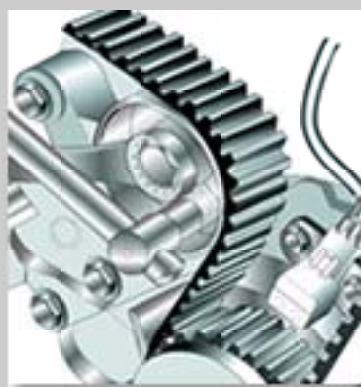


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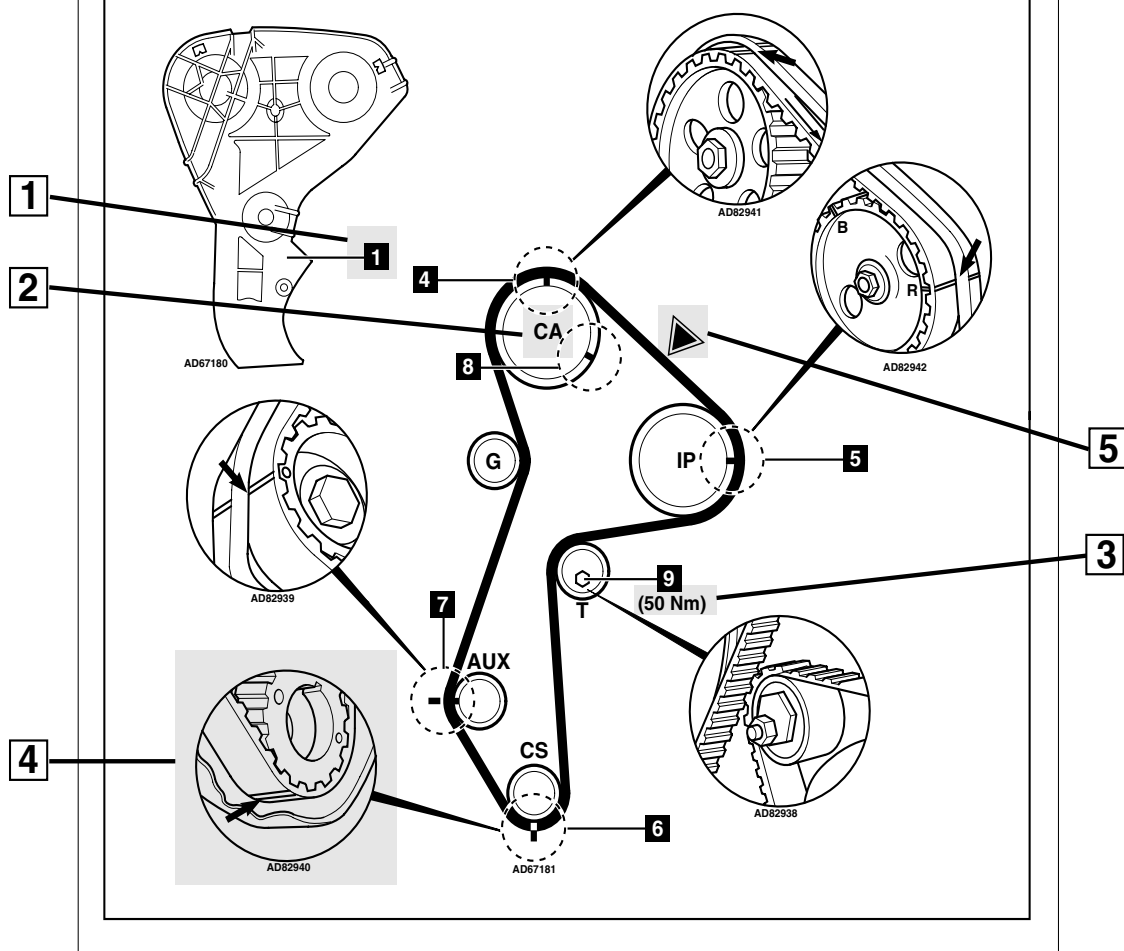
# Timing Belts

**Additional  
Information**

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**RENAULT**



- 1** Illustration identification number
- 2** Abbreviated sprocket identification
- 3** Tightening torque - Newton metres
- 4** Detail of timing marks
- 5** Timing belt tension checking point

The information relating to timing belt replacement intervals is additional to the main purpose of this manual but is included to provide guidance to garages and for customer advice.

