Table of Contents

Description

The flywheel housing assembly is bolted to the crankcase and supports the starter motor, rear engine support brackets, and crankshaft position sensor. All transmission applications are designed to be mated to one of four flywheel housing assemblies. Although all are similar in design there are some subtle changes to accommodate a variety of transmission applications. The following lists breaks down the various configurations:

- Flywheel housing SAE #1 houses a flywheel or flexplate with a 138 tooth ring gear.

  Starter location will work only with a 138 tooth ring gear.

  Standard SAE #2 side mount locations.

- Flywheel housing SAE #1A houses a flywheel or flexplate with a 148 tooth ring gear.

  Starter location will work only with a 148 tooth ring gear.

  Standard SAE #2 side mount locations.

- Flywheel housing SAE #2 houses a flywheel or flexplate with a 138 tooth ring gear.

  Starter location will work only with a 138 tooth ring gear.

  Standard SAE #2 side mount locations.

- Flywheel housing (Bus) SAE #2 houses a flywheel or flexplate with a 138 tooth ring gear.

  Starter location will work only with a 138 tooth ring gear.

  High side mounts for bus.

The following illustrations will expand upon the various flywheel and flexplate applications used with the DT466 and 570 engines.

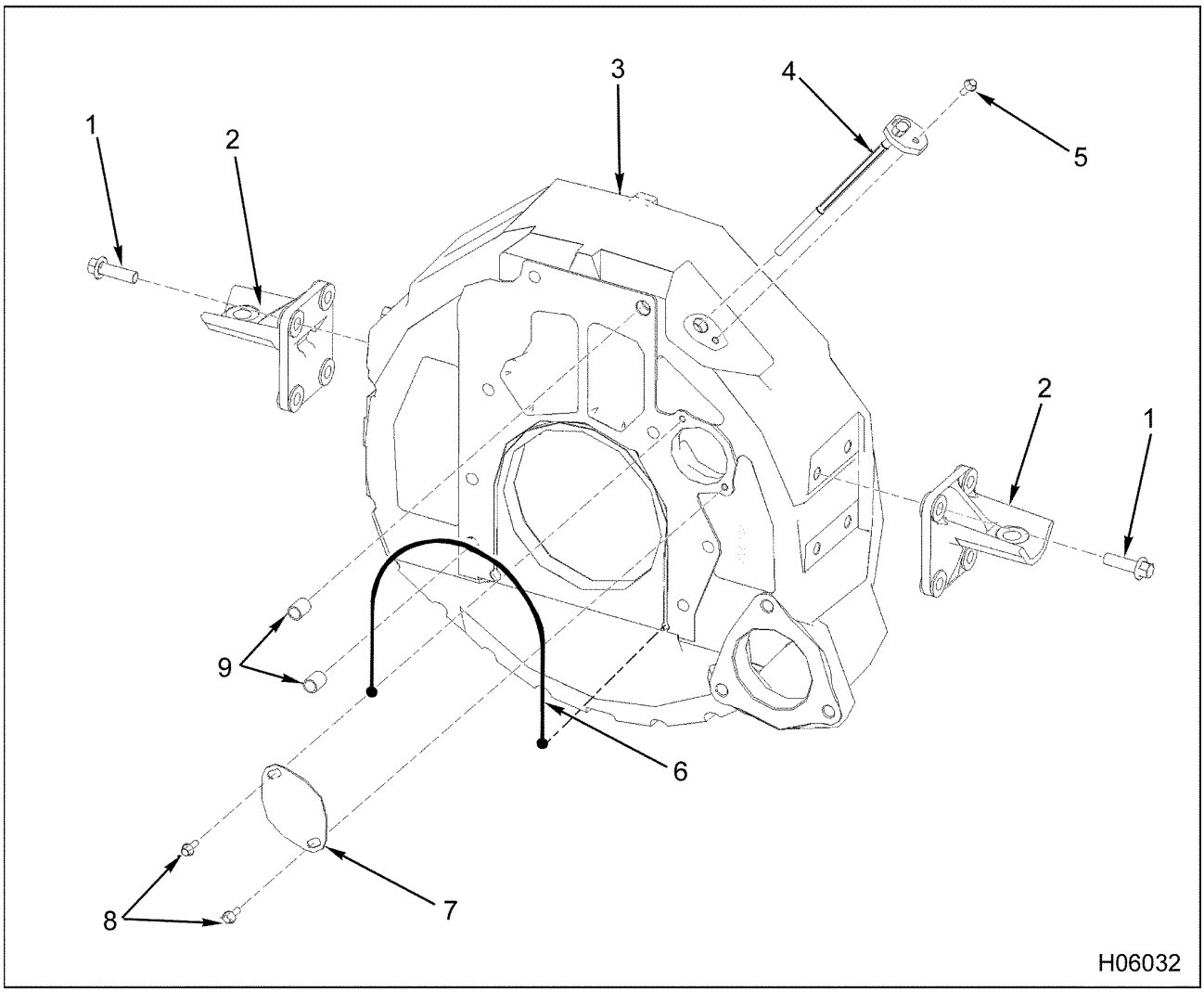

Figure 540 Flywheel housing and related parts

1. Bolt, M12 x 40 (8)
2. Rear engine mounting bracket (2)
3. Flywheel housing
4. Crankshaft Position sensor (CKP)
5. Bolt, M6 x 16
6. Flywheel housing seal
7. Cover plate
8. Bolt, M6 x 16 (2)
9. Hollow dowel (2)

Flywheel and Flexplate Applications

Manual Transmissions

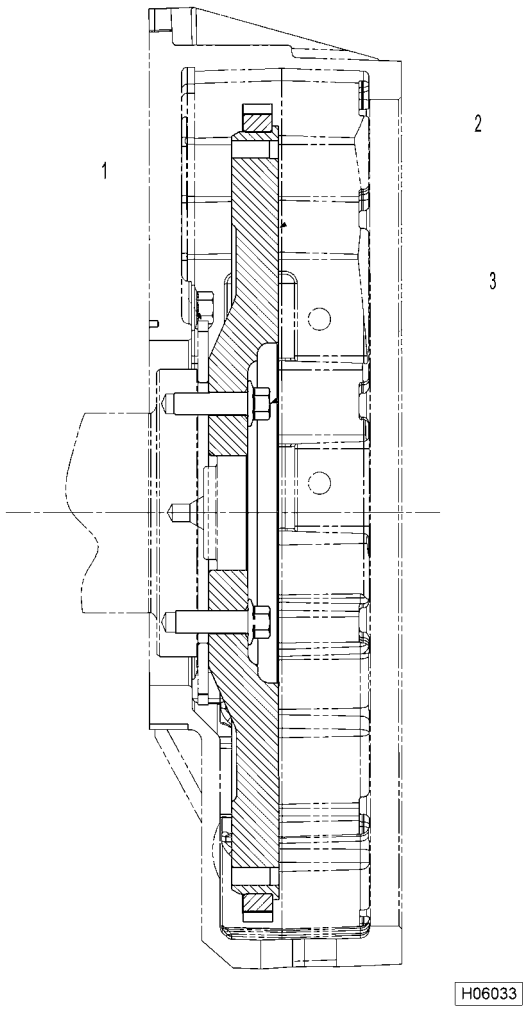

Figure 541 14 inch flywheel - for multiple plate clutch applications, 800 lbf·ft and below

