SERVICE



BULLETIN

NUMBER: SB-266-015 DATE: 2/9/04

MODEL: E-Tech™ with

J-Tech™

(Also applies to Mack Trucks Australia) (Supersedes SB-266-015 dated 4/4/03)

CONVERTING J-TECH™ 757GB58 SERIES ENGINE BRAKE UNITS TO TOP OIL FEED

The J-Tech™ 757GB58 series engine brake units were used on E-Tech™ engines from the beginning of production through July 2, 2000. On these units, oil is fed into the bottom of the engine brake by way of an oil feed port located in the rocker shaft front mounting bracket. Beginning July 2, 2000, the 757GB59 series engine brake units were implemented into production, replacing the 757GB58 series units. The 757GB59 engine brake units were changed to a dual oil feed, where the bottom oil feed was retained and an oil feed port was added to the top of the engine brake unit so that oil from the engine main gallery could be fed directly to the engine brake unit by external oil lines.



REV The 757GB58 series engine brake units do not have an oil feed port on the top of the housing. The instructions contained in this bulletin outline the procedures for adding a top oil feed port and the external oil supply lines.

NOTE



Beginning April 4, 2003, the only acceptable repair for resolving either poor engine brake performance or engine brake "drop-out" issues on engines equipped with the 757GB58 series engine brake units are the procedures outlined in this bulletin. Other repairs, such as installing the high volume oil pump, closer tolerance engine bearings, J-Tech™ control valve kits, etc., will not be covered by warranty.

The following chart outlines the parts necessary for this conversion.

Part No.	Description		
215SB321	J-Tech™ reset screw, slave piston spring and valve yoke adjusting screw update kit		
57GC522P2	External oil line kit		
6635-82000	Steel oil lines (two lines included, replaces steel braided lines included with 57GC522P2 oil line kit)		
4559-21423	Slave piston (required only if existing piston[s] are damaged)		
142GC243M	Flange-style jam nuts, exhaust valve yokes (required if engine not already so equipped)		
63AX335	1/4" NPT internal hex pipe plug (required if engine is equipped with front rocker shaft feed external oil lines)		



Special tools required for this modification are as follows:



	Part No.	Description		
•	387SX18	Drilling fixture (originally shipped to all MACK dealers approximately March 26, 2 now available through the MACK Parts System.)		
	4559-25084	Slave piston removal/installation tool		

NOTE

Before proceeding with the top oil feed conversion, the engine brake housings must be inspected for damage within the slave piston bores that would otherwise render the housing unusable.

When converting a 757GB58 series engine brake unit to a top oil feed, if the engine brake has not been previously updated with service kit part No. 215SB321, it must be updated at this time to prevent valve yoke guide pin breakage. This service kit contains updated reset screws, slave piston springs and actuating pin adjusting screws having the XADC-Armoloy® coating. The reset screws can be identified with the part No. 032053A stamped on the screw next to the screwdriver slot.

The XADC-Armoloy® coated actuating pin adjusting screws (part No. 421GC41CM) 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 previously used screws. Another means of identifying a 421GC41CM screw is by looking at the floating pin. The pin is fully coated with the Armoloy coating, whereas the pin on the previous screws (part Nos. 421GC41M and 421GC41AM) was not. Do not use any of the previous screw part Nos. 421GC41M or 421GC41AM.

Adding the top oil feed port to the 757GB58 series housings requires drilling into the top of the housing to provide a new oil feed port that intersects with the main oil supply passage inside the housing. This passage slopes upward to the solenoid port from near the bottom of the housing. A drilling fixture is required to ensure that the top feed oil port is properly located so that it intersects the passage at the correct location as shown in the following illustration. The drilling fixture was shipped to all MACK dealers approximately March 26, 2003. Additional fixtures (part No. 387SX18) are available through the MACK Parts System.

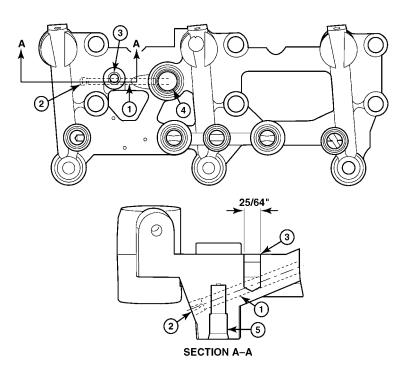


Figure 1 — Engine Brake Unit Part No. 757GB58 Top Oil Feed Port

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	4. Solenoid Port5. Bottom Oil Feed Port
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Procedures for removal, inspection, drilling and tapping of the engine brake housings 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 unit on a clean work bench, then carefully remove the slave piston reset screws (engine brake lash adjusting screws) and jam nuts.
- 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 installed 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.

