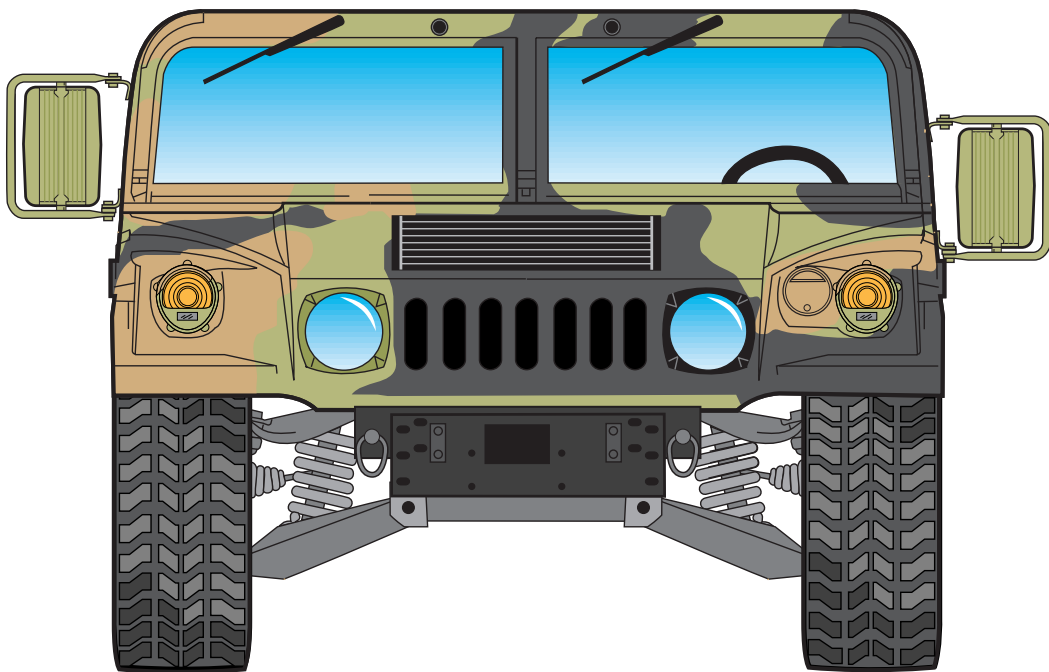


5715587

# AM General Corporation

# MILITARY HMMWV



## Use of Technical Manuals

For All M998 Series Vehicles

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# Section 1

## HOW TO USE TECHNICAL MANUALS

- GENERAL FEATURES:** The TM is the fundamental means by which the army communicates to soldiers the requirements and procedures necessary to perform equipment operations and maintenance. This program is designed to give you a basic understanding of the army technical manual system to enable you to get the maximum service life out of your equipment.

**ARMY TM 9-2320-280-20-1**  
**ATR FORCE TO 36A12-1A-2092-1-1**  
**MARINE CORPS TM 2320-20/7B**  
(SUPERSEDES TM 9-2320-280-20-1. 19 JANUARY 1990)

**Volume No. 1**

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**TECHNICAL MANUAL  
UNIT MAINTENANCE**

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998 (2320-01-107-7155) [EIC: BBD]; M998A1 (2320-01-371-9577) [EIC: BBN];

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH, M1038 (2320-01-107-7156) [EIC: BBE]; M1038A1 (2320-01-371-9578) [EIC: BBP];

TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) [EIC: BBN]; M1097A1 (2320-01-371-9583) [EIC: BBQ]; M1097A2 (2320-01-380-8604) [EIC: BBG];

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, M966 (2320-01-107-7153) [EIC: BBC]; M966A1 (2320-01-372-3932) [EIC: BBX];

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1036 (2320-01-107-7154) [EIC: BBH];

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1045 (2320-01-146-7191); M1045A1 (2320-01-371-9580) [EIC: BBR]; M1045A2 (2320-01-380-8229) [EIC: BB5];

