

TECHNICAL ADVISORS

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DIAGNOSING HYDRAULIC TAPPETS

To diagnose clicking noises which may be attributed to possible hydraulic tappet problems, proceed with the following steps:

1. Check engine crankcase oil and radiator coolant levels and fill to proper level, if necessary.
2. Locate objectionable engine noise by using a piece of hose, stethoscope or sounding rod. Check other engine parts which may be mistaken for tappet noise.
3. If the noise appears to be within the rocker arm cover, determine if the rocker arm is striking the inside of the cover by running the hand along the top of the cover.
4. Remove the rocker arm cover.
5. With the engine running locate the position of the noise by applying hand pressure to the push rod end of the rocker arm.
6. Check the rocker arm adjustment and re-adjust, if necessary, as follows:

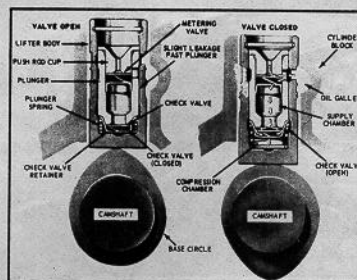
Individual Mounted Rocker Arms (Adjustable)

- a. Rotate engine until the individual affected cylinder is at approximate T.D.C. at the end of the compression stroke.
- b. With the engine in this position check the affected push rods for end clearance.
- c. If push rod end clearance is present, rotate the rocker arm adjusting nut clockwise until the pushrod end clearance is removed and then turn the adjusting nut one additional turn and evaluate for noise. If idle roughness is noted at start-up, allow sufficient running time to let the tappet bleed down to its operating range.

NOTE: Rocker arm should NOT be adjusted with the engine operating. Rocker arm adjusting nut torque (when loosening) should meet or exceed 4.0 ft. lbs. to maintain adjustment. Replace nuts if necessary.

Shaft Mounted Rocker Arms (Non-Adjustable)

- a. Rotate the engine until the individual affected piston is at approximate T.D.C. at the end of the compression stroke.
- b. Using the proper tool, apply pressure slowly to the rocker arm to bleed down the hydraulic tappet until the plunger is bottomed and then measure the available clearance between the rocker arm and valve stem tip. If the clearance is not within specifications (.050"-.200") correct as required, using a longer or shorter service pushrod.
7. Check for push rod interference with cylinder head, intake manifold/baffles, loose rocker arm pedestal bolts.
8. Check for worn valve guides and/or valve spring noise by applying side pressure to the valve spring retainer. Valve spring noise can sometimes be removed by rotating the valve spring. Check valve spring assembled height/squareness and correct as required.
9. IF THE PARTS ARE WITHIN SPECIFICATIONS AND THE ADJUSTMENT IS CORRECT, REPLACE ONLY THE AFFECTED TAPPET. DO NOT DISASSEMBLE, CLEAN, TEST OR RE-USE TAPPETS REMOVED. DO NOT REPLACE NON-OFFENDING TAPPETS.



If the noise is still present it may be necessary to check for low oil pressure, oil aeration, oil cleanliness, etc. Oil aeration check should be performed as follows:

- a. Operate the engine until normal operating temperatures are reached.
- b. Stop engine and remove oil pressure sending unit.
- c. Install a petcock type valve into the sending unit opening which will permit attachment of a ¼" to ¾" diameter hose of sufficient length to reach the oil fill opening. Close the valve.
- d. Operate the engine at approximately 500 RPM for five minutes, then open valve slightly to permit steady oil discharge and observe for air bubbles.

NOTE: Direct oil flow over a "white" card or through a transparent tube to facilitate observation. Do not operate engine at excessive speeds for long periods with the bleed attached.

- e. Increase engine speed to 1000 RPM and recheck for air bubbles.
- f. If aeration is present, inspect the oil pump intake system for leaks and repair as required.
- g. If no aeration is detected, remove aeration checking device and install hydraulic testing gauge to check engine oil pressure at normal operating temperature. Engine oil pressure at the sending unit should be 35-55 P.S.I. at 2000 rpm.
- h. If oil pressure is below specification, check for excessive wear in the oil pump, as indicated in the shop manual, and sticking of the oil pump relief valve. If the oil pump assembly is within specifications, check other lubricating clearances in the crankshaft, camshaft, etc.

NOTE: Hydraulic tappets holding a valve open during extended shut-down periods (overnight) may leak down and be noisy (clatter) for a short period (less than 30 seconds) following cold engine start-up. This condition, commonly referred to as "morning sickness", is not detrimental to engine operation and is not considered an objectionable noise.

It must be emphasized that the Hydraulic Tappet Diagnostic Procedure must be followed in determining the cause of clicking noise, sounding similar to a collapsed tappet. If cause of the noise is determined to be a tappet, the tappet should be replaced. Do not clean or test the tappet to be replaced and do not clean or test the remaining tappets.