1. Crankshaft timing disk
2. Flywheel assembly
3. Bolt, M12 x 40 (12)

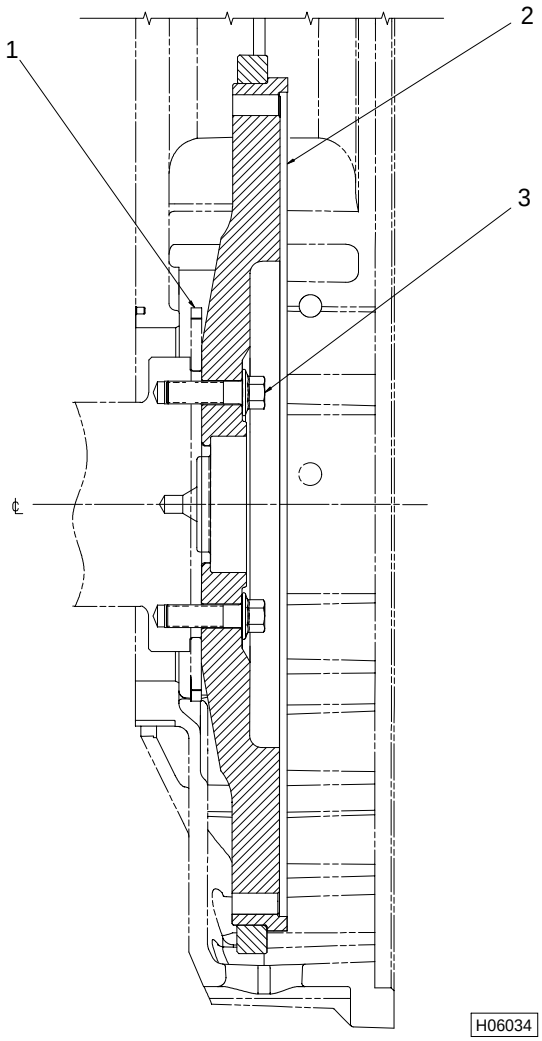

Figure 542 15.5 inch flywheel - for multiple plate clutch applications, 800 lbf·ft and above

1. Crankshaft timing disk
2. Flywheel assembly
3. Bolt, M12 x 40 (12)

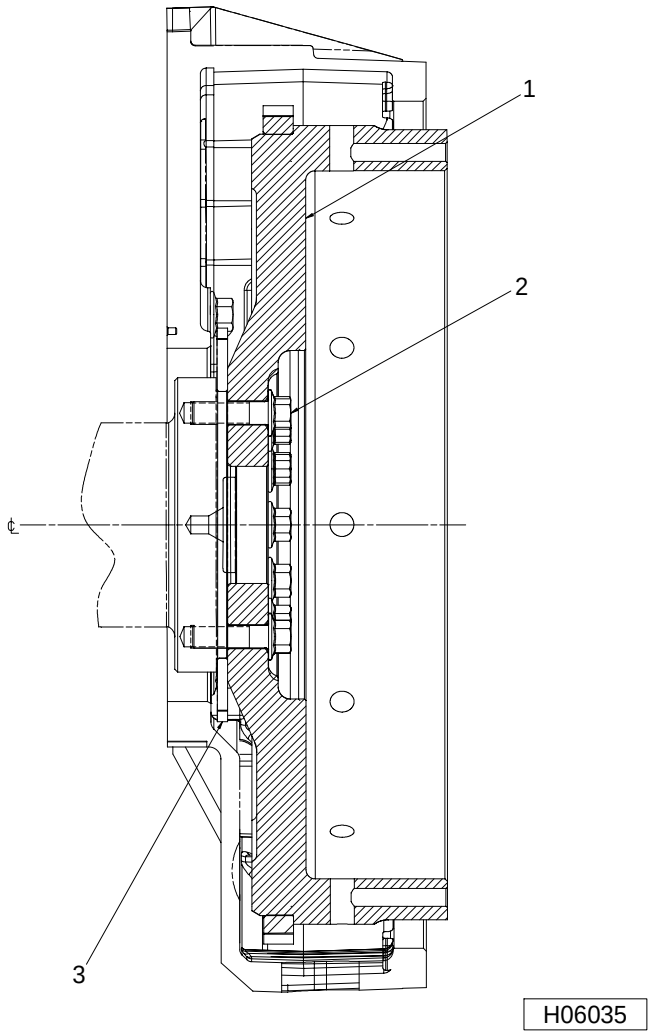

Figure 543 Pot type flywheel – for multiple plate clutch applications, 800 lbf·ft and above

1. Flywheel assembly
2. Bolt, M12 x 40 (12)
3. Crankshaft timing disk

Automatic Transmissions

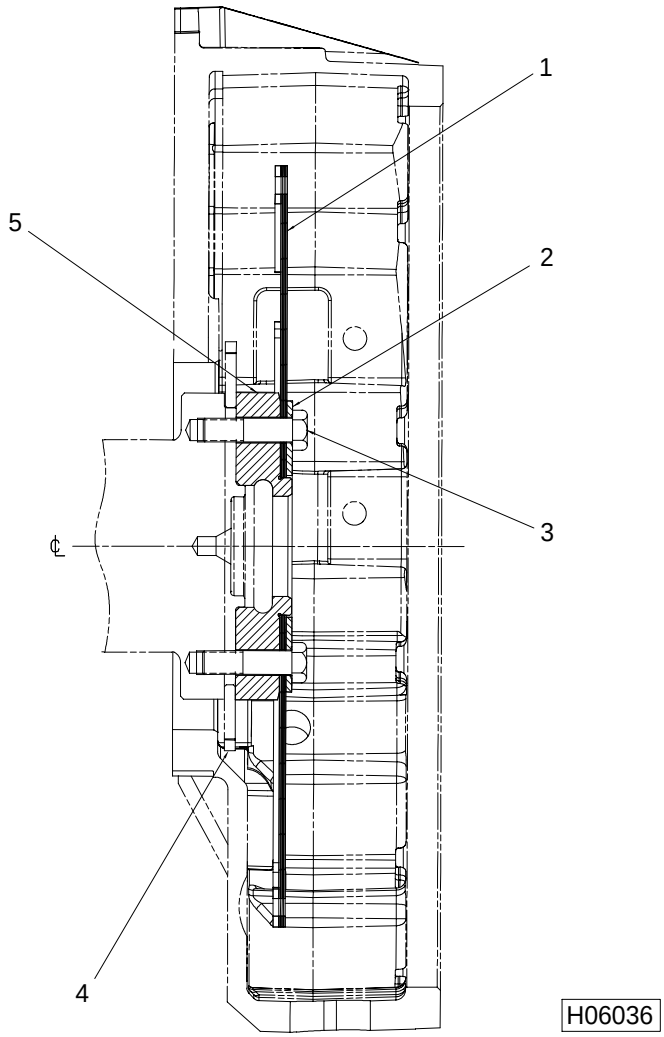

Figure 544 Application for Allison World Transmissions - MD-3060, MD-3560

1. Flexplate assembly
2. Reinforcement ring (Allison transmissions only)
3. Bolt, M12 x 45 (12)
4. Crankshaft timing disk
5. Flexplate adapter