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1046 (2320-01-146-7188); M1046A1 (2320-01-371-9582) [EIC: BBT];

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025 (2320-01-128-9551) [EIC: BBF]; M1025A1 (2320-01-371-9584) [EIC: BBV]; M1025A2 (2320-01-380-8233) [EIC: BB3];

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026 (2320-01-128-9552) [EIC: BBG]; M1026A1 (2320-01-371-9579) [EIC: BBQ];

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1043 (2320-01-146-7190); M1043A1 (2320-01-372-3933); M1043A2 (2320-01-380-8213) [EIC: BB4];

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1044 (2320-01-146-7189); M1044A1 (2320-01-371-9581);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) [EIC: BBK];

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);

TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) [EIC: BB8]; M996A1 (2310-01-372-3935) [EIC: BB2];

TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274) [EIC: BBA]; M997A1 (2310-01-372-3934) [EIC: BB2]; M997A2 (2310-01-380-8225) [EIC: BB8];

TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) [EIC: BBW]; M1035A2 (2310-01-380-8290) [EIC: BB9].

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SERVICE AND TROUBLESHOOTING INSTRUCTIONS	2-1
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TRANSMISSION AND TRANSFER CASE MAINTENANCE	5-1
PROPELLER SHAFTS AXLES AND SUSPENSION MAINTENANCE	6-1
BRAKE SYSTEM MAINTENANCE	7-1
WHEELS AND STEERING MAINTENANCE	8-1
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**DEPARTMENTS OF THE ARMY, THE AIR FORCE,  
AND HEADQUARTERS, MARINE CORPS**

**JANUARY 1995**

\* INSTRUCTOR GO TO SLIDE #2

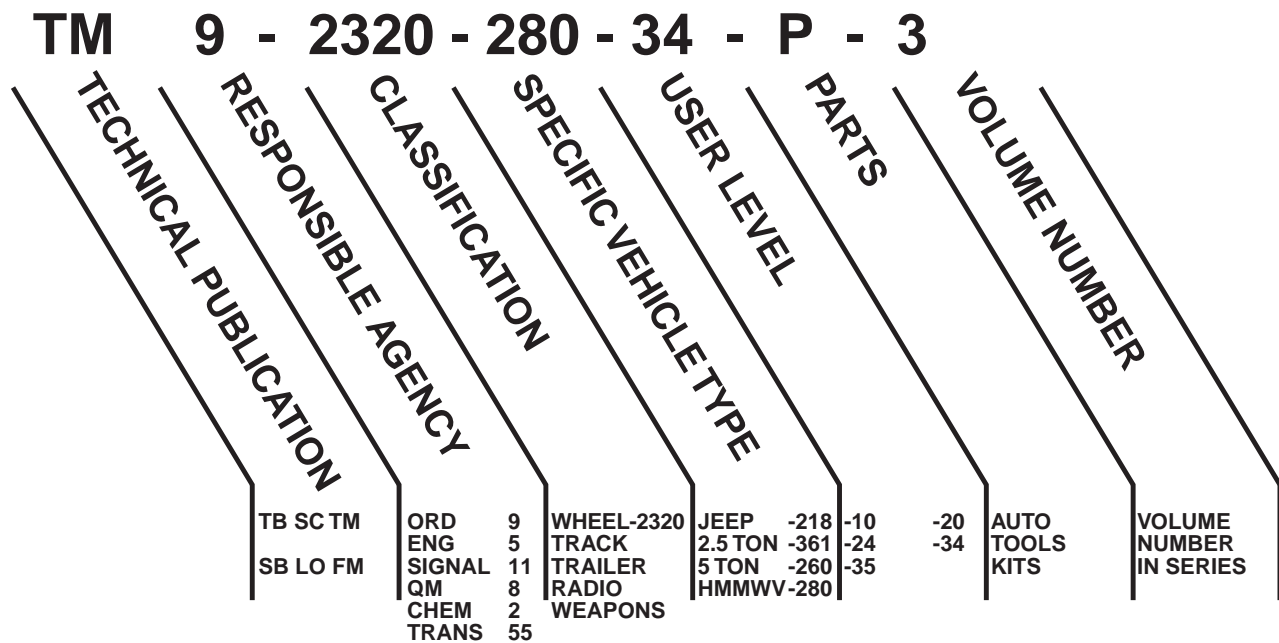
**2. YOUR TM** is the best source available for providing the listed information and data critical to vehicle maintenance.