Where possible the recommended intervals have been compiled from vehicle manufacturers' information. In a few instances no recommendation has been made by the manufacturer and the decision to replace the belt must be made from the evidence of a thorough examination of the condition of the existing belt.

Apart from the visible condition of the belt, which is explained fully later in this section, there are several other factors which must be considered when checking a timing belt:

1. Is the belt an original or a replacement.
2. When was the belt last replaced and was it at the correct mileage.
3. Is the service history of the vehicle known.
4. Has the vehicle been operated under arduous conditions which might warrant a shorter replacement interval.
5. Is the general condition of other components in the camshaft drive, such as the tensioner, pulleys, and other ancillary components driven by the timing belt, typically the water pump, sound enough to ensure that the life of the replacement belt will not be affected.
6. If the condition of the existing belt appears good, can you be satisfied that the belt will not fail before the next check or service is due.
7. If the belt does fail, have you considered the consequences. If the engine is an INTERFERENCE type then considerable expensive damage may well be the result.
8. The cost of replacing a belt as part of a routine service could be as little as 5 to 10% of the repair cost following a belt failure. Make sure your customer is aware of the consequences.
9. If in doubt about the condition of the belt - RENEW it.
10. Refer to the General Instructions section for further information relating to arduous or adverse operating conditions, inspection and service replacement.

- Engine damage - where it is stated that engine damage will result from belt failure it is still possible that by chance no damage will have occurred, therefore before removing the cylinder head check the compressions.
- Before disconnecting the battery earth lead ascertain if the vehicle is fitted with a coded radio. If it is, ensure that the owner has a record of the code or that an auxiliary power supply is connected to the set.
- Always disconnect the battery earth lead before starting work.
- Remove spark plugs (petrol engines) or glow plugs (diesel engines), to ease turning the engine.
- Always turn the engine in normal direction of rotation (clockwise - unless otherwise stated).
- Do NOT turn the camshaft, crankshaft or diesel injection pump, once the toothed belt has been removed (unless otherwise stated).
- Do NOT use timing pins to lock the engine when slackening or tightening crankshaft pulley bolt(s).
- Do NOT turn the crankshaft from the camshaft or other drive sprockets via the drive belt.
- Do NOT use cleaning fluids on belts, sprockets or rollers.
- Ensure that the replacement belt has the correct tooth profile. Trapezoidal, curvilinear and modified curvilinear types are NOT interchangeable.
- Do NOT forcibly twist the belt, turn inside out, or bend through a radius of less than 25 mm.
- Check the pulley alignment.
- Check the free running of auxiliary drives, such as water pump, oil pump and balancer shaft.
- Check the free running of tensioner and guide rollers.
- Always mark the belt with the direction of running before removal.
- Always refit a used belt so that its original direction of running is maintained.
- Do NOT lever or force the belt onto its sprockets.
- Always check the diesel injection pump timing, after replacing the drive belt.
- Observe all tightening torques.
- Check the ignition timing after belt replacement.

## Abbreviations

<b>AC</b>	Air conditioning compressor
<b>AP</b>	Air pump
<b>AT</b>	Automatic transmission
<b>AUX</b>	Auxiliary drive shaft
<b>BS</b>	Balancer shaft
<b>CA</b>	Camshaft
<b>CS</b>	Crankshaft
<b>F</b>	Cooling fan
<b>FP</b>	Fuel pump (diesel)
<b>FWD</b>	Front wheel drive

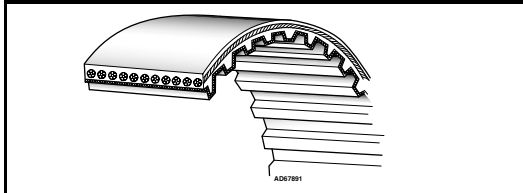
<b>G</b>	Guide pulley
<b>GEN</b>	Alternator
<b>HP</b>	Hydraulic pump
<b>INT</b>	Intermediate shaft
<b>IP</b>	Injection pump (diesel)
<b>Kg</b>	Kilogrammes
<b>LH</b>	Left-hand (as seen from driver's seat facing forward)
<b>MT</b>	Manual transmission
<b>MY</b>	Model year
<b>mm</b>	Millimetres

