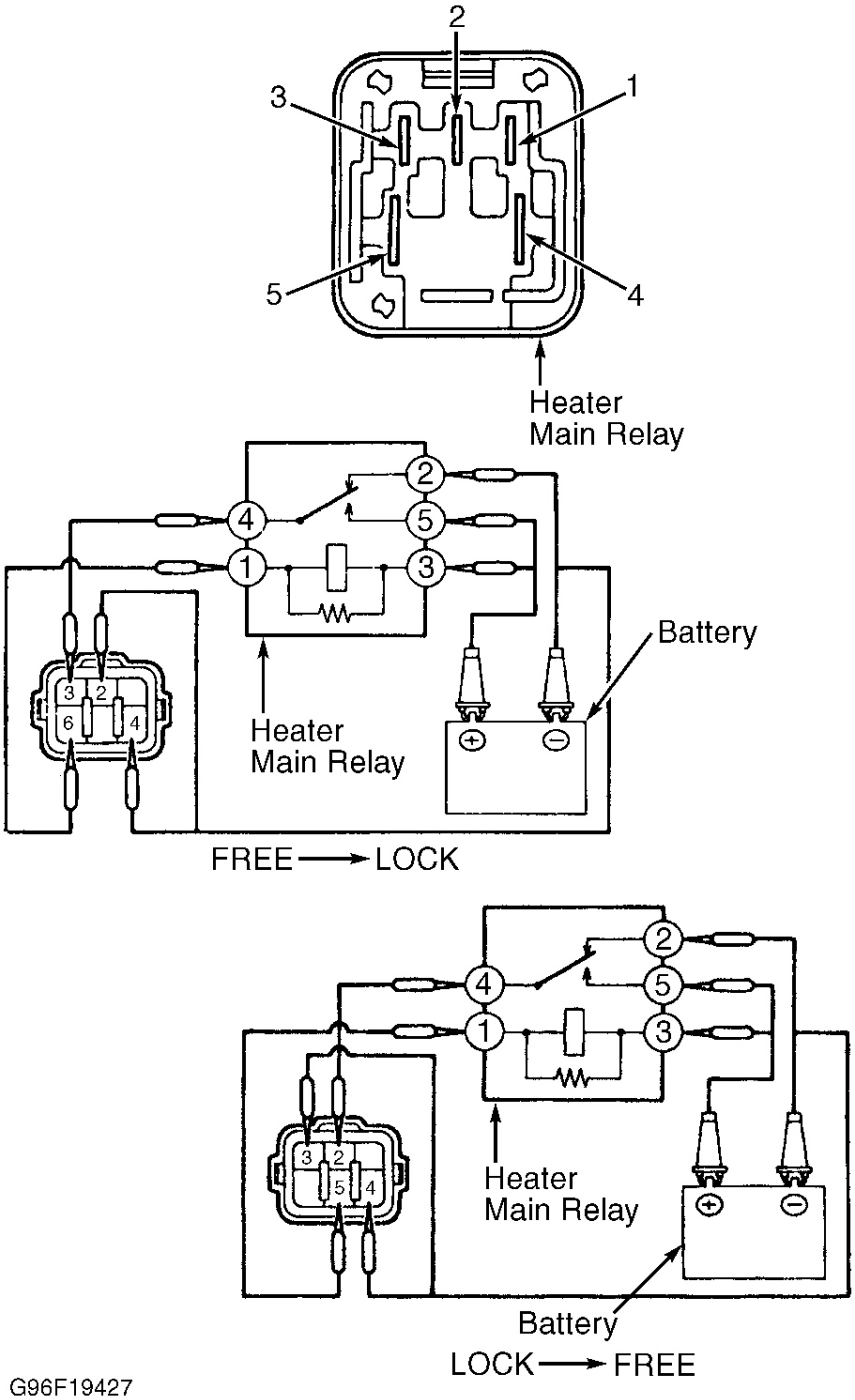


Fig. 6: Testing Differential Lock Actuator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIFFERENTIAL LOCK CONTROL SWITCH

Check differential lock control switch continuity between switch terminals No. 1 and 4. See **Fig. 7** or **Fig. 8** . If continuity does not exist, replace differential lock control switch.

