

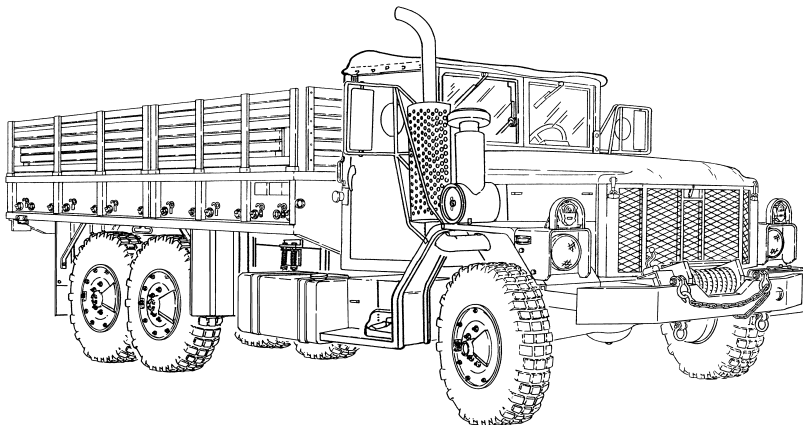
**ARMY TM 9-2320-386-24-1-2
AIR FORCE TO 36A12-1B-1122-2**

**TECHNICAL MANUAL
EXTENDED SERVICE PROGRAM
(ESP)**

**UNIT, DIRECT SUPPORT,
AND GENERAL SUPPORT
MAINTENANCE MANUAL**

FOR

**2-1/2-TON, 6X6, M44A3
SERIES TRUCKS (DIESEL)**



**TRUCK, CARGO: 2-1/2-TON, 6X6
M35A3 (2320-01-383-2047) (EIC: BHK);
(2320-01-383-3850) (EIC: BHL)**

**M35A3C (2320-01-383-2050) (EIC: BHP);
(2320-01-383-2049) (EIC: BHQ)**

**M36A3 (2320-01-383-2048) (EIC: BHM);
(2320-01-383-2046) (EIC: BHN).**

**CHAPTER 4
DIRECT SUPPORT TROUBLESHOOTING**

**CHAPTER 5
DIRECT SUPPORT MAINTENANCE**

**CHAPTER 6
GENERAL SUPPORT MAINTENANCE**

**CHAPTER 7
GENERAL MAINTENANCE**

**CHAPTER 8
SHIPMENT AND LIMITED STORAGE**

**CHAPTER 9
SUPPORTING INFORMATION**

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENTS OF THE ARMY AND AIR FORCE

1 MAY 2001

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NO. 9-2320-386-24-1-2

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NO. 36A12-1B-1122-2

HEADQUARTERS,
DEPARTMENT OF THE ARMY
AND AIR FORCE
WASHINGTON, D.C., 1 May 2001

EXTENDED SERVICE PROGRAM (ESP)
TECHNICAL MANUAL
UNIT, DIRECT SUPPORT, AND
GENERAL SUPPORT MAINTENANCE
FOR
2-1/2-TON, 6X6, M44A3 SERIES TRUCKS

TRUCK	MODEL	EIC	NSN W/O WINCH	NSN W/WINCH
Cargo, Fixed Side	M35A3	BHK	2320-01-383-2047	
Cargo, Fixed Side	M35A3	BHL		2320-01-383-3850
Cargo, Drop Side	M35A3C	BHP	2320-01-383-2050	
Cargo, Drop Side	M35A3C	BHQ		2320-01-383-2049
Cargo, Long Wheelbase	M36A3	BHM	2320-01-383-2048	
Cargo, Long Wheelbase	M36A3	BHN		2320-01-383-2046

This manual will provide maintenance instructions for ESP vehicles.

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeprs.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or E-mail your letter or DA Form 2028 direct to: AMSTA-LC-CI/TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

This manual is published in two parts. TM 9-2320-386-24-1-1 contains front matter and chapters 1, 2, and 3, (consisting of work packages 0001 00 through 0288 00). TM 9-2320-386-24-1-2 contains chapters 4 through 9 (consisting of work packages 0289 00 through 0395 00) and rear matter.

This manual contains a table of contents and alphabetical index for volume 2.

This publication supersedes TM 9-2320-386-24 dated 26 January 1996.