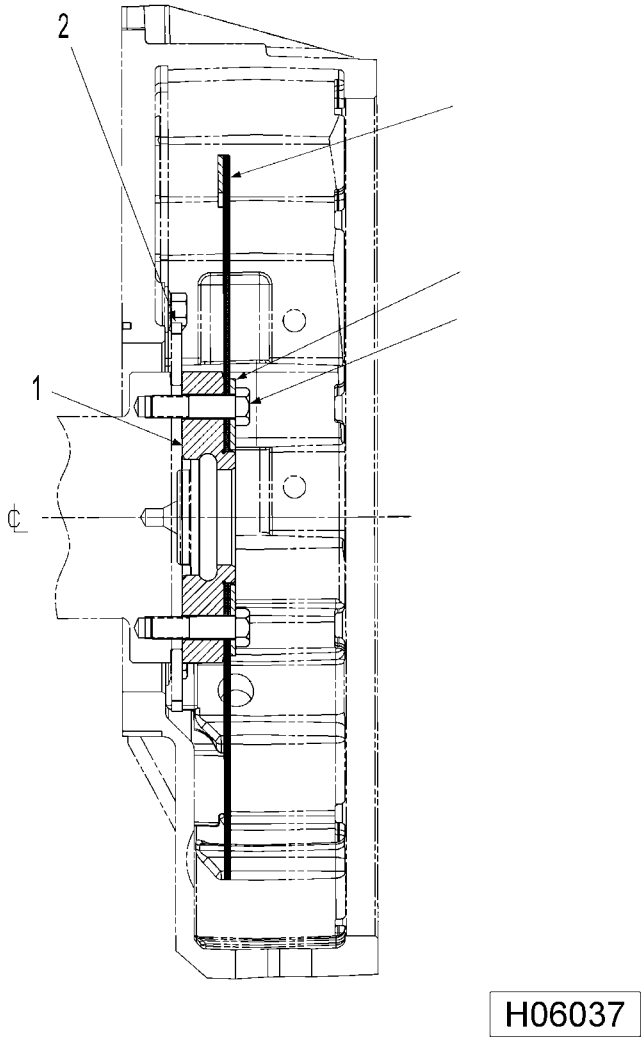

Figure 545 Application for Allison World Transmission - HD-4000

1. Flexplate adapter
2. Crankshaft timing disk
3. Flexplate assembly
4. Reinforcement ring
5. Bolt, M12 x 45 (12)

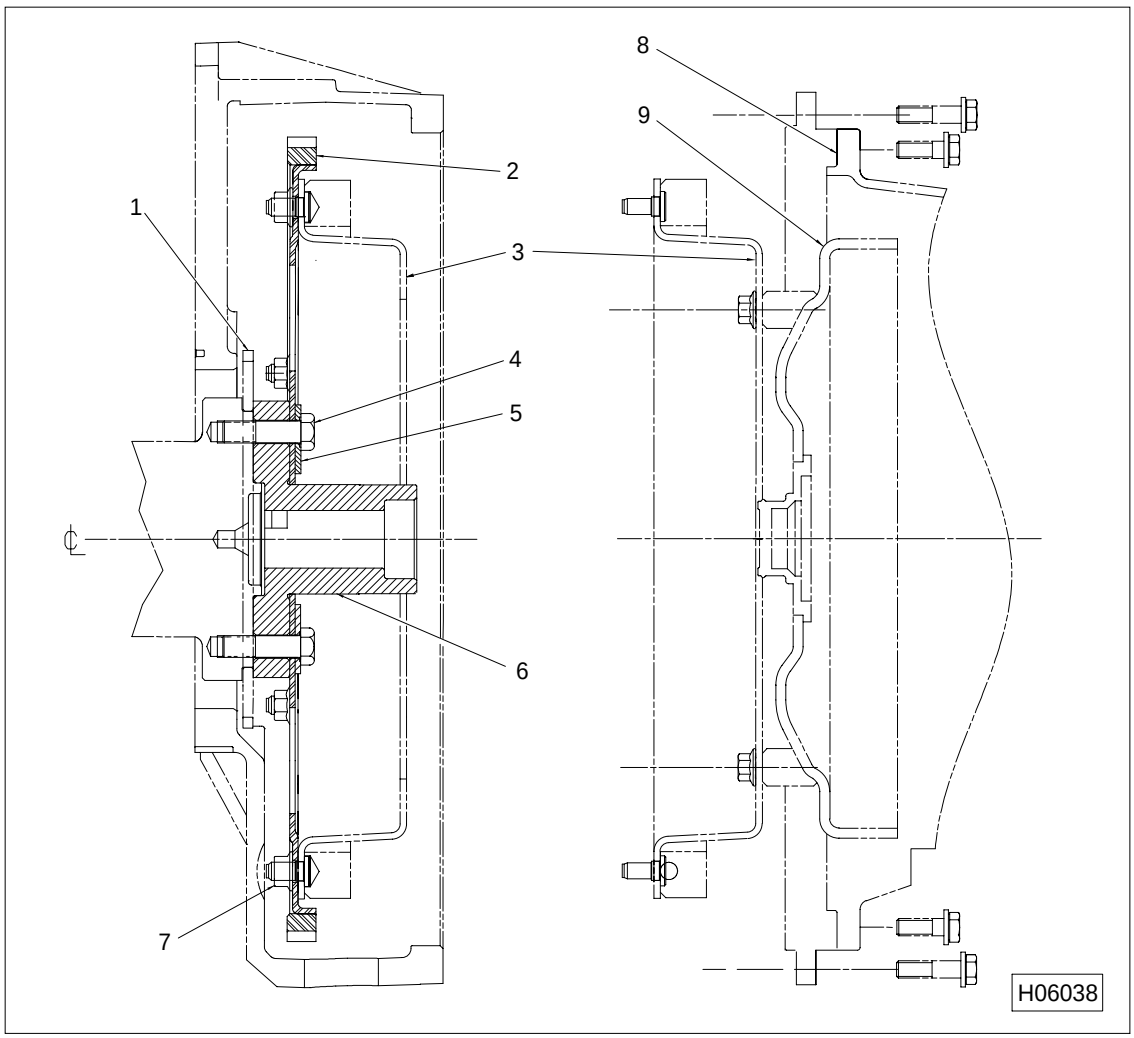

Figure 546 Application for Allison transmissions - 2000 through 2400 Series

1. Crankshaft timing disk
2. Flexplate assembly
3. Plate assembly, Allison AT transmissions
4. Bolt, M12 x 43 (12)
5. Reinforcement ring
6. Adapter hub, AT
7. Hex flange nut, M10 x 1.5
8. Transmission case
9. Torque converter assembly

Removal

Flywheel Assembly

WARNING: To avoid serious personal injury, possible death, or damage to the engine or vehicle, make sure the transmission is in neutral, parking brake is set, and wheels are blocked before doing diagnostic or service procedures on engine or vehicle.

WARNING: To avoid serious personal injury, possible death, or damage to the engine or vehicle, read all safety instructions in the "Safety Information" section of this manual.

WARNING: To avoid serious personal injury, possible death, or damage to the engine or vehicle, do not remove any engine mounting hardware until the engine is properly supported.

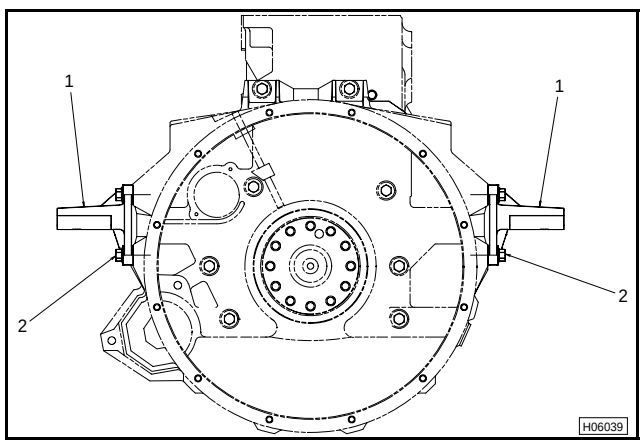

Figure 547 Loosening engine mounting bolts (148–tooth ring gear only)

1. Rear engine mounting brackets (2)
2. Mounting bolts, M12 x 40 (8)

1. There are two types of flywheels for manual transmissions: 138–tooth ring gear and 148–tooth ring gear. For flywheels with 148–tooth ring gears, first loosen the two lowest, rear most mounting bolts for the engine mounts on each side of the flywheel housing (SAE #1A). This will provide enough clearance for removal of the ring gear.

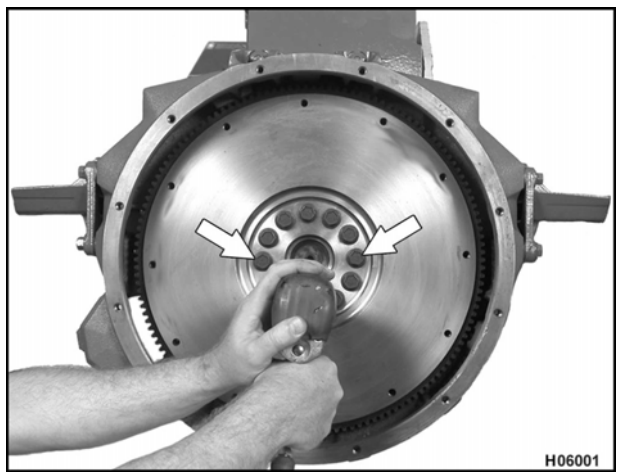

Figure 548 Removing flywheel mounting bolts

2. Remove the two flywheel mounting bolts at the 3 o’clock and 9 o’clock positions.
3. Install two guide pins (made locally) in place of the two flywheel mounting bolts.
4. Remove the remaining ten flywheel mounting bolts.
5. Slide the flywheel out of the flywheel housing and off the guide pins.
6. Remove guide pins.

