DIFFERENTIAL - ELECTRONIC LOCKING

1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

DESCRIPTION & OPERATION

NOTE: The Anti-lock Brake System (ABS) does not operate when the rear differential is locked. It is normal for the ABS warning light to be on at this time.

All Models Except 1997 Land Cruiser & LX450

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 left side 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 left side 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.

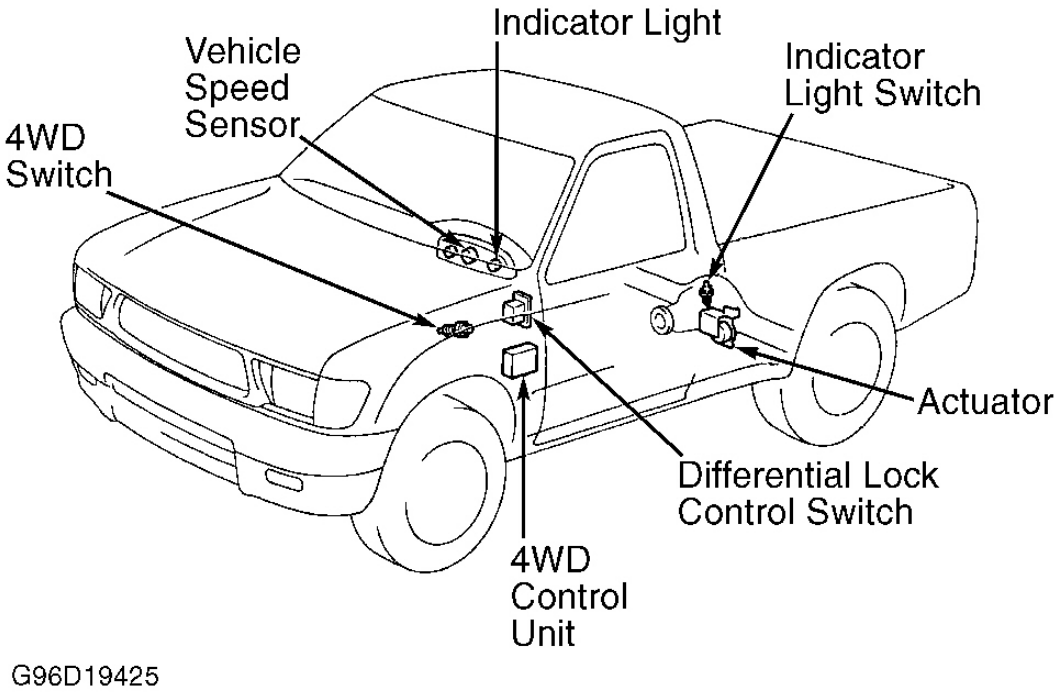


Fig. 1: Locating Electronic Locking Differential System Components (Tacoma)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

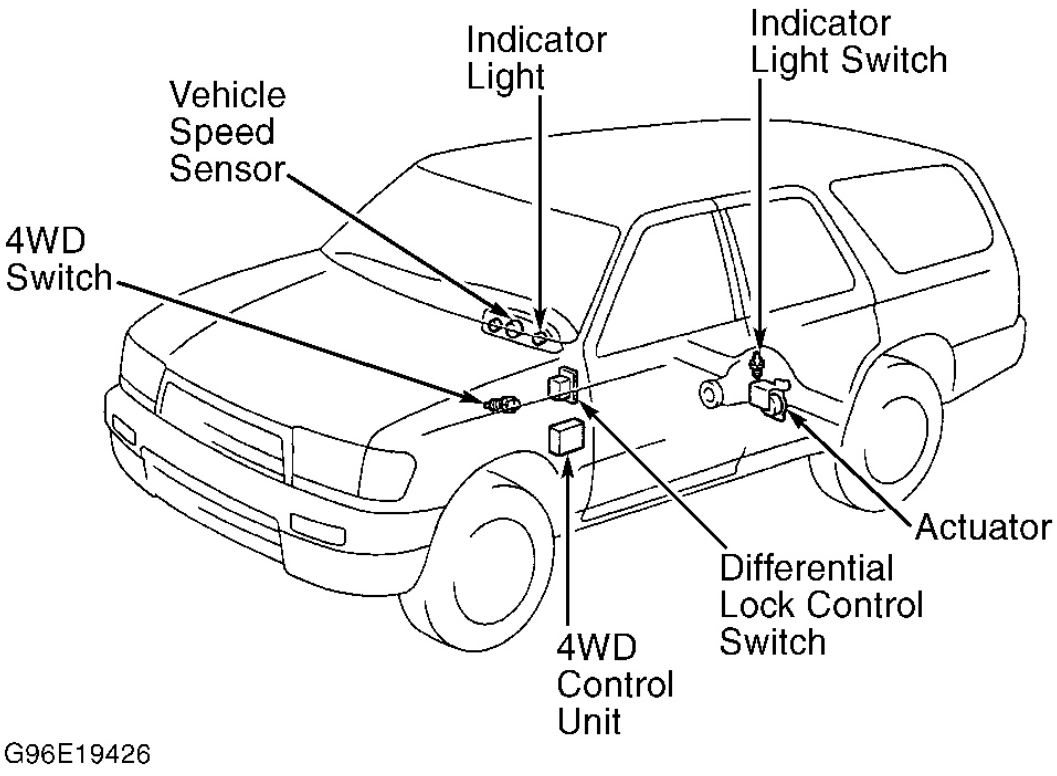


Fig. 2: Locating Electronic Locking Differential System Components (4Runner)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

