

## REPAIR GUIDE

Lexus GX470 2003-06

# Coolant Temperature Sensor

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1. Measure the resistance between the terminals.
2. If the result is not as specified, replace the ECT.

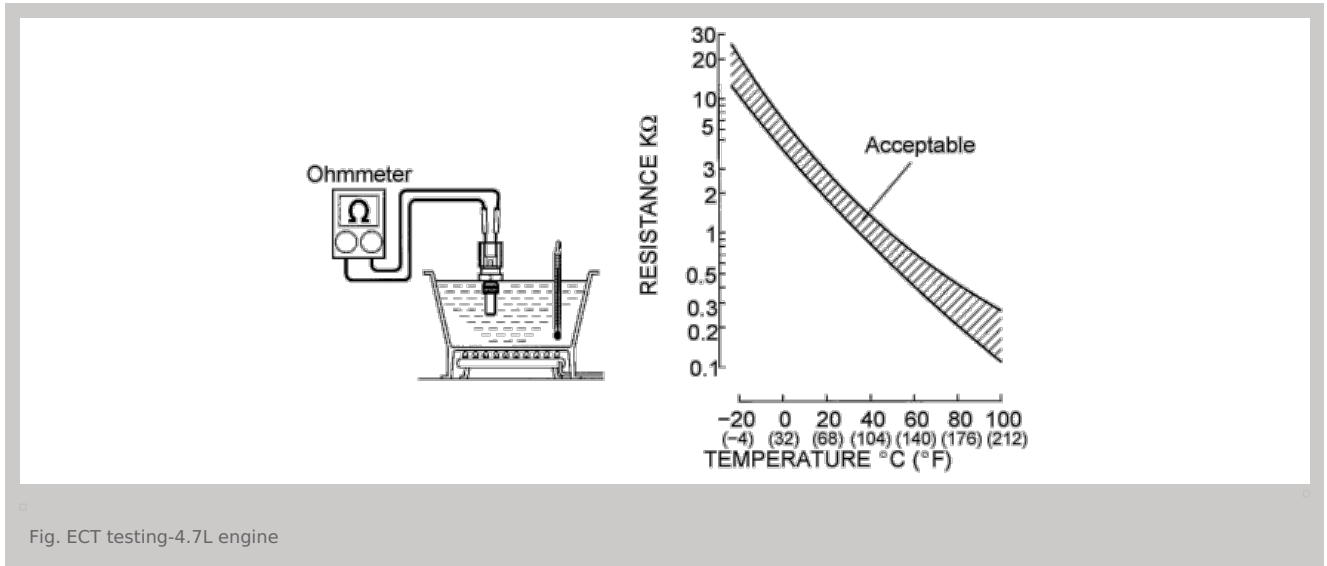


Fig. ECT testing-4.7L engine

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## REPAIR GUIDE

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# Alternator

## Diagnosis & Testing

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### Alternator Load Test

1. Before servicing the vehicle, refer to the Precautions section.
2. Connect a voltmeter and ammeter to the charging circuit as follows:
  - A. Disconnect the wire from terminal B of the alternator, and connect it to the negative (-) tester probe of the ammeter.
  - B. Connect the positive (+) tester probe of the ammeter to terminal B of the alternator.
  - C. Connect the positive (+) tester probe of the voltmeter to terminal B of the alternator.
  - D. Ground the negative (-) tester probe of the voltmeter.
3. With the engine running at 2,000 rpm, turn on the high beam headlights and set the heater blower switch to HI.
4. Check the reading on the ammeter. Standard amperage: 30 A or more
5. If the ammeter reading is less than the standard amperage, repair the alternator.

### Alternator No-Load Test

1. Before servicing the vehicle, refer to the Precautions section.
2. Connect a voltmeter and ammeter to the charging circuit as follows:
  - A. Disconnect the wire from terminal B of the alternator, and connect it to the negative (-) tester probe of the ammeter.
  - B. Connect the positive (+) tester probe of the ammeter to terminal B of the alternator.
  - C. Connect the positive (+) tester probe of the voltmeter to terminal B of the alternator.
  - D. Ground the negative (-) tester probe of the voltmeter.
3. With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.
4. With no load on the system, the amperage should be 10 A or less, and the voltage should be 13.2-14.0 volts.
5. If the voltmeter reading is more than the standard voltage, replace the voltage regulator.
6. If the voltmeter reading is less than the standard voltage, check the voltage regulator and alternator.

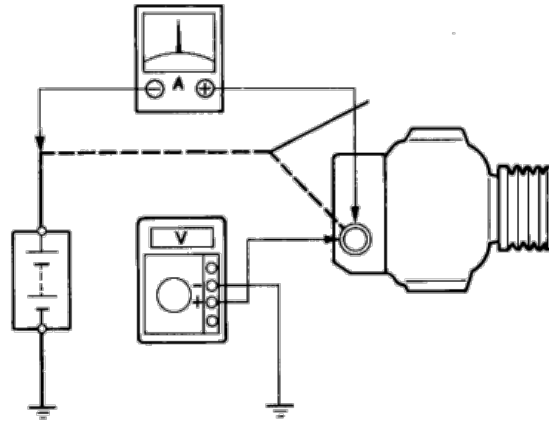


Fig. Connecting voltmeter and ammeter for alternator testing

## Installation

1. Install or connect the following:

- Alternator. Tighten the fasteners to 29 ft. lbs. (39 Nm).
- Alternator harness connectors
- Power steering pump pulley
- Radiator
- Engine under cover
- Accessory drive belt
- Negative battery cable

2. Fill the cooling system.
3. Start the engine and check for leaks.

## Removal & Installation

1. Before servicing the vehicle, refer to the Precautions section.
2. Drain the cooling system.
3. Remove or disconnect the following:

- Negative battery cable
- Accessory drive belt
- Engine under cover
- Radiator
- Power steering pump pulley
- Alternator harness connectors
- Alternator

1. Before servicing the vehicle, refer to the precautions section.
2. Drain the cooling system.
3. Remove or disconnect the following:

- Negative battery cable
- Accessory drive belt
- Engine under cover
- Radiator
- Power steering pump pulley
- Alternator harness connectors
- Alternator

### To install:

1. Install or connect the following:

- ❑ Alternator. Tighten the fasteners to 29 ft. lbs. (39 Nm).
- ❑ Alternator harness connectors
- ❑ Power steering pump pulley
- ❑ Radiator
- ❑ Engine under cover
- ❑ Accessory drive belt
- ❑ Negative battery cable

2. Fill the cooling system.
3. Start the engine and check for leaks.

1. Before servicing the vehicle, refer to the precautions section.
2. Disconnect the negative battery cable.
3. Remove the drive belt.
4. Disconnect the 2 oil cooler lines from the fan shroud, remove the fan shroud.
5. Remove the 4 nuts and remove the fan with the fluid coupling.
6. Disconnect the vane pump assembly.
7. Disconnect the alternator wiring.
8. Remove the nuts and bolts and remove the alternator.

**To install:**

1. Install the alternator. Tighten the bolt to 29 ft. lbs. (39 Nm), the upper nut to 29 ft. lbs. (39 Nm) and the side nut to 12 ft. lbs. (16 Nm).
2. Attach the alternator wiring.
3. Install the vane pump assembly.
4. Install the shroud and fluid coupling together and tighten shroud bolts. Tighten the fan coupling nuts to 21 ft. lbs. (29 Nm).

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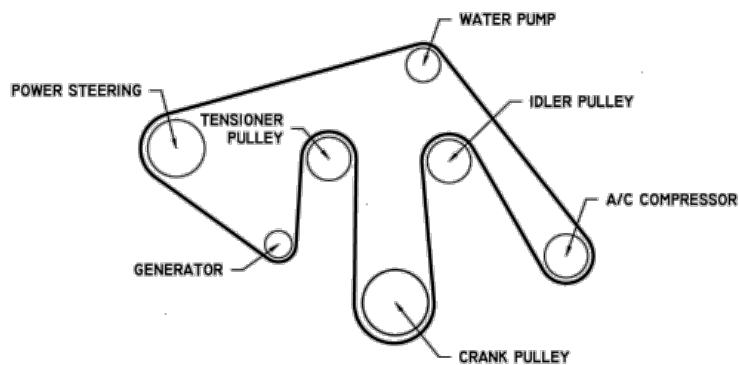
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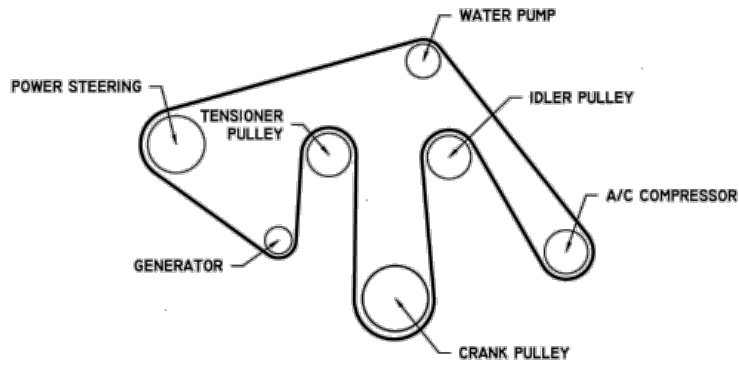
## Accessory Drive Belts

### Drive Belt Routings

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**Fig. Accessory drive belt routing -4.7L engine**

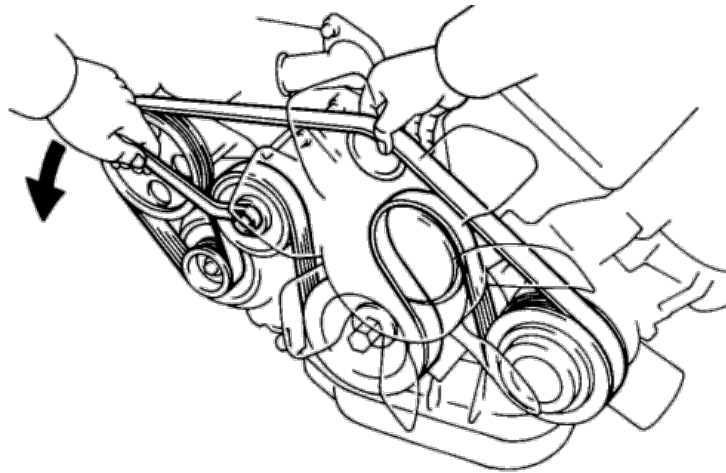


**Fig. Accessory drive belt routing -4.7L engine**

## Inspection

Inspect the drive belt for signs of glazing or cracking. A glazed belt will be perfectly smooth from slippage, while a good belt will have a slight texture of fabric visible. Cracks will usually start at the inner edge of the belt and run outward. All worn or damaged drive belts should be replaced immediately.

## Removal & Installation



**Fig. Accessory drive belt replacement**

1. Before servicing the vehicle, refer to the Precautions section.
2. Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and remove the drive belt.
3. Installation is the reverse of removal.

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## REPAIR GUIDE

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## Camshaft, Bearings & Lifters

### Removal & Installation

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1. Before servicing the vehicle, refer to the Precautions section.
2. Drain the cooling system.
3. Relieve the fuel system pressure.
4. Remove or disconnect the following:

- Negative battery cable
- Engine under covers
- Engine appearance cover
- Air intake hose
- Accessory drive belt
- Cooling fan
-

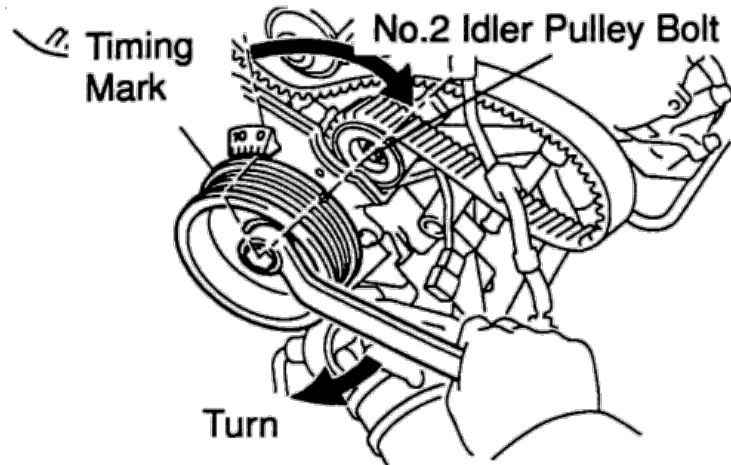
Radiator

- Idler pulley
- Upper and middle timing belt covers
- A/C compressor
- Cooling fan bracket
- Alternator
- Accessory drive belt tensioner

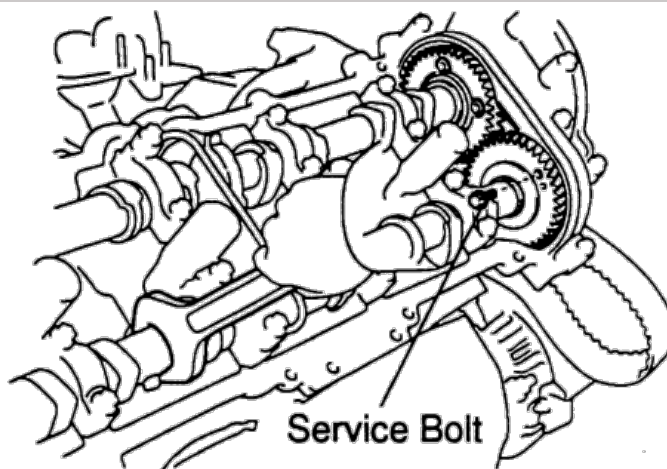
5. Set the engine to Top Dead Center (TDC) with the camshaft sprocket timing marks aligned with the rear cover timing marks.
6. Rotate the crankshaft to 50 degrees After TDC as shown. The crankshaft pulley timing mark should align with the center of the No. 2 idler pulley bolt.
7. Remove or disconnect the following:

- Crankshaft pulley
- Lower timing cover
- Timing belt.
- Camshaft timing sprockets
- Camshaft Position (CMP) sensor
- Ignition coils
- Valve cover
- Timing belt rear covers

8. Rotate the right bank camshafts as necessary to access the exhaust camshaft sub-gear service bolt hole and install a 6mm x 1.0mm bolt.



**Fig. Setting the crankshaft to 50 degrees ATDC**



**Fig. Camshaft service bolt installation**

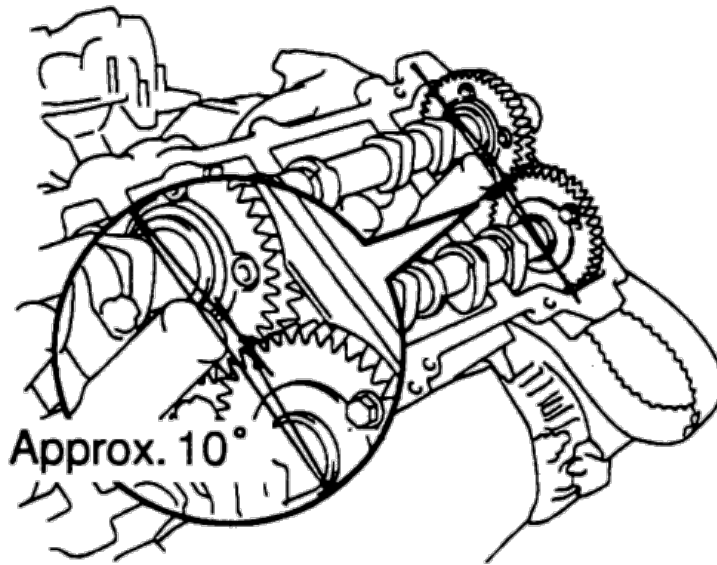


Fig. Right bank camshaft timing mark (1 dot marks) alignment

**NOTE**

Keep all valvetrain components in order for assembly.

1. Align the right bank camshaft 1 dot timing marks to a **10**
2. Loosen the bearing cap bolts in sequence and in several passes.
3. Remove the right bank camshafts.
4. Rotate the left bank camshafts as necessary to access the exhaust camshaft sub-gear service bolt hole and install a 6mm x 1.0mm bolt.
5. Align the left bank camshaft 2 dot timing marks as shown.
6. Loosen the bearing cap bolts in sequence and in several passes.
7. Remove the left bank camshafts.
8. Remove the valve lifters and shims.

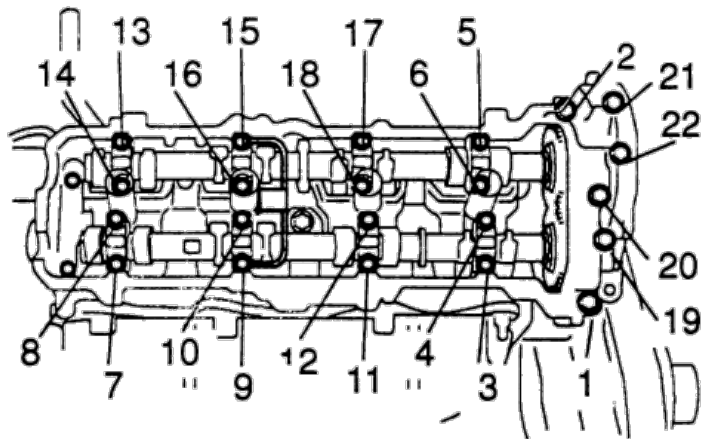


Fig. Right bank camshaft bearing cap loosening sequence

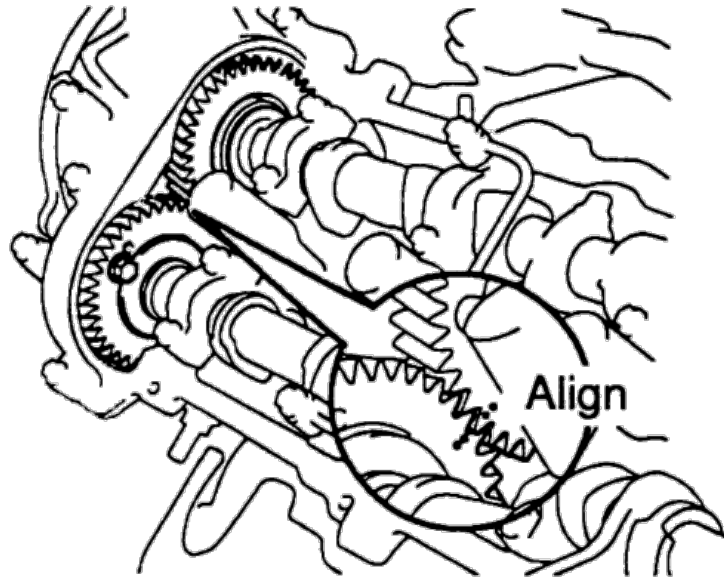


Fig. Left bank camshaft timing mark (2 dot marks) alignment

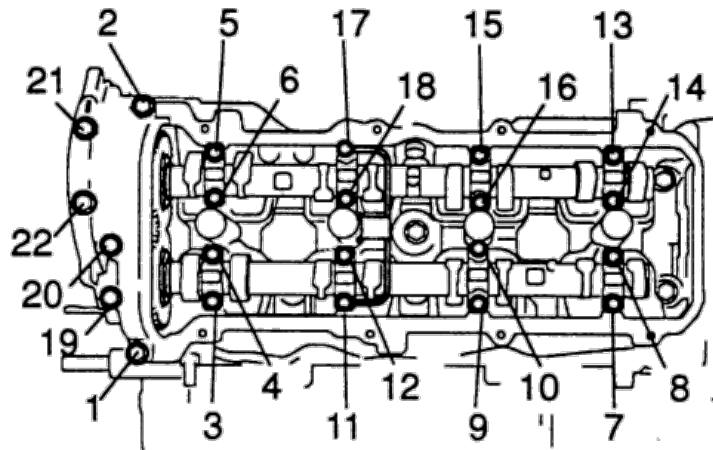


Fig. Left bank camshaft bearing cap loosening sequence

To install:

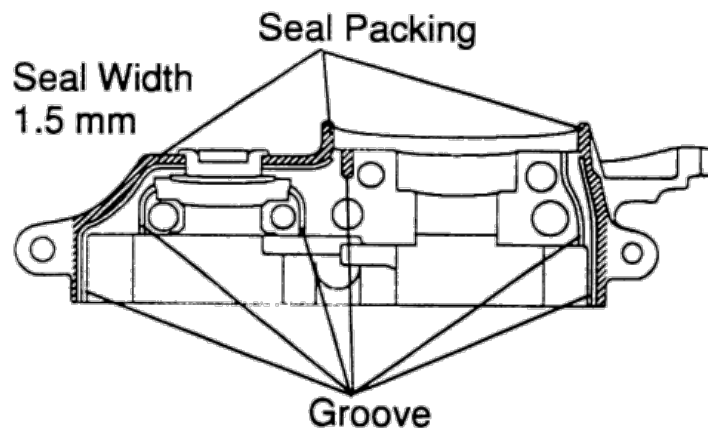


Fig. Apply a 1.5mm bead of sealant to the front bearing caps

1. Ensure that the crankshaft is at 50 degrees After TDC.
2. Install or connect the following:

- Valve lifters and shims in their original positions
- Right bank camshafts with the 1 dot timing marks at 10 degrees
- Left bank camshafts with the 2 dot timing marks aligned
- Left and right bank camshaft bearing caps in their original positions. Apply sealant to the front bearing caps as shown.
- Camshaft oil seals

3. The bearing cap bolts vary in length and are identified as follows:

- A: 3.70 inches (94mm)
- B: 2.83 inches (72mm)
- C: 0.98 inches (25mm)
- D: 2.05 inches (52mm)
- E: 1.50 inches (38mm)

4. Bolts in positions **ABC**

5. Lubricate the threads and under the contact flange for bolts in positions **DE**

6. Install oil feed pipes and the bearing cap bolts according to position in the illustrations.

7. Tighten the camshaft bearing bolts in sequence and in several passes to the following specifications:

- Bolt C: 66 inch lbs. (7.5 Nm)
- All others: 12 ft. lbs. (16 Nm)

8. Remove the service bolts from the exhaust camshaft gears.

9. Install or connect the following:

- Timing belt rear covers
- Valve cover
- Ignition coils
- CMP sensor
- Camshaft timing sprockets. Tighten the bolts to 80 ft. lbs. (108 Nm).
- Timing belt
- Lower timing cover
- Crankshaft pulley. Tighten the bolt to 181 ft. lbs. (245 Nm).
- Accessory drive belt tensioner
- Alternator
- Cooling fan bracket
- A/C compressor
- Upper and middle timing belt covers
- Idler pulley. Tighten the bolt to 27 ft. lbs. (37 Nm).
- Radiator
- Cooling fan
- Accessory drive belt
- Air intake hose
- Engine appearance cover
- Engine under covers
- Negative battery cable

10. Fill the cooling system.

11. Start the engine and check for leaks.

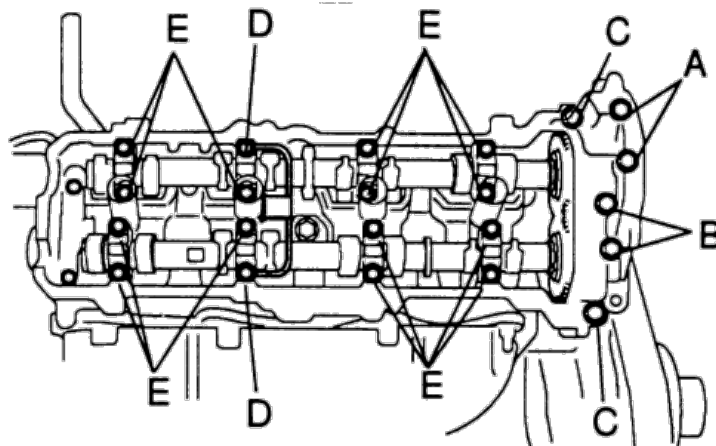




Fig. Right bank bearing cap bolt location

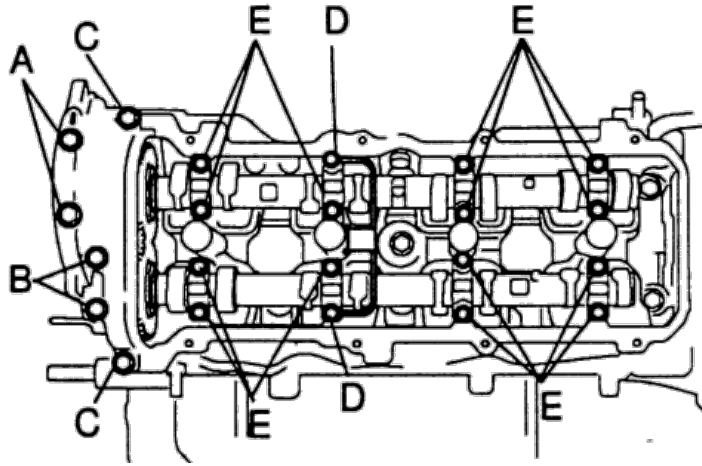


Fig. Left camshaft bearing cap bolt locations

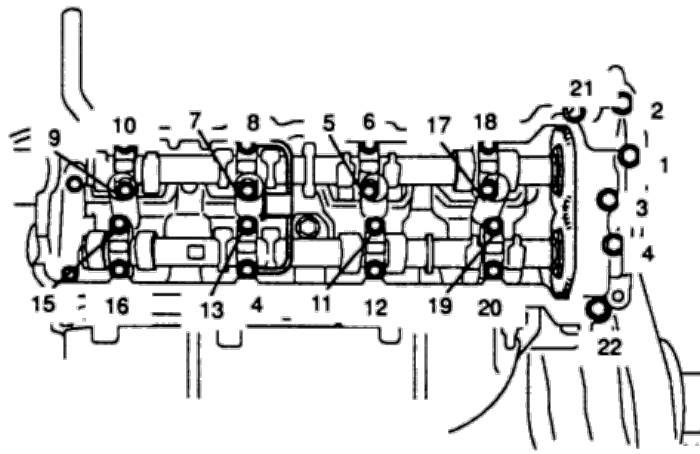


Fig. Right bank camshaft bearing cap bolt torque sequence

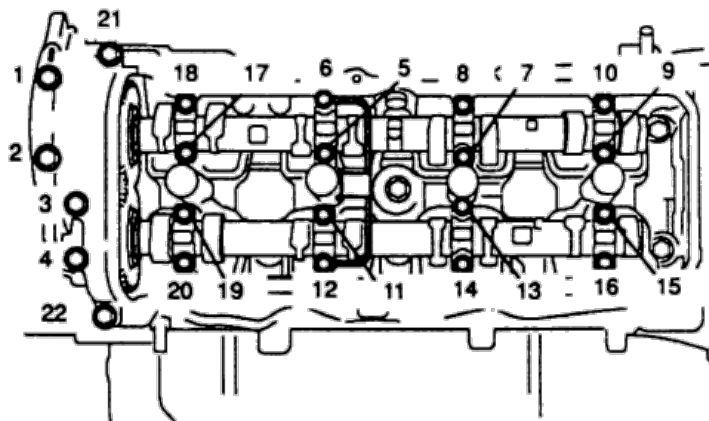


Fig. Left bank camshaft bearing cap bolt torque sequence

1. Before servicing the vehicle, refer to the precautions section.
2. Drain the cooling system.
3. Relieve the fuel system pressure.
4. Remove the V bank cover.
5. Remove the timing belt.
6. Remove the camshaft pulleys.

7. Remove the camshaft position sensor.
8. Remove the power steering pump and set it aside with the lines still attached.
9. Remove the front exhaust pipe.
10. On models with an automatic transmission, remove the oil dipstick and tube.
11. Remove the ignition coils.
12. Remove the rear timing belt plates being careful not to drop anything.
13. Disconnect the fuel inlet hose.
14. Remove the intake manifold.
15. Remove the water inlet and inlet housing. Refer to water pump removal.
16. Remove the front and rear water bypass joint.
17. Remove the engine hangers and if needed the oil dipstick and tube.
18. Remove the valve covers.

**NOTE**

Since the thrust level of the camshaft is small, the camshaft must be kept level during removal. If not kept level serious damage could occur.

19. Check the timing mark of the crankshaft pulley is aligned with the center(s) of the crankshaft pulley bolt and idler pulley bolt.

**NOTE**

If the crankshaft pulley is wrongly positioned, this can cause the piston to contact the head causing severe damage. Make sure the crankshaft pulley is properly positioned.

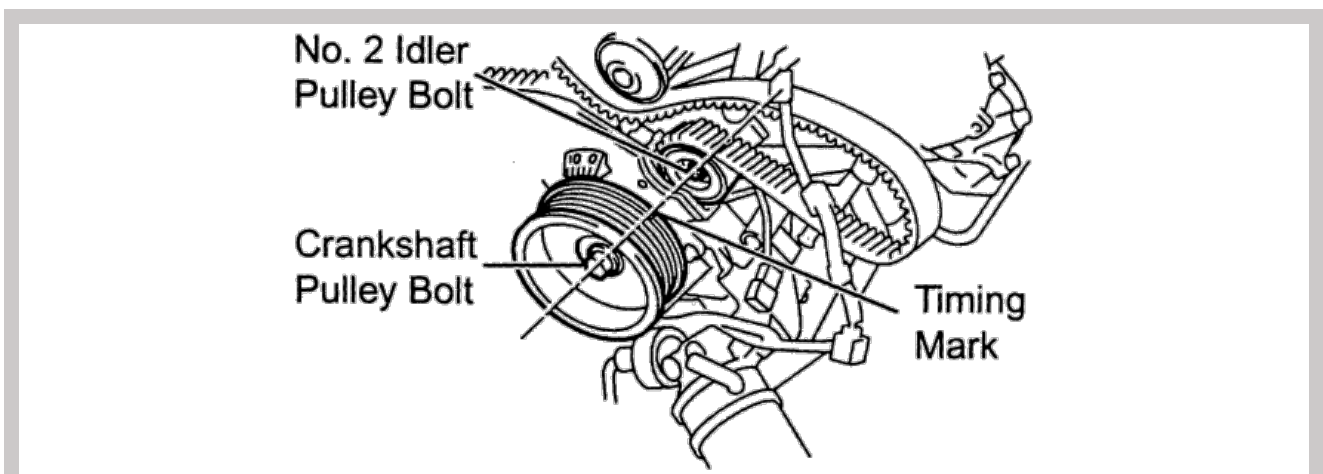


Fig. Check the timing mark of the crankshaft pulley is aligned with the center(s) of the crankshaft pulley bolt and idler pulley bolt-2003-06

20. Release the oil from the front bearing caps using the tool illustrated. Rotate the camshaft timing tube from left to right 2 to 3 times within its VVT-I range of 25 degrees and collect the oil from the timing oil control valve installation hole using a rag.

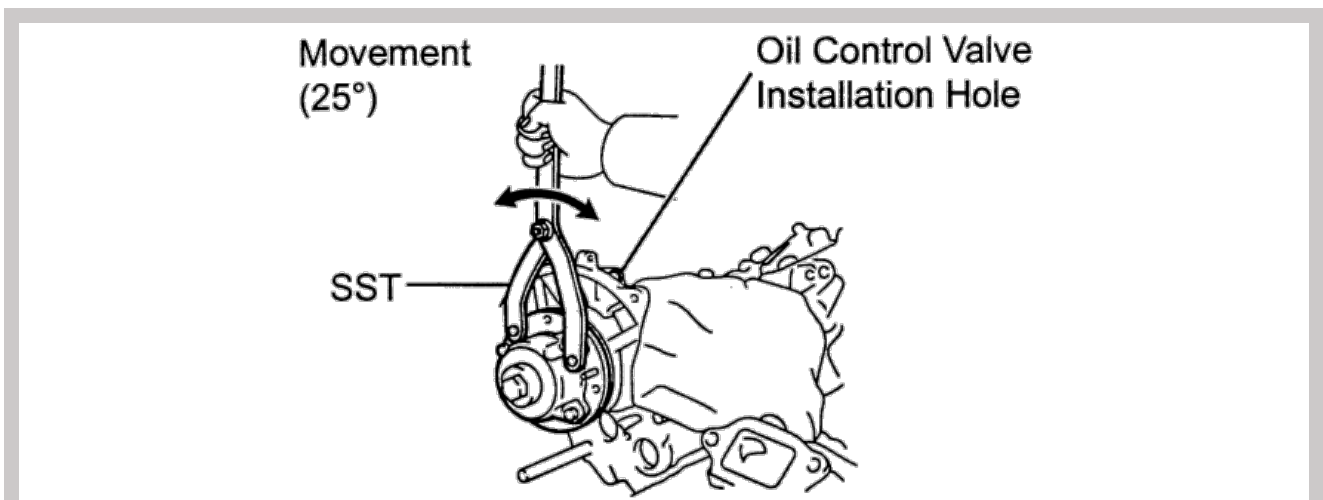


Fig. Release the oil from the front bearing caps using the tool illustrated-2003-06

21. Remove the left hand camshafts as follows:

- A. Bring the service bolt of the sub gear up by turning the left exhaust camshaft using a wrench on the hexagon head portion of the shaft.
- B. Secure the sub gear to the main gear using a 16 to 20 mm bolt with a diameter of 6mm and a thread pitch of 1mm.
- C. Make sure the torsional force of the sub gear is retained by the bolt.
- D. Align the 2 dot timing mark of the left side camshaft by turning the left exhaust camshaft using a wrench on the hexagon head portion of the shaft.

**NOTE**

Mark the position of the caps so they can be reinstalled in their original positions.

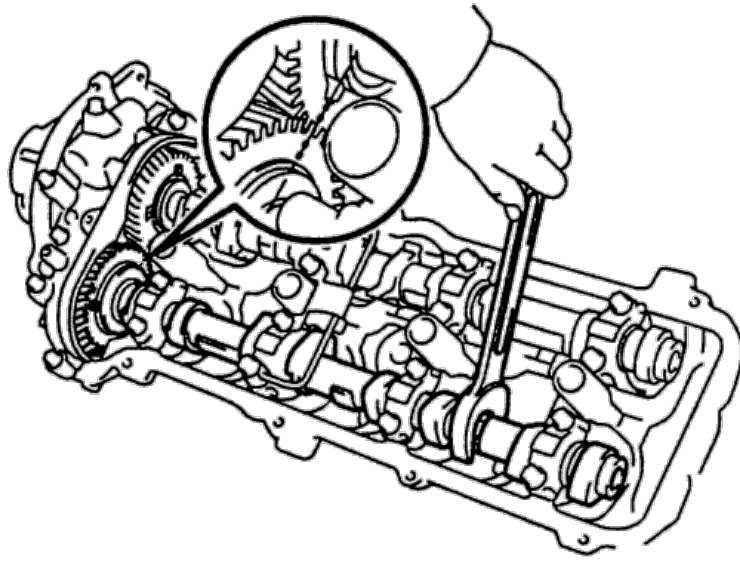


Fig. Align the 2 dot timing mark of the left side camshaft by turning the left exhaust camshaft using a wrench on the hexagon head portion of the shaft-2003-06

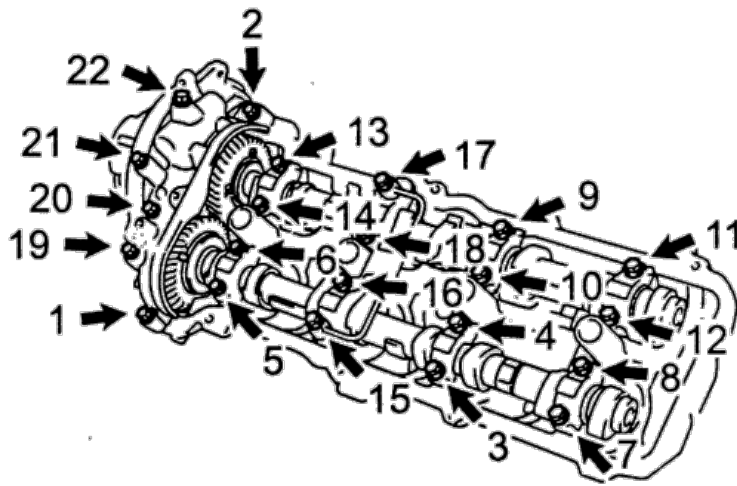


Fig. Loosen the left side 22 bearing cap bolts in the sequence illustrated using several passes-2003-06

- E. Loosen the 22 bearing cap bolts in the sequence illustrated using several passes.
- F. Remove the bolts, washers, oil feed pipe, bearing caps, camshaft housing plug, oil control valve filter and the camshafts.

**22.** Remove the right hand camshafts as follows:

- A. Bring the service bolt of the sub gear up by turning the right exhaust camshaft using a wrench on the hexagon head portion of the shaft.
- B. Secure the sub gear to the main gear using a 16 to 20 mm bolt with a diameter of 6mm and a thread pitch of 1mm.
- C. Make sure the torsional force of the sub gear is retained by the bolt.
- D. Align the 1 dot timing mark of the camshaft main gear (about 10 degrees) angle by turning the right exhaust camshaft using a wrench on the hexagon head portion of the shaft.

**NOTE**

Mark the position of the caps so they can be reinstalled in their original positions.

- E. Loosen the 22 bearing cap bolts in the sequence illustrated using several passes.
- F. Remove the bolts, washers, oil feed pipe, bearing caps, camshaft housing plug, oil control valve filter and the camshafts.

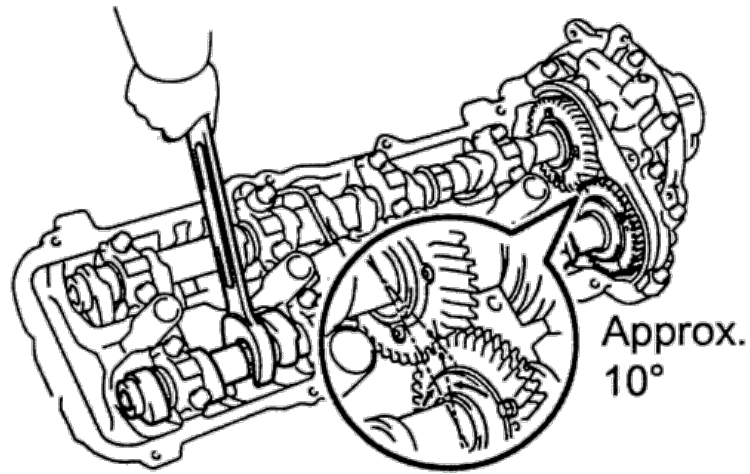


Fig. Align the 1 dot timing mark of the camshaft main gear (about 10 degrees) angle by turning the right exhaust camshaft using a wrench on the hexagon head portion of the shaft-2003-06

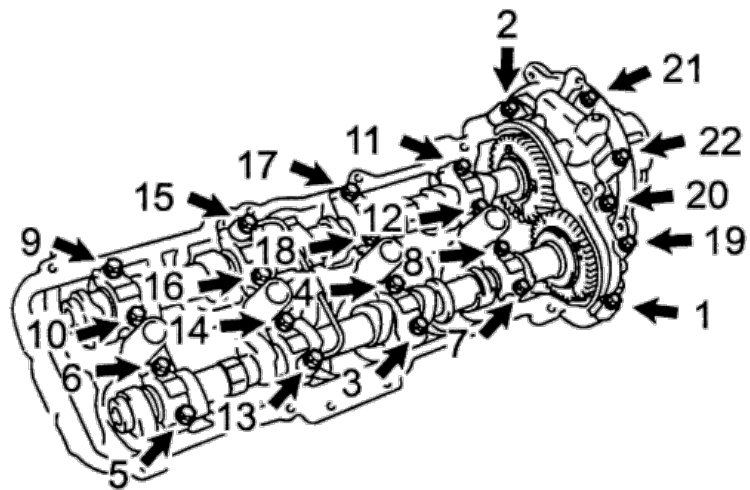


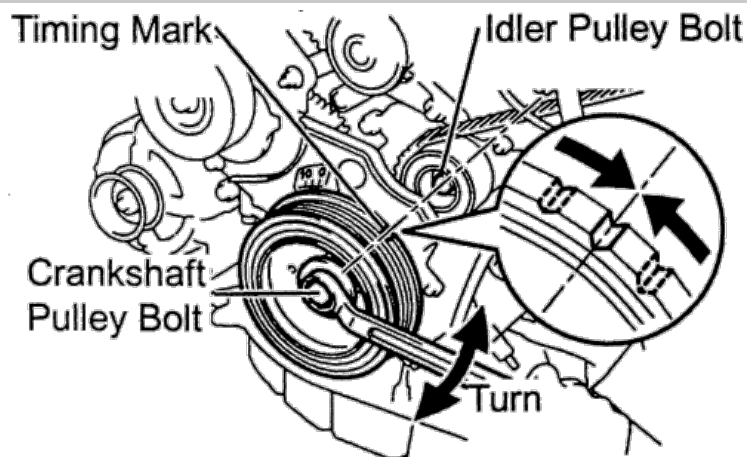
Fig. Loosen the right side 22 bearing cap bolts in the sequence illustrated using several passes-2003-06

**To install:**

1. Check the timing mark of the crankshaft pulley is aligned with the center(s) of the crankshaft pulley bolt and idler pulley bolt.

**NOTE**

If the crankshaft pulley is wrongly positioned, this can cause the piston to contact the head causing severe damage. Make sure the crankshaft pulley is properly positioned.



2. Install the left side camshafts as follows:

- A. Apply multi purpose grease to the thrust portion of the camshafts.
- B. Align the 2 dot timing mark of the camshaft drive and driven main gears and install the camshafts.
- C. Apply seal packing to the camshaft housing plug.
- D. Install the camshaft housing plug on the cylinder head as illustrated. Install the strainer on the head being careful it is properly positioned.
- E. Apply seal packing to the front bearing cap.
- F. Install the front bearing cap and then the other caps in the sequence illustrated.

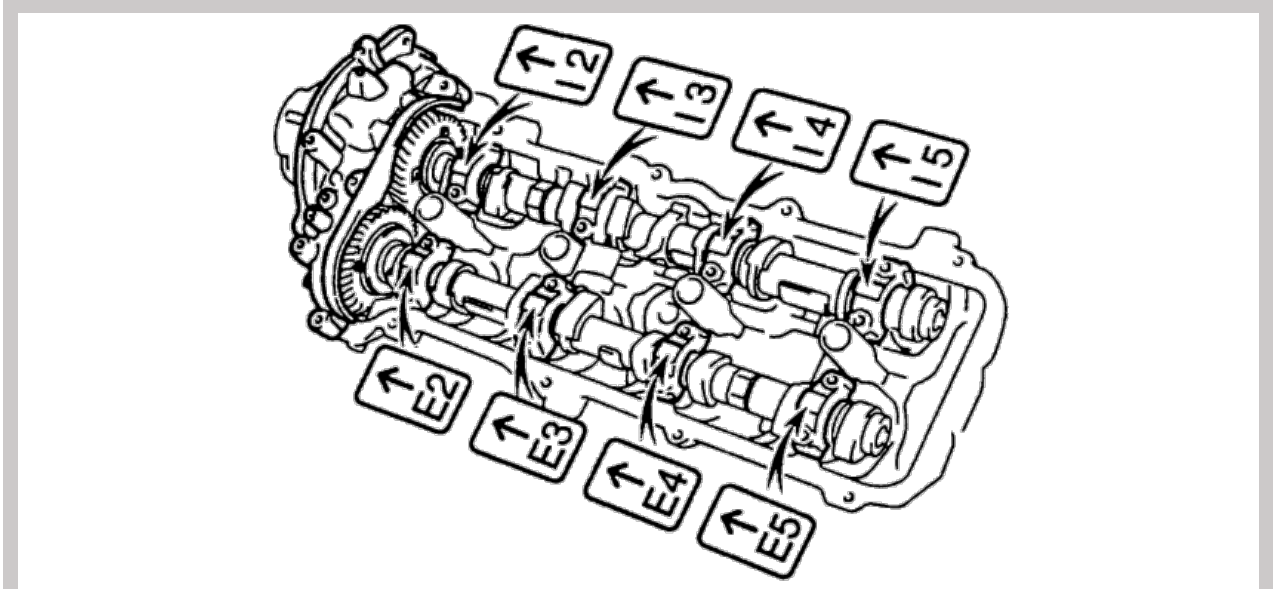


Fig. Install the front bearing cap and then the other caps in the sequence illustrated on the left side camshafts-2003-06

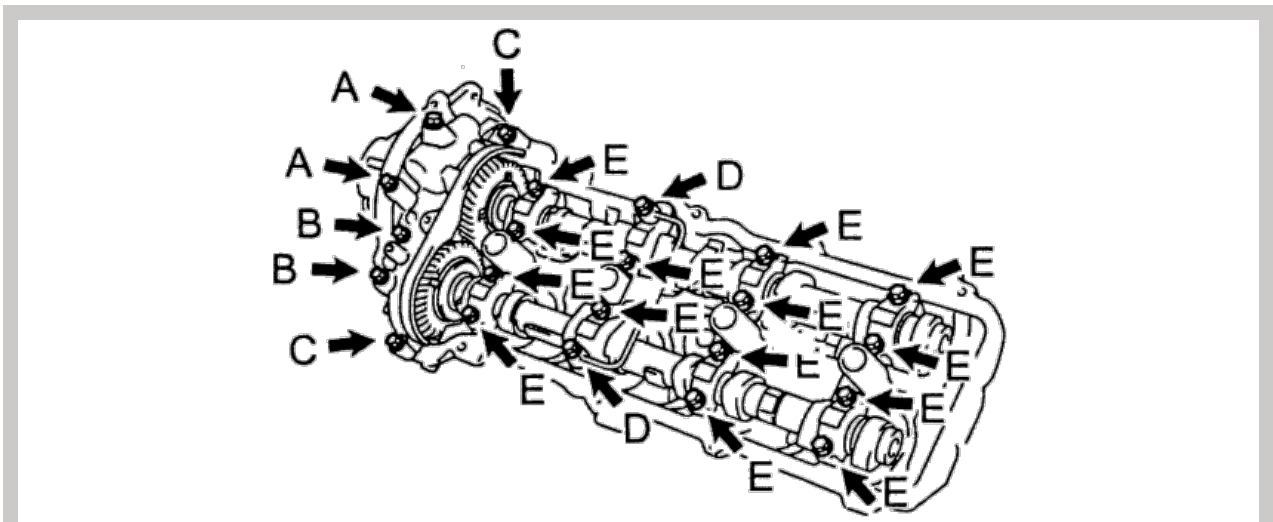


Fig. Apply a light coating of clean oil to the threads and underside of the bolt heads D and E. make sure no oil gets under the heads of bolts A, B and C on the left side camshafts-2003-06

- G. Push in the camshaft oil seal.
- H. Install 4 new seal washers to the bearing cap bolts A and B, refer to the illustration.
- I. Apply a light coating of clean oil to the threads and underside of the bolt heads D and E. make sure no oil gets under the heads of bolts A, B and C.
- J. The bolt lengths and positions are as follows. refer to the illustration for bolt location:

- 94mm bolts A
- 72mm bolts B
- 25mm bolts C
- 52mm bolts D
- 38mm bolts E

K. Tighten the cap bolts using several passes. Tighten bolt C to 66 inch lbs. (7.5 Nm) and the remaining bolts to 12 ft. lbs. (16 Nm).

