



SERVICE BULLETIN No.1186

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COACH MODEL	: T2145 and C2045
BULLETIN TYPE	: Product Improvement
SECTION	: Section 10 - HVAC
DATE	: May 18, 2006
SUBJECT	: AC compressor drive – introduction of a powerband
TERMS & CONDITIONS	: No claims will be accepted with reference to this Bulletin.

1. APPLICATION:

The Product Improvement subject of this Bulletin is applicable to following units:

Model	VIN (Cummins)	VIN (Detroit Diesel)	VIN (Caterpillar)
T2140	40150 →	40614 →	-
T2145	44319 →	44655 →	44801 →
C2045	46038 →	46663, 46673 →	47156, 47172, 47174 →

2. DESCRIPTION:

2.1 In order to promote smoother running, the engine to AC compressor drive has been changed. A single powerband now replaces the two V-belts that were standard equipment on earlier coaches (see Figure 1).

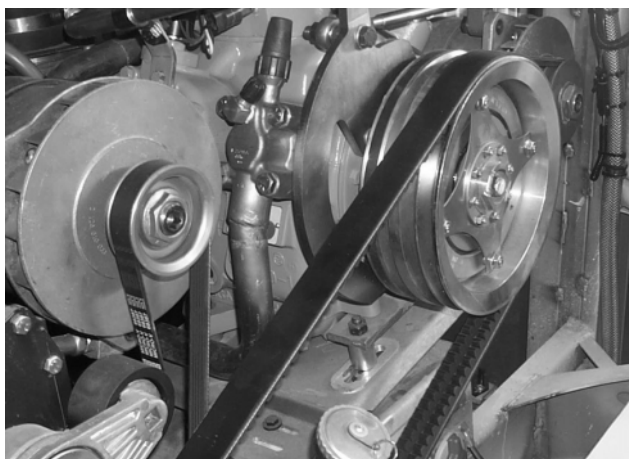


Figure 1: A powerband replaces two V-belts to provide a smoother compressor drive

Description continued on next page.

Service personnel: please read, initial and circulate.

Service Manager	Parts Manager	Warranty Administrator	Workshop Foreman	Service Technician

Continued from page 1.

2.2 Complementary to the installation of the powerband a safety stop has been added on the right-hand side of the AC compressor, below the compressor base, to prevent damage to surrounding components should drive belt failure occur (see Figure 2).

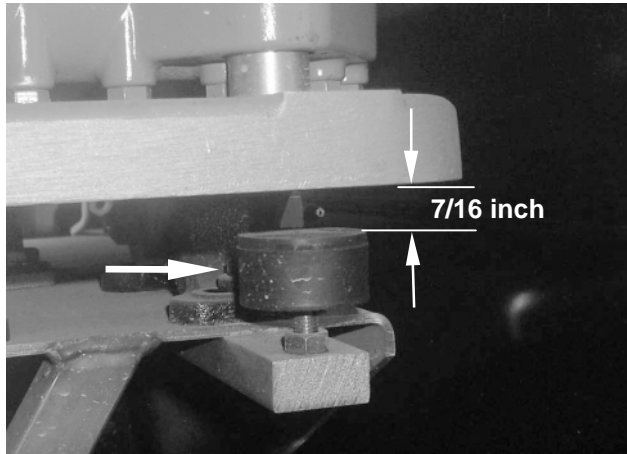


Figure 2: A safety stop now limits compressor travel and prevents damage to surrounding components should drive belt failure occur. The stop is adjusted to leave a 7/16-inch gap between the rubber bung and the lower edge of the compressor base after the powerband has been run in.

2.3 To support this product improvement in the field, service guidelines regarding belt tension and installation of related components have been included with this Bulletin.

3. **PARTS AND TOOLS:**

Old parts

VH reference	Description	Qty.	Application
VH 10680116	V-belt, XPB2650	2	Caterpillar
VH 10683837	V-belt, XPB2500, set of 2	1	Detroit Diesel
VH 639602090	V-belt, XPB2410	2	Cummins
VH 313636070	Krikit 1, Gates 7401-00071	1	All
Local purchase	Straightedge, approximately 4 ft long	1	All
Local purchase	Protractor/level	1	All

New parts

VH reference	Description	Qty.	Application
VH 10961199	Powerband 2 x XPB Quadpower II 2650LW	1	Caterpillar
VH 10961200	Powerband 2 x XPB Quadpower II 2500LW	1	Detroit Diesel
VH 10961201	Powerband 2 x XPB Quadpower II 2410LW	1	Cummins
VH 10565633	Krikit II, Gates 7401-00072	1	All
Local purchase	Straightedge, approximately 4 ft long	1	All
Local purchase	Protractor/level	1	All

- Old and new parts are interchangeable and both will be available as service replacements.
- New parts will be made available through regular channels.
- Parts may be purchased from your nearest ABC Customer Care & Parts Source service center.
- Parts and products disposition: discard according to applicable environmental regulations.