<b>Nm</b>	Newton metres
<b>OP</b>	Oil pump
<b>PAS</b>	Power assisted steering pump
<b>RH</b>	Right-hand (as seen from driver's seat facing forward)
<b>RWD</b>	Rear wheel drive
<b>SC</b>	Supercharger
<b>T</b>	Tensioner
<b>VP</b>	Vacuum pump
<b>WP</b>	Water pump

## Toothed timing belts

Since its introduction the toothed (or synchronous) belt has been increasingly used for driving camshafts, balancer shafts and diesel injection pumps, instead of the traditional roller chain or gears.

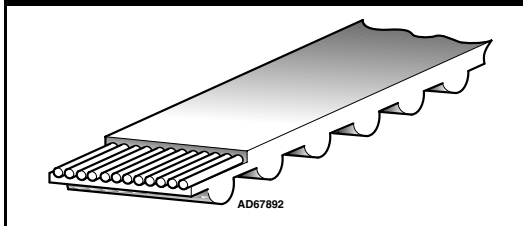
### 1. Construction



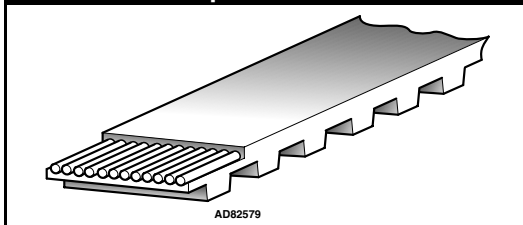
These belts are of complex construction (1), being manufactured from a fibre-glass, Kevlar or steel braided laminated inner core, coated with synthetic rubber, neoprene or highly saturated nitrile (HSN) which is wear and heat resistant.

The teeth, which may be curvilinear (2), modified curvilinear (with a more rounded form between teeth) or trapezoidal (3), are moulded integrally, to close tolerances and have a durable fabric facing for long life.

### 2. Rounded teeth



### 3. Trapezoidal teeth



This combination of design and construction results in a belt that will stretch little in use, requires no lubrication, is relatively inexpensive to manufacture, is almost silent in use and has a very high working efficiency.

## Service replacement

**Important - see Timing Belt Replacement intervals on page 3**

When a replacement interval is recommended by the vehicle manufacturer, this appears as a mileage or time interval in the Replacement Interval Guide box of each model-related page. These intervals should be strictly observed to avoid the possibility of belt failure and consequential expensive engine damage.

**NOTE: Reference to a special, lower, recommended replacement interval for vehicles used under arduous or adverse conditions relates to the following types of use:**

**Taxi operations**

**Permanent door-to-door use.**

**Frequent short trips with a cold engine in low temperatures.**

**Use in hot countries with temperatures often over +30 degrees C.**

**Use in cold countries with temperatures often below -15 degrees C.**

**Use in countries with a dusty atmosphere.**

**Towing a trailer or caravan.**

**Sustained high-speed driving.**

**Using poor quality fuel or oil.**

If there is no manufacturer's recommended replacement interval, this does not mean that the belt can be ignored, or that it will last forever.

Belts should be inspected at regular intervals and always replaced if their condition is in any way suspect.

## Contamination

In use the belt is protected from oil or water contamination by a cover, but should a seal or hose fail it is possible that damage to the belt could result, and in such cases the belt should be replaced.

The belt should not be allowed to come into contact with petrol, water, or oil and under no circumstances should any solvents be used to clean it.

If any doubt exists about the condition of the belt it should be replaced as the cost is low compared to the cost for repairing engine damage resulting from belt failure.

## Inspection

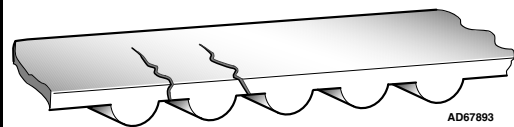
**Important - see Timing Belt Replacement intervals on page 3**

At the recommended service intervals, and whenever the timing belt is removed, it should be carefully inspected for wear or damage, however minor, which could lead to failure - with possibly expensive results.

