

# **Component Procedures: Drive Belt**

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# Component Procedures: Drive Belt

## Parts and Labor (itype\_189)

### Parts

Qualifier	Part #	Name	Price	Note
Serpentine Belt	12639035	Serpentine Belt	69.36	

### Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Remove & Replace	Belts & Pulleys > Serpentine Belt, R&R	C	0.4	0.3

## Drive Belt System Description (Article 12012)

The drive belt system consists of the following components:

- The drive belt
- The drive belt tensioner
- The drive belt idler pulley
- The crankshaft balancer pulley
- The accessory drive component mounting brackets
- The accessory drive components
- The power steering pump, if belt driven
- The generator
- The A/C compressor, if equipped
- The engine cooling fan , if belt driven
- The water pump , if belt driven
- The vacuum pump, if equipped
- The air compressor, if equipped

The drive belt system may use 1 belt or 2 belts. The drive belt is thin so that it can bend backwards and has several ribs to match the grooves in the pulleys. The drive belts are made of different types of rubbers, chloroprene or EPDM, and have different layers or plies containing either fiber cloth or cords for reinforcement.

Both sides of the drive belt may be used to drive the different accessory drive components. When the back side of the drive belt is used to drive a pulley, the pulley is smooth.

The drive belt is pulled by the crankshaft balancer pulley across the accessory drive component pulleys. The spring loaded drive belt tensioner keeps constant tension on the drive belt to prevent the drive belt from slipping. The drive belt tensioner arm will move when loads are applied to the drive belt by the accessory drive components and the crankshaft.

The drive belt system may have an idler pulley , which is used to add wrap to the adjacent pulleys. Some systems use an idler pulley in place of an accessory drive component when the vehicle is not equipped with the accessory.

## Drive Belt Replacement (Article 12169)

Callout Component Name

Preliminary Procedure Remove the air cleaner outlet duct , if necessary. Refer to Air Cleaner Outlet Duct Replacement .

Preliminary Procedure

Remove the air cleaner outlet duct , if necessary. Refer to Air Cleaner Outlet Duct Replacement .

1 Drive Belt Procedure Use a breaker bar to rotate the drive belt tensioner . Remove the drive belt from the pulleys and tensioner Clean and inspect the drive belt surfaces of all the pulleys. Inspect the drive belt for correct alignment.

Procedure

- Use a breaker bar to rotate the drive belt tensioner .
- Remove the drive belt from the pulleys and tensioner
- Clean and inspect the drive belt surfaces of all the pulleys.
- Inspect the drive belt for correct alignment.

## Belt Dressing Caution (Article 13032)

Document ID: 2062039

**Caution:**

Do not use belt dressing on the drive belt

. Belt dressing causes the breakdown of the composition of the drive belt. Failure to follow this recommendation will damage the drive belt.

## **Drive Belt Chirping, Squeal, and Whine Diagnosis (Article 12028)**

### Diagnostic Aids

- A chirping or squeal noise may be intermittent due to moisture on the drive belts or the pulleys. It may be necessary to spray a small amount of water on the drive belts in order to duplicate the customer's concern. If spraying water on the drive belt duplicates the symptom, cleaning the belt pulleys may be the probable solution.
- If the noise is intermittent, verify the accessory drive components by varying their loads making sure they are operated to their maximum capacity. An overcharged A/C system, power steering system with a pinched hose or wrong fluid, or a generator failing are suggested items to inspect.
- A chirping, squeal or whine noise may be caused by a loose or improper installation of a body or suspension component. Other items of the vehicle may also cause the noise.
- The drive belts will not cause a whine noise.

### Test Description

The numbers below refer to the step numbers on the diagnostic table.