A CAUTION

If any of the springs are broken, broken pieces 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 broken spring to fall into the piston bore. 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 into 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. If it has been determined that the engine brake housings are usable, remove and discard the check valve components (if equipped) located in the bottom oil inlet port of the housings. These components have been replaced by an oil inlet check valve. Install an oil inlet check valve (part No. 4559-2025132, supplied in the 57GC522P2 oil line kit) into the oil supply port on the front rocker shaft mounting bracket on each cylinder head.

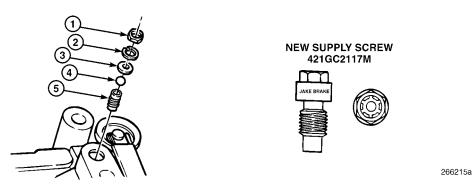


Figure 2 — J-Tech™ Oil Supply Check Valve

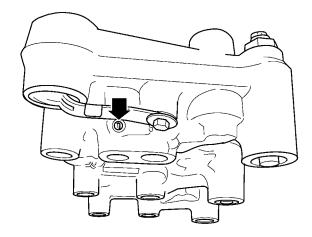
Seal ring Ring, retaining	4. Ball, check 5. Spring
Washer, retaining	o. Opining

NOTE

If the spring (item 5 in the above illustration) appears to be missing, it may have travelled up into the oil passage. The spring must be removed. This can be accomplished by removing the solenoid and inserting a tie wrap into the oil supply gallery at the solenoid port and pushing the spring to the oil inlet port from where it can then be removed.

8. Remove the solenoid valve and the O-rings from the engine brake unit.

9. Using a 4 mm Allen wrench, remove the Allen-head plug from the front bottom of the housing.



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Figure 3 — Oil Passage Plug

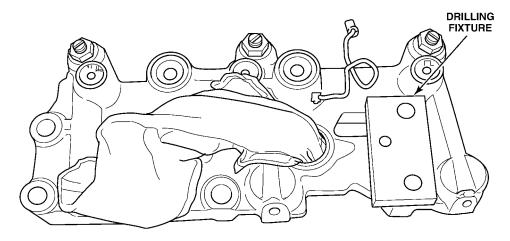
NOTE

If difficulty removing the plug is encountered, thoroughly clean all oil from the housing, then use a torch to lightly apply heat directly to the housing around the plug. Keep the torch moving in a circular motion at all times. Applying heat to the housing will loosen the bond of the thread locking compound. Apply a minimal amount of heat only; do not overheat the housing. Do not apply heat directly to the plug, and do not apply heat to the plug with an Allen wrench inserted into the internal hex of the plug.

If the pipe plug cannot be removed, even after applying heat to the housing, the housing can still be modified. Extra care, however, must be taken when cleaning the housing after the drilling and tapping operations have been completed, to ensure that the sloped oil passage inside the housing is cleaned of all debris. Refer to Figure 1, Section A–A for an illustration of the areas that must be cleaned. Use a generous amount of Brakleen® (or similar type of solvent) to clean the housing and blow dry with clean, dry compressed air.

10. Insert a clean, lint-free shop rag into the solenoid port to keep drilling chips and other debris that may enter the oil passage to a minimum.

11. Position the drilling fixture on the brake housing by inserting the two fixture locating pins into the engine brake mounting holes.



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Figure 4 — Position Drilling Fixture on Engine Brake Housing

12. Using the drill fixture and a sharp 25/64" drill bit, drill a hole 0.100" (2.54 mm) deep into the top of the housing. The 25/64" drill bit is a very snug fit in the drill fixture. Drilling a 0.100" (2.54 mm) deep hole in the housing first, then removing the drilling fixture will make the drilling operation easier.

NOTE

The drilling operations must be performed on a drill press to ensure that a straight hole is drilled in the housing.

NOTE

The oil passage slopes upward toward the solenoid port from the plug near the bottom-front of the housing. The top feed oil port is not centered over the oil passage. If the passage was centered, there is a greater possibility that the vertical drilling would break through the passage wall.



13. Remove the drill fixture and mark the sharp 25/64" drill bit with a piece of tape, 0.750"— 0.800" (19.05–20.32 mm) from the tip of the bit. This mark denotes the maximum depth to be drilled.

A CAUTION

DO NOT exceed 0.800" (20.32 mm) or the drill will break through the bottom of the housing.

14. Drill into the top of the housing to the 0.750"-0.800" (19.05-20.32 mm) depth. While drilling the housing, use plenty of cutting oil to keep the drill bit well lubricated. Drill slowly and in small increments, backing the drill bit out of the hole frequently to remove drilling chips, and to look into the hole to determine when the drill bit finally breaks through the oil passage. Stop drilling as soon as the drill intersects fully with the oil passage.