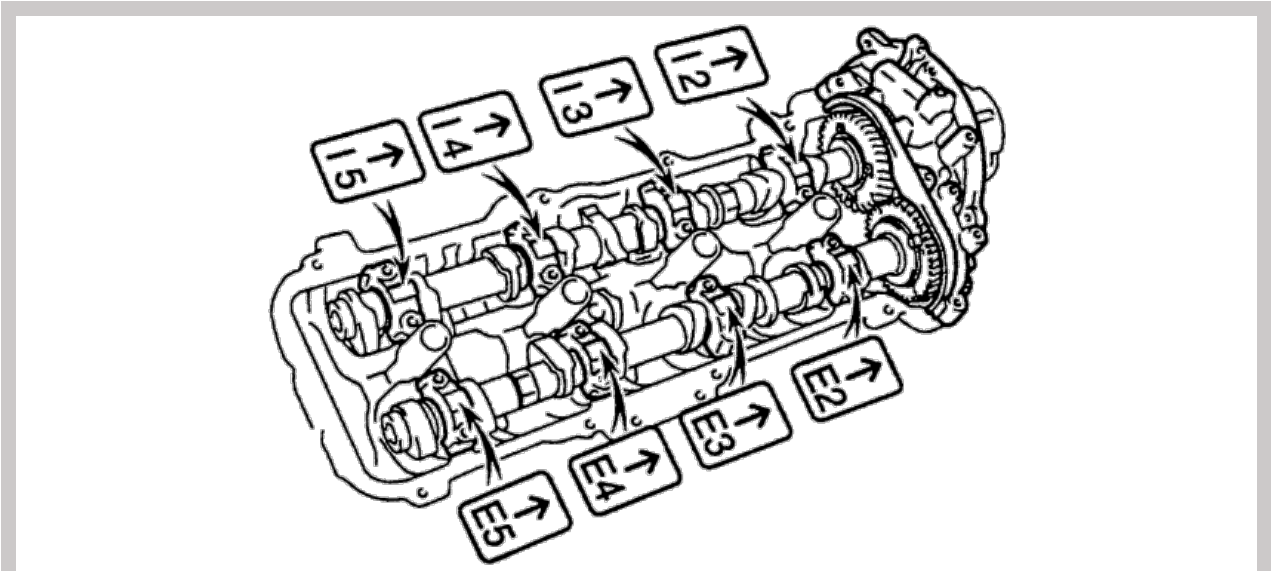


Fig. Install the front bearing cap and then the other caps in the sequence illustrated on the left side camshafts-2003-06

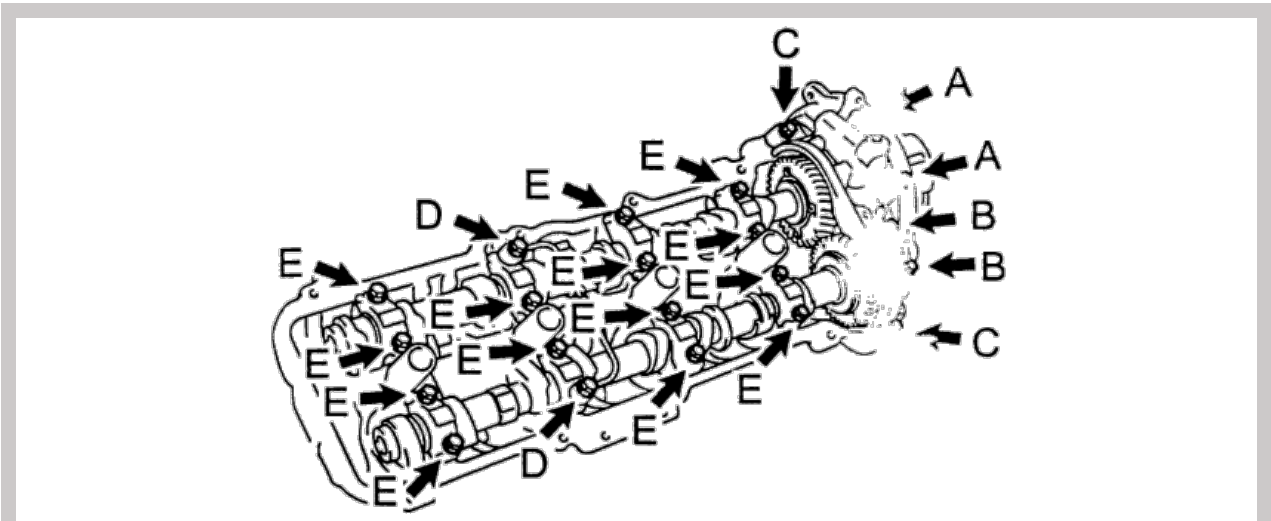


Fig. Apply a light coating of clean oil to the threads and underside of the bolt heads D and E. make sure no oil gets under the heads of bolts A, B and C on the right side camshafts-2003-06

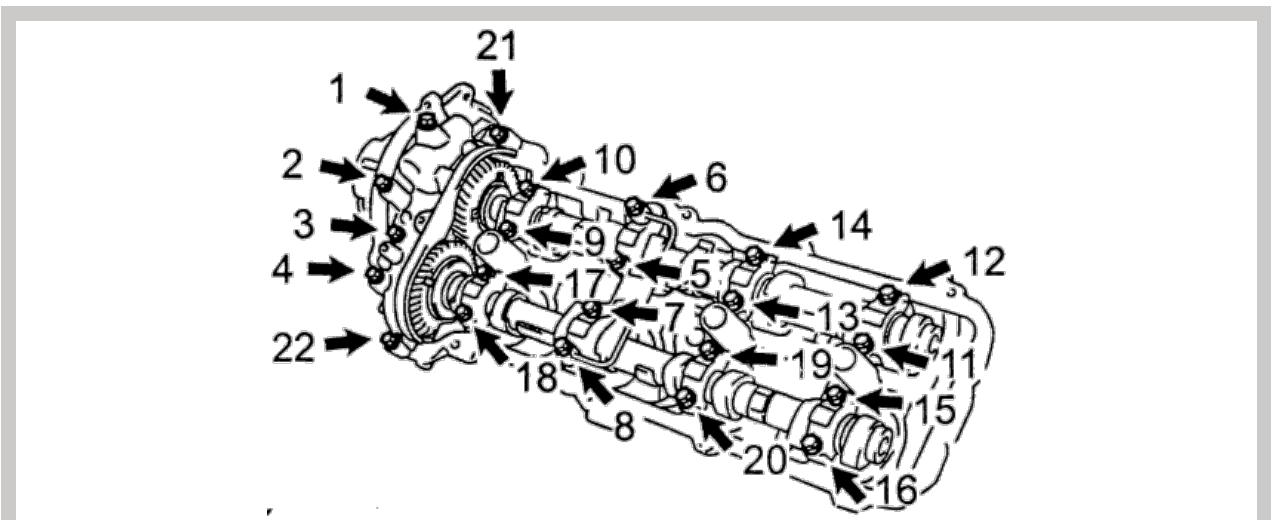


Fig. Left side camshaft bolt torque sequence-2003-06

L. Remove the service bolt.

**3.** Install the right side camshafts as follows:

- A.** Apply multi purpose grease to the thrust portion of the camshafts.
- B.** Align the 1 dot timing mark of the camshaft drive and driven main gears and install the camshafts.
- C.** Set the 1 dot timing mark of the camshaft drive and driven gears at a 10 degree angle.
- D.** Apply seal packing to the camshaft housing plug.
- E.** Install the camshaft housing plug on the cylinder head as illustrated. Install the strainer on the head being careful it is properly positioned.
- F.** Apply seal packing to the front bearing cap.
- G.** Install the front bearing cap and then the other caps in the sequence illustrated.
- H.** Push in the camshaft oil seal.
- I.** Install 4 new seal washers to the bearing cap bolts A and B, refer to the illustration.
- J.** Apply a light coating of clean oil to the threads and underside of the bolt heads D and E. make sure no oil gets under the heads of bolts A, B and C.
- K.** The bolt lengths and positions are as follows. refer to the illustration for bolt location:

- 94mm bolts A
- 72mm bolts B
- 25mm bolts C
- 52mm bolts D
- 38mm bolts E

Fig. Install the front bearing cap and then the other caps in the sequence illustrated on the right side camshafts-2003-06

Fig. Apply a light coating of clean oil to the threads and underside of the bolt heads D and E. make sure no oil gets under the heads of bolts A, B and C on the right side camshafts-2003-06

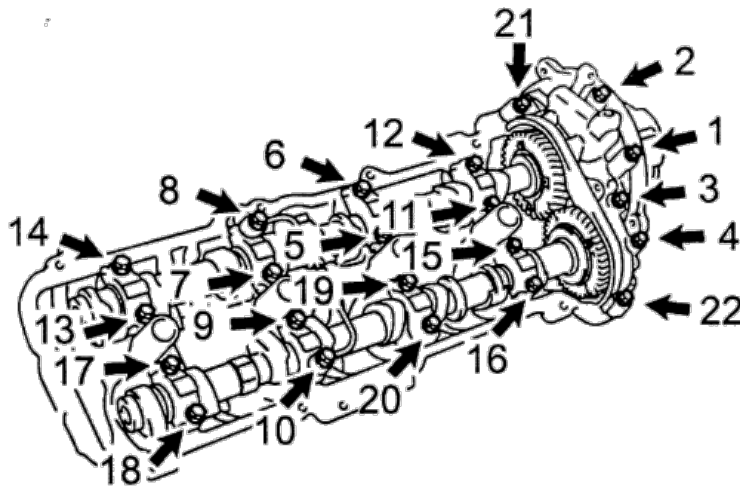


Fig. Right side camshaft bolt torque sequence-2003-06

- L.** Tighten the cap bolts using several passes. Tighten bolt C to 66 inch lbs. (7.5 Nm) and the remaining bolts to 12 ft. lbs. (16 Nm).
- M.** Remove the service bolt.

- 4.** Check and adjust the valve clearance.
- 5.** Install the camshaft timing control valve.
- 6.** Install the 4 half moon plugs onto the cylinder heads.
- 7.** Install the valve covers and tighten to 53 inch lbs. (6 Nm).
- 8.** Install the engine hangers and tighten to 27 ft. lbs. (37 Nm).
- 9.** Install the VVT sensors.
- 10.** Install the oil dipstick tube and dipstick.
- 11.** Install the ignition coils.
- 12.** Install the water bypass joint and tighten the retainers to 13 ft. lbs. (18 Nm).

13. Install the water inlet and housing assembly.
14. Install the intake manifold.
15. Install the timing belt rear plates, right plates first, then left plates. Tighten the retainers to 66 inch lbs. (7 Nm).
16. Install the throttle body cover.
17. Install the front exhaust pipe, power steering pump.
18. Install the camshaft position sensor and camshaft timing pulleys, tighten to 25 ft. lbs. (34 Nm).
19. Install the timing belt.
20. Fill the cooling system and perform an oil change.
21. Start the vehicle and check for leaks.

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## REPAIR GUIDE

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# Cylinder Head

## Removal & Installation

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1. Before servicing the vehicle, refer to the Precautions section.
2. Drain the cooling system.
3. Relieve the fuel system pressure.
4. Remove or disconnect the following:

- Battery and tray
- Engine appearance cover
- Engine under covers
- Air intake assembly
- Accessory drive belt
- A/C compressor and bracket
- Cooling fan and bracket
- Radiator
- Idler pulley
- Front covers
- Timing belt.
- Camshaft sprockets
- Camshaft Position (CMP) sensor
- Power steering pump
- Exhaust front pipes
- Transmission dipstick tube
- Ignition coils
- Rear timing belt covers
- Fuel lines
- Intake manifold
- Water inlet housing assembly
- Front and rear water bypass joints
- Engine lifting eyes
- Oil dipstick tube
- Valve covers
- Camshafts
- Cylinder heads with the exhaust manifolds attached. Loosen the bolts in the sequence shown.



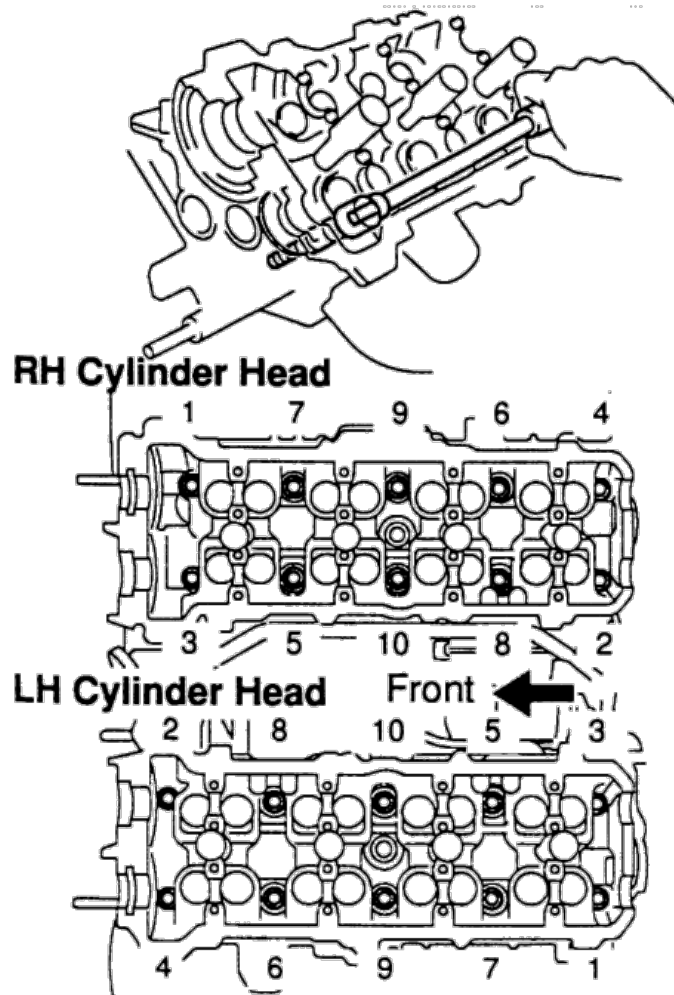
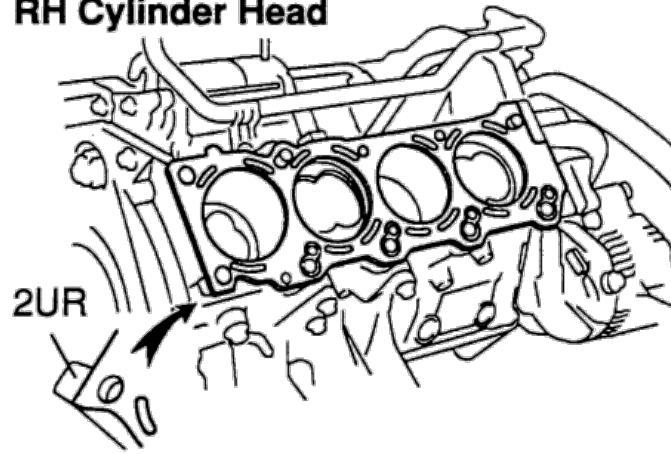


Fig. Cylinder head loosening sequence

To install:

### RH Cylinder Head



### LH Cylinder Head

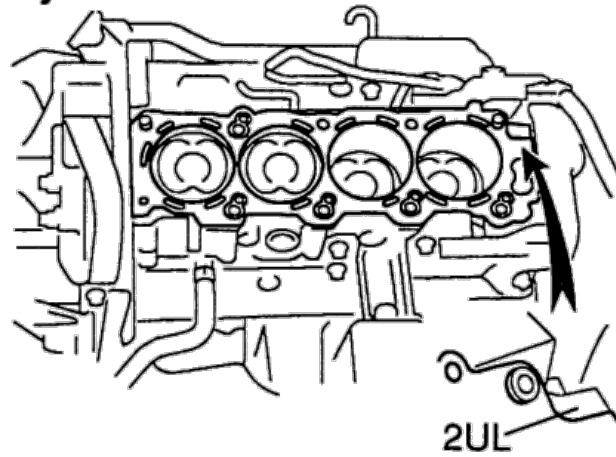
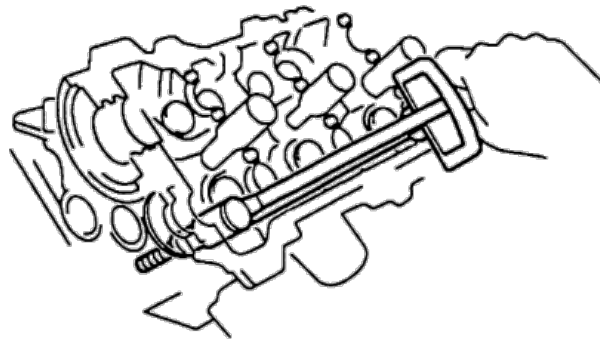
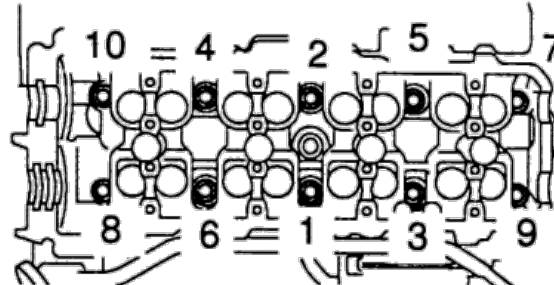


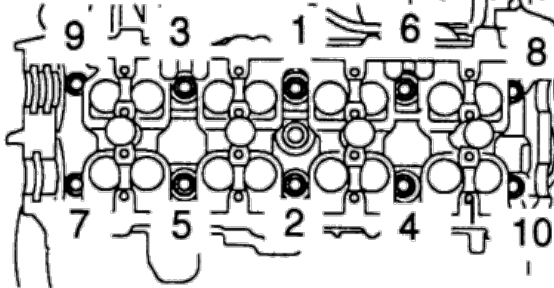
Fig. Cylinder head gasket identification



**RH Cylinder Head**



**LH Cylinder Head**



**Fig. Cylinder head torque sequence**

1. Install the cylinder heads with new gaskets. Tighten the bolts in sequence as follows:

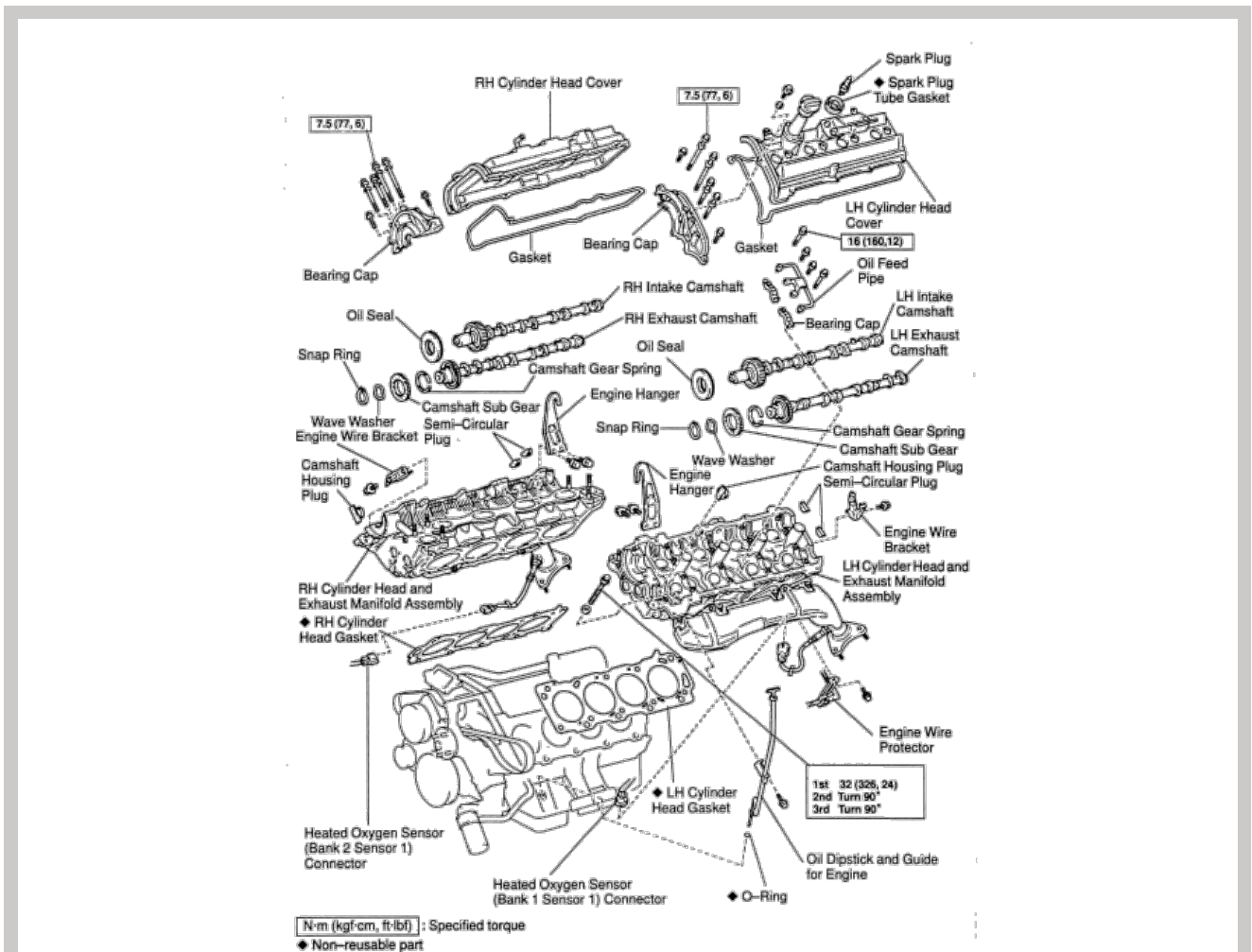
- A. Step 1: 24 ft. lbs. (32 Nm)
- B. Step 2: Plus 180 degrees

2. Install or connect the following:

- Camshafts
- Valve covers
- Oil dipstick tube
- Engine lifting eyes
- Front and rear water bypass joints
- Water inlet housing assembly
- Intake manifold
- Fuel lines
- Rear timing belt covers
- Ignition coils
- Transmission dipstick tube
- Exhaust front pipes
- Power steering pump
- CMP sensor
- Camshaft sprockets
- Timing belt
- Front covers
- Idler pulley
- Radiator
- Cooling fan and bracket
- A/C compressor and bracket
- Accessory drive belt
- Air intake assembly
- Engine under covers

- Engine appearance cover
- Battery and tray

3. Fill the cooling system.
4. Start the engine and check for leaks.



**Fig. Exploded view of the cylinder head mounting-4.7L LX470**

1. Before servicing the vehicle, refer to the precautions section.
2. Drain the cooling system.
3. Relieve the fuel system pressure.
4. Remove the V bank cover.
5. Remove the timing belt.
6. Remove the camshaft pulleys.
7. Remove the camshaft position sensor.
8. Remove the power steering pump and set it aside with the lines still attached.
9. Remove the front exhaust pipe.
10. On models with an automatic transmission, remove the oil dipstick and tube.
11. Remove the ignition coils.
12. Remove the rear timing belt plates being careful not to drop anything.
13. Disconnect the fuel inlet hose.
14. Remove the intake manifold.
15. Remove the water inlet and inlet housing. Refer to water pump removal.
16. Remove the front and rear water bypass joint.
17. Remove the engine hangers and if needed the oil dipstick and tube.
18. Remove the valve covers.

**NOTE**

Since the thrust level of the camshaft is small, the camshaft must be kept level during removal. If not kept level serious damage could occur.

19. Check the timing mark of the crankshaft pulley is aligned with the center(s) of the crankshaft pulley bolt and idler pulley bolt.

**NOTE**

If the crankshaft pulley is wrongly positioned, this can cause the piston to contact the head causing severe damage. Make sure the crankshaft pulley is properly positioned.

20. Release the oil from the front bearing caps using the tool illustrated. Rotate the camshaft timing tube from left to right 2 to 3 times within its VVT-I range of 25 degrees and collect the oil from the timing oil control valve installation hole using a rag.

21. Remove the left hand camshafts as follows:

- A. Bring the service bolt of the sub gear up by turning the left exhaust camshaft using a wrench on the hexagon head portion of the shaft.
- B. Secure the sub gear to the main gear using a 16 to 20 mm bolt with a diameter of 6mm and a thread pitch of 1mm.
- C. Make sure the torsional force of the sub gear is retained by the bolt.
- D. Align the 2 dot timing mark of the left side camshaft by turning the left exhaust camshaft using a wrench on the hexagon head portion of the shaft.

**NOTE**

Mark the position of the caps so they can be reinstalled in their original positions.

- E. Loosen the 22 bearing cap bolts in the sequence illustrated using several passes.
- F. Remove the bolts, washers, oil feed pipe, bearing caps, camshaft housing plug, oil control valve filter and the camshafts.

22. Remove the right hand camshafts as follows:

- A. Bring the service bolt of the sub gear up by turning the right exhaust camshaft using a wrench on the hexagon head portion of the shaft.
- B. Secure the sub gear to the main gear using a 16 to 20 mm bolt with a diameter of 6mm and a thread pitch of 1mm.
- C. Make sure the torsional force of the sub gear is retained by the bolt.
- D. Align the 1 dot timing mark of the camshaft main gear (about 10 degrees) angle by turning the right exhaust camshaft using a wrench on the hexagon head portion of the shaft.

**NOTE**

Mark the position of the caps so they can be reinstalled in their original positions.

- E. Loosen the 22 bearing cap bolts in the sequence illustrated using several passes.
- F. Remove the bolts, washers, oil feed pipe, bearing caps, camshaft housing plug, oil control valve filter and the camshafts.

23. Loosen the cylinder head bolts in the sequence shown, using several passes.

24. Remove the cylinder heads and exhaust manifolds together as an assembly.

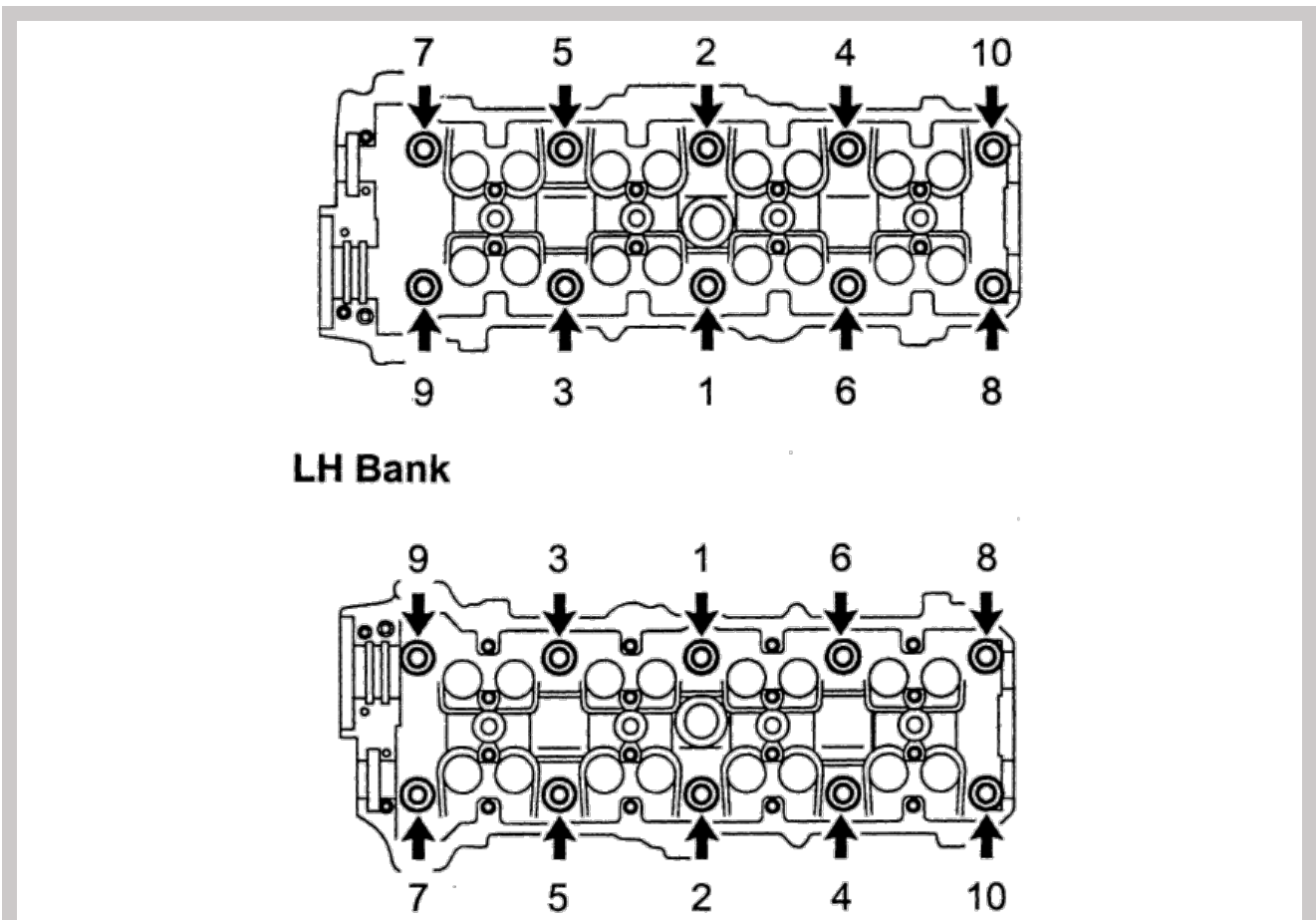


Fig. Cylinder head loosening sequence-2006 4.7L 2UZ-FE engine

**To install:**

- 1. Install new gaskets and the cylinder heads

2. Tighten the bolts in sequence on 2003-05 models as follows:

- A. Step 1: 24 ft. lbs. (32 Nm).
- B. Step 2: Plus 180 degrees.

3. Tighten the bolts in sequence on 2006 models as follows:

- A. Step 1: 30 ft. lbs. (40 Nm).
- B. Step 2: Plus 90 degrees.
- C. Step 3: Plus 90 degrees.

4. Check the timing mark of the crankshaft pulley is aligned with the center(s) of the crankshaft pulley bolt and idler pulley bolt.

**NOTE**

If the crankshaft pulley is wrongly positioned, this can cause the piston to contact the head causing severe damage. Make sure the crankshaft pulley is properly positioned.

5. Install the left side camshafts as follows:

- A. Apply multi purpose grease to the thrust portion of the camshafts.
- B. Align the 2 dot timing mark of the camshaft drive and driven main gears and install the camshafts.
- C. Apply seal packing to the camshaft housing plug.
- D. Install the camshaft housing plug on the cylinder head as illustrated. Install the strainer on the head being careful it is properly positioned.
- E. Apply seal packing to the front bearing cap.
- F. Install the front bearing cap and then the other caps in the sequence illustrated.
- G. Push in the camshaft oil seal.
- H. Install 4 new seal washers to the bearing cap bolts A and B, refer to the illustration.
- I. Apply a light coating of clean oil to the threads and underside of the bolt heads D and E. make sure no oil gets under the heads of bolts A, B and C.
- J. The bolt lengths and positions are as follows. refer to the illustration for bolt location:

- 94mm bolts A
- 72mm bolts B
- 25mm bolts C
- 52mm bolts D
- 38mm bolts E

- K. Tighten the cap bolts using several passes. Tighten bolt C to 66 inch lbs. (7.5 Nm) an the remaining bolts to 12 ft. lbs. (16 Nm).
- L. Remove the service bolt.

6. Install the right side camshafts as follows:

- A. Apply multi purpose grease to the thrust portion of the camshafts.
- B. Align the 1 dot timing mark of the camshaft drive and driven main gears and install the camshafts.
- C. Set the 1 dot timing mark of the camshaft drive and driven gears at a 10 degree angle.
- D. Apply seal packing to the camshaft housing plug.
- E. Install the camshaft housing plug on the cylinder head as illustrated. Install the strainer on the head being careful it is properly positioned.
- F. Apply seal packing to the front bearing cap.
- G. Install the front bearing cap and then the other caps in the sequence illustrated.
- H. Push in the camshaft oil seal.
- I. Install 4 new seal washers to the bearing cap bolts A and B, refer to the illustration.
- J. Apply a light coating of clean oil to the threads and underside of the bolt heads D and E. make sure no oil gets under the heads of bolts A, B and C.
- K. The bolt lengths and positions are as follows. refer to the illustration for bolt location:

- 94mm bolts A
- 72mm bolts B
- 25mm bolts C
- 52mm bolts D
- 38mm bolts E

- L. Tighten the cap bolts using several passes. Tighten bolt C to 66 inch lbs. (7.5 Nm) an the remaining bolts to 12 ft. lbs. (16 Nm).
- M. Remove the service bolt.

7. Check and adjust the valve clearance.

8. Install the camshaft timing control valve.

9. Install the 4 half moon plugs onto the cylinder heads.

10. Install the valve covers and tighten to 53 inch lbs. (6 Nm).

11. Install the engine hangers and tighten to 27 ft. lbs. (37 Nm).

12. Install the VVT sensors.
13. Install the oil dipstick tube and dipstick.
14. Install the ignition coils.
15. Install the water bypass joint and tighten the retainers to 13 ft. lbs. (18 Nm).
16. Install the water inlet and housing assembly.
17. Install the intake manifold.
18. Install the timing belt rear plates, right plates first, then left plates. Tighten the retainers to 66 inch lbs. (7 Nm).
19. Install the throttle body cover.
20. Install the front exhaust pipe, power steering pump.
21. Install the camshaft position sensor and camshaft timing pulleys, tighten to 25 ft. lbs. (34 Nm).
22. Install the timing belt.
23. Fill the cooling system and perform an oil change.
24. Start the vehicle and check for leaks.

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## REPAIR GUIDE

Lexus GX470 2003-06

### Engine

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#### NOTE

Disconnecting the negative battery cable on some vehicles may interfere with the functions of the on board computer system. The computer may undergo a relearning process once the negative battery cable is reconnected.

### Removal & Installation

1. Before servicing the vehicle, refer to the precautions section.
2. Remove the transmission.
3. Remove the hood.
4. Remove the V-bank cover.
5. Remove the air cleaner assembly.
6. Remove the under-covers.
7. Remove the radiator.
8. Remove the fan shroud.
9. Tag and disconnect all hoses, pipes and wires necessary for engine removal.
10. Remove the fan.
11. Remove the power steering pump and secure it out of the way.
12. Remove the alternator and secure it out of the way.
13. Remove the compressor and secure it out of the way.
14. Remove the transmission filler tube.
15. Remove the oil level sending unit.
16. Remove the exhaust manifolds.
17. Attach a crane and equalizer to the engine.
18. Support the weight of the engine with the crane and remove the mount bolts.
19. Remove the engine.
20. Installation is the reverse of removal. Observe the following torques:

- Engine mount bolts: 28 ft. lbs. (38 Nm)
- Exhaust manifold nuts: 33 ft. lbs. (44 Nm)
- Oil level sending unit: 11 ft. lbs. 15 Nm)
- Fan bolts: 21 ft. lbs. (29 Nm)
- Compressor: bolt, 34 ft. lbs. (47 Nm); nut, 18 ft. lbs. (25 Nm)
- Power steering pump: 32 ft. lbs. (43 Nm)
- Hood: 10 ft. lbs. (13 Nm)

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## REPAIR GUIDE

Lexus GX470 2003-06

### Exhaust Manifold

## Removal & Installation

1. Before servicing the vehicle, refer to the Precautions section.
2. Attach a hoist to the engine lifting eyes.
3. Remove or disconnect the following:

- Negative battery cable
- Heated Oxygen (HO2S) sensor connectors
- Exhaust manifold heat shield
- Exhaust front pipe
- Motor mount
- Motor mount bracket
- Exhaust manifold

### To install:

#### NOTE

Use new exhaust manifold nuts for assembly.

1. Install or connect the following:

- Exhaust manifold. Tighten the nuts to 32 ft. lbs. (44 Nm).
- Motor mount bracket. Tighten the bolts to 27 ft. lbs. (36 Nm).
- Motor mount. Tighten the fasteners to 22 ft. lbs. (30 Nm).
- Exhaust front pipe. Tighten the nuts to 46 ft. lbs. (62 Nm).
- Exhaust manifold heat shield
- HO2S sensor connectors
- Negative battery cable

2. Start the engine and check for leaks.

1. Before servicing the vehicle, refer to the precautions section.
2. Attach a hoist to the engine lifting eyes.
3. Remove or disconnect the following:

- Negative battery cable
- Heated Oxygen (HO 2 S) sensor connectors
- Exhaust manifold heat shield
- Exhaust front pipe
- Motor mount
- Motor mount bracket
- Exhaust manifold

### To install:

#### NOTE

Use new exhaust manifold nuts for assembly.

1. Install or connect the following:

- Exhaust manifold. Tighten the nuts to 32 ft. lbs. (44 Nm).
- Motor mount bracket. Tighten the bolts to 27 ft. lbs. (36 Nm).
- Motor mount. Tighten the fasteners to 22 ft. lbs. (30 Nm).
- Exhaust front pipe. Tighten the nuts to 46 ft. lbs. (62 Nm).
- Exhaust manifold heat shield
- HO 2 S sensor connectors
- Negative battery cable

2. Start the engine and check for leaks.





## Front Crankshaft Seal

### Removal & Installation

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1. Before servicing the vehicle, refer to the Precautions section.
2. Drain the cooling system.
3. Remove or disconnect the following:

- Negative battery cable
- Engine under cover
- Engine appearance cover
- Air intake assembly
- Accessory drive belt
- Cooling fan and pulley
- Radiator
- Drive belt idler pulley
- Camshaft Position (CMP) sensor connector
- Upper timing covers
- Oil cooler pipe
- Center timing cover
- A/C compressor
- Cooling fan bracket
- Crankshaft pulley
- Lower timing cover
- Timing belt.
- Crankshaft timing sprocket
- Front crankshaft seal

#### To install:

1. Install the oil seal so that it is flush with the oil pump housing.
2. Install or connect the following:

- Crankshaft timing sprocket
- Timing belt
- Lower timing cover
- Crankshaft pulley. Tighten the bolt to 181 ft. lbs. (245 Nm).
- Cooling fan bracket. Tighten the 12mm bolts to 12 ft. lbs. (16 Nm) and the 14mm bolts to 24 ft. lbs. (32 Nm).
- A/C compressor
- Center timing cover
- Oil cooler pipe
- Upper timing covers
- CMP sensor connector
- Drive belt idler pulley. Tighten the bolt to 27 ft. lbs. (37 Nm).
- Radiator
- Cooling fan and pulley. Tighten the nuts to 16 ft. lbs. (21 Nm).
- Accessory drive belt
- Air intake assembly
- Engine appearance cover
- Engine under cover
- Negative battery cable

3. Fill the cooling system.
4. Start the engine and check for leaks.

1. Before servicing the vehicle, refer to the Precautions section.
2. Drain the cooling system.
3. Remove or disconnect the following:

- Negative battery cable
- Engine under cover
- Engine appearance cover
- Air intake assembly
- Accessory drive belt
- Cooling fan and pulley

- Radiator
- Drive belt idler pulley
- Camshaft Position (CMP) sensor connector
- Upper timing covers
- Oil cooler pipe
- Center timing cover
- A/C compressor
- Cooling fan bracket
- Crankshaft pulley
- Lower timing cover
- Timing belt.
- Crankshaft timing sprocket
- Front crankshaft seal

#### To install:

1. Install the oil seal so that it is flush with the oil pump housing.
2. Install or connect the following:

- Crankshaft timing sprocket
- Timing belt
- Lower timing cover
- Crankshaft pulley. Tighten the bolt to 181 ft. lbs. (245 Nm).
- Cooling fan bracket. Tighten the 12mm bolts to 12 ft. lbs. (16 Nm) and the 14mm bolts to 24 ft. lbs. (32 Nm).
- A/C compressor
- Center timing cover
- Oil cooler pipe
- Upper timing covers
- CMP sensor connector
- Drive belt idler pulley. Tighten the bolt to 27 ft. lbs. (37 Nm).
- Radiator
- Cooling fan and pulley. Tighten the nuts to 16 ft. lbs. (21 Nm).
- Accessory drive belt
- Air intake assembly
- Engine appearance cover
- Engine under cover
- Negative battery cable

3. Fill the cooling system.
4. Start the engine and check for leaks.

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## REPAIR GUIDE

Lexus GX470 2003-06



## Intake Manifold

### Removal & Installation

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1. Before servicing the vehicle, refer to the Precautions section.
2. Drain the cooling system.
3. Relieve the fuel system pressure.
4. Remove or disconnect the following:

- Negative battery cable
- Engine appearance cover
- Accelerator cable
- Throttle Position (TP) sensor connector
- Accelerator pedal position sensor
- Throttle motor connector
- Evaporative Emissions (EVAP) vacuum switching valve connector
- Fuel injector connectors
- Engine Coolant Temperature (ECT) sensor connector
- ETC gauge sender connector
- Heated Oxygen (HO2S) sensor connectors

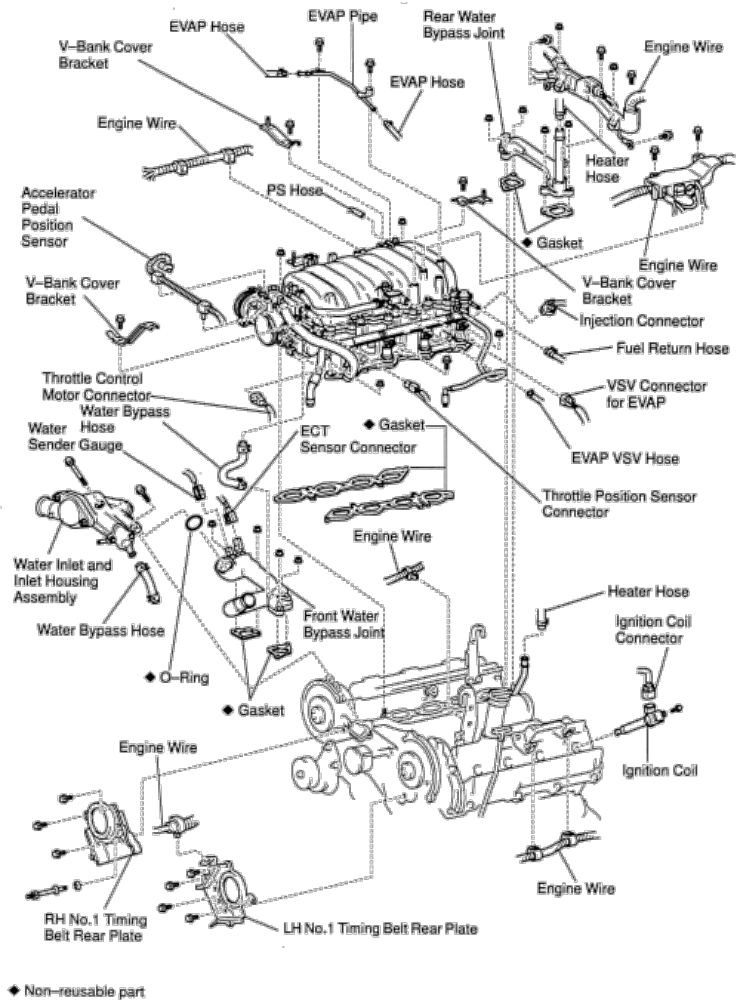
- Fuel pressure regulator vacuum hose
- Positive Crankcase Ventilation (PCV) valve and hose
- EVAP hoses
- Power steering vacuum hoses
- Water bypass hose
- Engine control wiring harness clamps
- Cylinder head ground cables
- Intake manifold wire harness protector
- EVAP pipe
- Engine appearance cover brackets
- Intake manifold

**To install:**

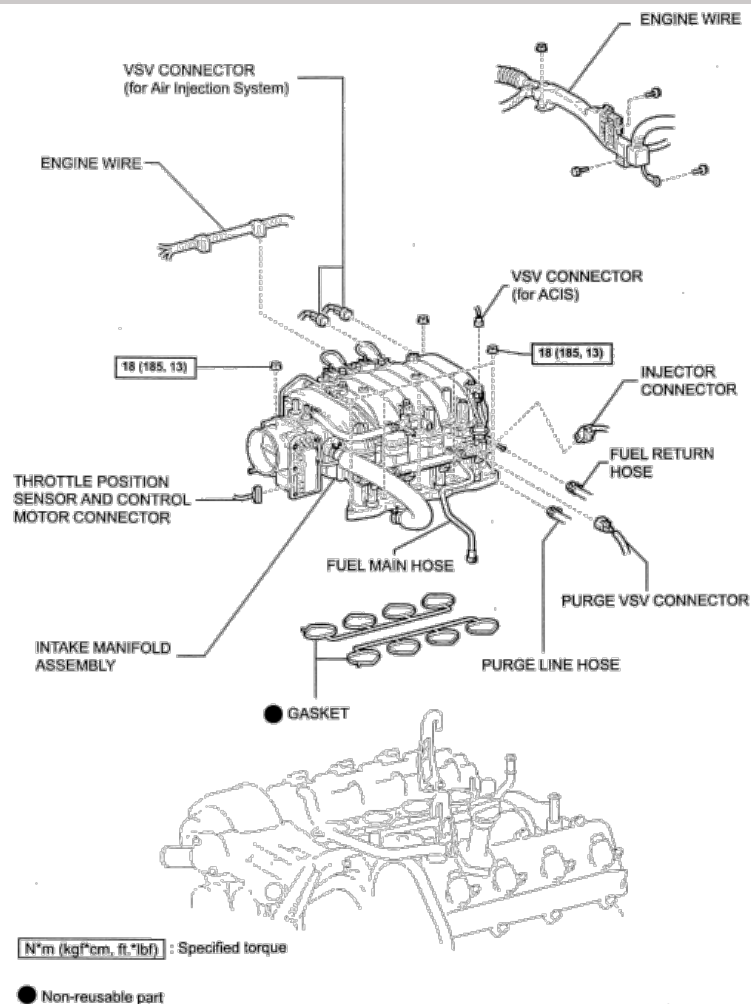
1. Install or connect the following:

- Intake manifold. Tighten the fasteners to 13 ft. lbs. (18 Nm).
- Engine appearance cover brackets
- EVAP pipe
- Intake manifold wire harness protector
- Cylinder head ground cables
- Engine control wiring harness clamps
- Water bypass hose
- Power steering vacuum hoses
- EVAP hoses
- PCV valve and hose
- Fuel pressure regulator vacuum hose
- HO2S sensor connectors
- ETC gauge sender connector
- ECT sensor connector
- Fuel injector connectors
- EVAP vacuum switching valve connector
- Throttle motor connector
- Accelerator pedal position sensor
- TP sensor connector
- Accelerator cable
- Engine appearance cover
- Negative battery cable

2. Fill the cooling system.
3. Start the engine and check for leaks.



**Fig. Exploded of the intake manifold mounting**



**Fig. Intake manifold and related parts-2003-06 GX470 and LX470**

1. Before servicing the vehicle, refer to the precautions section.
2. Drain the cooling system.
3. Relieve the fuel system pressure.
4. Remove the V bank cover.
5. Remove the timing belt.
6. Remove the camshaft pulleys.
7. Remove the camshaft position sensor.
8. Remove the power steering pump and set it aside with the lines still attached.
9. Remove the front exhaust pipe.
10. On models with an automatic transmission, remove the oil dipstick and tube.
11. Remove the ignition coils.
12. Remove the rear timing belt plates being careful not to drop anything.
13. Disconnect the fuel inlet hose.
14. Remove the intake manifold as follows:
  - A. Disconnect the all electrical connectors from the manifold.
  - B. Disconnect all hoses from the intake manifold.
  - C. Disconnect the wire clamp bracket on the right hand delivery pipe.
  - D. Remove the engine wire harness protector from the water bypass joint and right hand cylinder head.
  - E. Remove the guide from the A/T bracket on the left side.
  - F. Remove the two ground cable from the left and right head.
  - G. Remove the bolts and disconnect the wire harness protector from the intake manifold.
  - H. Remove the engine wire from the engine hanger and bracket.
  - I. Remove the left and right side front V cover brackets.
  - J. Remove the nuts, bolts and manifold.
  - K. Remove the throttle body.
  - L. Remove the bolts and nuts that attach the upper manifold to the lower manifold.
  - M. Disconnect the EVAP hose from the upper manifold.
  - N. Remove the accelerator cable clamp and VSV for the EVAP.
  - O. Remove the bolt, union, gaskets and brake booster from the upper manifold.
  - P. Remove the EVAP pipe from the manifold.
  - Q. Disconnect the fuel return hose from the regulator.

- R. Remove the bolts attaching the fuel return hose to the lower manifold.
- S. Remove the fuel pressure regulator, pulsation damper gaskets.
- T. Remove the retainer and rear fuel pipe.
- U. Remove the fuel rail and injectors.

**To install:**

1. Install new intake manifold gaskets and the manifold. Tighten the bolts to 13 ft. lbs. (18 Nm) in several passes.
2. Install the throttle cover bracket, wire bracket and wire to the engine hanger bracket.
3. Install the wire to the timing belt rear plate.
4. Attach the wire protector to the intake manifold.
5. Attach the 2 ground cables the cylinder heads.
6. Connect the water bypass hoses to the throttle body.
7. Connect the wire clamps to the bracket on the right delivery pipe.
8. Attach the hoses to the intake manifold.
9. Attach the electrical connectors to the intake manifold.
10. Connect the fuel hose.