Flexplate (Automatic Transmissions)

NOTE: The flexplate assembly is available as a service part. Typically, there will be no need to disassemble the flexplate assembly.

Allison 2000 Series Transmissions

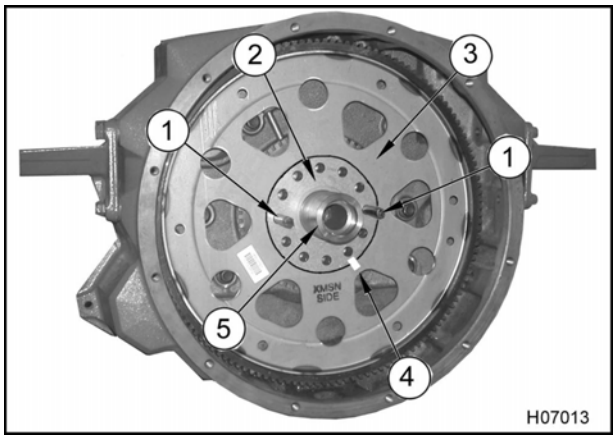

Figure 549 Removing flexplate (Allison 2000 Series Transmission)

1. Guide pins
2. Reinforcement ring
3. Flexplate assembly
4. Paint marking index
5. Adapter hub

1. Paint mark the exposed face of the reinforcement ring and flexplate for installation later on.
2. Remove the two flexplate mounting bolts at the 3 and 9 o'clock positions.
3. Install two guide pins (made locally) in place of the two flexplate mounting bolts.
4. Remove the remaining ten flexplate mounting bolts.
5. Slide the reinforcement ring, flexplate and adapter hub off guide pins.
6. Remove guide pins.

MD-3000 and HD-4000 Series Transmissions

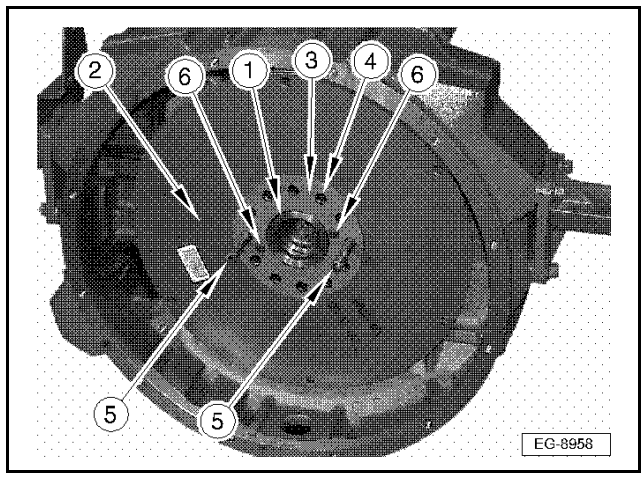

Figure 550 Removing flexplate (MD-3000 and HD-4000 Series Transmissions)

1. Adapter hub
2. Flexplate assembly
3. Reinforcement ring
4. Mounting bolt holes
5. Guide pins
6. Flexplate assembly bolts (2)

NOTE: Do not remove the two small flexplate assembly bolts.

1. Remove the two flexplate mounting bolts at the 3 o'clock and 9 o'clock positions.
2. Install two guide pins (made locally) in place of the two flexplate mounting bolts.
3. Remove the remaining ten flexplate mounting bolts.
4. Slide the flexplate assembly off the guide pins.
5. Remove the guide pins.

Crankshaft Timing Disk and Rear Oil Seal

CAUTION: To avoid engine damage, if only replacing the timing disk, do not use bolts to remove timing disk from crankshaft. Damage to the rear oil seal could occur resulting in a leak.

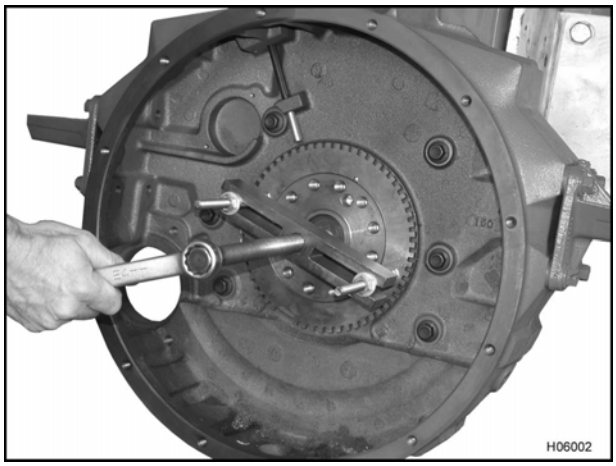

Figure 551 Removing the crankshaft timing disk

1. Use an H-bar puller to remove the crankshaft timing disk from the end of the crankshaft (Table 51).

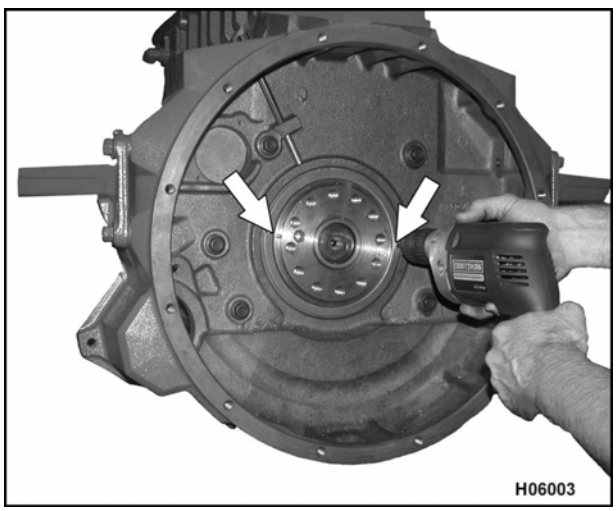

Figure 552 Drilling holes in the rear oil seal

NOTE: Use appropriate size drill bit for pulling screw.

2. Drill two holes of appropriate diameter for slide hammer use into the rear oil seal at approximately the 3 and 9 o'clock positions.

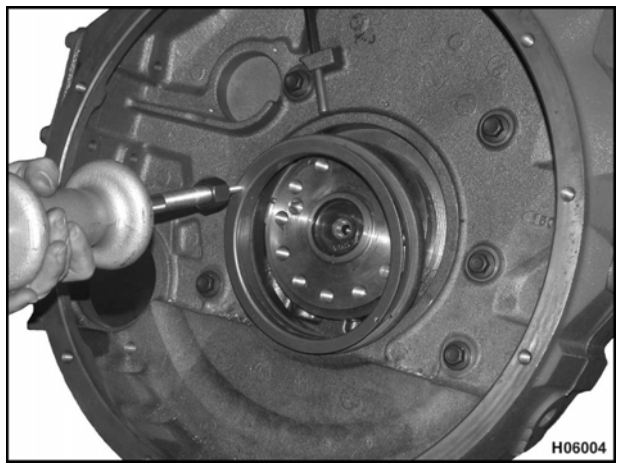

Figure 553 Removing the rear oil seal

3. Use a slide hammer (Table 51) to alternately pull on each side of the rear oil seal using the two previously drilled holes. Discard oil seal assembly.