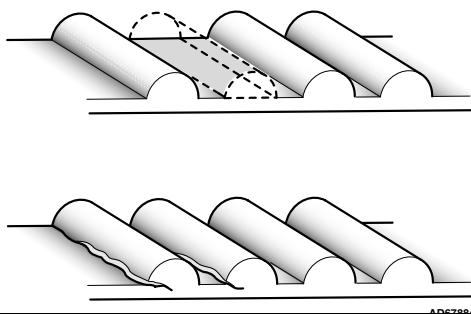
**WARNING: In the majority of cases, failure of the drive belt will result in piston and valve contact with resulting engine damage.**

Timing belt damage may be visible as cracking or scuffing on the outer surface (4), possibly caused by deposits on the tensioner roller, which often runs on the back of the belt, or by the tensioner binding at some time. Any such damage should be investigated further, to ascertain possible causes before fitting a new belt.

### 4. Cracking and scuffing



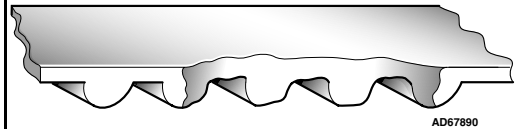
### 5. Damaged teeth



The teeth should be checked for signs of cracking or other damage (5), and the sides of the belt also inspected for wear or damage (6) which could indicate that the sprockets on which it runs, may be out of alignment.

Cracking or damage to teeth may indicate that the camshaft or one of the ancillaries, such as the water pump, which may be driven by the belt, has locked up, if only briefly. Therefore these should be checked before replacing the belt.

## 6. Side wear and damage



The teeth on the sprockets should also be checked for damage, and cleaned only with a soft brush.

A wire brush must not be used, nor any form of metal scraper. If there is a build up of dirt or dust in the corners of the teeth, this may be gently removed with a soft wooden scraper.

## Cleaning

Solvents should never be used to clean oil deposits from the surface of the belt, and if in any doubt, the belt should be replaced.

Any cleaning of the belt must be undertaken carefully using a dry soft bristle brush, such as a toothbrush. The belt should be laid on a flat surface and care taken not to twist or crush the belt.

Under no circumstances should the belt be turned inside out for cleaning or inspection. Any maltreatment of the belt could result in premature failure.

## Fitting

When fitting a belt, the tensioner must be released, and the belt slid into place.

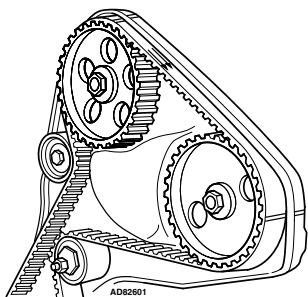
It may be necessary to stretch the belt slightly over the first sprocket, ensuring that the timing marks remain aligned.

Under no circumstances should any form of lever be applied to the belt to force it into place. Once fitted, the engine should always be turned in the direction of normal rotation (except in special cases, where instructed in the text), never backwards as this could cause the belt to slip and the timing to 'jump'.

At each stage of belt fitting, carefully check the timing marks are aligned correctly.

Some belts have timing marks identified which will relate to marks on the sprockets (7). These may be used in conjunction with other timing marks on the engine castings and sprockets, or may be used solely as the timing reference marks. Again, the specific fitting instructions must be followed.

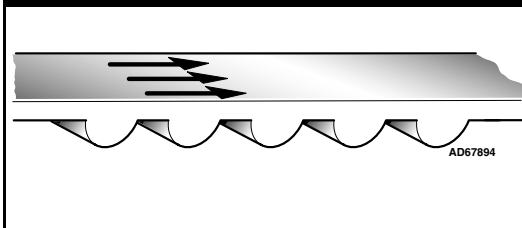
## 7. Belt timing marks



Never use the belt to lock the camshaft sprockets when undoing the sprocket retaining bolts, as this will damage the belt teeth.

Use a sprocket holding tool, or the hexagons or flats which are provided on some camshafts for this purpose.

## 8. Direction arrows

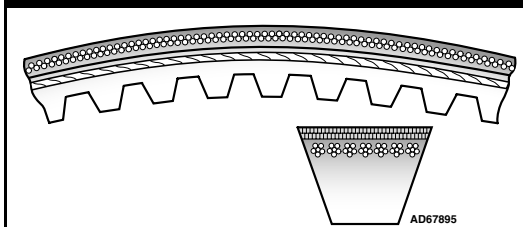


## V-Belts

V-belts used for driving auxiliary components, such as alternator, water pump, air conditioning compressor and cooling fan are normally of 'raw-edged' construction.