- The noise may not be engine related. This step is to verify that the engine is making the noise. If the engine is not making the noise do not proceed further with this table.
- The noise may be an internal engine noise. Removing the drive belts one at a time and operating the engine for a brief period will verify the noise is related to the drive belt. When removing the drive belt the water pump may not be operating and the engine may overheat. Also DTCs may set when the engine is operating with the drive belts removed.
- Inspect all drive belt pulleys for pilling. Pilling is the small balls or pills or it can be strings in the drive belt grooves from the accumulation of rubber dust.
- Misalignment of the pulleys may be caused from improper mounting of the accessory drive component, incorrect installation of the accessory drive component pulley, or the pulley bent inward or outward from a previous repair. Test for a misaligned pulley using a straight edge in the pulley grooves across two or three pulleys. If a misaligned pulley is found refer to that accessory drive component for the proper installation procedure for that pulley.
- Inspecting of the fasteners can eliminate the possibility that a wrong bolt, nut, spacer, or washer was installed.
- Inspecting the pulleys for being bent should include inspecting for a dent or other damage to the pulleys that would prevent the drive belt from not seating properly in all of the pulley grooves or on the smooth surface of a pulley when the back side of the belt is used to drive the pulley.
- This test is to verify that the drive belt tensioner operates properly. If the drive belt tensioner is not operating properly, proper belt tension may not be achieved to keep the drive belt from slipping which could cause a squeal noise.
- This test is to verify that the drive belt is not too long, which would prevent the drive belt tensioner from working properly. Also if an incorrect length drive belt was installed, it may not be routed properly and may be turning an accessory drive component in the wrong direction.
- This test is to verify that the pulleys are the correct diameter or width. Using a known good vehicle compare the pulley sizes.
- Replacing the drive belt when it is not damaged or there is not excessive pilling will only be a temporary repair.

### Step Action Yes No

**Caution:** Refer to Belt Dressing Caution . **DEFINITION:** The following items are indications of chirping: A high pitched noise that is heard once per revolution of the drive belt or a pulley. Chirping may occur on cold damp start-ups and will subside once the vehicle reaches normal operating temp. **DEFINITION:** The following items are indications of drive belt squeal: A loud screeching noise that is caused by a slipping drive belt. This is unusual for a drive belt with multiple ribs. The noise occurs when a heavy load is applied to the drive belt, such as an air conditioning compressor engagement snapping the throttle, or slipping on a seized pulley or a faulty accessory drive component. **DEFINITION:** The following items are indications of drive belt whine: A high pitched continuous noise. The noise may be caused by an accessory drive component failed bearing.

- A high pitched noise that is heard once per revolution of the drive belt or a pulley.
- Chirping may occur on cold damp start-ups and will subside once the vehicle reaches normal operating temp.
- A loud screeching noise that is caused by a slipping drive belt. This is unusual for a drive belt with

multiple ribs.

- The noise occurs when a heavy load is applied to the drive belt, such as an air conditioning compressor engagement snapping the throttle, or slipping on a seized pulley or a faulty accessory drive component.

- A high pitched continuous noise.

- The noise may be caused by an accessory drive component failed bearing.

1 Did you review the Drive Belt Symptom operation and perform the necessary inspections? Go to Step 2 Go to Symptoms - Engine Mechanical

2 Verify that there is a chirping, squeal or whine noise. Does the engine make the chirping squeal or whine noise? Go to Step 3 Go to Diagnostic Aids

3 Remove the drive belt. If the engine has multiple drive belts, remove the belts one at a time and perform the test below each time a belt is removed. Operate the engine for no longer than 30–40 seconds. Repeat this test if necessary by removing the remaining belt(s). Does the chirping, squeal or whine noise still exist? Go to Symptoms - Engine Mechanical Go to Step 4

- Remove the drive belt. If the engine has multiple drive belts, remove the belts one at a time and perform the test below each time a belt is removed.

- Operate the engine for no longer than 30–40 seconds.

- Repeat this test if necessary by removing the remaining belt(s).

4 If diagnosing a chirping noise, inspect for severe pilling exceeding 1/3 of the belt groove depth. If diagnosing a squeal or whine noise, proceed to step 13. Do the belt grooves have pilling? Go to Step 5 Go to Step 6

5 Clean the drive belt pulleys with a suitable wire brush. Did you complete the repair? Go to Step 20 Go to Step 6

6 Inspect for misalignment of the pulleys. Are any of the pulleys misaligned? Go to Step 7 Go to Step 8

7 Replace or repair any misaligned pulleys. Did you complete the repair? Go to Step 20 Go to Step 8

8 Inspect for bent or cracked brackets. Did you find any bent or cracked brackets? Go to Step 9 Go to Step 10

9 Replace any bent or cracked brackets. Did you complete the repair? Go to Step 20 Go to Step 10

10 Inspect for improper, loose or missing fasteners. Did you find the condition? Go to Step 11 Go to Step 12

11 Caution: Refer to Fastener Caution . Tighten any loose fasteners. Refer to Fastener Specifications .

Replace any improper or missing fasteners. Did you complete the repair? Go to Step 20 Go to Step 12

- Tighten any loose fasteners. Refer to Fastener Specifications .

