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(Also applies to Mack Trucks Australia)
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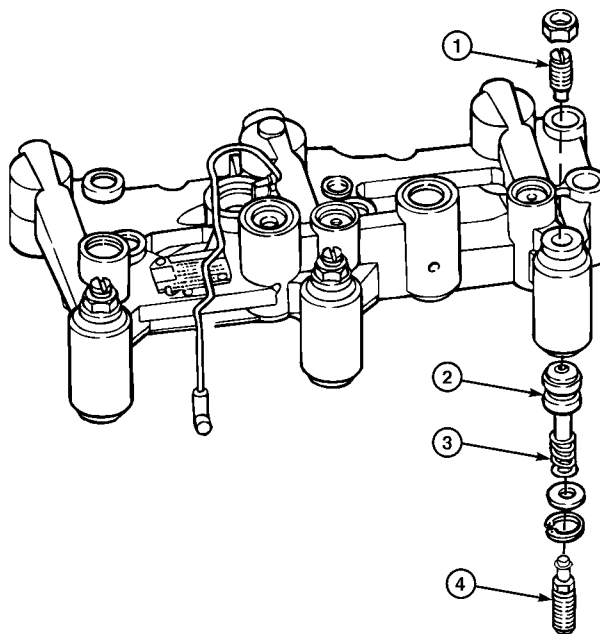
VALVE YOKE GUIDE PIN, ROTATOR AND SLAVE PISTON SPRING BREAKAGE — ENGINES EQUIPPED WITH J-TECH™ ENGINE BRAKE

REV

A valve yoke guide pin will break off (usually flush with the cylinder head) when it has been subjected to unusual bending loads which it was not designed to withstand. These bending loads result when the yoke is not evenly “balanced” relative to the two valves that it is operating. This imbalance can occur from valve yoke mis-adjustment, improper J-Tech™ slave lash, valve seat recession, J-Tech™ engine brake “drop-out,” wear/breakage of the actuator pin adjusting screw, broken J-Tech™ slave piston springs or improper function of the J-Tech™ reset screw.

In order to avoid repeated valve yoke guide pin and/or J-Tech™ actuating screw failures, it is essential to thoroughly investigate the causes outlined above and be sure that the root cause of the breakage is corrected.

J-Tech™ Engine Brake Reset Screw/Slave Piston Spring Kit (Part No. 215SB321)



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Figure 1 — J-Tech™ Engine Brake Reset Screw, Slave Piston Spring and Actuating Pin Adjusting Screw

- | | |
|-----------------|-----------------------------------|
| 1. Reset Screw* | 3. Slave Piston Spring* |
| 2. Slave Piston | 4. Actuating Pin Adjusting Screw* |

* Reset screws, slave piston springs and actuating pin adjusting screws (items 1, 3 and 4 in the illustration above) are all included in the J-Tech™ Reset Screw/Slave Piston Spring service kit (part No. 215SB321)

NOTE

If the engine is equipped with external oil supply lines to the engine brake units and the engine brake has not been previously updated as described in this bulletin, service kit part No. 215SB321 must be installed to prevent valve yoke guide pin breakage.

Warranty claims submitted for broken guide pin repairs must include installation of the J-Tech™ Reset Screw/Slave Piston Spring service kit (part No. 215SB321). Failure to install the components included in the service kit (part No. 215SB321) will result in repeat engine breakdown.

When investigating causes of valve yoke guide pin breakage, the J-Tech™ engine brake reset screws and slave piston springs must be inspected and updated to the current components if they have not already been updated. The current reset screws can be identified by the part number stamped next to the screwdriver slot. If part No. 032053A is stamped on the reset screws, the brake unit in most cases will contain the current slave piston springs. Engine brake units having the updated reset screws and slave piston springs can also be identified by the part number stamped on the engine brake identification plates. Engine brake units having MACK part Nos. 75GB59B or 757GB59C contain the updated components.

REV The production tie-in date for the updated J-Tech™ engine brake units (part No. 757GB59B) in E-Tech™ engines is September 2002, beginning with engine serial No. 2R2728.

REV All ASET™ AC, AI and AMI production engines have the updated J-Tech™ reset screws and slave piston springs, and the engine brake units have been updated to part Nos. 757GB59B or 757GB59C units.

REV For engine brakes not already updated with the current reset screws and slave piston springs, a service kit (part No. 215SB321), which includes six improved reset screws (part No. 4559-32053), six slave piston springs (part No. 4559-30860) and six actuating pin adjusting screws (part No. 421GC41CM), is now available through the MACK Parts System. The single slave piston springs replace the previously used dual spring arrangement.

