



TROUBLESHOOTING GUIDE

**FOR MICRO-V[®] XF
MULTI-RIBBED BELTS**



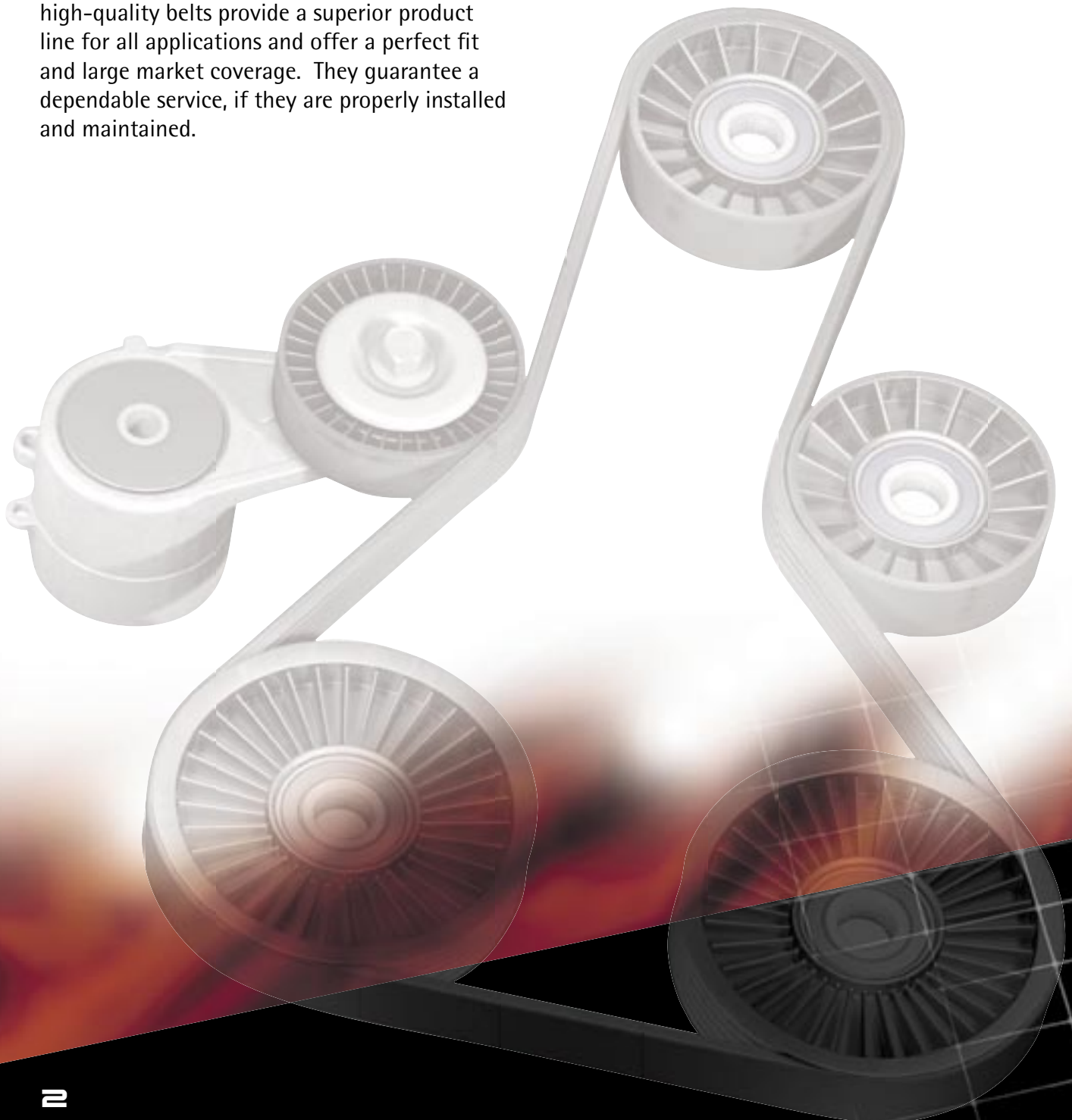
In older cars, the accessory belt drive system or fan belt system used V-belts. In 1982, Gates introduced the Micro-V® multi-ribbed belt, with multiple V-shaped ribs along the belt's length. Since then, there has been an enormous evolution in the accessory belt drive systems, with serpentine belts that power all accessories in the system, from power steering to air conditioning. Today, 90% of the 230 million accessory drives use multi-ribbed belts. Gates now presents a real innovation in the accessory belt drive system:

the new **MICRO-V® XF**.

