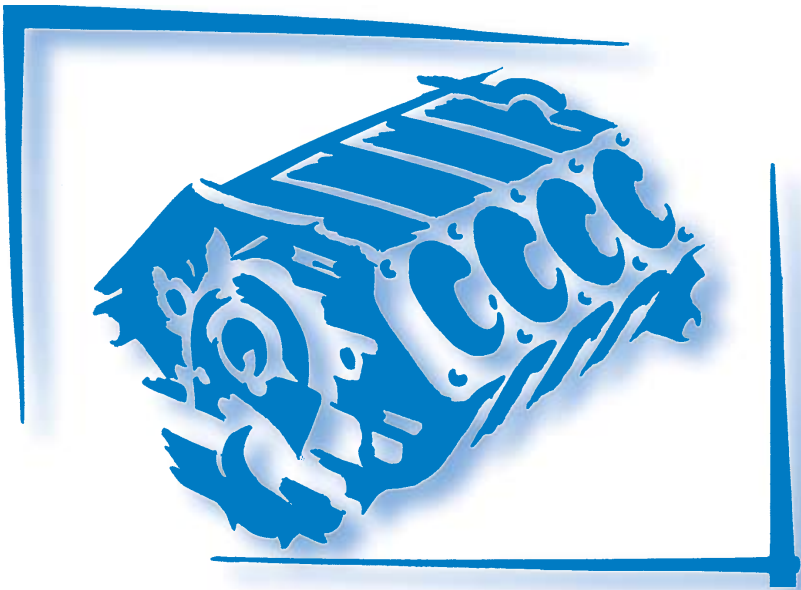


THE OFFICIAL ASE STUDY GUIDE

ASE Engine Machinist Tests



National Institute for
**AUTOMOTIVE
SERVICE
EXCELLENCE**



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ASE ENGINE MACHINIST TESTS

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OVERVIEW

Introduction

This *Study Guide* is intended to help engine machinists study for the ASE certification tests. It was written by the same people who develop and assemble the actual ASE tests and, therefore, should be very useful for reviewing technical knowledge and seeking additional reference material.

ASE voluntary certification is a means through which engine machinists can prove their abilities to themselves, to their employers, and to their customers. By passing ASE tests you will earn the most valuable credential available. Because the tests are tough, you'll have the satisfaction of proving to yourself that you are among the elite in your profession. What's more, these credentials are recognized throughout the nation.

Certified engine machinists promote customer trust and improve the image of the industry; and trust and professionalism are the first steps to a more prosperous business.

ASE encourages you to take the tests and to join the proven pros who wear the ASE Blue Seal of Excellence®.

How Do I Become Certified?

There are three tests in the Engine Machinist certification series. If you pass one or more tests, and have at least two years of hands-on working experience, then you will become certified as an ASE-certified Engine Machinist. If you pass all three tests in the series and meet the experience requirement, you will earn ASE Master Engine Machinist status. (Appropriate vocational training may be substituted for up to one year of work experience.)

If you fail a test, you may take it again during any scheduled test administration in which it is offered. And remember, you are the only one who will receive your tests scores; results will not be given over the phone nor will they be released to anyone without your written permission.

The Engine Machinist Test Series consists of three tests. The Test Content section of this booklet has a detailed list of content areas covered in each test:

- Cylinder Head Specialist (M1)
- Cylinder Block Specialist (M2)
- Assembly Specialist (M3)

ASE also offers certification in Automobile, Medium/Heavy Truck, Truck Equipment, School Bus, Transit Bus, Collision Repair and Refinish, and Advanced Level specialties. Separate *Study Guides* are available.

For full information on ASE testing as well as downloadable *Study Guides*, *Registration Booklets*, and more, visit www.ase.com. You may also request *Registration Booklets* by mailing the coupon located on the back cover of this booklet or by calling ASE at 703-669-6600, ext. 400.

Who Writes the Questions?

The test questions are written by a panel of experts from the engine rebuilding and machining industry, including working machinists. Test questions are designed to test the skills needed for engine machining. They are written to deal with practical problems of diagnosis and repair experienced by machinists in their day-to-day work.

Each question has its roots in an ASE “item-writing” workshop where a panel of experts meets in a workshop setting to share ideas and translate them into test questions. Each test question written by these experts must survive review by all members of the group.

From there, all questions are pre-tested and quality-checked on a national sample of engine machinists. Those questions that meet ASE standards of quality and accuracy are included in the scored sections of the tests; the “rejects” are sent back to the drawing board or discarded altogether.

Each machinist test is made up of 55–60 multiple-choice questions. The testing sessions are 4 hours and 15 minutes, allowing plenty of time to complete several tests.