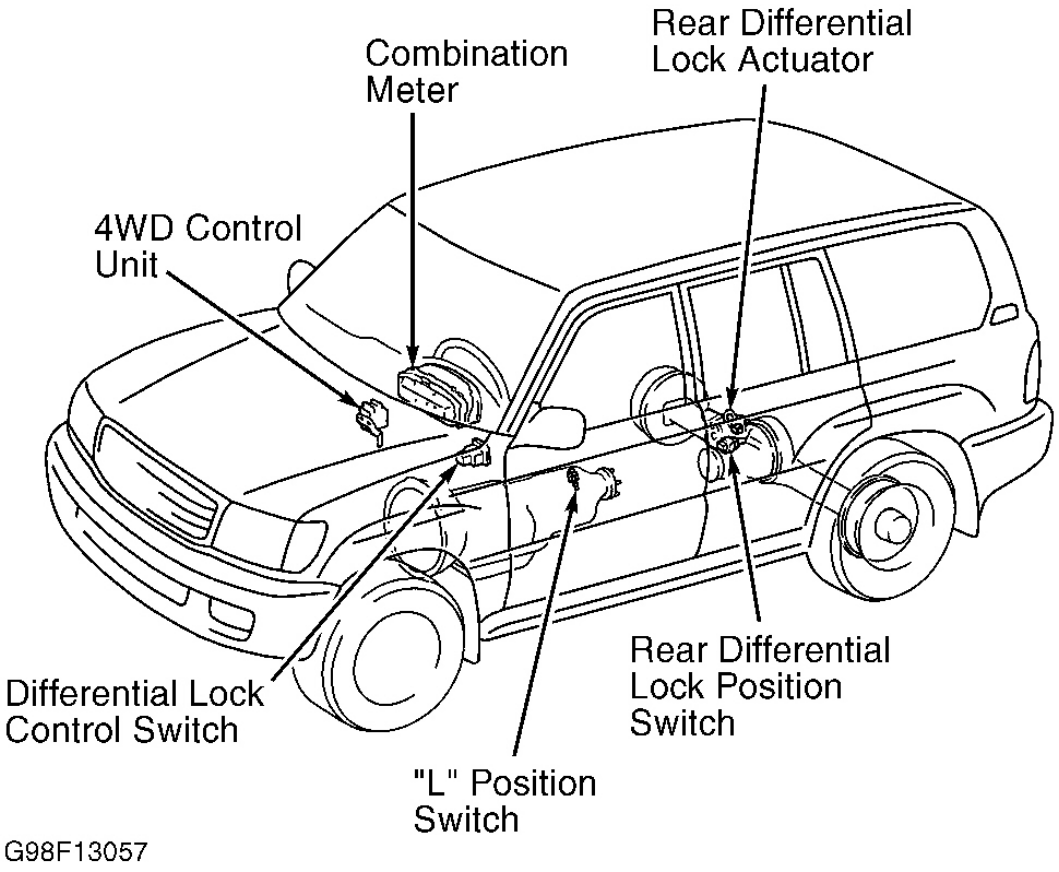


Fig. 3: Locating Electronic Locking Differential System Components (1998 Land Cruiser & LX470)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1997 Land Cruiser & LX450

The electronic locking differential system frees or locks either front and/or rear differentials according to position of differential lock control switch and center differential lock indicator switch. See **Fig. 4** . Differentials will lock only when the center differential lock indicator switch is on, and vehicle speed is 5 MPH or less. Front and rear differential lock indicators, located on instrument cluster, will illuminate when differentials are locked. When ignition is turned on, a bulb check is performed, illuminating front and rear indicators for about one second.

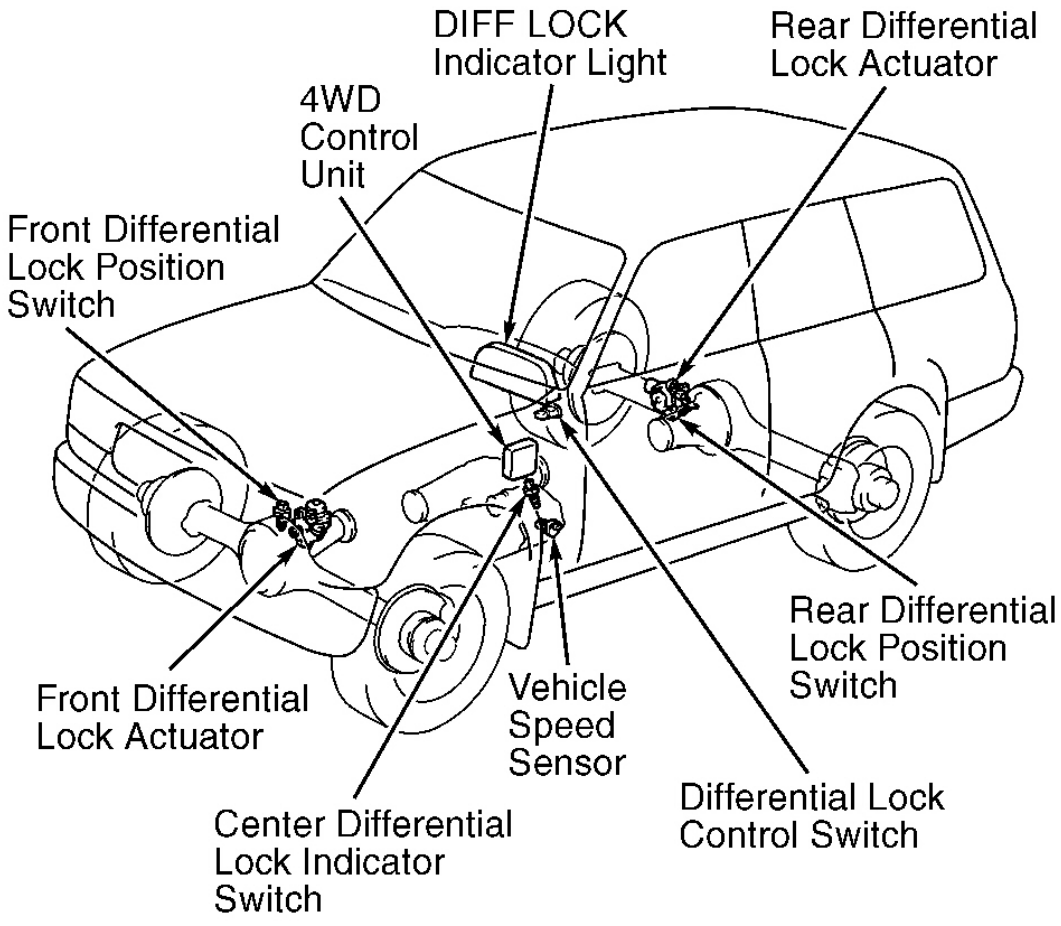


Fig. 4: Locating Electronic Locking Differential System Components (1997 Land Cruiser & LX450)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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. The differential locks and the indicator will light stay on.**

INDICATOR LIGHTS DO NOT LIGHT UP

Differential Lock Control System Off

Check for blown fusible link or blown GAUGE 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 TESTING

OVERALL SYSTEM CHECK

All Models (Except 1997 Land Cruiser & LX450)

1. Raise vehicle off ground so all 4 wheels can rotate. Start engine and place transfer case shift lever in 4WD position. On Land Cruiser and LX470, turn center differential switch on (located on center instrument panel). On all models, turn differential lock control switch on, and ensure indicator light turns on. Go to next step.
2. If light indicator light is blinking, rotate tires to engage differential gears. Turn differential lock control switch off, and ensure indicator light turns off. 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 5 MPH, measure voltage between 4WD control unit terminals No. 2 and 3 by backprobing connector. See **Fig. 5** . Voltage should be 0.5 volt or less. If voltage is not as specified, check wiring harness for short to voltage. See **WIRING DIAGRAMS** . Repair as necessary. Turn differential lock control switch off. Stop engine and lower vehicle.