Gates Micro-V® XF belts are designed to meet or exceed original equipment requirements. These high-quality belts provide a superior product line for all applications and offer a perfect fit and large market coverage. They guarantee a dependable service, if they are properly installed and maintained.

Remember! These are only general guidelines. Always refer to the vehicle manufacturer's recommended procedures for replacement, tensioning and maintenance of multi-ribbed belts. Failure to follow these instructions could result in injury or property damage. Gates disclaims all liability due to failure to follow these instructions.

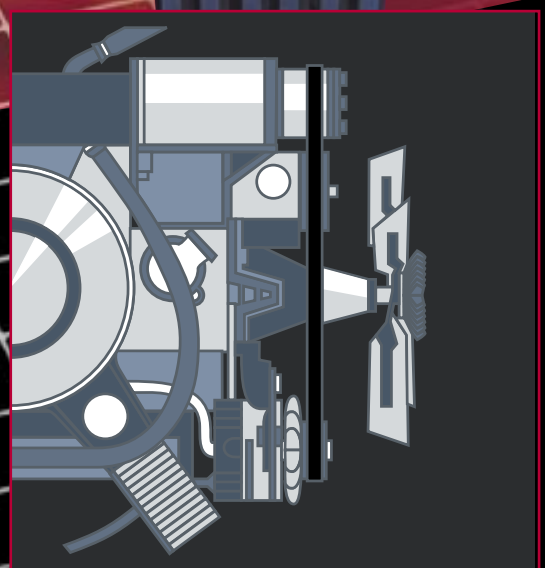
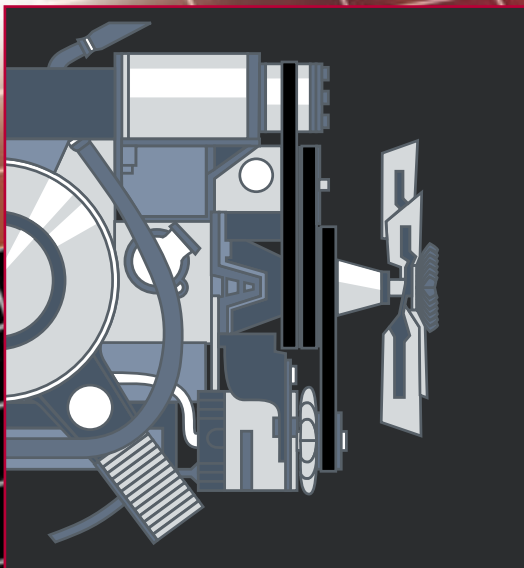
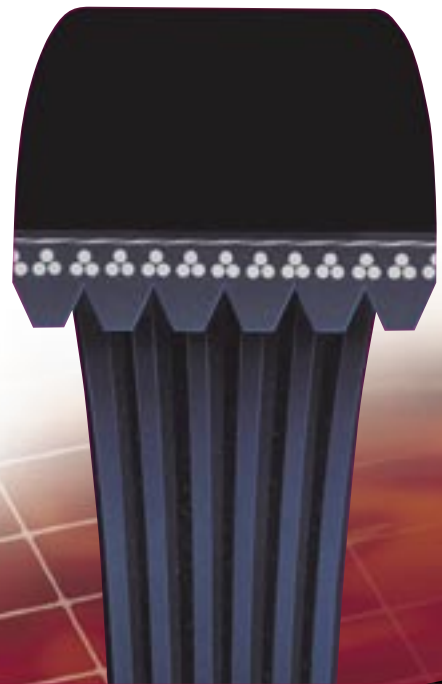
This brochure gives you more details on Micro-V® XF belt construction, inspection and failure modes, removal and installation, as well as extra support.