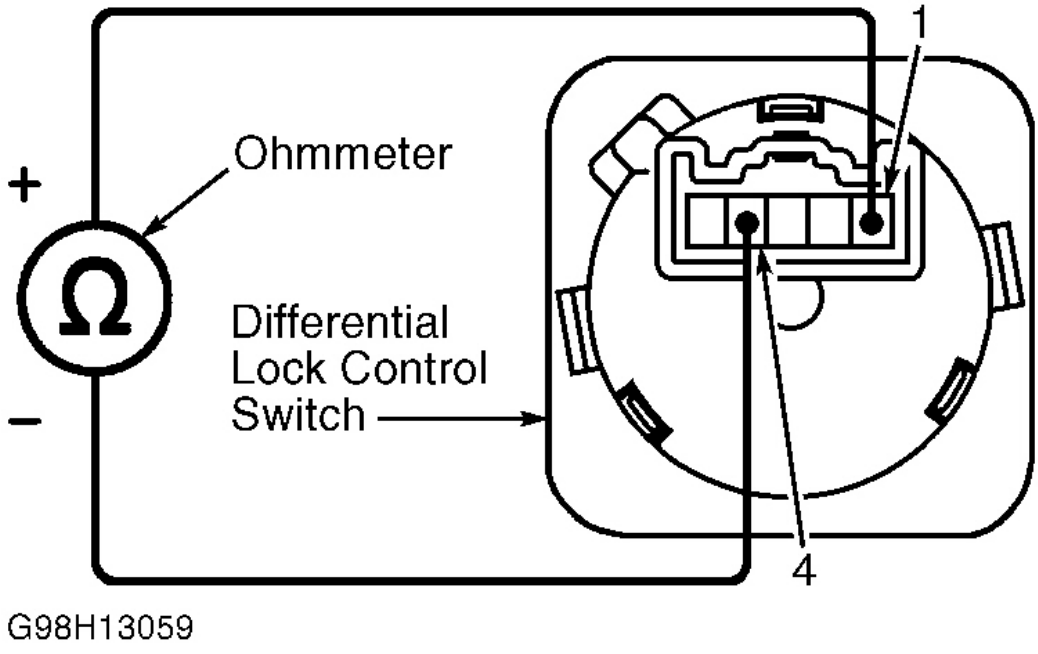


Fig. 7: Testing Differential Lock Control Switch (Land Cruiser)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

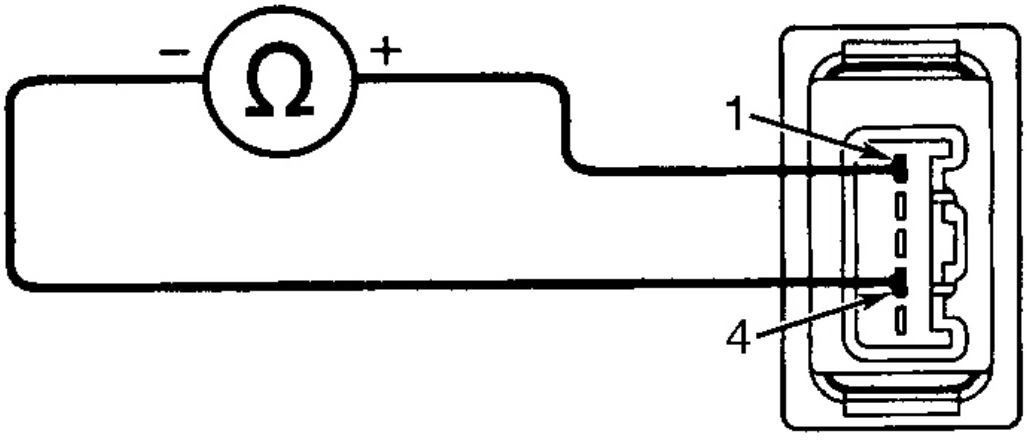


Fig. 8: Testing Differential Lock Control Switch (Tacoma & 4Runner)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIFFERENTIAL LOCK INDICATOR SWITCH