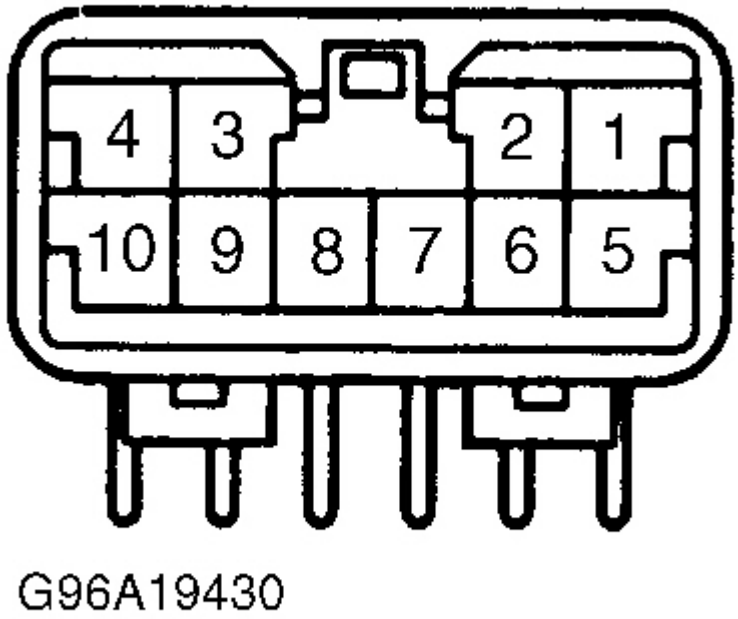


Fig. 5: Identifying 4WD Control Unit Terminals (All Models; Except 1997 Land Cruiser & LX450)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1997 Land Cruiser & LX450

1. Raise vehicle off ground so all 4 wheels can rotate. Start engine and place transfer case shift lever in 4WD position. Turn differential lock control switch to "RR" position and ensure indicator light turns on. Go to next step.
2. If light indicator light is blinking, rotate tires to engage differential gears. Turn differential lock control switch to "FR/RR" position and ensure indicator light turns on. Turn differential lock control switch off and ensure indicator lights turn off. Go to next step.
3. Turn differential lock control switch on and check voltage between 4WD control unit terminals as specified. See **DIFFERENTIAL LOCK CONTROL SWITCH SPECS (1997 LAND CRUISER & LX450)** table. See **Fig. 6** . Voltage should be 0.5 volt or less. If voltage is not as specified, check wiring harness for short to voltage. See WIRING DIAGRAMS. Repair as necessary. Turn differential lock control switch off. Stop engine and lower vehicle.

DIFFERENTIAL LOCK CONTROL SWITCH SPECS (1997 LAND CRUISER & LX450)

Control Switch Changing From	Measure Between Terminals No.	(1) Voltage
Off To "RR"	1 & 3	.5 Or Less

"RR" To "FR/RR"	5 & 7	.5 Or Less

(1) Specified voltage should exist during switch position change.

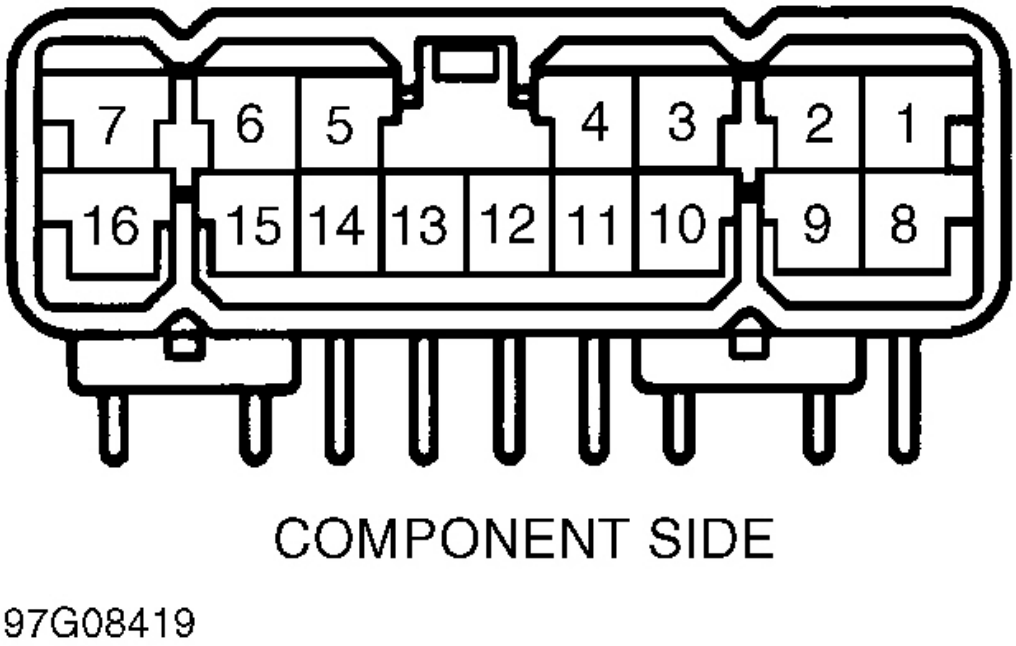


Fig. 6: Identifying 4WD Control Unit Connector Terminals (1997 Land Cruiser & LX450)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIFFERENTIAL LOCK CIRCUIT

All Models Except 1997 Land Cruiser & LX450

1. Ensure battery voltage is 10-14 volts. Disconnect 4WD control unit. Turn ignition on and go to next step.
2. Check differential lock actuator circuit. Using ohmmeter, measure resistance between 4WD control unit wiring harness connector terminals No. 2 and 3. See **Fig. 7** . Resistance should be less than 100 ohms. If resistance is as specified, go to next step. If resistance is not as specified, go to step 9).
3. Check ground circuit. Check continuity between 4WD control unit wiring harness connector terminal No. 7 and ground. Continuity should exist. If continuity is as specified, go to next step. If continuity is not as specified, 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" (40 cm) 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. 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 position switch circuit. Measure voltage between 4WD control unit wiring harness connector terminal No. 1 and ground. When differential lock indicator light is on, no voltage should be present. When differential lock indicator light is off, 10-14 volts should be present. If voltage is as specified, go to next step. If voltage is not as specified, go to step 9).
7. Check 4WD position switch circuit. Measure voltage between 4WD control unit wiring harness connector terminal No. 8 and ground. With 4WD shift lever in "N" or "H" position, no voltage should be present. With 4WD shift lever in "L" position, 10-14 volts should be present. 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. Measure voltage between 4WD control unit wiring harness connector terminal No. 4 and ground. With control switch off, no voltage should be present. With control switch on, 10-14 volts should be present. If voltage is as specified, go to step 10). If voltage is not as specified, go to next step.
9. Components and wiring harness. Check appropriate component (if necessary). See **COMPONENT TESTING** . Replace as necessary. If appropriate component is okay, check harness and connectors for terminal damage, corrosion or pins pushed out. Repair or replace as necessary and retest system.

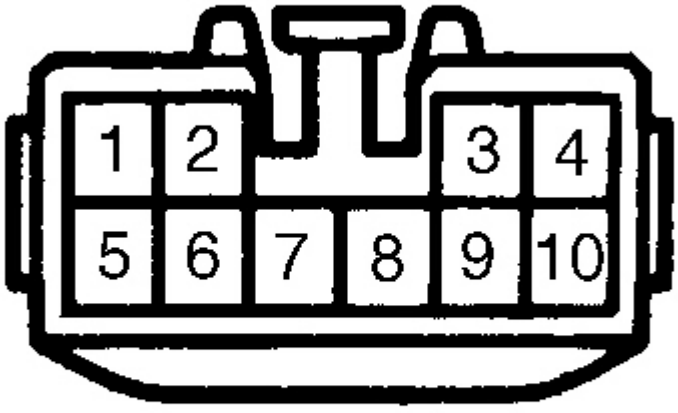


Fig. 7: Identifying 4WD Control Unit Connector Terminals (All Models Except 1997 Land Cruiser & LX450)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. Check circuit with control unit connected. Turn ignition off. Connect 4WD control unit connector. Turn

ignition on. With differential control switch in specified positions, check voltage at 4WD control unit by backprobing connector. See **Fig. 5** . See **TESTING DIFFERENTIAL LOCK CONTROL OPERATION** (EXCEPT 1997 LAND CRUISER LX450) table. If voltage is not as specified, replace 4WD control unit.