Micro-V® XF belt construction

Gates new Micro-V® XF multi-ribbed belts are made in the same high-tech materials and construction as the OE belts and perfectly meet OEM demands. The low belt profile makes these belts extremely flexible and allows them to bend easily around small pulleys, transmitting power on the ribbed side as well as on the reverse. Furthermore the profile gives better tensile cord support. The cords divide their strength evenly among several smaller wedges instead of forcing all the undercord into one large wedge.

With the pulleys placed in the same drive plane, Micro-V® XF belts can turn several pulleys at the same time.



Inspection and failure modes of Micro-V® XF belts

As the Micro-V® XF belt does a tough job in a demanding environment, it is very important to detect belt wear in time and to have the belt replaced before it fails. The recommended replacement interval is 4 years. Heat, stress and abrasion affect Micro-V® XF belts. Slipping belts cause heat build-up, leading to potential accessory damage and/or overheated engines.

A single multi-ribbed belt breaking on a serpentine drive can cause a costly roadside failure. An efficient belt allows the accessory

drive to function perfectly. With the water pump functioning properly, the engine will not overheat and will assure a long service life. Gates recommends regular inspection and timely replacement of multi-ribbed belts. Keep in mind, however, that problems with the belt, such as noise, wear or a broken belt, are often caused by a malfunction in the drive. In that case, replacing the belt will not be sufficient. A thorough inspection of the pulleys, idlers and tensioners will be necessary to find (and solve) the real cause of the problem.

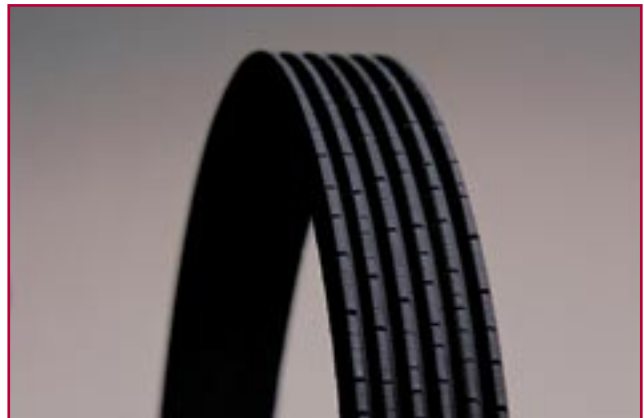
The following signs of wear indicate that a multi-ribbed belt needs to be replaced:

1. RANDOM CRACKING ACROSS THE RIBS

Appearance: Small yet visible cracks along the length of a rib or ribs.

Cause: In addition to continuous exposure to high temperatures, the stress of bending around the pulleys leads to cracking. Cracks begin at the rib top and grow to the cord line. As a rule, if cracks appear 1 or 2 cm apart, 80% of the life is gone and the belt should be replaced.

Solution: Replace with a Gates Micro-V® XF belt, which is engineered to withstand higher temperatures and resist cracking.

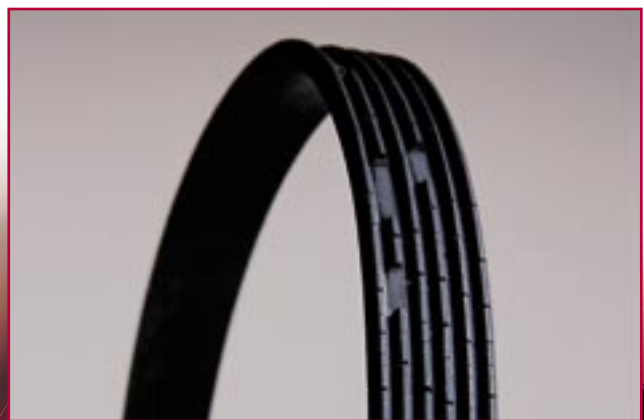


2. CHUNK-OUT

Appearance: Pieces or chunks of rubber material have come off the belt. When chunk-out has occurred, a belt can fail at any moment.