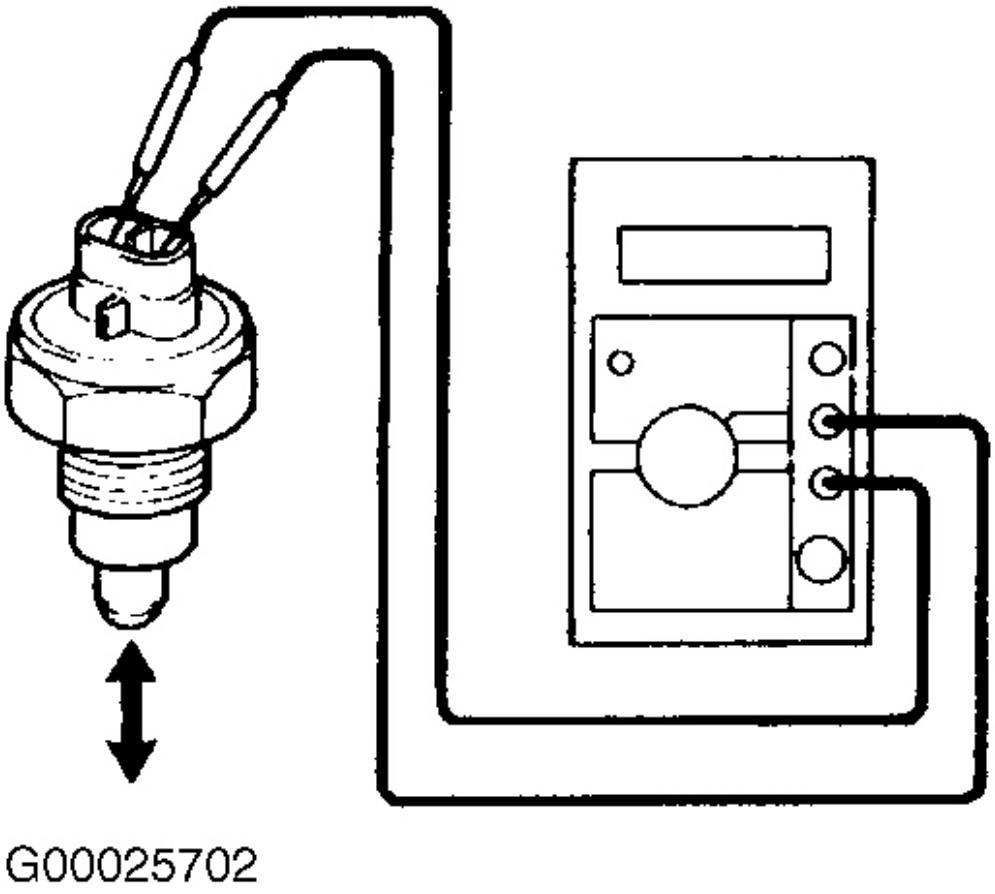


Fig. 9: Testing Differential Lock Indicator Switch
Courtesy of TOYOTA MOTOR CORP.

Disconnect indicator light switch connector. Remove switch by unscrewing from differential. Using a DVOM, ensure continuity exists between terminals of switch when switch is depressed (locked). See **Fig. 9** . Ensure continuity does not exist when switch is released (unlocked). If continuity is not as specified, replace switch.

REMOVAL & INSTALLATION

REAR DIFFERENTIAL LOCK ACTUATOR

Removal & Installation (Land Cruiser)

1. Lock rear differential. Disconnect negative battery cable. Remove 2 actuator protector covers. Disconnect

electrical connectors. Remove rear differential lock position switch and gasket. Remove 3 bolts and remove actuator cover. See **Fig. 10** .