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CHAPTER 4

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DIRECT SUPPORT TROUBLESHOOTING PROCEDURES

EXTENDED SERVICE PROGRAM (ESP)

TRUCK, CARGO, 2-1/2-TON, 6X6, M44A3 SERIES TRUCKS (DIESEL)

M35A3, W/O WINCH (NSN 2320-01-383-2047); W/WINCH (NSN 2320-01-383-3850);

M35A3C, W/O WINCH (NSN 2320-01-383-2050); W/WINCH (NSN 2320-01-383-2049);

M36A3, W/O WINCH (NSN 2320-01-383-2048); W/WINCH (NSN 2320-01-383-2046).

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DIRECT SUPPORT TROUBLESHOOTING PROCEDURES

EXTENDED SERVICE PROGRAM (ESP)

TRUCK, CARGO, 2-1/2-TON, 6X6, M44A3 SERIES TRUCKS (DIESEL)

M35A3, W/O WINCH (NSN 2320-01-383-2047); W/WINCH (NSN 2320-01-383-3850);

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SECTION I. INTRODUCTION TO TROUBLESHOOTING

WARNING

Operation of a deadlined vehicle without preliminary inspection may cause injury to personnel and or damage to equipment.

- a. This chapter provides the information needed to diagnose and correct malfunctions of the mechanical system at the direct support maintenance level.
- b. The troubleshooting procedures in this chapter cannot give all of the answers or correct all vehicle malfunctions encountered. However, these procedures are a step-by-step approach to a problem that directs tests and inspections toward the source of a problem and a successful solution.
- c. Each malfunction symptom given for an individual component or system is followed by step(s) to determine the cause and corrective action you must take to remedy the problem.
- d. Before taking any corrective action for a possible malfunction, the following rules should be followed:
 - (1) Question operator to obtain any additional information that might help you to determine the cause of the problem.
 - (2) Never overlook the chance the problem could be of simple origin. The problem could require only a minor adjustment.
 - (3) Use all senses to observe and locate troubles.
 - (4) Use test instruments or gauges to help you to determine and isolate problems.
 - (5) Always isolate the system where the malfunction occurs and then locate the defective component.
 - (6) Use standard automotive theories and principles when troubleshooting the vehicles covered in this manual.

END OF WORK PACKAGE

DIRECT SUPPORT TROUBLESHOOTING PROCEDURES**EXTENDED SERVICE PROGRAM (ESP)****TRUCK, CARGO, 2-1/2-TON, 6X6, M44A3 SERIES TRUCKS (DIESEL)****M35A3, W/O WINCH (NSN 2320-01-383-2047); W/WINCH (NSN 2320-01-383-3850);****M35A3C, W/O WINCH (NSN 2320-01-383-2050); W/WINCH (NSN 2320-01-383-2049);****M36A3, W/O WINCH (NSN 2320-01-383-2048); W/WINCH (NSN 2320-01-383-2046).****SECTION II. DIRECT SUPPORT TROUBLESHOOTING PROCEDURES****TABLE OF CONTENTS**

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DIRECT SUPPORT TROUBLESHOOTING PROCEDURES

EXTENDED SERVICE PROGRAM (ESP)

TRUCK, CARGO, 2-1/2-TON, 6X6, M44A3 SERIES TRUCKS (DIESEL)

M35A3, W/O WINCH (NSN 2320-01-383-2047); W/WINCH (NSN 2320-01-383-3850);

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DIRECT SUPPORT TROUBLESHOOTING PROCEDURES (CONTD)

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END OF WORK PACKAGE

DIRECT SUPPORT TROUBLESHOOTING PROCEDURES

EXTENDED SERVICE PROGRAM (ESP)

TRUCK, CARGO, 2-1/2-TON, 6X6, M44A3 SERIES TRUCKS (DIESEL)

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M36A3, W/O WINCH (NSN 2320-01-383-2048); W/WINCH (NSN 2320-01-383-2046).

DIRECT SUPPORT MECHANICAL TROUBLESHOOTING

This work package provides diagnostic and corrective procedures for the mechanical system at Direct Support maintenance levels. The information in this work package is for use in conjunction with TM 9-2320-361-34 and chapter 3 of this manual. The troubleshooting system index will help in finding specific problems and solutions in Direct Support Mechanical Troubleshooting.

WARNING

Operation of a deadlined vehicle without preliminary inspection may cause injury to personnel and/or damage to equipment.

NOTE

Notify your supervisor if corrective action does not correct malfunction.

Direct Support Mechanical Troubleshooting.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

ENGINE

1. ENGINE WILL NOT CRANK

Step 1. Remove starter (WP 0091 00) and check start drive gear and flexplate ring gear for broken and missing teeth.