Note: Each test could contain up to 15 additional questions that are included for statistical research purposes only. Your answers to these questions will not affect your score, but since you do not know which ones they are, you should answer all questions in the test. The five-year Recertification Test will cover the same content areas as those listed above. However, the number of questions in each content area of the Recertification Test will be reduced by about one-half.

How Do I Prepare for the ASE Tests?

Become familiar with test content and question format: The Test Specifications in this booklet contain a summary description of the content covered by each test. The Task Lists describe the actual work performed by engine machinists in each specialty area. Together, these form a “blueprint” for writing and assembling the ASE tests.

Please note that each question on the test is keyed, or linked, to a particular task or set of tasks in the task list. Therefore, a review of the task lists, with an eye to judging whether you know how to perform each task listed, will provide you with valuable information as you prepare for the tests.

There are five types of multiple-choice questions on the tests, each of which is included in the sample questions in this booklet. Note the different instructions for some questions.

Be sure to read each question carefully, (twice, if necessary) so that you understand exactly what is being asked. *Each question tests a specific diagnostic or repair problem and has only one best answer.*

To summarize, we suggest the following steps be taken:

Step 1. Study the content list for each test you will attempt.

Step 2. Carefully read the task list for each area.

Step 3. Go over the sample questions to become familiar with each question type. This is very important.

Step 4. Review steps 1 through 3 and identify the skill area(s) where you need additional study.

Types of Knowledge Measured by the Tests

The types of knowledge and skills you will need to know to pass the tests are as follows:

- **Basic technical knowledge:** Tests your knowledge of what is in a system and how the system works, and what are the proper procedures and precautions to be followed in making repairs and adjustments.
- **Service or repair knowledge and skill:** Tests your understanding and ability to apply generally accepted repair procedures and precautions in assembly, disassembly, and reconditioning operations; and in making inspections and adjustments. Also tests ability to use shop manuals and precision tools of the trade.
- **Testing and diagnostic knowledge and skill:** Tests your ability to recognize problems and to use generally available measurement and testing equipment to make a diagnosis. Also tests your ability to trace the effects of a particular condition and find the cause of a particular set of symptoms.

If you are an experienced and competent machinist, a careful review of this booklet, and additional brush-up on those areas in which you are weakest, is all you should need to pass the ASE tests.

Before the Tests

Try to be well-rested for the tests so you will be alert and efficient. Have three or four sharpened soft-lead (#2) pencils and an eraser with you; pencils will not be furnished at the test center. If you wish to pace yourself, bring a watch, some testing rooms may not have clocks. Finally, be sure to bring along your test center admission ticket and some form of photo identification.

OVERVIEW (CONTINUED)**At the Test Center**

When you reach the test center, wait in the assigned area until the proctor begins the test administration. He or she will instruct you in filling out the answer folder and will tell you the amount of time allotted for each test.

Once the test has begun, keep track of time. Do not spend too long on any one question. If a question is difficult, mark the answer that you think is correct and put a check by it in the test book. Then go on to the next question. If you finish before the allotted time, you may go back to the questions that you checked.

It is to your advantage to answer every question. Do not leave any answers blank. Your score will be based on the number of correct answers that you give.

Test Content and Sample Questions

The material in this section is designed to help engine machinists prepare for the ASE certification tests.

Each section begins with the Test Specifications, which will list the main categories covered on that particular test and the number of test questions and percentage of the test devoted to each topic.

The Task List describes the work activities an engine machinist should be able to perform in each technical area covered on that test. This list was developed by working machinists and technical experts from across the country and will provide a valuable check list of what to study for the test.

These task descriptions offer detailed information to engine machinists preparing for the test and to persons who may be instructing engine machinists. The task lists may also serve as guidelines for question writers, reviewers, and test assemblers.

It should also be noted that the number of questions in each content area may not equal the number of tasks listed. Some of the tasks are complex and broad in scope and may be covered by several questions. Other tasks are simple and narrow in scope and one question may cover several tasks. The main objective in listing the tasks is to describe accurately what is done on the job, not to make each task correspond to a particular test question.