- General Information, Description, and Data ..... (Chapter 1)..... TM-2320-XXX-20-1
- Troubleshooting ..... (Chapter 2, Sec. IV) ..... TM-2320-XXX-20-1
- Detailed Maintenance Procedures ..... Chapter 3-12)..... TM-2320-XXX-20-2
- General Maintenance Instructions..... Chapter 2, Sec. II & III) TM-2320-XXX-20-2
- Maintenance Allocation ..... (Appendix B) ..... TM-2320-XXX-20-3
- Illustrated List of Manufactured Items..... (Appendix D) ..... TM-2320-XXX-20-3
- Torque Limits ..... (Appendix E) ..... TM-2320-XXX-20-3
- Mandatory Replacement Parts ..... (Appendix G)..... TM-2320-XXX-20-3
- Metric Conversion Chart..... (Back Cover) ..... Most TM's

\* AFTER DISCUSSION, GO TO SLIDE #3.

3. **FIRST**, you need to know which technical manual to use for your assigned task and for your individual maintenance skill level.

- Discuss "Which Publication to Use Chart."



TB – TECHNICAL BULLETIN  
 SC – SUPPLY CATALOG  
 TM – TECHNICAL MANUAL  
 SB – SUPPLY BULLETIN  
 LO – LUBRICATION ORDER  
 FM – FIELD MANUAL

\* AFTER DISCUSSION, GO TO SLIDE #4.

4. **ASSIGNED TASK:** Unit Maintenance has reported that a HMMWV has *loss of coolant* in the cooling system. The vehicle has been assigned to you for repair.

### Troubleshooting Steps

- Look at the cover of the manual. You will see chapter titles listed from top to bottom on the right-hand side.
- Look for “General Maintenance” in the chapter list on the cover. This is where trouble shooting information is located.

**ARMY TM 9-2320-280-34**  
**AIR FORCE TO 36A12-1A-2092-3**  
**MARINE CORPS TM 2320-34/9B**  
(SUPERSEDES TM 9-2320-280-34, 20 AUGUST 1991)