Inspection

Flywheel Housing Face Runout

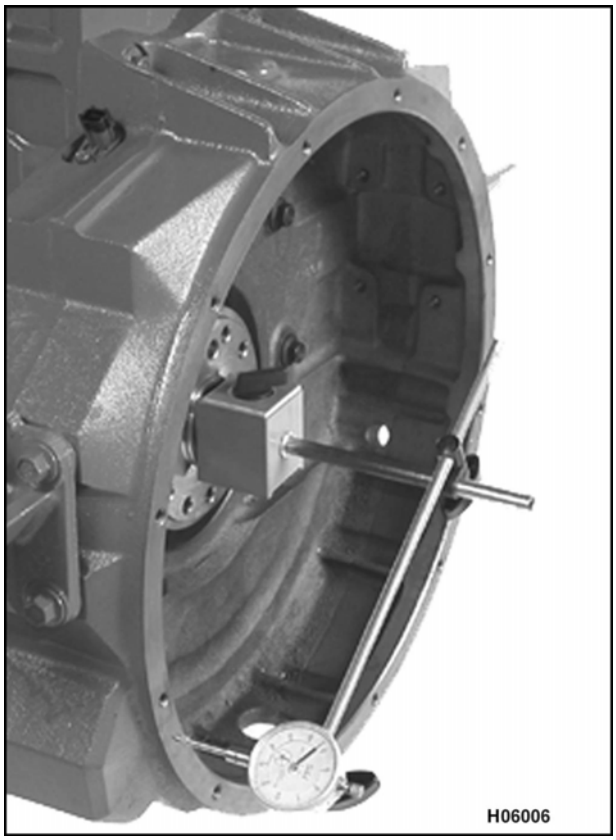

Figure 554 Flywheel housing face runout

1. Attach a dial indicator to the crankshaft. Place the tip of the dial indicator against the face of the flywheel housing.
2. Zero the dial indicator.
3. Measure the runout at each 90 degree interval (four locations) around the face of the flywheel housing.
4. Record the average of the four measurements and compare the result to the flywheel housing face runout specification.

Flywheel Housing Bore Concentricity

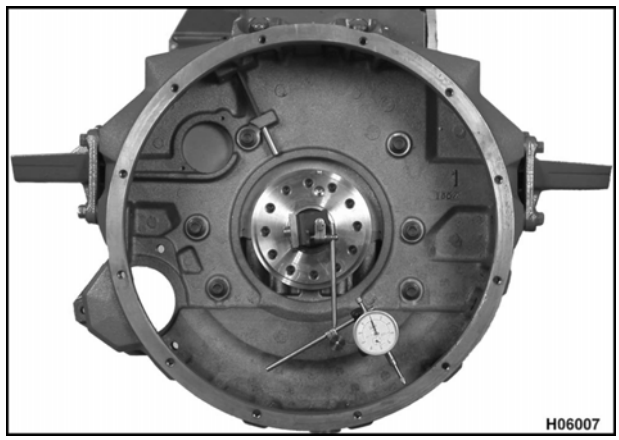

Figure 555 Flywheel housing bore concentricity

1. Attach a dial indicator to the crankshaft. Place the tip of the dial indicator against the flywheel housing bore.
2. Zero the dial indicator.
3. Slowly rotate the crankshaft. Record the total indicator variation and compare the result to the flywheel housing bore concentricity specification.

Crankshaft Pilot Concentricity

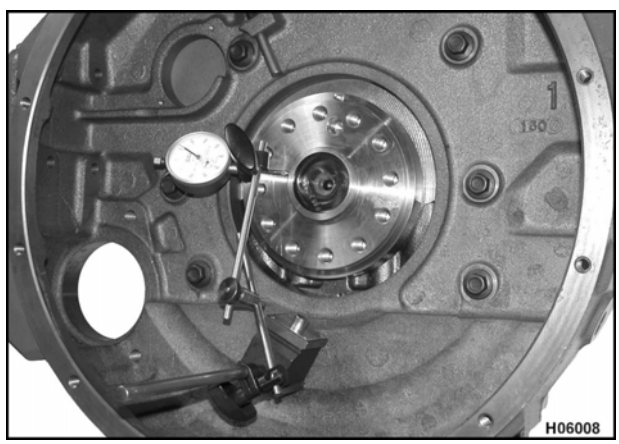

Figure 556 Crankshaft pilot concentricity

1. Attach a dial indicator to the flywheel housing. Place the tip of the dial indicator against the crankshaft pilot.
2. Zero the dial indicator.

3. Slowly rotate the crankshaft. Record the total indicator variation and compare the result to the crankshaft pilot concentricity specification.

Removing Flywheel Housing

WARNING: To avoid serious personal injury, possible death, or damage to the engine or vehicle, do not remove any engine mounting hardware until the engine is properly supported.

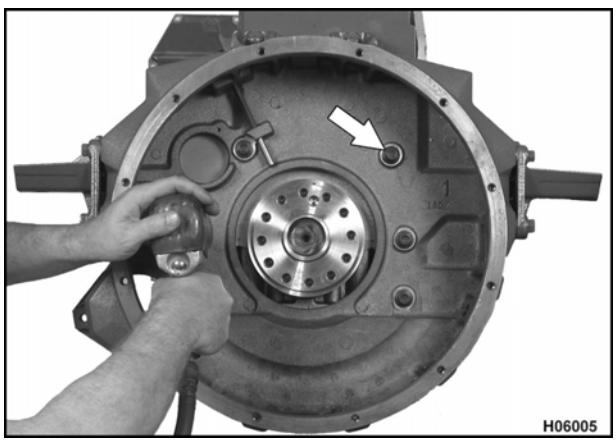

Figure 557 Removing flywheel housing mounting bolts

1. Remove the eight mounting bolts that secure the flywheel housing to the crankcase.
2. Use an assistant to help remove the flywheel housing from the engine.
3. Inspect for cracks.

Flywheel Reconditioning

Cleaning

Clean the flywheel with a non-caustic solvent and dry with filtered compressed air page 3.

Inspection‘

1. Inspect the flywheel for cracks, heat checks, and extensive scoring which would make it unfit for further service. Replace or resurface as required.
2. Inspect ring gear for worn, chipped, or cracked teeth. If teeth are damaged, replace ring gear.

Flywheel Resurfacing

WARNING: To avoid serious personal injury, possible death, or damage to the engine or vehicle, carefully examine the flywheel after resurfacing for any cracks or heat checks. Flywheel resurfacing information is provided for guidance only. International Truck and Engine Corporation assumes no responsibility either for the results of any work performed in accordance with this information or for the ability of service personnel to detect heat cracks. Any cracks or heat checks in the flywheel could cause it to separate, creating the possibility of injury to the operator or bystanders. If there are any questions, do not use the flywheel.

CAUTION: Flexplates used with automatic transmissions cannot be resurfaced. If damaged, replace flexplate.

Flywheels used with manual transmissions may be resurfaced to correct minor wear and scoring.

When resurfacing the flywheel, see dimension “A” on figure below, to determine if the flywheel was previously refaced or if it has adequate stock for refacing.

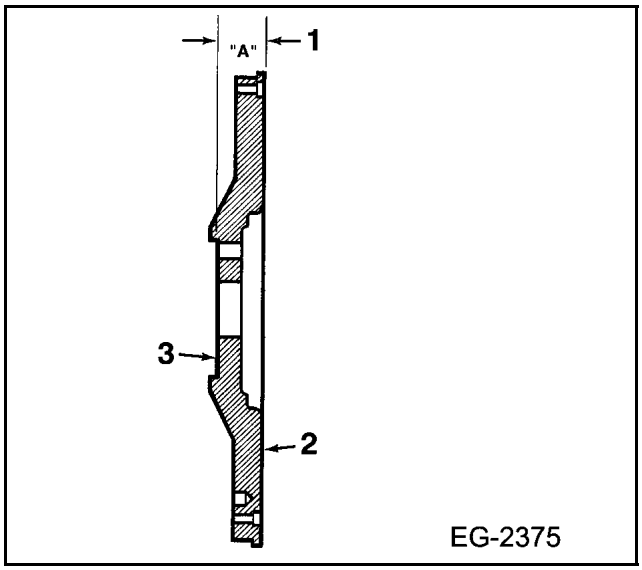

Figure 558 Flywheel reconditioning

1. Dimension “A”: New flywheel: 38 + 0.025 mm (1.500 in + 0.010 in). Minimum permissible after resurfacing: 36 mm (1.430 in).
2. Clutch disc and over plate mounting face
3. Crankshaft flange mounting face

NOTE: If the dimensions depicted in the figure above cannot be maintained, the flywheel must be replaced.

Ring Gear Replacement

1. Remove any damaged ring gear from the flywheel as follows:
   A. Heat ring gear with a torch to expand gear.
   B. Once heated, knock the ring gear off flywheel. Do not hit the flywheel when removing gear.

WARNING: To avoid serious personal injury or possible death, wear heat resistant gloves when handling heated components.

2. Install a new ring gear as follows:
   A. Heat the new ring gear evenly until the gear expands enough to slip onto the flywheel.
   B. Make sure the ring gear is seated properly against the flywheel shoulder.