2. Remove shift fork set bolt. See **Fig. 11** . Remove 4 differential lock actuator mounting bolts, and remove actuator and shift fork.
3. Ensure all mating surfaces and bolt threads are clean. Apply a continuous bead of silicone sealant to actuator mating surface. Install actuator and shift fork to differential, matching shaft with shift fork hole, and shift fork with sleeve. Apply Loctite to threads of shift fork set bolt. Install and tighten shift fork set bolt to 14 ft. lbs. (20 N.m).
4. Install differential lock actuator mounting bolts and tighten evenly to 17 ft. lbs. (24 N.m). Apply a bead of silicone sealant to actuator cover mating surface. Install actuator cover and tighten bolts to 13 ft. lbs. (18 N.m). To complete installation, reverse removal procedures. With ignition on, turn differential lock control switch off. Ensure differential lock is released.

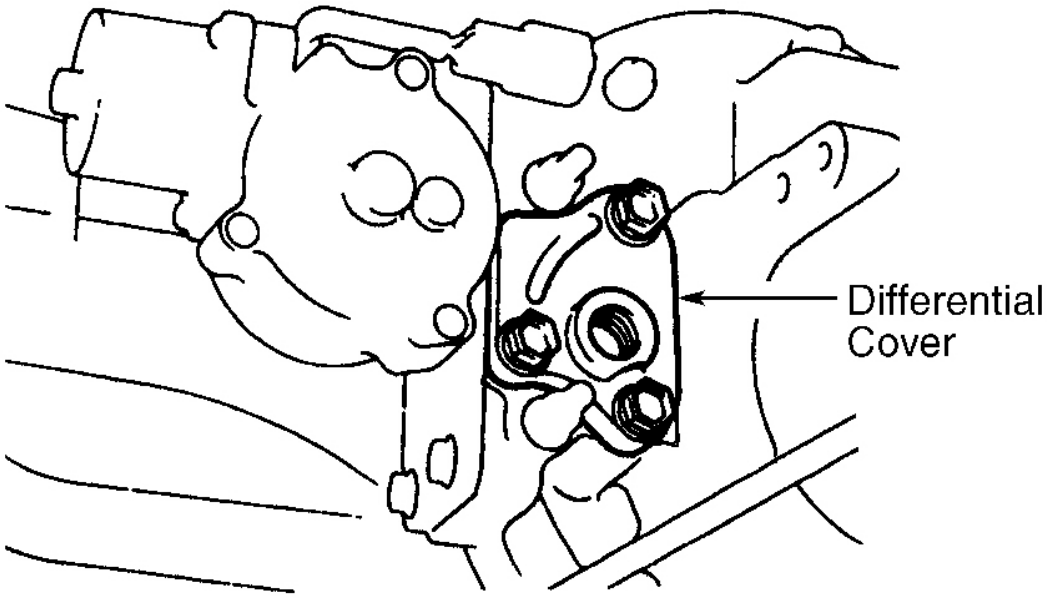


Fig. 10: Removing Rear Differential Actuator Cover (Land Cruiser)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