4. AC COMPRESSOR INSTALLATION:

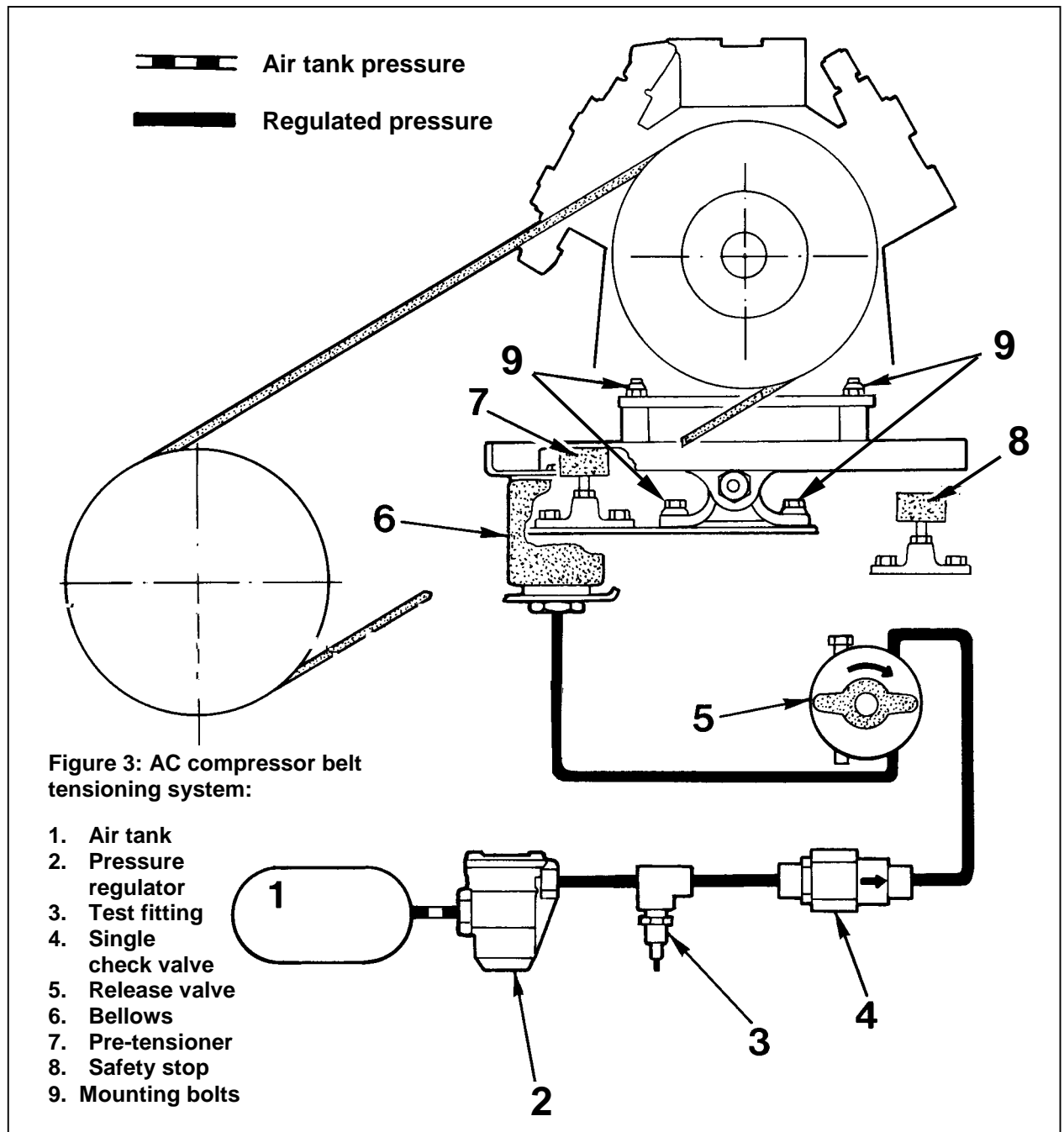
4.1 Drive belt tensioning system (see Figure 3) :

The AC compressor is driven by the engine through two pulleys and a powerband, which is actually two V-belts bonded together.

The compressor belt is tensioned by an air bellows (6), which receives regulated air pressure from air pressure regulator (2).

Air release valve (5) is provided to release air pressure from air bellows (6) during belt replacement.

An adjustable pre-tensioner (7) is installed under the compressor base. This provides adequate belt tension for start-up when the air pressure is low.