Sample questions follow. Although these same questions will not appear on actual tests, they are in the same format as actual test questions. All five types of multiple-choice questions used on the ASE tests are represented here. Note the different instructions for some questions. ■

**TEST SPECIFICATIONS AND TASK LIST
CYLINDER HEAD SPECIALIST (TEST M1)**

Content Area	Questions in Test	Percentage of Test
A. Cylinder Head Disassembly, Inspection, and Cleaning	9	16%
B. Cylinder Head Crack Repair	5	9%
C. Cylinder Head Machining and Inspection	31	56%
D. Cylinder Head Assembly	10	18%
Total	55	100%

A. Cylinder Head Disassembly, Inspection, and Cleaning (9 questions)

1. Verify customer concern; Inspect cylinder head for damage, thickness, and missing or related components.
2. Remove sensors, external components, studs and identification tags as needed; identify locations.
3. Remove, clean and inspect housings and covers.
4. Remove and inspect precombustion chambers, nozzle adaptors, and injector assemblies as needed.
5. Remove core plugs; identify locations.
6. Remove gallery plugs and restrictors, relief valves, fittings and adaptors; identify locations.
7. Remove, disassemble, and inspect valve train components; identify locations and orientation.
8. Inspect and remove timing and retaining components.
9. Remove and inspect pump and distributor drive assemblies as needed.
10. Check all camshaft bearing caps for correct position and numbering; mark in accordance with manufacturer's recommended procedures.
11. Remove and inspect camshaft carriers, camshaft bearing caps and camshaft.
12. Remove and inspect camshaft bearings; identify size and locations.
13. Remove and inspect valve springs, rotators, retainers, locks, seals, shims and seats; identify locations and orientation as required.
14. Measure and record installed valve stem height and/or valve protrusion/recession; measure lash adjustment shims.
15. Remove and inspect valves and guides as required; identify locations.
16. Clean cylinder head and related components.
17. Verify engine make, model, year, vehicle identification number (VIN), serial number, arrangement number, and Control Parts List (CPL) as required.

M1 TASK LIST (CONTINUED)

B. Cylinder Head Crack Repair (5 questions)

1. Evaluate head for repair.
2. Determine extent of crack.
3. Determine crack repair method by location of the crack; repair using accepted industry procedures.
4. Verify integrity of repair.

C. Cylinder Head Inspection and Machining (31 questions)

1. Detail cylinder head; inspect mating surfaces.
2. Inspect cylinder head for cracks and leaks.
3. Inspect cylinder head for structural integrity and porosity; repair as needed and verify repair.
4. Inspect cylinder head for warpage, gasket surface finish, and thickness; record measurements and repair according to industry accepted procedures.
5. Inspect threaded holes & fasteners, determine thread type; repair or replace as needed.
6. Verify valve guide type and material; measure valve guide wear and installed height; repair or replace as needed.
7. Verify valve seat type and material; inspect valve seat condition; repair or replace as needed.
8. Inspect injector area, measure injector tip protrusion/recession; repair as needed.
9. Inspect precombustion chambers, injector tubes, and nozzle adaptor fit and location; repair as needed.
10. Inspect fire ring grooves; repair as needed.
11. Inspect and measure lifter, lash adjuster, and/or camshaft follower bores; repair as needed.
12. Verify valve type and material, inspect and measure valves; repair or replace as needed.
13. Measure valve stem installed height and/or valve protrusion/recession; adjust or repair as needed.
14. Inspect, measure and test valve springs using proper orientation/procedure; replace as needed.
15. Inspect valve spring seats, retainers, rotators, and locks; replace as needed.
16. Inspect other valve train components (rocker arms, cam followers, camshafts, studs, etc.); repair or replace as needed.
17. Inspect, and measure camshaft bores and alignment; repair as needed.
18. Perform industry recommended updates as appropriate.

D. Cylinder Head Assembly (10 questions)

1. Clean cylinder head and related parts.
2. Install camshaft bearings, if required; check camshaft fit.
3. Arrange all parts for assembly.
4. Install valves and related components.
5. Check valves for seating.
6. Install camshaft and related components.
7. Check valve lash where appropriate; adjust if required.
8. Install precombustion chambers and index glow plug position if required.
9. Pressure test cylinder head assembly as required.
10. Install gallery plugs and restrictors, relief valves, fittings and adaptors in correct locations. ■

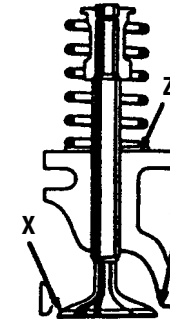
SAMPLE QUESTIONS CYLINDER HEAD SPECIALIST (TEST M1)

Questions:

1. Machinist A says that valves being considered for reuse should be checked for keeper groove wear. Machinist B says that valves being considered for reuse should be measured for stem wear.

Who is right?

- (A) A only
- (B) B only
- * (C) Both A and B
- (D) Neither A nor B



2. Machinist A says that removal of material at X or Y, shown above, will reduce valve spring tension. Machinist B says that shims added at Z, shown above, could cause spring coil bind.

Who is right?

- (A) A only
- (B) B only
- * (C) Both A and B
- (D) Neither A nor B

3. A loose valve seat should be:

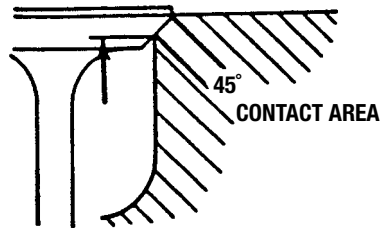
- (A) staked.
- (B) spot welded.
- (C) bonded.
- * (D) replaced.