NOTE

Before disassembling the engine brake units to check for broken slave piston springs, make sure the units have not already been updated by either checking the J-Tech™ engine brake part number stamped on the identification plate, or by looking at the part number stamped on the reset screws (at the top of the screw next to the screw slot).

The improved reset screws included in the service kit were originally developed for the J-Tech™ engine brake used on ASET™ engines, but they can also be used for the J-Tech™ engine brake used on E-Tech™ engines. The term “reset” refers to the dynamic function of the screw in allowing the outboard exhaust valve to fully close, in preparation for the valve to reopen at the next cycle during an engine braking event. If the outboard exhaust valve does not fully close during each engine braking event, bending loads on the valve yoke guide pin will result. In addition to the reset function, the reset screw also functions as the engine brake lash adjusting screw.

Procedures for removal, inspection and replacement of the slave piston springs and reset screws are as follows:

1. With the engine brake units on the engine, break the engine brake lash adjusting screw jam nuts loose.
2. Remove the engine brake units from the engine.
3. Place the engine brake units on a clean work bench, then carefully remove the slave piston reset screws (engine brake lash adjusting screws) and jam nuts.

NOTE

Take care not to mix the old reset screws with the new screws. The new screws are approximately 0.330" (8.4 mm) longer than the old screws. The new screws can also be identified by the part number (032053A) stamped on the top of the screw next to the screw slot.

4. Turn the engine brake unit upside down (bottom side facing up), then use the slave piston removal/installation tool (tool No. 4559-25084) to compress the slave piston springs to allow removal of the retaining circlip, retaining washer and slave piston inner and outer springs.

NOTE

Before removing the circlip, note the way it is facing. (Note that the circlip to be removed is on the **bottom** side of the engine brake unit.) The circlip must be reinstalled with the sharp edge facing the installer.

NOTE

THE SLAVE PISTON SPRINGS ARE NOT REMOVED FROM OR INSTALLED INTO THE ENGINE BRAKE UNITS THROUGH THE TOP OF THE ACCUMULATORS.

5. Carefully remove the slave piston springs WITHOUT removing the slave pistons. Inspect for broken springs.

CAUTION

If any of the springs are broken, they are confined to the spring chamber below the slave piston, an area where there are no oil passages. Removal of the slave piston can allow pieces of the broken spring to fall into the piston bore where there are oil passages. To avoid this, place the housing in the vertically upright position, then remove the slave piston. Removing the piston with the housing in this position will “sweep” any spring particles out of the bore. After the piston has been removed, inspect the snap ring groove for particles and clean as necessary before placing the housing upside-down.

6. Carefully remove the slave pistons. When removing the pistons, check each piston for freedom of movement in the bore. The slave pistons must slide freely within the bore and not be restricted in any way. Keep the pistons in order so that they will be reinstalled in the same bore from which they were removed.

NOTE

If a slave piston does not slide freely in the bore, it is a sign that damage has occurred to the brake housing and/or other components, making replacement of the brake housing necessary.

7. After determining that the engine brake housing is usable, inspect the slave pistons prior to installation into the housings. Burnished or polished surfaces on the slave pistons are common and normal. A wear-in ring pattern may be visible on the top of some slave pistons. This ring pattern is caused by contact between the reset screw body (outside diameter with the screwdriver slot) and the slave piston. This ring pattern in no way affects performance or reliability of the engine brake, and is not a reason to replace a slave piston. If a slave piston is badly scored or otherwise damaged, replace with a new slave piston (part No. 4559-21423) as necessary.
8. Reassemble the engine brake unit by first installing the slave piston into its respective bore (or a new slave piston if the original was damaged), then installing the new slave piston springs (part No. 4559-30860) supplied in the kit. Use the spring compressor (tool No. 4559-25084) to compress the springs and slave piston, then reinstall the existing retaining washer and circlip. Make sure the circlip is properly installed (sharp edge facing the installer) and seated.
9. Install the new reset screw (part No. 4559-32053) supplied in the kit, then reinstall the existing jam nuts. Do not tighten the jam nuts at this time.
10. Repeat the above procedures for the remaining slave pistons in both engine brake units.
11. Install the new actuating pin adjusting screws (part No. 421GC41CM) in the valve yokes and new-style flange jam nuts (part No. 142GC243M), if not already so equipped. Generously lubricate the adjusting screws and jam nuts with clean engine oil.