A CAUTION

Be sure to stop drilling as soon as the drill bit reaches the 0.750'-0.800' (19.05-20.32 mm) depth. Do not continue drilling through to the bottom of the passage because once the drill bit reaches the bottom, only a small amount of further drilling will break through the housing (refer to Figure 1, Section A-A). Should this happen, the housing can still be used by using a suitable pipe plug to seal the hole drilled through the bottom of the housing.

NOTE

When drilled as specified above, the vertical hole will expose approximately 1/2 of the sloped oil passage inside the housing, as the newly drilled port is not located directly over the oil passage. This is sufficient for adequate oil flow.



- REV 15. Using a standard 1/2", 82-degree countersink tool for use in metal, countersink the top of the hole to a point where a 0.50" (12.7 mm) countersink is achieved. Do not produce a vertical-walled counterbore.
 - 16. Remove the housing from the drill press.
 - 17. Tap the hole with a 7/16-20 UNF tap to a depth between 0.45"-0.67" (11-17 mm). Use a generous amount of cutting oil to lubricate the tap when tapping the hole. Complete the tapping operation with a 7/16-20 UNF bottom tap.

NOTE

To make the tapping operation easier, the 7/16"-20 tap can be "chucked" in the drill press and the hole tapped by turning the chuck BY HAND, one-half turn clockwise followed by onequarter turn counterclockwise, and continuing in this manner until the full tap depth is reached.

- 18. Remove the shop rag from the solenoid port.
- 19. Thoroughly clean all metal chips from the housing by blowing clean, dry compressed air into the solenoid port. Blow air toward both the newly drilled oil supply port and the oil passage plug port so that chips will exit the housing at both of these locations.

- 20. Thoroughly wash the oil passage by spraying a generous amount of Brakleen® (or similar type of solvent) into the passage through the solenoid port. Blow dry with compressed air.
- 21. Apply one drop of Loctite® 242 on the oil passage plug, then install the plug into the passage at the end of the housing. Use a 4 mm Allen wrench to tighten the plug.
- 22. Lubricate the solenoid threads and O-rings with clean engine oil, then install the solenoid into the solenoid port in the housing. Tighten the solenoid to 15 lb-ft (20 N·m).
- 23. Repeat the above procedures for the second engine brake unit.

After drilling and tapping the top-feed oil supply port, reassemble the engine brake units as follows:

- 1. Inspect each slave piston before installation into the housing. Burnished or polished surfaces on the slave pistons are common and normal. A wear-in ring pattern may be visible on top of some pistons. This ring pattern is caused by contact between the reset screw body (outside diameter with the screwdriver slot) and the slave piston. The 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.
- 2. Reassemble the engine brake unit by first installing the slave piston into its respective bore (or a new piston if the original was damaged), then by installing the new slave piston springs (part No. 4559-30860, supplied in the 215SB321 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.
- 3. Install the new reset screw (part No. 4559-32053, supplied in the 215SB321 kit), then reinstall the existing jam nuts. Do not tighten the jam nuts at this time.

A CAUTION

Install the reset screws only to the point where they touch the tops of the slave pistons and the slave pistons remain fully retracted.

- 4. Repeat the above procedures for the remaining slave pistons in both engine brake units.
- 5. Install the new actuating pin adjusting screws (part No. 421GC41CM, supplied in the 215SB321 kit) in the valve yokes and new-style flange jam nuts (part No. 142GC243M, ordered separately), if not already so equipped. Generously lubricate the adjusting screws and jam nuts with clean engine oil.
- 6. Adjust the valve yokes as outlined in the *E-Tech™ Engine Service Manual*, 5-106, then use an accurately calibrated torque wrench to 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.

7. Reinstall the engine brake units onto the engine.

NOTE

Before installing the engine brake units, make sure that an oil inlet check valve (part No. 4559-2025132, supplied in the 57GC522P2 kit) is installed in the oil inlet port located on top of the front rocker shaft mounting bracket on each cylinder head.

- 8. Adjust valve lash (inlet, 0.016" [0.406 mm] and exhaust, 0.024" [0.610 mm]) as outlined in the *E-Tech™ Engine Service Manual*, 5-106. Use an accurately calibrated torque wrench to tighten the jam nuts to 45 lb-ft (61 N⋅m).
- 9. Adjust 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).
- 10. 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 0.021", restamp the new setting in the "Engine Brake" area of the ID plate.