TESTING DIFFERENTIAL LOCK CONTROL OPERATION (EXCEPT 1997 LAND CRUISER & LX450)

Measure Between Terminals No. (1)	Control Switch Position	Voltage
8 & 7	(2)	10-14
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.

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

1997 Land Cruiser & LX450

1. Ensure battery voltage is 10-14 volts. Disconnect 4WD control unit. Turn ignition on and go to next step.
2. Check rear differential lock actuator circuit. Using ohmmeter, measure resistance between 4WD control unit wiring harness connector terminals No. 1 and 3. See **Fig. 8** . Resistance should be less than 100 ohms. If resistance is as specified, go to next step. If resistance is not as specified, go to step 11).
3. Check front differential lock actuator circuit. Using ohmmeter, measure resistance between 4WD control unit wiring harness connector terminals No. 5 and 7. Resistance should be less than 100 ohms. If resistance is as specified, go to next step. If resistance is not as specified, go to step 11).
4. Check ground circuit. Check continuity between 4WD control unit wiring harness connector terminal No. 13 and ground. Continuity should exist. If continuity is as specified, go to next step. If continuity is not as specified, go to step 11).
5. Check vehicle speed sensor circuit. Check continuity between 4WD control unit wiring harness connector terminal No. 4 and ground. Move vehicle slowly (at least 5 MPH). A pulse of continuity should exist for each 15.8" (40 cm) of movement. If continuity is as specified, go to next step. If continuity is not as specified, go to step 11).
6. Check DIFF fuse circuit. Measure voltage between 4WD control unit wiring harness connector terminal No. 8 and ground. If battery voltage is present, go to next step. If battery voltage is not present, check and replace fuse as necessary. If fuse is okay, go to step 11).
7. Check rear differential lock position switch circuit. Measure voltage between 4WD control unit wiring harness connector terminal No. 2 and ground. When rear differential lock indicator light is on, no voltage should be present. When rear differential lock indicator light is off, 10-14 volts should be present. If voltage is as specified, go to next step. If voltage is not as specified, go to step 11).
8. Check front differential lock position switch circuit. Measure voltage between 4WD control unit wiring harness connector terminal No. 9 and ground. When front differential lock indicator light is on, no voltage should be present. When front differential lock indicator light is off, 10-14 volts should be

present. If voltage is as specified, go to next step. If voltage is not as specified, go to step 11).

9. Check center differential position switch circuit. Measure voltage between 4WD control unit wiring harness connector terminal No. 15 and ground. With 4WD shift lever in "N" or "H" position, no voltage should be present. With 4WD shift lever in "L" position, 10-14 volts should be present. If voltage is as specified, go to next step. If voltage is not as specified, go to step 11).
10. Check differential lock control switch circuit. Measure voltage between specified 4WD control unit wiring harness connector terminal and ground. See **CONTROL SWITCH CIRCUIT SPECIFICATIONS** table. If voltage is as specified, go to step 12). If voltage is not as specified, go to next step.

CONTROL SWITCH CIRCUIT SPECIFICATIONS

Connector Terminal	Control Switch Position	Volts
6	"FR/RR"	Battery Voltage
6	Off Or "RR"	0
12	"RR" Or "FR/RR"	Battery Voltage
12	Off	0

11. Check components and wiring harness. Check appropriate component (if necessary). See **COMPONENT TESTING** . Replace as necessary. If appropriate component is okay, check harness and connectors for terminal damage, corrosion or pins pushed out. Repair or replace as necessary and retest system.

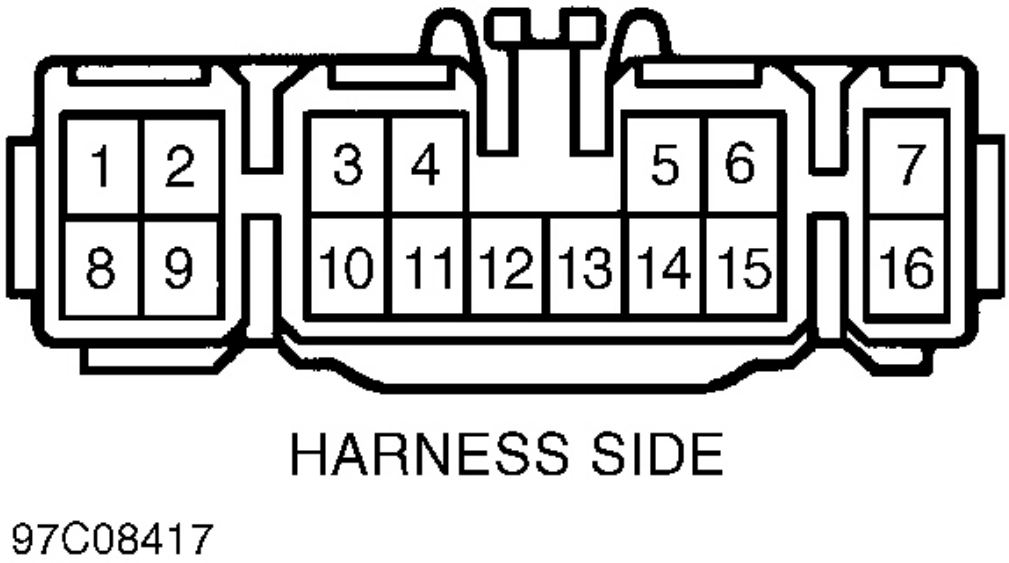


Fig. 8: Identifying 4WD Control Unit Connector Terminals (1997 Land Cruiser & LX450)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. Check circuit with control unit connected. Turn ignition off. Connect 4WD control unit connector. Turn ignition on. With differential control switch in specified positions, check voltage at 4WD control unit by backprobing connector. See **Fig. 6** . See **TESTING DIFFERENTIAL LOCK CONTROL OPERATION (1997 LAND** CRUISER & LX450) table. If voltage is not as specified, replace 4WD control unit.

TESTING DIFFERENTIAL LOCK CONTROL OPERATION (1997 LAND CRUISER & LX450)

Measure Between Terminals No. (1)	Control Switch	Voltage
15 & 13	Any	0.5 Or Less
9 & 13	"FR/RR"	0.5 Or Less
2 & 13	"RR" Or "FR/RR"	0.5 Or Less
3 & 1	Off-"RR"	(2) 10-14
1 & 3	"RR"-Off	(2) 10-14
7 & 5	Off Or "RR"-"FR/RR"	(2) 10-14
5 & 7	"FR/RR"-"RR" Or Off	(2) 10-14

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

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

COMPONENT TESTING

NOTE: For information on center differential lock actuator and indicator switch, see appropriate TRANSFER CASES article in POWERTRAIN category.