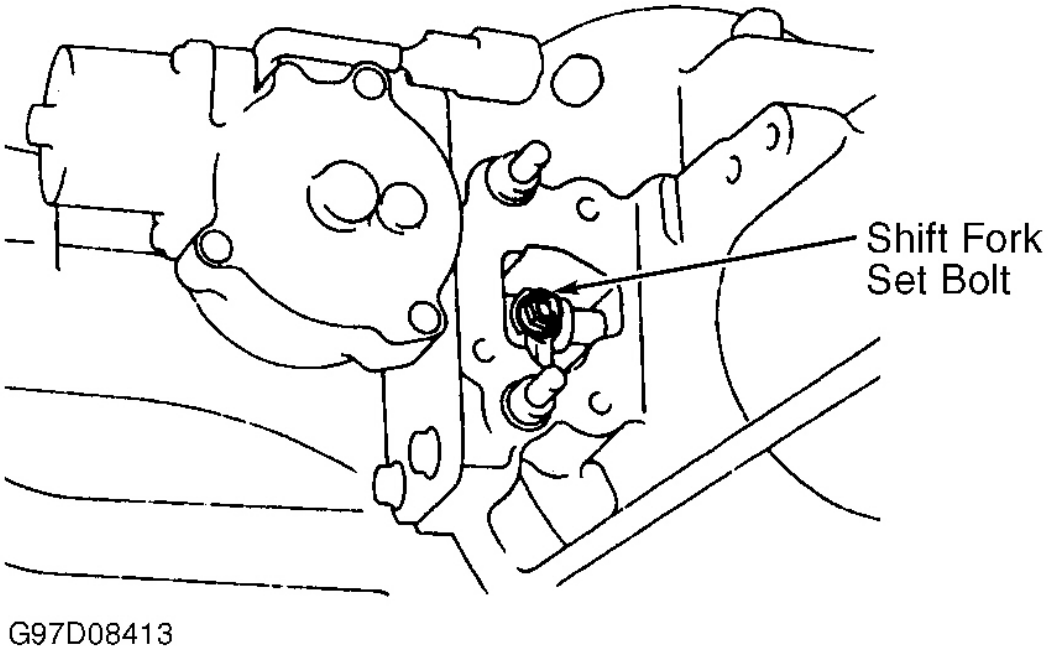


Fig. 11: Removing Actuator Shift Fork Set Bolt (Land Cruiser)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Removal & Installation (Tacoma & 4Runner)

1. Disconnect negative battery cable. Remove actuator protective cover, if equipped. Disconnect electrical connector. Remove bolts, actuator and "O" ring.
2. To install actuator, ensure that outermost rack tooth of shift fork is above center line of actuator installation hole. See **Fig. 12** .
3. Ensure match marks of actuator pinion are between 0 and 5 degrees clockwise above center line of actuator. See **Fig. 13** . If needed, use 1.5 volt dry cell battery to rotate pinion to correct position.
4. Coat NEW "O" ring with gear oil. Install "O" ring to actuator. Apply grease to pinion. Install actuator with elongated slot on actuator aligned with knock pin on side of carrier. Ensure pinion meshes with rack tooth of shift fork. With actuator installed, rotate actuator counterclockwise until knock pin contacts right hand side. See **Fig. 14** . Install bolts and tighten to 20 ft. lbs. (26 N.m).