- a. If starter drive gear teeth are damaged, repair starter (TM 9-2920-243-34).
- b. If flexplate ring gear teeth are damaged, replace flexplate ring gear (WP 0337 00).

Step 2. Check engine for fluid locked pistons.

- a. Remove all fuel injectors (WP 0319 00). Crank engine by hand and examine any fluid expelled from cylinders. If fluid is coolant/water, perform malfunction 10, step 2. If fluid is fuel, perform malfunction 19.
- b. Turn crankshaft by hand. If crankshaft turns easily, install fuel injectors (WP 0319 00) and proceed to step 4. If crankshaft turns hard, or does not turn, proceed to step 3.

Step 3. Check engine for mechanical lockup.

- a. Remove fan drivebelt (WP 0084 00) and turn drive pulley of each belt-driven accessory. If drive pulley does not turn, replace accessory component (WP 0087 00, WP 0081 00, WP 0089 00 (Prestolite), or WP 0090 00 (Leece-Neville).
- b. Remove valve cover (WP 0028 00). Turn crankshaft by hand at vibration damper and visually check valve train operation. If valve train is not operating properly, check camshaft and crankshaft gears, cam roller followers, push rods, and rocker arms for bends, cracks, and breaks. Replace if damaged (WP 0309 00 or WP 0308 00), or notify GS maintenance.

*Direct Support Mechanical Troubleshooting (Contd).***MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION**

- c. Remove gear-driven accessories and turn drive gear by hand. If drive gear does not turn, replace defective component (WP 0169 00, WP 0313 00, or WP 0326 00).

Step 4. Remove transmission (WP 0335 00) and turn engine crankshaft by hand. If crankshaft turns freely, replace transmission (WP 0335 00).

Step 5. Replace engine (WP 0295 00).

END OF TESTING!

2. ENGINE CRANKS BUT WILL NOT START

Step 1. Remove exhaust and air intake tubes from turbocharger and check for presence of water. If water is present on fins of turbocharger, remove and drain exhaust and air intake systems (WP 0066 00 and WP 0038 00). Replace turbocharger (WP 0325 00).

Step 2. Check fuel injection timing (WP 0322 00).

Adjust fuel injection timing, if necessary (WP 0322 00).

Step 3. Check intake and exhaust valve clearance adjustment (WP 0311 00).

Step 4. Check fuel injector rack control linkage for proper operation.

Replace fuel injector rack control linkage if bent or binding (WP 0320 00).

Step 5. Replace governor (WP 0326 00). If condition continues, replace engine (WP 0295 00).

END OF TESTING!

3. ENGINE STARTS BUT STOPS WHEN ACCELERATOR IS OPERATED

Step 1. Perform malfunction 2, steps 2 through 4.

Step 2. Check height of fuel injectors for any seizure.

Replace fuel injector(s) if seized (WP 0319 00).

Step 3. Check for bent or broken push rods.

Replace push rod(s) if bent or broken (WP 0309 00).

Step 4. Check surge tank for evidence of blown head gasket before taking cylinder head off.

Step 5. Check cylinder head and cylinder walls for wear and damage.

a. Remove cylinder head (WP 0302 00). Inspect cylinder head and head gasket surface for cracks. Replace cylinder head if cracked (WP 0302 00).

b. Check intake and exhaust valves for chips, wear, burrs, cracks, and pits. Notify GS maintenance if exhaust valves are chipped, worn, burred, cracked, or pitted (WP 0356 00).

c. Check cylinder walls for cracks, burrs, chafing, and wear. Replace engine (WP 0295 00).

END OF TESTING!

4. ENGINE STOPS WHEN ACCELERATOR IS RETURNED TO IDLE POSITION

Perform malfunction 2.

END OF TESTING!

5. POOR ACCELERATION AND/OR LACK OF POWER

Step 1. Check turbocharger, air intake, and exhaust system for leaks and restrictions.

a. Tighten any loose connections. Replace any missing hardware.

b. Replace turbocharger if defective (WP 0325 00).

c. If malfunction continues after test run, perform step 2.

Step 2. Check transmission for proper operation.

Replace and repair transmission if operating improperly (WP 0335 00).

Step 3. Perform malfunction 2.

END OF TESTING!

Direct Support Mechanical Troubleshooting (Contd).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

6. ENGINE DELIVERS EXCESSIVE BLACK SMOKE

Perform malfunction 19.

END OF TESTING!

7. ENGINE SURGES OR MISFIRES DURING OPERATION

Step 1. Perform malfunction 3.

Step 2. If malfunction continues, replace engine (WP 0295 00).

END OF TESTING!