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## REPAIR GUIDE

Lexus GX470 2003-06

### Oil Pan

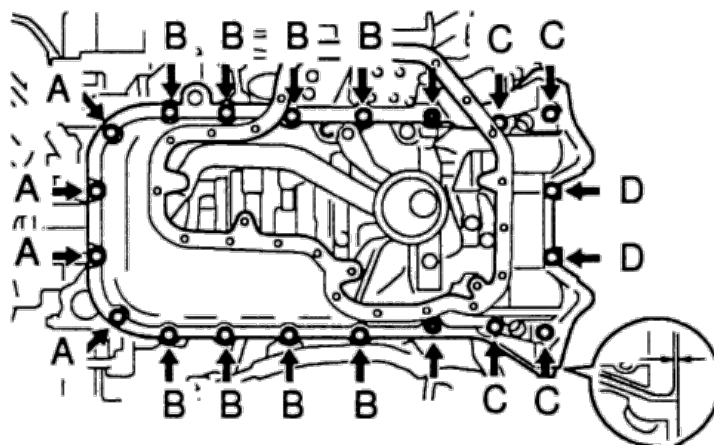
#### Removal & Installation

[Print](#)

1. Before servicing the vehicle, refer to the Precautions section.
2. Remove the engine from the vehicle and mount it on a stand.
3. Remove or disconnect the following:

- Oil dipstick tube
- Lower oil pan
- Oil pan baffle
- Upper oil pan

**To install:**



**Fig. Upper oil pan bolt location**

1. The upper oil pan bolts are different lengths and are identified as follows:

- A: 0.79 inch (20mm) w/10mm head
- B: 0.98 inch (25mm) w/12mm head
- C: 2.36 inch (60mm) w/12mm head
- D: 1.38 inch (35mm) w/10mm head

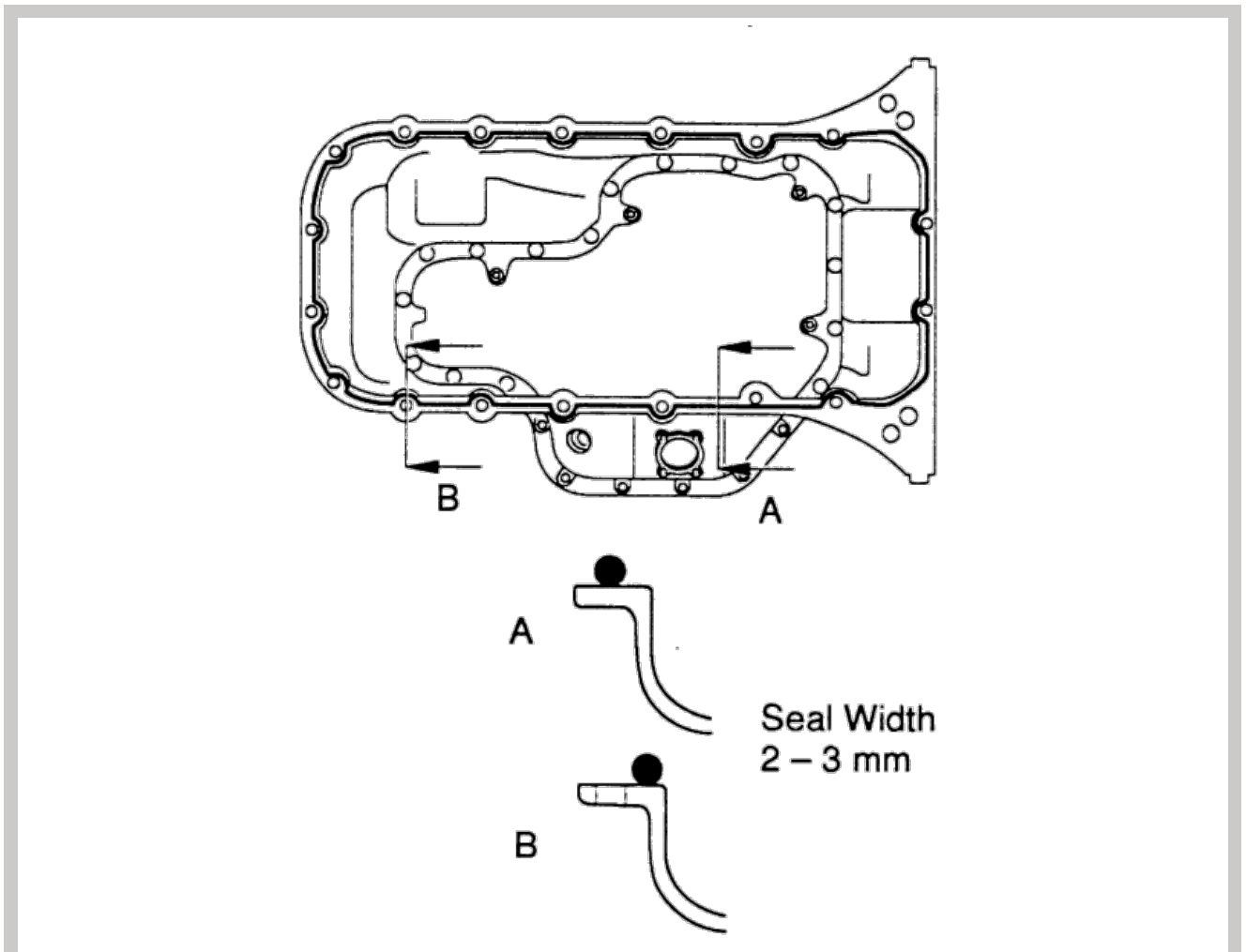
2. Apply silicone sealant to the upper oil pan as shown.
3. Install the upper oil pan and tighten the fasteners in several passes to the following specifications:

- 10mm: 66 inch lbs. (7.5 Nm)
- 12mm: 21 ft. lbs. (28 Nm)

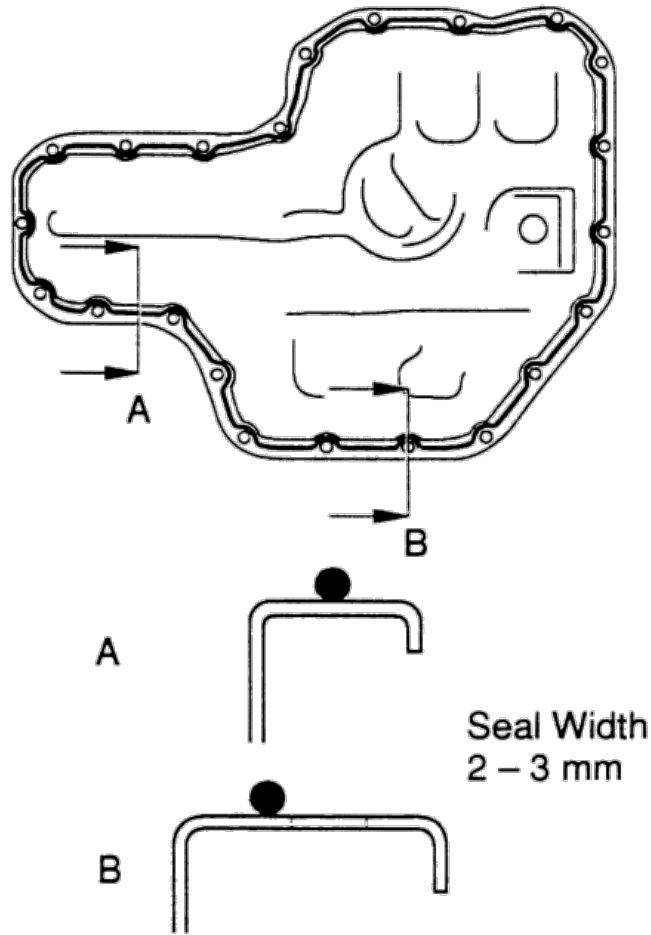
4. Install or connect the following:

- Oil pan baffle. Tighten the fasteners to 66 inch lbs. (7.5 Nm).
- Lower oil pan. Tighten the fasteners in several passes to 66 inch lbs. (7.5 Nm).
- Oil dipstick tube

5. Install the engine.



**Fig. Upper oil pan sealant application**



**Fig. Lower oil pan sealant application**

1. Before servicing the vehicle, refer to the precautions section.
2. Remove the engine from the vehicle and mount it on a stand.
3. Remove or disconnect the following:

- Oil dipstick tube
- Lower oil pan
- Oil pan baffle
- Upper oil pan

**To install:**

**Fig. Upper oil pan bolt location**

1. The upper oil pan bolts are different lengths and are identified as follows:

- A: 0.79 inch (20mm) w/10mm head
- B: 0.98 inch (25mm) w/12mm head
- C: 2.36 inch (60mm) w/12mm head
- D: 1.38 inch (35mm) w/10mm head

**Fig. Upper oil pan sealant application**

2. Apply silicone sealant to the upper oil pan as shown.
3. Install the upper oil pan and tighten the fasteners in several passes to the following specifications:



- 10mm: 66 inch lbs. (7.5 Nm)
- 12mm: 21 ft. lbs. (28 Nm)

Fig. Lower oil pan sealant application

4. Install or connect the following:

- Oil pan baffle. Tighten the fasteners to 66 inch lbs. (7.5 Nm).
- Lower oil pan. Tighten the fasteners in several passes to 66 inch lbs. (7.5 Nm).
- Oil dipstick tube

5. Install the engine.

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## REPAIR GUIDE

Lexus GX470 2003-06

### Oil Pump

#### Inspection

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1. Before servicing the vehicle, refer to the Precautions section.
2. Remove the oil pump from the engine and disassemble it.
3. Coat the relief valve with engine oil and check that it falls smoothly into the valve hole by its own weight.
4. If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.

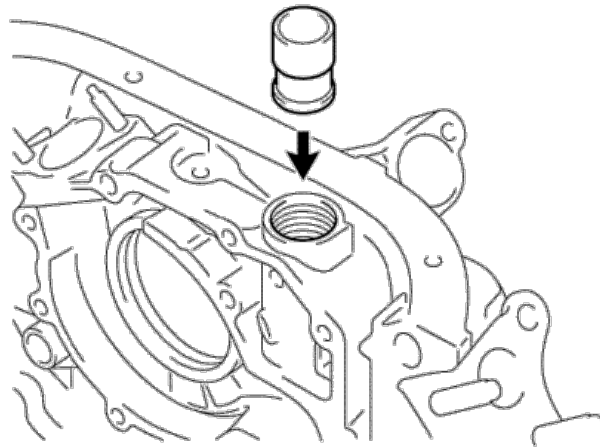


Fig. Relief valve inspection

5. Place the drive and driven rotors into the oil pump body.
6. Using a feeler gauge, measure the clearance between the drive and driven rotor tips.
7. Standard tip clearance is 0.060 to 0.180 mm (0.0024 to 0.0071 in.).
8. If the tip clearance is greater than maximum, replace the rotors as a set.

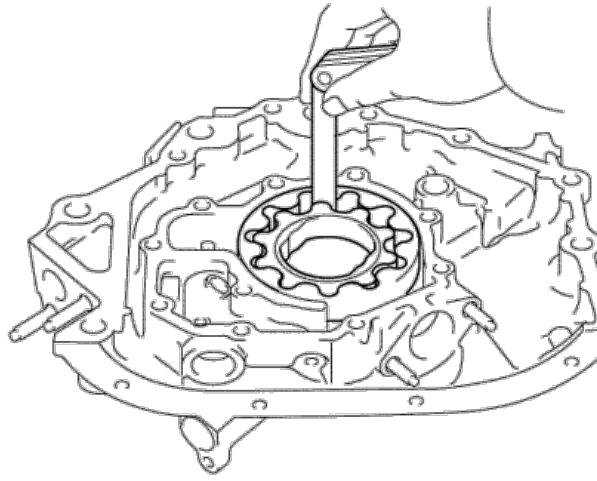


Fig. Measuring rotor tip clearance

9. Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.
10. Standard side clearance is 0.030 to 0.090 mm (0.0012 to 0.0035 in.).
11. If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

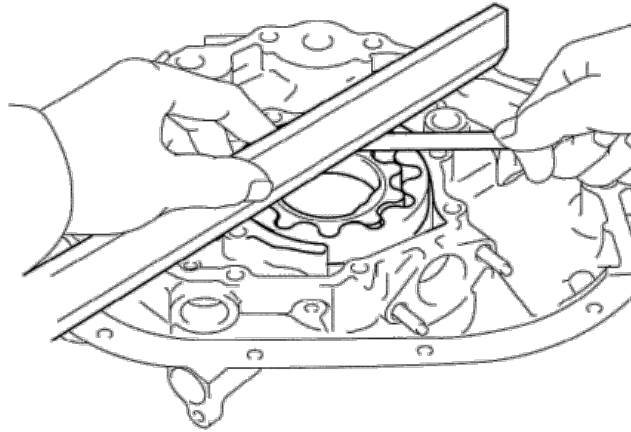


Fig. Measuring side clearance

12. Using a feeler gauge, measure the clearance between the driven rotor and body.
13. Standard body clearance is 0.250 to 0.325 mm (0.0098 to 0.0128 in.).
14. If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

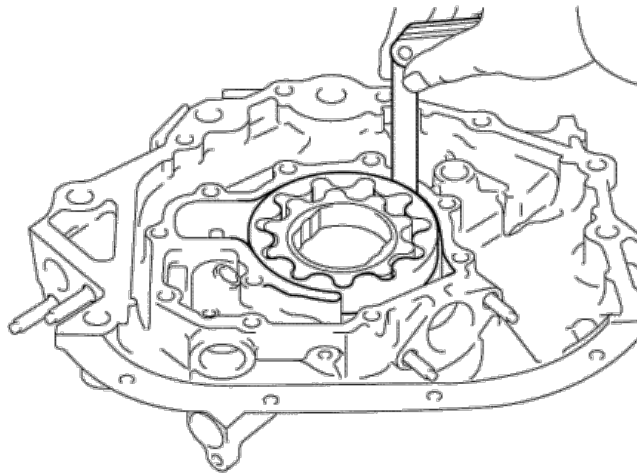


Fig. Measuring body clearance

## Removal & Installation

1. Before servicing the vehicle, refer to the Precautions section.
2. Remove the engine from the vehicle and mount it on a stand.
3. Remove or disconnect the following:

- Front cover
- Timing belt.
- Timing belt idler pulleys
- Crankshaft timing sprocket
- Oil dipstick tube
- Oil filter and bracket
- Crankshaft Position (CKP) sensor
- Oil pan and baffle
- Oil pump pickup tube
- Oil pump

### To install:

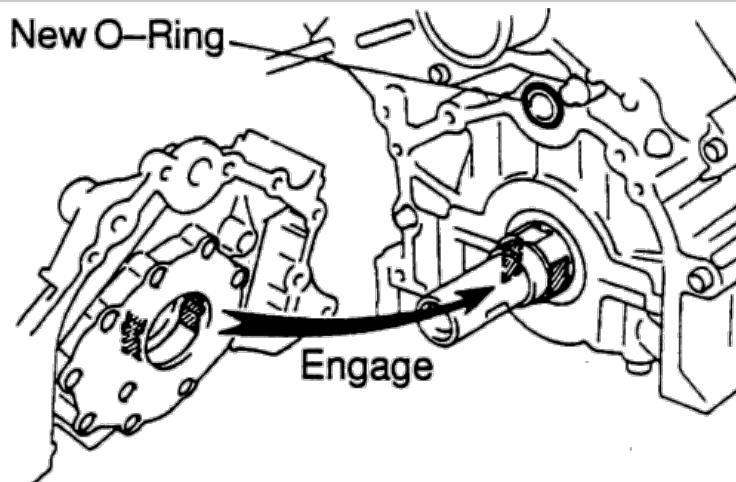


Fig. Location of the O-ring seal

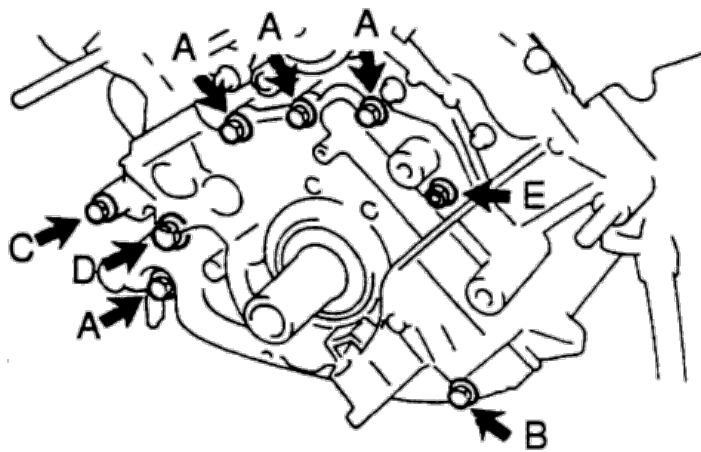


Fig. Oil pump bolt location

1. The upper oil pan bolts are different lengths and are identified as follows:

- A: 1.38 inch (35mm) w/12mm head
- B: 1.97 inch (50mm) w/12mm head
- C: 4.17 inch (106mm) w/12mm head
- D: 1.57 inch (40mm) w/14mm head
- E: 1.18 inch (30mm) w/6mm hex head

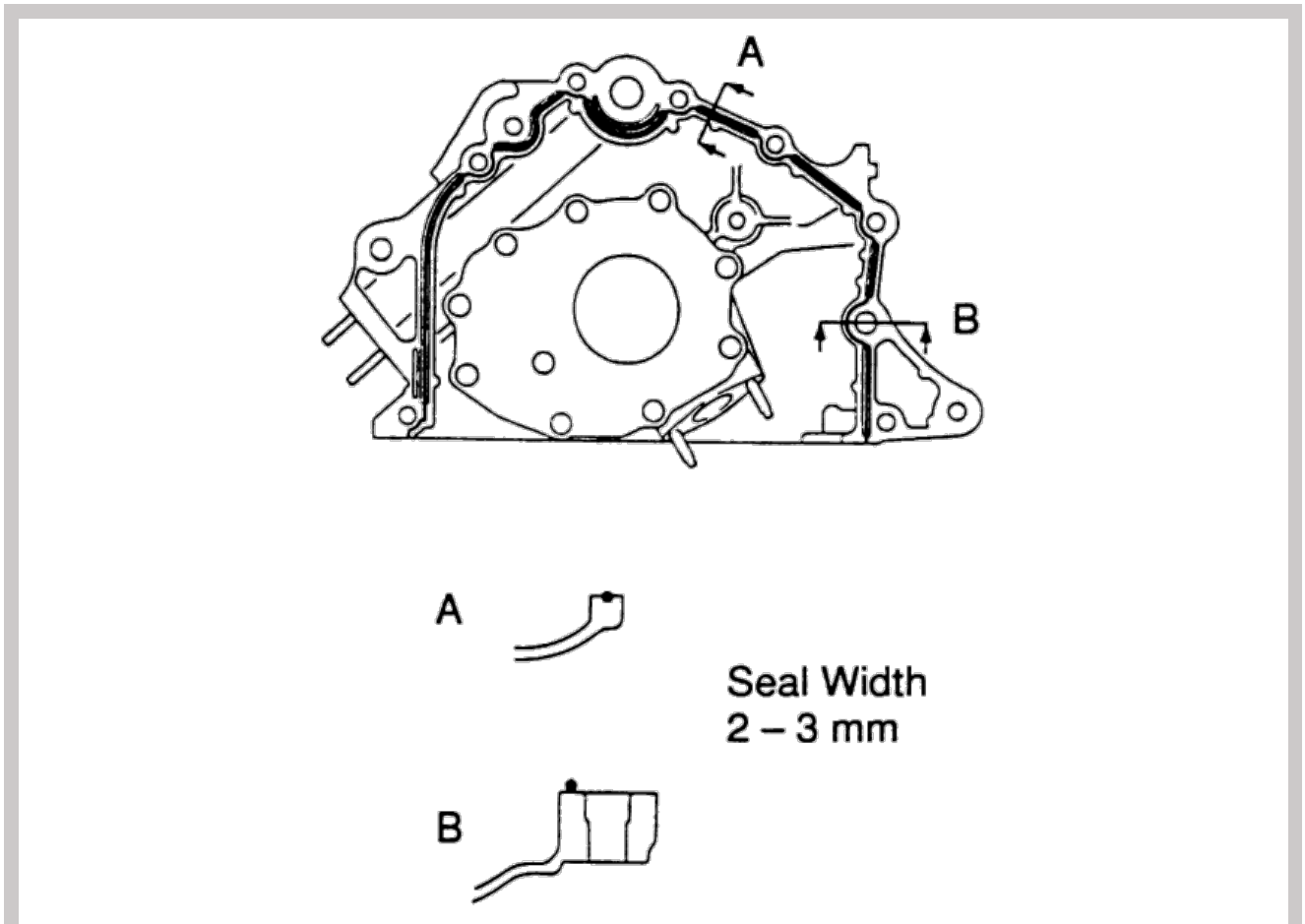
2. Install a new O-ring on the engine block.
3. Apply silicone sealant to the oil pump housing as shown.
4. Install the oil pump. Tighten the bolts in several passes to the following specifications:

- 12mm: 11 ft. lbs. (15.5 Nm)
- 14mm: 22 ft. lbs. (30.5 Nm)
- 6mm Hex: 11 ft. lbs. (15.5 Nm)

5. Install or connect the following:

- Oil pump pickup tube. Tighten the bolts to 66 inch lbs. (7.5 Nm).
- Oil pan and baffle
- CKP sensor
- Oil filter and bracket. Tighten the bolts to 13 ft. lbs. (18 Nm).
- Oil dipstick tube
- Crankshaft timing sprocket
- Timing belt idler pulleys
- Timing belt
- Front cover

6. Install the engine.



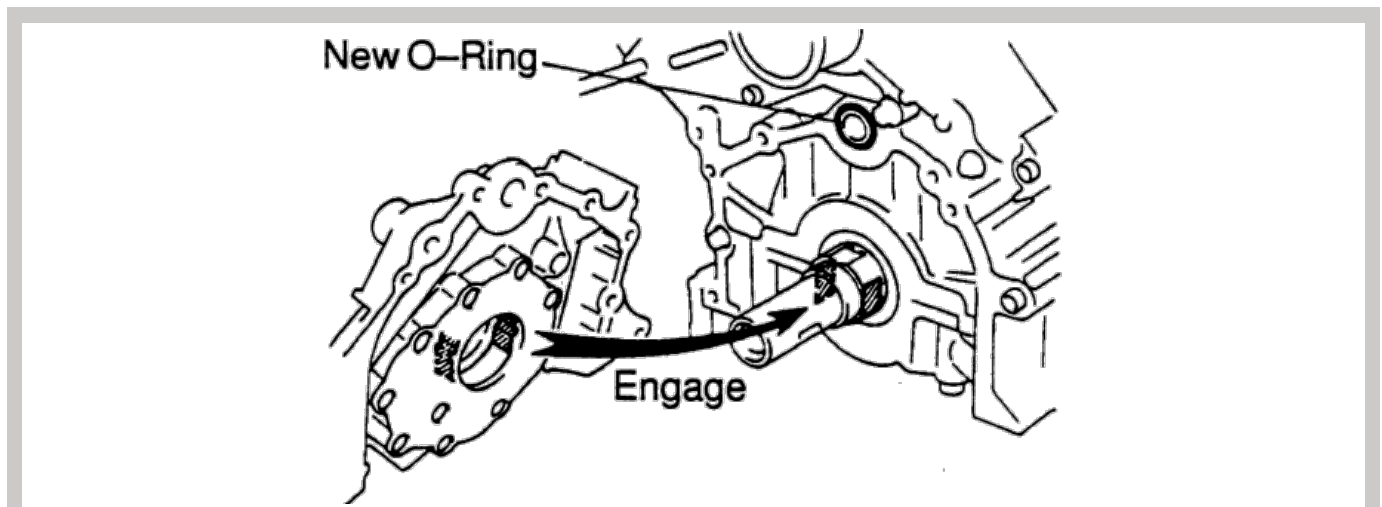
**Fig. Oil pump housing sealant application**

1. Before servicing the vehicle, refer to the precautions section.
2. Remove the engine from the vehicle and mount it on a stand.
3. Remove or disconnect the following:

- Front cover
- Timing belt.
- Timing belt idler pulleys
- Crankshaft timing sprocket
- Oil dipstick tube
- Oil filter and bracket
- Crankshaft Position (CKP) sensor

- ❑ Oil pan and baffle
- ❑ Oil pump pickup tube
- ❑ Oil pump

**To install:**



**Fig. Location of the O-ring seal**



**Fig. Oil pump bolt location**

1. The upper oil pan bolts are different lengths and are identified as follows:

- ❑ A: 1.38 inch (35mm) w/12mm head
- ❑ B: 1.97 inch (50mm) w/12mm head
- ❑ C: 4.17 inch (106mm) w/12mm head
- ❑ D: 1.57 inch (40mm) w/14mm head
- ❑ E: 1.18 inch (30mm) w/6mm hex head

2. Install a new O-ring on the engine block.

3. Apply silicone sealant to the oil pump housing as shown.



**Fig. Oil pump housing sealant application**

4. Install the oil pump. Tighten the bolts in several passes to the following specifications:

- ❑ 12mm: 11 ft. lbs. (15.5 Nm)
- ❑ 14mm: 22 ft. lbs. (30.5 Nm)
- ❑ 6mm Hex: 11 ft. lbs. (15.5 Nm)

5. Install or connect the following:

- ❑ Oil pump pickup tube. Tighten the bolts to 66 inch lbs. (7.5 Nm).
- ❑ Oil pan and baffle
- ❑ CKP sensor
- ❑ Oil filter and bracket. Tighten the bolts to 13 ft. lbs. (18 Nm).
- ❑ Oil dipstick tube
- ❑ Crankshaft timing sprocket
- ❑ Timing belt idler pulleys
- ❑ Timing belt
- ❑ Front cover

6. Install the engine.

# REPAIR GUIDE

Lexus GX470 2003-06



## Piston & Ring Positioning

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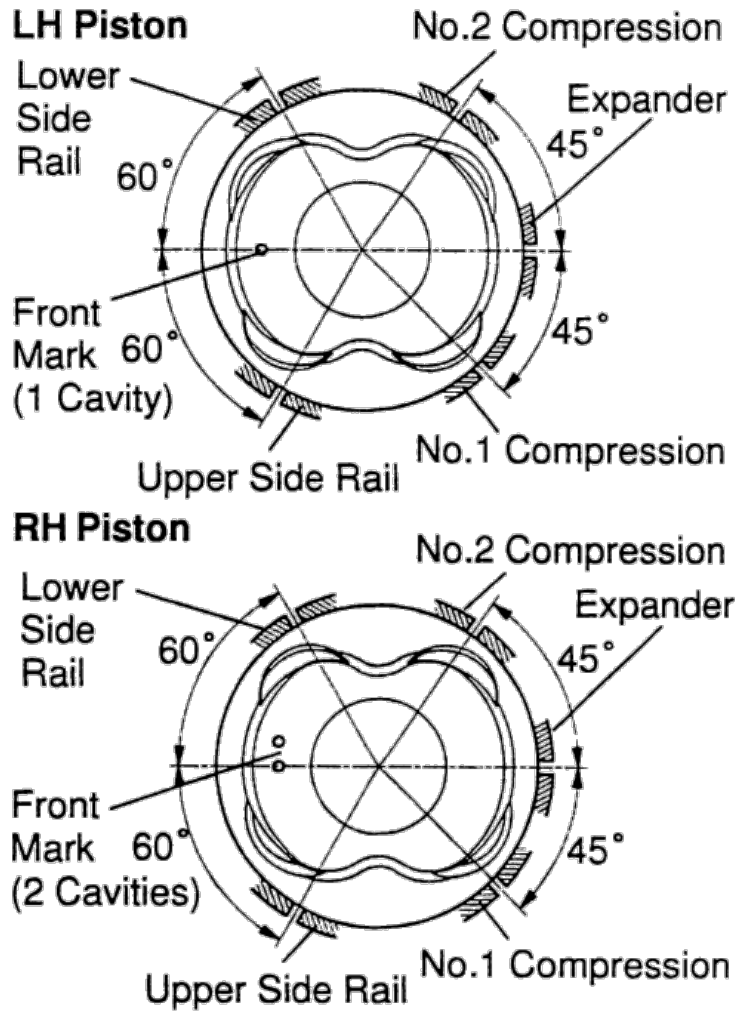
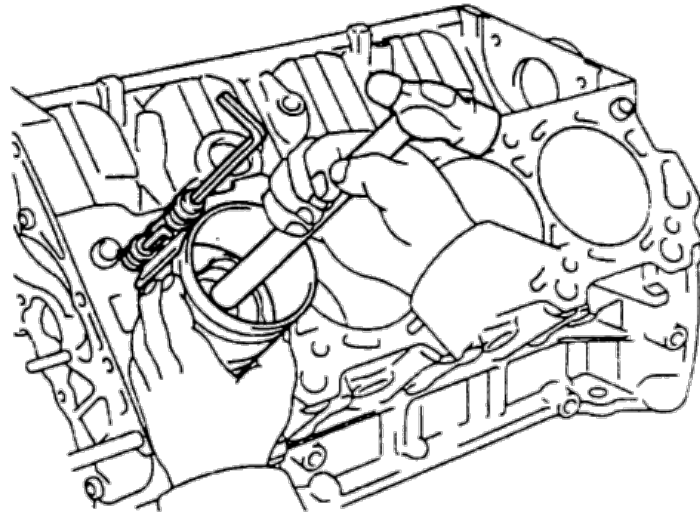
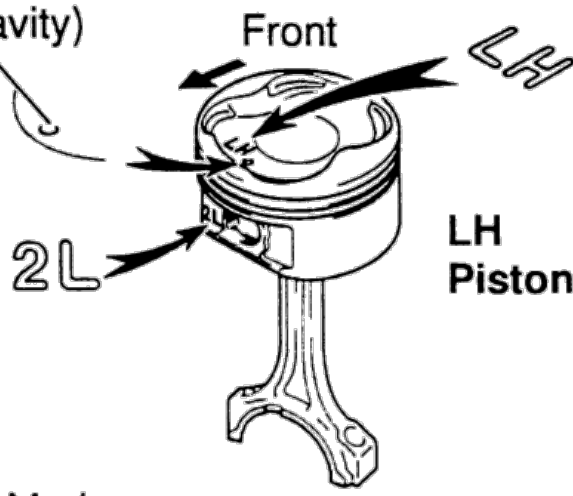


Fig. Piston ring positioning



Front Mark  
(1 Cavity)



Front Mark  
(2 Cavities)

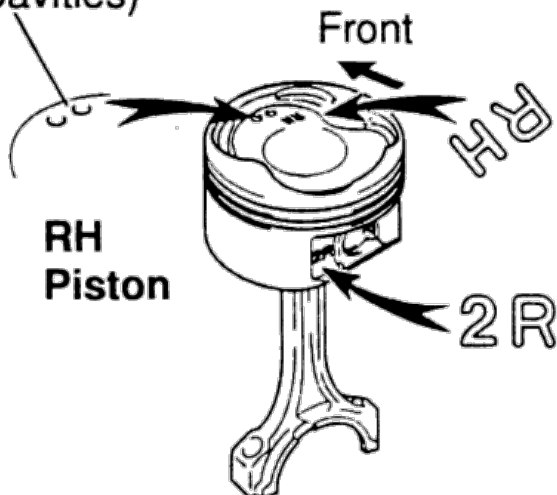


Fig. Piston positioning

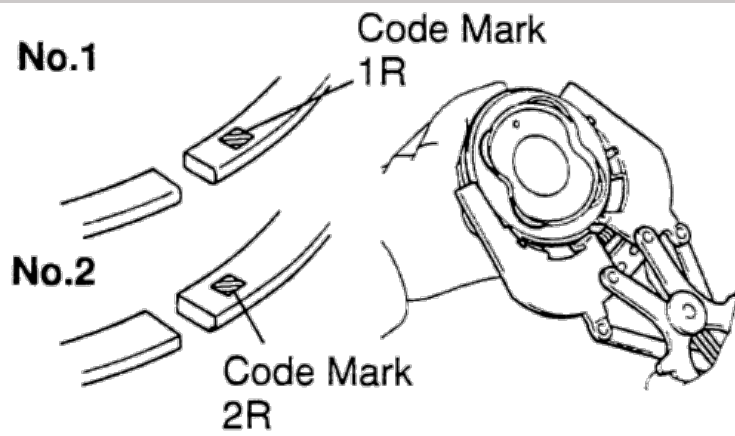


Fig. Piston ring identification

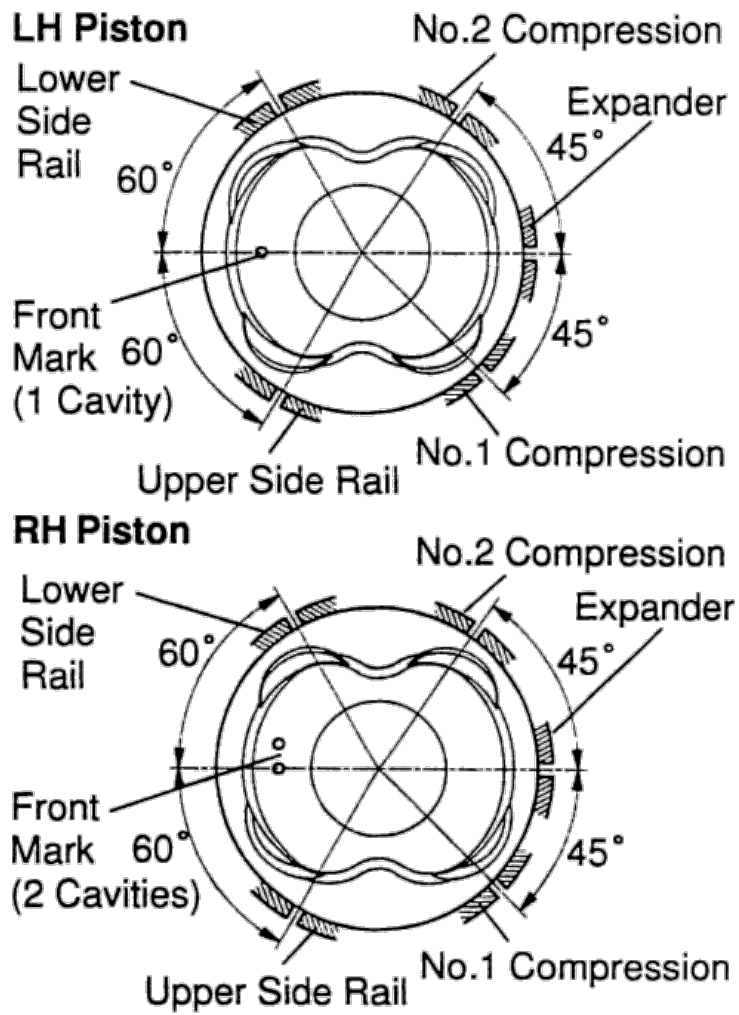
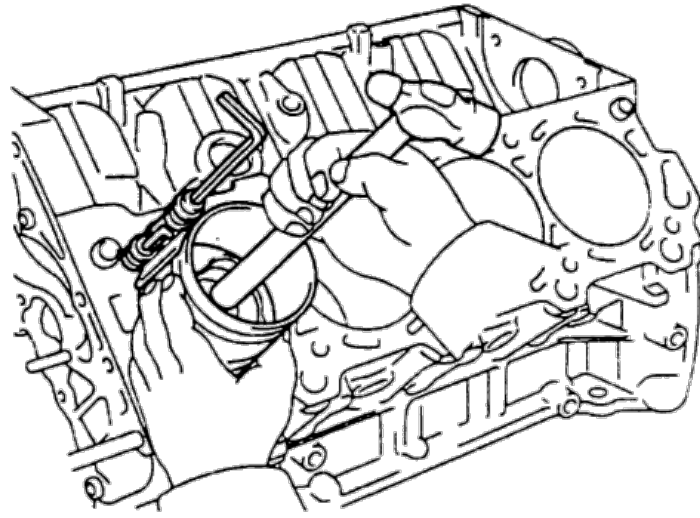
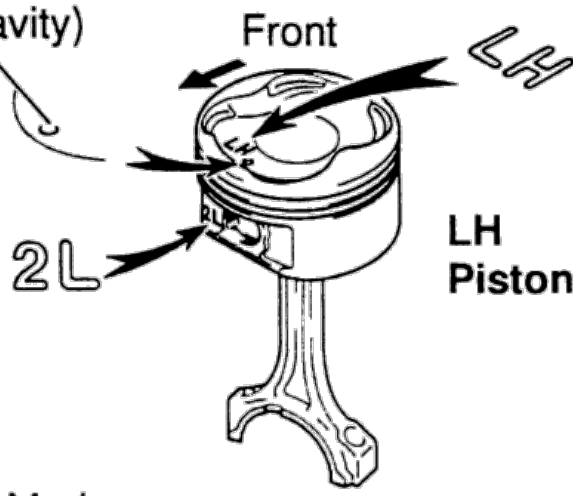


Fig. Piston ring positioning





Front Mark  
(1 Cavity)



Front Mark  
(2 Cavities)

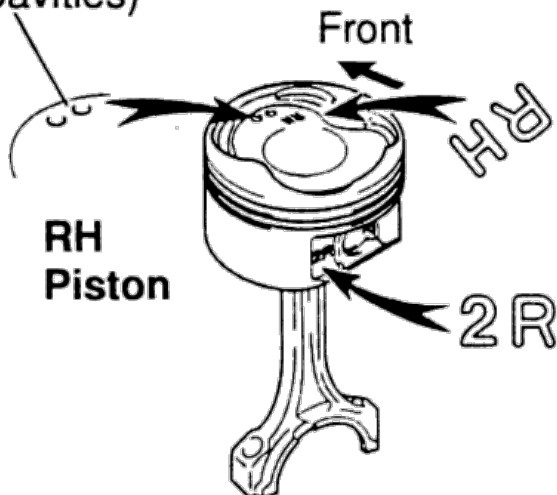


Fig. Piston positioning

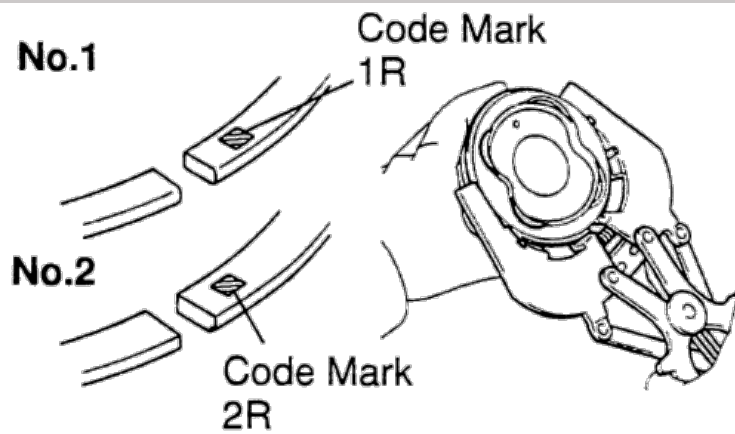


Fig. Piston ring identification

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## REPAIR GUIDE

Lexus GX470 2003-06

### Rear Main Seal

#### Removal & Installation

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1. Before servicing the vehicle, refer to the Precautions section.
2. Remove the transmission and flywheel from the vehicle.
3. Cut off the rubber lip portion of the seal with a sharp knife.
4. Pry out the oil seal.

#### To install:

1. Install the rear main seal so that it is flush with the seal retainer housing.
2. Install or connect the following:

- Flywheel/driveplate. Tighten the bolts to 35 ft. lbs. (48 Nm) plus a 90 degree turn.
- Transmission

1. Before servicing the vehicle, refer to the precautions section.
2. Remove the transmission and flywheel from the vehicle.
3. Cut off the rubber lip portion of the seal with a sharp knife.
4. Pry out the oil seal.

#### To install:

1. Install the rear main seal so that it is flush with the seal retainer housing.
2. Install or connect the following:

- Flywheel/driveplate. Tighten the bolts to 35 ft. lbs. (48 Nm) plus a 90 degree turn.
- Transmission

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## REPAIR GUIDE

Lexus GX470 2003-06

### Timing Belt

#### Removal & Installation

[Print](#)

1. Disconnect the negative battery cable.
2. Raise and safely support the vehicle.
3. Remove the oil pan protector and the engine under cover.
4. Drain the cooling system and store the coolant for refilling purposes.

5. Lower the vehicle and remove the battery clamp cover.
6. From the top of the engine, remove the fuel return hose, the engine cover nuts/bolts and the cover.
7. Remove the air cleaner and the intake air connector assembly.
8. Remove the cooling fan pulley by performing the following procedures:
  - A. Loosen the 4 fan clutch-to-fan pulley nuts.
  - B. Using a box-end wrench on the serpentine drive belt tensioner bolt, rotate the tensioner counterclockwise and remove the drive belt.

**NOTE**

The serpentine drive belt tensioner bolt is a left-hand thread.

- C. Remove the fan clutch-to-fan pulley nuts, the fan, the clutch assembly and the fan pulley.
- 
9. Remove the radiator by performing the following procedures:
    - A. Disconnect the upper, lower and reservoir hoses from the radiator.
    - B. Disconnect and plug the automatic transmission oil cooler at the radiator. Disconnect the automatic transmission oil cooler hoses from the fan shroud clamp.
    - C. Remove the radiator reservoir tank.
    - D. Remove the fan shroud-to-radiator bolts and the shroud.
    - E. Remove the 2 upper radiator-to-chassis nuts.
    - F. Remove the middle radiator-to-chassis nut/bolts and brackets.
    - G. Carefully, lift the radiator from the vehicle.
  10. Remove the serpentine drive belt idler pulley bolt, cover plate and pulley.
  11. Remove the right side (No. 3) timing belt cover.
  12. Remove the left side (No. 3) timing belt cover by performing the following procedures:
    - A. Disconnect the engine wire from both wire clamps.
    - B. Disconnect the camshaft position sensor wire from the wire clamp on the left-side (No.3) timing belt cover.
    - C. Disconnect the sensor connector from the connector bracket.
    - D. Disconnect the sensor connector.
    - E. Remove the wire grommet from the left-side (No. 3) timing belt cover.
    - F. Remove the oil cooler tube bolts and tube.

13. Remove the middle (No. 2) timing belt cover bolts and cover.
14. Remove the cooling fan bracket nuts/bolts and bracket.

**NOTE**

If reusing the timing belt, make sure that there are 3 installation marks on the belt; if there are none, install them.

15. Using the Crankshaft Pulley Holding tool 09213-70010, Bolt tool 90105-08076 and Companion Flange Holding tool 09330-00021, or equivalent, loosen the crankshaft pulley bolt.
16. Position the No. 1 cylinder to approximately 50 degrees After Top Dead Center (ATDC) of the compression stroke by performing the following procedures:
  - A. Rotate the crankshaft pulley (CLOCKWISE) to align its groove with the timing mark -0- on the lower (No. 1) timing belt cover.
  - B. Check that the camshaft sprocket timing marks are aligned with the rear timing belt plate marks; if not, rotate the crankshaft 1 revolution (360 degrees).
  - C. Rotate the crankshaft pulley approximately 50 degrees (CLOCKWISE) and align the crankshaft pulley timing mark between the centers of the crankshaft pulley bolt and the idler pulley bolt.

**WARNING**

If the timing belt is disengaged, having the crankshaft pulley in the wrong angle can cause the valve to come into contact with the piston when removing the camshaft pulley.

17. Remove the crankshaft pulley bolt.

**NOTE**

If reusing the timing belt and the installation marks have disappeared, place new installation marks on the timing belt to match the camshaft timing sprocket marks.

**NOTE**

To avoid meshing the timing sprocket and the timing belt, secure one with a string; then, place matchmarks on the timing belt and the right-side camshaft timing sprocket.

18. Remove the timing belt tensioner bolts and the tensioner.
19. Using the Camshaft Holding tool 09960-10010, or equivalent, slightly turn the left-side camshaft sprocket clockwise to loosen the tension spring. Then, disconnect the timing belt from the camshaft sprockets.
20. Remove the alternator by performing the following procedures:

- A. Disconnect the electrical connector from the alternator.
- B. Remove the rubber cap/nut and disconnect the battery wire from the alternator.
- C. Disconnect the wire clamp from the alternator cord clip.
- D. Remove the alternator-to-engine nuts/bolts and the alternator.

- 21. Remove the serpentine drive belt tensioner nuts/bolts and the tensioner.
- 22. Using the Crankshaft Puller Assembly tool 09950-50012, or equivalent, press the crankshaft pulley from the crankshaft.

**WARNING**

DO NOT rotate the crankshaft pulley.

- 23. Remove the lower (No. 1) timing belt cover bolts and the cover.
- 24. Remove the timing belt guide, spacer and the timing belt.

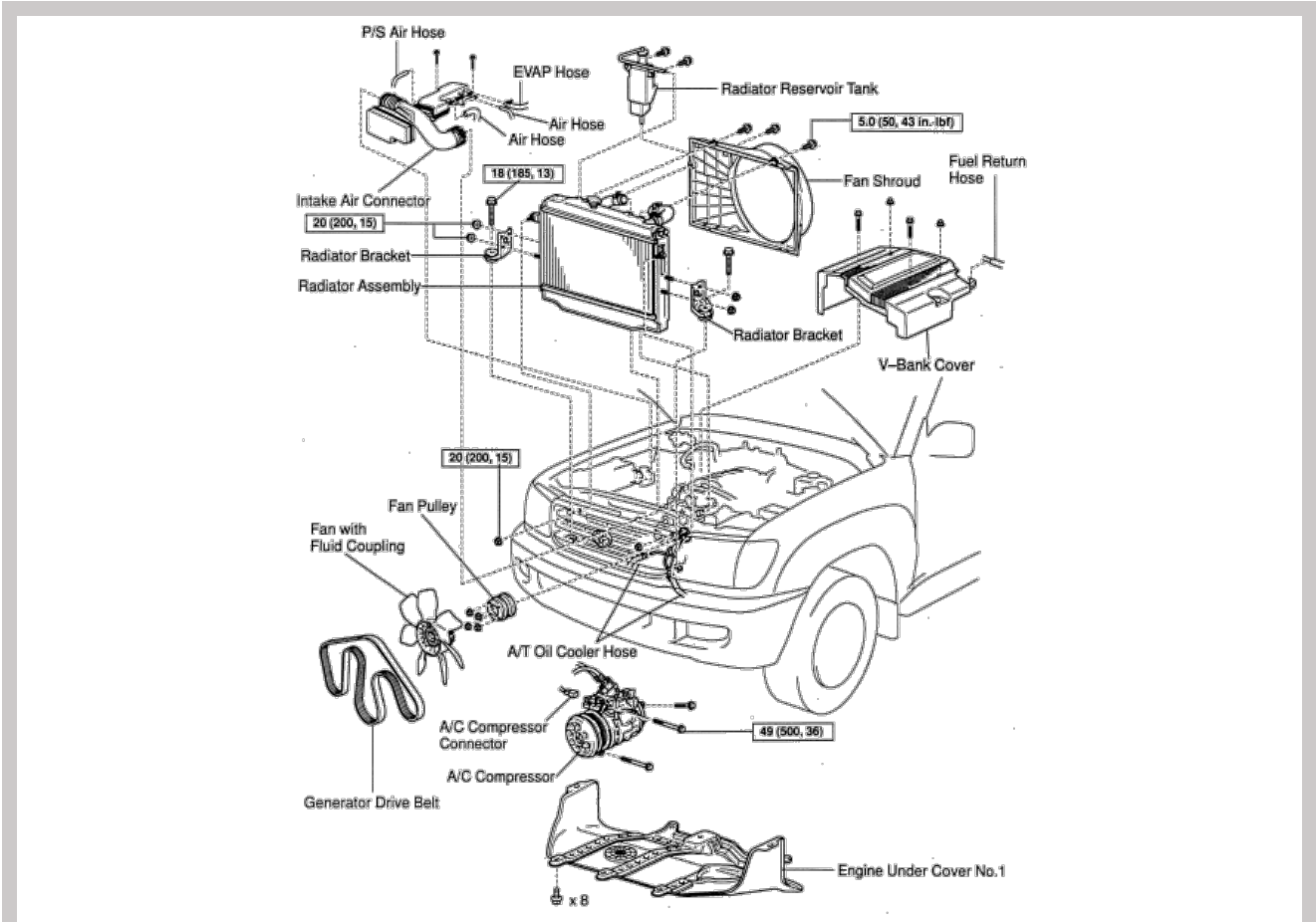


Fig. Exploded view of vehicle components for timing belt replacement-LX470

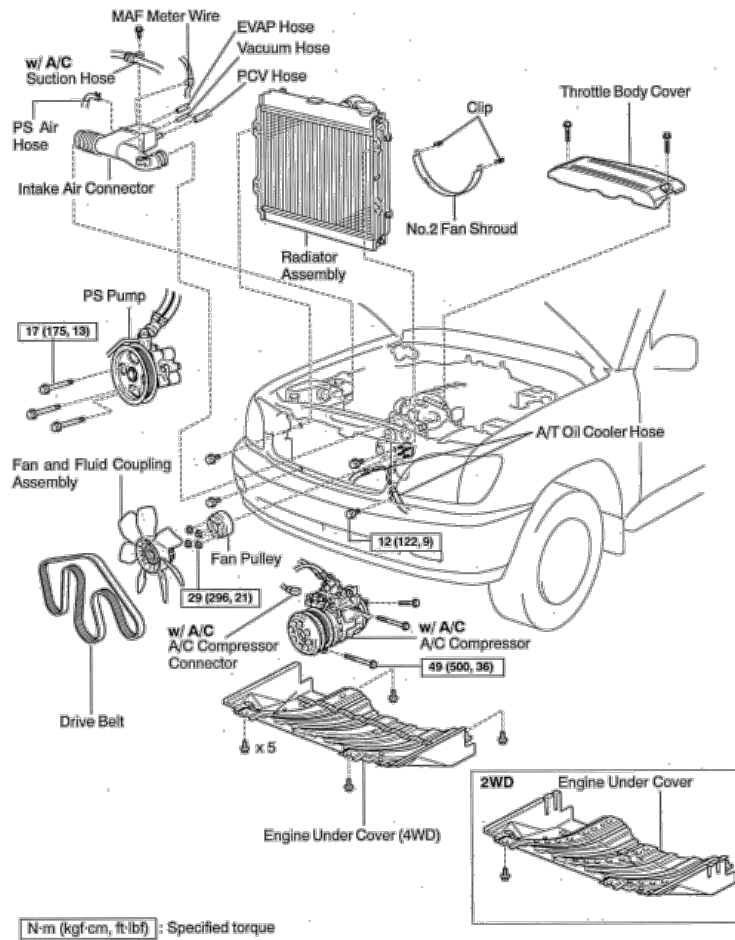


Fig. Exploded view of vehicle components for timing belt replacement-GX470

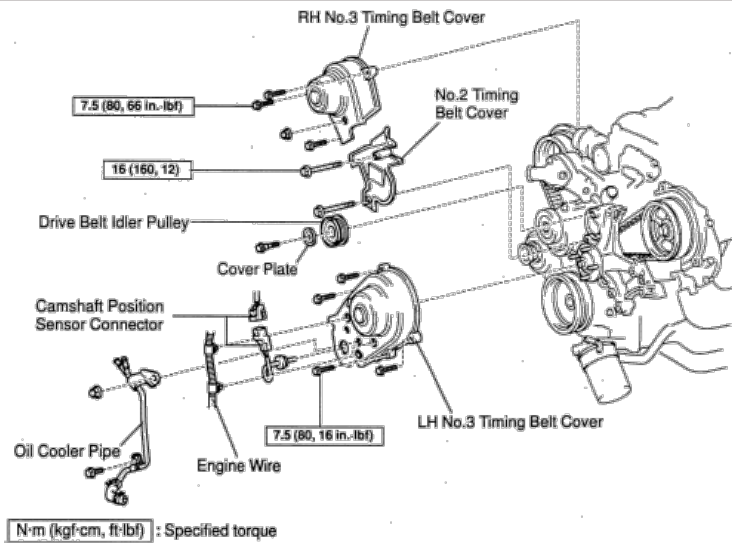


Fig. Exploded view of upper timing belt covers

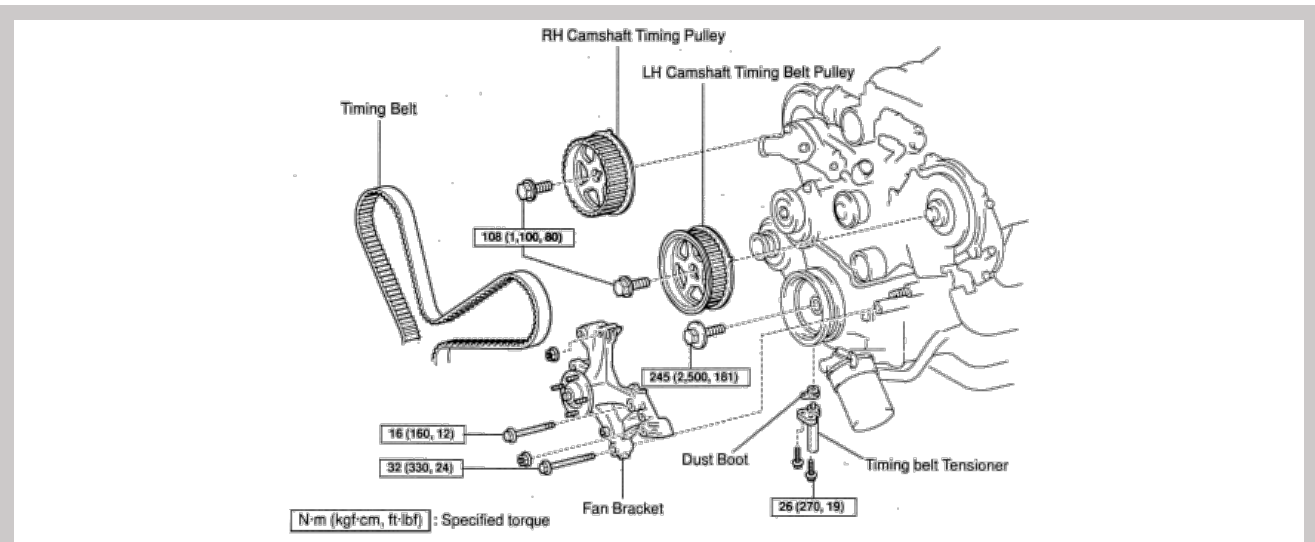


Fig. Exploded view of upper timing sprockets and components

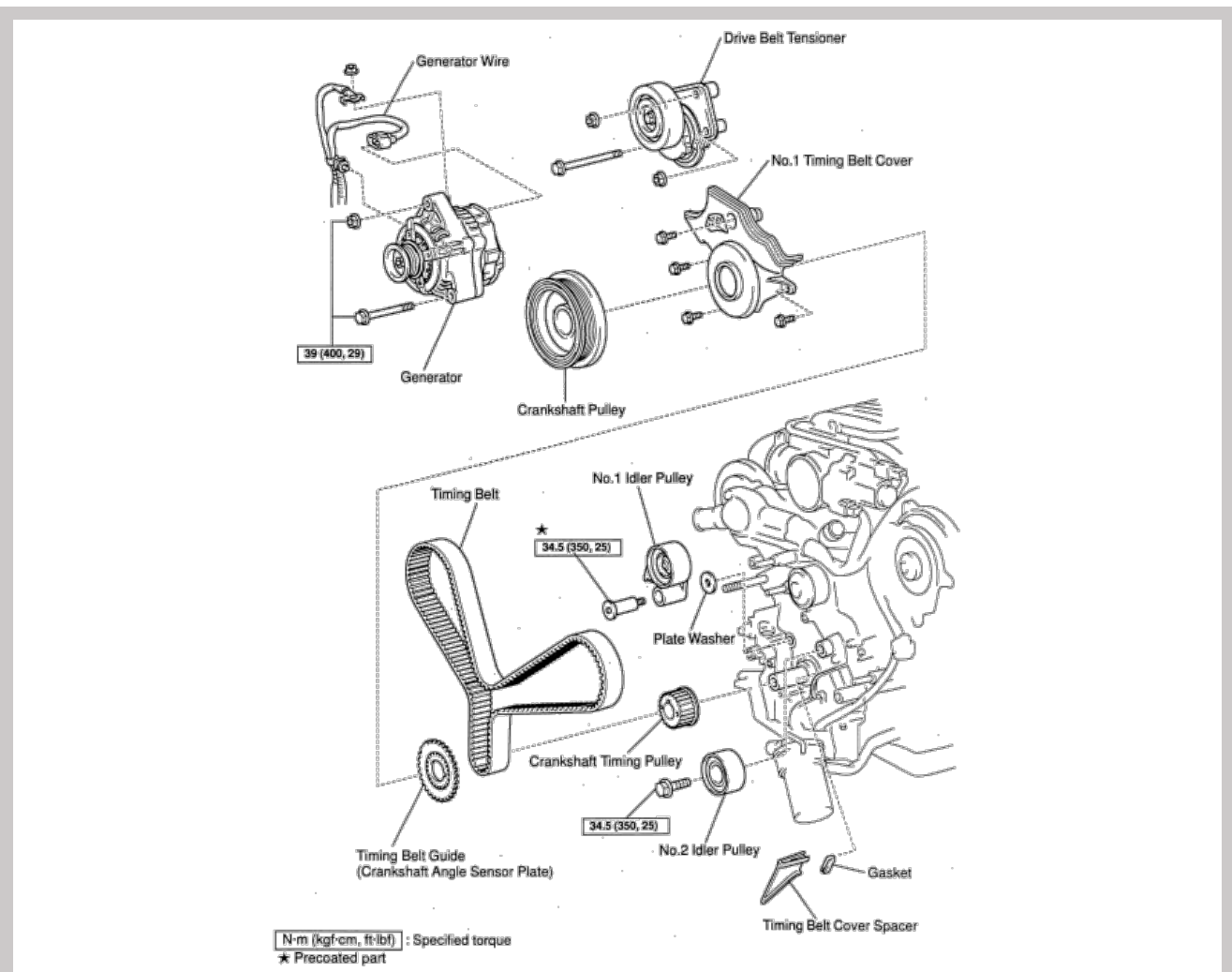


Fig. Exploded view of lower timing belt cover, sprockets and components

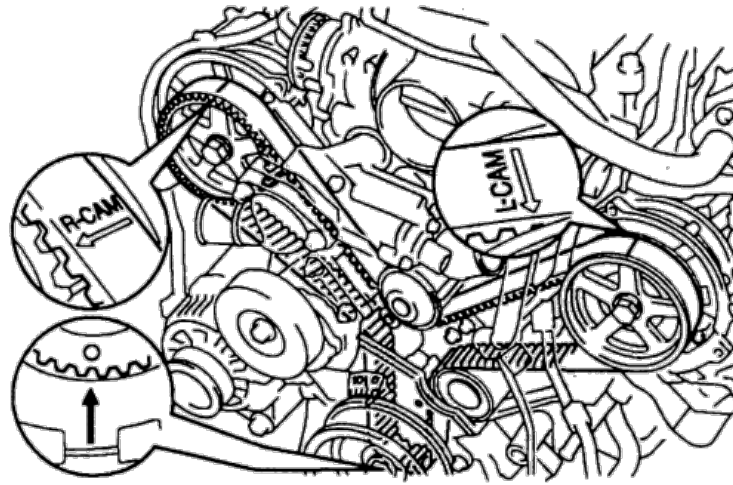


Fig. Alignment of timing belt with the timing sprockets

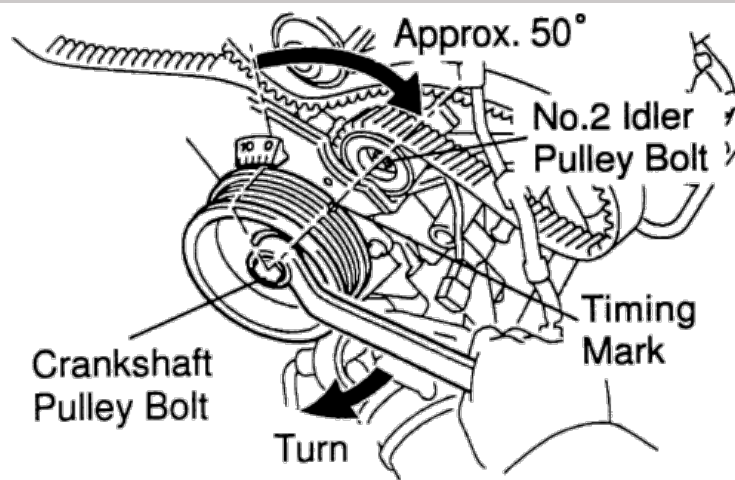


Fig. Aligning of crankshaft pulley timing mark with the center line of the crankshaft pulley bolt and the idler pulley bolt