4. Which of these is the most accepted method of increasing clearance in non-adjusted valve trains?

- * (A) Grinding the tip end of the valve
- (B) Grinding the valve face area
- (C) Grinding the valve seat area
- (D) Grinding the spring seat area

M1 SAMPLE QUESTIONS (CONTINUED)

5. Magnetic particle inspection of cast iron cylinder heads is used to check for:
- (A) porosity.
 - * (B) cracks.
 - (C) leaks.
 - (D) warpage.



6. The 45° valve contact area shown above should be narrowed by using a:
- (A) 5° stone.
 - * (B) 30° stone.
 - (C) 45° stone.
 - (D) 60° stone.
7. Machinist A says that valve locks should be replaced in pairs. Machinist B says that rotators should be checked for direction of rotation. Who is right?
- * (A) A only
 - (B) B only
 - (C) Both A and B
 - (D) Neither A nor B

Question 8 is not like the ones above.

It has the word **EXCEPT**. For this question, look for the choice that could **NOT** cause the described situation or is **NOT** an accepted procedure. Read the entire question carefully before choosing your answer.

8. During assembly of an overhead cam cylinder head, all of these should be checked **EXCEPT**:
- (A) rocker arm position.
 - * (B) deck clearance specifications.
 - (C) camshaft seal installation.
 - (D) torque specifications used on camshaft bolts.

TEST SPECIFICATIONS AND TASK LIST CYLINDER BLOCK SPECIALIST (TEST M2)

Content Area	Questions in Test	Percentage of Test
A. Cylinder Block Disassembly and Cleaning	4	7%
B. Cylinder Block Crack Repair	3	5%
C. Cylinder Block Machining	24	40%
D. Crankshaft Inspection and Machining	12	20%
E. Connecting Rods and Piston Inspection and Machining	10	17%
F. Balancing	3	5%
G. Cylinder Block Preparation	4	7%
Total	60	100%

A. Cylinder Block Disassembly and Cleaning (4 questions)

1. Inspect block and attached components for damage.
2. Remove sensors, external components, and ID tags as needed; identify locations.
3. Remove main bearing caps, inspect main bearing caps and saddles; identify locations and mark as needed.
4. Remove and inspect camshaft bearings and auxiliary/balance shaft bearings/bushings; identify locations.
5. Remove and inspect cylinder liners as needed.
6. Remove core plugs; identify locations as needed.
7. Remove gallery plugs; identify locations as needed.
8. Verify engine make, model and vehicle I.D. (VIN); record serial and casting number(s).
9. Remove engine studs as needed; identify locations.
10. Clean cylinder block.

B. Cylinder Block Crack Repair (3 questions)

1. Determine extent of crack and evaluate for repair.
2. Determine crack repair method by location of the crack; repair using accepted industry procedures.

M2 TASK LIST (CONTINUED)**C. Cylinder Block Machining (24 questions)**

1. Detail cylinder block; inspect mating surfaces.
2. Inspect block for cracks.
3. Inspect block for structural integrity and porosity; repair as needed.
4. Inspect block deck following manufacturer's recommendations for warpage, finish and heights; record measurements and resurface as needed.
5. Inspect cylinder bores for taper, out-of-round and perpendicularity (squareness); bore or sleeve cylinders as needed.
6. Inspect counterbore diameter, counterbore depth, concentricity to lower bore, and lower bore condition; repair as needed.
7. Inspect main bearing caps and block mating surfaces for condition and fit.
8. Install main bearing caps and measure housing bore diameter and alignment; measure thrust width; correct bore as needed.
9. Measure camshaft and auxiliary/balance shaft bearing housing bores and alignment; repair as needed.
10. Hone cylinder bores or liners, finish to manufacturers' specifications.
11. Inspect threaded holes; repair as needed.
12. Inspect lifter bores; repair as needed.
13. Identify fastener type, condition, and suitability for re-use.
14. Locate specifications and use proper methods for tightening fasteners.

D. Crankshaft Inspection and Machining (12 questions)

1. Inspect crankshaft for damage; determine needed repairs.
2. Identify crankshaft by make, model and casting number.
3. Remove oil gallery plugs and crankshaft attachments as needed.
4. Clean crankshaft.
5. Inspect crankshaft for cracks; repair as needed.
6. Check crankshaft for straightness; check flange, seal surface and snout runout; repair as needed.
7. Check journals for hardness as needed; compare to manufacturer's specifications and repair as needed.
8. Inspect all threaded areas for damage, repair as needed.
9. Check all snout, journals, flanges, flywheel and pilot areas for size and condition; inspect seal surfaces for wear; inspect for thrust wear and fillet (radius) condition; repair as needed.
10. Remove dowels as needed.
11. Inspect gears, keyways and keys; remove and replace as needed.
12. Identify, remove and inspect counterweights and bolts; mark locations as needed.
13. Chamfer/debur oil holes and polish crankshaft journals; verify journal size and surface finish according to manufacturer's specifications.