8. ENGINE STOPS DURING NORMAL OPERATION

Step 1. Start engine (TM 9-2320-386-10) and check operation.

If engine runs rough, misfires, or does not start, perform malfunction 2.

Step 2. Perform malfunction 1, steps 1 through 3.

Step 3. Perform malfunction 3.

END OF TESTING!

9. EXHAUST COLOR BLUE DURING NORMAL OPERATION**NOTE**

Blue exhaust indicates presence of excessive engine oil in cylinder combustion chamber.

Step 1. Check for failure of turbocharger oil seal.

Remove charged-air cooler tubes (WP 0073 00) and check for presence of oil. If oil is present, replace turbocharger (WP 0325 00).

Step 2. Check intake and exhaust valve adjustment (WP 0311 00).

Step 3. Perform malfunction 3, step 5.

END OF TESTING!

10. EXHAUST COLOR WHITE DURING NORMAL OPERATION**CAUTION**

Thick white exhaust indicates coolant is present in engine combustion chambers during operation. When this condition is evident, shut down engine immediately and determine cause. Continued engine operation may result in permanent engine damage.

Step 1. Perform cooling system pressure test (TM 750-254).

a. If test does not indicate a leak in cooling system, perform malfunction 2.

b. If test indicates a leak is present in cooling system, perform step 2.

Step 2. Replace fuel injectors (WP 0319 00).

If condition continues, perform step 3.

Step 3. Check engine oil for presence of coolant.

a. If coolant is present, remove cylinder head (WP 0302 00). Inspect cylinder head, head gasket, and engine block for cracks. Replace cylinder head if cracked (WP 0302 00). Replace engine if engine block is cracked (WP 0295 00).

*Direct Support Mechanical Troubleshooting (Contd).***MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION**

- b. Remove oil pan (WP 0312 00). Inspect crankshaft main bearings and connecting rod bearings. Notify GS maintenance if crankshaft, main bearings, or connecting rod bearings are chipped, pitted, or worn.

END OF TESTING!

11. ENGINE OIL PRESSURE LOW OR ZERO AT NORMAL OPERATING TEMPERATURE

Step 1. Check engine oil for presence of fuel.

If fuel is present, remove fuel injectors (WP 0319 00) and check for defective fuel injectors and O-rings. Replace fuel injector(s) and O-rings if defective (WP 0319 00).

Step 2. Remove oil pan (WP 0312 00). Check oil pump for proper operation and clogged or restricted oil pump suction pipe.

- a. Clean oil pump suction pipe if clogged.
- b. Replace oil pump if operating improperly (WP 0313 00). Notify GS maintenance if repair of oil pump is necessary.

Step 3. Check for excessive clearance between rocker arm shafts and rocker arms WP 0309 00, camshaft and camshaft bearings, and crankshaft and crankshaft bearings (WP 0364 00).

Replace or repair engine if there is excessive clearance.

END OF TESTING!

12. ENGINE OIL PRESSURE EXTREMELY HIGH AT NORMAL OPERATING TEMPERATURE**NOTE**

Continued high oil pressure may indicate spun internal engine bearings or restricted engine block oil feed passage.

Remove oil pan (WP 0312 00) and check for evidence of spun bearings and restricted oil passages. If evident, replace engine (WP 0295 00).

END OF TESTING!

13. ENGINE OIL LOSS DURING NORMAL OPERATION

Perform malfunctions 9 and 11.

END OF TESTING!

14. ENGINE NOISE ABNORMAL**CAUTION**

Abnormal engine noise is evidence of internal damage to components. Do not operate engine continuously except for testing. Failure to comply may damage engine permanently.

When abnormal engine noise is evident, engine should be checked, and location of noise determined, to ensure that engine is the cause and will not be permanently damaged.

Step 1. A knocking noise at the front of engine indicates camshaft, crankshaft, oil pump, air compressor, fuel governor, or idle gears may be damaged, have excessive backlash, or a loose fit.

Replace if damaged (WP0169 00, WP 0313 00, or WP 0326 00), or notify GS maintenance.

Step 2. A knocking noise at the top of engine indicates valve train, fuel injector linkage, or valves may be worn, binding, damaged, incorrectly adjusted, or underlubricated.

- a. Adjust valve clearance and/or fuel injector linkage if necessary (WP 0311 00 or WP 0320 00).
- b. Perform malfunction 10.