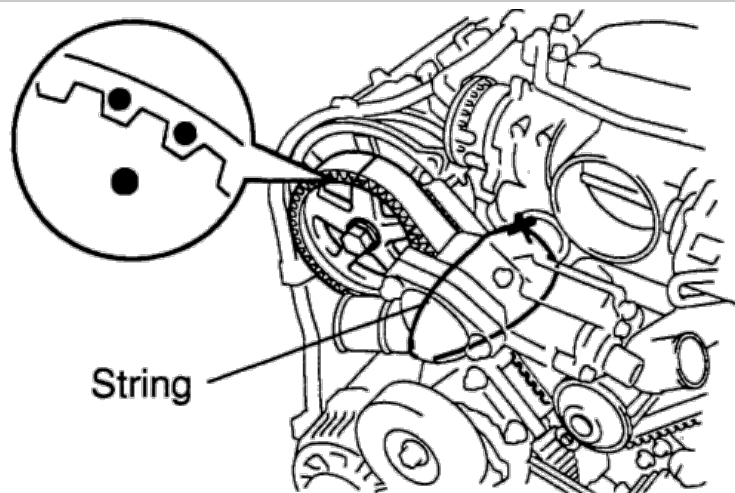


Fig. Securing the timing belt with string and matchmarking the camshaft with the timing belt

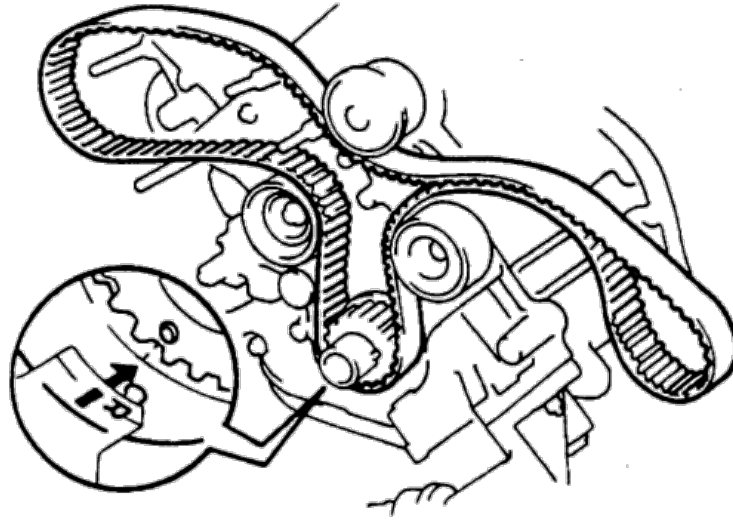


Fig. Installing the timing belt on the crankshaft sprocket

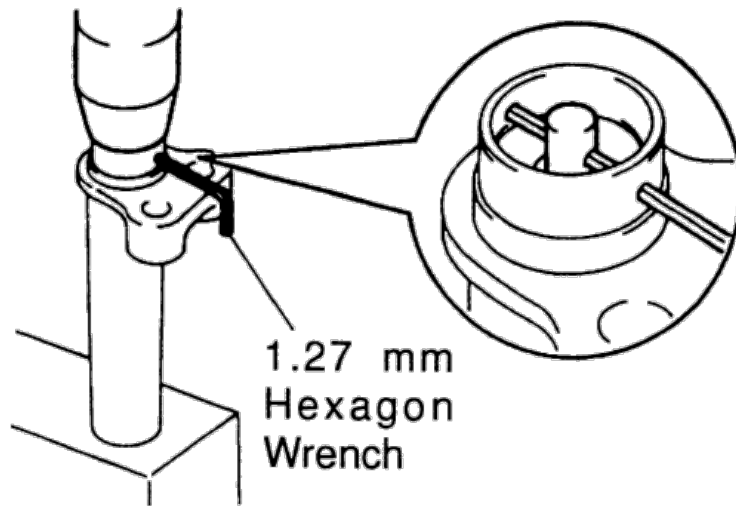


Fig. Securing the timing belt tensioner pushrod

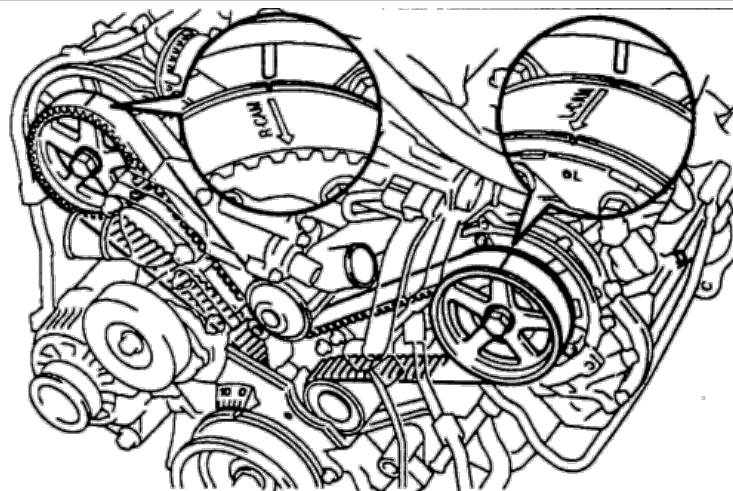


Fig. Checking the TDC alignment marks after rotating the crankshaft 2 revolutions

**To install:**

**NOTE**



With the timing belt removed, this is a perfect opportunity to inspect and/or replace the water pump.

---

1. Inspect the timing belt tensioner by performing the following procedures:

- A. Inspect the seal for leakage; if leakage is suspected, replace the tensioner.
- B. Using both hands to hold the tensioner facing upward, strongly press the pushrod against a solid surface. If the pushrod moves, replace the tensioner.

**WARNING**

Never hold the tensioner with the pushrod facing downward.

---

- C. Measure the pushrod protrusion from the housing end, it should be 0.413-0.453 in. (10.5-11.5mm). If the protrusion is not as specified, replace the tensioner.

2. Temporarily install the timing belt by performing the following procedures:

- A. Align the timing belt's installation mark with the crankshaft timing sprocket.
- B. Install the timing belt on the crankshaft timing sprocket, the No. 1 idler pulley and the No. 2 idler pulley.

3. Install the gasket to the timing belt cover spacer and install the cover spacer.

4. Install the timing belt guide with the cup side facing outward.

5. Install the lower (No. 1) timing belt cover.

6. Install the crankshaft pulley by performing the following procedures:

- A. Align the crankshaft pulley with the crankshaft key.
- B. Using the Crankshaft Installer tool 09223-46011, or equivalent, and a hammer, tap the crankshaft pulley into position.

7. Install the serpentine drive belt tensioner and torque the tensioner-to-engine bolts to 12 ft. lbs. (16 Nm).

**NOTE**

To install the serpentine drive belt tensioner, use a bolt 4.18 in. (106mm) in length.

---

8. Check that the crankshaft pulley's timing mark is aligned with the centers of the idler pulley and crankshaft pulley bolts.

9. Install the alternator and torque the alternator-to-engine nuts/bolts to 29 ft. lbs. (39 Nm). Connect the alternator's electrical connectors and clip.

10. Install the timing belt to the left-side camshaft by performing the following procedures:

- A. Rotate the left-side camshaft pulley to align the timing belt installation mark with the camshaft sprocket's timing mark and slide the belt onto the camshaft timing sprocket.
- B. Using the Camshaft Holding tool 09960-10010, or equivalent, slightly turn the left-side camshaft sprocket counterclockwise to place tension on the timing belt between the crankshaft sprocket and the camshaft sprocket.

11. Rotate the right-side camshaft pulley to align the timing belt installation mark with the camshaft sprocket's timing mark and slide the belt onto the camshaft timing sprocket.

12. Using a vertical press, slowly press the pushrod into the housing using 200-2205 lbs. (981-9807 N) until the holes align, then, install a 1.27mm Allen® wrench to secure the pushrod and release the press. Install the dust boot on the tensioner housing.

13. Install the timing belt tensioner and torque the bolts to 19 ft. lbs. (26 Nm).

14. Using a pair of pliers, remove the Allen® wrench from the tensioner housing.

15. Check the valve timing by performing the following procedure:

- A. Temporarily install the crankshaft pulley bolt.
- B. Slowly, rotate the crankshaft pulley 2 revolutions (CLOCKWISE) and realign the TDC marks.

**NOTE**

If the pulley/sprocket timing marks do not realign, remove the timing belt and reinstall it.

---

16. Using the Crankshaft Pulley Holding tool 09213-70010, Bolt tool 90105-08076 and Companion Flange Holding tool 09330-00021, or equivalent, torque the crankshaft pulley bolt to 181 ft. lbs. (245 Nm).

17. Install the cooling fan bracket and torque the 12mm (head size) bolt to 12 ft. lbs. (16 Nm) and the 14mm (head size) bolt to 24 ft. lbs. (32 Nm).

18. Install the air conditioning compressor.

19. Install the middle (No. 2) timing belt cover and torque the bolts to 12 ft. lbs. (16 Nm).

20. Install the upper right-side (No. 3) timing belt cover and torque the bolts to 66 inch lbs. (7.5 Nm).

21. Install the upper left-side (No. 3) timing belt cover by performing the following procedures:

- A. Install the oil cooler tube and bolt.
- B. Feed the Camshaft Position Sensor (CPS) through the left-side (No. 3) timing belt cover hole.
- C. Install the left-side (No. 3) timing belt cover and torque the bolts to 66 inch lbs. (7.5 Nm).
- D. Install the wire grommet to the left-side (No. 3) timing belt cover.
- E. Install the sensor connector to the connector bracket and connect the sensor connector.
- F. Install the sensor wire and the engine wire to the clamps on the left-side (No. 3) timing belt cover.

22. Install the drive belt idler pulley and cover plate; then, torque the pulley bolt to 27 ft. lbs. (37 Nm).

23. To complete the installation, reverse the removal procedures.
24. Refill the cooling system and connect the negative battery cable.

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## REPAIR GUIDE

Lexus GX470 2003-06



# Timing Belt, Cover, Sprockets, & Seal

## Removal & Installation

Print

1. Disconnect the negative battery cable.
2. Raise and safely support the vehicle.
3. Remove the oil pan protector and the engine under cover.
4. Drain the cooling system and store the coolant for refilling purposes.
5. Lower the vehicle and remove the battery clamp cover.
6. From the top of the engine, remove the fuel return hose, the engine cover nuts/bolts and the cover.
7. Remove the air cleaner and the intake air connector assembly.
8. Remove the cooling fan pulley by performing the following procedures:
  - A. Loosen the 4 fan clutch-to-fan pulley nuts.
  - B. Using a box-end wrench on the serpentine drive belt tensioner bolt, rotate the tensioner counterclockwise and remove the drive belt.

### NOTE

The serpentine drive belt tensioner bolt is a left-hand thread.

1. Remove the fan clutch-to-fan pulley nuts, the fan, the clutch assembly and the fan pulley.
1. Remove the radiator by performing the following procedures:
  - A. Disconnect the upper, lower and reservoir hoses from the radiator.
  - B. Disconnect and plug the automatic transmission oil cooler at the radiator. Disconnect the automatic transmission oil cooler hoses from the fan shroud clamp.
  - C. Remove the radiator reservoir tank.
  - D. Remove the fan shroud-to-radiator bolts and the shroud.
  - E. Remove the 2 upper radiator-to-chassis nuts.
  - F. Remove the middle radiator-to-chassis nut/bolts and brackets.
  - G. Carefully, lift the radiator from the vehicle.
2. Remove the serpentine drive belt idler pulley bolt, cover plate and pulley.
3. Remove the right side (No. 3) timing belt cover.
4. Remove the left side (No. 3) timing belt cover by performing the following procedures:
  - A. Disconnect the engine wire from both wire clamps.
  - B. Disconnect the camshaft position sensor wire from the wire clamp on the left-side (No.3) timing belt cover.
  - C. Disconnect the sensor connector from the connector bracket.
  - D. Disconnect the sensor connector.
  - E. Remove the wire grommet from the left-side (No. 3) timing belt cover.
  - F. Remove the oil cooler tube bolts and tube.
5. Remove the middle (No. 2) timing belt cover bolts and cover.
6. Remove the cooling fan bracket nuts/bolts and bracket.

### NOTE

If reusing the timing belt, make sure that there are 3 installation marks on the belt; if there are none, install them.

1. Using the Crankshaft Pulley Holding tool 09213-70010, Bolt tool 90105-08076 and Companion Flange Holding tool 09330-00021, or equivalent, loosen the crankshaft pulley bolt.
2. Position the No. 1 cylinder to approximately 50 degrees After Top Dead Center (ATDC) of the compression stroke by performing the following procedures:
  - A. Rotate the crankshaft pulley (CLOCKWISE) to align its groove with the timing mark -0- on the lower (No. 1) timing belt cover.
  - B. Check that the camshaft sprocket timing marks are aligned with the rear timing belt plate marks; if not, rotate the crankshaft 1 revolution

(360 degrees).

- C. Rotate the crankshaft pulley approximately 50 degrees (CLOCKWISE) and align the crankshaft pulley timing mark between the centers of the crankshaft pulley bolt and the idler pulley bolt.

#### WARNING

If the timing belt is disengaged, having the crankshaft pulley in the wrong angle can cause the valve to come into contact with the piston when removing the camshaft pulley.

1. Remove the crankshaft pulley bolt.

#### NOTE

If reusing the timing belt and the installation marks have disappeared, place new installation marks on the timing belt to match the camshaft timing sprocket marks.

#### NOTE

To avoid meshing the timing sprocket and the timing belt, secure one with a string; then, place matchmarks on the timing belt and the right-side camshaft timing sprocket.

1. Remove the timing belt tensioner bolts and the tensioner.
2. Using the Camshaft Holding tool 09960-10010, or equivalent, slightly turn the left-side camshaft sprocket clockwise to loosen the tension spring. Then, disconnect the timing belt from the camshaft sprockets.
3. Remove the alternator by performing the following procedures:
  - A. Disconnect the electrical connector from the alternator.
  - B. Remove the rubber cap/nut and disconnect the battery wire from the alternator.
  - C. Disconnect the wire clamp from the alternator cord clip.
  - D. Remove the alternator-to-engine nuts/bolts and the alternator.
4. Remove the serpentine drive belt tensioner nuts/bolts and the tensioner.
5. Using the Crankshaft Puller Assembly tool 09950-50012, or equivalent, press the crankshaft pulley from the crankshaft.

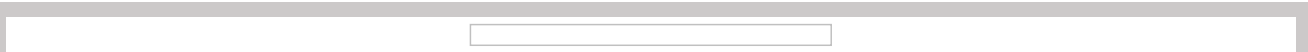
#### WARNING

DO NOT rotate the crankshaft pulley.

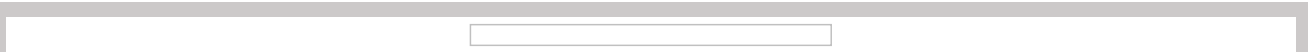
1. Remove the lower (No. 1) timing belt cover bolts and the cover.
2. Remove the timing belt guide, spacer and the timing belt.



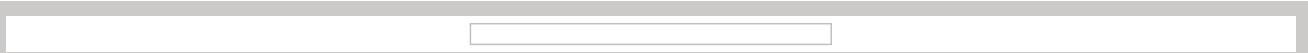
**Fig. Exploded view of vehicle components for timing belt replacement**



**Fig. Exploded view of upper timing belt covers**



**Fig. Exploded view of upper timing sprockets and components**



**Fig. Exploded view of lower timing belt cover, sprockets and components**



**Fig. Alignment of timing belt with the timing sprockets**




**Fig. Aligning of crankshaft pulley timing mark with the center line of the crankshaft pulley bolt and the idler pulley bolt**




**Fig. Securing the timing belt with string and matchmarking the camshaft with the timing belt**



**Fig. Installing the timing belt on the crankshaft sprocket**



**Fig. Securing the timing belt tensioner pushrod**



**Fig. Checking the TDC alignment marks after rotating the crankshaft 2 revolutions**

**To install:**

**NOTE**

With the timing belt removed, this is a perfect opportunity to inspect and/or replace the water pump.

1. Inspect the timing belt tensioner by performing the following procedures:
  - A. Inspect the seal for leakage; if leakage is suspected, replace the tensioner.
  - B. Using both hands to hold the tensioner facing upward, strongly press the pushrod against a solid surface. If the pushrod moves, replace the tensioner.

**WARNING**

Never hold the tensioner with the pushrod facing downward.

1. Measure the pushrod protrusion from the housing end, it should be 0.413-0.453 in. (10.5-11.5mm). If the protrusion is not as specified, replace the tensioner.
1. Temporarily install the timing belt by performing the following procedures:
  - A. Align the timing belt's installation mark with the crankshaft timing sprocket.
  - B. Install the timing belt on the crankshaft timing sprocket, the No. 1 idler pulley and the No. 2 idler pulley.
2. Install the gasket to the timing belt cover spacer and install the cover spacer.
3. Install the timing belt guide with the cup side facing outward.
4. Install the lower (No. 1) timing belt cover.
5. Install the crankshaft pulley by performing the following procedures:
  - A. Align the crankshaft pulley with the crankshaft key.
  - B. Using the Crankshaft Installer tool 09223-46011, or equivalent, and a hammer, tap the crankshaft pulley into position.
6. Install the serpentine drive belt tensioner and torque the tensioner-to-engine bolts to 12 ft. lbs. (16 Nm).

**NOTE**

To install the serpentine drive belt tensioner, use a bolt 4.18 in. (106mm) in length.

1. Check that the crankshaft pulley-s timing mark is aligned with the centers of the idler pulley and crankshaft pulley bolts.
2. Install the alternator and torque the alternator-to-engine nuts/bolts to 29 ft. lbs. (39 Nm). Connect the alternator-s electrical connectors and clip.
3. Install the timing belt to the left-side camshaft by performing the following procedures:
  - A. Rotate the left-side camshaft pulley to align the timing belt installation mark with the camshaft sprocket-s timing mark and slide the belt onto the camshaft timing sprocket.
  - B. Using the Camshaft Holding tool 09960-10010, or equivalent, slightly turn the left-side camshaft sprocket counterclockwise to place tension on the timing belt between the crankshaft sprocket and the camshaft sprocket.
4. Rotate the right-side camshaft pulley to align the timing belt installation mark with the camshaft sprocket-s timing mark and slide the belt onto the camshaft timing sprocket.
5. Using a vertical press, slowly press the pushrod into the housing using 200-2205 lbs. (981-9807 N) until the holes align, then, install a 1.27mm Allen® wrench to secure the pushrod and release the press. Install the dust boot on the tensioner housing.
6. Install the timing belt tensioner and torque the bolts to 19 ft. lbs. (26 Nm).
7. Using a pair of pliers, remove the Allen® wrench from the tensioner housing.
8. Check the valve timing by performing the following procedure:
  - A. Temporarily install the crankshaft pulley bolt.
  - B. Slowly, rotate the crankshaft pulley 2 revolutions (CLOCKWISE) and realign the TDC marks.

#### NOTE

If the pulley/sprocket timing marks do not realign, remove the timing belt and reinstall it.

1. Using the Crankshaft Pulley Holding tool 09213-70010, Bolt tool 90105-08076 and Companion Flange Holding tool 09330-00021, or equivalent, torque the crankshaft pulley bolt to 181 ft. lbs. (245 Nm).
2. Install the cooling fan bracket and torque the 12mm (head size) bolt to 12 ft. lbs. (16 Nm) and the 14mm (head size) bolt to 24 ft. lbs. (32 Nm).
3. Install the air conditioning compressor.
4. Install the middle (No. 2) timing belt cover and torque the bolts to 12 ft. lbs. (16 Nm).
5. Install the upper right-side (No. 3) timing belt cover and torque the bolts to 66 inch lbs. (7.5 Nm).
6. Install the upper left-side (No. 3) timing belt cover by performing the following procedures:
  - A. Install the oil cooler tube and bolt.
  - B. Feed the Camshaft Position Sensor (CPS) through the left-side (No. 3) timing belt cover hole.
  - C. Install the left-side (No. 3) timing belt cover and torque the bolts to 66 inch lbs. (7.5 Nm).
  - D. Install the wire grommet to the left-side (No. 3) timing belt cover.
  - E. Install the sensor connector to the connector bracket and connect the sensor connector.
  - F. Install the sensor wire and the engine wire to the clamps on the left-side (No. 3) timing belt cover.
7. Install the drive belt idler pulley and cover plate; then, torque the pulley bolt to 27 ft. lbs. (37 Nm).
8. To complete the installation, reverse the removal procedures.
9. Refill the cooling system and connect the negative battery cable.

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## REPAIR GUIDE

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## Valve Covers

### Removal & Installation

Print

1. Before servicing the vehicle, refer to the Precautions section.
2. Remove battery clamp cover.
3. Remove throttle body cover.
4. Remove air cleaner and intake air connector assembly.
5. Remove the upper timing belt covers.
6. Remove ignition coils.
7. Remove the 9 bolts, seal washers and the right cylinder head cover.
8. Remove the oil dipstick for the transmission.
9. Disconnect the PCV hose.
10. Disconnect the engine wire clamp from the wire bracket on the cylinder head cover.
11. Remove the 9 bolts, 9 seal washers and the left cylinder head cover.

**To install:**

1. Install the left cylinder head cover.
2. Connect the engine wire clamp to the wire bracket on the cylinder head cover.
3. Connect the PCV hose.
4. Replace the oil dipstick for the transmission.
5. Install the right cylinder head cover.
6. Install the ignition coils.
7. Install the upper timing belt covers.
8. Install the air cleaner and intake air connector assembly.
9. Install the throttle body cover.
10. Install the battery clamp cover.

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## REPAIR GUIDE

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# Valve Lash (Clearance) Adjustment

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### NOTE

Measure valve clearance with the engine cold.

1. Before servicing the vehicle, refer to the Precautions section.
2. Drain the cooling system.
3. Remove or disconnect the following:

- Negative battery cable
- Ignition coils
- Valve covers

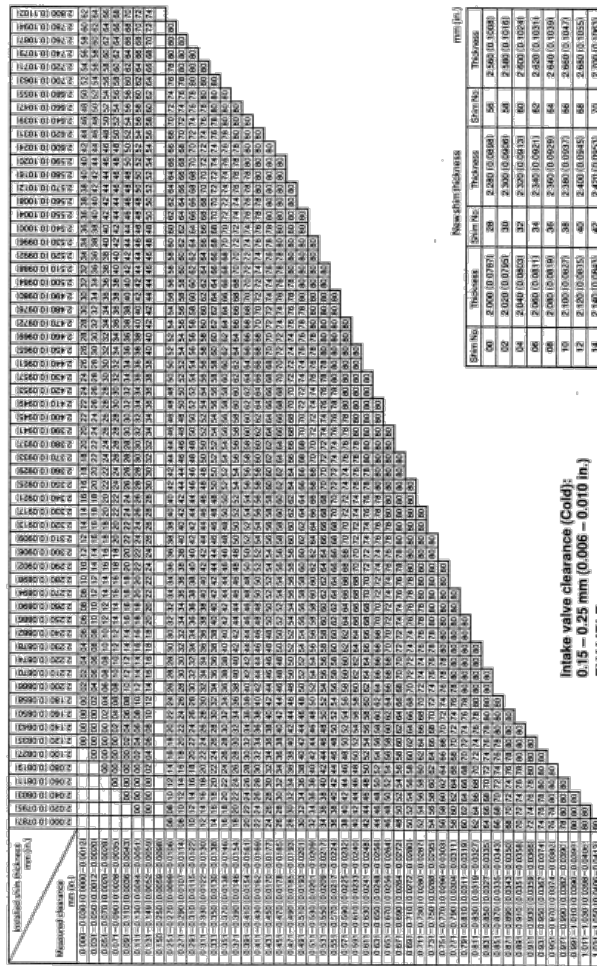
4. Set the engine to the top of the compression stroke with the valves closed for the cylinder to be measured.
5. Check the valve clearance. The valve clearance specifications are as follows:

- Intake: 0.006-0.010 in. (0.15-0.25mm)
- Exhaust: 0.010-0.014 in. (0.25-0.35mm)

6. Record the measurements for each valve.
7. When all valve clearances have been measured, remove the camshafts.
8. Remove the valve shims and measure them. Note this measurement along with the clearance measurement recorded earlier.
9. Using the valve clearance and shim thickness measurements, find replacement shims in the Adjusting Shim Selection charts.
10. Install or connect the following:

- Replacement valve shims
- Camshafts
- Valve covers
- Ignition coils
- Negative battery cable

11. Fill the cooling system.
12. Start the engine and check for leaks.



Intake valve clearance (Cold):  
0.15 - 0.25 mm (0.006 - 0.010 in.)

EXAMPLE:  
The 2.300 mm (0.0906 in.) shim is installed,  
and the measured clearance is 0.440 mm  
(0.0173 in.). Replace the 2.300 mm (0.0906  
in.) shim with a No. 54 shim.

Shim No.	New Shim Thickness	
	Thickness	Shim No.
00	2.000 (0.0787)	29
02	2.002 (0.0791)	31
04	2.004 (0.0802)	33
06	2.006 (0.0811)	34
08	2.008 (0.0819)	35
10	2.010 (0.0827)	36
12	2.012 (0.0835)	37
14	2.014 (0.0843)	38
16	2.016 (0.0851)	39
18	2.018 (0.0859)	40
20	2.020 (0.0867)	41
22	2.022 (0.0874)	42
24	2.024 (0.0882)	43
26	2.026 (0.0890)	44

Fig. Intake valve clearance shim selection chart

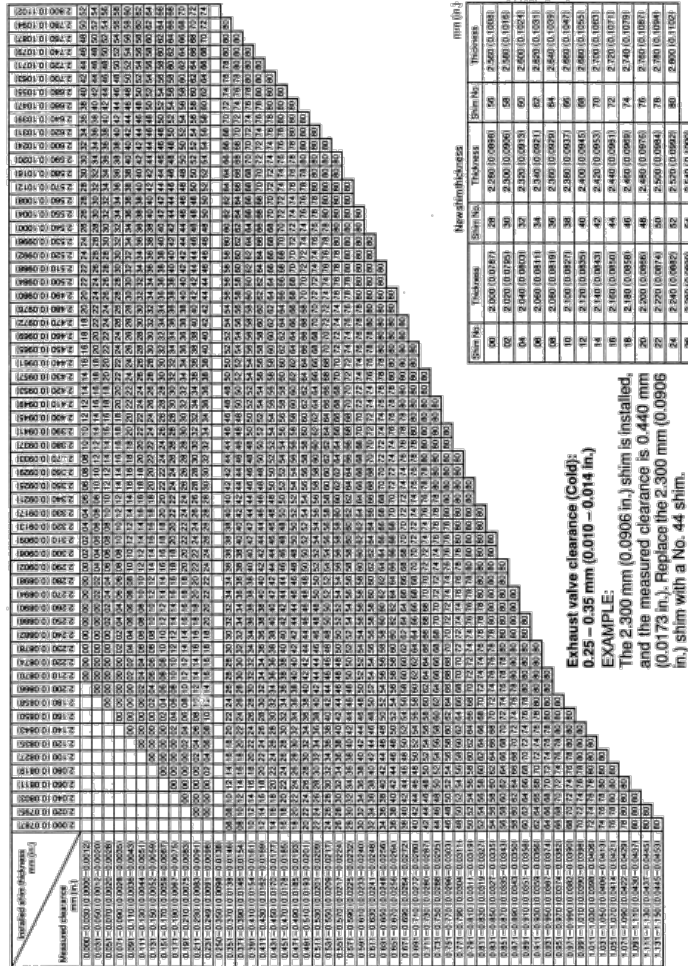


Fig. Exhaust valve clearance shim selection chart

**NOTE**

Measure valve clearance with the engine cold.

1. Before servicing the vehicle, refer to the precautions section.
2. Drain the cooling system.
3. Remove or disconnect the following:

- Negative battery cable
- Ignition coils
- Valve covers

4. Set the engine to the top of the compression stroke with the valves closed for the cylinder to be measured.
5. Check the valve clearance. The valve clearance specifications are as follows:

- Intake: 0.006-0.010 in. (0.15-0.25mm)
- Exhaust: 0.010-0.014 in. (0.25-0.35mm)

6. Record the measurements for each valve.
7. When all valve clearances have been measured, remove the camshafts.
8. Remove the valve shims and measure them. Note this measurement along with the clearance measurement recorded earlier.
9. Using the valve clearance and shim thickness measurements, find replacement shims in the Adjusting Shim Selection charts.

Fig. Intake valve clearance shim selection chart



Fig. Exhaust valve clearance shim selection chart

10. Install or connect the following:

- Replacement valve shims
- Camshafts
- Valve covers
- Ignition coils
- Negative battery cable

11. Fill the cooling system.

12. Start the engine and check for leaks.

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## REPAIR GUIDE

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### Component Locations

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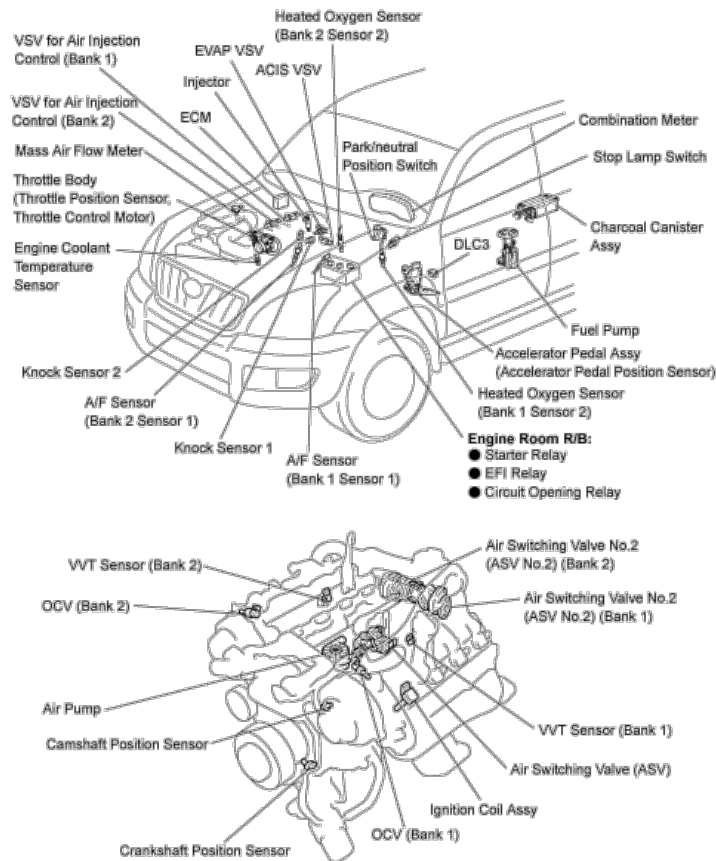


Fig. GX470 component locations

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## REPAIR GUIDE

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### Removal & Installation

The fuel filter is part of the fuel pump module unit and is not a normally replaced item.

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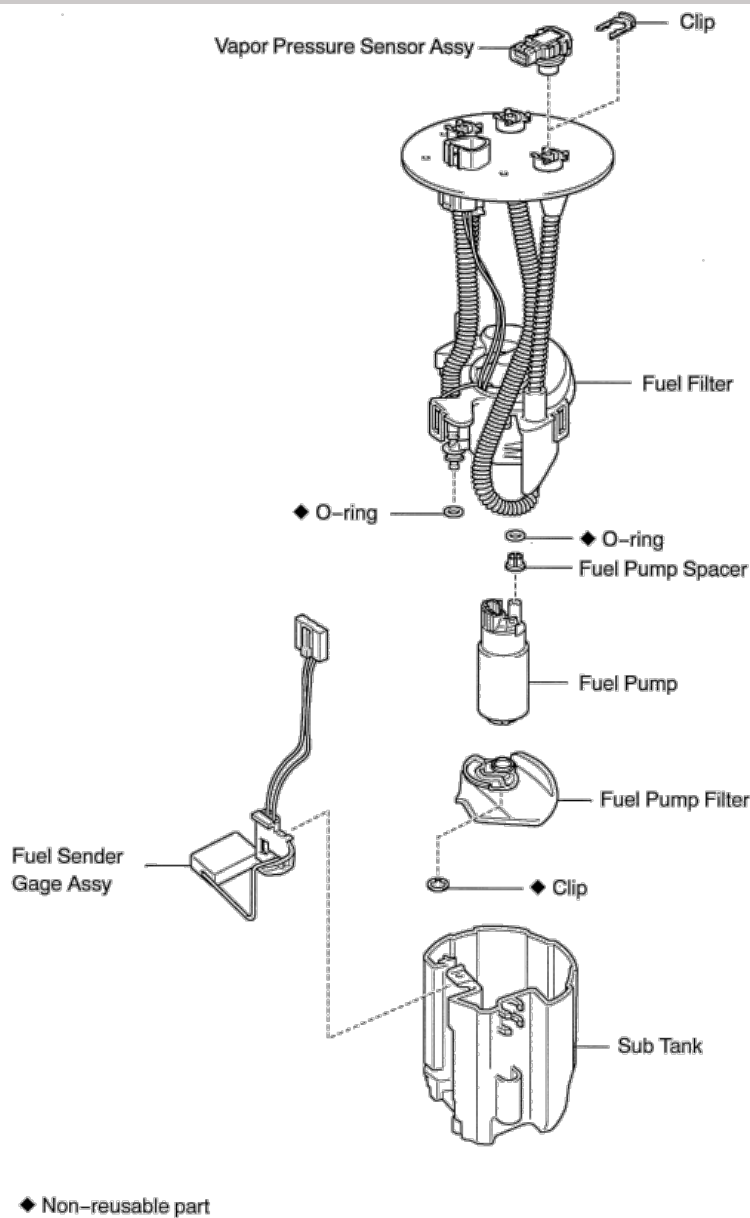


Fig. Fuel pump components-GX470

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## REPAIR GUIDE

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### Air Bag (Supplemental Restraint System)

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#### CAUTION

Some vehicles are equipped with an air bag system. The system must be disarmed before performing service on, or around, system components, the steering column, instrument panel components, wiring and sensors. Failure to follow the safety precautions and the disarming procedure could result in accidental air bag deployment, possible injury and unnecessary system repairs.

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## REPAIR GUIDE

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### Disarming the System

To avoid personal injury when working on vehicles equipped with an air bag, the negative battery cable must be disconnected and at least 90 seconds must elapse before working on the system. Failure to do so may result in deployment of the air bag.

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To avoid personal injury when working on vehicles equipped with an air bag, the negative battery cable must be disconnected and at least 90 seconds

must elapse before working on the system. Failure to do so may result in deployment of the air bag.

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## REPAIR GUIDE

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### Service Precautions

Several precautions must be observed when handling the inflator module to avoid accidental deployment and possible personal injury.

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- Never carry the inflator module by the wires or connector on the underside of the module.
- When carrying a live inflator module, hold securely with both hands and ensure that the bag and trim cover are pointed away.
- Place the inflator module on a bench or other surface with the bag and trim cover facing up.
- With the inflator module on the bench, never place anything on or close to the module which may be thrown in the event of an accidental deployment.

Disconnect and isolate the battery negative cable before beginning any airbag system component diagnosis, testing, removal, or installation procedures. Allow system capacitor to discharge for two minutes before beginning any component service. This will disable the airbag system. Failure to disable the airbag system may result in accidental airbag deployment, personal injury, or death.

Do not place an intact undeployed airbag face down on a solid surface. The airbag will propel into the air if accidentally deployed and may result in personal injury or death.

When carrying or handling an undeployed airbag, the trim side (face) of the airbag should be pointing towards the body to minimize possibility of injury if accidental deployment occurs. Failure to do this may result in personal injury or death.

Replace airbag system components with OEM replacement parts. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection. Failure to do so may result in occupant personal injury or death.

Wear safety glasses, rubber gloves, and long sleeved clothing when cleaning powder residue from vehicle after an airbag deployment. Powder residue emitted from a deployed airbag can cause skin irritation. Flush affected area with cool water if irritation is experienced. If nasal or throat irritation is experienced, exit the vehicle for fresh air until the irritation ceases. If irritation continues, see a physician.

Do not use a replacement airbag that is not in the original packaging. This may result in improper deployment, personal injury, or death.

The factory installed fasteners, screws and bolts used to fasten airbag components have a special coating and are specifically designed for the airbag system. Do not use substitute fasteners. Use only original equipment fasteners listed in the parts catalog when fastener replacement is required.

During, and following, any child restraint anchor service, due to impact event or vehicle repair, carefully inspect all mounting hardware, tether straps, and anchors for proper installation, operation, or damage. If a child restraint anchor is found damaged in any way, the anchor must be replaced. Failure to do this may result in personal injury or death.

Deployed and non-deployed airbags may or may not have live pyrotechnic material within the airbag inflator.

Do not dispose of driver/passenger/curtain airbags or seat belt tensioners unless you are sure of complete deployment. Refer to the Hazardous Substance Control System for proper disposal.

Dispose of deployed airbags and tensioners consistent with state, provincial, local, and federal regulations.

After any airbag component testing or service, do not connect the battery negative cable. Personal injury or death may result if the system test is not performed first.

If the vehicle is equipped with the Occupant Classification System (OCS), do not connect the battery negative cable before performing the OCS Verification Test using the scan tool and the appropriate diagnostic information. Personal injury or death may result if the system test is not performed properly.

Never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one, then perform the Airbag System test before replacing the other.

Both the ORC and the OCM store Occupant Classification System (OCS) calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules and the OCS may malfunction and cause personal injury or death.

If equipped with OCS, the Seat Weight Sensor is a sensitive, calibrated unit and must be handled carefully. Do not drop or handle roughly. If dropped or damaged, replace with another sensor. Failure to do so may result in occupant injury or death.

If equipped with OCS, the front passenger seat must be handled carefully as well. When removing the seat, be careful when setting on floor not to drop. If dropped, the sensor may be inoperative, could result in occupant injury, or possibly death.

If equipped with OCS, when the passenger front seat is on the floor, no one should sit in the front passenger seat. This uneven force may damage the sensing ability of the seat weight sensors. If sat on and damaged, the sensor may be inoperative, could result in occupant injury, or possibly death.

#### CAUTION

Some vehicles are equipped with an air bag system. The system must be disarmed before performing service on, or around, system components, the steering column, instrument panel components, wiring and sensors. Failure to follow the safety precautions and the disarming procedure could result in accidental air bag deployment, possible injury and unnecessary system repairs.

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## REPAIR GUIDE

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### Transmission Removal & Installation

1. Disconnect the negative battery cable.
2. Remove the shift knob.
3. Remove the upper trim panels.
4. Remove the console.
5. Remove the snapping and remove the transfer case lever.
6. Remove the engine under-covers.
7. Remove the front suspension member brackets.
8. Disconnect the oxygen sensor.
9. Remove the exhaust pipe.
10. Remove the driveshafts.
11. Remove the drain plug.
12. Remove the transmission control cable.
13. Support the transmission with a transmission jack.
14. Remove the crossmember.
15. Disconnect all wires and lines as necessary.
16. Disconnect the breather hose.
17. Remove the bellhousing cover.
18. Turn the crankshaft as needed to access the torque converter bolts and remove them.
19. Remove the transmission-to-engine bolts.
20. Remove the transmission/transfer case assembly.
21. Separate the transfer case from the transmission.
22. Remove the rear mount from the transmission.
23. Installation is the reverse of removal. Observe the following torques:

- Rear mount: 48 ft. lbs. (65 Nm)
- Control cable bracket: 19 ft. lbs. (25 Nm)
- Transfer case-to-transmission: 17 ft. lbs. (24 Nm)
- Transmission-to-engine: 17mm bolts, 53 ft. lbs. (71 Nm); 14mm bolts, 27 ft. lbs. (37 Nm)
- Torque converter bolts: 35 ft. lbs. (48 Nm)
- Bellhousing cover: 13 ft. lbs. (18 Nm)
- Crossmember-to-frame: 53 ft. lbs. (72 Nm)
- Transmission-to-crossmember: 13 ft. lbs. (18 Nm)
- Front and rear driveshaft flanges: 65 ft. lbs. (88 Nm)
- Suspension member brackets: 24 ft. lbs. (33 Nm)

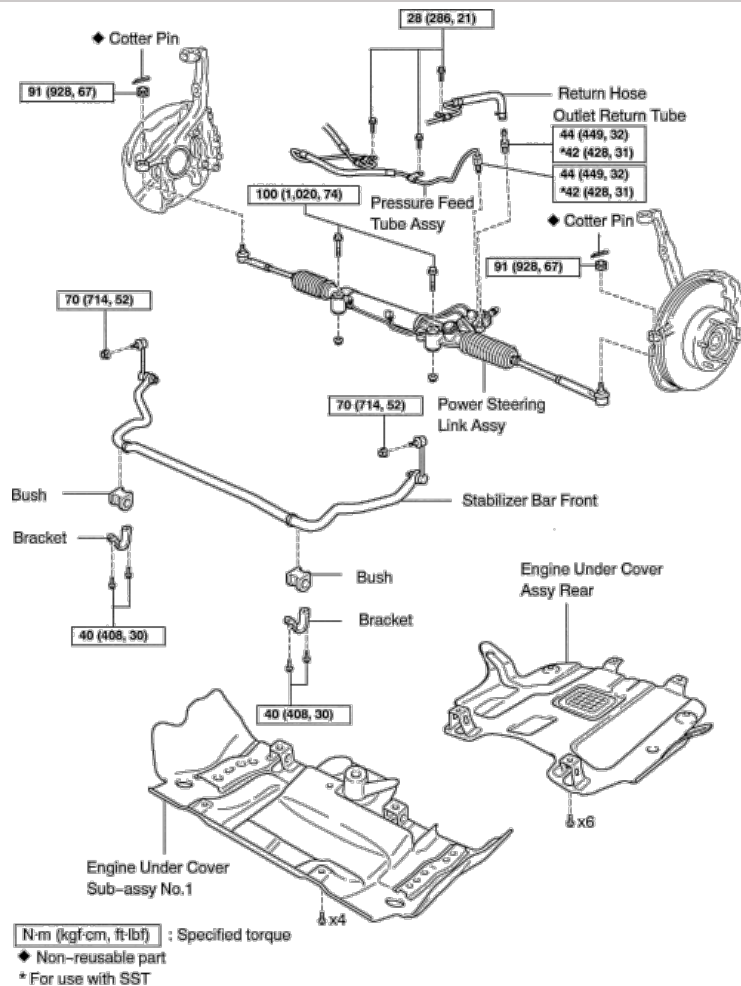
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## REPAIR GUIDE

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## Removal & Installation



**Fig. Steering gear and related parts - GX470**

1. Before servicing the vehicle, refer to the precautions section.
2. Disconnect the battery ground cable.
3. Place the front wheels in the straight ahead position.
4. Remove the horn pad.
5. Remove the steering wheel.
6. Remove the lower steering column cover.
7. Remove the turn signal switch.
8. Remove the spiral cable assembly.
9. Remove the front wheels.
10. Remove the engine under-covers.
11. Remove the stabilizer bar.
12. Remove the tie rod ends from the knuckle.
13. Remove the steering intermediate shaft.
14. Disconnect the pressure and return lines.
15. Remove the 2 bolts and remove the steering gear assembly.

**To install:**

1. Position the gear and install the 2 bolts. Torque to 74 ft. lbs. (100 Nm).

**NOTE**

The nuts have detents. Never turn the nuts, just the bolts.