In this type of belt, sub-surface fibres are laid perpendicular to the direction of belt rotation (9),

## 9. V-belt construction



Certain manufacturers specify the direction of use for the belt, this being identified by arrows on the top surface (8), and should be strictly observed. If removing a belt for any reason which may be re-used, the direction of rotation should be marked on it, in chalk, for reference when re-fitting.

Any recommended belt checking or replacement intervals should be followed.

## Tension

The tension of the belt is important and can be set in a number of different ways.

Engine manufacturers issue specific instructions for each application, which are described in each section. These should always be followed, as incorrect tension can lead to premature failure.

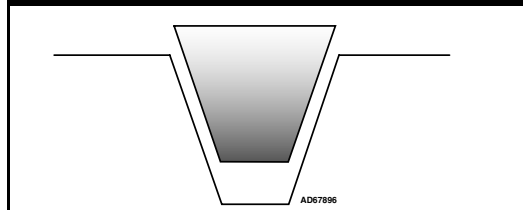
In many cases the tensioner operates automatically, but the installation procedure must be carefully followed to ensure that the correct tension is achieved.

Manually tensioned belts normally require the use of a gauge to measure the tension and these are listed under special tools, in each section.

In some cases an alternative, such as the Burroughs tension gauge can be used and a comparison table, between this and some other gauges, is included in this manual.

## Auxiliary drive belts

## 10. V-belt & pulley contact



providing a high degree of flexibility, but having extreme transverse stiffness and high wear resistance.

Drive is transmitted from the crankshaft pulley through the side wall contact between the belt and the pulley 'V' groove (10).

Several belts may be used, where the loads are high and there are several auxiliary components to be driven.

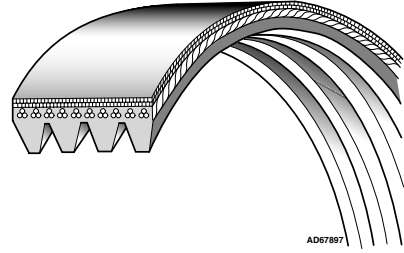
## Poly V-Belts

Introduced in 1979, Poly V (or Micro-V) belts are now fitted to an increasing number of engines. These belts are considerably wider and thinner than their V-belt counterpart and usually have between three and six ribs (11).

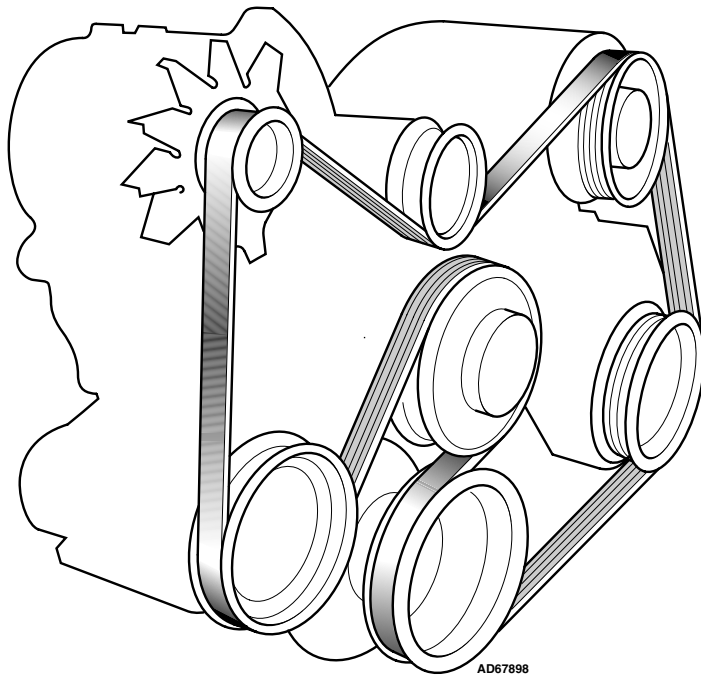
Additionally the back of the belt can be used to drive components or for tensioning purposes.