- Replace any improper or missing fasteners.

12 Inspect for a bent pulley. Did you find the condition? Go to Step 18 Go to Step 19

13 Inspect for an accessory drive component seized bearing or a faulty accessory drive component. Did you find and correct the condition? Go to Step 20 Go to Step 14

14 If diagnosing a whine noise and the condition still exist, proceed to Diagnostic Aids. Test the drive belt tensioner for proper operation. Refer to Drive Belt Tensioner Diagnosis . Did you find and correct the condition? Go to Step 20 Go to Step 15

15 Inspect for the correct drive belt length. Did you find and correct the condition? Go to Step 20 Go to Step 16

16 Inspect for misalignment of a pulley. Did you find and correct the condition? Go to Step 20 Go to Step 17

17 Inspect for the correct pulley size. Did you find and correct the condition? Go to Step 20 Go to Diagnostic Aids

18 Replace the bent pulley. Did you complete the repair? Go to Step 20 Go to Step 19

19 Replace the drive belt. Refer to Drive Belt Replacement . Did you complete the repair? Go to Step 20 Go to Diagnostic Aids

20 Operate the system in order to verify the repair. Did you correct the condition? System OK Go to Step 3

## **Drive Belt Rumbling and Vibration Diagnosis (Article 12030)**

### Diagnostic Aids

The accessory drive components can have an affect on engine vibration. Vibration from the engine operating may cause a body component or another part of the vehicle to make rumbling noise. Vibration can be caused by, but not limited to the A/C system over charged, the power steering system restricted or the incorrect fluid, or an extra load on the generator. To help identify an intermittent or an improper condition, vary the loads on the accessory drive components.

The drive belt may have a rumbling condition that can not be seen or felt. Sometimes replacing the drive belt may be the only repair for the symptom.

If replacing the drive belt, completing the diagnostic table, and the noise is only heard when the drive belts are installed, there might be an accessory drive component with a failure. Varying the load on the different accessory drive components may aid in identifying which component is causing the rumbling noise.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

- This test is to verify that the symptom is present during diagnosing. Other vehicle components may cause a similar symptom.
- This test is to verify that one of the drive belts is causing the rumbling noise or vibration. Rumbling noise may be confused with an internal engine noise due to the similarity in the description. Remove only one drive belt at a time if the vehicle has multiple drive belts. When removing the drive belts the water pump may not be operating and the engine may overheat. Also DTCs may set when the engine is operating with the drive belts removed.
- Inspecting the drive belts is to ensure that they are not causing the noise. Small cracks across the ribs of the drive belt will not cause the noise. Belt separation is identified by the plies of the belt separating and may be seen at the edge of the belt or felt as a lump in the belt.
- Small amounts of pilling is normal condition and acceptable. When the pilling is severe the drive belt does not have a smooth surface for proper operation.
- Inspecting of the fasteners can eliminate the possibility that the wrong bolt, nut, spacer, or washer was installed.
- This step should only be performed if the water pump is driven by the drive belt. Inspect the water pump shaft for being bent. Also inspect the water pump bearings for smooth operation and excessive play. Compare the water pump with a known good water pump.
- Accessory drive component brackets that are bent, cracked, or loose may put extra strain on that accessory component causing it to vibrate.

Step Action Yes No

Caution: Refer to Belt Dressing Caution . DEFINITION: The following items are indications of drive belt rumbling: A low pitch tapping, knocking, or thumping noise heard at or just above idle. Heard once per revolution of the drive belt or a pulley. Rumbling may be caused from: Pilling, the accumulation of rubber dust that forms small balls (pills) or strings in the drive belt pulley groove The separation of the drive belt A damaged drive belt DEFINITION: The following items are indications of drive belt vibration: The vibration is engine-speed related. The vibration may be sensitive to accessory load.