CENTER DIFFERENTIAL LOCK CONTROL SWITCH (1997 LAND CRUISER & LX450)

Remove center differential lock switch from instrument panel. Disconnect electrical connector. With switch off (released), ensure no continuity exists between switch terminals. With switch on (pushed in), ensure continuity exists between switch terminals. Replace switch if continuity is not as specified.

DIFFERENTIAL LOCK ACTUATOR

All Models

Raise and support vehicle. Using a spare heater main relay, connect battery voltage as shown. See **Fig. 9** . Rotate rear tire and ensure differential locks or is free. If differential does not operate as specified, replace actuator.

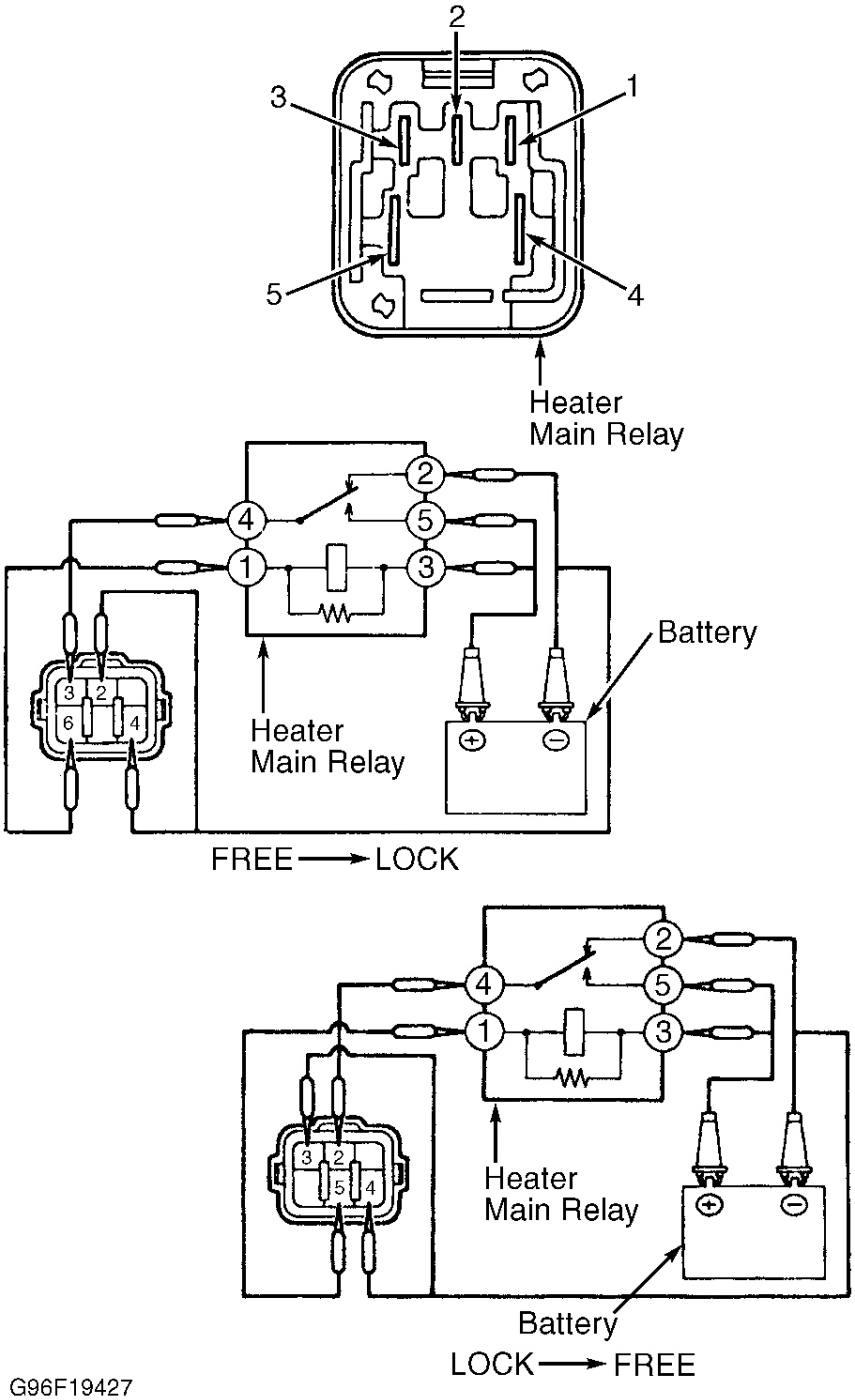


Fig. 9: Testing Differential Lock Actuator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIFFERENTIAL LOCK CONTROL SWITCH

All Models Except 1997 Land Cruiser & LX450

Check differential lock control switch continuity between switch terminals No. 1 and 4. See **Fig. 10** or **Fig. 11** . If continuity does not exist, replace differential control switch.

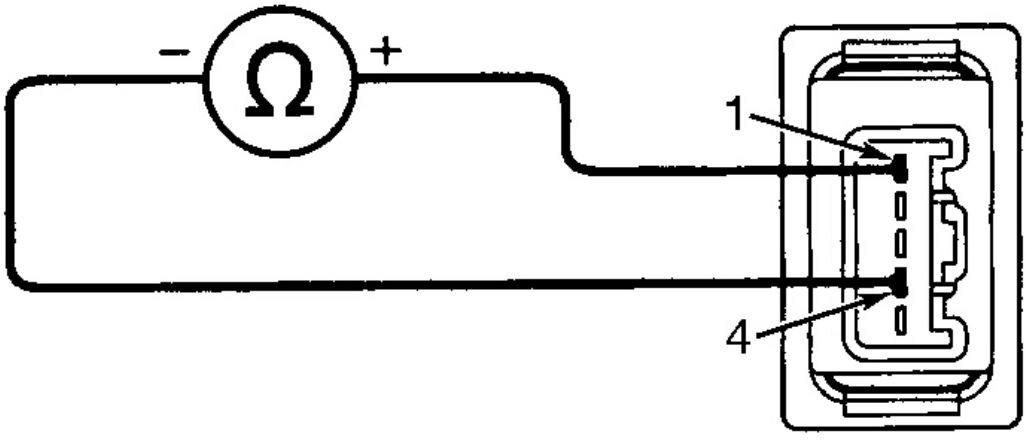


Fig. 10: Testing Differential Lock Control Switch (Tacoma & 4Runner)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