2. Install the stabilizer bar. Torque the end links to 52 ft. lbs. (70 Nm); the clamp bolts to 30 ft. lbs. (40 Nm).
3. Connect the return line. Use a torque wrench with SST 09023-12700, or equivalent. The torque wrench should have a fulcrum length of 300mm. Torque to 31 ft. lbs. (42 Nm).
4. Connect the pressure line at the sub-frame. Torque to 21 ft. lbs. (28 Nm).
5. Connect the pressure line to the gear. Use a torque wrench with SST 09023-12700, or equivalent. The torque wrench should have a fulcrum length of 300mm. Torque to 31 ft. lbs. (42 Nm).
6. Connect the intermediate shaft. Torque to 26 ft. lbs. (36 Nm).
7. Connect the tie rod ends. Torque to 67 ft. lbs. (91 Nm).
8. Install the under-covers.
9. The remainder of installation is the reverse of removal.

## REPAIR GUIDE

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### Air Spring

#### Removal & Installation

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GX470

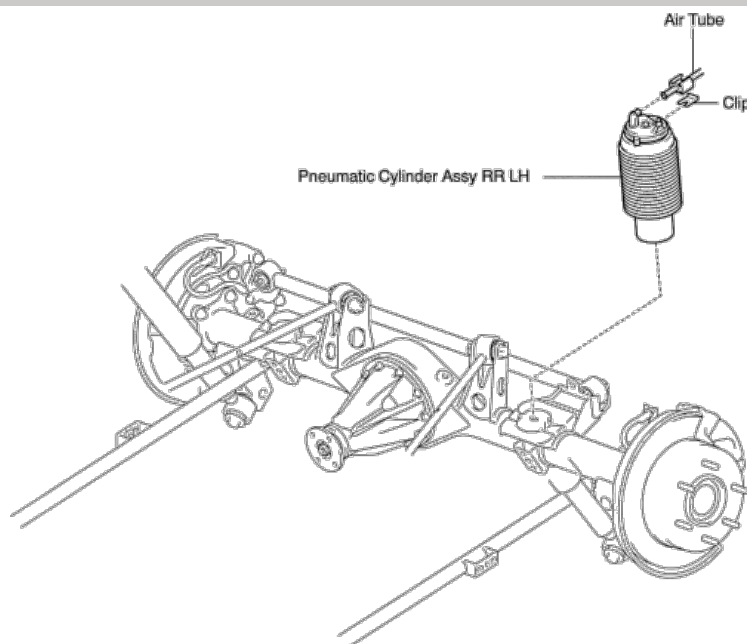


Fig. Rear air spring-GX470

1. Before servicing the vehicle, refer to the precautions section.
2. Remove the wheel.
3. Support the frame with jackstands and allow the axle to hang.
4. Disconnect the height control tube.
5. Disconnect the clip on the underside of the air spring. If the clip is difficult to remove, thread a wire through the hole and pull it. Discharge the air from the air spring to retract it.
6. Turn the unit 90 degrees and remove it from the axle.

#### NOTE

Don't manually extend the unit.

7. Installation is the reverse of removal. Use new O-rings on the height control tube.

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## REPAIR GUIDE

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### Bleeding the Brake System

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#### NOTE

If any work is done on the brake system or if air is suspected in the brake lines, bleed the air from the system.

#### NOTE

Do not let brake fluid remain on a painted surface. Wash it off immediately.

1. Before servicing the vehicle, refer to the Precautions section.

2. Check the fluid level in the reservoir after bleeding each wheel. Add DOT3 fluid, if necessary.
3. If the master cylinder was disassembled or if the reservoir becomes empty, bleed the air from the master cylinder as follows:
  - A. Disconnect the brake lines from the master cylinder.
  - B. Slowly depress the brake pedal and hold it.
  - C. Block off the outlet plug with your finger, and release the brake pedal.
  - D. Repeat 3 or 4 times.
4. Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.
5. At the point when fluid stops coming out, tighten the bleeder plug to 11 Nm (8 ft. lbs.), then release the brake pedal.
6. Repeat until all the air in the fluid has been bled out.
7. Repeat the procedure to bleed the air out of brake line for each wheel.
8. Check the fluid level and add DOT3 fluid if necessary.

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## REPAIR GUIDE

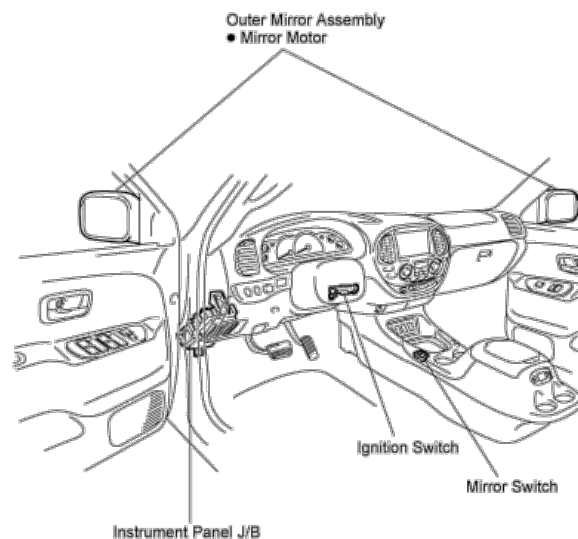
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### Outside Mirrors

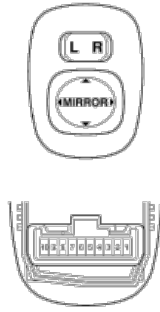
#### Power Mirrors

Diagnosis & Testing

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**Fig. Power mirror component locations**



**1. w/o Retract Mirror and Driving Position Memory:**

(a) Left Side:

**INSPECT MIRROR SWITCH CONTINUITY**

Switch position	Tester connection	Specified condition
OFF	-	No continuity
UP	4 - 8, 6 - 7	Continuity
DOWN	4 - 7, 6 - 8	Continuity
LEFT	5 - 8, 6 - 7	Continuity
RIGHT	5 - 7, 6 - 8	Continuity

(b) Right Side:

**INSPECT MIRROR SWITCH CONTINUITY**

Switch position	Tester connection	Specified condition
OFF	-	No continuity
UP	3 - 8, 6 - 7	Continuity
DOWN	3 - 7, 6 - 8	Continuity
LEFT	2 - 8, 6 - 7	Continuity
RIGHT	2 - 7, 6 - 8	Continuity

If continuity is not as specified, replace the switch.

**2. w Retract Mirror only:**

(a) Left Side:

**INSPECT MIRROR SWITCH CONTINUITY**

Switch position	Tester connection	Specified condition
OFF	-	No continuity
UP	4 - 8, 6 - 7	Continuity
DOWN	4 - 7, 6 - 8	Continuity
LEFT	5 - 8, 6 - 7	Continuity
RIGHT	5 - 7, 6 - 8	Continuity

(b) Right side:

**INSPECT MIRROR SWITCH CONTINUITY**

Switch position	Tester connection	Specified condition
OFF	-	No continuity
UP	3 - 8, 6 - 7	Continuity
DOWN	3 - 7, 6 - 8	Continuity
LEFT	5 - 8, 6 - 7	Continuity
RIGHT	5 - 7, 6 - 8	Continuity

If continuity is not as specified, replace the switch.

(c) INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
DRIVE	7 - 9, 8 - 10	Continuity
RETRACT	7 - 10, 8 - 9	Continuity

If continuity is not as specified, replace the switch.

Fig. Power mirror testing-Steps 1 and 2



**3. w/o Retract Mirror and Driving Position Memory:**

(a) Left Side:

**INSPECT MIRROR SWITCH CONTINUITY**

Switch position	Tester connection	Specified condition
OFF	1 - 2	10 kΩ or higher
UP	2 - 3	100 Ω
DOWN	2 - 3	470 Ω
LEFT	2 - 3	600 Ω
RIGHT	2 - 3	250 Ω

(b) Right Side:

**INSPECT MIRROR SWITCH CONTINUITY**

Switch position	Tester connection	Specified condition
OFF	1 - 2	10 kΩ or higher
UP	2 - 3	100 Ω
DOWN	2 - 3	470 Ω
LEFT	2 - 3	600 Ω
RIGHT	2 - 3	250 Ω

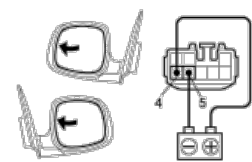
If continuity is not as specified, replace the switch.

(c) INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
DRIVE	4 - 7, 6 - 8	Continuity
RETRACT	4 - 8, 6 - 7	Continuity

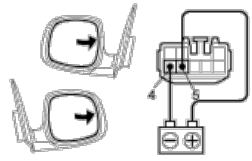
Fig. Power mirror testing-Step 3



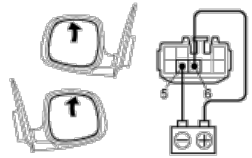


**4. w/ Retract Mirror only:  
INSPECT MIRROR MOTOR OPERATION**

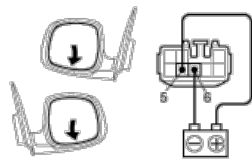
(a) Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 5. Check that the mirror turns leftward.



(b) Reverse the polarity and check that the mirror turns rightward.



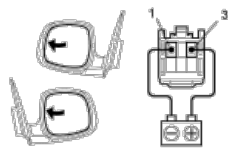
(c) Connect the positive (+) lead from the battery to terminal 6 and the negative (-) lead to terminal 5. Check that the mirror turns upward.



(d) Reverse the polarity and check that the mirror turns downward.

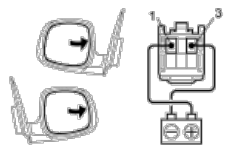
If operation is not as specified, replace the mirror assembly.

**Fig. Power mirror testing-Step 4**

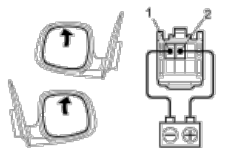


**5. w/o Retract Mirror and Driving Position Memory:  
INSPECT MIRROR MOTOR OPERATION**

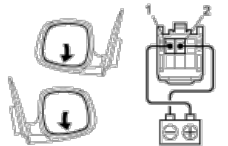
(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 1. Check that the mirror turns leftward.



(b) Reverse the polarity and check that the mirror turns rightward.



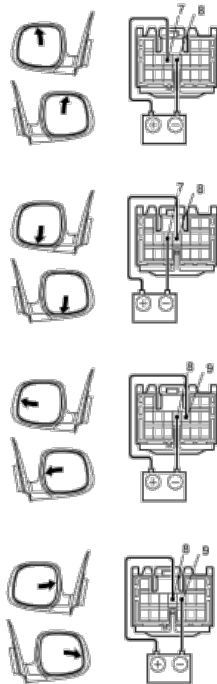
(c) Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1. Check that the mirror turns upward.



(d) Reverse the polarity and check that the mirror turns downward.

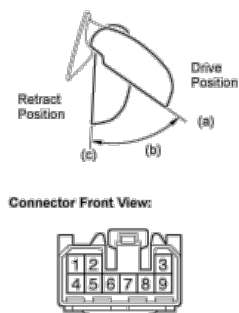
If operation is not as specified, replace the mirror assembly.

**Fig. Power mirror testing-Step 5**



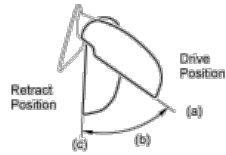
- 6. w/ Retract Mirror and Driving Position Memory:  
INSPECT MIRROR MOTOR OPERATION**
- (a) Connect the positive (+) lead from the battery to terminal 7 and the negative (-) lead to terminal 8. Check that the mirror turns upward.
- (b) Reverse the polarity and check that the mirror turns downward.
- (c) Connect the positive (+) lead from the battery to terminal 8 and the negative (-) lead to terminal 9. Check that the mirror turns leftward.
- (d) Reverse the polarity and check that the mirror turns rightward.

Fig. Power mirror testing-Step 6



- 7. w/o Driving Position Memory:  
INSPECT ELECTRICAL RETRACT MOTOR OPERATION**
- (a) Driving position:
- (1) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2. Check that the mirror moves to the retract position.
  - (2) Reverse the polarity and check that the mirror does not operate.
- If operation is not as specified, replace the mirror assembly.
- (b) Between driving position and retract position:
- (1) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2. Check that the mirror moves to the retract position.
  - (2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).
- If operation is not as specified, replace the mirror assembly.
- (c) Retract position:
- (1) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2. Check that the mirror does not operate.
  - (2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).
- If operation is not as specified, replace the mirror assembly.

Fig. Power mirror testing-Step 7



Connector Front View:



**8. w/ Driving Position Memory:  
INSPECT ELECTRICAL RETRACT MOTOR OPERATION**

- (a) Driving position:
- (1) Connect the positive (+) lead from the battery to terminal 13 and the negative (-) lead to terminal 14. Check that the mirror moves to the retract position.
  - (2) Reverse the polarity and check that the mirror does not operate.
- If operation is not as specified, replace the mirror assembly.

- (b) Between driving position and retract position:
- (1) Connect the positive (+) lead from the battery to terminal 13 and the negative (-) lead to terminal 14. Check that the mirror moves to the retract position.
  - (2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).
- If operation is not as specified, replace the mirror assembly.

- (c) Retract position:
- (1) Connect the positive (+) lead from the battery to terminal 13 and the negative (-) lead to terminal 14. Check that the mirror does not operate.
  - (2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).
- If operation is not as specified, replace the mirror assembly.

**Fig. Power mirror testing-Step 8**

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## REPAIR GUIDE

Lexus GX470 2003-06

### 4.7L V8 - Auto

4.7L V8 - Auto

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#### Trouble Code: P0100

*Mass Airflow Sensor Circuit Malfunction*

Possible Causes:

- MAF sensor signal circuit is open, shorted to ground or power
- MAF sensor ground circuit is open between sensor and ground
- MAF sensor power circuit is open (check the power to the relay)
- MAF sensor has failed, or the PCM has failed

#### Trouble Code: P0101

*Mass Airflow Sensor Signal Range/Performance*

Possible Causes:

- MAF sensor signal circuit is open, shorted to ground or power
- MAF sensor is contaminated, damaged or it has failed
- PCM has failed

#### Trouble Code: P0115

*Engine Coolant Temperature Sensor Circuit Malfunction*

Possible Causes:

- IAT sensor signal circuit is open, shorted to ground or VREF
- ECT sensor ground circuit is open between sensor and ground
- ECT sensor is contaminated, damaged or has failed
- PCM has failed

#### Trouble Code: P0116

*Engine Coolant Temperature Sensor Range/Performance*

Possible Causes:

- Check for problems in the cooling system (i.e., coolant, the fan)
- ECT sensor signal circuit or ground circuit has high resistance

- ECT sensor is contaminated, damaged or has failed
- PCM has failed

## Trouble Code: P0125

*Insufficient Coolant Temperature For Closed Loop*

Possible Causes:

- Check the operation of the thermostat (it may be stuck open)
- ECT sensor signal circuit has high resistance
- ECT sensor has failed
- Inspect for low coolant level for an incorrect coolant mixture

## Trouble Code: P0128

*Thermostat System Malfunction*

Possible Causes:

- Check the operation of the thermostat (it may be stuck open)
- ECT sensor is out-of-calibration or skewed
- Inspect for low coolant level or for an incorrect coolant mixture

## Trouble Code: P0325

*Knock Sensor 1 Circuit Malfunction*

Possible Causes:

- Knock sensor signal circuit is open or shorted to ground
- Knock sensor signal circuit is shorted to VREF or system power
- Knock sensor is damaged, not tightened properly or has failed
- PCM has failed

## Trouble Code: P0335

*Crankshaft Position Sensor 'A' Circuit Malfunction*

Possible Causes:

- CKP Sensor 'A' signal circuit is open, shorted to ground or shorted to system power
- CKP Sensor 'A' signal ground circuit is open
- CKP Sensor 'A' is damaged or has failed

## Trouble Code: P0340

*Camshaft Position Sensor Circuit Malfunction*

Possible Causes:

- CMP sensor signal circuit is open, shorted to ground or power
- CMP sensor signal ground circuit is open
- CMP sensor has failed, or the PCM has failed

## Trouble Code: P0341

*Camshaft Position Sensor 'A' Signal Range/Performance*

Possible Causes:

- CMP sensor signal circuit is open, shorted to ground or power
- CMP sensor pulley is damaged, or timing belt has jumped teeth
- CMP sensor is damaged or has failed
- PCM has failed

## Trouble Code: P0420

*Catalyst Efficiency Below Normal (Bank 1)*

Possible Causes:

- Catalytic converter is damaged, contaminated or has failed
- Front A/FS or rear HO2S is contaminated with fuel or moisture
- Front A/FS or the rear HO2S is loose in its mounting hole

- Front A/FS is older (aged) than the rear HO2S (HO2S is lazy)
- Gas leaks at the exhaust manifold or in the exhaust pipes

## Trouble Code: P0441

*EVAP System Incorrect Purge Flow Detected*

Possible Causes:

- Charcoal canister is clogged, loaded with fuel or with moisture
- Fuel tank over-fill check valve cracked or damaged
- Fuel tank seal leaking, fuel tank cracked or damaged/leaking
- Fuel vapor hoses/tubes blocked or restricted, or fuel vapor control valve tube or fuel vapor vent valve assembly blocked
- Vacuum hose or tubing cracked, damaged or disconnected
- Vapor pressure sensor is damaged or has failed
- VSV circuit for the canister purge, VSV for the CCV or the VSV for the pressure switching valve is open or shorted to ground
- VSV for the vapor pressure sensor circuit is open or shorted to ground, or the vapor pressure sensor is damaged or has failed

## Trouble Code: P0442

*EVAP System Small Leak (0.040") Detected*

Possible Causes:

- Canister Purge valve is damaged, leaking or has failed
- Charcoal canister is loaded with fuel or moisture
- Fuel filler cap loose, cross-threaded, incorrect part or damaged
- Fuel tank is cracked (leaking), or a leak exists in the 'O' ring
- Fuel tank pressure sensor is damaged or has failed
- Fuel vapor line(s), fuel pipes or hoses damaged or leaking
- PCM has failed

## Trouble Code: P0450

*EVAP Vapor Pressure Sensor Circuit Malfunction*

Possible Causes:

- Vapor pressure sensor signal circuit open or shorted to ground
- Vapor pressure sensor ground circuit is open
- Vapor pressure sensor power circuit is open
- Vapor pressure sensor is damaged or has failed
- PCM has failed

## Trouble Code: P0451

*EVAP Vapor Pressure Sensor Range/Performance*

Possible Causes:

- Vapor pressure sensor vacuum hoses loose or damaged
- Vapor pressure sensor is damaged or has failed
- PCM has failed

## Trouble Code: P0500

*Vehicle Speed Sensor Circuit Malfunction*

Possible Causes:

- VSS signal circuit is open between the meter and the PCM
- VSS signal circuit shorted to ground between meter and PCM
- VSS No. 1 is damaged or has failed
- Combination Meter is damaged or has failed
- PCM has failed

## Trouble Code: P0505

*Idle Control System Malfunction*

Possible Causes:

- Air Induction system leaks (check for intake manifold leaks)
- Air leaks in the PCV system (at the valve or its related hoses)
- Throttle body assembly is damaged or has failed
- PCM has failed

## Trouble Code: P0560

*System Voltage (Backup Power Circuit) Malfunction*

Possible Causes:

- Battery backup circuit is open between battery and the PCM
- PCM has failed

## Trouble Code: P0753

*A/T Shift Solenoid 'A' Circuit Malfunction*

Possible Causes:

- SSA control circuit is open, shorted to ground or to power (B+)
- SSA is damaged or has failed (an electrical fault)
- PCM has failed

## Trouble Code: P0773

*A/T Shift Solenoid 'E' (SL) Circuit Malfunction*

Possible Causes:

- SL control circuit is open or shorted to ground
- SL control circuit is shorted to system power (B+)
- SL is damaged or has failed (an electrical fault)
- PCM has failed

## Trouble Code: P1300

*Igniter Circuit Malfunction*

Possible Causes:

- IGT or IGF signal circuit is open between the igniter and PCM
- IGT or IGF signal circuit is shorted to ground
- Igniter is damaged or has failed
- PCM has failed

## Trouble Code: P1305

*Igniter No. 2 Circuit Malfunction*

Possible Causes:

- IGT or IGF signal circuit is open or shorted to ground
- Igniter is damaged or has failed
- PCM has failed

## Trouble Code: P1310

*Igniter No. 3 Circuit Malfunction*

Possible Causes:

- IGT or IGF signal circuit is open or shorted to ground
- Igniter is damaged or has failed

## Trouble Code: P1315

*Igniter No. 4 Circuit Malfunction*

Possible Causes:

- IGT or IGF signal circuit is open or shorted to ground
- Igniter is damaged or has failed
- PCM has failed

## Trouble Code: P1320

*Igniter No. 5 Circuit Malfunction*

Possible Causes:

- IGT or IGF signal circuit is open between the igniter and PCM
- IGT or IGF signal circuit is shorted to ground
- Igniter is damaged or has failed
- PCM has failed

## Trouble Code: P1325

*Igniter No. 6 Circuit Malfunction*

Possible Causes:

- IGT or IGF signal circuit is open between the igniter and PCM
- IGT or IGF signal circuit is shorted to ground
- Igniter is damaged or has failed
- PCM has failed

## Trouble Code: P1335

*Crankshaft Position Sensor Circuit Malfunction*

Possible Causes:

- CKP sensor (+) circuit is open or shorted to ground
- CKP sensor (-) circuit is open or shorted to ground
- CKP sensor (+), (-) circuit is shorted to VREF or system power
- CKP sensor is damaged or has failed
- PCM has failed

## Trouble Code: P1520

*Stop Light Switch Circuit Malfunction*

Possible Causes:

- Stop light switch is shorted to ground
- Stop light switch is damaged or has failed
- PCM has failed

## Trouble Code: P1600

*PCM Battery Backup Circuit Malfunction*

Possible Causes:

- Battery backup circuit is open (check EFI fuse and fuse link)
- Battery terminals are corroded or loose
- PCM has failed

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## REPAIR GUIDE

Lexus GX470 2003-06



### Engine & Model Year Identification

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#### ENGINE AND VEHICLE IDENTIFICATION

Code -	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	End. Mfg.
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota

Code -	Year
3	2003

<sup>1</sup> SFI: Sequential Fuel Injection

<sup>2</sup> - Stamped on the left side of the engine block

<sup>3</sup> - 10th digit of the Vehicle Identification Number (VIN)

#### ENGINE AND VEHICLE IDENTIFICATION

Code -	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	End. Mfg.
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota

Code -	Year
4	2004

<sup>1</sup> SFI: Sequential Fuel Injection

<sup>2</sup> - Stamped on the left side of the engine block

<sup>3</sup> - 10th digit of the Vehicle Identification Number (VIN)

## ENGINE AND VEHICLE IDENTIFICATION

Code -	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	End. Mfg.
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota

Code -	Year
5	2005

<sup>1</sup> SFI: Sequential Fuel Injection

<sup>2</sup> - Stamped on the left side of the engine block

<sup>3</sup> - 10th digit of the Vehicle Identification Number (VIN)

ENGINE AND VEHICLE IDENTIFICATION									
Engine							Model Year		
Code ③	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	Eng. Mfg.	Code ②	Year	
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota	1	2001	
SFI: Sequential Fuel Injection							2	2002	
DOHC: Double Overhead Camshaft							3	2003	
③ Stamped on the left side of the engine block							4	2004	
② 10th digit of the Vehicle Identification Number (VIN)							5	2005	

Fig.

## ENGINE AND VEHICLE IDENTIFICATION

Code -	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	End. Mfg.
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota

Code -	Year
3	2003

<sup>1</sup> SFI: Sequential Fuel Injection

<sup>2</sup> - Stamped on the left side of the engine block

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## ENGINE AND VEHICLE IDENTIFICATION

Code -	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	End. Mfg.
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota

Code -	Year
4	2004

<sup>1</sup> SFI: Sequential Fuel Injection

<sup>2</sup> - Stamped on the left side of the engine block

<sup>3</sup> - 10th digit of the Vehicle Identification Number (VIN)

## ENGINE AND VEHICLE IDENTIFICATION

Code -	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	End. Mfg.
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota

Code -	Year
5	2005

<sup>1</sup> SFI: Sequential Fuel Injection

<sup>2</sup> - Stamped on the left side of the engine block

<sup>3</sup> - 10th digit of the Vehicle Identification Number (VIN)

## ENGINE AND VEHICLE IDENTIFICATION

Code -	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	End. Mfg.
2UZ-FE	4.7 (4664)	285	8	SFI	DOHC	Toyota

Code -	Year
6	2006

<sup>1</sup> SFI: Sequential Fuel Injection

<sup>2</sup> - Stamped on the left side of the engine block

<sup>3</sup> - 10th digit of the Vehicle Identification Number (VIN)

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## Blower Motor

### Removal & Installation

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1. Before servicing the vehicle, refer to the Precautions section.
2. Remove the rear cooling unit from the vehicle.
3. Remove the 2 screws and the A/C amplifier.
4. Disconnect the connector.
5. Remove the 2 screws and the power transistor.
6. Remove the wire harness.
7. Remove the 11 screws, 3 holding springs and separate the cooling unit cases.
8. Disconnect the connector.
9. Remove the blower case.
10. Remove the 3 screws and the blower motor.

#### To install:

1. Installation is the reverse of the removal procedure.

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## Heater Core

### Removal & Installation

[Print](#)

1. Disconnect the negative battery cable.
2. Drain the cooling system into a clean container for reuse.
3. Disconnect the heater hoses from the rear heater core.
4. Remove the front seats.
5. Remove the rear heater control assembly.
6. Remove the rear console box.
7. Remove the front console box cover.
8. Remove the lower center cluster finish panel.
9. Remove the front door scuff plates.
10. Remove the cowl side trim.
11. Remove the rear door scuff plates.
12. Remove the center pillar garnishes.
13. Slide the carpet rearward.
14. Remove the cooler bracket bolts and the bracket.
15. Remove the rear heater duct bolt/screw and the duct.
16. Disconnect the rear heater housing electrical connector.
17. Remove the 3 rear heater housing-to-chassis bolts and the heater housing.
18. Remove the heater core-to-heater housing 3 screws and 2 clamps.
19. Remove the heater core from the heater housing.

#### To install:

1. Install the heater core to the heater housing.
2. Install the heater core-to-heater housing 3 screws and 2 clamps.
3. Install the heater housing and the 3 rear heater housing-to-chassis bolts.
4. Connect the rear heater housing electrical connector.
5. Install the rear heater duct and the duct bolt/screw.
6. Install the cooler bracket and the bracket bolts.
7. Slide the carpet rearward.
8. Install the center pillar garnishes.
9. Install the rear door scuff plates.
10. Install the cowl side trim.
11. Install the front door scuff plates.
12. Install the lower center cluster finish panel.
13. Install the front console box cover.
14. Install the rear console box.
15. Install the rear heater control assembly.

16. Install the front seats.
17. Connect the heater hoses to the rear heater core.
18. Refill the cooling system.
19. Connect the negative battery cable.

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## REPAIR GUIDE

Lexus GX470 2003-06

### Overall Electrical Wiring Diagram (2003) 1

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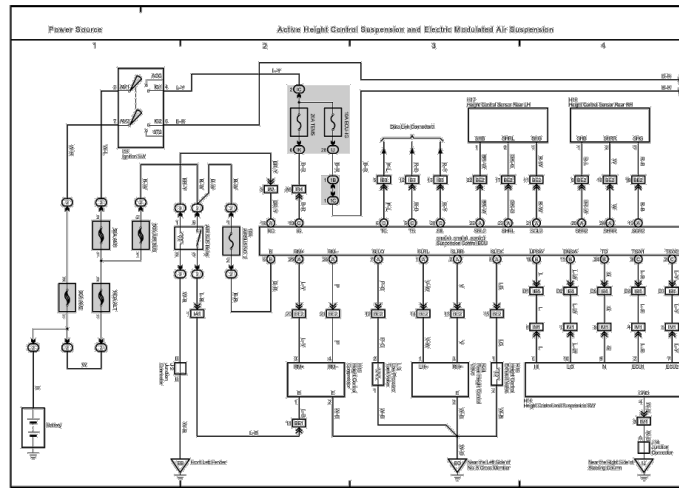


Fig. Active Height Control Suspension and Electric Modulated Air Suspension (2003)

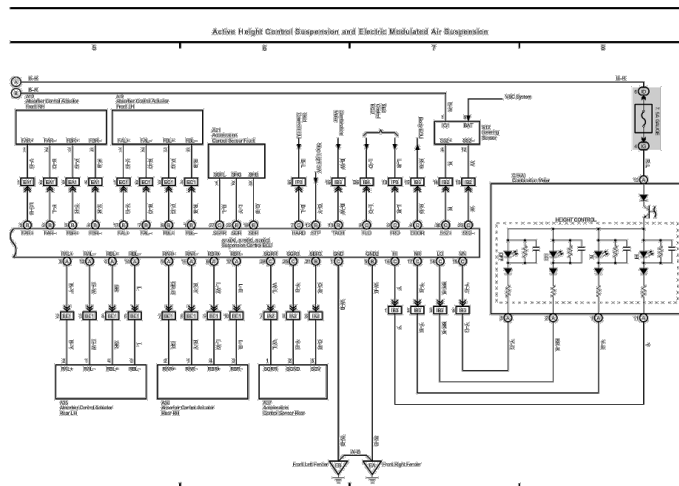


Fig. Active Height Control Suspension and Electric Modulated Air Suspension (2003)

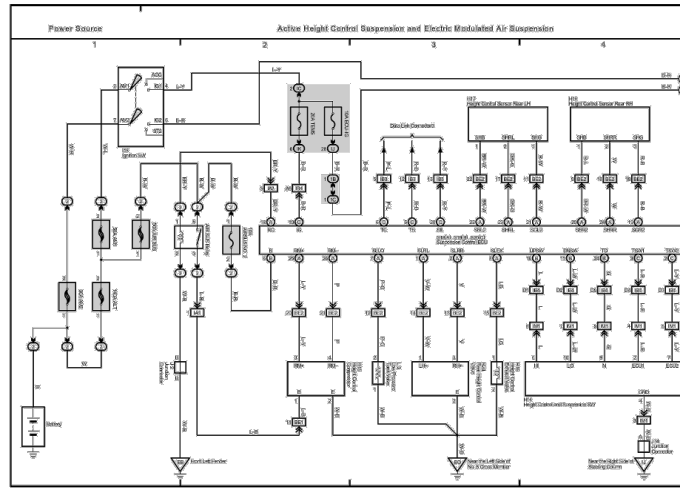


Fig. Active Height Control Suspension and Electric Modulated Air Suspension (2003)

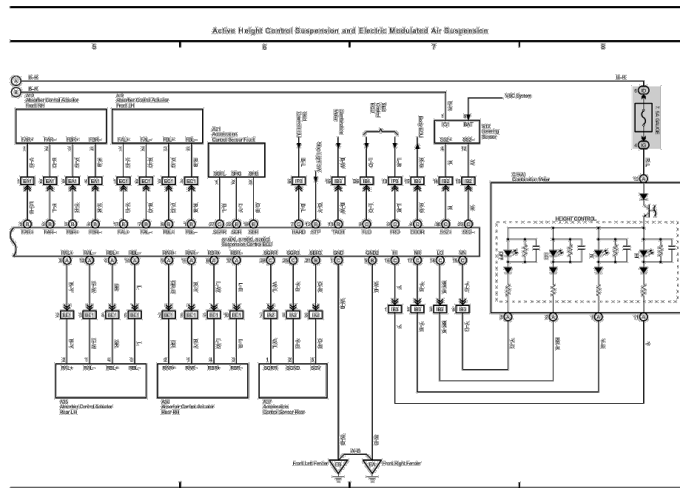


Fig. Active Height Control Suspension and Electric Modulated Air Suspension (2003)

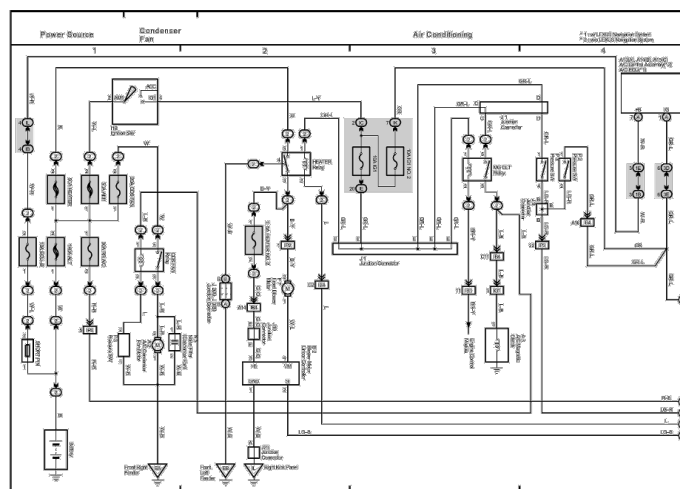


Fig. Air Conditioning (2003)

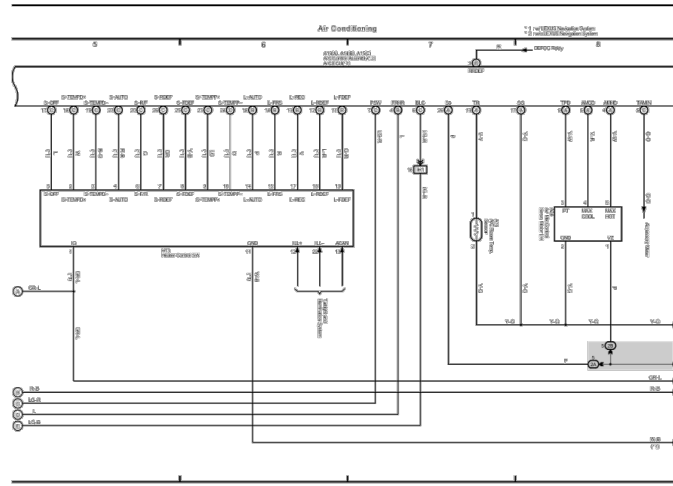


Fig. Air Conditioning (2003)

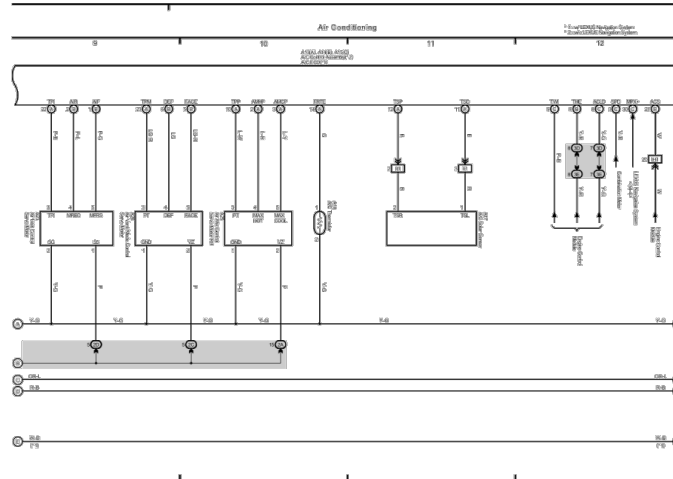


Fig. Air Conditioning (2003)

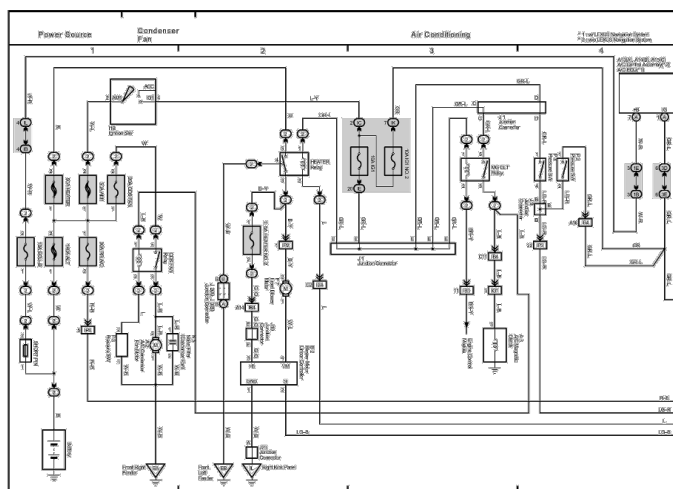


Fig. Air Conditioning (2003)

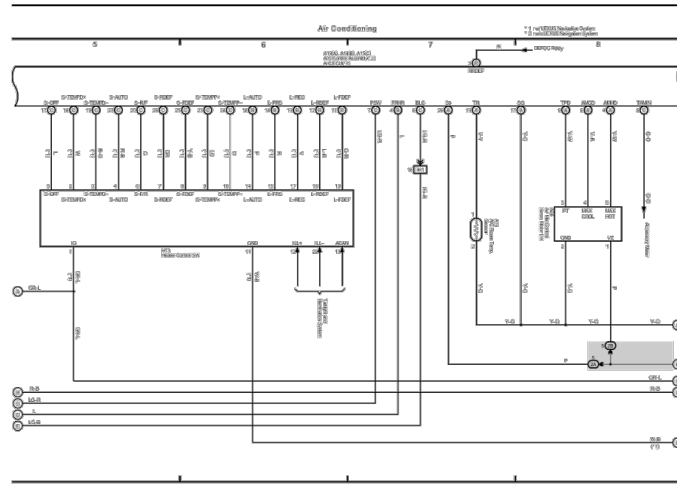


Fig. Air Conditioning (2003)

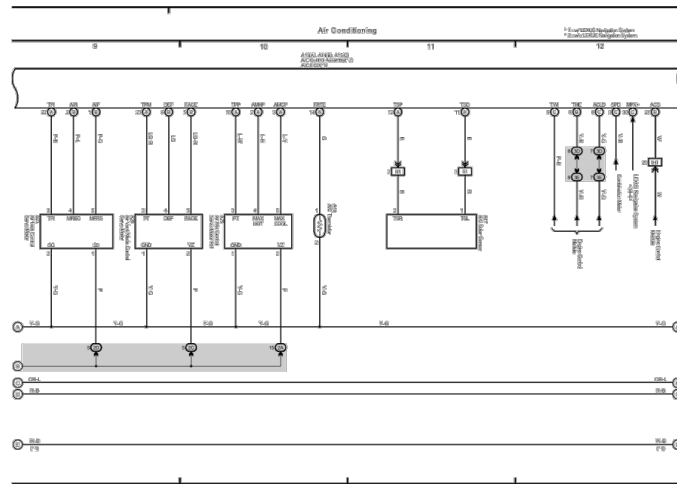


Fig. Air Conditioning (2003)

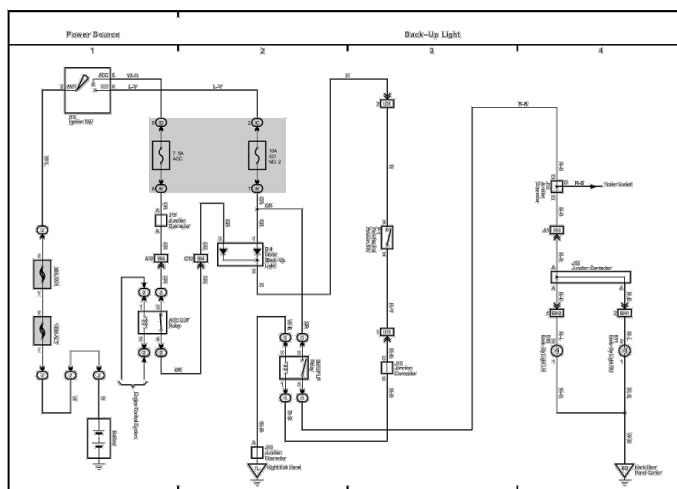


Fig. Back-Up Light (2003)

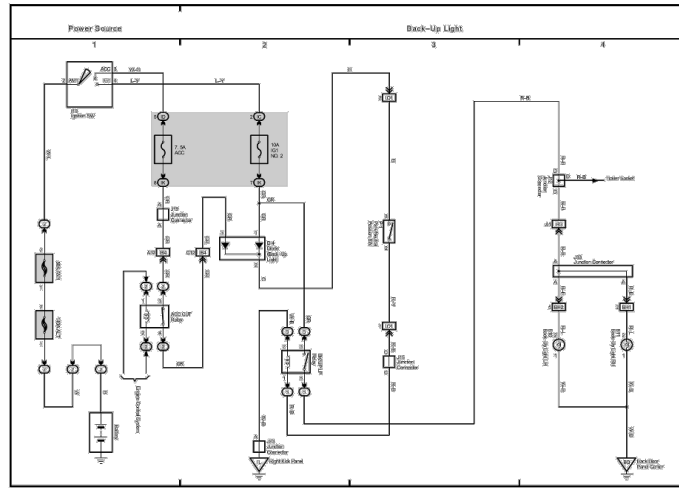


Fig. Back-Up Light (2003)

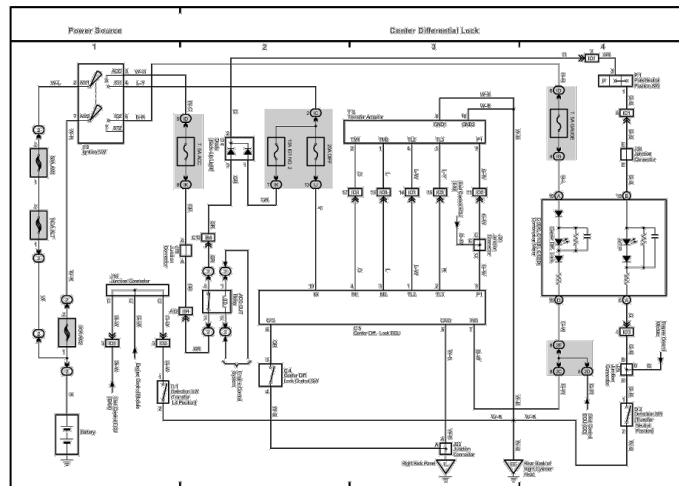


Fig. Center Differential Lock (2003)

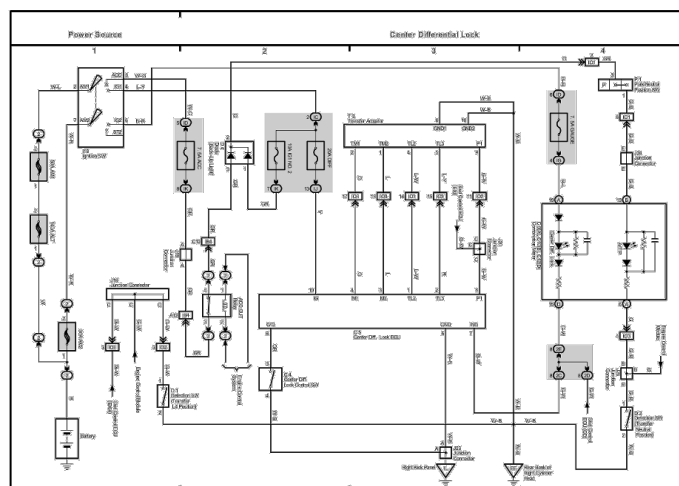


Fig. Center Differential Lock (2003)

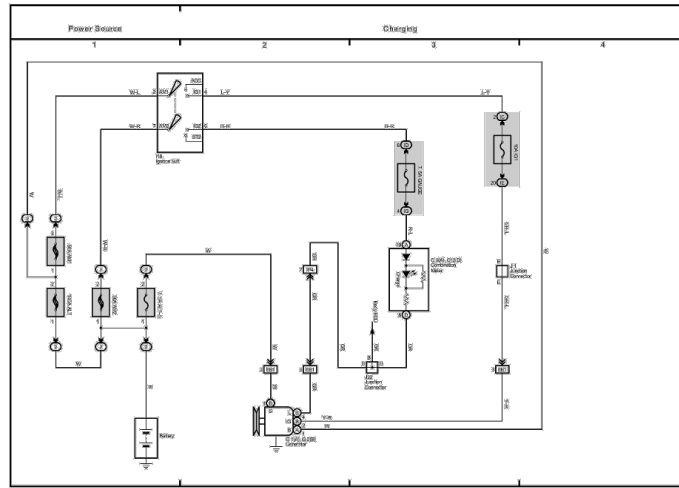


Fig. Charging (2003)

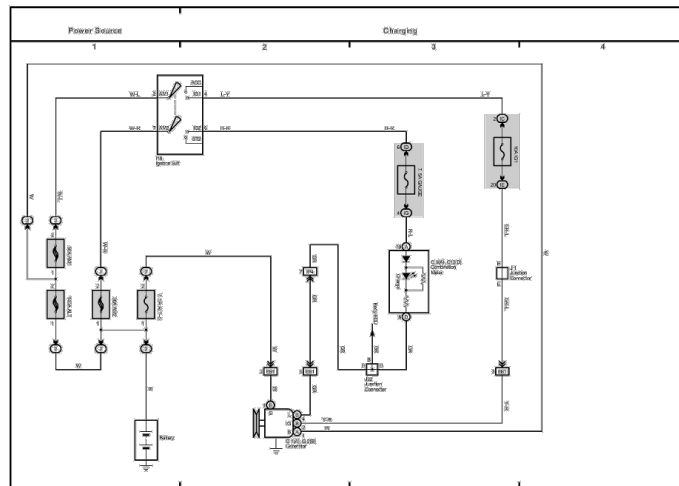


Fig. Charging (2003)

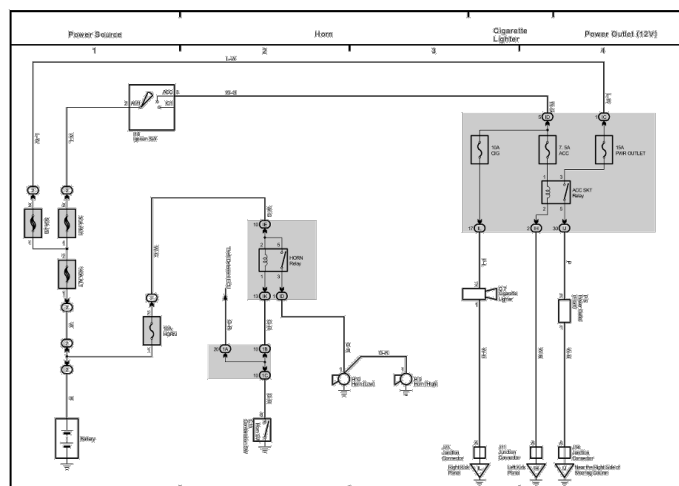


Fig. Cigarette Lighter (2003)

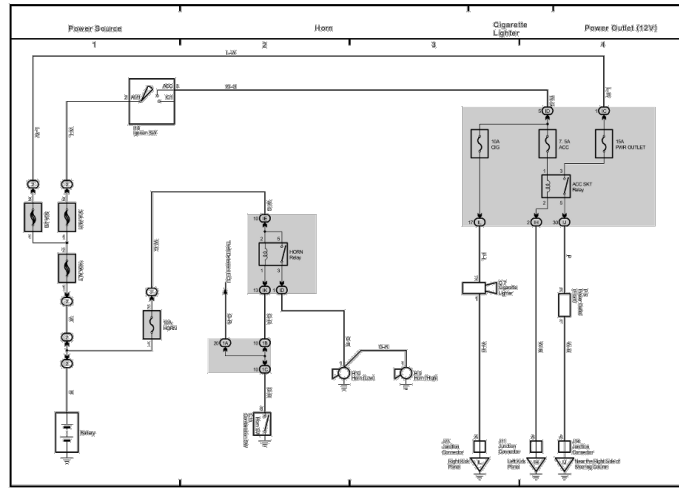


Fig. Cigarette Lighter (2003)

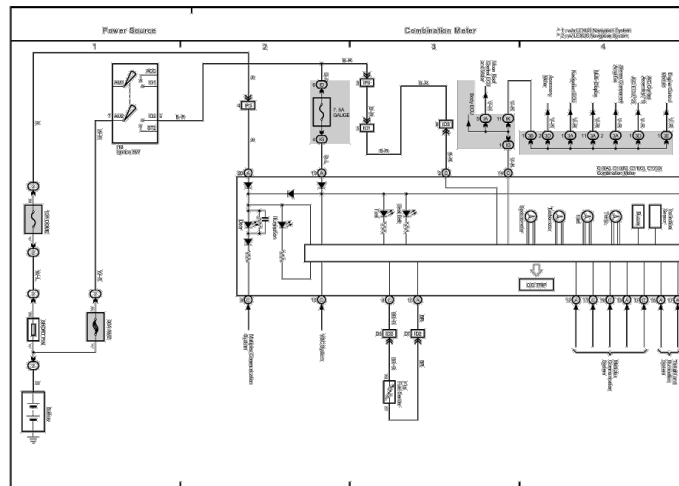


Fig. Combination Meter (2003)

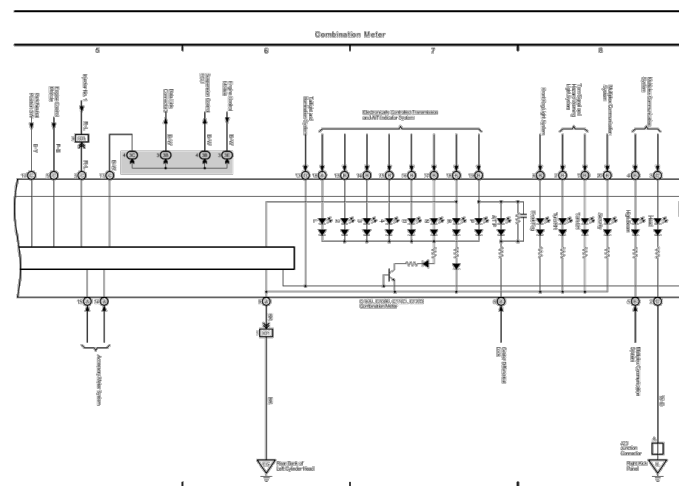


Fig. Combination Meter (2003)



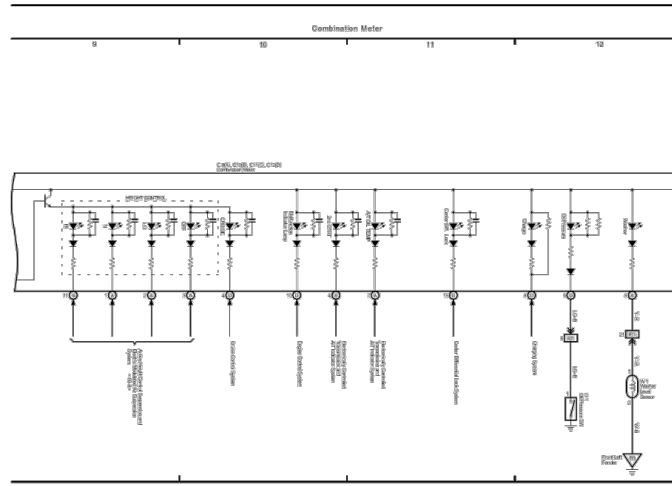


Fig. Combination Meter (2003)