Due to its reduced thickness, compared to the traditional V-belt, it can drive smaller diameter pulleys, resulting in the so-called 'serpentine drive' layout (12), in which all the auxiliaries are driven by one long belt.

## 11. Poly V-belt construction



## 12. Typical serpentine drive belt layout



## Belt tension measurement

Vehicle manufacturers specify a wide range of different gauges for checking the tension in timing belts.

It is not possible to directly measure the tension in an installed belt so most tension gauges measure belt deflection for a known load or, in some cases, the load for a known deflection. A few manufacturers specify special tools which are essentially a torque arm to load the belt tensioner by a predetermined amount.

To assist workshops offering all-makes service Autodata has prepared a comparison chart for a range of the gauges specified by different car manufacturers. Using this chart it is possible to convert readings from one gauge to another,

enabling one gauge to be used for a variety of makes.




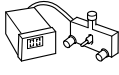

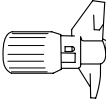
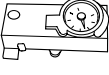

The tests were carried out by comparing known belt tensions with a Burroughs gauge, calibrated in Newtons and other gauges calibrated in arbitrary units.

The restricted ranges on some gauges has reduced the readings available for comparison.

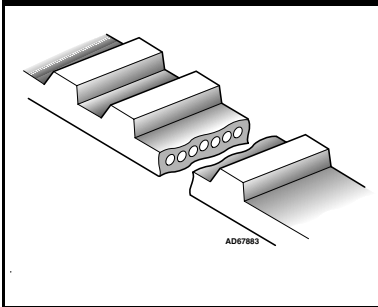
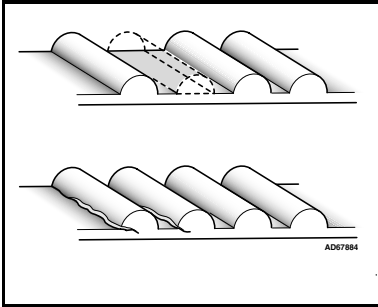
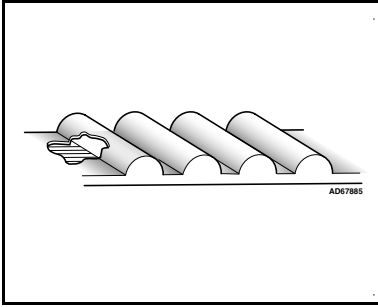
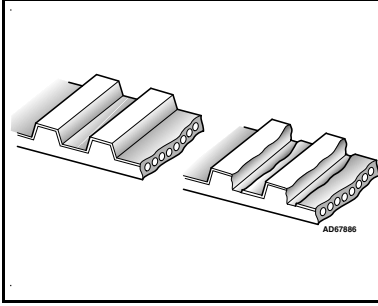
With any tension gauge it is important to take care when using the gauge, following the manufacturer's instructions.

It is often difficult to obtain consistent readings with these gauges and it is good practice to take several readings to establish the correct setting.

**Tension gauge comparison**

Burroughs (BT33-73F/ BT33-86J)	Sykes-Pickavant 316690	SEEM C.Tronic G2 105.5	SEEM C.Tronic 87 (Pin S)	Lowener (Ford 21-113 & Vauxhall 510-2)	Peiseler (VAG 210, Volvo 5197 & SEAT U.10.028)	BMW (11.2.080) & (Volvo 9988500*)	Burroughs/ Rover - (KM 4088AR)
 Newtons	 Kg	 Units	 Units	 Units	 Units	 Units	 Units
50			13				
100			22,5				
150		33	31,5			28	
200	16	40	38,5		11,7	35	1,7
250	20	47	46	4	12,5	41,5	2,7
300	25	53	52	7,4	13,1	46,5	4
350	29	61	58	9,6	13,4	51	5
400	35	67	63	11	13,6	53	6
450	40	72	68,5	12			7
500	46	78	73,5				7,5
550	51						8
600	58						8,5
650	63						9
670	65						

**\*NOTE:** This gauge is sensitive to belt thickness and should only be used as recommended by the vehicle manufacturer.