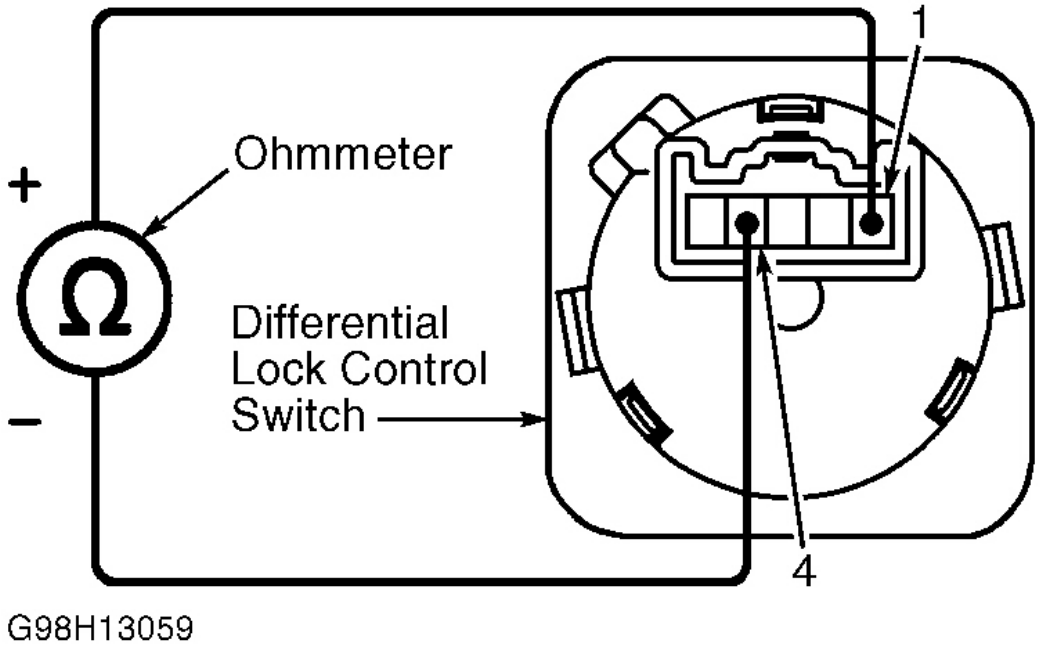


Fig. 11: Testing Differential Lock Control Switch (1998 Land Cruiser & LX470)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1997 Land Cruiser & LX450

Check differential lock control switch continuity between specified terminals. See **DIFFERENTIAL LOCK CONTROL SWITCH SPECIFICATIONS** table. See **Fig. 12** . If continuity does not exist as specified, replace differential control switch.

DIFFERENTIAL LOCK CONTROL SWITCH SPECIFICATIONS

Switch Position	Continuity Between Terminals No.
Off	None
"RR"	1 & 4
"FR/RR"	1, 2 & 4

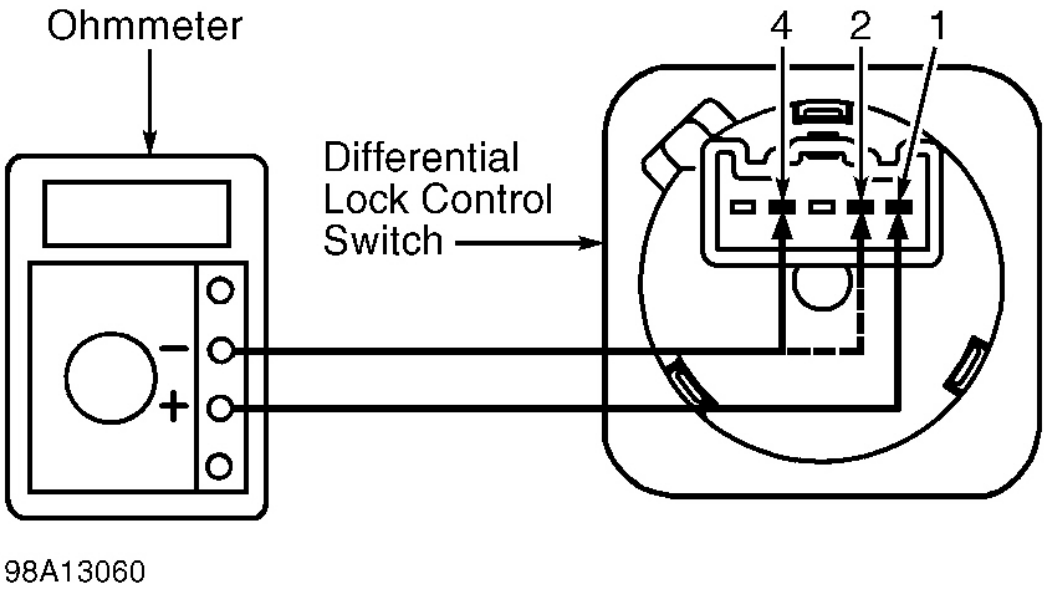


Fig. 12: Testing Differential Lock Control Switch (1997 Land Cruiser & LX450)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INDICATOR LIGHT/DIFFERENTIAL POSITION SWITCH

Front Or Rear

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. Ensure continuity does not exist when switch is released. If continuity is not as specified, replace switch.

REMOVAL & INSTALLATION

NOTE: For information on center differential lock actuator and indicator switch, see appropriate TRANSFER CASES article in the POWERTRAIN category.

FRONT DIFFERENTIAL LOCK ACTUATOR (1997 LAND CRUISER & LX450)

Removal & Installation

1. Lock front differential. Disconnect negative battery cable. Disconnect actuator connector and differential vent tube. Remove 2 nuts and one bolt. Remove lock actuator. Remove "O" ring from actuator.
2. Ensure outermost rack tooth of shifter fork is above the center line of actuator installation hole. See **Fig. 13** . If necessary, use a dry cell 1.5 volt battery to align matchmark of actuator pinion with center line of actuator. See **Fig. 14** .

3. Install NEW "O" ring to actuator. Apply a small amount of gear oil to "O" ring. Apply a small amount of MP lube grease to gear portion of actuator. Install actuator, ensuring outermost rack tooth of shift fork fits matchmark of actuator gear. See **Fig. 15** . Tighten actuator mounting nuts and bolt to 20 ft. lbs. (26 N.m).
4. To complete installation, reverse removal procedures. With ignition on, turn differential lock control switch Off. Ensure differential lock is released.