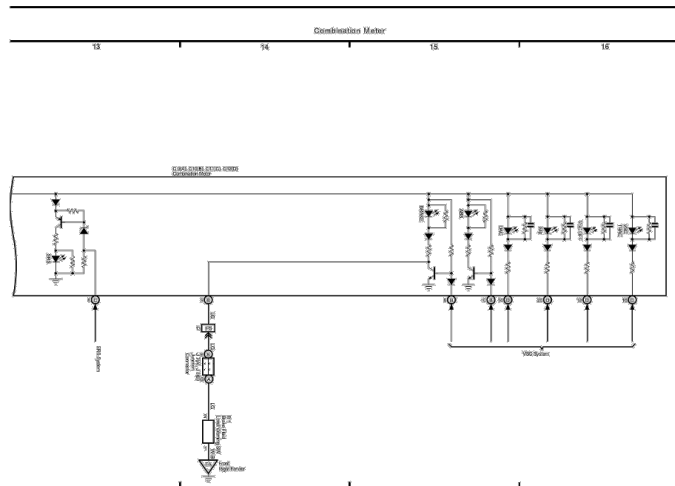


Fig. Combination Meter (2003)

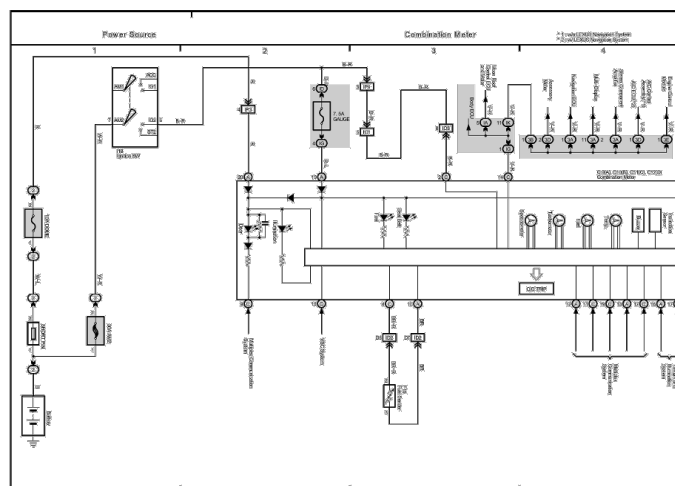


Fig. Combination Meter (2003)

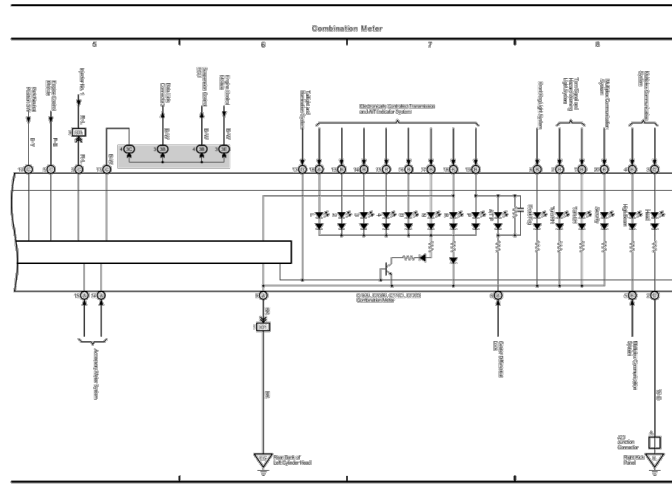


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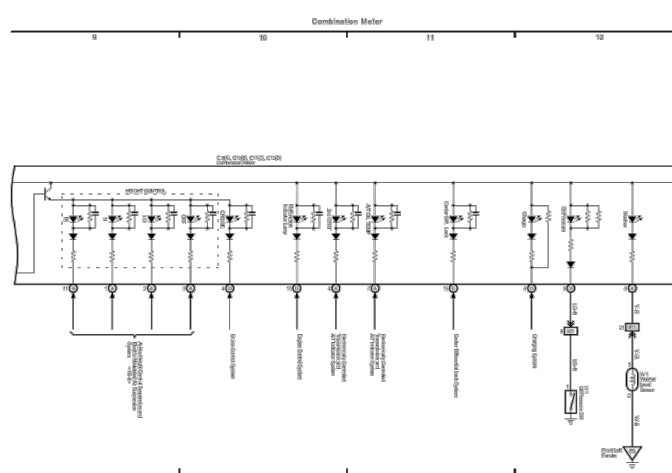


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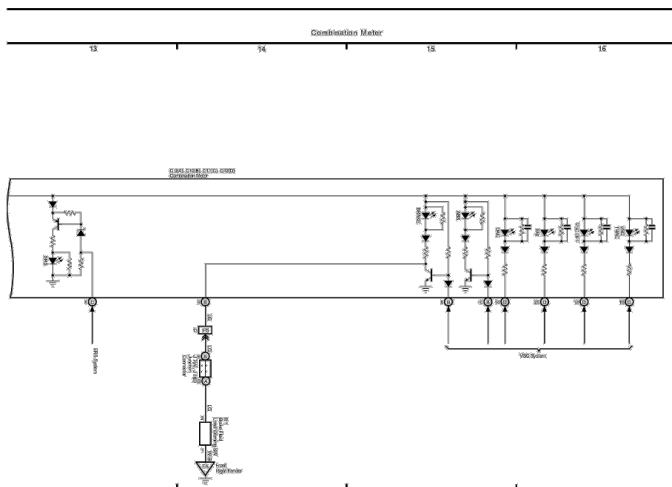


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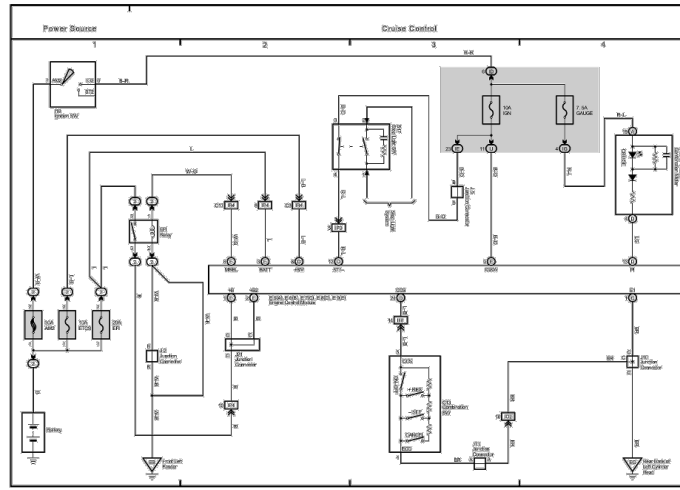


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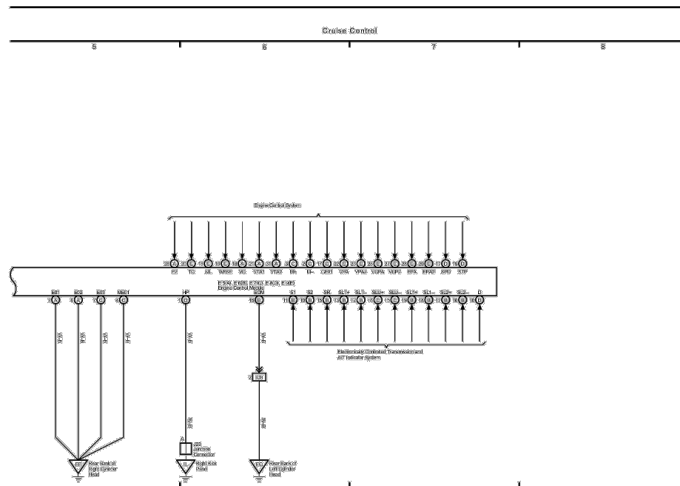


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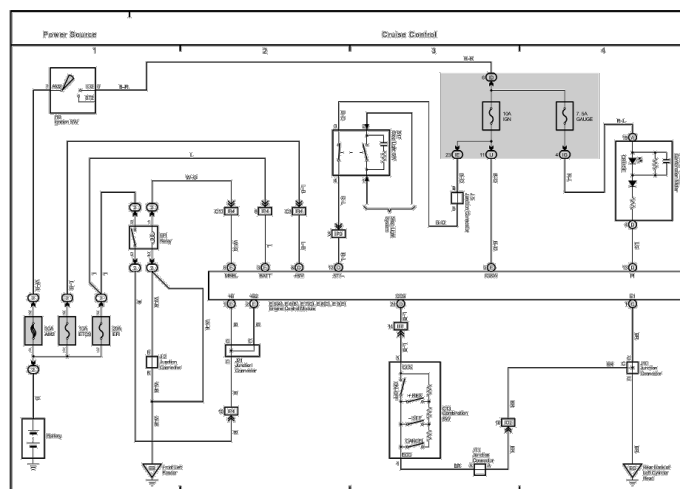


Fig. Cruise Control (2003)

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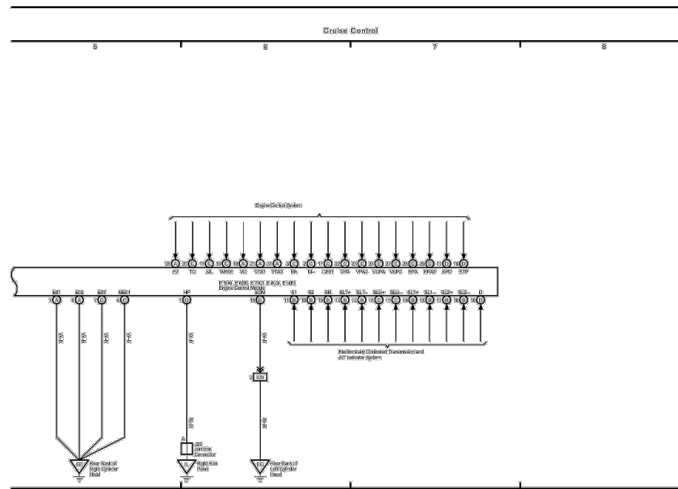


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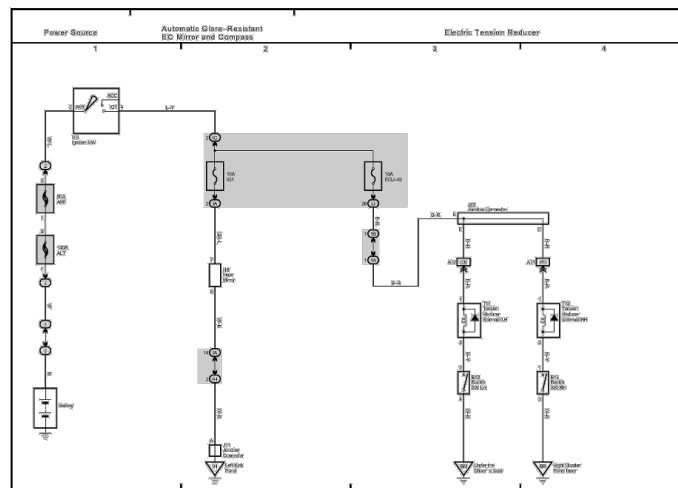


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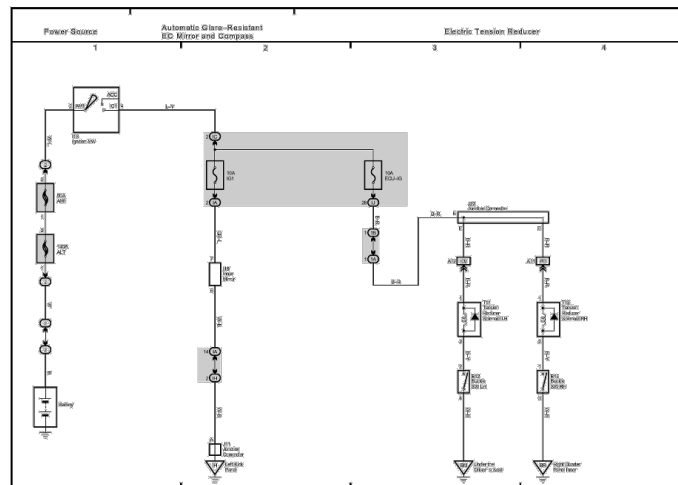


Fig. Electric Tension Reducer (2003)

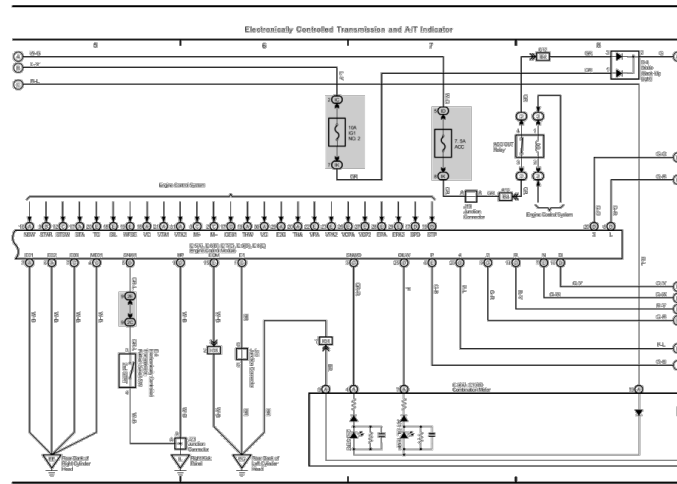


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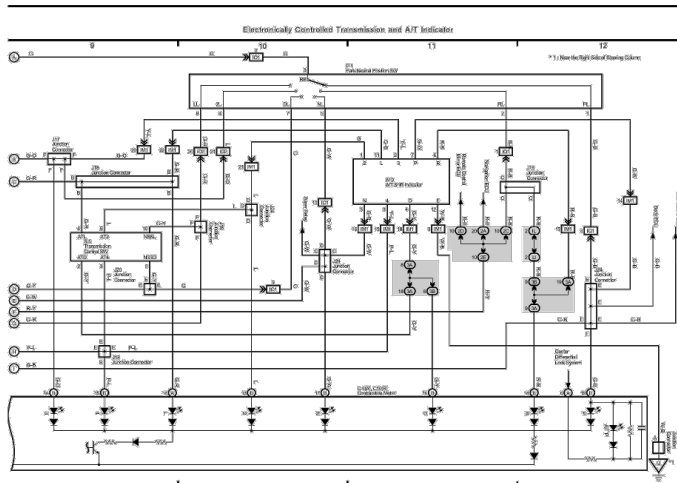


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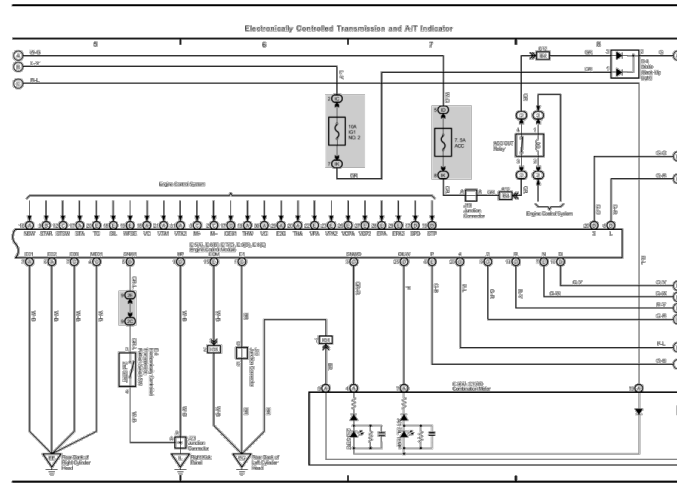


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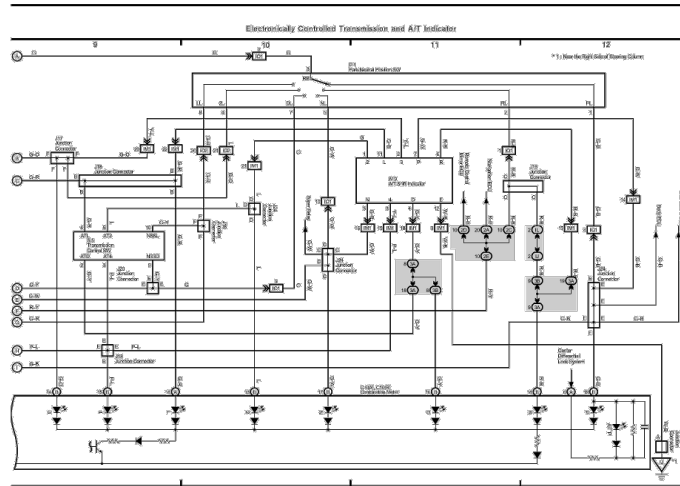


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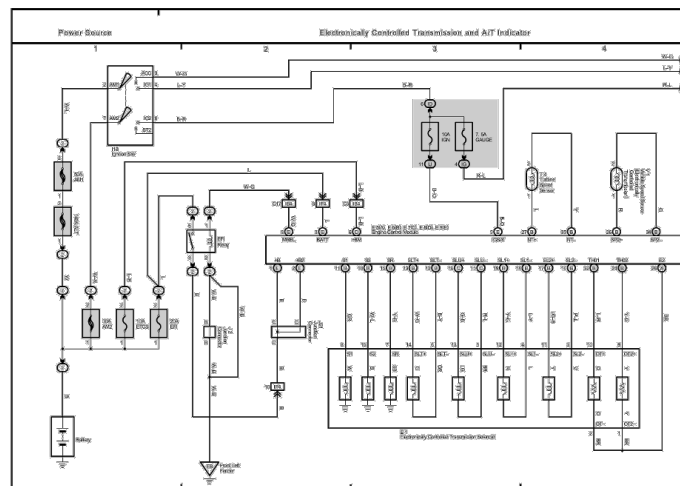


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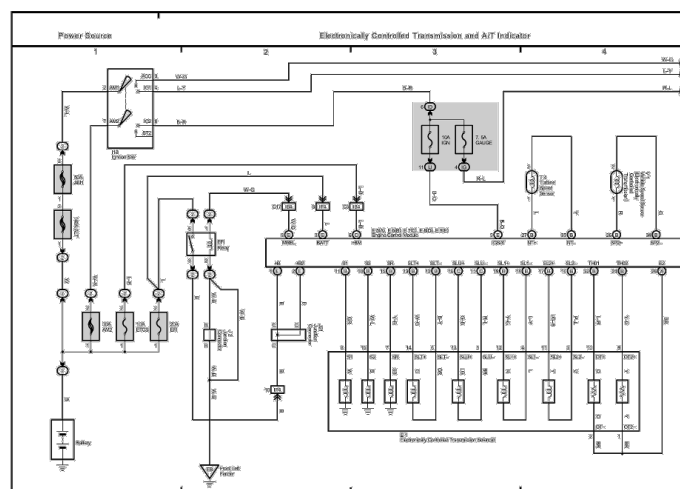


Fig. Electronically Controlled Transmission and A/T Indicator (2003)

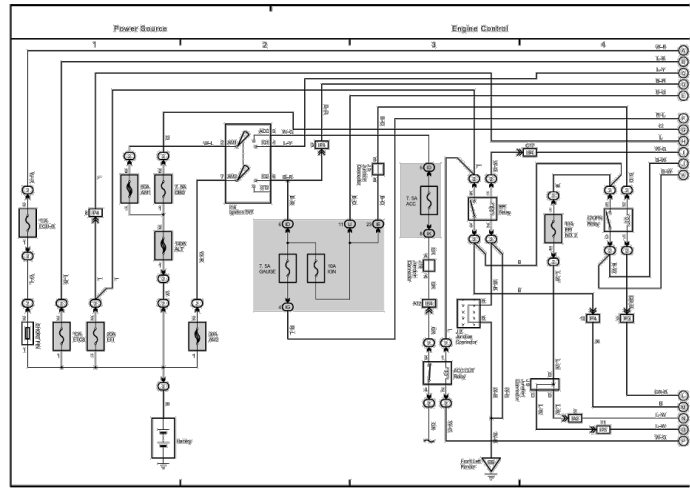


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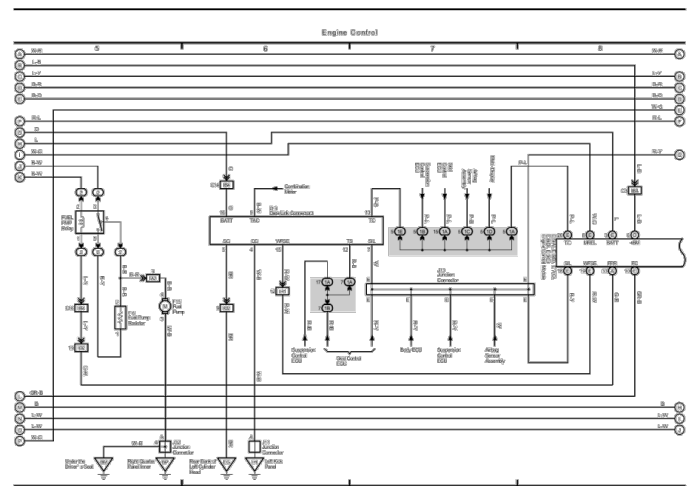


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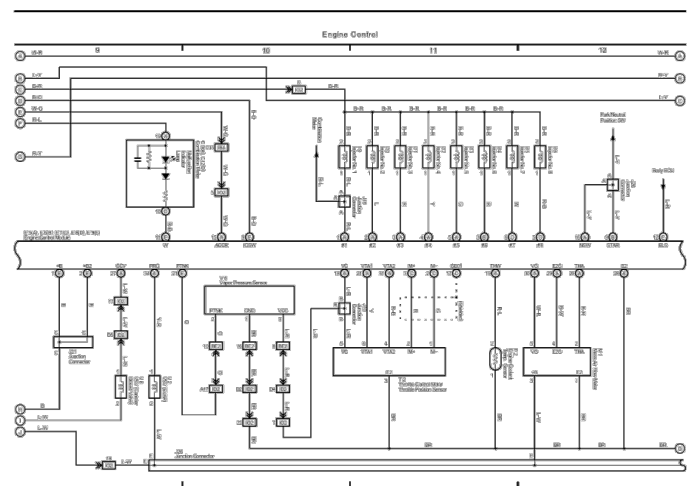


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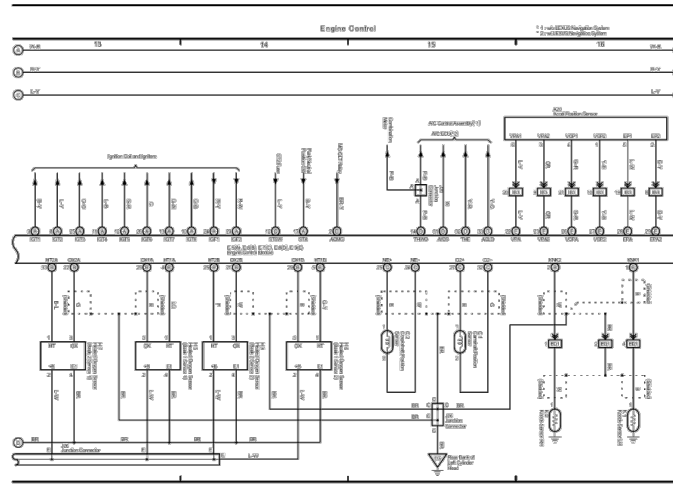


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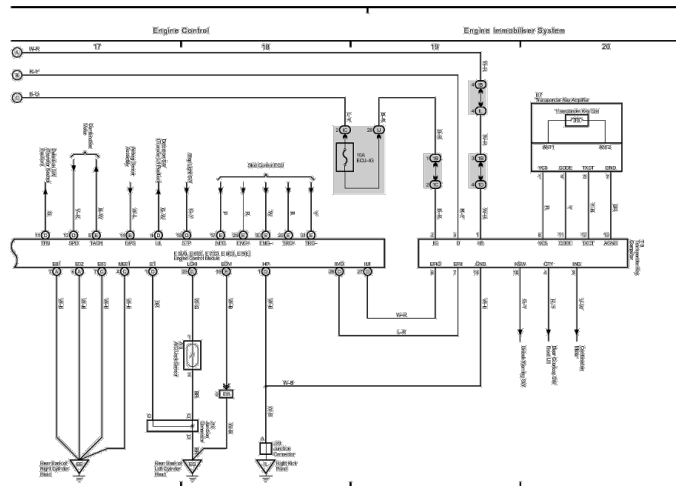


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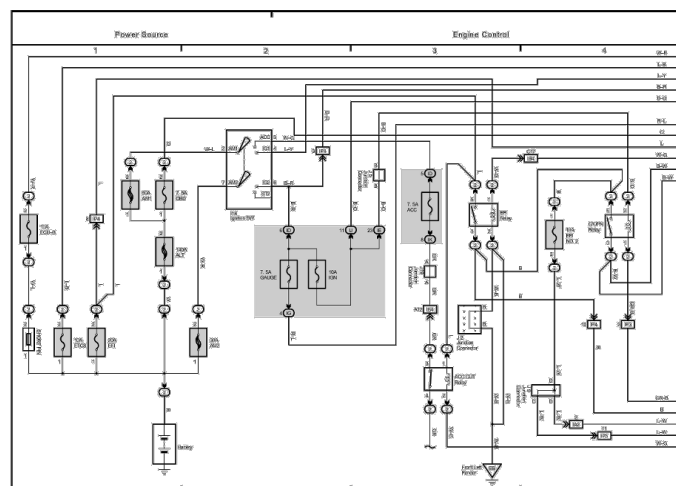


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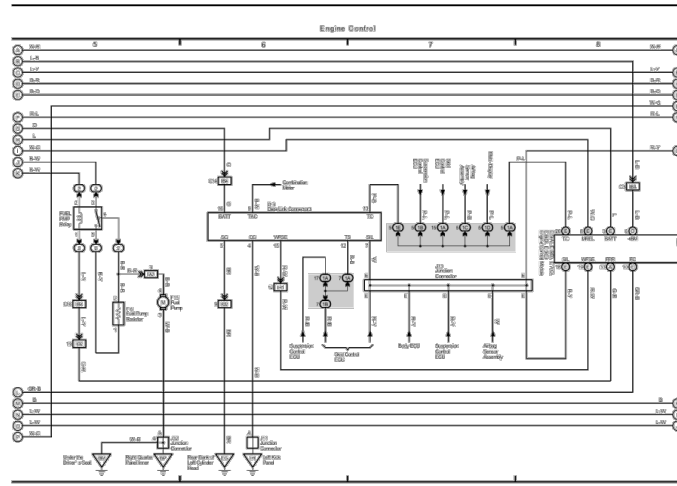


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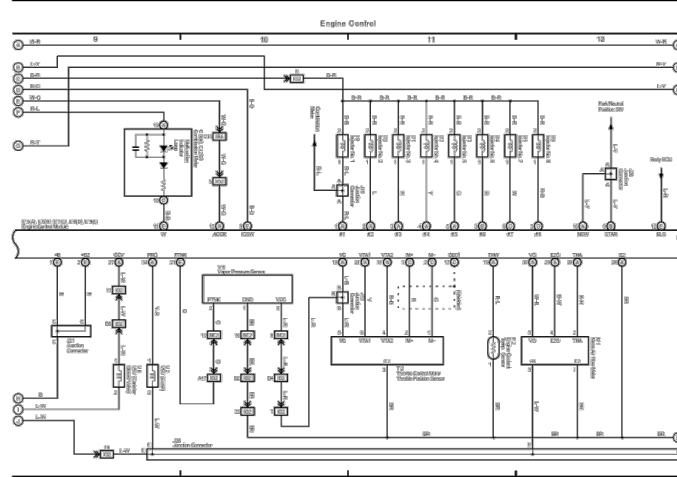


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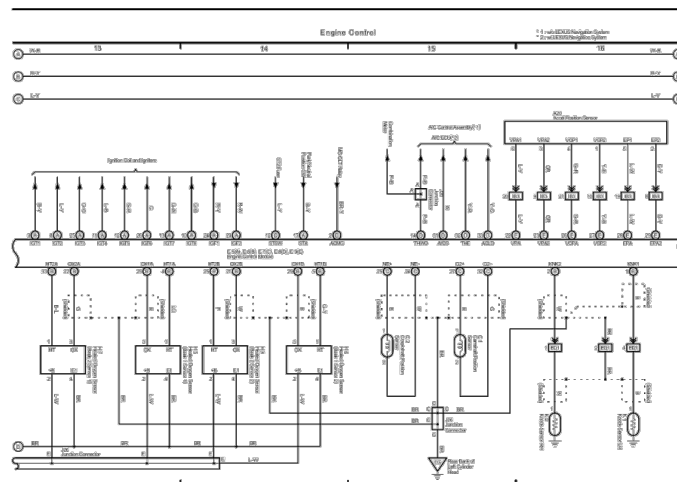


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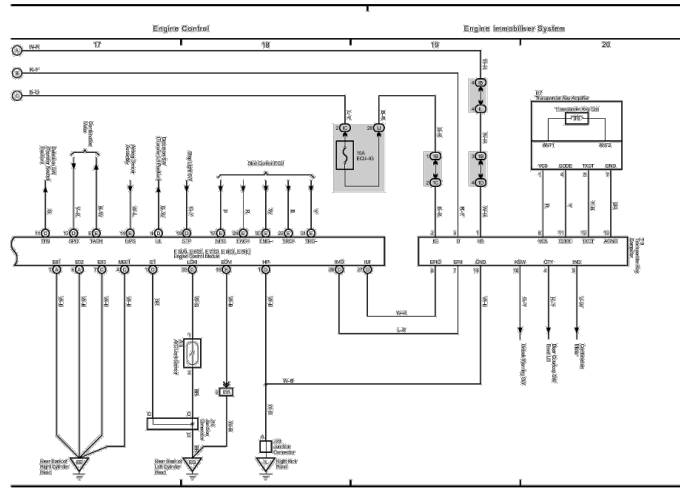


Fig. Engine Control (2003)



Fig. Engine Immobiliser System (2003)



Fig. Engine Immobiliser System (2003)

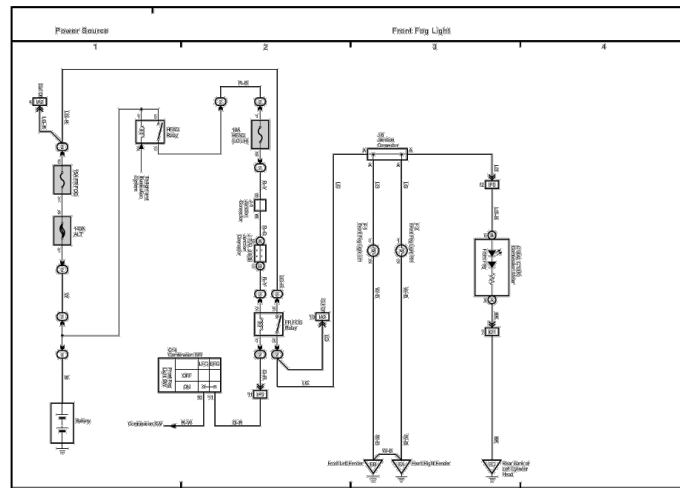


Fig. Front Fog Light (2003)

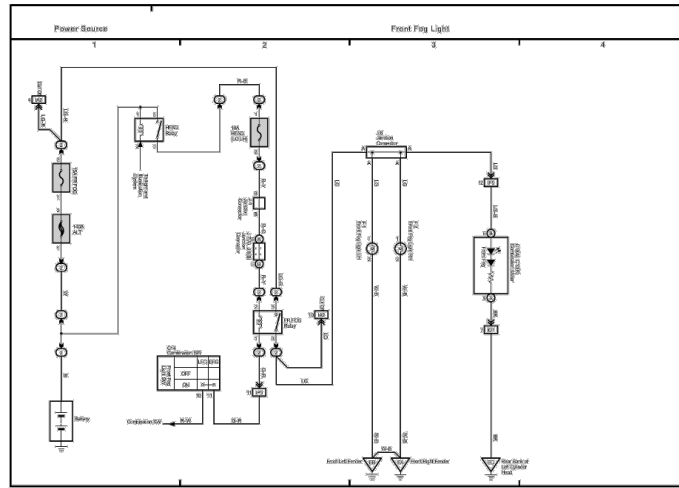


Fig. Front Fog Light (2003)

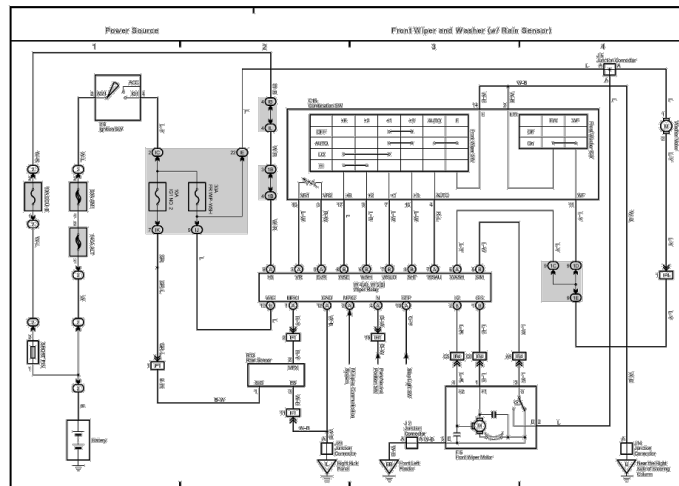


Fig. Front Wiper and Washer (2003)

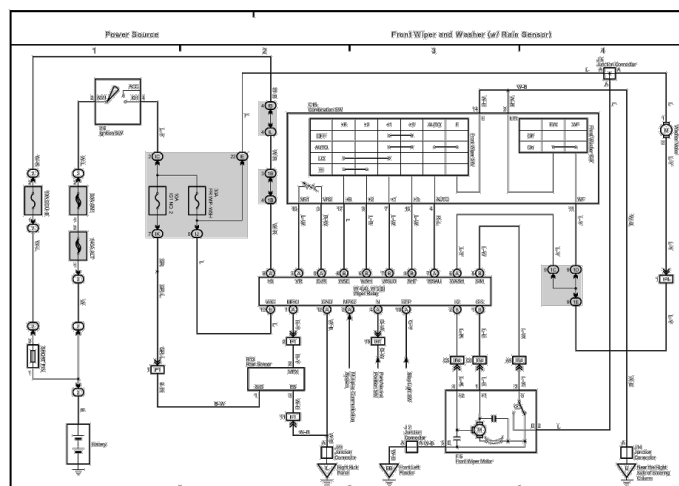


Fig. Front Wiper and Washer (2003)

Fig. Horn (2003)

Fig. Horn (2003)

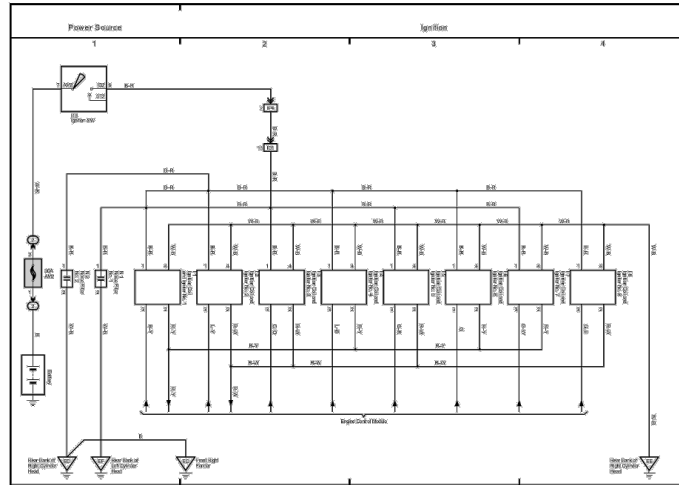


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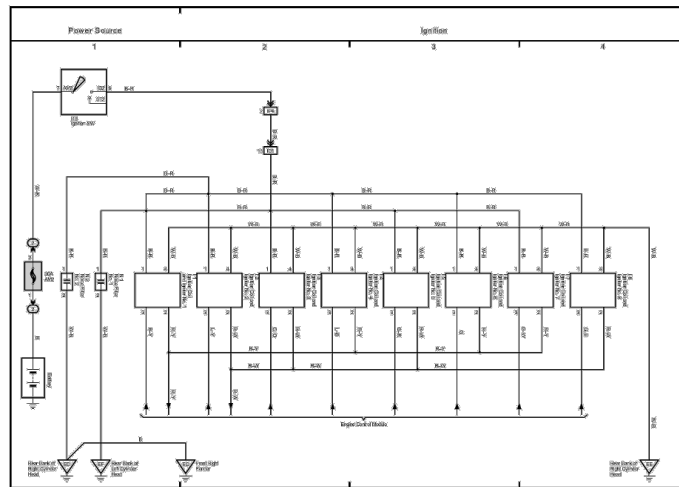


Fig. Ignition (2003)

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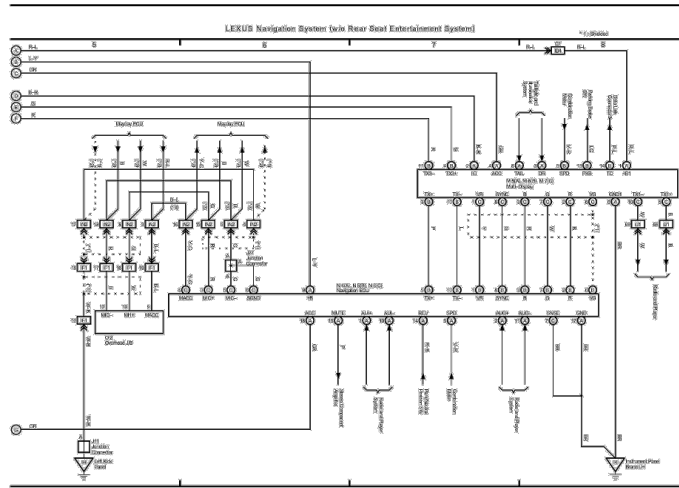


Fig. LEXUS Navigation System (2003)

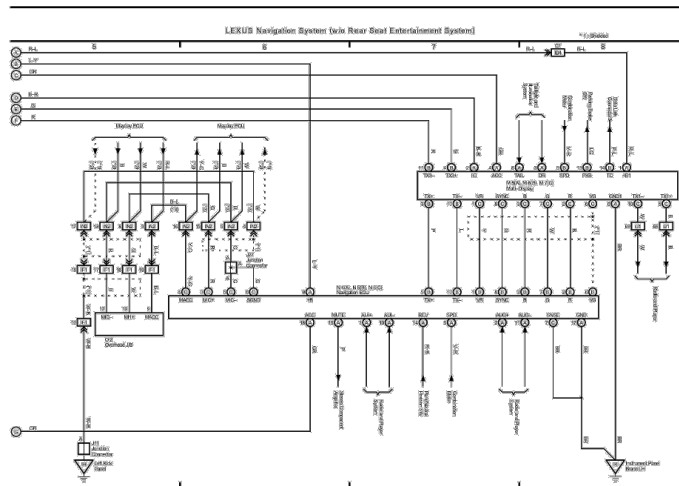


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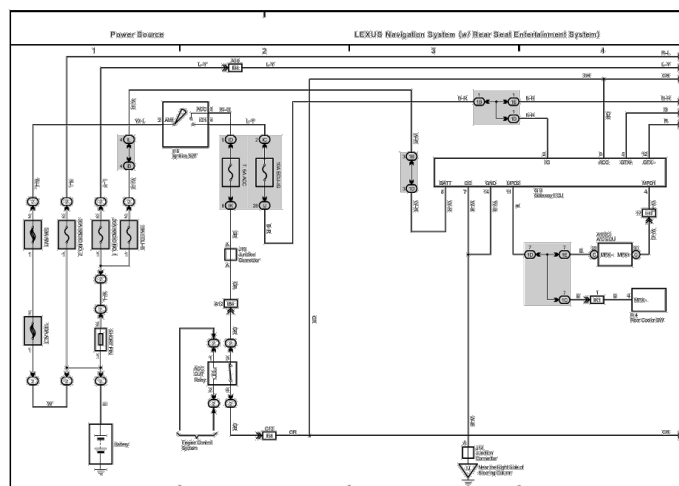


Fig. LEXUS Navigation System (w/ Rear Seat Entertainment System) (2003)

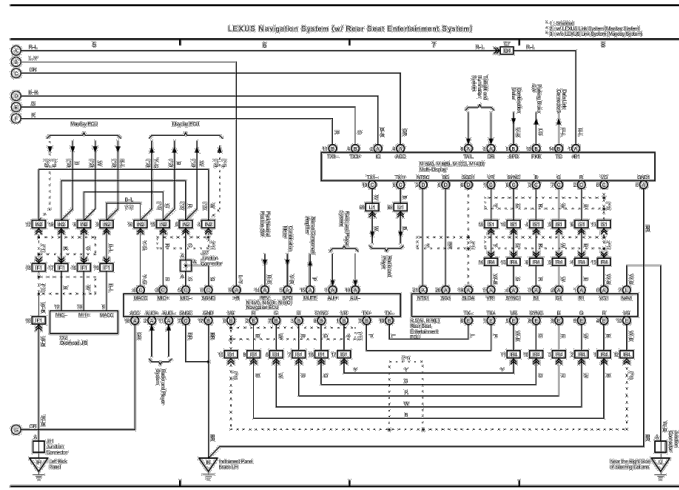


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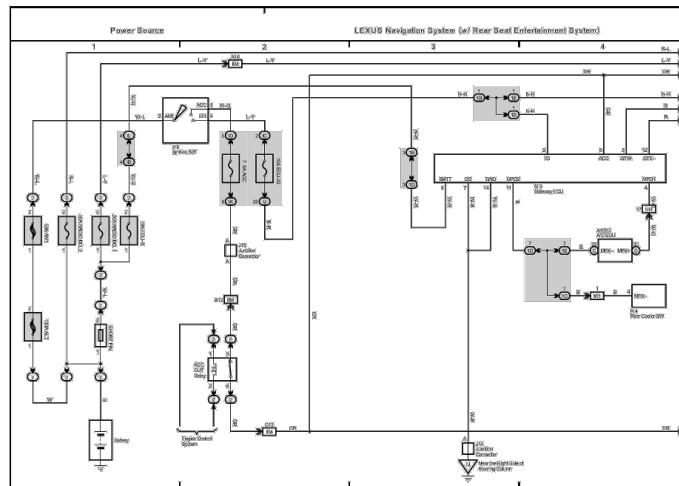


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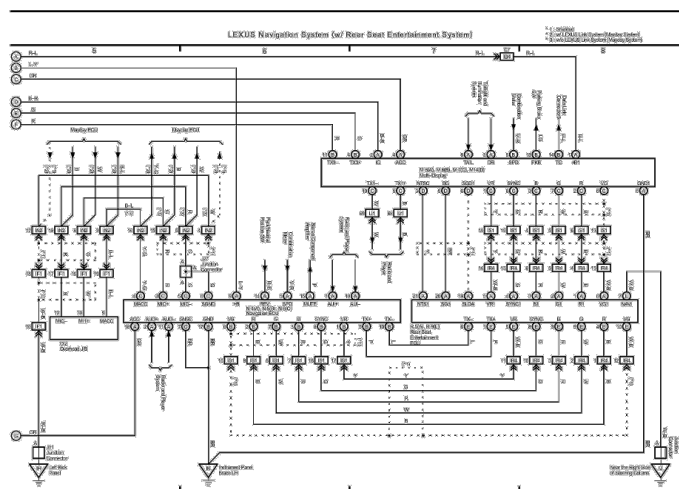


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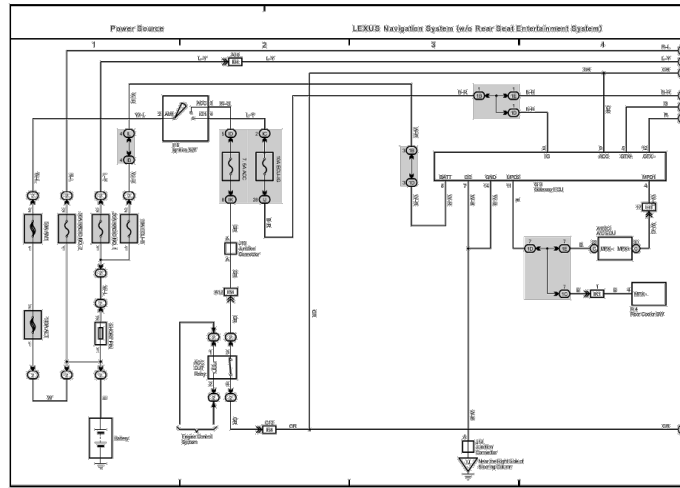


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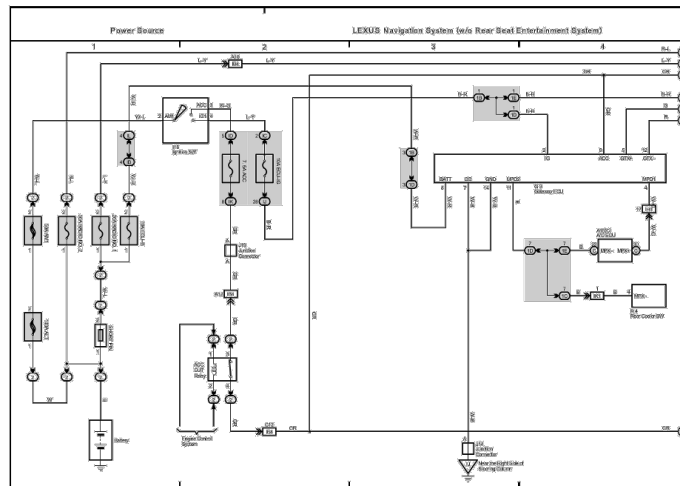


Fig. LEXUS Navigation System (w/o Rear Seat Entertainment System) (2003)

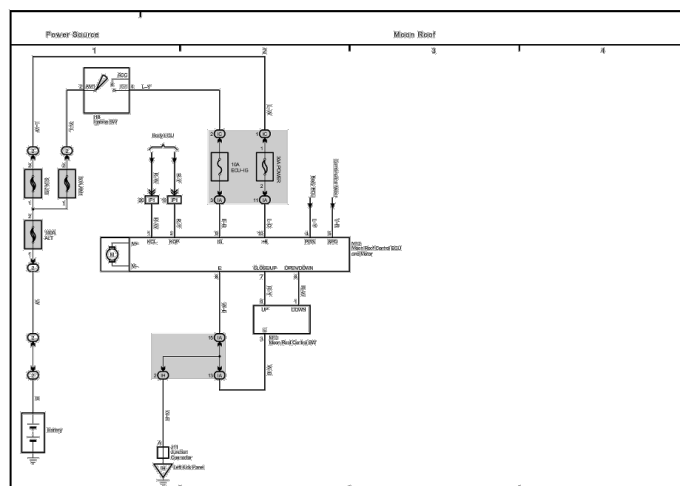


Fig. Moon Roof (2003)



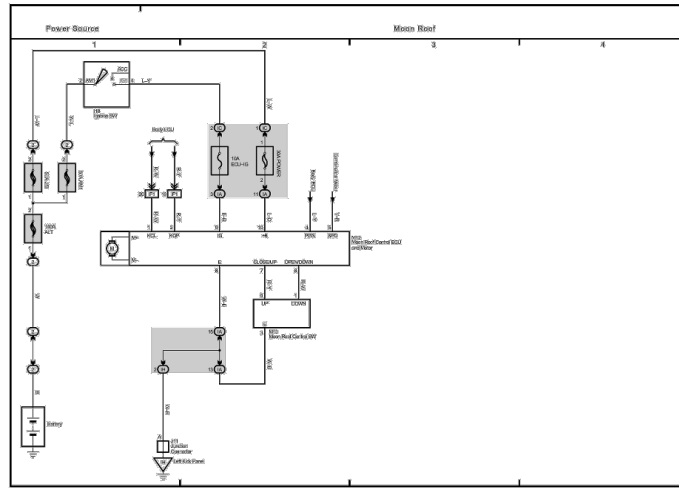


Fig. Moon Roof (2003)

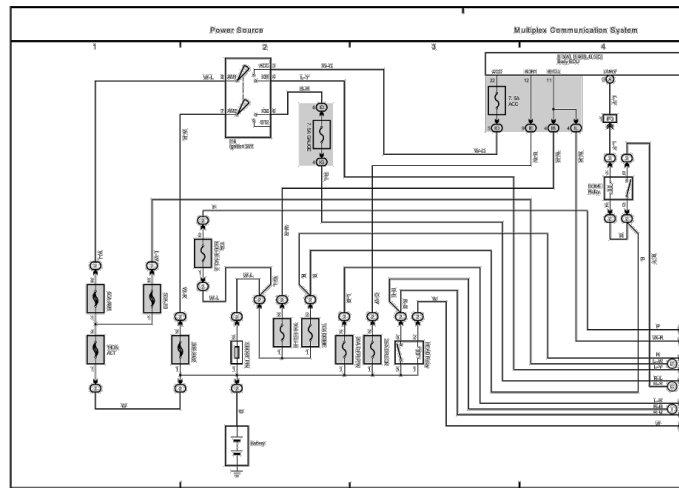


Fig. Multiplex Communication System (2003)