NOTE: Do not heat ring gear to a temperature higher than 278°C (500°F). Heating beyond this temperature will adversely affect the ring gear hardness.

Installation

Flywheel Housing

NOTE: Verify that the two hollow dowels and the flywheel housing seal are in place before installing the flywheel housing (Figure 540).

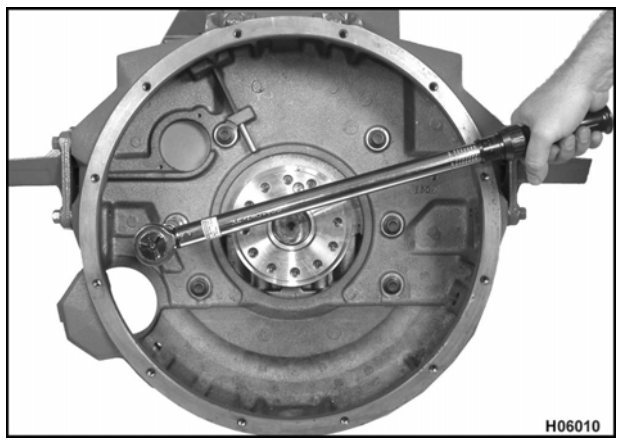

Figure 559 Torquing flywheel housing mounting bolts

1. Use an assistant to help lift the flywheel housing into position.
2. Install all eight flywheel housing mounting bolts (M12 x 50) finger tight. Then tighten the bolts to the special torque value (Table 50).
3. Install rear engine mounting brackets and bolts (M12 x 40). Tighten bracket bolts to the special torque value (Table 50).

NOTE: On engines with a 148–tooth ring gear, leave the lowest, rear most mounting bracket bolt loose (2 or 3 threads) on each side of the flywheel housing (SAE #1A). This will provide enough clearance for installation of the flywheel and ring gear assembly.

Rear Oil Seal

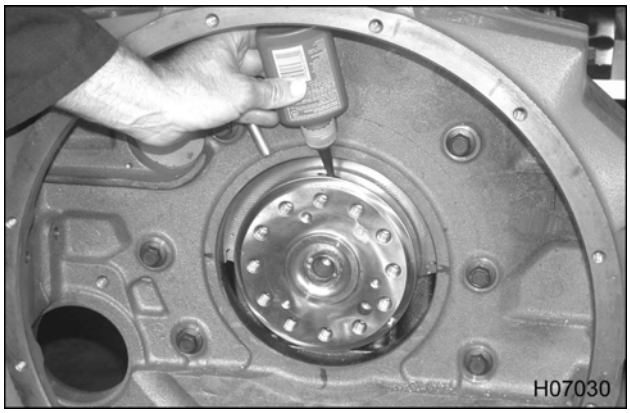

Figure 560 Applying sealant to the crankshaft and seal assembly

1. Apply a 360° bead of Loctite® hydraulic sealant to the crankshaft where the rear oil seal assembly will be positioned.

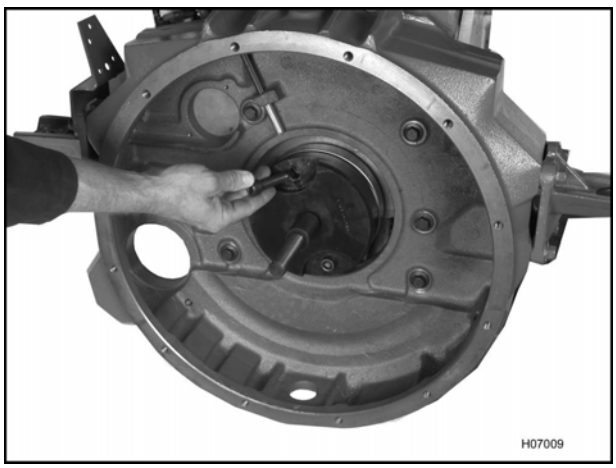

Figure 561 Installing the rear oil seal installer base

2. Install base component of oil seal installer onto crankshaft and tighten bolts (2).

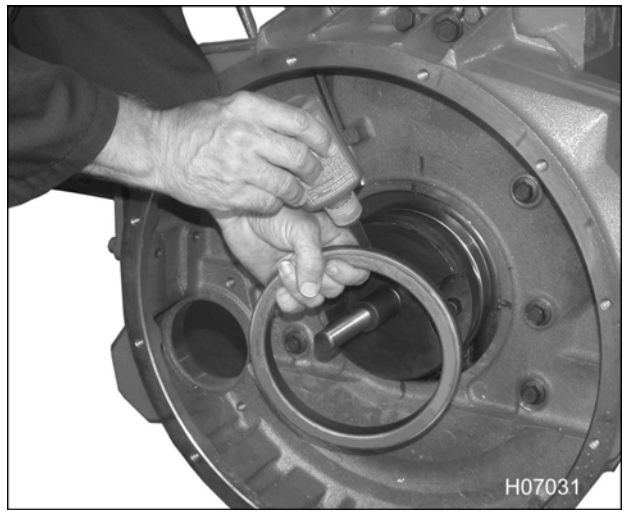

Figure 562 Applying sealant to the seal assembly

3. Apply a 360° bead of Loctite® hydraulic sealant to the outside diameter of the rear oil seal assembly.

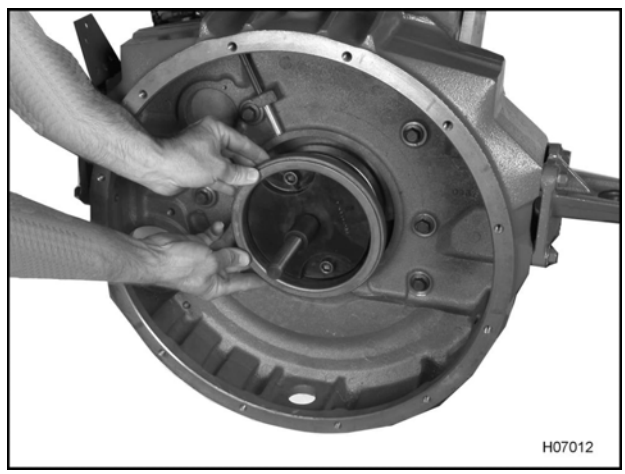

Figure 563 Placing oil seal onto rear oil seal installer base

4. Orient steel face of oil seal outward (towards transmission) and start seal onto oil seal installer base.

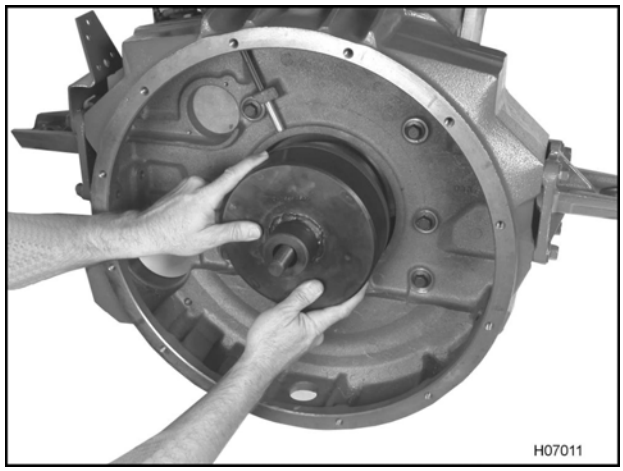

Figure 564 Installing rear oil seal installer onto base

5. Place oil seal installer up to steel face of seal and gently push by hand into flywheel housing as far as possible.

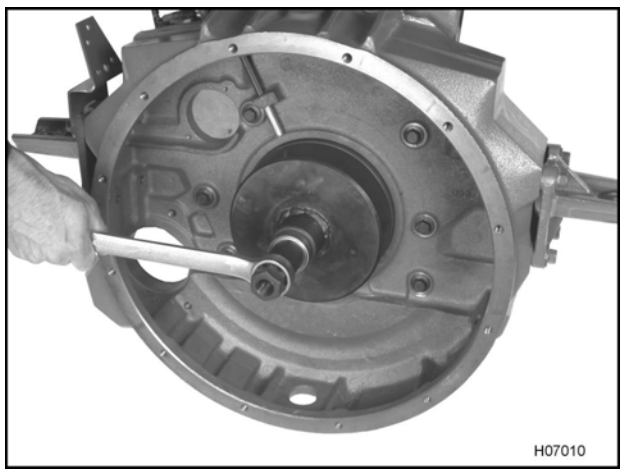

Figure 565 Installing the rear oil seal

6. Put washer and forcing nut onto shaft and tighten until rear oil seal bottoms out in flywheel housing. The seal will be placed at the correct location (depth).