<p><b>TECHNICAL MANUAL</b></p> <p><b>DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE</b></p> <p>TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998 (2320-01-107-7155) [EIC: BB0]; M998A1 (2320-01-371-9577) [EIC: BBN];</p> <p>TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH, M1038 (2320-01-107-7156) [EIC: BBE]; M1038A1 (2320-01-371-9578) [EIC: BBP];</p> <p>TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) [EIC: B8M]; M1097A1 (2320-01-371-9583) [EIC: BBU]; M1097A2 (2320-01-380-8604) [EIC: BB6];</p> <p>TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, M966 (2320-01-107-7153) [EIC: BB0]; M966A1 (2320-01-372-3932) [EIC: BBX];</p> <p>TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1036 (2320-01-107-7154) [EIC: BBH];</p> <p>TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1045 (2320-01-146-7191); M1045A1 (2320-01-371-9580) [EIC: BBR]; M1045A2 (2320-01-380-8229) [EIC: BB5];</p> <p>TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1046 (2320-01-146-7188); M1046A1 (2320-01-371-9582) [EIC: BB1];</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025 (2320-01-128-9551) [EIC: BBF]; M1025A1 (2320-01-371-9584) [EIC: BBV]; M1025A2 (2320-01-380-8233) [EIC: BB3];</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026 (2320-01-128-9552) [EIC: BBG]; M1026A1 (2320-01-371-9579) [EIC: BBQ];</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1043 (2320-01-146-7190); M1043A1 (2320-01-372-3933); M1043A2 (2320-01-380-8213) [EIC: BB4];</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1044 (2320-01-146-7189); M1044A1 (2320-01-371-9581);</p> <p>TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) [EIC: BBK];</p> <p>TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);</p> <p>TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) [EIC: BB8]; M996A1 (2310-01-372-3935) [EIC: BB2];</p> <p>TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274) [EIC: BBA]; M997A1 (2310-01-372-3934); [EIC: BBZ] M997A2 (2310-01-380-8225) [EIC: BB3];</p> <p>TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) [EIC: BBW]; M1035A2 (2310-01-380-8290) [EIC: BB9].</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>HOW TO USE THIS MANUAL</td><td style="text-align: right;">iv</td></tr> <tr><td>INTRODUCTION</td><td style="text-align: right;">1-1</td></tr> <tr><td>GENERAL MAINTENANCE</td><td style="text-align: right;">2-1</td></tr> <tr><td>ENGINE MAINTENANCE</td><td style="text-align: right;">3-1</td></tr> <tr><td>FUEL SYSTEM MAINTENANCE</td><td style="text-align: right;">4-1</td></tr> <tr><td>COOLING SYSTEM MAINTENANCE</td><td style="text-align: right;">5-1</td></tr> <tr><td>ELECTRICAL SYSTEM MAINTENANCE</td><td style="text-align: right;">6-1</td></tr> <tr><td>TRANSMISSION MAINTENANCE</td><td style="text-align: right;">7-1</td></tr> <tr><td>TRANSFER CASE MAINTENANCE</td><td style="text-align: right;">8-1</td></tr> <tr><td>PROPELLER SHAFTS, AXLES, AND SUSPENSION MAINTENANCE</td><td style="text-align: right;">9-1</td></tr> <tr><td>SERVICE BRAKE SYSTEM MAINTENANCE</td><td style="text-align: right;">10-1</td></tr> <tr><td>STEERING SYSTEM MAINTENANCE</td><td style="text-align: right;">11-1</td></tr> <tr><td>FRAME MAINTENANCE</td><td style="text-align: right;">12-1</td></tr> <tr><td>BODY MAINTENANCE</td><td style="text-align: right;">13-1</td></tr> <tr><td>SPECIAL PURPOSE BODIES MAINTENANCE</td><td style="text-align: right;">14-1</td></tr> <tr><td>WINCH MAINTENANCE</td><td style="text-align: right;">15-1</td></tr> <tr><td>SPECIAL PURPOSE KITS MAINTENANCE</td><td style="text-align: right;">16-1</td></tr> <tr><td>TRANSMISSION REPAIR</td><td style="text-align: right;">17-1</td></tr> <tr><td>TRANSFER CASE REPAIR</td><td style="text-align: right;">18-1</td></tr> <tr><td>DIFFERENTIAL REPAIR</td><td style="text-align: right;">19-1</td></tr> <tr><td>STEERING SYSTEM REPAIR</td><td style="text-align: right;">20-1</td></tr> <tr><td>FRAME REPAIR</td><td style="text-align: right;">21-1</td></tr> <tr><td>BODY REPAIR</td><td style="text-align: right;">22-1</td></tr> </table>	HOW TO USE THIS MANUAL	iv	INTRODUCTION	1-1	GENERAL MAINTENANCE	2-1	ENGINE MAINTENANCE	3-1	FUEL SYSTEM MAINTENANCE	4-1	COOLING SYSTEM MAINTENANCE	5-1	ELECTRICAL SYSTEM MAINTENANCE	6-1	TRANSMISSION MAINTENANCE	7-1	TRANSFER CASE MAINTENANCE	8-1	PROPELLER SHAFTS, AXLES, AND SUSPENSION MAINTENANCE	9-1	SERVICE BRAKE SYSTEM MAINTENANCE	10-1	STEERING SYSTEM MAINTENANCE	11-1	FRAME MAINTENANCE	12-1	BODY MAINTENANCE	13-1	SPECIAL PURPOSE BODIES MAINTENANCE	14-1	WINCH MAINTENANCE	15-1	SPECIAL PURPOSE KITS MAINTENANCE	16-1	TRANSMISSION REPAIR	17-1	TRANSFER CASE REPAIR	18-1	DIFFERENTIAL REPAIR	19-1	STEERING SYSTEM REPAIR	20-1	FRAME REPAIR	21-1	BODY REPAIR	22-1
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APRIL 1995

\* AFTER DISCUSSION GO TO SLIDE #5.