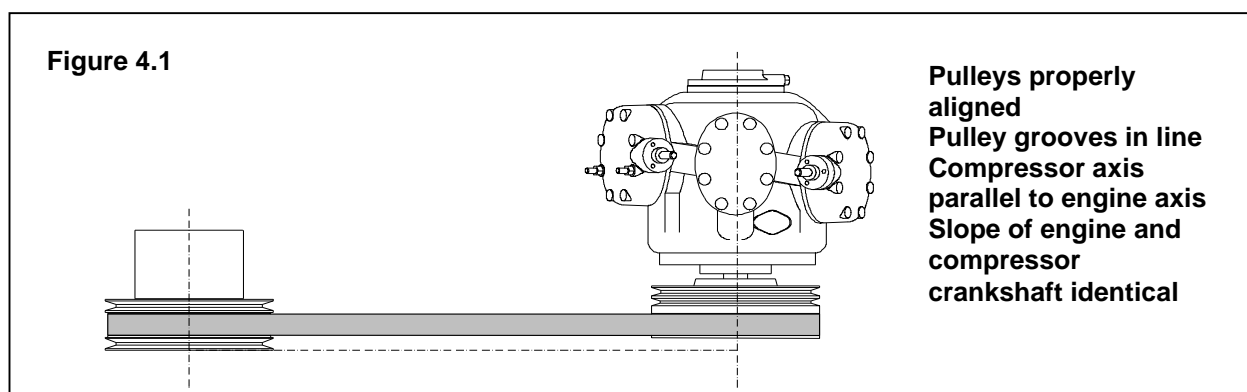


When new drive belts are being fitted, it is important that pre-tensioner (7) makes full contact with the bottom of the compressor base. After the belts have been run-in, a 5/32 to 3/16 inch (4 to 5 mm) gap will have developed, allowing free movement of the base and the running compressor. No further adjustment is required as long as the drive belts remain installed. Safety stop (8) limits the rotation of the compressor base. In case of drive belt failure compressor travel is insufficient to cause damage to surrounding components. Bolts (9) and corresponding slots in the compressor base and mounting pads allow adjustment of the compressor position longitudinally and horizontally (see Figure 4.2). Vertical adjustment can be achieved by changing the length of the spacers between the compressor and base (see 5 and 6, Figure 10). This way the compressor clutch and pulley assembly can be aligned properly with the crankshaft pulley, and the compressor base can be brought into a horizontal position.

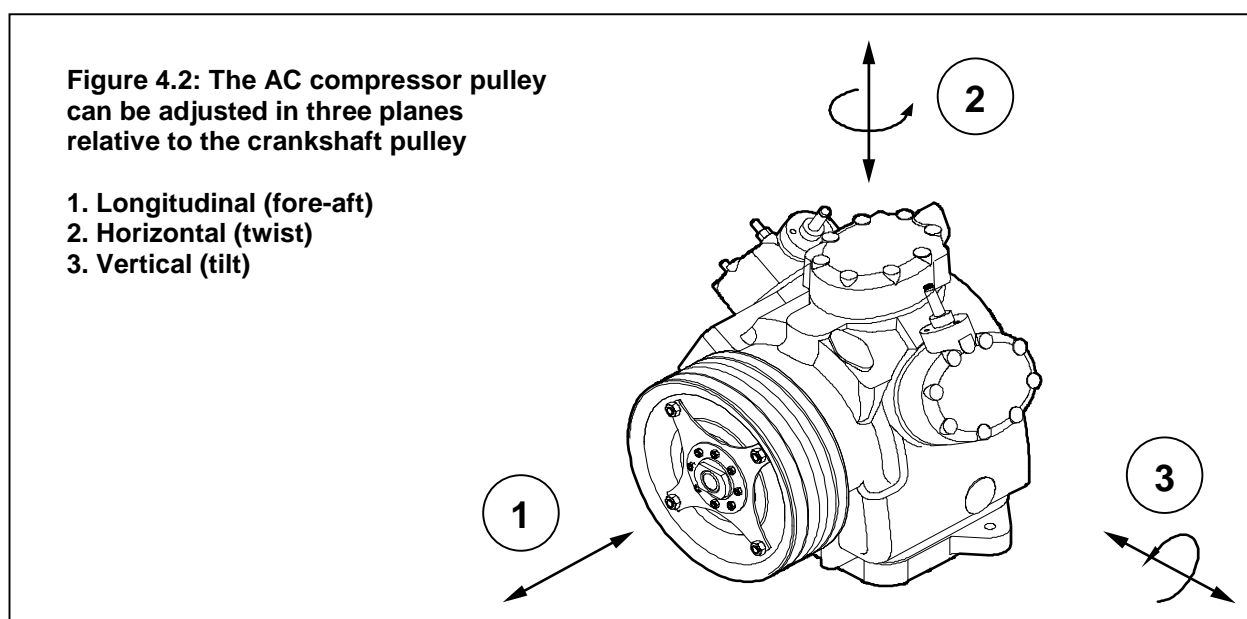
4.2 Powerband installation requirements:

4.2.1 Pulley alignment:

In order to avoid squeaking, skipping, disengagement and premature wear of the compressor belt, it is necessary to align the compressor pulley with the crankshaft pulley (see Figure 4.1).