REV

12. Adjust the valve yokes and, using an accurately calibrated torque wrench, tighten the jam nuts to 33 lb-ft (45 N·m).

NOTE

DO NOT use THREAD LOCKING COMPOUND.

It is critical that the adjusting screw jam nuts be tightened to proper torque specifications with an accurately calibrated torque wrench. DO NOT simply tighten the nuts with a standard wrench.

13. Reinstall the engine brake units onto the engine.
14. Adjust valve lash (inlet, 0.016" [0.406 mm] and exhaust, 0.024" [0.610 mm]) and tighten the adjusting screw jam nuts to 45 lb-ft (61 N·m).
15. Adjust the engine brake slave lash to the **new specification of 0.021" (0.533 mm)**. Use a new 0.020" or 0.021" thickness gauge and adjust to 0.020"–0.021". Do not exceed 0.021". After properly adjusting engine brake slave piston lash, tighten the jam nuts to 25 lb-ft (34 N·m).
16. If the engine ID plate located on the cylinder head cover has not already been stamped with the new engine brake slave piston lash setting of 0.21", restamp the new setting in the appropriate area of the ID plate.
17. To identify that the engine brake units have been updated with the new slave piston springs, stamp a letter "C" to the right of the engine brake housing part number (757GB59) located on the housing identification plate. If the part number ends with the letter "A" (757GB59A), cross out the "A" and stamp a "C."

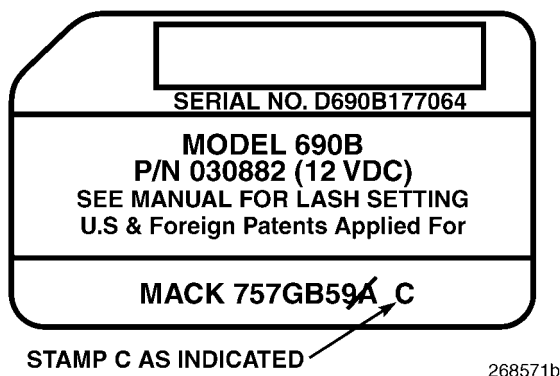


Figure 2 — Engine Brake Unit Identification Plate

Valve Yoke Actuating Pin Adjusting Screw

The head of the actuating pin should protrude from the adjusting screw body as shown in the following illustration.

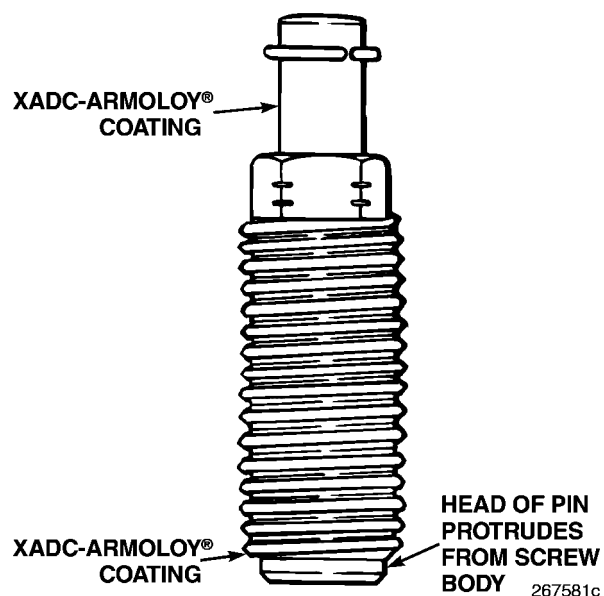


Figure 3 — Actuating Pin Adjusting Screw Assembly

Effective approximately mid-August 2002, a new engine brake actuating pin adjusting screw assembly (part No. 421GC41CM) was implemented into engine production. The bottom pin-seat surface of this screw body and the entire surface of the floating pin are coated with an XADC-Armoloy® coating. The XADC-Armoloy® coating features the inclusion of synthetic nano-diamond with the thin dense chromium, and provides significant improvements in hardness and wear resistance. Actuating pin adjusting screws having the XADC-Armoloy® coating can be identified by the dull aluminum color of the screw body pin seat surface, and on the lower side of the first thread. The rest of the screw body is the same black color as the previous screws. Another means of identifying a 421GC41CM screw is by looking at the floating pin. The pin is fully coated with Armoloy coating on these screws, whereas the pin on the previous part number screws was not.