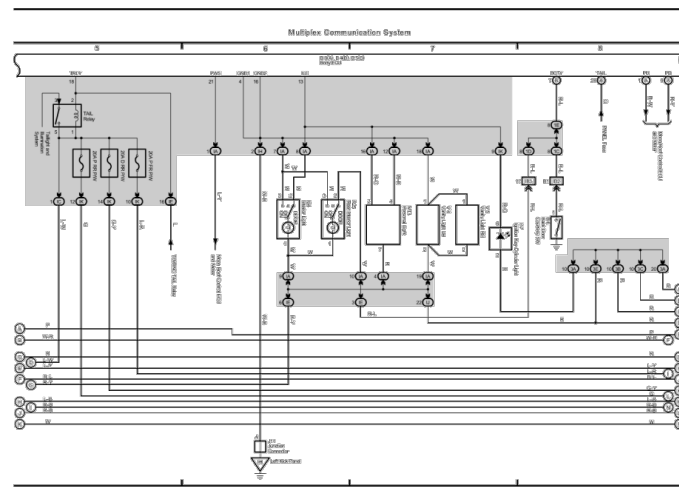


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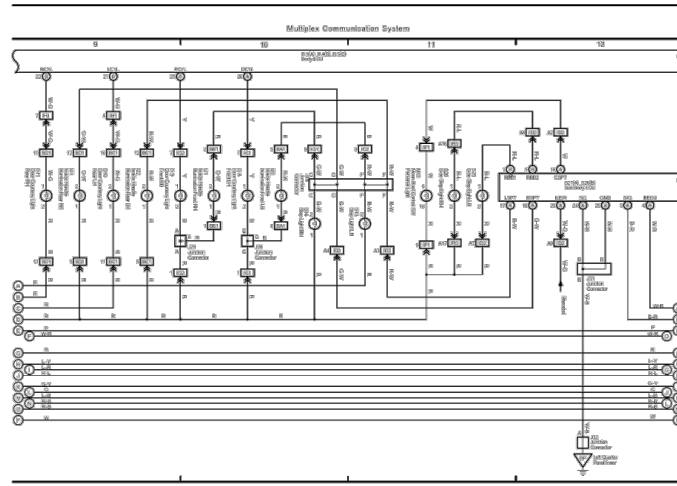


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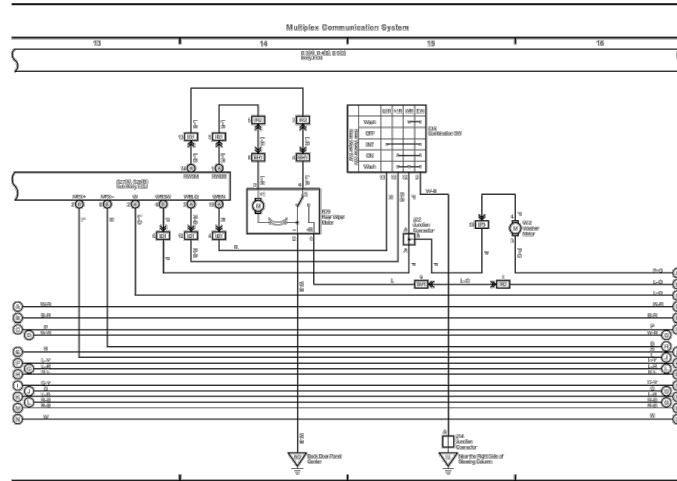


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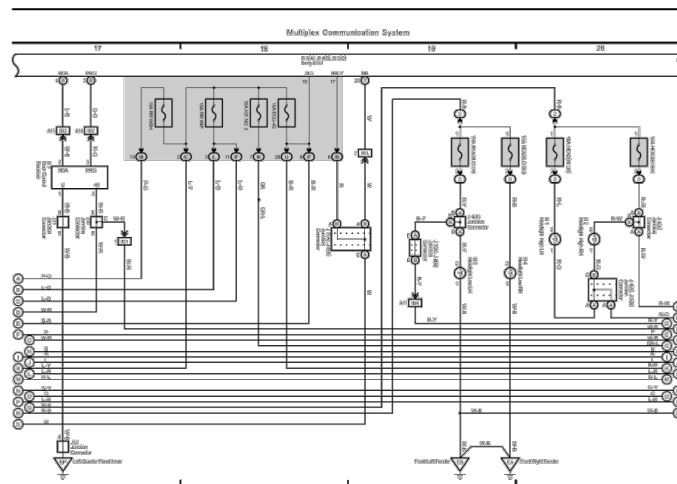


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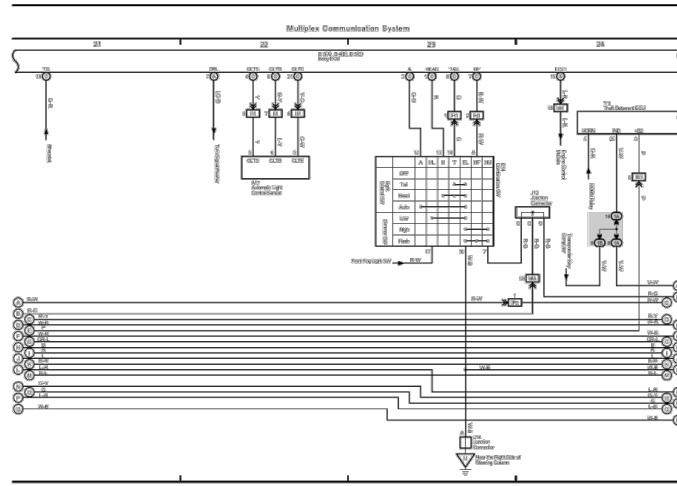


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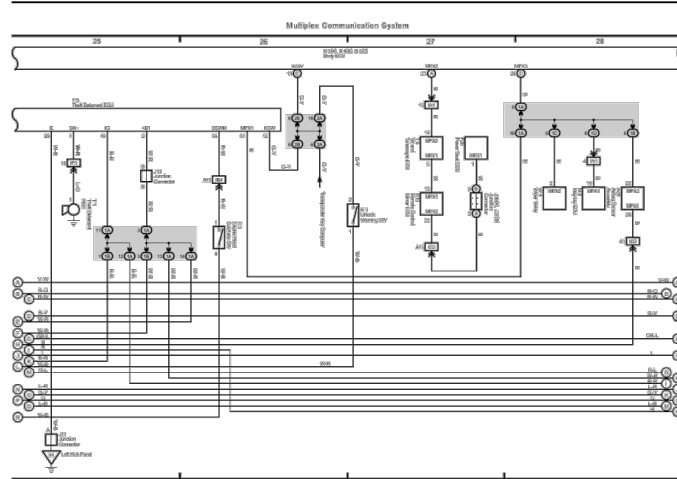


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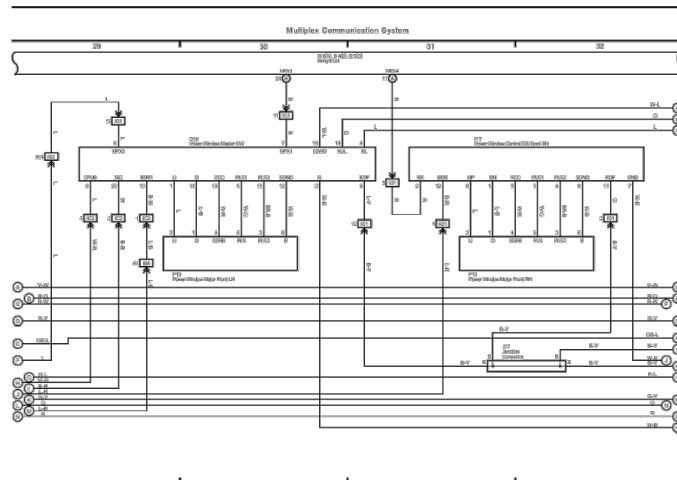


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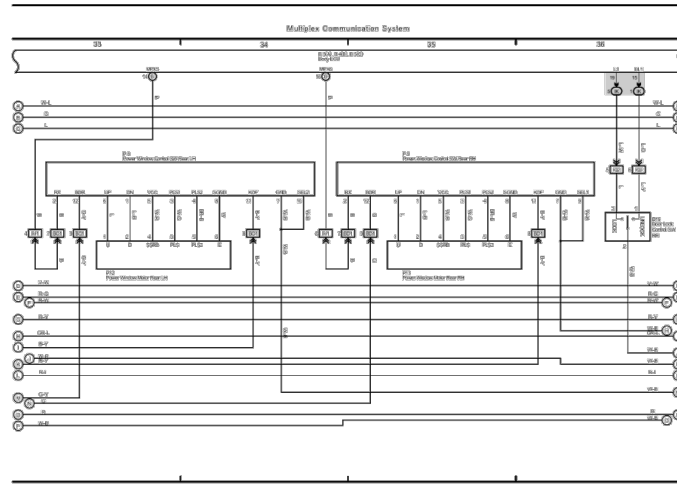


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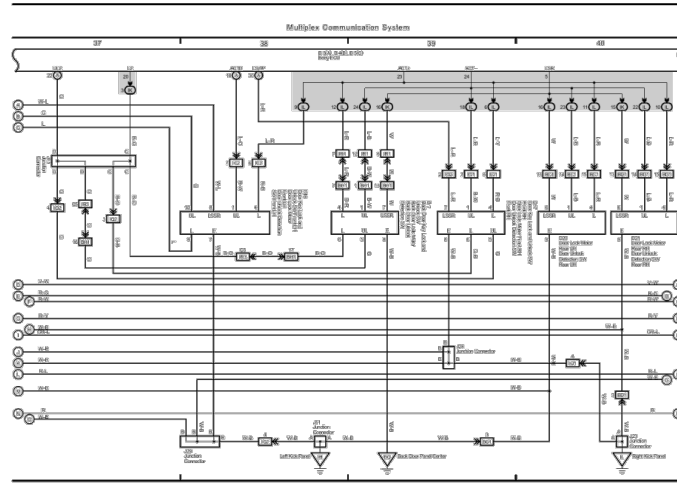


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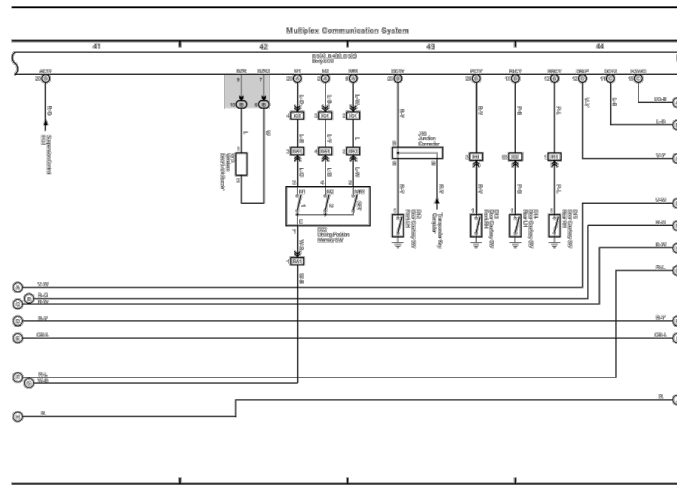


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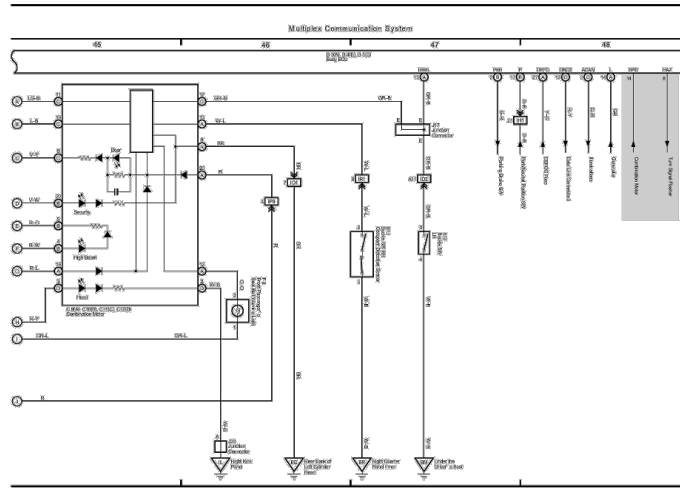


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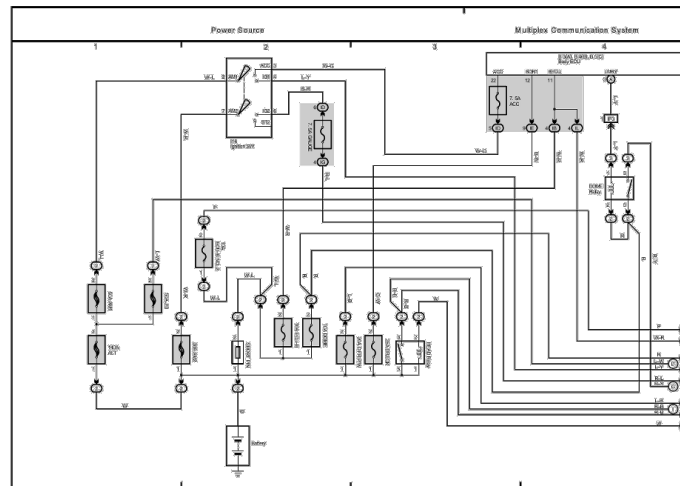


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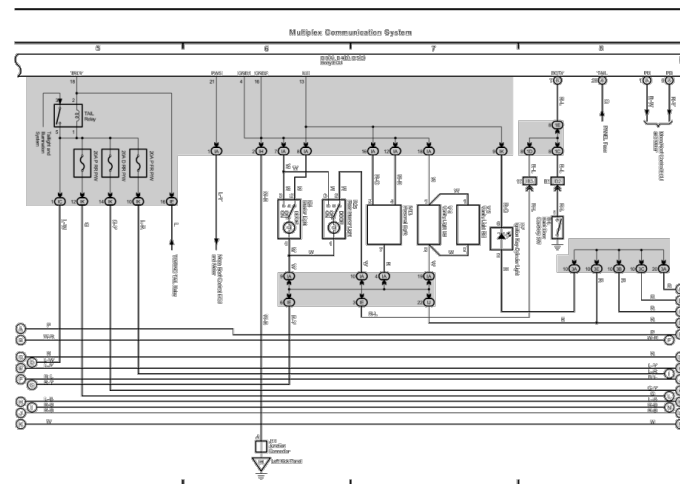


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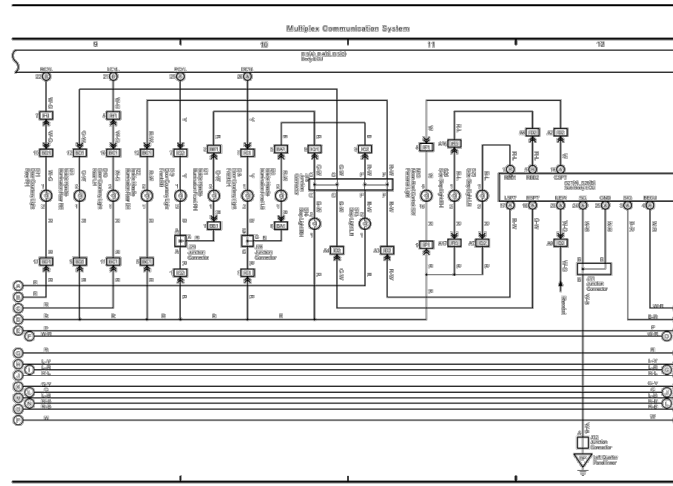


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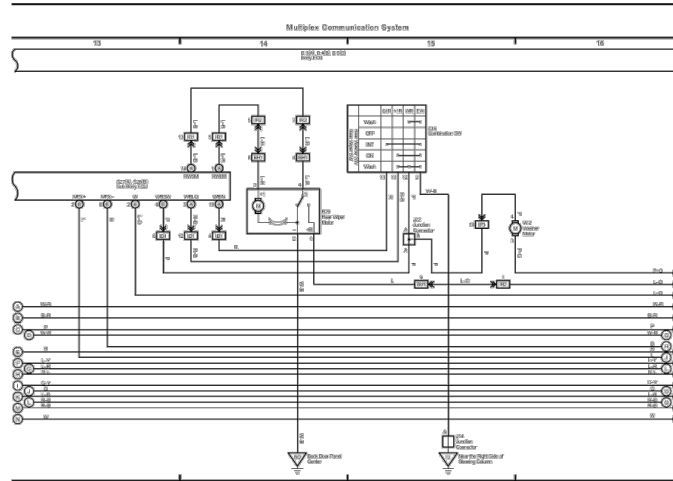


Fig. Multiplex Communication System (2003)

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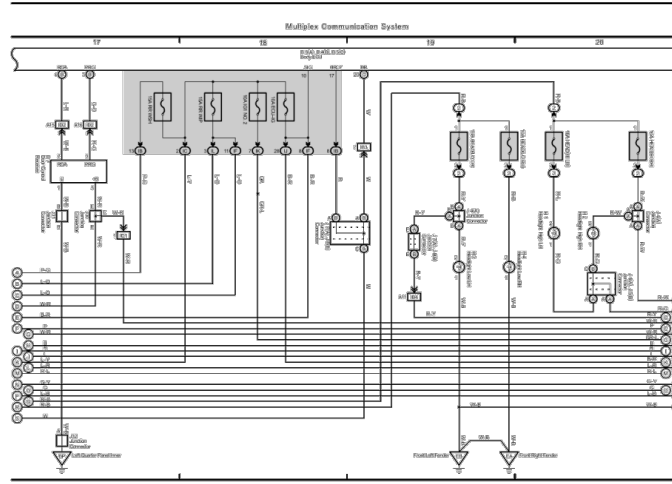


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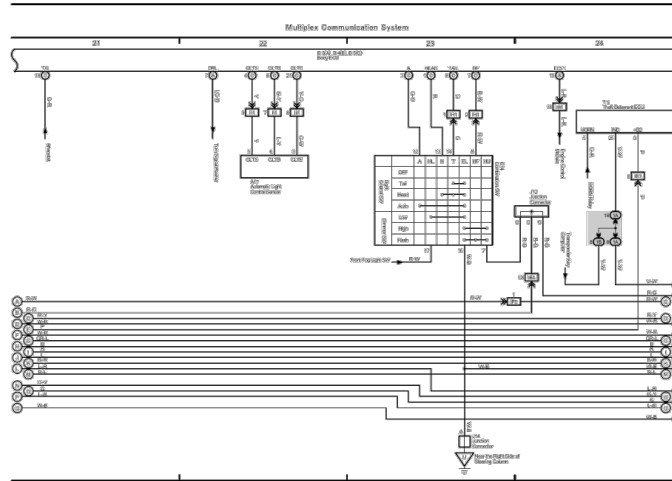


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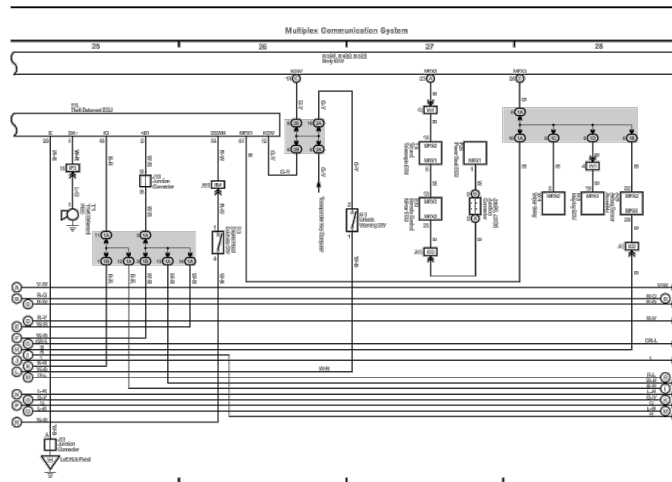


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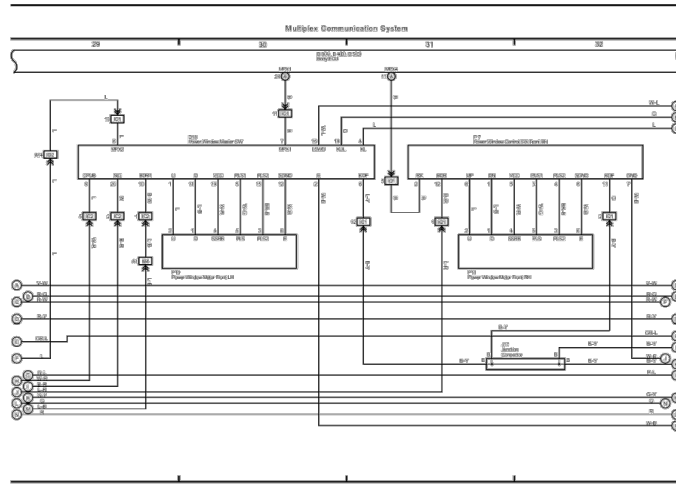


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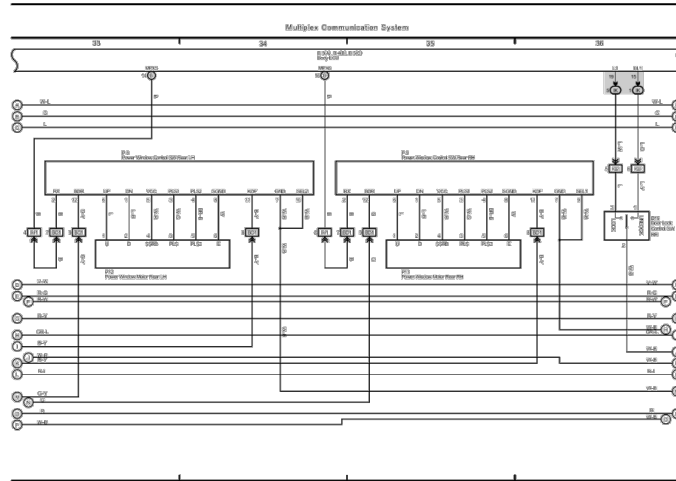


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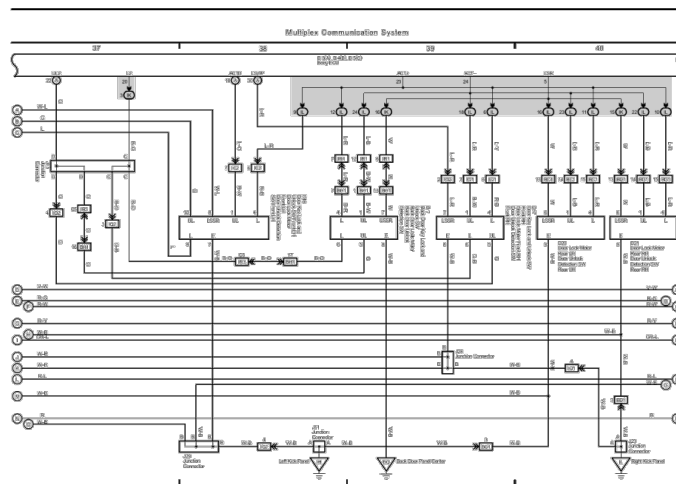


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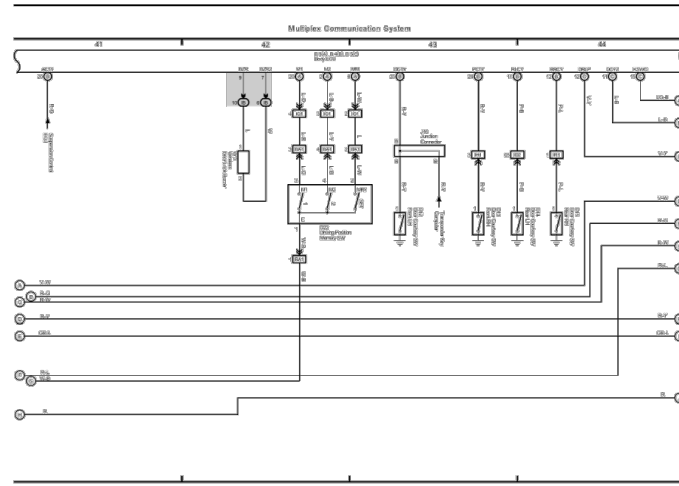


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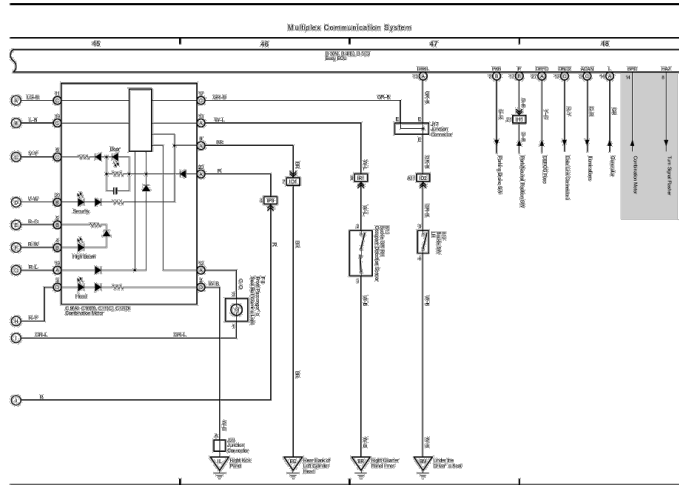


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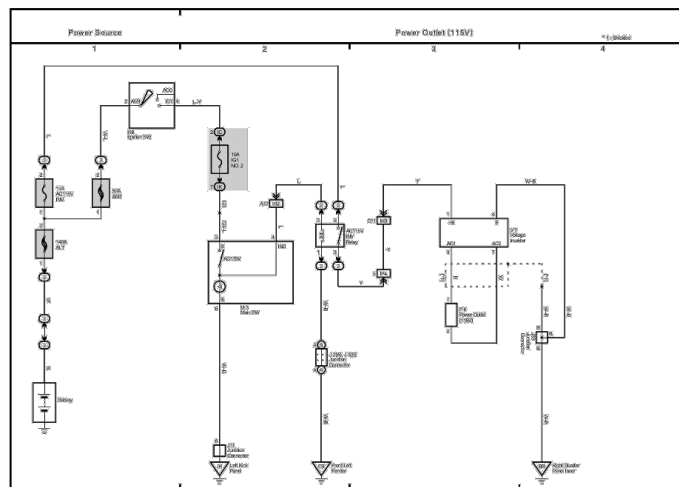


Fig. Power Outlet (115V) (2003)

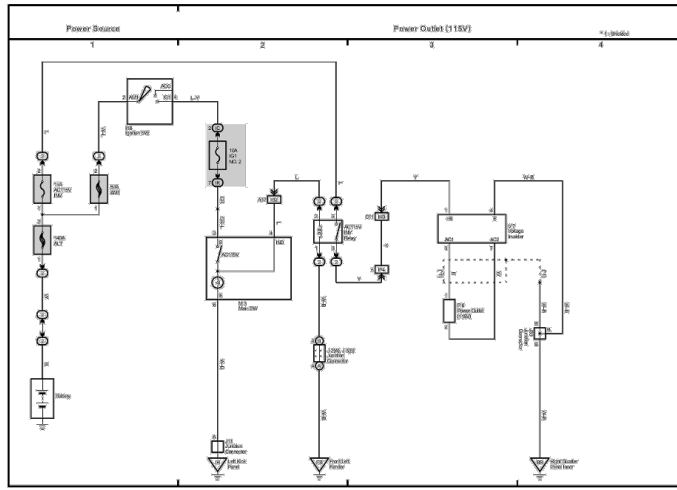


Fig. Power Outlet (115V) (2003)



Fig. Power Outlet (12V) (2003)



Fig. Power Outlet (12V) (2003)

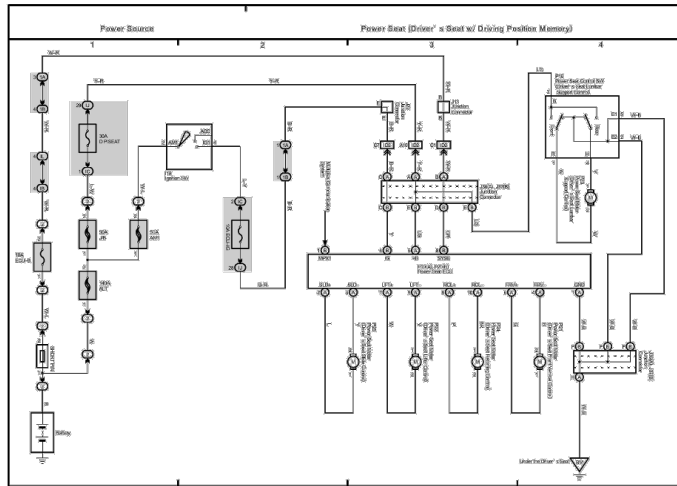


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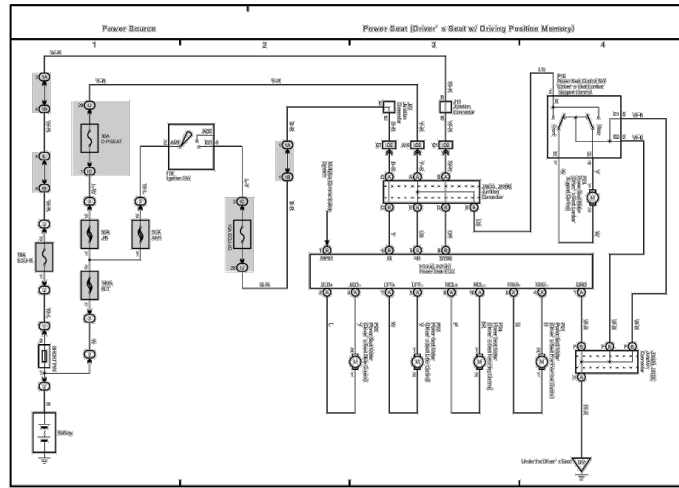


Fig. Power Seat (2003)

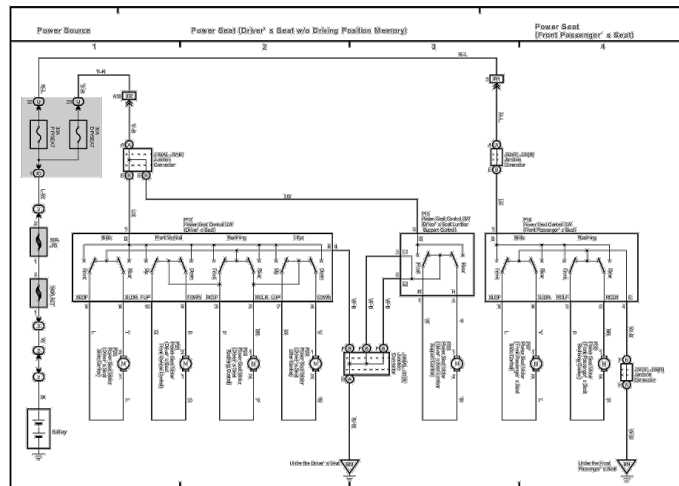


Fig. Power Seat (Driver-s Seat w/o Driving Position Memory) (2003)

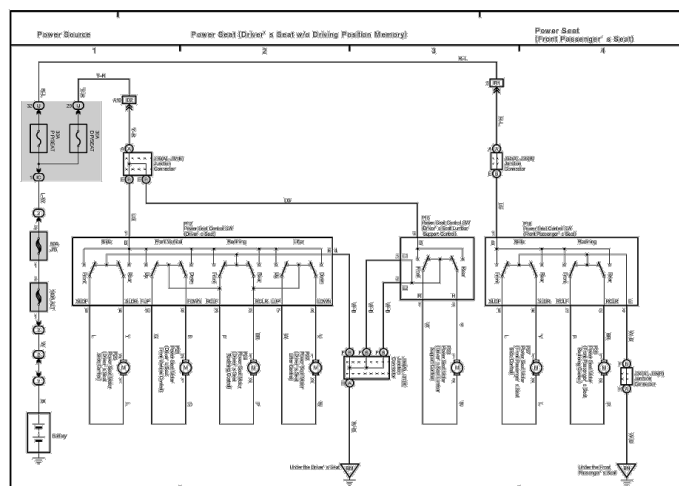
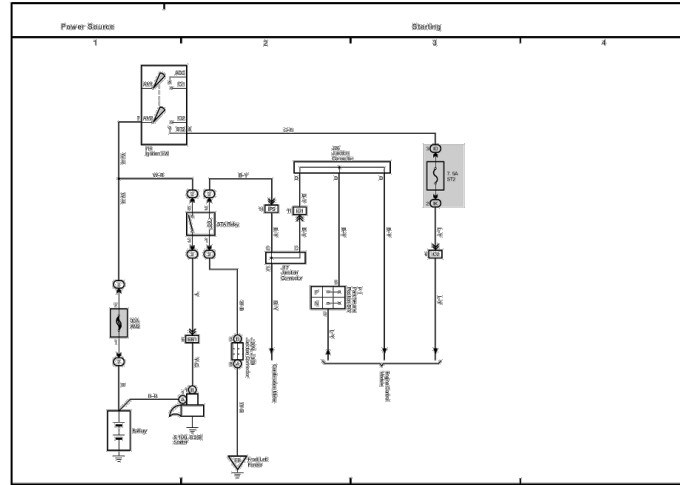


Fig. Power Seat (Driver-s Seat w/o Driving Position Memory) (2003)

**Fig. Power Source (2003)**



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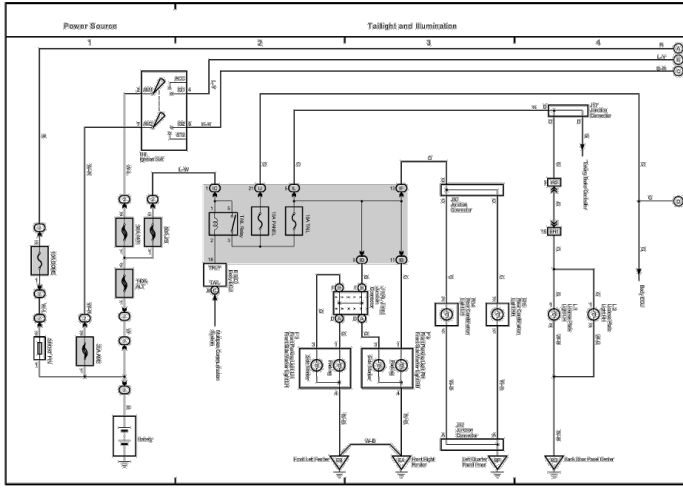


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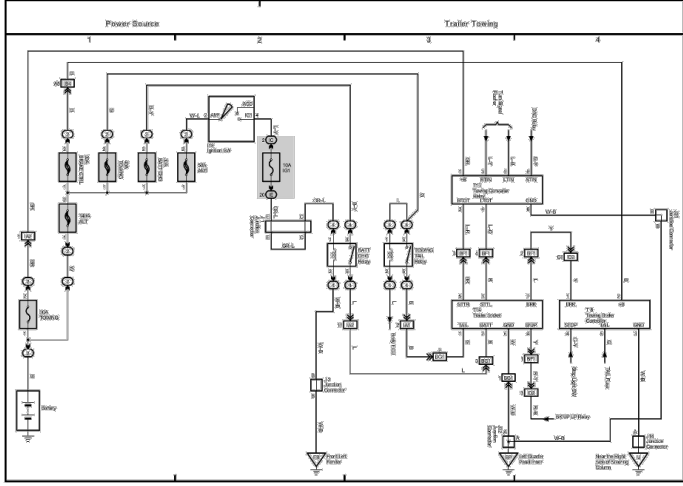


Fig. Power Source (2003)

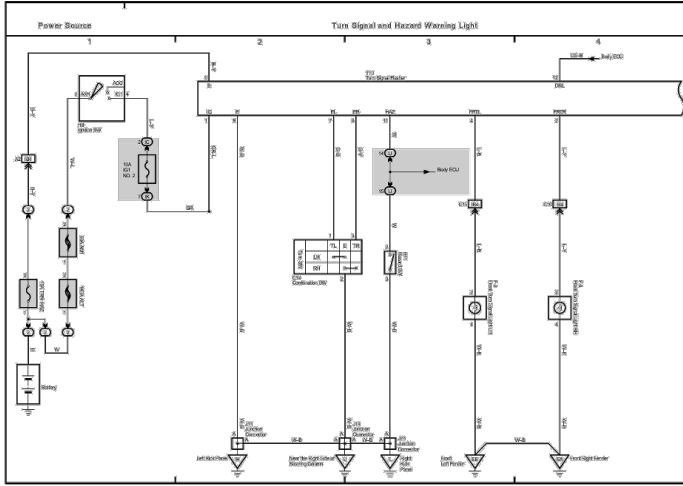


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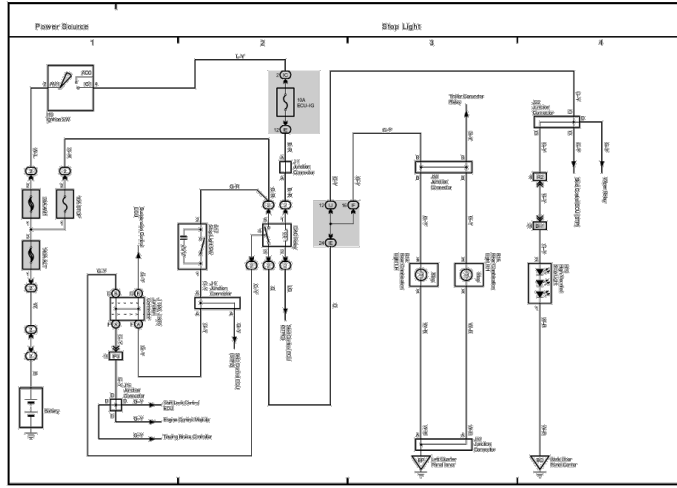


Fig. Power Source (2003)

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## Overall Electrical Wiring Diagram (2003) 5

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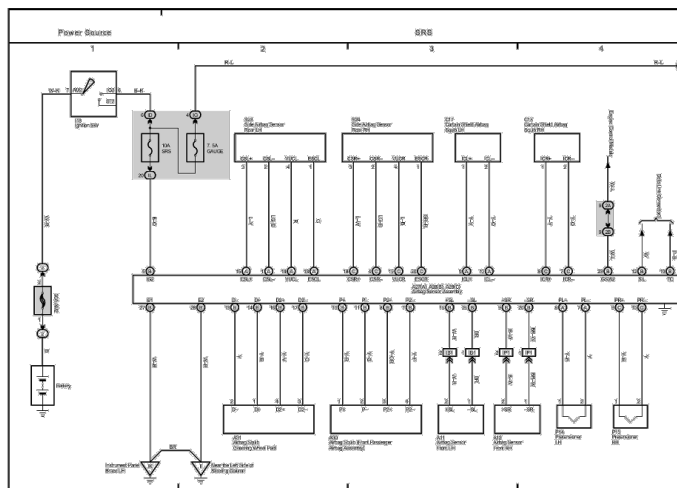


Fig. Power Source (2003)

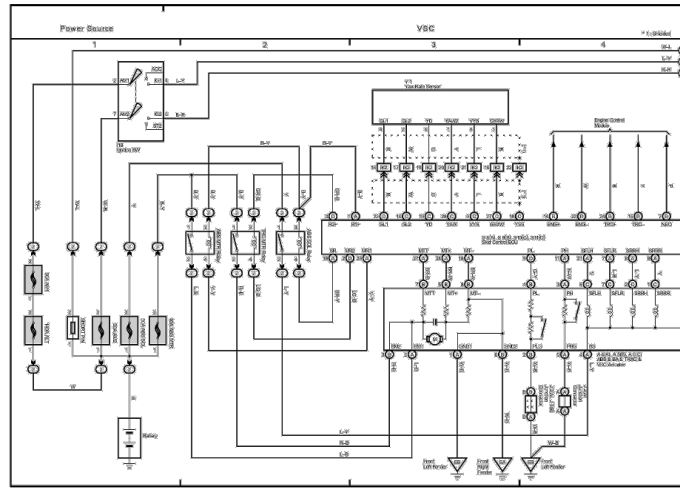


Fig. Power Source (2003)



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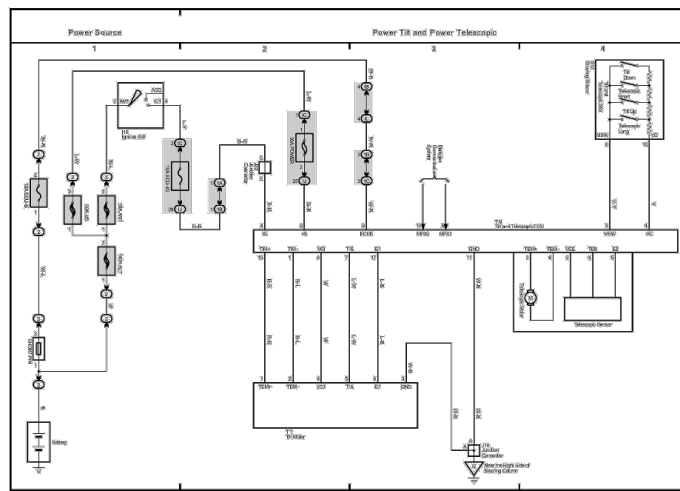


Fig. Power Source (2003)



Fig. Power Source (2003)



Fig. Power Source (2003)

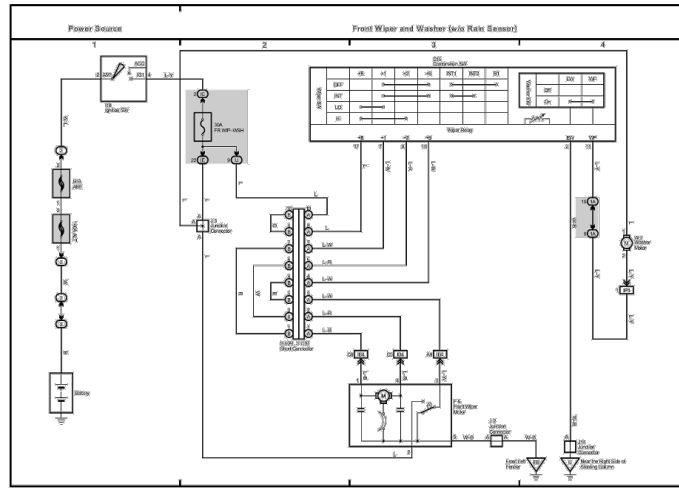


Fig. Power Source (2003)



Fig. Power Source (2003)

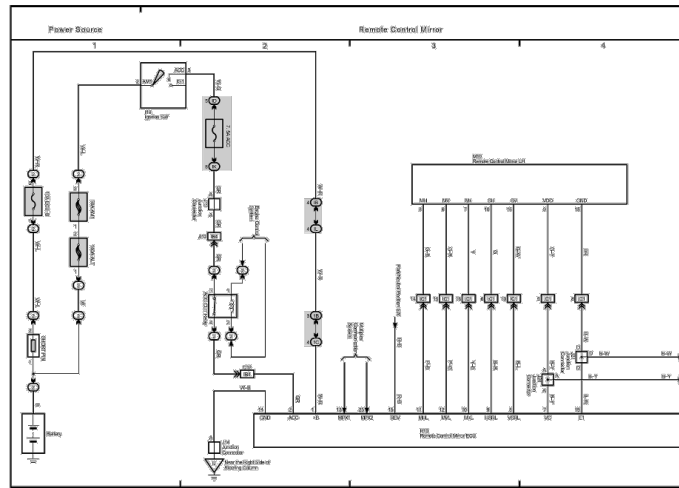
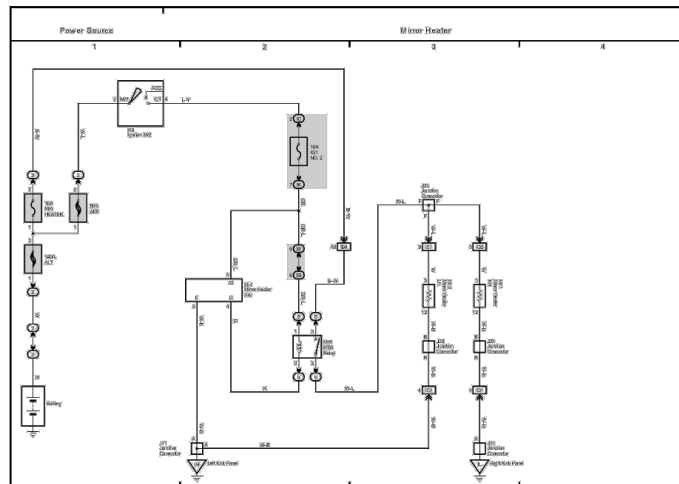
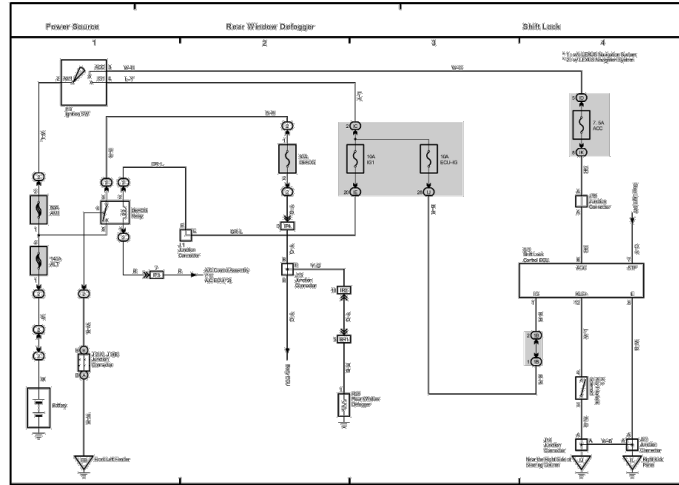


Fig. Power Source (2003)





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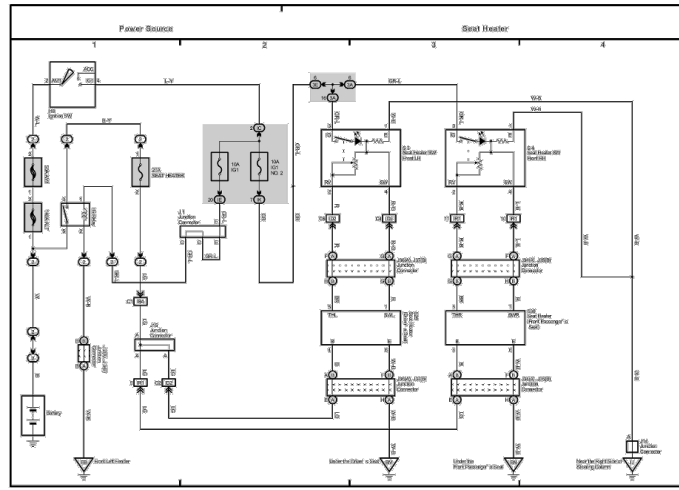


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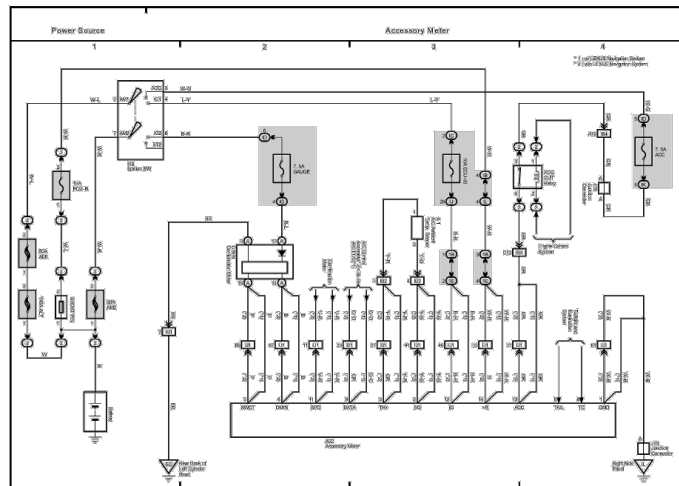


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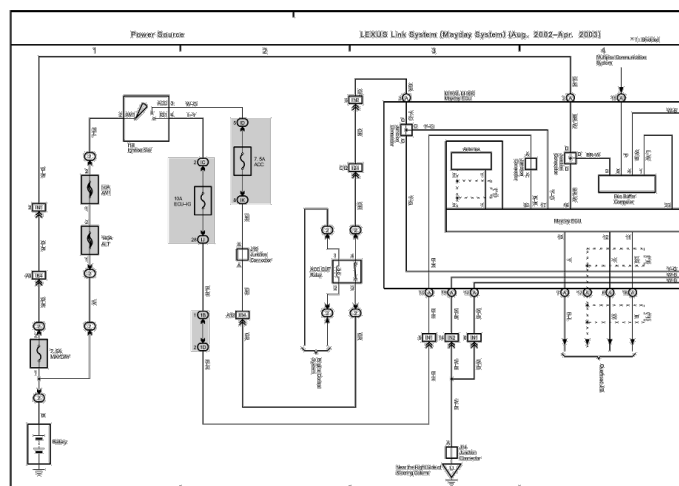


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Fig. Power Source (2003)

Fig. Power Source (2003)

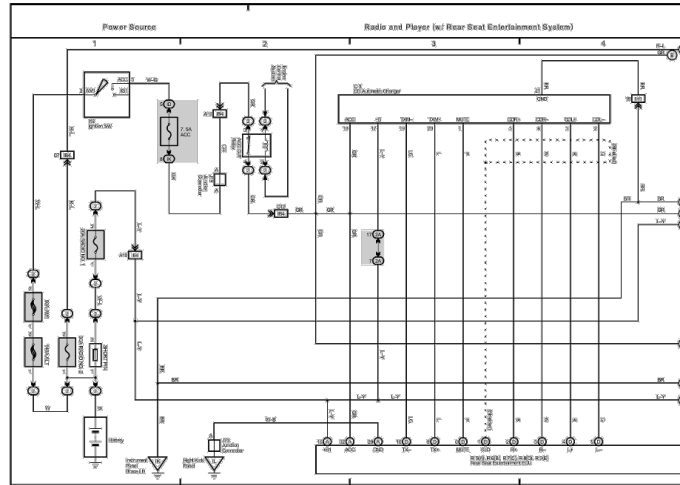


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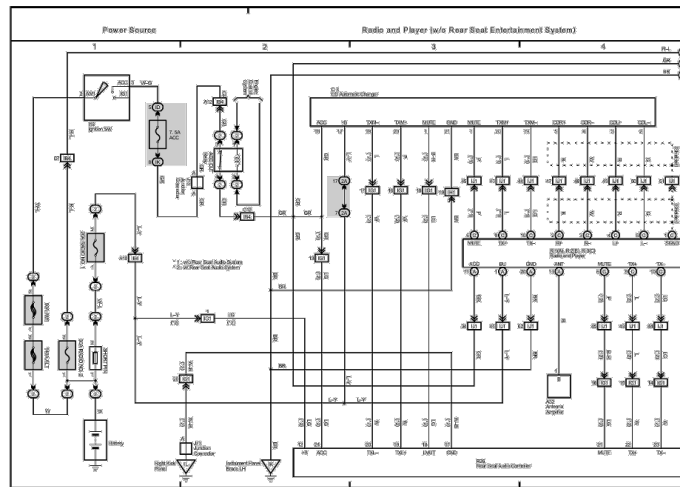