Cause: Chunk-out can happen when several cracks in one area move parallel to the cord line. Heat, age and stress are the primary contributors.

Solution: Replace the belt immediately with a Gates Micro-V® XF belt. Gates belts are designed for greater flexibility and heat tolerance in today's smaller engine compartments.



3. PILLING

Appearance: Belt material is sheared off from the ribs and builds up in the belt grooves.

Cause: There are a number of causes, including lack of tension, misalignment, worn pulleys or a combination of these factors. Pilling will occur most frequently in diesel engines, but is not isolated to them.

Solution: When pilling leads to belt noise or excess belt vibration, the belt should be replaced.



4. ABRASION

Appearance: Back side of belt appears shiny or glazed. In advanced stages, the fabric becomes exposed.

Cause: When in motion, the belt makes contact with an object in its path such as a flange or bolt. This may be caused by improper belt tension.

Solution: Replace the belt and remove the foreign object or, if it can't be removed, make sure that contact is avoided. Check the belt tensioner and ensure proper belt tension.



5. DAMAGED OUTERMOST BELT RIBS

Appearance: Sidewalls of the belt may appear glazed or the edge-cord may become frayed and ribs removed. A noticeable noise may result. In severe cases, the belt can jump off the pulley.

Cause: Pulley misalignment is a common cause of premature belt failure. Misalignment forces the belt to kink or twist while running, causing premature wear.

Solution: Replace the belt and make sure to realign the pulleys. Also check that the pulleys, pulley brackets and shafts are not bent or broken.



6. UNEVEN RIB WEAR

Appearance: Damage to the side of the belt, a possible break in a tensile cord or jagged ribs. A thumping or grinding noise may also be heard.

Cause: A foreign object – such as a pebble – in the pulley will cause uneven wear and can cut into the belt and break the tensile cords.

Solution: Replace the belt and inspect the pulley for foreign objects or damage. Replace the pulley if necessary.



7. GRAVEL PENETRATION

Appearance: Small pinholes are visible on the back side of the belt. Bumps may be visible and fabric around the holes can be frayed.

Cause: Pebble, gravel or sand is wedged between the belt groove(s) and pulley ridge(s).

Solution: Clean the drive and then replace the belt to avoid tensile cord separation and possible roadside failure. Use Gates Micro-V® XF belts, which are precision ground in the factory for a better pulley fit.



8. RIB SEPARATION

Appearance: A belt rib begins to separate from the joined strands. If left unattended, the cover will often separate, causing the entire belt to unravel.

Cause: The belt is not correctly positioned. One of the belt ribs is placed outside the pulley groove, causing a belt rib to run without a supporting or aligning pulley groove.

Solution: The belt's life has been severely limited, so the belt should be replaced immediately. Make sure all ribs of the replacement belt fit into the pulley grooves. Run the engine and then, with the engine off and battery disconnected, inspect the belt for proper installation.



9. OIL CONTAMINATION

Appearance: The belt surface is flaky, sticky or swollen.

Cause: Oil and grease are a rubber compound's worst enemies, weakening the compound's bonds and making the belt soft and spongy. Eventually, such a belt will slip, create heat and fail.

Solution: Eliminate sources of oil, grease or chemical contamination. Replace the belt. Do not use belt dressing.



10. BROKEN BELT

Appearance: The belt is broken.

Cause: A large foreign object in the pulley can cut into the belt and break the tensile cords. A tensile break may occur but go unnoticed when the belt is forced or pried on during installation. Other possible causes may be severe shock loads or a blocked pulley and/or accessory.