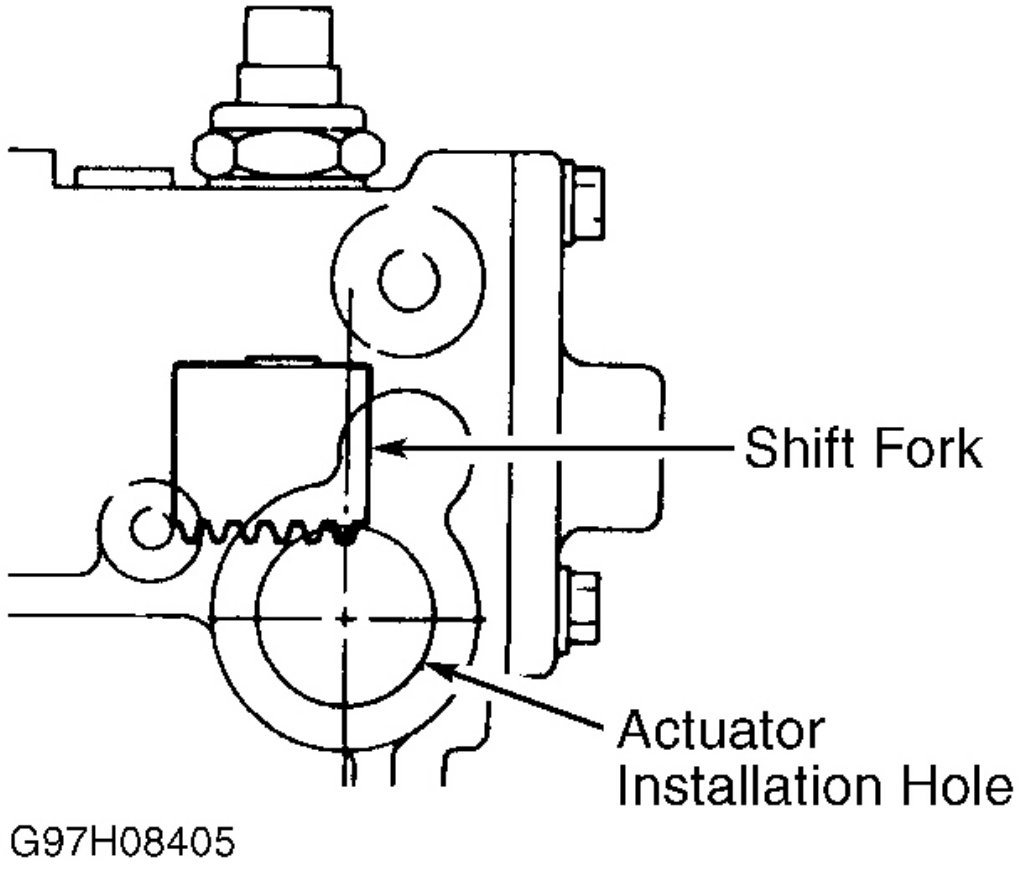


Fig. 12: Aligning Shifter Fork Rack
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