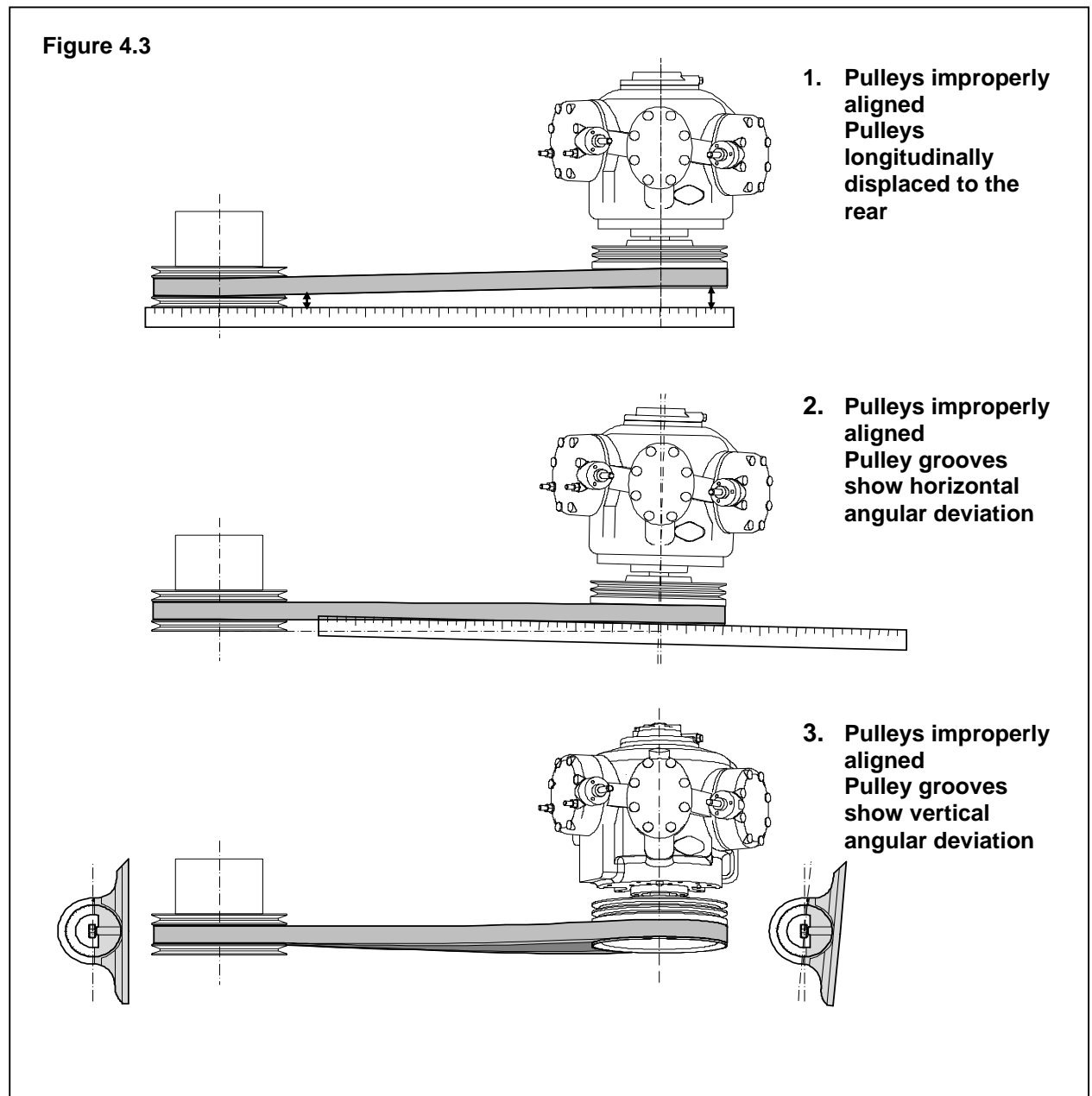
The compressor pulley relative to the crankshaft pulley can be adjusted by changing the compressor position in three planes (see Figure 4.2).



There are three possible types of pulley misalignment (see Figure 4.3):

1. Displacement (longitudinally)
2. Angular deviation (horizontally)
3. Angular deviation (vertically)

Combinations of displacement and angular deviation can occur.



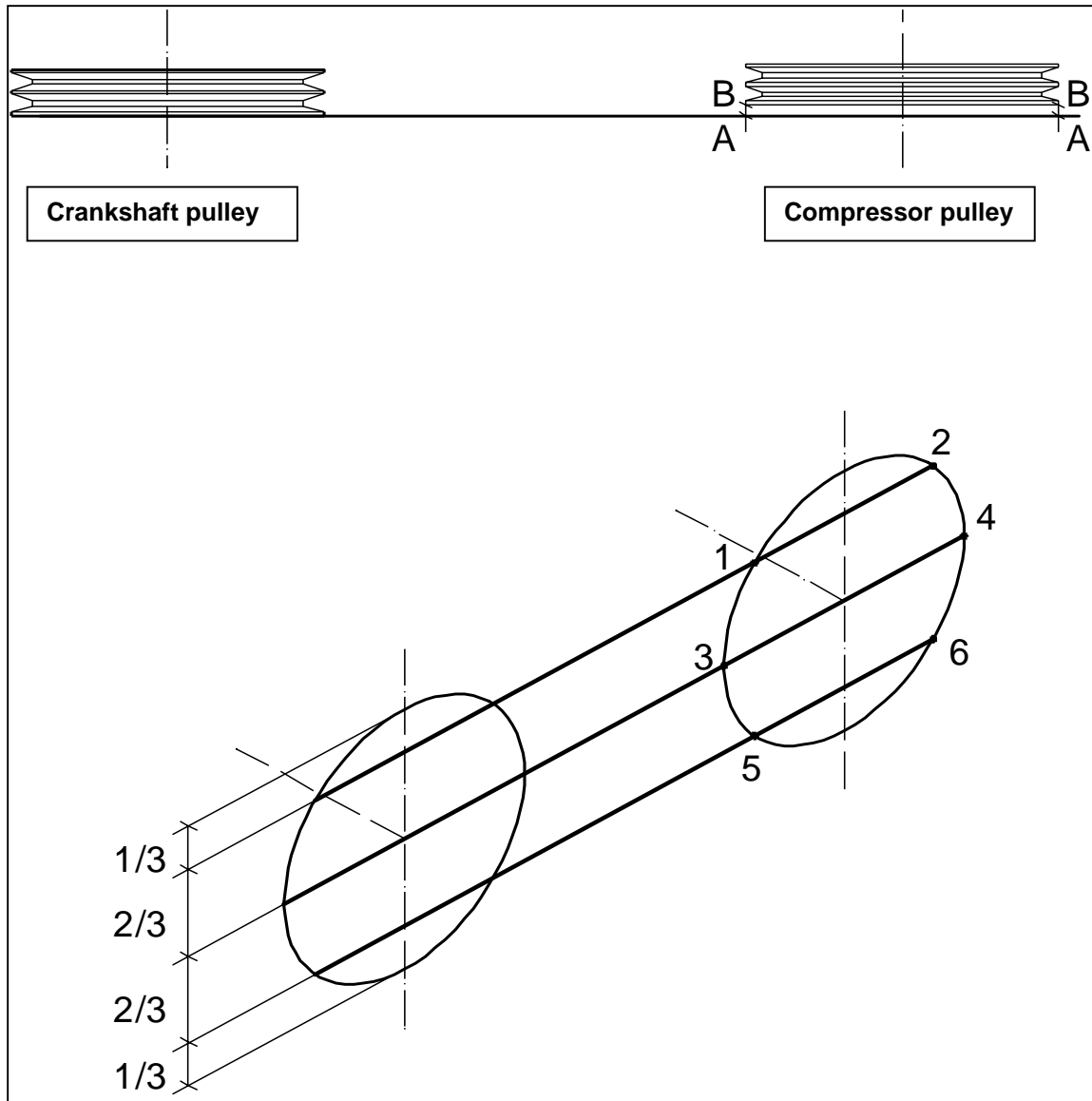
To check that the pulley grooves are in line, proceed as follows:

Longitudinal compressor alignment

Starting at the centers (see locations 3 and 4, Figure 4.4), place a straightedge against the outer face of both the crankshaft and the compressor pulley. Make sure to fully cover the pulley faces. In this application, where the crankshaft pulley has four grooves and the compressor pulley only two, there will be a gap between the straightedge and the compressor pulley rim.

Ideally, the drive belt(s) should be parallel to the straightedge (see 1, Figure 4.1)

Figure 4.4



Starting at the crank pulley longitudinal alignment should be checked in three places:

1. From pulley center to pulley center in locations 3 and 4.
2. From the center up 2/3rds of the pulley radius in locations 1 and 2.
3. From the center down 2/3rds of the pulley radius in locations 5 and 6.

With a tape measure, measure the distance between the straightedge and the drive belt at the crankshaft pulley, and at the compressor pulley.

Repeat the check with the straightedge at locations 1 and 2, and 5 and 6, Figure 4.4 respectively.

The difference between the measurements should be within tolerances (see further).

If required, adjust as described further in this Bulletin.

Horizontal compressor alignment

Rest an extremity of the straightedge against the upper part of the outer face of the compressor pulley, positioning the other end close to the crankshaft pulley.

Check the distance between each extremity of the straightedge and the drive belt.

If the distances are different, adjust as described further in this Bulletin.

Vertical compressor alignment

Rest a short angle and level indicator (protractor) on the outer face of the crankshaft pulley.

Adjust the level indicator inclination at 0° and check that the compressor pulley is at the same angle.

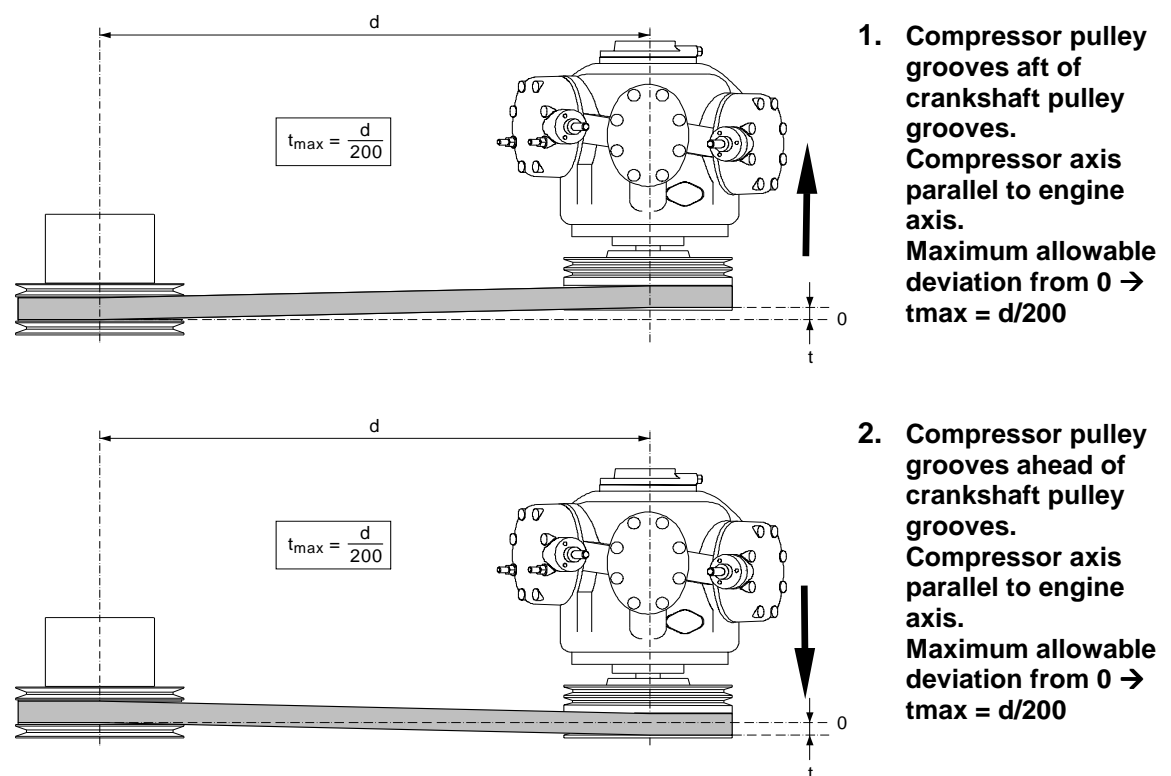
If the angles are different, adjust as described further in this Bulletin.