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Fig. Power Source (2003)

Fig. Power Source (2003)

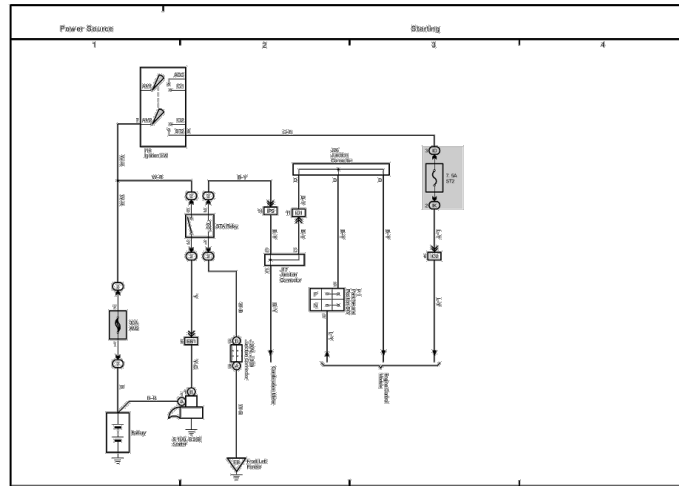


Fig. Power Source (2003)

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Fig. Power Source (2003)

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Fig. Power Source (2003)

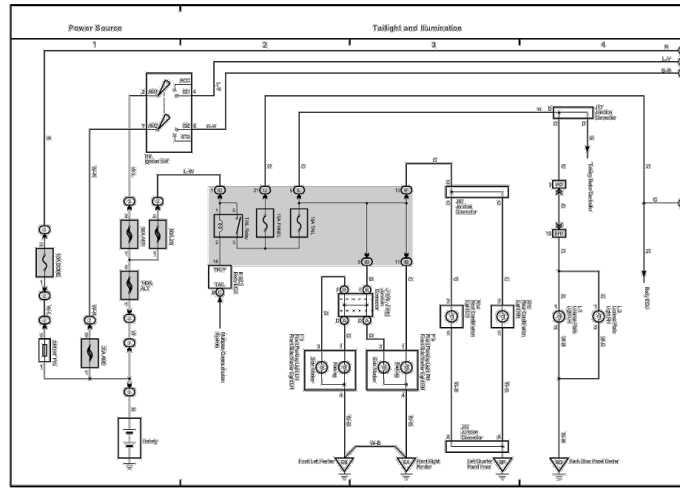


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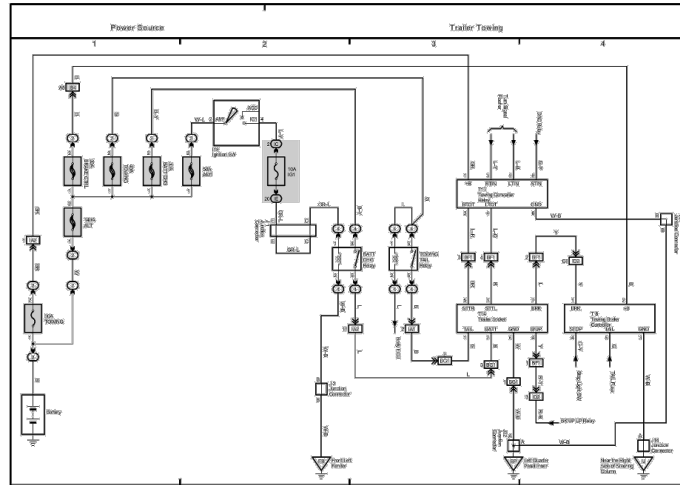


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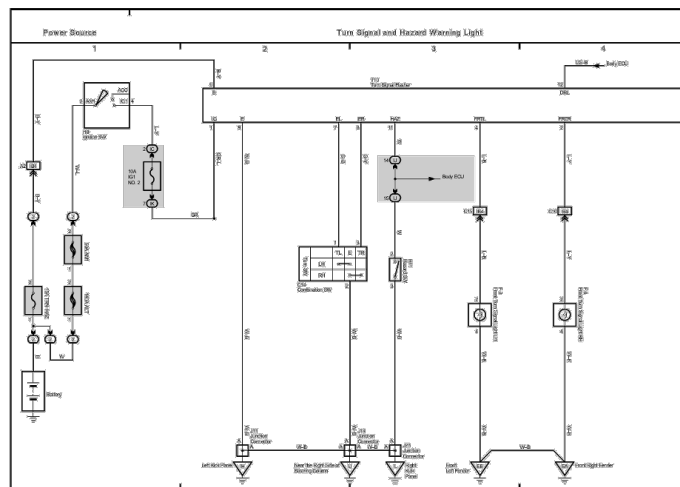


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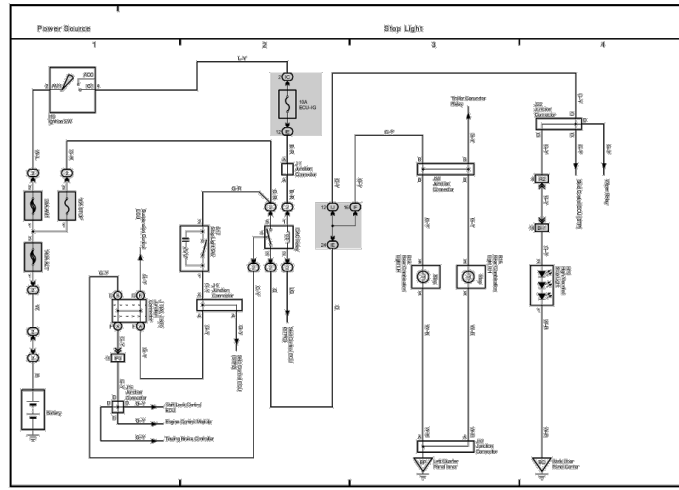


Fig. Power Source (2003)



Fig. Power Source (2003)



Fig. Power Source (2003)

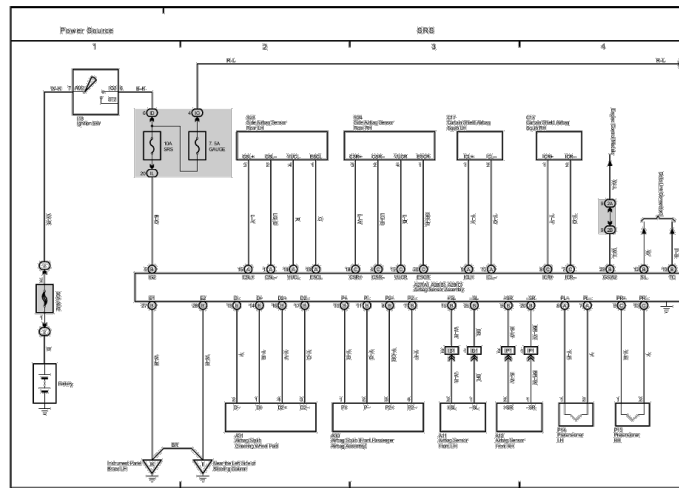


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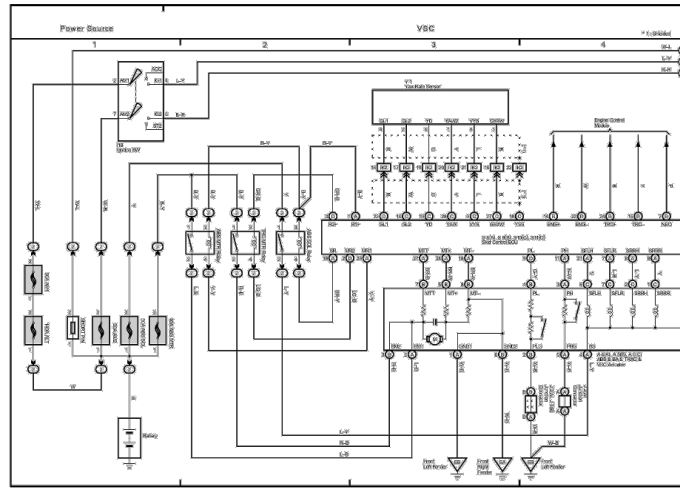


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Fig. Power Source (2003)

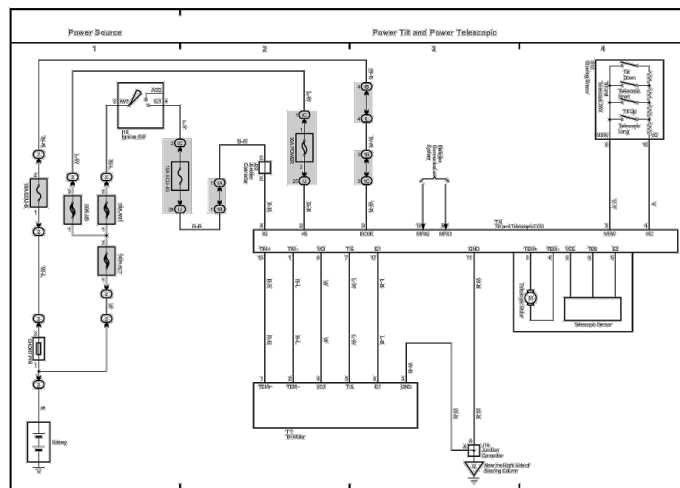


Fig. Power Source (2003)



Fig. Power Source (2003)



Fig. Power Source (2003)

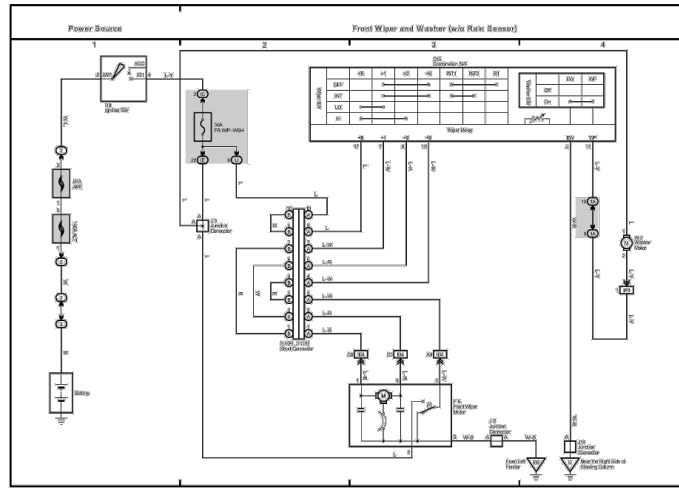


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Fig. Power Source (2003)

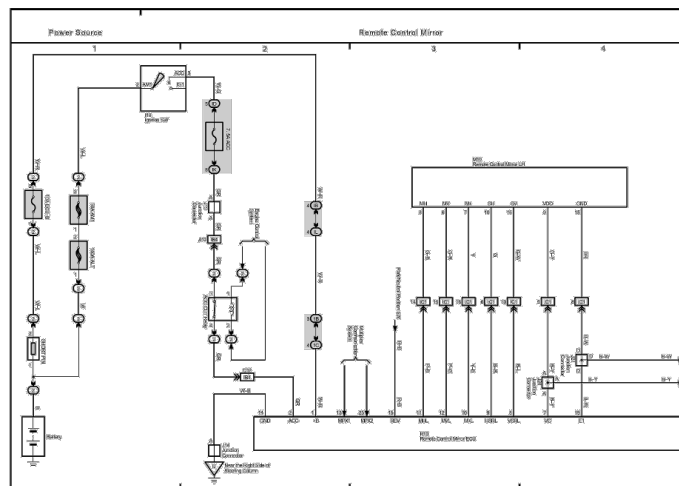
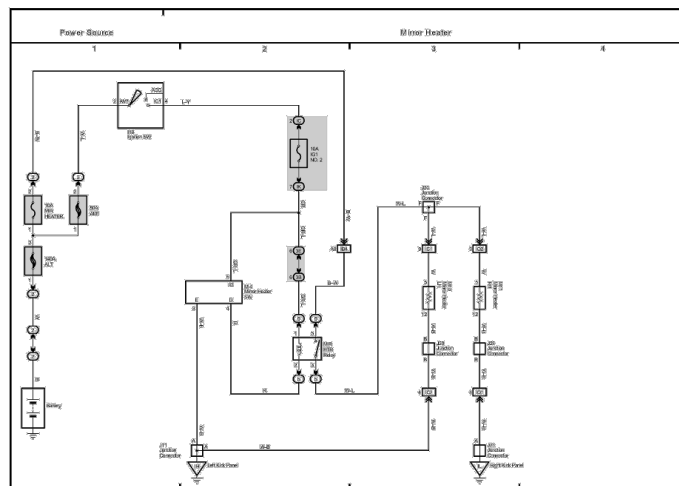
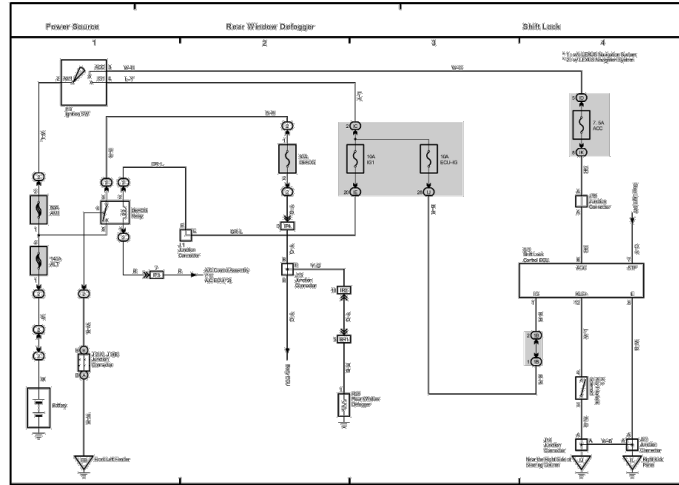


Fig. Power Source (2003)





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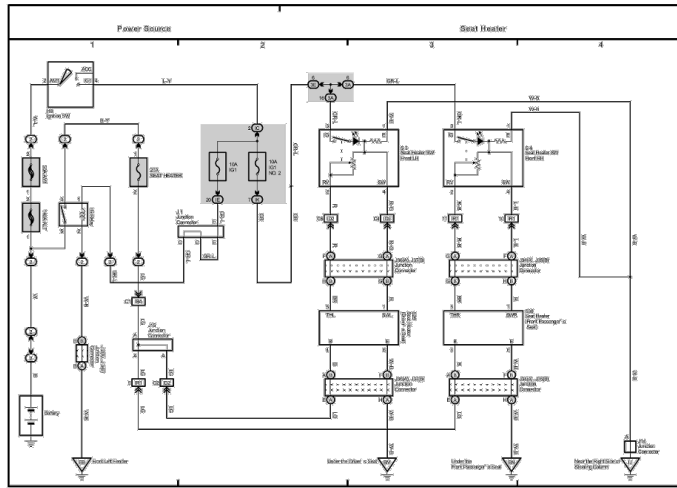


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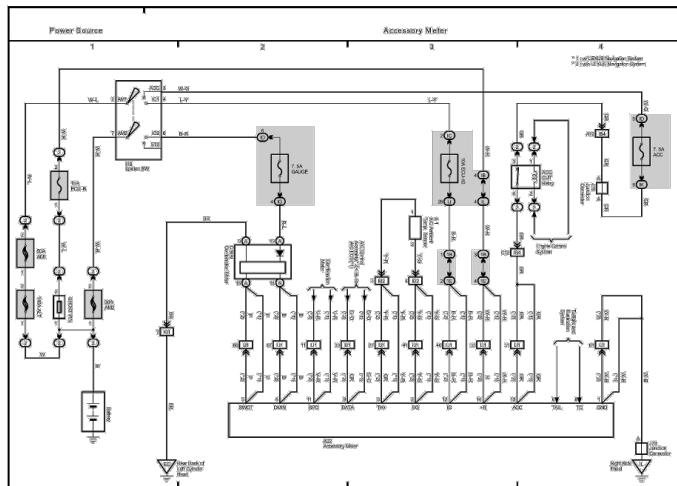


Fig. Power Source (2003)

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Fig. Power Source (2003)

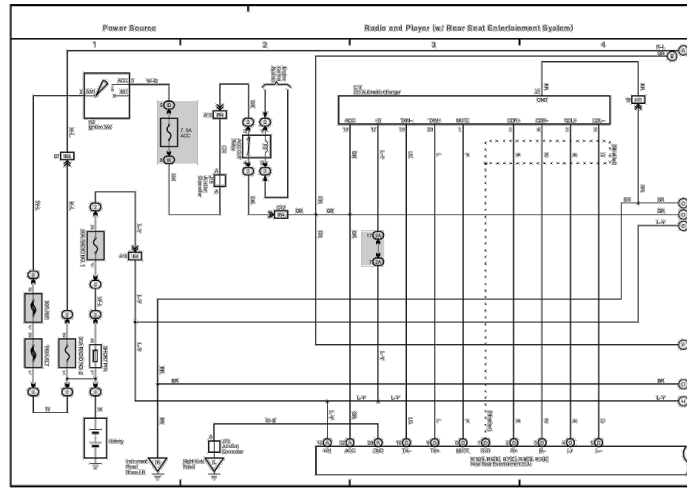


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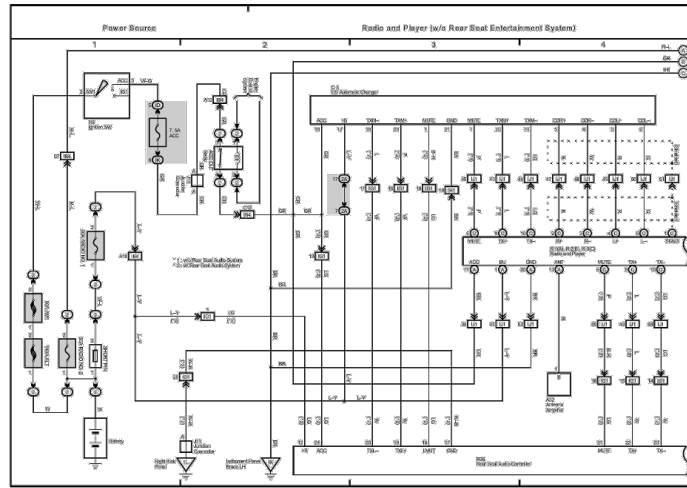


Fig. Power Source (2003)



Fig. Power Source (2003)



Fig. Power Source (2003)



Fig. Power Tilt and Power Telescopic (2003)



Fig. Power Tilt and Power Telescopic (2003)



Fig. Radio and Player (w/ Rear Seat Entertainment System) (2003)

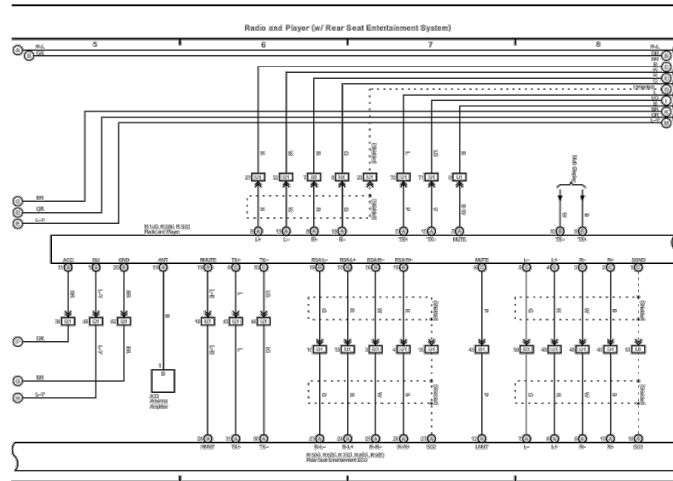


Fig. Radio and Player (w/ Rear Seat Entertainment System) (2003)

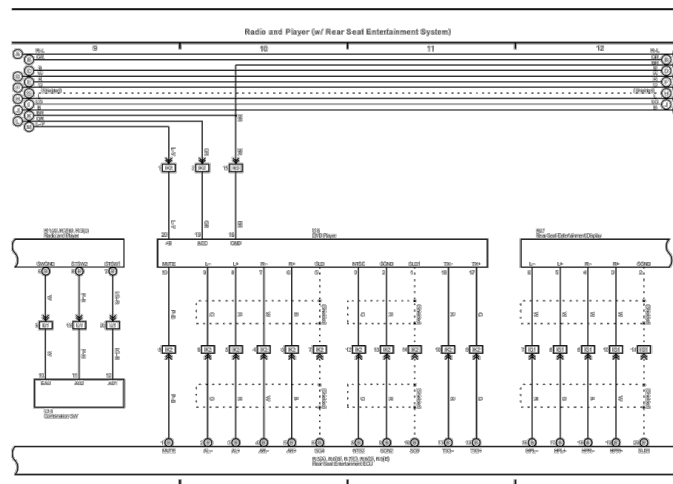


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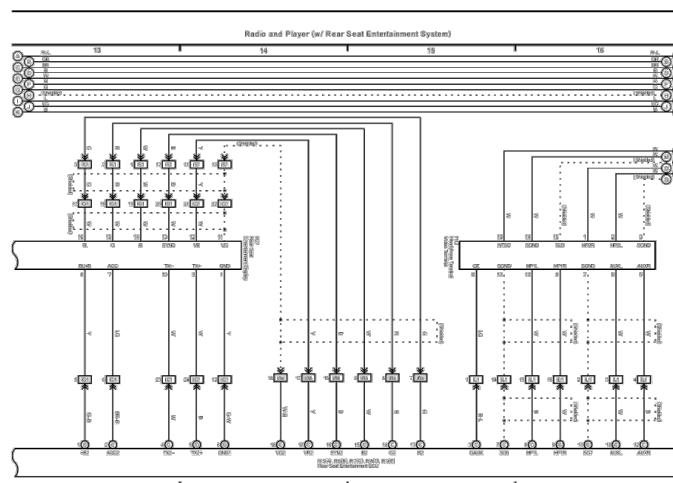


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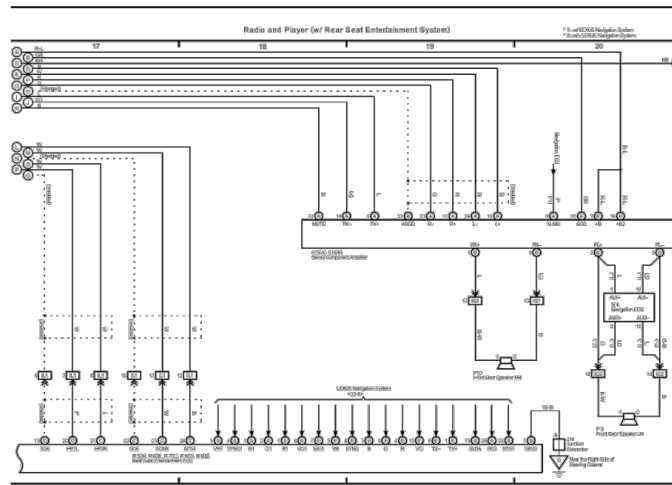


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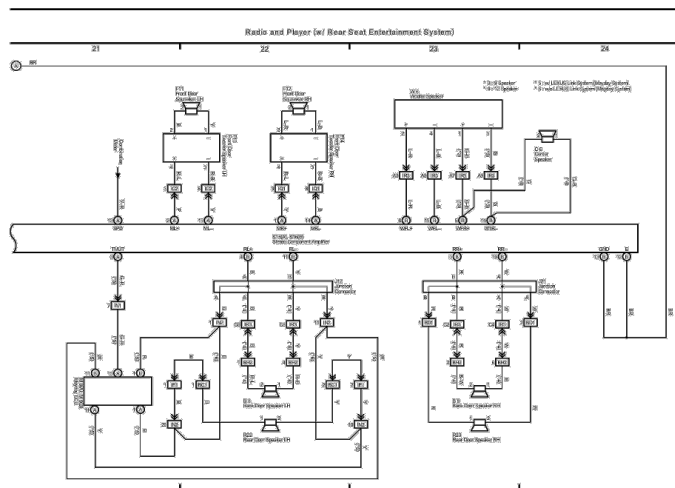


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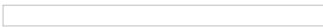


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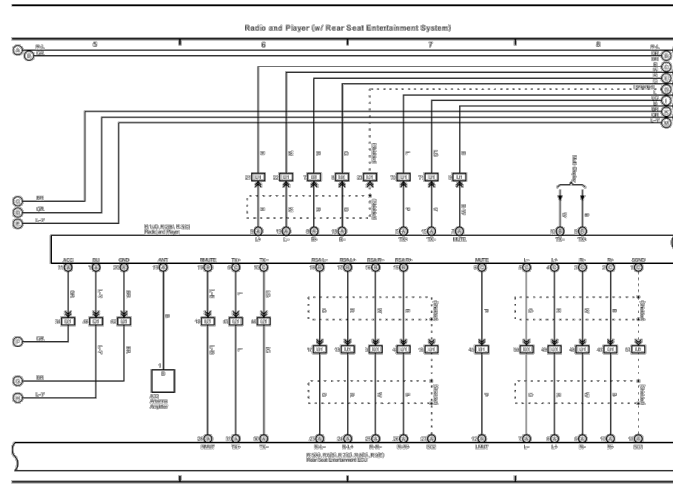


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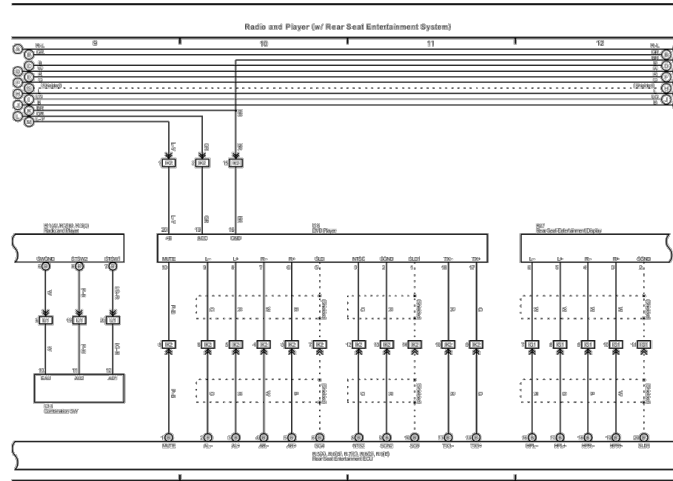


Fig. Radio and Player (w/ Rear Seat Entertainment System) (2003)

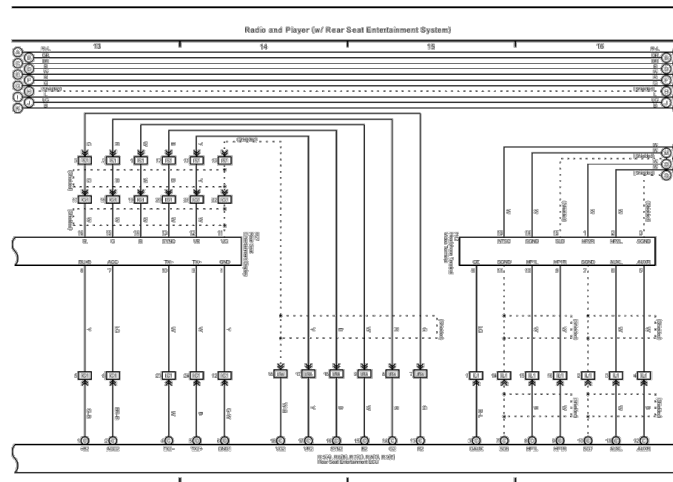


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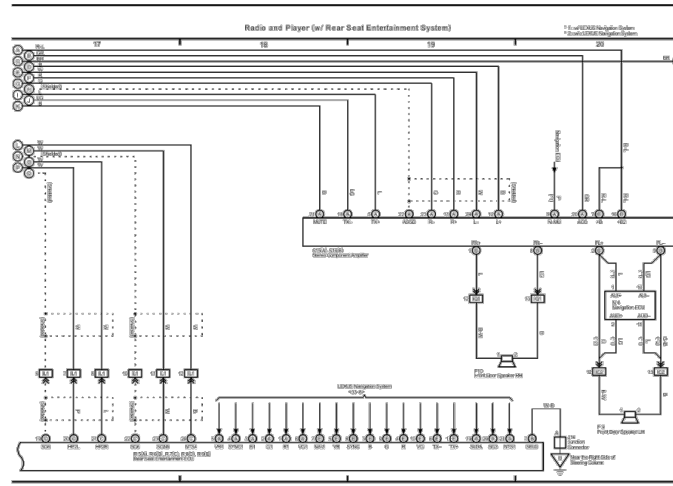


Fig. Radio and Player (w/ Rear Seat Entertainment System) (2003)

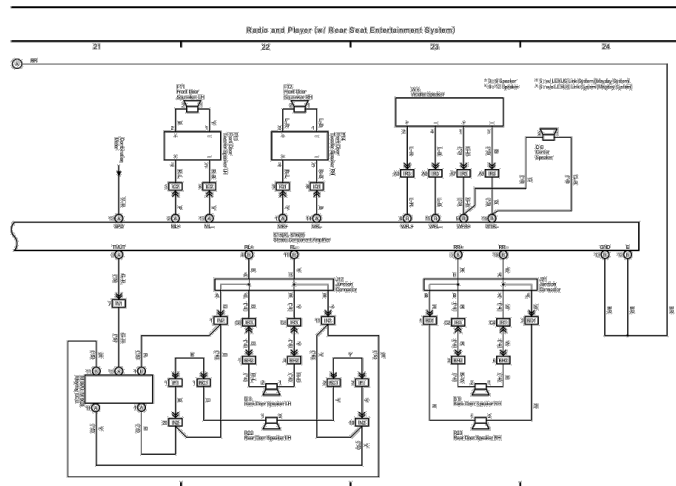


Fig. Radio and Player (w/ Rear Seat Entertainment System) (2003)

Fig. Radio and Player (w/o Rear Seat Entertainment System) (2003)

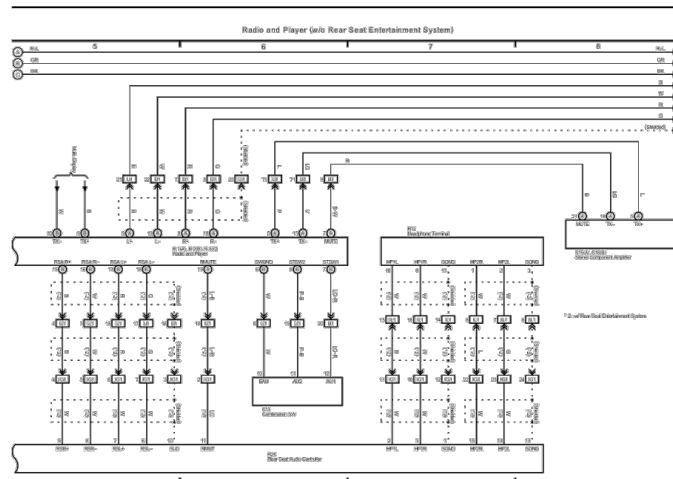


Fig. Radio and Player (w/o Rear Seat Entertainment System) (2003)

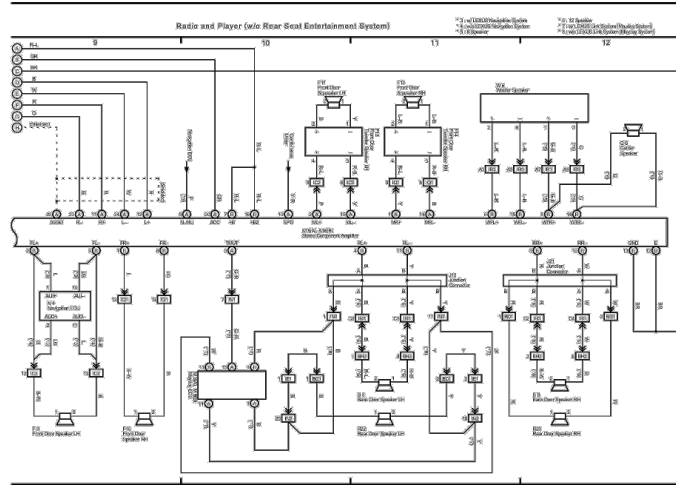


Fig. Radio and Player (w/o Rear Seat Entertainment System) (2003)



Fig. Radio and Player (w/o Rear Seat Entertainment System) (2003)

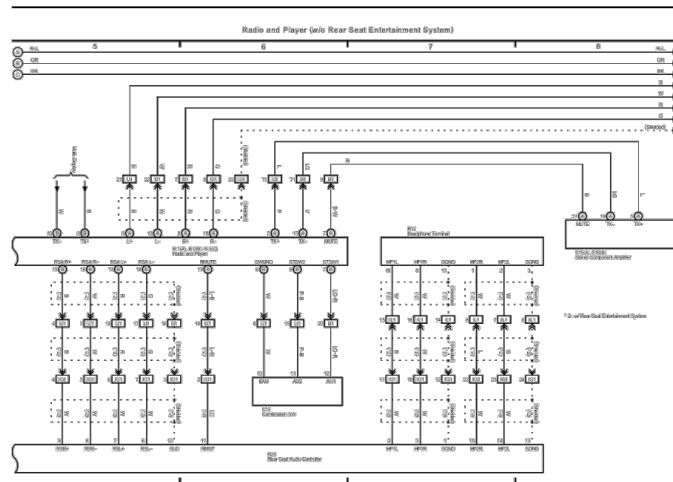


Fig. Radio and Player (w/o Rear Seat Entertainment System) (2003)



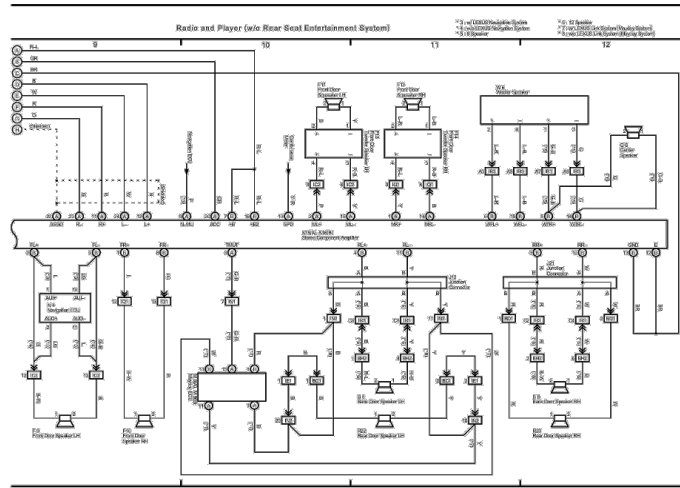


Fig. Radio and Player (w/o Rear Seat Entertainment System) (2003)

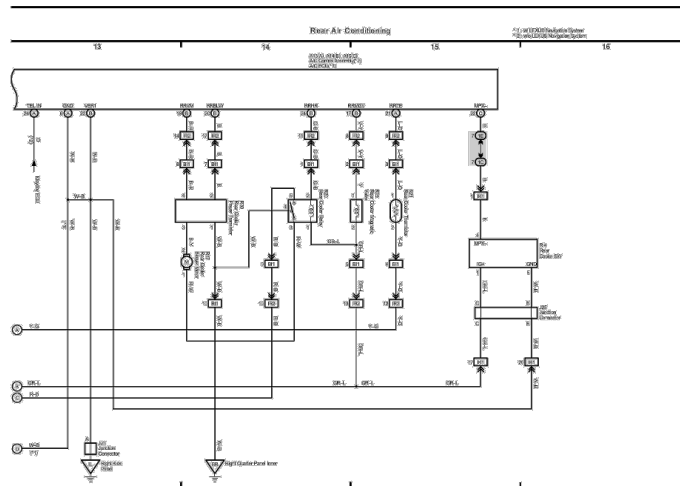


Fig. Rear Air Conditioning (2003)

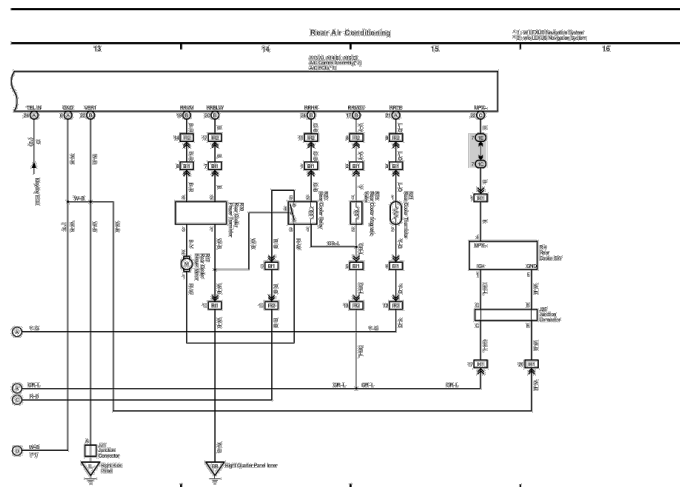


Fig. Rear Air Conditioning (2003)

Fig. Rear Window Defogger (2003)

Fig. Rear Window Defogger (2003)

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Fig. Remote Control Mirror (2003)

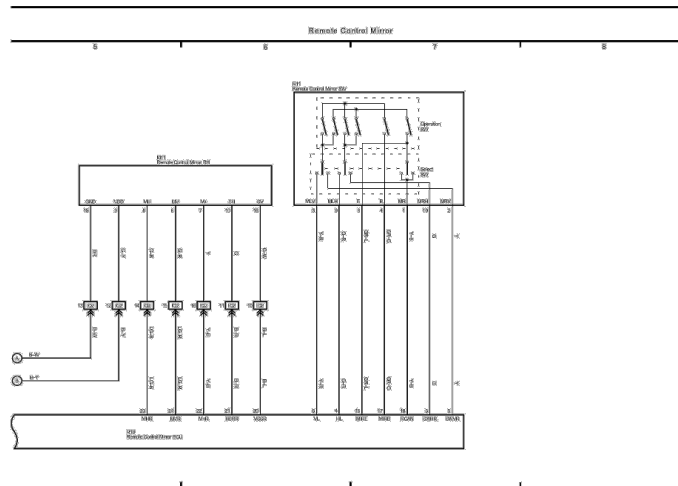


Fig. Remote Control Mirror (2003)

Fig. Remote Control Mirror (2003)

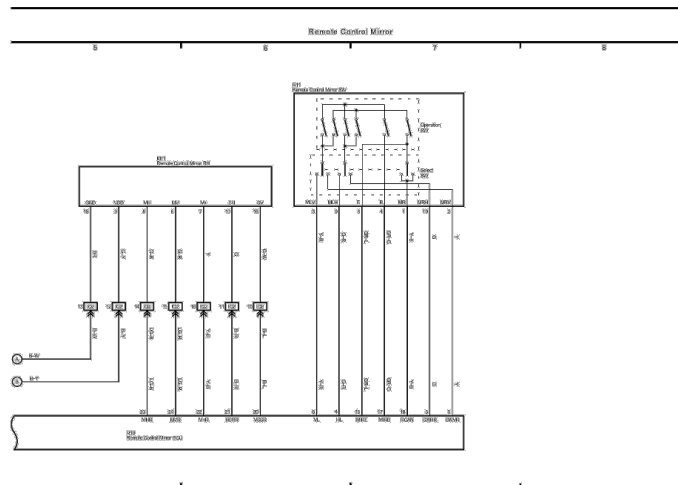


Fig. Remote Control Mirror (2003)



Fig. Seat Heater (2003)



Fig. Seat Heater (2003)



Fig. Shift Lock (2003)



Fig. Shift Lock (2003)



Fig. SRS (2003)

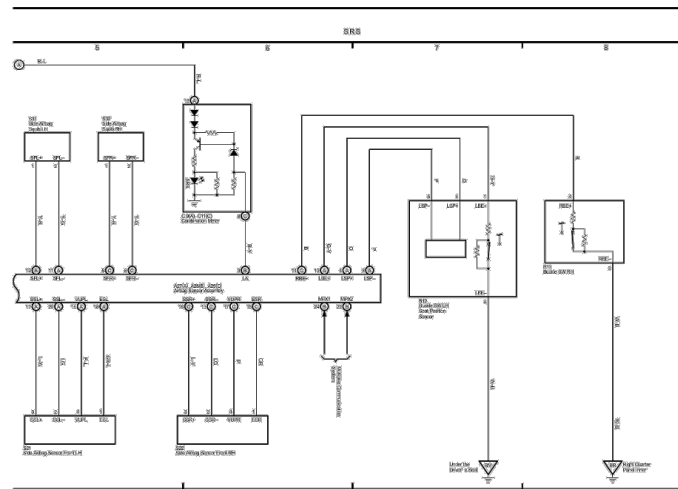


Fig. SRS (2003)



Fig. SRS (2003)

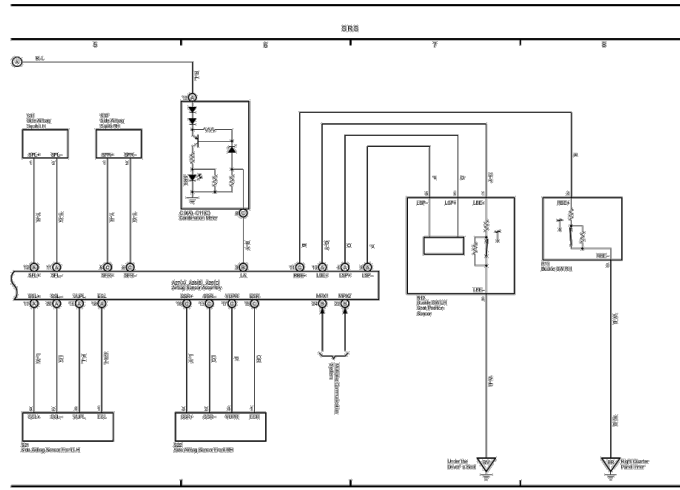


Fig. SRS (2003)



Fig. Starting (2003)



Fig. Starting (2003)



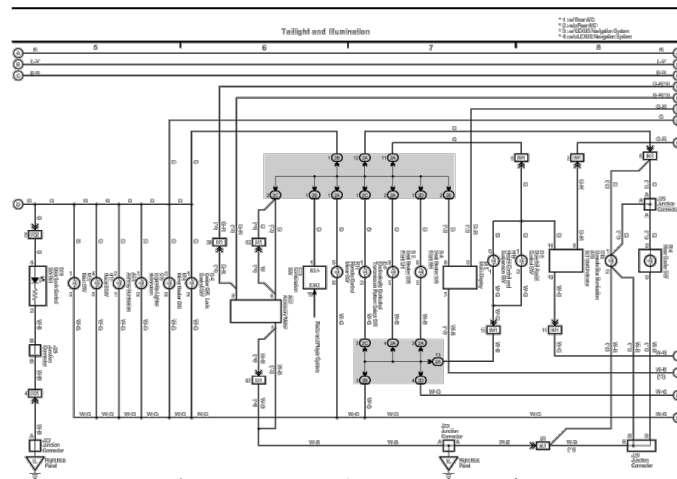
Fig. Stop Light (2003)



Fig. Stop Light (2003)



Fig. Taillight and Illumination (2003)





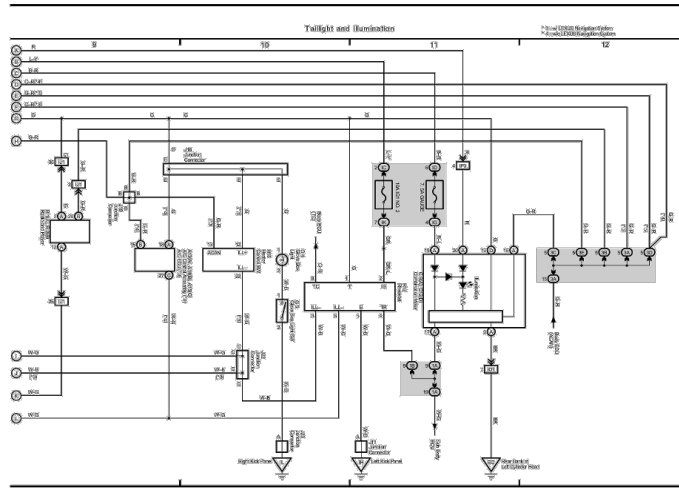


Fig. Taillight and Illumination (2003)



Fig. Trailer Towing (2003)



Fig. Trailer Towing (2003)



Fig. Turn Signal and Hazard Warning Light (2003)

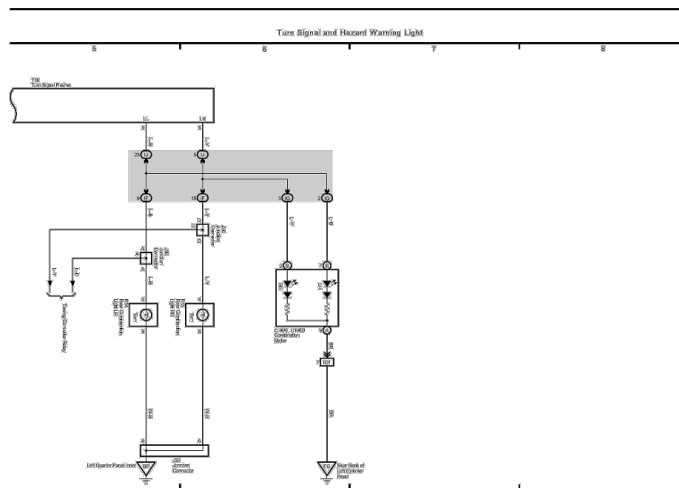


Fig. Turn Signal and Hazard Warning Light (2003)



Fig. Turn Signal and Hazard Warning Light (2003)

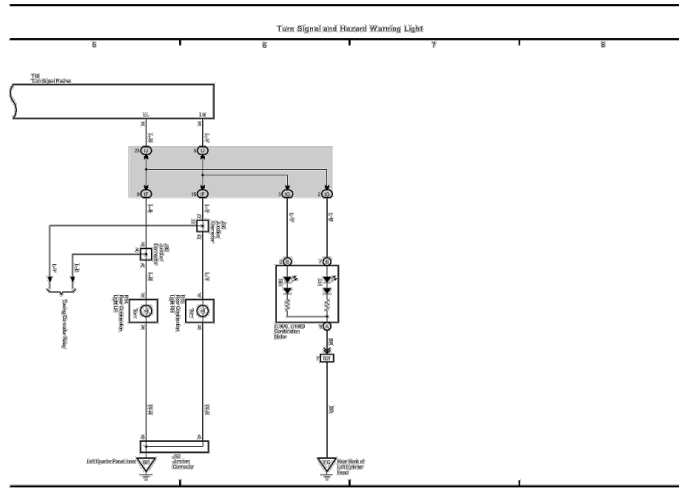


Fig. Turn Signal and Hazard Warning Light (2003)

Fig. VSC (2003)

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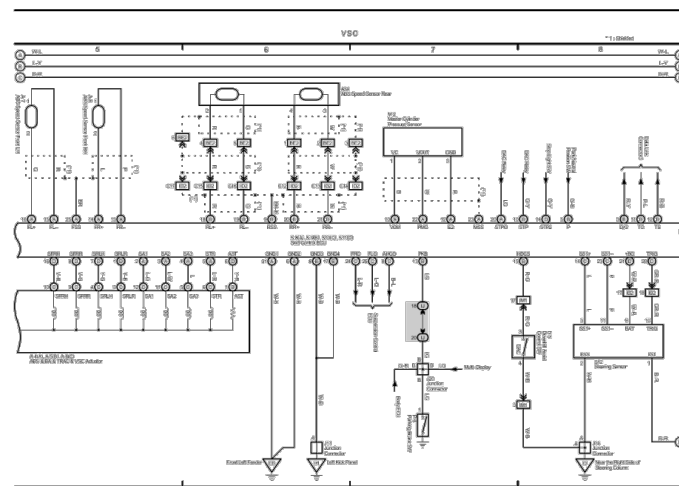


Fig. VSC (2003)

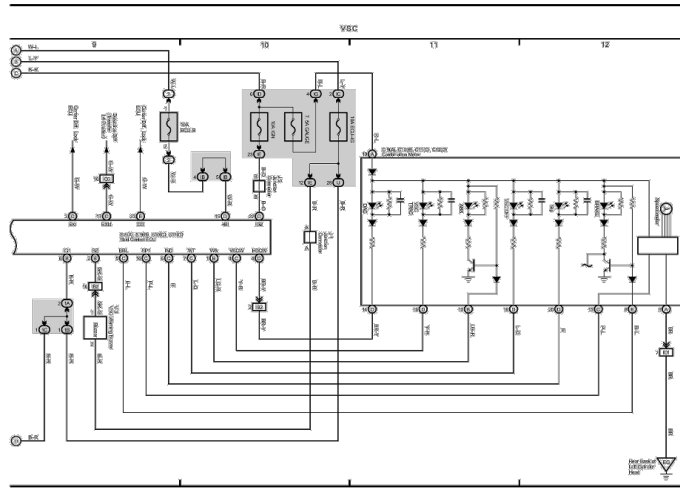


Fig. VSC (2003)



Fig. VSC (2003)

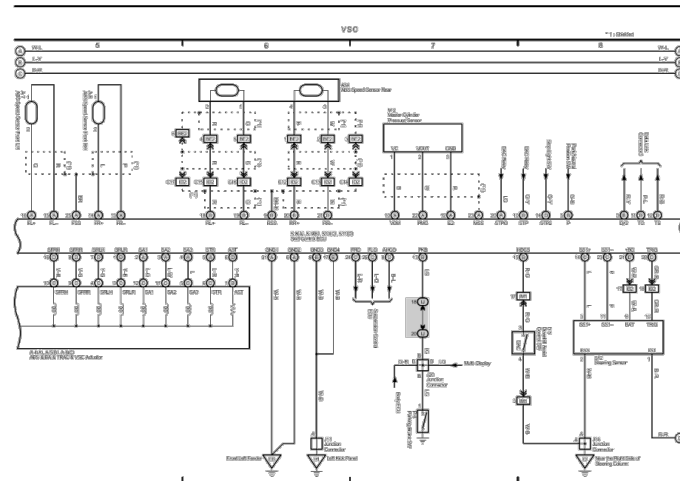


Fig. VSC (2003)