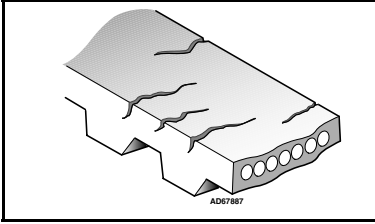
Symptom	Probable Cause	Remedy
<p><b>Broken belt</b></p>  <p>AD67863</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Foreign body in drive</li> <li><input type="checkbox"/> Excessive tension</li> <li><input type="checkbox"/> Belt crimped during installation</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Ensure cover is fitted correctly</li> <li><input checked="" type="checkbox"/> Set tension correctly</li> <li><input checked="" type="checkbox"/> Avoid mishandling belt</li> </ul>
<p><b>Sheared teeth</b></p>  <p>AD67864</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Insufficient tension</li> <li><input type="checkbox"/> Seized drive sprocket</li> <li><input type="checkbox"/> Sprockets misaligned</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Set tension correctly</li> <li><input checked="" type="checkbox"/> Remedy seizure</li> <li><input checked="" type="checkbox"/> Align correctly</li> </ul>
<p><b>Worn teeth</b></p>  <p>AD67865</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Incorrect tension</li> <li><input type="checkbox"/> Worn sprockets</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Set tension correctly</li> <li><input checked="" type="checkbox"/> Replace sprockets</li> </ul>
<p><b>Hollow teeth</b></p>  <p>AD67866</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Pre-set tension very low</li> <li><input type="checkbox"/> Running tension too low</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Set tension correctly</li> <li><input checked="" type="checkbox"/> Ensure tensioner is operating correctly</li> </ul>

## Symptom

## Probable Cause

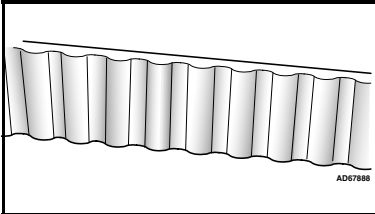
## Remedy

### Top surface cracks



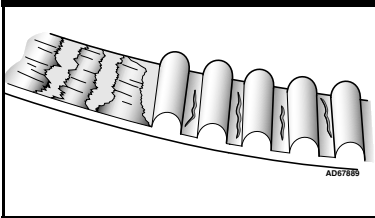
- |  |  |
|--|--|
| <input type="checkbox"/> Excessive heat                        | <input checked="" type="checkbox"/> Check cause                        |
| <input type="checkbox"/> Tensioner pulley/guide pulley binding | <input checked="" type="checkbox"/> Free tensioner pulley/guide pulley |

### Land wear



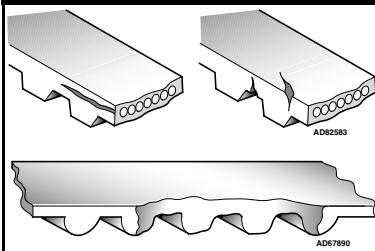
- |   |   |
|---|---|
| <input type="checkbox"/> Excessive tension      | <input checked="" type="checkbox"/> Set tension correctly |
| <input type="checkbox"/> Rough sprocket surface | <input checked="" type="checkbox"/> Replace sprockets     |

### Oil contamination



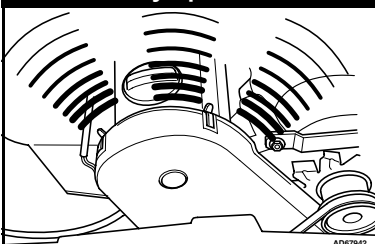
- |  |   |
|--|---|
| <input type="checkbox"/> Engine oil leak | <input checked="" type="checkbox"/> Remedy oil leak |
|--|---|

### Edge wear



- |  |  |
|--|--|
| <input type="checkbox"/> Sprocket flange damaged | <input checked="" type="checkbox"/> Replace sprocket |
| <input type="checkbox"/> Sprockets misaligned    | <input checked="" type="checkbox"/> Align correctly  |

### Noisy operation



- |  |   |
|--|---|
| <input type="checkbox"/> Excessive tension       | <input checked="" type="checkbox"/> Set tension correctly |
| <input type="checkbox"/> Insufficient tension    | <input checked="" type="checkbox"/> Set tension correctly |
| <input type="checkbox"/> Sprockets misaligned    | <input checked="" type="checkbox"/> Align correctly       |
| <input type="checkbox"/> Sprocket flange damaged | <input checked="" type="checkbox"/> Replace sprocket      |