4.2.2 Tolerances for longitudinal, horizontal and vertical alignment:

The maximum allowable deviation from the pulleys being in line amounts to 0.5% of the crankshaft to compressor shaft distance (see d, Figure 4.5).

E.g. (longitudinal alignment): if the distance from the crankshaft center to the center of the compressor shaft is 39-3/8 inch (1,000 mm), the pulley grooves can be off 13/64 inch (5 mm) relative to each other.

Figure 4.5 Tolerances for longitudinal alignment



4.2.3 Adjustment:

Longitudinal and horizontal alignment

Adjustment can be made by undoing the compressor and compressor base mounting bolts and by shifting the compressor in the direction required. The slots in the compressor base and in the mounting pads allow for this (see Figures 5 and 6).

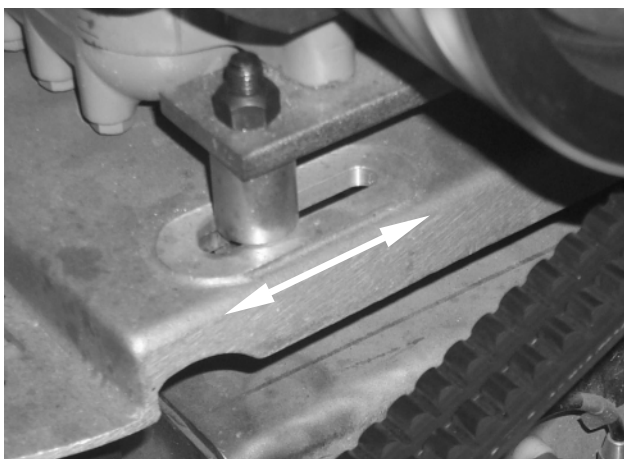


Figure 5: Slots in the compressor base allow sideways movement

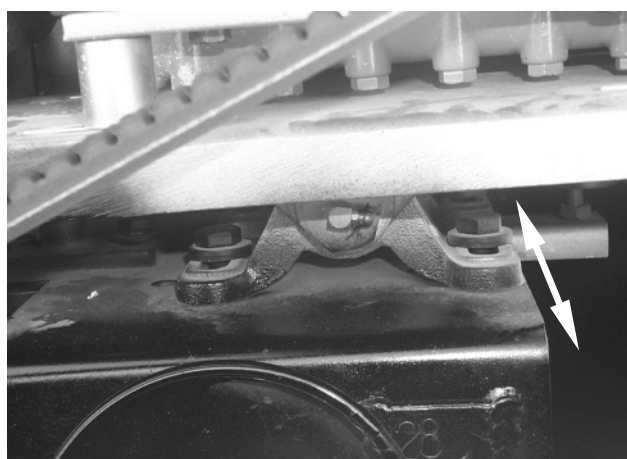


Figure 6: Slots in the base mounting pads allow fore/aft movement

Vertical alignment

If the pulley angles are different, shim under the appropriate spacers in order to obtain a correct angle (see Figures 7 and 11, items #5 and #6).

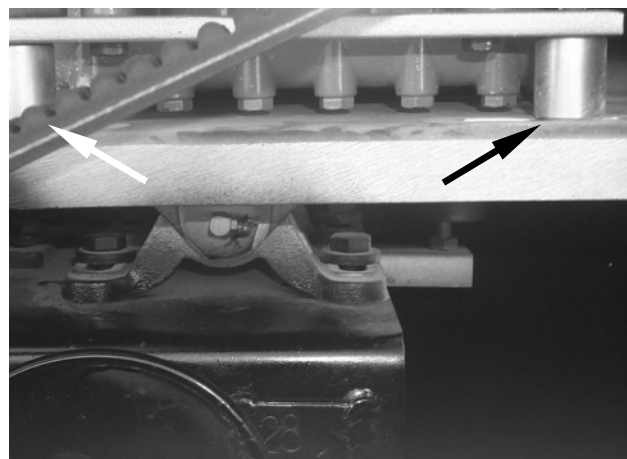


Figure 7: Vertical alignment can be achieved by shimming the appropriate spacers

4.2.3 Drive belt tension:

The tension of the drive belt is crucial to its service life. Too high a tension will put undue stress on the driving and driven components. Too low a tension will destroy the belt in a very short time.