M2 TASK LIST (CONTINUED)**E. Connecting Rods and Piston Inspection and Machining (10 questions)**

1. Separate piston and connecting rod; verify assembled position, and remove small end bushing if needed.
2. Clean and visually inspect connecting rods; verify matched set.
3. Inspect connecting rod, cap, and bolts for cracks as required by manufacturer.
4. Evaluate connecting rod fasteners for condition and suitability for re-use.
5. Measure width of large end of connecting rod; compare to manufacturer's specifications.
6. Measure connecting rod housing bore diameter and compare to manufacturer's specifications; repair as needed.
7. Measure connecting rod small end bore diameter; compare to manufacturer's specifications; repair as needed.
8. Install and size small end bushing according to manufacturer's recommended procedure.
9. Inspect connecting rod for bend, twist, and center-to-center distance according to manufacturer's recommended procedure; repair as needed.
10. Evaluate pistons and pins for re-use as needed.
11. Assemble piston on connecting rod; verify correct position.
12. Compare or verify piston compression heights and configuration.
13. Identify type and install piston pin retainer according to manufacturer's recommended procedures.

F. Balancing (3 questions)

1. Weigh, compare and equalize piston weights as needed.
2. Weigh, compare and equalize connecting rod weights as needed.
3. Determine internal vs. external crankshaft assembly balance and correct to manufacturer's tolerance.

G. Cylinder Block Preparation (4 questions)

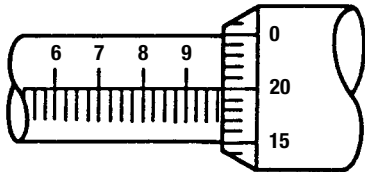
1. Clean cylinder block using industry accepted methods.
2. Lay out all parts and components to be assembled.
3. Install cam bearings, auxiliary/balance shaft bushings and bearings; verify size, fit, alignment, location and position.
4. Install core plugs, gallery plugs, sensors, external components, and ID tags as needed.
5. Install liners; verify height, fit and o-ring position as required. ■

SAMPLE QUESTIONS CYLINDER BLOCK SPECIALIST (TEST M2)

Questions:

- Dry magnetic particle inspection is most commonly used to check for cracks in:
 - crankshafts.
 - connecting rods.
 - camshafts.
 - * (D) cylinder blocks.

- Connecting rods for a piston assembly should not be heated above:
 - (A) 250° F.
 - * (B) 450° F.
 - (C) 650° F.
 - (D) 850° F.



- The micrometer shown above reads:
 - (A) .920".
 - (B) .965".
 - (C) .990".
 - * (D) .995".

- Cylinder block core plugs should be:
 - (A) installed dry.
 - (B) shot peened before installation.
 - * (C) installed with a sealer.
 - (D) demagnetized before installation.

- Machinist A says that I.D. tags and sensors should be removed before thermal cleaning (oven).

Machinist B says that I.D. tags and sensors are safely cleaned in a caustic solution.

Who is right?

- * (A) A only (C) Both A and B
(B) B only (D) Neither A nor B

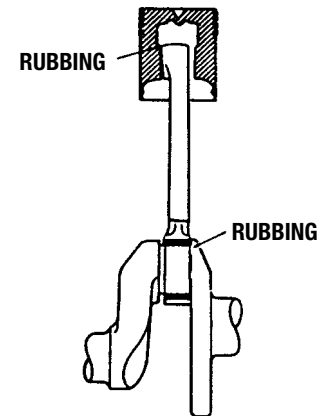
M2 SAMPLE QUESTIONS (CONTINUED)

- A crankshaft's oil gallery plugs are proving difficult to remove. Machinist A says that they can be drilled out. Machinist B says that they can be burned out with a torch. Who is right?
 - * (A) A only (C) Both A and B
 - (B) B only (D) Neither A nor B

Questions 7 and 8 are not like the ones above

They have the word **EXCEPT** or **LEAST**. For these questions, look for the choice that could **NOT** cause the described situation or is not accepted procedure. Read the entire question carefully before choosing your answer.

- A crack in a cylinder block is **LEAST** likely repaired by:
 - (A) welding.
 - * (B) epoxy filler.
 - (C) pinning.
 - (D) sleeving.