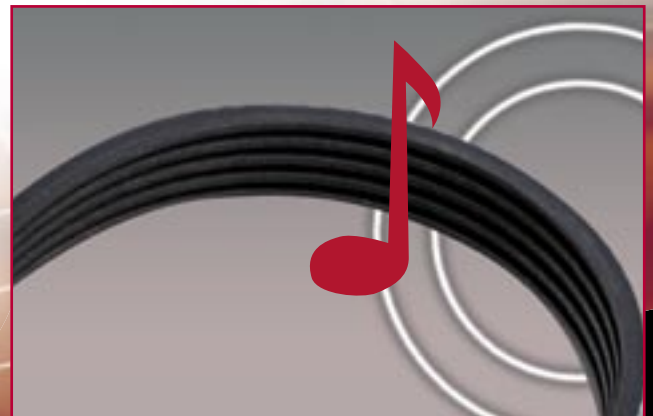
Solution: Carefully check all components of the drive for foreign objects and damage. Replace them if necessary. Make sure not to force the belt onto the drive with unsuitable tools.



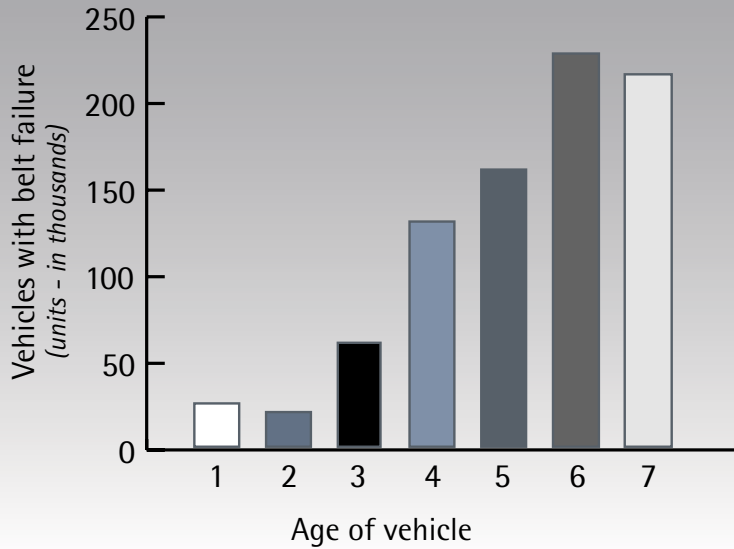
11. NOISE

Noise caused by misalignment and/or improper tension may be diagnosed by using the "water spray test".

Fill a spray bottle with water and spray the belt with a light mist, while the engine is running. If the noise occurs after misting, there may be problems with tension or misrouted belts. If the noise decreases for a few seconds, then returns even louder, the problem is likely to be misalignment. If the noise increases immediately after misting the belt with water and does not become louder afterwards, chances are it is a tension problem.



FAILURE OCCURRENCE



This chart illustrates how the incidence of belt failure increases dramatically after the fourth year in operation. To help motorists avoid unpleasant and hazardous situations, replace the multi-ribbed belt with a Micro-V® XF belt if it is four years old or older.

Micro-V® XF belt removal and installation

STEP 1 – Safety first

First and foremost, for your own safety, disconnect the car's battery and set the hand brake.

STEP 2 – Check belt routing

Before removing the old belt on a serpentine drive, look under the bonnet and around the engine compartment for the belt routing diagram or consult Gates serpentine belt routing catalogue E/70408.

STEP 3 – Release tension

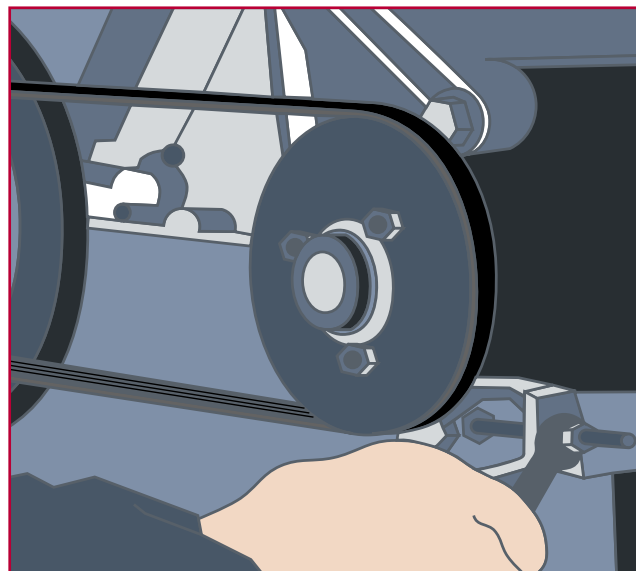
You can easily slide the belt off the pulleys, once the tension is relieved.