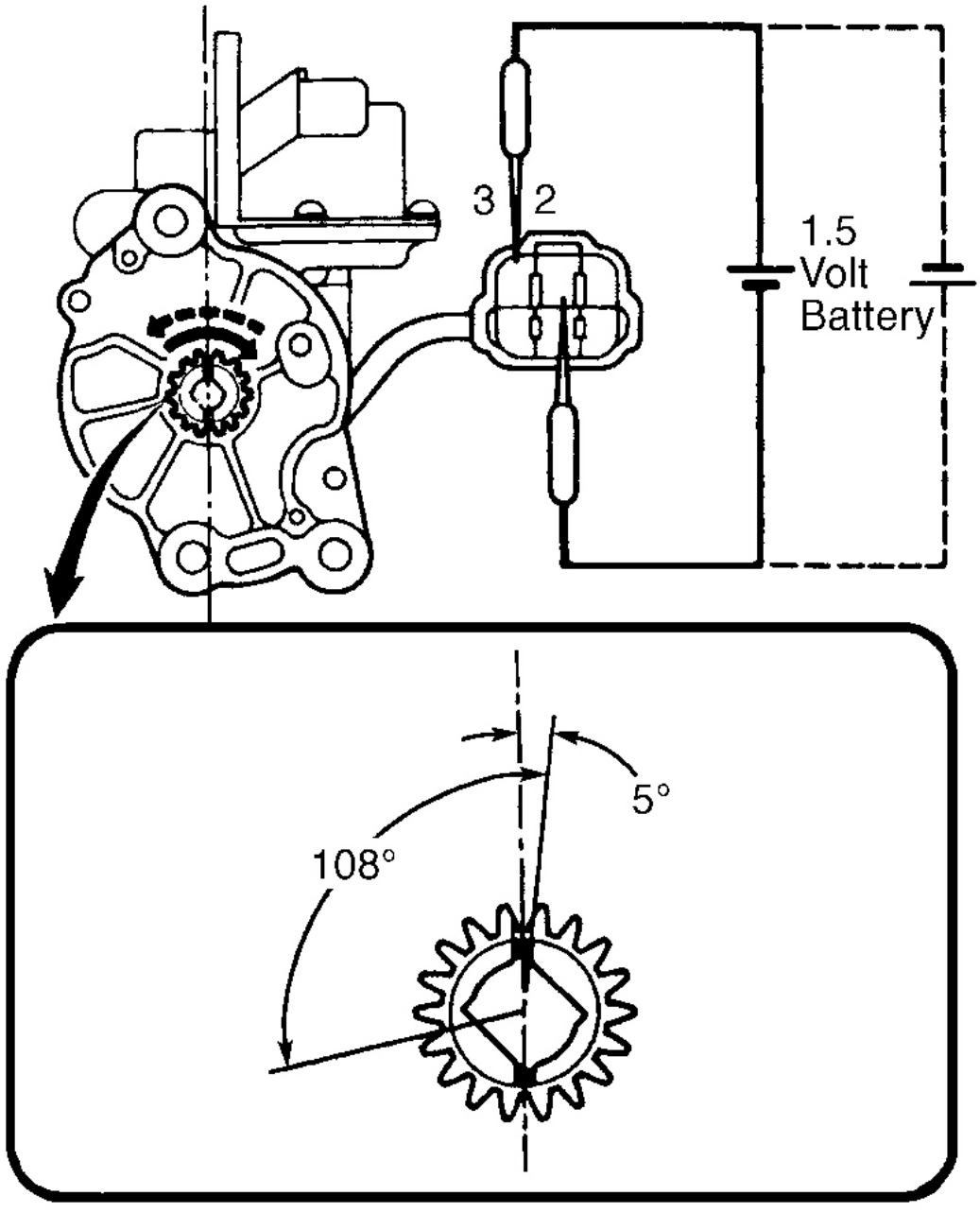


Fig. 13: Aligning Match Marks Of Actuator Pinion
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

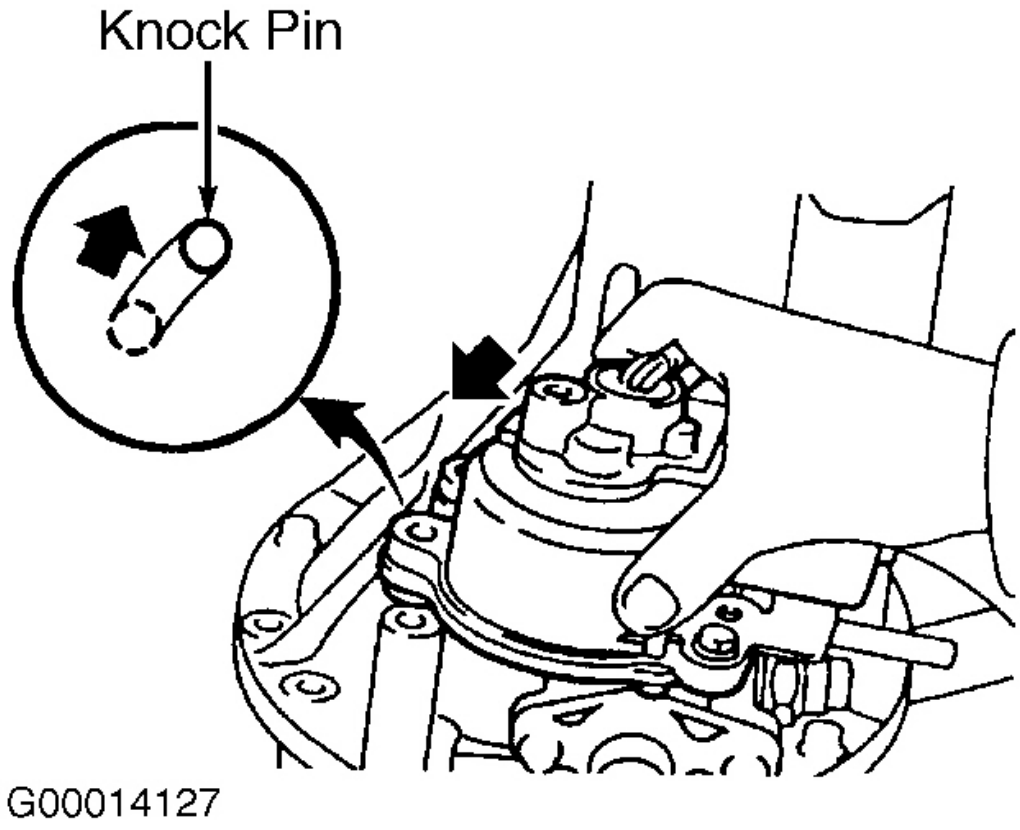


Fig. 14: Aligning Actuator & Knock Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

WIRING DIAGRAMS

2001 Lexus LX 470

2001 DRIVE AXLES Electronic Locking Differentials - Land Cruiser, LX470, Tacoma & 4Runner

Fig. 15: Center & Rear Differential Lock System Wiring Diagram (Land Cruiser)

2001 Lexus LX 470

2001 DRIVE AXLES Electronic Locking Differentials - Land Cruiser, LX470, Tacoma & 4Runner

Fig. 16: Differential Lock System Wiring Diagram (4Runner 4WD)

2001 Lexus LX 470

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Fig. 17: Rear Differential Lock System Wiring Diagram (Tacoma)