Crankshaft Timing Disk

NOTE: Alignment dowel pin convex end must protrude out of crankshaft (Figure 540).

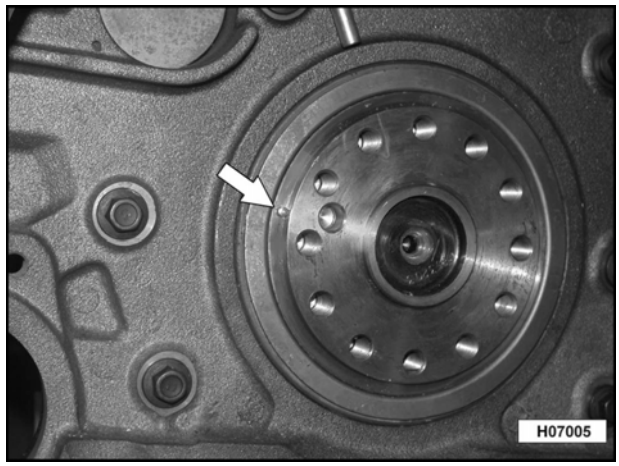

Figure 566 Crankshaft timing disk alignment dowel

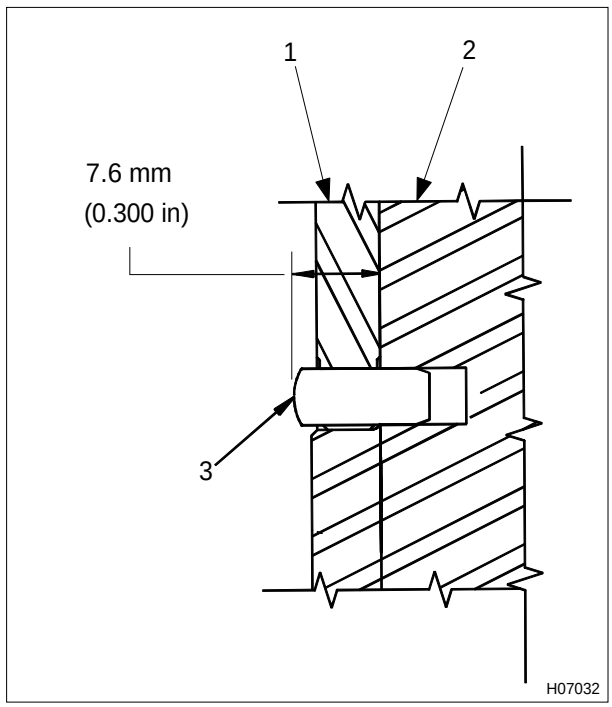

Figure 567 Crankshaft timing disk alignment dowel details

1. Crankshaft timing disk
2. Crankshaft
3. Alignment dowel (convex end)

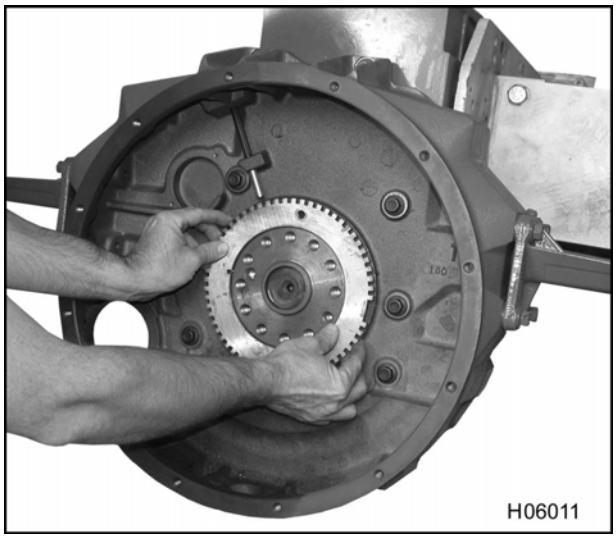

Figure 568 Installing the crankshaft timing disk

NOTE: Crankshaft timing disk can be installed with either side out.

1. Align index notch of the crankshaft timing disk with alignment dowel. Use a rubber mallet to tap the crankshaft timing disk onto the crankshaft. Tap evenly around the crankshaft timing disk to ensure a flush fit against the end of the crankshaft.

Flywheel Assembly

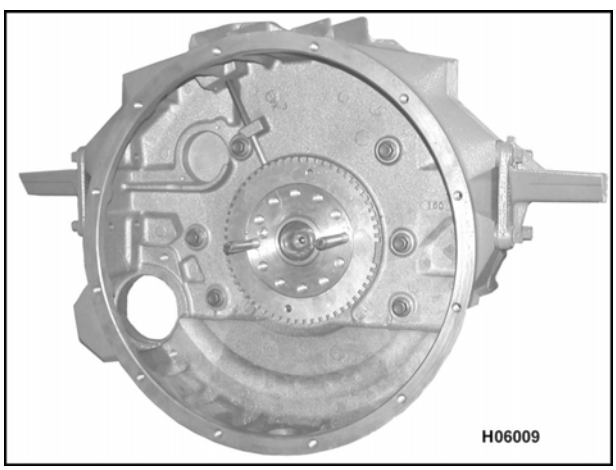

Figure 569 Installing guide pins

1. Install two guide pins in the flywheel mounting bolt holes at the 3 o'clock and 9 o'clock positions.
2. Install the flywheel onto the guide pins.
3. Install ten flywheel mounting bolts finger tight.
4. Remove the guide pins and install the remaining two flywheel mounting bolts finger tight.

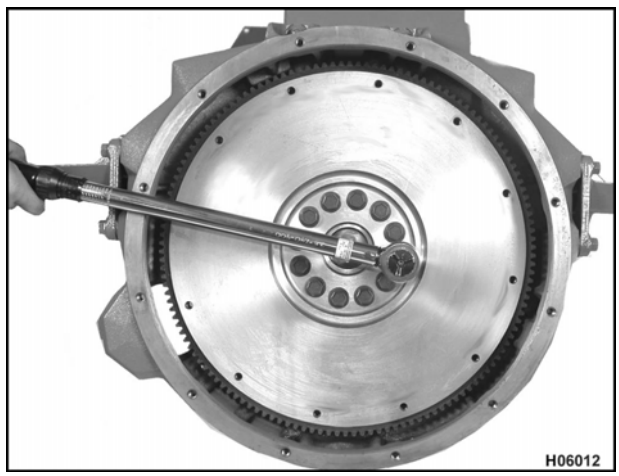

Figure 570 Torquing the flywheel mounting bolts

5. Tighten the flywheel mounting bolts to the special torque value (Table 50).
6. Tighten two remaining rear engine mounting bracket bolts on manual transmission applications with 148 tooth ring gears to the special torque value (Table 50).

Checking Flywheel Surface Runout

Figure 571 Checking flywheel surface runout

1. Attach a dial indicator to the face of the flywheel housing. Place the tip of the dial indicator against the face of the flywheel.
2. Zero the dial indicator.
3. Slowly rotate the flywheel. Record the total indicator variation and compare the result to the flywheel surface runout specification.

Flexplate (Automatic Transmissions)

Allison 2000 Series Transmissions

CAUTION: To avoid engine damage, if the vehicle is being reconfigured with an Allison 2000 Series transmission, make sure that the correct flywheel housing is installed on the engine. Otherwise, there will be interference between the flexplate studs and the flywheel housing that will only be evident after the transmission has been installed.