5. Go to page 2-2 which is the “**Troubleshooting Symptom Index**”. Look down the list until you find “Engine”. Beneath that heading you will find the symptoms noted by unit maintenance: **(Loss of Coolant Item #11).**

TM 9-2320-280-34

**Section II. TROUBLESHOOTING**

**2-6. GENERAL**

Information in this section is for use by support maintenance personnel in conjunction with, and as a supplement to, troubleshooting procedures in TM 9-2320-280-20.

**2-7. MECHANICAL TROUBLESHOOTING INSTRUCTIONS**

a. The troubleshooting procedures in this section cannot give all the answers or correct all vehicle malfunctions encountered. However, these procedures are an organized step by step study of a problem that directs tests and inspections toward the source of a problem and successful correction.

**CAUTION**

Operation of a deadlined vehicle without preliminary inspection will cause further damage.

b. Do the easiest things first. Most troubles are easily corrected. For example:

- (1) Excessive oil consumption is generally caused by leaky gaskets or loose line connections.
- (2) Always check the easiest and most obvious things first. This simple rule saves time and trouble.

c. Doublecheck before disassembly. The source of most engine problems can be traced to more than one part in a system. For example:

- (1) Excessive fuel consumption may not be caused by the fuel pump alone. Instead, the trouble could be a clogged air cleaner, or a restricted exhaust passage causing severe back pressure.
- (2) Engines very often are disassembled in search of a complaint and the real evidence of the problem is destroyed. Check again to be sure an easier solution to the problem has not been overlooked.

d. Before correcting a problem, diagnose the cause of the problem. Do not allow the same failure to occur again.

**TROUBLESHOOTING SYMPTOM INDEX**

MALFUNCTION NO.	MECHANICAL MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
<b>ENGINE</b>		
1.	Engine will not crank . . . . .	2-4
2.	Engine cranks but will not start. . . . .	2-4
3.	Engine stops during normal operation . . . . .	2-4
4.	Engine knocks (mechanical noise) . . . . .	2-5
5.	Excessive oil loss or consumption . . . . .	2-5
6.	Low oil pressure . . . . .	2-5
7.	Excessive engine vibration . . . . .	2-5
8.	Excessive exhaust smoke . . . . .	2-6
9.	Accelerator pedal sticks or full throttle cannot be obtained . . . . .	2-6
10.	Leaking exhaust gases or exhaust noises . . . . .	2-6
11.	Loss of coolant . . . . .	2-7
12.	Engine overheats . . . . .	2-7
13.	Engine does not develop full power. . . . .	2-7
14.	Lubricating oil diluted. . . . .	2-7

2-2

\* AFTER DISCUSSION, GO TO SLIDE #6.

**6.** Turn to the page indicated:

- On page 2-7, steps/tests relating to resolving the problem of loss of coolant are listed.

Step 1. Pressurize coolant system and check for leaks at water pump and around cylinder heads, If any leakage is present, replace cylinder head gaskets, cylinder heads (para. 3-4 or 3-5), or water pump (para. 5-4).

Step 2. Check cylinder block for cracks. Replace engine if cylinder block is cracked. (para 3-22).

- In both steps you are referred to a detailed procedure in another chapter. Perform the tasks as necessary.
- In step 1, ITEM #11, check for leaks at the water pump and around the cylinder heads. No leaks are discovered. You note leakage at the water pump. The water pump must be replaced. You are referred to paragraph 5-4 for detailed repair procedures.