*Direct Support Mechanical Troubleshooting (Contd).***MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION**

- c. Replace engine (WP 0295 00).
- Step 3. A knocking noise at the sides of engine indicates valve train components may be damaged. Replace valve train components if damaged (WP 0309 00, WP 0320 00, or WP 0308 00).
- Step 4. A noise at the rear of engine indicates flexplate or transmission components may be loose or damaged.
 - a. Place transmission in NEUTRAL and start engine (TM 9-2320-386-10) to verify noise is at transmission.
Replace transmission if noise is at transmission (WP 0335 00).
 - b. Remove access plate on flywheel housing and check if flexplate or torque converter is loose. If loose, tighten screws (WP 0335 00).
 - c. Remove transmission (WP 0335 00) and check if flexplate is damaged or loose. Tighten screws if loose. Replace flexplate, if damaged (WP 0337 00).
- Step 5. A noise at the bottom of engine indicates flexplate, crankshaft, or connecting rods may be worn or damaged.
 - a. Perform step 4, steps b and c.
 - b. Check crankshaft and connecting rods for excessive wear.
Notify GS maintenance if crankshaft or connecting rods are excessively worn.
 - c. If malfunction continues, replace engine (WP 0295 00).

END OF TESTING!

15. ENGINE VIBRATION ABNORMAL

- Step 1. Check for loose or defective vibration damper (WP 0303 00).
 - a. Tighten screws if loose.
 - b. If vibration damper is still loose, replace vibration damper (WP 0303 00).
- Step 2. Perform malfunction 3.
If engine vibration continues, notify GS maintenance.

END OF TESTING!

FUEL SYSTEM**WARNING**

Diesel fuel is flammable. Do not perform troubleshooting checks near open flame, sparks, or electricity. Injury to personnel may result.

Eye protection is required when performing fuel system checks. Failure to wear eye protection may result in injury to personnel.

16. NO FUEL AT FUEL INJECTORS

- Step 1. Prime the fuel system (TM 9-2320-386-10) and attempt to start engine. If engine does not start, perform step 2.
- Step 2. Check fuel supply line for restrictions.
 - a. Disconnect fuel supply line from governor (WP 0051 00).
 - b. Apply air pressure to fuel supply line and check for leaks and restrictions. If leaking or restricted, replace fuel supply line (WP 0051 00).
 - c. Connect fuel supply line to governor and attempt to restart engine. If engine does not start, perform step 3.

*Direct Support Mechanical Troubleshooting (Contd).***MALFUNCTION****TEST OR INSPECTION****CORRECTIVE ACTION**

Step 3. Check for restricted fuel/water separator.

- a. Disconnect fuel line from rear of cylinder head and crank engine.
- b. If no fuel is present, replace fuel filter (WP 0054 00).
- c. Crank engine. If no fuel is present, fuel/water separator is defective. Replace fuel/water separator (WP 0053 00).

Step 4. Check transfer pump for proper operation.

- a. Loosen transfer pump-to-fuel/water separator fuel line and crank engine.
- b. If no fuel is present, remove transfer pump (WP 0324 00) and check for damage to transfer pump and cam lobe. If damaged, replace governor (WP 0326 00).
- c. If fuel is present, perform step 5.

Step 5. Replace fuel injector (WP 0319 00).

END OF TESTING!

17. LOW FUEL SUPPLY AT FUEL INJECTORS

Perform malfunction 16.

END OF TESTING!

18. FUEL INJECTORS INOPERATIVE

Step 1. Perform malfunction 16.

Step 2. Perform malfunction 3, steps 1 and 2.

END OF TESTING!

19. FUEL INJECTORS DELIVER EXCESS FUEL INTO ENGINE**WARNING**

Compressed air source will not exceed 30 psi (207 kPa).
Eyeshields must be worn at all times. Failure to do so may
result in injury to personnel.

Step 1. Check fuel return line for restrictions.

- a. Disconnect fuel return line from governor (WP 0051 00).
- b. Apply air pressure to fuel return line.
- c. Replace fuel return line if restricted (WP 0048 00).

Step 2. Fuel setting is too high.

Adjust fuel setting as necessary (WP 0323 00).

Step 3. Perform malfunctions 7 and 14 if there is evidence of abnormal noise or misfiring of engine.

Step 4. Check fuel injection timing (WP 0322 00).

Adjust timing as necessary (WP 0322 00).

Step 5. Check for leaking O-rings and defective fuel injectors.

- a. Disconnect fuel line from rear of cylinder head.
- b. Apply air pressure to cylinder head. If air is heard leaking at fuel injector(s), remove fuel injector(s) (WP 0319 00) and replace O-rings.

Step 6. Replace fuel injectors (WP 0319 00).

END OF TESTING!