- All of these could cause the condition shown above **EXCEPT**:
 - (A) a worn thrust bearing.
 - (B) a bent connecting rod.
 - (C) an incorrect rod installation.
 - * (D) a cracked piston skirt.

TEST SPECIFICATIONS AND TASK LIST

ASSEMBLY SPECIALIST (TEST M3)

M3 TASK LIST (CONTINUED)

Content Area	Questions in Test	Percentage of Test
A. Engine Disassembly, Inspection, and Cleaning	10	17%
B. Engine Preparation	9	15%
C. Short Block Assembly	15	25%
D. Long Block Assembly	18	30%
E. Final Assembly	8	13%
Total	60	100%

A. Engine Disassembly, Inspection, and Cleaning (10 questions)

1. Verify engine make and model; inspect engine for damage; interpret available technical, and customer information; verify customer complaint.
2. Remove and inspect engine fluids; dispose of in approved manner.
3. Remove sensors, external components, studs and ID tags as needed; identify locations.
4. Note timing marks as needed, remove fuel system, ignition system, supercharger and/or turbocharger.
5. Remove, clean and inspect manifolds, coolers, housings, and gaskets as needed.
6. Mark as needed, remove, and inspect harmonic balancer/pulley and flywheel.
7. Remove, clean and inspect all pans and covers.
8. Remove and inspect valve train, cylinder heads, gaskets, and related components.
9. Remove valve lifters; identify locations.
10. Note timing marks, inspect and remove timing and retaining components; inspect crankshaft and camshaft reluctors for position and damage.
11. Remove oil pump, remove and inspect drive and pickup assembly.
12. Check all connecting rod and main bearing caps for correct position and numbering; mark in accordance with manufacturers' recommended procedures.
13. Remove and inspect oilers/piston cooling nozzles, connecting rod and piston assemblies.
14. Remove and inspect main bearing caps; remove crankshaft from bearing saddles and inspect.
15. Remove and inspect main and connecting rod bearings; identify size and locations.
16. Remove and inspect camshaft and accessory (auxiliary/balance) shafts; identify and mark locations as needed.

17. Remove and inspect accessory (auxiliary/balance) bearings/bushings; identify locations.
18. Remove and inspect camshaft bearings; identify locations.
19. Remove and inspect cylinder liners as needed.
20. Remove core plugs; identify size and locations; mark as needed.
21. Remove gallery plugs and check valves; identify locations; mark as needed.
22. Remove engine studs, dowel pins and fasteners as necessary; identify locations.
23. Clean all components prior to inspection.

B. Engine Preparation (9 questions)

1. Clean cylinder block, crankshaft, and related components for final assembly.
2. Lay out all parts and components to be assembled; verify for application, reuse and sizes.
3. Install camshaft bearings, auxiliary/balance shaft bushings/bearings; verify location, position and fit.
4. Install core plugs, gallery plugs, check valves, dowel pins, oilers/piston cooling nozzles, and wear sleeves, as required.
5. Verify cylinder liner height, fit, and O-ring position as required.

C. Short Block Assembly (15 questions)

1. Install cylinder liners as required.
2. Install mushroom style valve lifters.
3. Install camshaft, auxiliary/balance shafts and related components.
4. Install main bearings, oil seals, and crankshaft, following recommended procedures.
5. Install main bearing caps, check crankshaft bearing clearance and end play; check for snout, gear(s), and flange run out.
6. Install timing components; verify correct timing positions, gear backlash, and end play.
7. Assemble piston on connecting rod; verify correct position and alignment.
8. Check piston ring end gap; install piston rings following manufacturers' recommendations.
9. Install oilers/piston cooling nozzles as needed; Install piston and connecting rod assembly according to manufacturers' recommendation and verify piston height.
10. Check connecting rod bearing clearances and connecting rod side clearances.
11. Verify position-to-cylinder wall clearance according to manufacturers' specifications.

D. Long Block Assembly (18 questions)

1. Inspect oil pump assembly; service or replace as needed.
2. Check for pump drive gear run out; install oil pump, drive and pickup assembly.
3. Verify that check valves, fittings, dowel pins, and adapters are installed as needed.
4. Install ID tags, pans, covers, and housings.
5. Check flywheel housing for run out; correct as necessary.
6. Check harmonic balancer assembly according to manufacturers' recommendations.
7. Install cylinder head assemblies.
8. Install lifters/cam followers as needed.
9. Install valve train components; verify rocker arm geometry, valve lash, timing, and backlash settings.