When a new drive belt has been installed, and the tension has been set, the belt length will change drastically during the first 20 minutes running time. This has several causes: the drive belt cords settle in the bonding material, the pulley coating wears off, and the belt lowers into the pulley groove, adapting its shape to that of the groove. The air bellows will compensate for this. After the belt has been run-in for 20 minutes, it is therefore very important to check that the compressor base position and bellows installation height are still within limits (see Procedure, parts 6.4 and 6.5).

5. DRIVE BELT RULES:

- Always replace drive belts by items of the same type (check references printed on the belt).
- Always replace belts of the same drive in pairs (single belt).
- Always pull back the tensioning device when removing or installing belts.
- Never use a special lubricating spray to make drive belts stop squeaking.
- Never pry or roll belts over the edge of the pulley.
- Once installed, tension the belts according to the data provided in the maintenance manual.
- During running-in the belt will stretch and part of the tension will be lost. Readjust belt tension to its initial value after the first 20 minutes of operation.
- When re-using a drive belt, make sure it runs in the same direction as previously installed.
- Never paint drive belts.
- Always install barriers on drive belts when welding.

Failure to follow these rules will result in drive belt failure and consequential damage.

6. PROCEDURES:

If you do not have the expertise to perform present procedure, do not hesitate to go to your nearest ABC Customer Care & Parts Source service center.

6.1 General:

- This job should be executed by an experienced automotive service technician.
For more information refer to the Maintenance and Parts Manuals.

6.2 Special tools, equipment or services:

- This job requires the use of:
 - a 4ft straightedge
 - a protractor/level
 - a Gates Kriket II belt tension gauge (VH 10565633)

6.3 Preparations:

- Park the coach on a level surface with the front wheels straight.
Apply the parking brake and shut down the engine.
- Switch off all systems and turn off the battery master switch.
- Put a "DO NOT OPERATE" tag on the instrument panel.

- Read the entire procedure before beginning to work.

CAUTION: When working in the engine compartment, turn the starter motor inhibitor switch to “starter motor disabled” for the steps, which do not require engine operation.

6.4 To replace a powerband:

Job time estimate: 0.5 hours

- 1) With the air bellows beneath the compressor base fully inflated (see Figure 7), unscrew and remove the drive belt pre-tensioner (7, Figure 3).

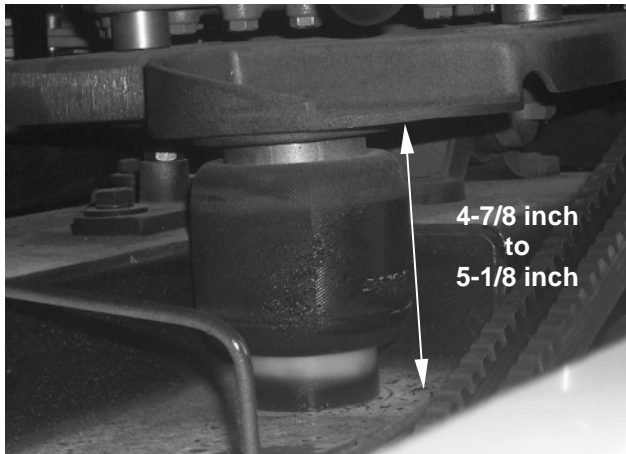


Figure 8: Tensioner bellows inflated to 75 psi (5.2 bar) and set to an installation height of 4-7/8 inch (125 mm) to 5-1/8 inch (130 mm). The compressor base is in a horizontal position.

- 2) Remove all bellows pressure by rotating the release valve (see Figure 9) clockwise. Allow the compressor to tilt towards the engine. Remove the powerband.

NOTE: Before installing a new powerband, it is recommended to check the compressor clutch bearing for excessive play. Replace bearing as required.

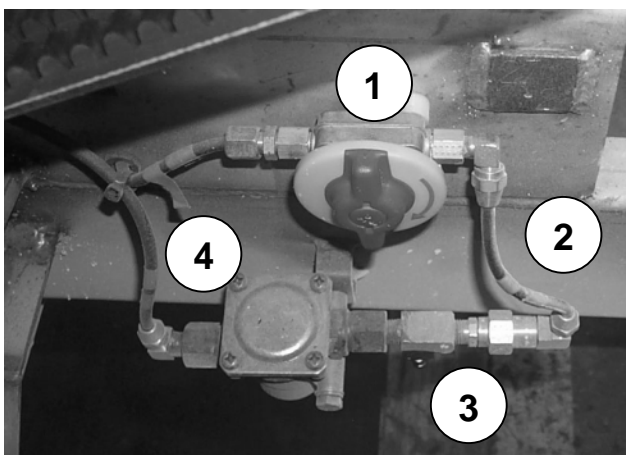


Figure 9: C2045 - Release valve (1) with pressure regulator (4), check valve (2) and test fitting (3)

- 3) Install a new powerband so that the references, which have been printed on it can be read.
- 4) Repressurize the bellows with the release valve. The compressor base should now be in a horizontal position. If not, loosen the four compressor upper mounting bolts (see 7, Figure 11 on last page). Shift the compressor to the right to obtain a horizontal position. Retighten the bolts to a torque of 52 ft.lbf (70 Nm).

- 5) Reinstall the pre-tensioner and adjust it fully up so it just butts the compressor base.

6.5 To check and adjust powerband tension:

- 1) With the air system fully pressurized and using Gates belt tension gauge Kriket II (VH 10565633) as described in the maintenance manual, check powerband tension to comply with the data in the chart below.