Many new cars use an automatic tensioner which makes servicing easy. Release the tension by means of a spanner or socket wrench and block the tensioner in the retracted position.



Always check the condition of the automatic tensioner. If it is not functioning properly, replace it with a Gates DriveAlign® tensioner. For more information on Gates DriveAlign® tensioners, please consult leaflet E2/70380 or catalogue E/70378.

Other cars use tensioners or accessories which have to be locked down manually to provide the correct tension. These are called locked centre drives. To remove the belt, release the tension by loosening the jackscrew.

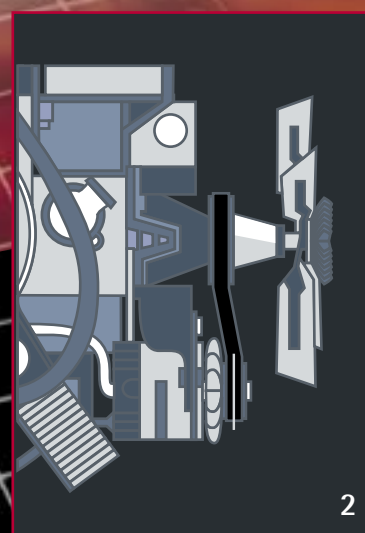
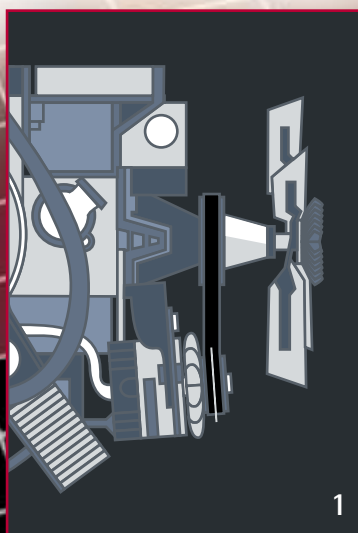


STEP 4 – *Check for misalignment*

While replacing the belt, check the alignment of the pulleys as this is a very critical factor for multi-ribbed belts. Misalignment can cause severe belt wear and damage. It can also create noise or cause belts to jump off the pulleys. Misalignment can be caused by non-parallel shafts on drive accessories (*picture 1*) or pulleys located incorrectly on the shafts (*picture 2*). If misalignment is due to non-parallel shafts, it may be caused by a damaged accessory bracket. Replace the bracket if necessary. The accessory pulley may be seated too far forward or backward on the shaft. In this case,

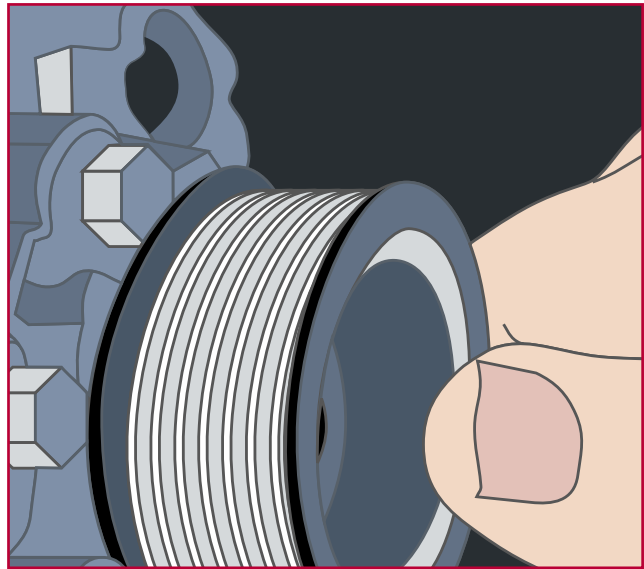
add or remove metal shims to reposition the pulley or accessory.