M3 TASK LIST (CONTINUED)

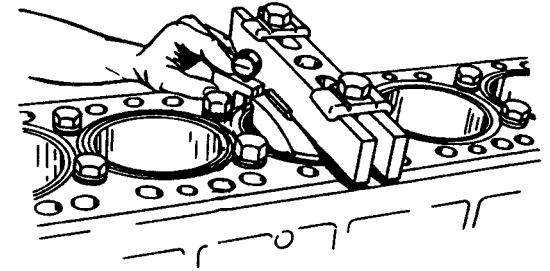
E. Final Assembly (8 questions)

1. Install manifolds and intercoolers as needed.
2. Set timing; install injection pump, injectors, supercharger, and/or turbocharger; install ignition system.
3. Assemble, test and install lubricating and oil cooling system.
4. Install remaining components.
5. Install flywheel and check for runout.
6. Test short block, long block or complete assembly. ■

SAMPLE QUESTIONS ASSEMBLY SPECIALIST (TEST M3)

Questions:

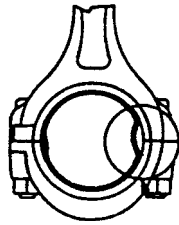
1. A gear driven camshaft will not turn after the thrust plate has been torqued down.
Technician A says that the spacer ring is missing.
Technician B says that the camshaft is not correctly timed.
Who is right?
* (A) A only
(B) B only
(C) Both A and B
(D) Neither A nor B



2. What is the technician checking in the illustration shown above?
(A) Surface finish
(B) Cylinder block deck height
* (C) Liner protrusion
(D) Liner concentricity
3. Oil galleries should be cleaned with a:
(A) shop towel.
(B) air nozzle.
* (C) bristle brush.
(D) flex hone.
4. Technician A says that crankshaft end play can be measured with a dial indicator.
Technician B says that crankshaft end play can be measured with plastigage.
Who is right?
* (A) A only
(B) B only
(C) Both A and B
(D) Neither A nor B

M3 SAMPLE QUESTIONS (CONTINUED)

5. The bearing distortion shown is caused by:
(A) an oversize bearing in a standard rod.
(B) reconditioning the connecting rod too large.
(C) excessive bearing spread.
* (D) excessive bearing crush.
6. Upon disassembly, the main bearing caps were found to be worn from contact with the crankshaft's counterweights. Which of these is the most likely cause?
(A) Worn main bearing tangs
(B) Tapered main bearing journals
* (C) Worn thrust bearing surfaces
(D) Excessive bearing oil clearances
7. Material that is removed from the cylinder head or block can be compensated for by:
(A) retarding the valve timing.
* (B) installing a thicker head gasket.
(C) retarding ignition timing.
(D) installing longer push rods.



Question 8 is not like the ones above.

It has the word **EXCEPT**. For this question, look for the choice that could **NOT** be caused by the described situation. Read the entire question carefully before choosing your answer.

8. All of these could be caused by improper piston ring end-gap **EXCEPT**:
(A) seized rings.
(B) broken rings.
(C) excessive blow-by.
* (D) low ring tension.

INDUSTRY TRAINING

Using this Section:

The manuals, clinics, and other training materials listed below are designed to help you sharpen your technical skills and become more knowledgeable in your trade as an engine machinist. Since the ASE tests reflect these skills, the more you learn, the better your chances of passing ASE tests.

Please call or write the listed manufacturers for availability, schedules, and prices (if applicable).

AlliedSignal Consumer Products (FRAM/Autolite)

Clinics:

- Electronic Ignition Controls
- Electronic Fuel Injection/Distributorless Ignition
- Fundamentals of Closed Loop Fuel Controls
- Electronic Diesel Fuel Control
- Heavy Duty Air Filtration
- Heavy Duty Lube System Filtration
- Heavy Duty Hydraulic Systems
- Heavy Duty Cooling Systems

Contact local FRAM/Autolite jobber or local AlliedSignal Sales Representative, or write: AlliedSignal Consumer Products, Attn: Training, 39 Olde Ridgebury Rd., Danbury, CT 06810, or call 203-830-7800.

Engine Rebuilders Association (AERA)

The following reference materials may be purchased to assist in preparation for the ASE Machinist tests.

Text Books:

- *Automotive Engines* by Tim Gilles
- *Diesel Engine & Fuel System Repair* by Dagele
- *Modern Diesel Technology* by Robert N. Brady
- *Today's Technician* (2 book set) by Hollembeak
- *Automotive Machining & Engine Repair* by Gary Lewis
- *Compact and Automotive Diesels* by Ralbovsky

Video Training Tapes (w/ free study guide): ALSO AVAILABLE IN DVD

Cylinder Head Series:

- Preparation for Machining
- Basic Machining
- Heavy Duty Cyl. Head Rebuilding
- Aluminum Overhead Cam Cyl. Head Rebuilding

Cylinder Block Series:

- Preparation, Testing & Inspection
- Resizing, Sleeving & Resurfacing
- Align Boring & Honing
- HD Connecting Rod Reconditioning
- Machining & Repairing HD Blocks
- Heavy Duty Cylinder Block Repairing and Machining

To obtain additional information and pricing, write or call: AERA, Engine Rebuilders Association, 500 Coventry Lane, Suite 180, Crystal Lake, IL 60014
Ph: 888-326-2372, Fax: 888-329-2372.