Drive belt	Tension @ 75 to 80 psi bellows pressure			
	New belt	After running-in (20 min)	After 1,000 miles	Maintenance interval
VH 10961199 VH 10961200 VH 10961201	220 ± 20 lbf 1,000 ± 100N	220 ± 20 lbf 1,000 ± 100N	220 ± 20 lbf 1,000 ± 100N	220 ± 20 lbf 1,000 ± 100N

- 2) If the belt tension is not to specification, adjust it as follows:

Locate the pressure regulating valve (4, Figure 9).

Remove the bottom cover.

Turn the screw indicated in Figure 10:

- Clockwise to increase pressure.
- Counterclockwise to decrease pressure

CAUTION: The tensioning bellows should not exceed the recommended installation height shown in Figure 8.



Figure 10: Pressure regulator adjusting screw

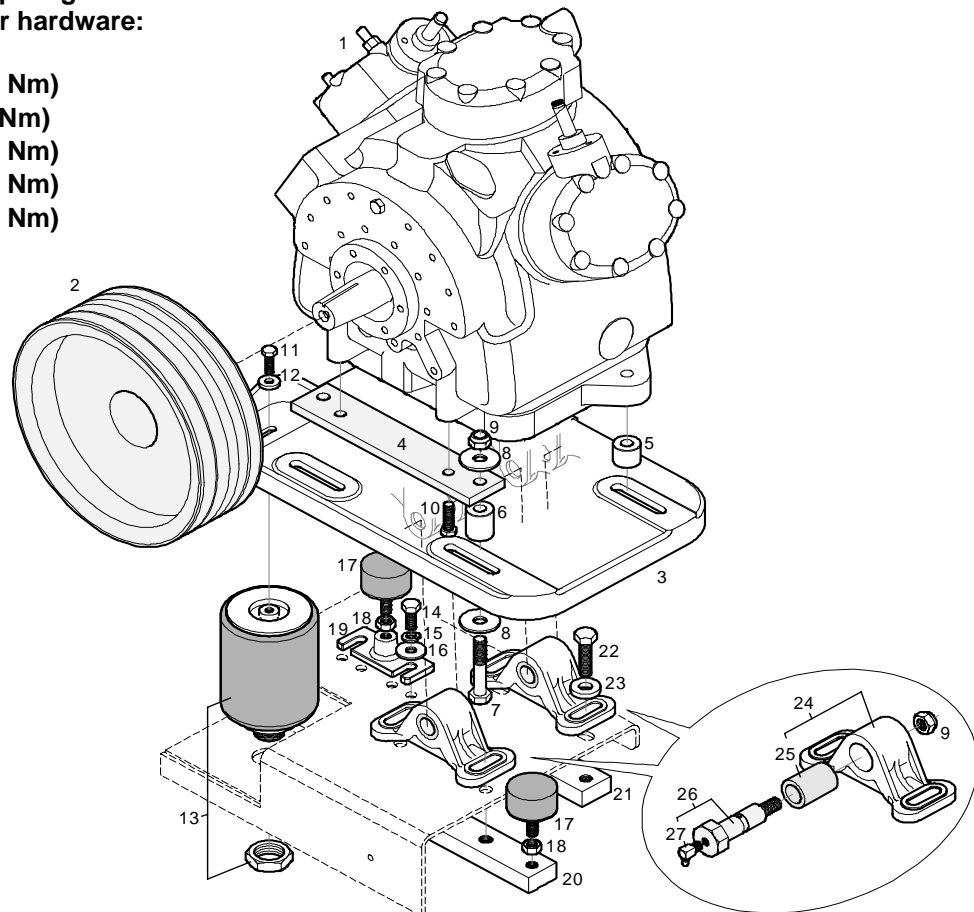
- 3) Recheck belt tension.
Refit the bottom cover.
- 4) Run the engine for 20 minutes.
After the powerband has been run-in for 20 minutes, check that the compressor base position and bellows installation height are still within limits.
Make sure a 5/32 to 3/16 inch (4 to 5 mm) gap exists between the pre-tensioner (see 7, Figure 3) and the compressor base.

Check and adjust the gap between the safety stop (see Figure 2) and the compressor base to be approximately 7/16 inch (11 mm).
Readjust the compressor base position as required.

Procedure complete.

**Figure 11: Torque figures for
AC compressor hardware:**

- 7. 52 ft.lbf (70 Nm)**
- 11. 44 in.lbf (5 Nm)**
- 13. 30 ft.lbf (40 Nm)**
- 14. 30 ft.lbf (40 Nm)**
- 22. 52 ft.lbf (70 Nm)**



7. DISCLAIMER:

The procedures contained herein are not exclusive. Van Hool cannot possibly know, evaluate, or advise the transportation industry of all conceivable ways in which a procedure may be undertaken or of the possible consequences of each such procedure. Other procedures may be as good, or better, depending upon the particular circumstances involved.

Each carrier who uses the procedures herein must first satisfy itself thoroughly that neither the safety of its employees or agents, nor the safety or usefulness of any products, will be jeopardized by any procedure selected.

8. SERVICE INFORMATION:

Service Bulletins are issued to supplement or supersede information in the Van Hool manuals. Note Service Bulletin number, date and subject on the register at the end of the relevant chapter(s). File Service Bulletin separately for future reference.