Installation of External Oil Supply Line Kit (Part No. 57GC522P2)

NOTE

Some engines may have external oil line kits already installed. On these engines, the external oil line feeds oil to the front of the rocker shaft. When a 757GB58 series engine brake unit is converted to a top oil feed on one of these engines, it will be necessary to remove and discard the oil line and fitting from the front of the rocker shaft, then install a 1/4" NPT internal hex pipe plug (part No. 63AX335). Tighten the plug to 15 lb-ft (20 N·m). **DO NOT** overtighten the plug. Pipe plugs having an internal Allen-wrench hex are necessary because the plug goes relatively deep into the rocker shaft. Pipe plugs having an external hex head will bottom on the hex head before becoming tight in the threads.

A CAUTION



On engines equipped with external oil lines connected to the front of the rocker shafts, block-off plugs are installed in the oil supply holes at the bottom of number one and four rocker shaft mounting brackets. These plugs MUST be removed. If these plugs are not removed, oil starvation to the rocker assemblies will result.

Install the J-Tech™ External Oil Supply Line Kit (part No. 57GC522P2) using the instructions supplied with the kit. This kit contains all the necessary components to install the external oil lines from the oil filter mounting adapter to the engine brake units. DO NOT, however, use the two steel-braid lines (part No. 744GB331A) supplied with the kit. These lines, which run from the bulkhead fitting installed in the cylinder head cover spacer to the elbow fitting installed in the oil supply port of the engine brake unit, are too short for use with this modification. Instead, steel lines (part No. 6635-82000) must be ordered separately. These lines are supplied in packages of two. Installation of these steel lines is as follows:

- 1. Install the oil supply fittings into the top oil feed port in each engine brake unit. Install the fittings with the jam nut screwed all the way up on the fitting. Hand-tighten the fitting in the oil supply port, ending with the fitting angled toward the bulkhead fitting installed in the cylinder head cover spacer.
- 2. Using a suitable non-flammable solvent, thoroughly flush the two steel oil lines and blow dry with clean shop air.
- 3. Install the lines to the bulkhead and oil supply fittings, then tighten the line fittings.
- 4. Check the line routing, making sure there is sufficient clearance between the line and the solenoid. Also, ensure that the line follows a "non-stressed" path from the bulkhead fitting to the oil supply fitting. When satisfied that the line is properly routed, tighten the jam nut for the oil supply fitting.
- 5. After all fittings have been tightened, recheck the line routing and perform a slight bending adjustment at any location where the line may contact either the solenoid or the brake housing. This bending adjustment can be accomplished by inserting a small screwdriver or similar tool between the line and the point of contact or minimal clearance.

A CAUTION

Do not use any type of tool that has any sharp edges to perform the bending adjustment. Sharp tools can nick the line and produce a stress riser, resulting in breakage of the line.

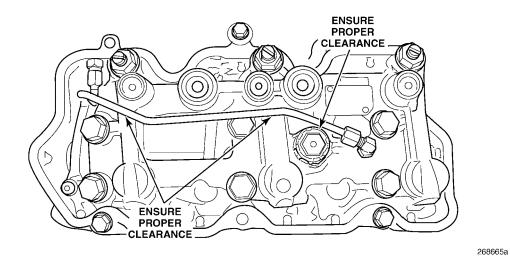


Figure 5 — Inspect Steel Line Routing

After completing the installation, start the engine and check for oil leaks, then perform a short road test to verify proper engine brake operation.

For warrantable repairs, the labor code and maximum labor allowance are as follows:

266 6A 2L 80	5.7 hr. —	Time allowed to remove and reinstall engine brake units, convert to top oil feed, install 215SB321 update kit, adjust yoke balance, valve lash, brake lash and install 57GC522P2 oil line kit on all models excluding CX, CV, CH and CL. Does not include "take-charge" time.
	6.1 hr. —	Time allowed to remove and reinstall engine brake units, convert to top oil feed, install 215SB321 update kit, adjust yoke balance, valve lash, brake lash and install 57GC522P2 oil line kit on CX, CV, CH and CL models. Does not include "take-charge" time.
266 6B 2L 80	3.8 hr. —	Time allowed to remove and reinstall engine brake units, convert to top oil feed, install 215SB321 update kit and adjust yoke balance, valve lash and brake lash on all models (excluding CX, CV, CH and CL) already equipped with rocker shaft feed external oil lines. Includes time to install rigid steel oil lines and to replace the 90-degree elbow fitting at front of rocker shaft with a pipe plug. Does not include "take-charge" time.
	4.2 hr. —	Time allowed to remove and reinstall engine brake unit, convert to top oil feed, install 215SB321 update kit and adjust yoke balance, valve lash and brake lash on CX, CV, CH and CL models already equipped with rocker shaft feed external oil lines. Includes time to install rigid steel oil lines and to replace the 90-degree elbow fitting at front of rocker shaft with a pipe plug. Does not include "take-charge" time.