Delmar Cengage Publishers

Engine Diagnosis, Repair and Rebuilding.

This book offers a comprehensive introduction to the technology of engine diagnosis, repair and rebuilding. Automotive engine repair techniques, universal to all engines are thoroughly discussed with an emphasis on diagnosis and troubleshooting. New edition includes: Environmental updates; Expanded units on shop safety and hand tools; New features, case histories and shop tips; ASE-style practice tests to help prepare for the ASE certification exam.
Call: 1-800-487-8488, or visit www.autoed.cengage.com.

Engine Builder Magazine

Engine Builder Magazine from Babcox Publications is a monthly business magazine serving the machine shop, custom engine, production engine and small parts rebuilding markets. Its primary objective is to aid its readers in the profitable operation of their business. Call 330-670-1234.

Federal Mogul

Federal Mogul Technical Training Classes are offered at the Worldwide Training Center in St. Louis, MO., and include classroom and lab instruction. Most classes are four days long. Classes available include:

- Basic Automotive Cylinder Head
- Aluminum Cylinder Head Repair
- Automotive Lower Block Reconditioning
- Crack Repair
- Diesel Cylinder Head Reconditioning
- Diesel Lower Block Reconditioning
- High Performance Machining

For a catalog and class schedule, write: Federal Mogul Worldwide Technical Training Center, P.O. Box 7224, St. Louis, MO 63177, or call 314-512-8352.

Fel-Pro Gaskets

Free Educational Packet:

- Torque Tables Booklet
- Gasket Installation
- Sealing Tips
- Check the Facts

To obtain a free Educational packet, write to: Fel-Pro Gaskets, Federal-Mogul Corp., Marketing Communications Dept., ASE Technician Educational Packet, 7450 N. McCormick Blvd., Skokie, IL 60076 or call 847-568-2143.

Visit the Federal-Mogul website at www.federal-mogul.com

Motor Age

MOTOR AGE Training for ASE Certification:

Self-study training guides for ASE's machinist's tests. One complete guide for all three machinist categories contains technical preparation information with sample tests questions, and a complete ASE Task List for each category.

Request complete ordering info, prices, etc. from Motor Age Training for Certification, 131 West First St, Duluth, MN 55802. Phone: 800-240-1968, Internet: www.motorage.com

Parts Craft Division (Dana Corp.)

NAPA Machine Shop School: Individual week-long classes—includes classroom instruction and extensive hands-on shop experiences. Class choices include:

- Basic Cylinder Head
- Aluminum Cylinder Head
- Lower Block
- Crankshaft Grinding
- Performance Machining

To obtain a Machine Shop School brochure, including an application form and scheduling information, write: NAPA Machine Shop School, 8000 Yankee Road, Ottawa Lake, MI 49267 or call Stacey White, 419-535-4201.

Snap-on Technical Training Systems

Training Centers and Info: Snap-on Technical Training Systems maintains and operates 48 Technical Training Centers in addition to remotely held class locations. All classes are lead by Snap-on qualified instructors utilizing up to date training material, props and student handouts.

- Introduction to Test Taking Skills—TRO75MSC (4 hours)—Provides basic testing taking skills. Tips on test preparation and how to relate to test questions with your subject knowledge.

Snap-on's automotive/mechanical offerings may be of interest to engine machinists.

For more info on course offerings or to request a training catalog or schedule, please contact the nearest Snap-on Training Center or call 800-225-5786.

Spokane Community College and LFR Productions

Offer a "how to" video series. The following videos come in any of three formats VHS, CD, or DVD.

How to read a micrometer

Block Cylinder Boring

Block Cylinder Honing

Connecting Rod Reconditioning

Crankshaft Grinding

Engine Balancing

Contact information: LFR productions W. 20502 South Bank Rd. Nine Mile Falls, WA. 99026, 800-827-9254, www.lfrproductions.com

Spanish Language Training Resources

For a listing of training providers who offer training, or training materials in Spanish go to www.ase.com; once there, enter the "Service Professionals" area and click on "Spanish Language Training Resources."

Recursos de Educación en Español

Para obtener acceso a la lista de proveedores de educación, ó materiales educativos en Español diríjase a www.ase.com; una ves allí, entre en la sección "Español" y prosiga al área "Lista de Educadores y Materiales Didácticos."



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