- A low pitch tapping, knocking, or thumping noise heard at or just above idle.
  - Heard once per revolution of the drive belt or a pulley.
  - Rumbling may be caused from:
    - Pilling, the accumulation of rubber dust that forms small balls (pills) or strings in the drive belt pulley groove
    - The separation of the drive belt
    - A damaged drive belt
    - The vibration is engine-speed related.
    - The vibration may be sensitive to accessory load.
- 1 Did you review the Drive Belt Symptom operation and perform the necessary inspections? Go to Step 2 Go to Symptoms - Engine Mechanical
- 2 Verify that there is a rumbling noise or that the vibration is engine related. Does the engine make the rumbling noise or vibration? Go to Step 3 Go to Diagnostic Aids
- 3 Remove the drive belt. If the engine has multiple drive belts, remove the belts one at a time and perform the test below each time a belt is removed. Operate the engine for no longer than 30–40 seconds. Repeat this test if necessary by removing the remaining belt(s). Does the rumbling or vibration still exist? Go to Symptoms - Engine Mechanical or Go to Vibration Analysis - Engine Go to Step 4
- Remove the drive belt. If the engine has multiple drive belts, remove the belts one at a time and perform the test below each time a belt is removed.
  - Operate the engine for no longer than 30–40 seconds.
  - Repeat this test if necessary by removing the remaining belt(s).
- 4 Inspect the drive belts for wear, damage, separation, sections of missing ribs, and debris build-up. Did you find any of these conditions? Go to Step 7 Go to Step 5
- 5 Inspect for severe pilling of more than 1/3 of the drive belt pulley grooves. Did you find severe pilling? Go to Step 6 Go to Step 7
- 6 Clean the drive belt pulleys using a suitable wire brush. Reinstall the drive belts. Refer to Drive Belt Replacement . Did you correct the condition? Go to Step 8 Go to Step 7
- Clean the drive belt pulleys using a suitable wire brush.
  - Reinstall the drive belts. Refer to Drive Belt Replacement .
- 7 Install a new drive belt. Refer to Drive Belt Replacement . Did you complete the replacement? Go to Step 8 Go to Step 9
- 8 Operate the system in order to verify the repair. Did you correct the condition? System OK Go to Step 9
- 9 Inspect for improper, loose or missing fasteners. Did you find any of these conditions? Go to Step 10 Go to

## Step 11

10 Tighten any loose fasteners. Refer to Fastener Specifications . Replace improper or missing fasteners. Did you complete the repair? Go to Step 13 Go to Step 11

- Tighten any loose fasteners. Refer to Fastener Specifications .
- Replace improper or missing fasteners.

11 Inspect for a bent water pump shaft. Refer to Water Pump Replacement . Did you find and correct the condition? Go to Step 13 Go to Step 12

12 Inspect for bent or cracked brackets. Did you find and correct the condition? Go to Step 13 Go to Diagnostic Aids

13 Operate the system in order to verify the repair. Did you correct the condition? System OK Go to Step 3

## Drive Belt Falls Off and Excessive Wear Diagnosis (Article 12029)

### Diagnostic Aids

If the drive belt repeatedly falls off the drive belt pulleys, this is because of pulley misalignment.

An extra load that is quickly applied on released by an accessory drive component may cause the drive belt to fall off the pulleys. Verify the accessory drive components operate properly.

If the drive belt is the incorrect length, the drive belt tensioner may not keep the proper tension on the drive belt.

Excessive wear on a drive belt is usually caused by an incorrect installation or the wrong drive belt for the application.

Minor misalignment of the drive belt pulleys will not cause excessive wear, but will probably cause the drive belt to make a noise or to fall off.

Excessive misalignment of the drive belt pulleys will cause excessive wear but may also make the drive belt fall off.

### Test Description

The numbers below refer to the step numbers on the diagnostic table.