NOTE

Any existing dealer stock of actuating pin adjusting screw part numbers 421GC41M or 421GC41AM should not be used.

With the previous actuating pin adjusting screw assemblies (part Nos. 421GC41M or 421GC41AM), wear of the screw body can result in the pin recessing into the screw until flush with the screw body as shown in the illustration below.

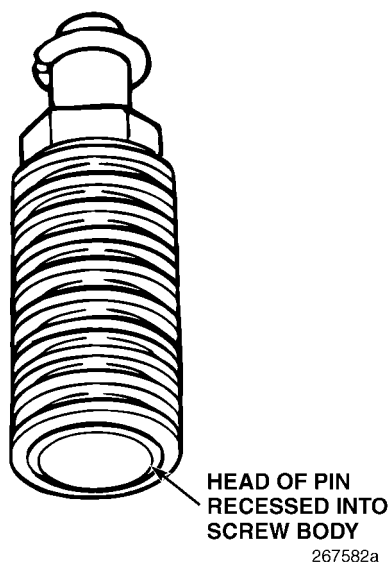


Figure 4 — Worn Actuating Pin Adjusting Screw

In severe cases, the end of the adjusting screw threads may be worn or broken due to contact with the valve tip.

The length of the adjusting screw assembly, from the face of the actuating pin to the top of the screw body, should be 0.970"–0.960" (24.64–24.38 mm). If any one of the adjusting screw assemblies measures less than 0.960", all six of the screws should be replaced with six XADC-Armoloy® screws (part No. 421GC41CM).

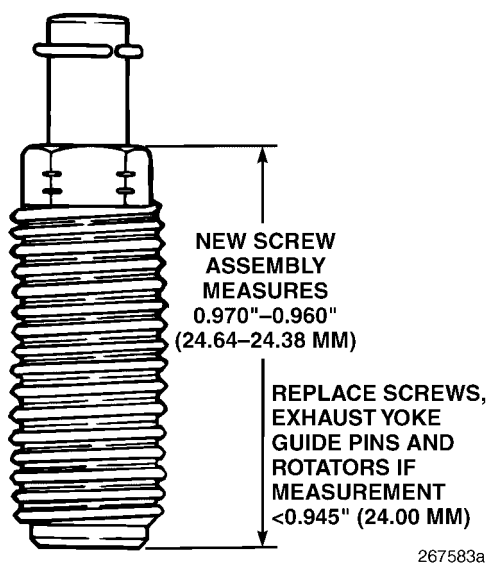


Figure 5 — Measuring Actuating Pin Adjusting Screw Assembly

Valve Rotators

Not only will a severely worn actuating pin adjusting screw produce bending loads that can result in breakage of the exhaust yoke guide pin, it will also introduce an excessive amount of clearance between the adjusting screw actuator pin and the tip of the exhaust valve. This excessive clearance can result in breakage of the outboard exhaust valve rotator internal spring, and may also damage the inboard exhaust valve rotator.

If an actuating pin adjusting screw assembly measures 0.945" (24.00 mm) or less, or the actuating pin is worn flush with the screw body and the bottom of the screw body begins to break apart, the exhaust valve yoke guide pins and outboard exhaust valve rotators at the locations of this extreme screw wear must be replaced along with all six actuating pin adjusting screws.

If the adjusting screw assembly is worn severely enough, the possibility exists that the inboard exhaust valve rotator may also be damaged. When a rotator is damaged, the rotator internal spring breaks into pieces. These pieces of spring will eventually come out of the rotator casing and collect in the valve spring seat counterbore. To determine if a rotator is damaged, rotate the engine until the piston is at top dead center, then un-key the valve and remove the rotator and valve spring. Use a magnet to check for pieces of spring in the valve spring seat area. If spring pieces are found, the rotator is damaged and must be replaced.

NOTE

Pieces of the broken rotator spring can damage the cylinder head valve spring seating surfaces, and can also result in camshaft and lifter failure if pieces of the spring migrate down a pushrod hole. It is essential that the cylinder head be cleaned of any rotator spring pieces. Do not wash the cylinder head surfaces in an attempt to remove the pieces of broken rotator spring. A magnet must be used to clean the cylinder head. Pieces of spring that are washed down the pushrod hole can result in camshaft and lifter failure, as well as damage to the cylinder block lifter bore.

CAUTION

Failure to replace a rotator that has a broken internal spring will result in complete failure of the rotator which can cause major engine damage. If more than 12 rotators are damaged, all rotators should be replaced.