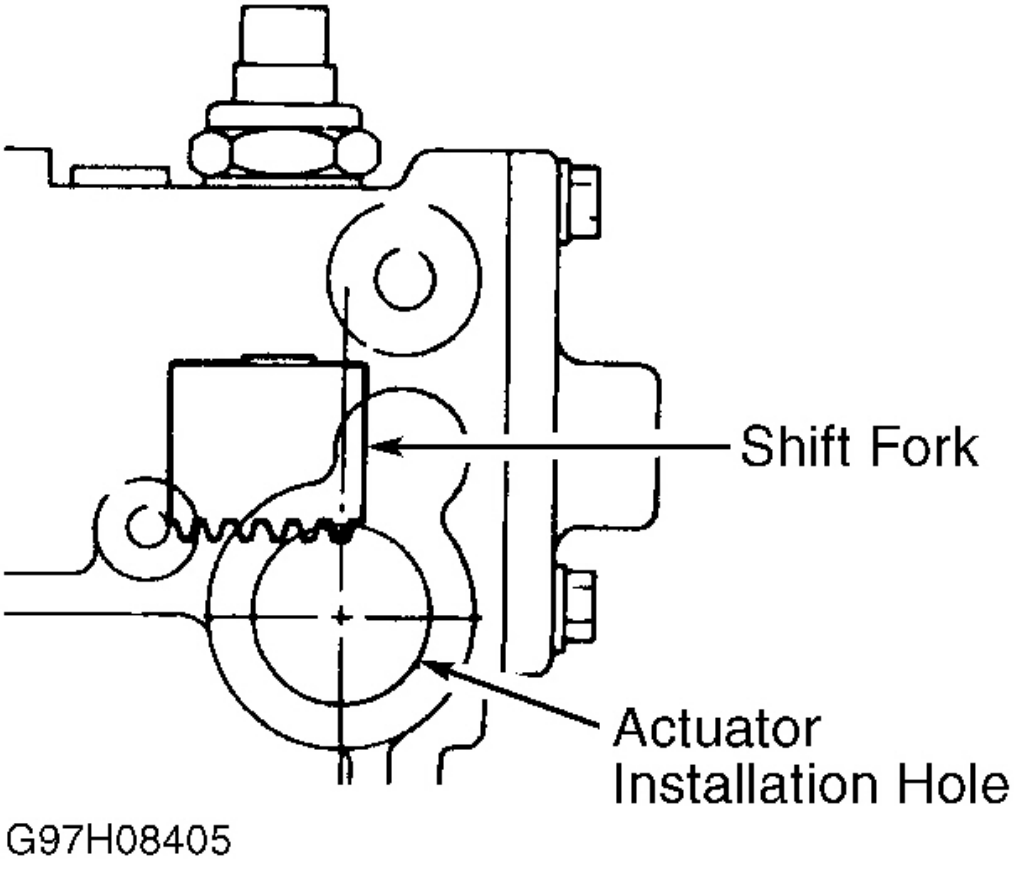


Fig. 13: Aligning Shifter Fork During Installation Of Actuator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

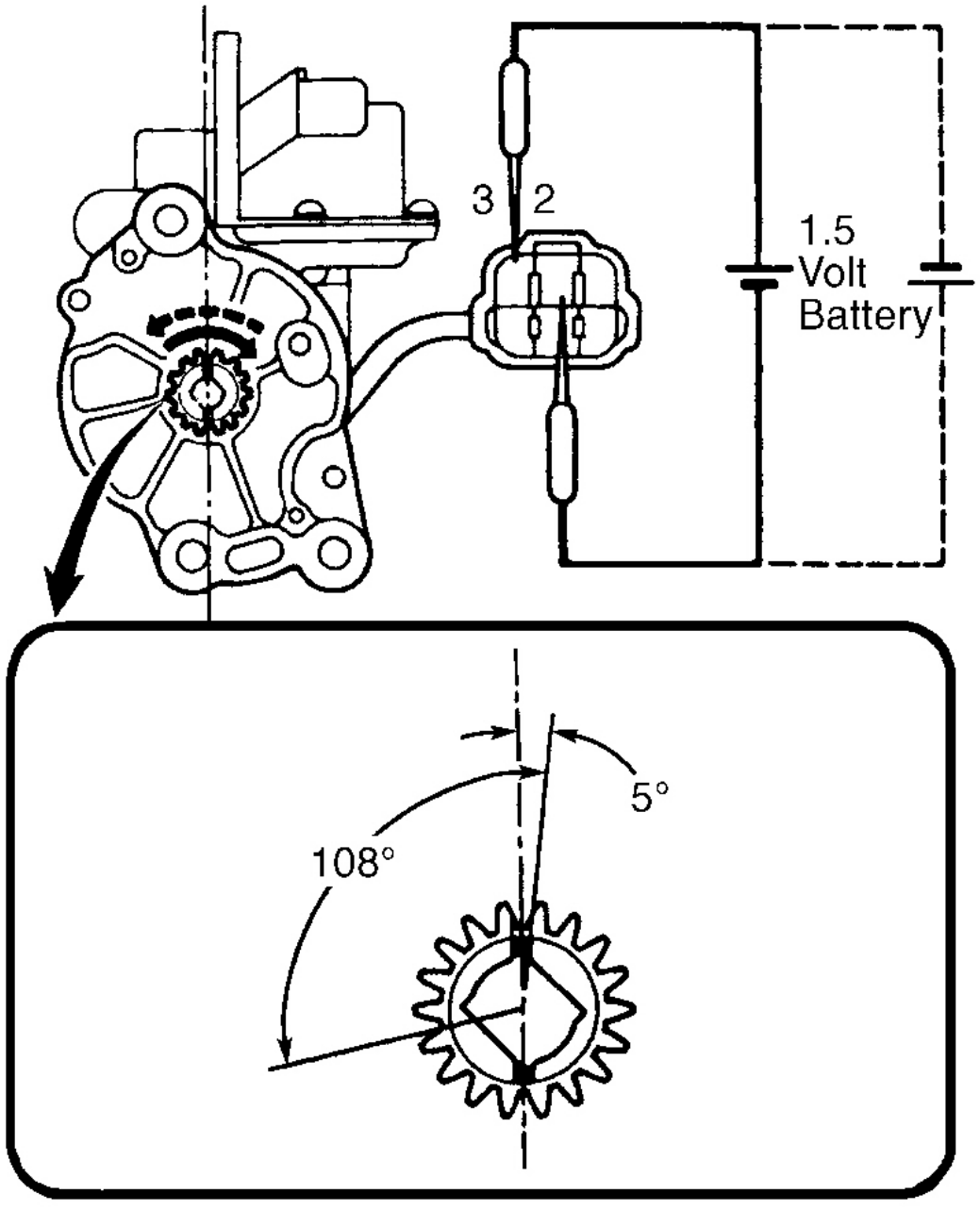


Fig. 14: Aligning Matchmark Grove Of Actuator Gears
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

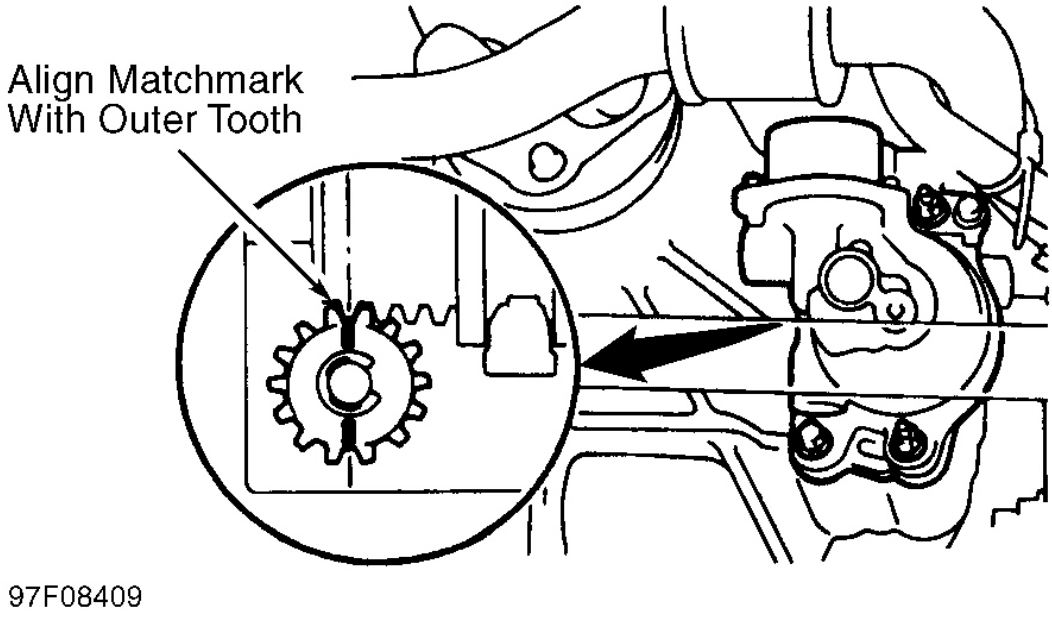


Fig. 15: Aligning Actuator Matchmarks With Outer Rack Tooth
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REAR DIFFERENTIAL LOCK ACTUATOR