Misalignment is now easy to diagnose thanks to Gates DriveAlign™ laser alignment tool, which allows you to identify the two most common types of misalignment in serpentine belt systems, even in the tight confines of the engine compartment. Simply position the tool within the grooves of a pulley and aim its bright laser beam at an opposite pulley. Any misalignment is instantly visible. This exclusive lightweight and easy-to-use Gates tool is compatible with all automotive serpentine belt drives.



STEP 5 – *Check belt and pulleys for wear and dirt*

Once you have checked alignment, you can remove the belt. Now carefully inspect the entire ribbed area for cracking, chunking and pilling as described earlier in this brochure. Clean the pulleys and tensioners with a solvent and check them for signs of abnormal wear. To check the condition, press a small amount of plasticine firmly into the grooves. The edges of the impression should be straight and the tips even with no distorted points.



STEP 6 – *Belt installation*

Once you have thoroughly checked the drive, install the belt according to the belt routing diagram (see Gates belt routing catalogue E/70408). Carefully align the belt ribs with the pulley grooves and check that the belt is squarely on each pulley. Pulleys that cannot be visually inspected should be felt to ensure proper installation. If not properly installed, the belt can ride up on the pulley or skip grooves resulting in severe belt damage.

STEP 7 – *Apply correct tension*

If the serpentine drive has an automatic tensioner, slowly release the tensioner and it will automatically apply the right tension. If the car has a locked centre drive, you need to carefully apply the right tension. Too much tension can destroy multi-ribbed belts; too little tension can cause noise, belt slippage and pilling. After having tensioned the belt, let the drive run for a few minutes to ensure proper functioning of the belt and even distribution of the tension along the belt's length. Applying the correct tension is easy with Gates sonic tension tester STT-1. Each STT-1 comes complete and ready to use with an instruction manual and a user-friendly belt installation guide on CD-ROM.

That's all there is to Micro-V® XF belt removal and installation. When properly installed and maintained, Gates Micro-V® XF belts will ensure many kilometres of trouble-free performance.

Complete product range for accessory belt drive systems and up-to-date cataloguing

MICRO-V® XF KITS



Accessory drive systems usually handle several accessories simultaneously. So when the drive fails or a component breaks, all those accessories risk being damaged. A Micro-V® XF kit contains a Micro-V® XF multi-ribbed belt and all metal components (tensioners/idlers) necessary for a complete overhaul, to avoid this kind of untimely breakdowns. Each kit is specifically composed for its application(s) and contains high-quality products.

DRIVEALIGN® TENSIONERS



OE-quality automatic tensioners that include a unique sealing, a life-extending damping mechanism and a patented round spring design.

SONIC BELT TENSION TESTER STT-1

A practical and accurate tool to check the tension of Micro-V® XF multi-ribbed belts.



DRIVEALIGN™ LASER ALIGNMENT TOOL

A lightweight and easy-to-use tool to identify the most common types of misalignment.



DR. GATES PROFESSIONAL TOOL KIT

Your tool kit for the complete installation and maintenance of belt drive systems.



CATALOGUING

When you replace a multi-ribbed belt, you need to make sure that you install the Micro-V® XF replacement belt correctly. With Gates handy serpentine belt routing catalogue (E/70408) you cannot be mistaken. This easy-to-use catalogue contains the belt routing diagrams for all popular vehicle models. If you need more elaborate information on Micro-V® XF belt references, you can always consult the complete Gates belt catalogue for passenger cars (E2/70107 ED 2005/2). Remember that, when you install a new Micro-V® XF belt, you should always check the belt tensioner. Gates offers a complete DriveAlign® tensioner catalogue (E/70378), where you can find all the necessary information.

Your distributor:



A Tomkins Company