- This inspection is to verify the condition of the drive belt. Damage may of occurred to the drive belt when the drive belt fell off. The drive belt may of been damaged, which caused the drive belt to fall off. Inspect the belt for cuts, tears, sections of ribs missing, or damaged belt plys.
- Misalignment of the pulleys may be caused from improper mounting of the accessory drive component, incorrect installation of the accessory drive component pulley, or the pulley bent inward or outward from a previous repair. Test for a misaligned pulley using a straight edge in the pulley grooves across two or three pulleys. If a misaligned pulley is found refer to that accessory drive component for the proper installation procedure of that pulley.
- Inspecting the pulleys for being bent should include inspecting for a dent or other damage to the pulleys that would prevent the drive belt from not seating properly in all of the pulley grooves or on the smooth surface of a pulley when the back side of the belt is used to drive the pulley.
- Accessory drive component brackets that are bent or cracked will let the drive belt fall off.
- Inspecting of the fasteners can eliminate the possibility that a wrong bolt, nut , spacer, or washer was installed. Missing, loose, or the wrong fasteners may cause pulley misalignment from the bracket moving under load. Over tightening of the fasteners may cause misalignment of the accessory component bracket.
- The inspection is to verify the drive belt is correctly installed on all of the drive belt pulleys. Wear on the drive belt may be caused by mis-positioning the drive belt by one groove on a pulley.
- The installation of a drive belt that is two wide or two narrow will cause wear on the drive belt. The drive belt ribs should match all of the grooves on all of the pulleys.
- This inspection is to verify the drive belt is not contacting any parts of the engine or body while the engine is operating. There should be sufficient clearance when the drive belt accessory drive components load varies. The drive belt should not come in contact with an engine or a body component when snapping the throttle.

### Step Action Yes No

Caution: Refer to Belt Dressing Caution . DEFINITION: The drive belt falls off the pulleys or may not ride correctly on the pulleys. DEFINITION: Wear at the outside ribs of the drive belt due to an incorrectly installed drive belt.

1 Did you review the Drive Belt Symptom operation and perform the necessary inspections? Go to Step 2 Go to Symptoms - Engine Mechanical

2 If diagnosing excessive wear, proceed to step 13. If diagnosing a drive belt that falls off, inspect for a damaged drive belt. Did you find the condition? Go to Step 3 Go to Step 4

3 Install a new drive belt. Refer to Drive Belt Replacement . Does the drive belt continue to fall off? Go to Step 4 System OK

4 Inspect for misalignment of the pulleys. Did you find and repair the condition? Go to Step 12 Go to Step 5

- 5 Inspect for a bent or dented pulley. Did you find and repair the condition? Go to Step 12 Go to Step 6
- 6 Inspect for a bent or a cracked bracket. Did you find and repair the condition? Go to Step 12 Go to Step 7
- 7 Inspect for improper, loose or missing fasteners. Did you find loose or missing fasteners? Go to Step 8 Go to Step 9
- 8 Caution: Refer to Fastener Caution . Tighten any loose fasteners. Refer to Fastener Specifications . Replace improper or missing fasteners. Does the drive belt continue to fall off? Go to Step 9 System OK
  - Tighten any loose fasteners. Refer to Fastener Specifications .
  - Replace improper or missing fasteners.
- 9 Test the drive belt tensioner for operating correctly. Refer to Drive Belt Tensioner Diagnosis . Does the drive belt tensioner operate correctly? Go to Step 11 Go to Step 10
- 10 Replace the drive belt tensioner. Refer to Drive Belt Tensioner Replacement . Does the drive belt continue to fall off? Go to Step 11 System OK
- 11 Inspect for failed drive belt idler and drive belt tensioner pulley bearings. Did you find and repair the condition? Go to Step 12 Go to Diagnostic Aids
- 12 Operate the system in order to verify the repair. Did you correct the condition? System OK Go to Step 2
- 13 Inspect the drive belt for the proper installation. Refer to Drive Belt Replacement . Did you find this condition? Go to Step 16 Go to Step 14
- 14 Inspect for the proper drive belt. Did you find this condition? Go to Step 16 Go to Step 15
- 15 Inspect for the drive belt rubbing against a bracket, hose, or wiring harness. Did you find and repair the condition? Go to Step 17 Go to Diagnostic Aids
- 16 Replace the drive belt. Refer to Drive Belt Replacement . Did you complete the replacement? Go to Step 17 —
- 17 Operate the system in order to verify the repair. Did you correct the condition? System OK —