All Models

1. Lock rear differential. Disconnect negative battery cable. Remove actuator protector(s). Disconnect electrical connectors and bleeder tube. Remove rear differential lock position switch. Remove 3 bolts and differential cover. See **Fig. 16** .
2. Remove shift fork set bolt. See **Fig. 17** . Remove differential lock actuator mounting bolts, and remove actuator.
3. Clean all mating surfaces, set bolt threads and shaft fork. Apply form-in-place type gasket sealant to actuator. Install actuator to differential, matching shaft with shaft fork hole. Apply Loctite to threads of fork set bolt. Install and tighten 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 form-in-place type sealant to differential cover mating area, and install cover. To complete installation, reverse removal procedures. With ignition on, turn differential lock control switch off. Ensure differential lock is released.

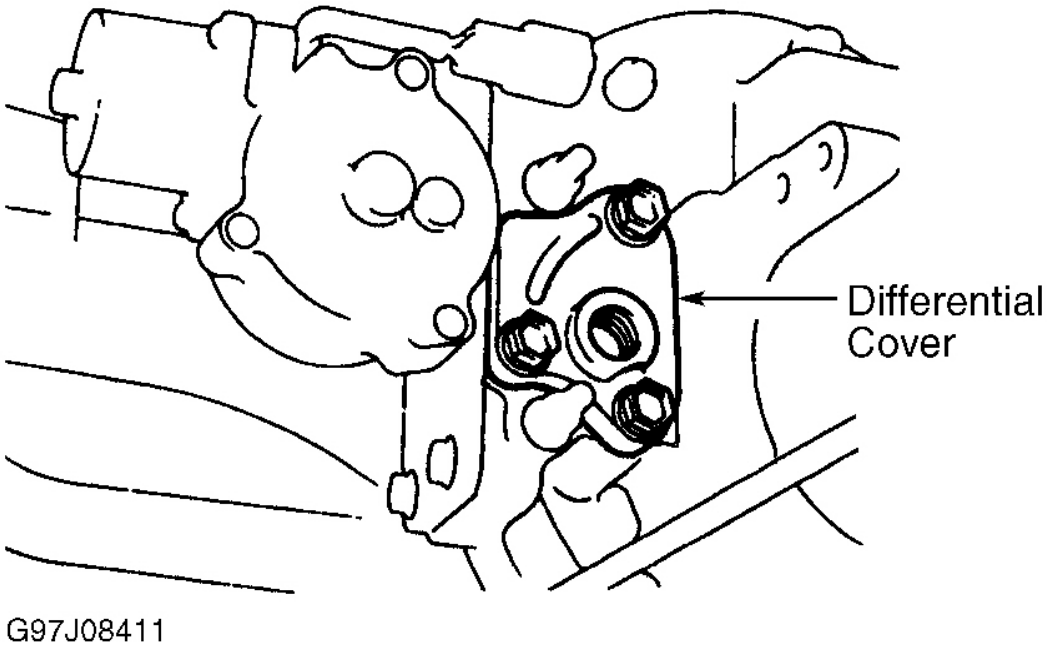


Fig. 16: Removing Rear Differential Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

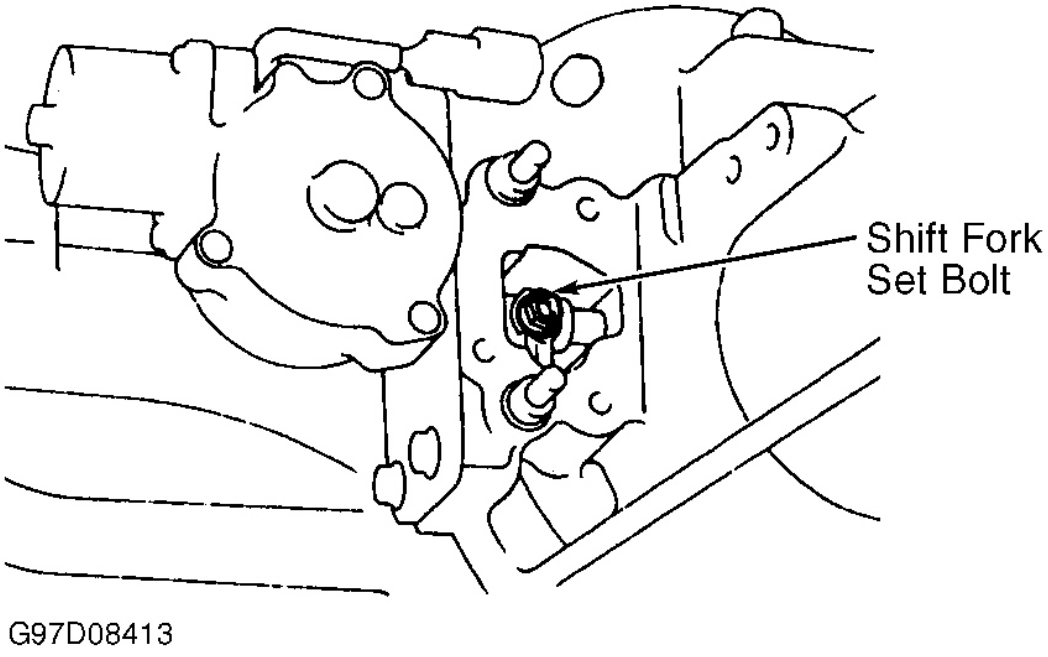


Fig. 17: Removing Shift Fork Set Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

WIRING DIAGRAMS

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 18: Front & Rear Differential Lock System Wiring Diagram (1997 LX450)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 19: Front & Rear Differential Lock System Wiring Diagram (1997 Land Cruiser)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 20: Center Differential Lock System Wiring Diagram (1997 LX450)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 21: Center Differential Lock System Wiring Diagram (1997 Land Cruiser)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 22: Center & Rear Differential Lock System Wiring Diagram (1998 LX470)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 23: Center & Rear Differential Lock System Wiring Diagram (1998 Land Cruiser)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 24: Rear Differential Lock System Wiring Diagram (1997 Tacoma)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 25: Rear Differential Lock System Wiring Diagram (1997 4Runner)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 26: Rear Differential Lock System Wiring Diagram (1998 Tacoma)

1998 Lexus LX 470

DIFFERENTIAL - ELECTRONIC LOCKING 1997-98 DRIVE AXLES Lexus/Toyota Electronic Locking Differentials

Fig. 27: Rear Differential Lock System Wiring Diagram (1998 4Runner)