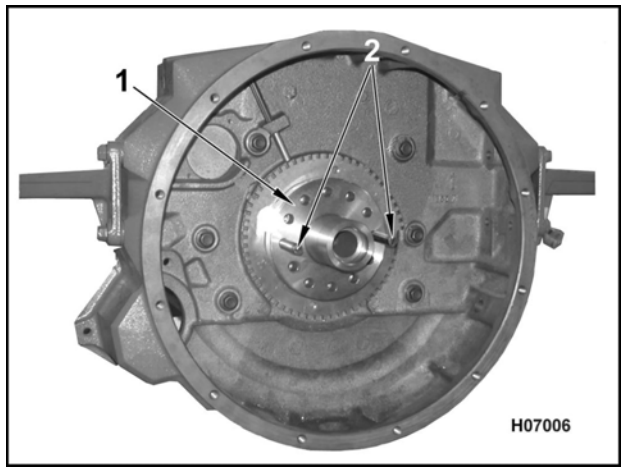

Figure 572 Installing guide pins and adapter hub

1. Adapter hub
2. Guide pins

1. Install two guide pins in the flexplate mounting bolt holes at the 3 o'clock and 9 o'clock positions.
2. Install the adapter hub on the guide pins.

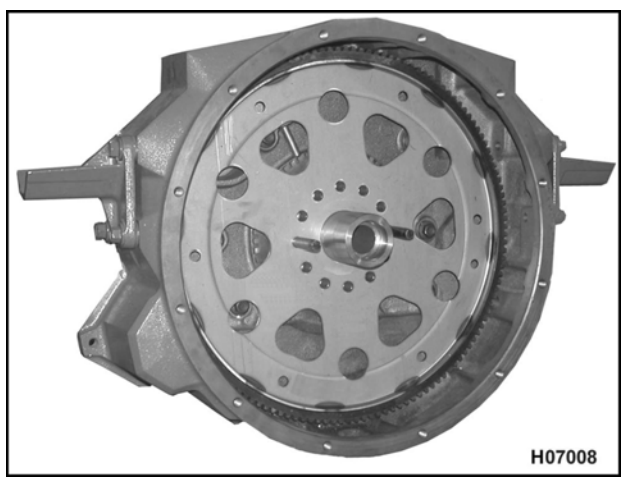

Figure 573 Installing the flexplate

1. Flexplate assembly

NOTE: When installed correctly, the ring gear on the flexplate is offset (not centered) toward the transmission.

3. Install the flexplate assembly on the guide pins.

CAUTION: To avoid engine damage, make sure the reinforcement ring is installed with the paint mark or XMSN SIDE facing outward (towards the transmission), otherwise, premature flexplate failure may occur.

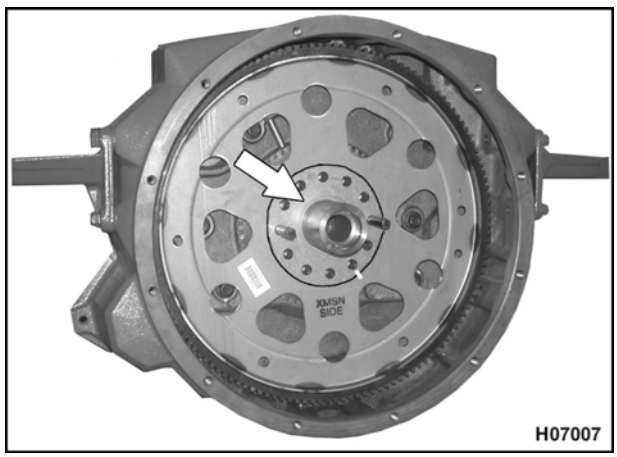

Figure 574 Installing reinforcement ring with paint mark

4. Install the reinforcement ring on the guide pins (made locally) with paint mark facing outward.
5. Install ten flexplate mounting bolts finger tight.
6. Remove the guide pins and install the remaining two flexplate mounting bolts finger tight.
7. Tighten the flexplate mounting bolts to the special torque value (Table 50).

MD-3000 and HD-4000 Series World Transmissions

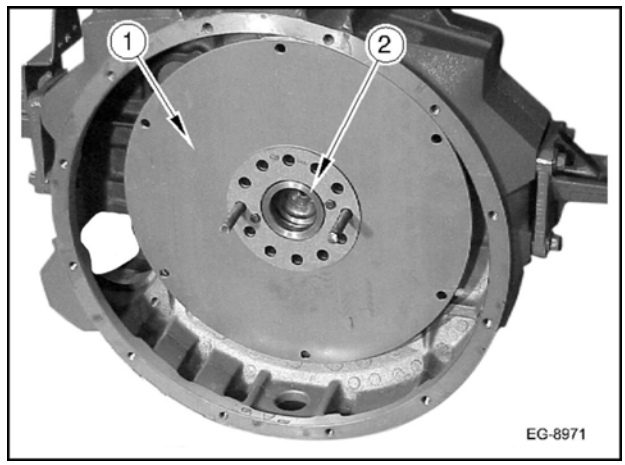

Figure 575 Installing the flexplate assembly

1. Flexplate assembly
2. End of crankshaft

1. Install two guide pins in the flexplate mounting bolt holes at the 3 o'clock and 9 o'clock positions.

NOTE: The flexplate assembly is available as a completely assembled service part.

2. Install the flexplate assembly on the guide pins.

NOTE: This following step applies to MD transmissions only.

3. Install reinforcement ring with part number or logo facing outward (towards the transmission).
4. Install ten flexplate mounting bolts finger tight.
5. Remove the guide pins and install the remaining two flexplate mounting bolts finger tight.
6. Tighten the flexplate mounting bolts to the special torque value (Table 50).

NOTE: Flywheel and ring gear are part of the torque converter assembly.

NOTE: Make sure that the paint mark, part number or XMSN SIDE on the flexplate is facing outward (towards the transmission).

SPECIFICATIONS

Table 48 Flywheel and Flywheel Housing Specifications

Flywheel housing:	
Flywheel housing bore concentricity	SAE # 1 = 0.30 mm (0.012 in) SAE # 2 = 0.28 mm (0.011 in)
Flywheel housing face runout	SAE # 1 = 0.30 mm (0.012 in) SAE # 2 = 0.28 mm (0.011 in)
Crankshaft pilot:	
Crankshaft pilot concentricity	0.13 mm (0.005 in)
Flywheel:	
Flat flywheel surface runout at clutch mounting holes.	0.20 mm (0.008 in)
Pot flywheel surface runout at	165.1 mm (6.5 in)
Pot flywheel clutch mounting surface runout at	190.5 mm (7.5 in)

WARNING: To avoid serious personal injury, possible death, or damage to the engine or vehicle, do not machine beyond minimum dimensions specified for flywheel resurfacing.

WARNING: To avoid serious personal injury, possible death, or damage to the engine or vehicle, carefully examine the flywheel after resurfacing for any cracks or heat checks. Flywheel resurfacing information is provided for guidance only. International Truck and Engine Corporation assumes no responsibility either for the results of any work performed in accordance with this information or for the ability of service personnel to detect heat cracks. Any cracks or heat checks in the flywheel could cause it to separate, creating the possibility of injury to the operator or bystanders. If there are any questions, do not use the flywheel.

Table 49 Flywheel Resurfacing Specifications

Flat flywheel minimum thickness after resurfacing	36.32 mm (1.430 in)
Pot flywheel minimum thickness after resurfacing	39.37 mm (1.550 in)
Requires measurement from crankshaft mounting surface of flywheel to clutch surface of flywheel.	

Special Torque

Table 50 Flywheel and Flywheel Housing Special Torques

Engine mounting bracket bolts	108 N·m (80 lbf·ft)
Flexplate mounting bolts	136 N·m (100 lbf·ft)
Flywheel housing mounting bolts	108 N·m (80 lbf·ft)
Flywheel mounting bolts	136 N·m (100 lbf·ft)
Rear engine mounting bracket bolts	108 N·m (80 lbf·ft)

SPECIAL SERVICE TOOLS

Table 51 Flywheel and Flywheel Housing Special Service Tools

Crankshaft timing disk puller (H-bar)	Obtain locally
Dial indicator with magnetic base	Obtain locally
Guide pins	Obtain locally
Rear seal installer	ZTSE4637
Slide hammer puller set	ZTSE1879