TM 9-2320-280-34

*Table 2-1. Mechanical Troubleshooting (Cont'd)*

<b>MALFUNCTION TEST OR INSPECTION</b>
---

**11. LOSS OF COOLANT**

- Step 1. Pressurize coolant system and check for leaks at water pump and around cylinder heads. If any leakage is present, replace cylinder head gaskets, cylinder heads (para. 3-4 or 3-5) or water pump (para. 5-4).
- Step 2. Check cylinder block for cracks. Replace engine (para. 3-22 or 3-24) if cylinder block is cracked.

END OF TESTING!

**12. ENGINE OVERHEATS**

- Step 1. Check for leaking or defective water pump. Replace leaking or defective water pump (para. 5-4).
- Step 2. Remove surge tank cap (TM 9-2320-280-10). With engine running, check for excessive bubbles in surge tank that may indicate leaking head gaskets or cracked cylinder heads. If bubbles are present, remove cylinder heads (para. 3-4 and 3-5) and check for defective head gaskets, cracked cylinder heads, or cracked cylinder block. Replace cylinder heads (para. 3-4 and 3-5) if damaged. Replace engine (para. 3-22 or 3-24) if cylinder block is cracked.

END OF TESTING!

2-7

\* AFTER DISCUSSION, GO TO SLIDE #7.



7. A. Go to paragraph 5-4.

B. After reporting the results of your troubleshooting efforts to your supervisor, he decides the most expedient means of repairing the vehicle would be to replace the water pump.

C. In paragraph 5-4 you will find the detailed maintenance procedure for “**water pump and adapter plate replacement.**”

TM 9-2320-280-34

#### 5-4. WATER PUMP AND ADAPTER PLATE MAINTENANCE

This task covers:

- a. Removal
- b. Inspection

c. Installation

#### INITIAL SETUP:

##### Tools

General mechanic's tool kit:  
automotive (Appendix G, Item 1)

##### Materials/Parts

Water pump gasket (Appendix E, Item 17)  
Lockwasher (Appendix E, Item 83)  
Pipe sealing compound (Appendix B, Item 49)  
Sealing compound (Appendix B, Item 50)  
Anaerobic gasket sealer (Appendix B, Item 45)

##### Manual References

TM 9-2320-280-20  
TM 9-2815-237-34P

##### Equipment Condition

- Engine oil filler tube removed (TM 9-2320-280-20).
- Water pump inlet hose removed (TM 9-2320-280-20).
- Water pump pulley removed (TM 9-2320-280-20).
- Thermostat bypass hose removed (TM 9-2320-280-20).

##### Maintenance Level

Direct support

TURN THE PAGE AND **CONTINUE** WITH SLIDE #7.

### Detailed Maintenance Procedures:

- D. Detailed procedures include everything you must do to accomplish a basic maintenance task.
- E. Before beginning the task, look through the procedure.
- F. The basic headings listed under “Initial Setup” outline task conditions, materials, special tools, manpower requirements, and special conditions. The headings are as follows.
  - **Applicable Models** are any models that require a particular maintenance task. If a maintenance task covers all models, then this heading will not be used.
  - **Test Equipment** is test equipment needed to complete a task. If test equipment is not required, this heading will not be used.
  - **Special Tools** are those special tools needed to complete a maintenance task. If special tools are not required, this heading will not be used.
  - **Tools** are the tools and equipment needed to complete a maintenance task.
  - **Materials/Parts** is a heading that lists only mandatory replacement parts or materials.
  - **Personnel Required** is the number of personnel required to perform a task. If only one mechanic is required, this heading will not be used.
  - **Manual References** are those TMs needed to complete the task.
  - **Equipment Conditions** are conditions which must exist before starting the task.
  - **General Safety Instructions** are a summary of all warnings for the maintenance task if any apply.
  - **Maintenance Level** identifies maintenance level required to perform a task.
- G. A **Step-By-Step** maintenance procedure follows the “initial setup” and gives detailed instructions for the procedure.

\* AFTER DISCUSSION, GO TO SLIDE #8

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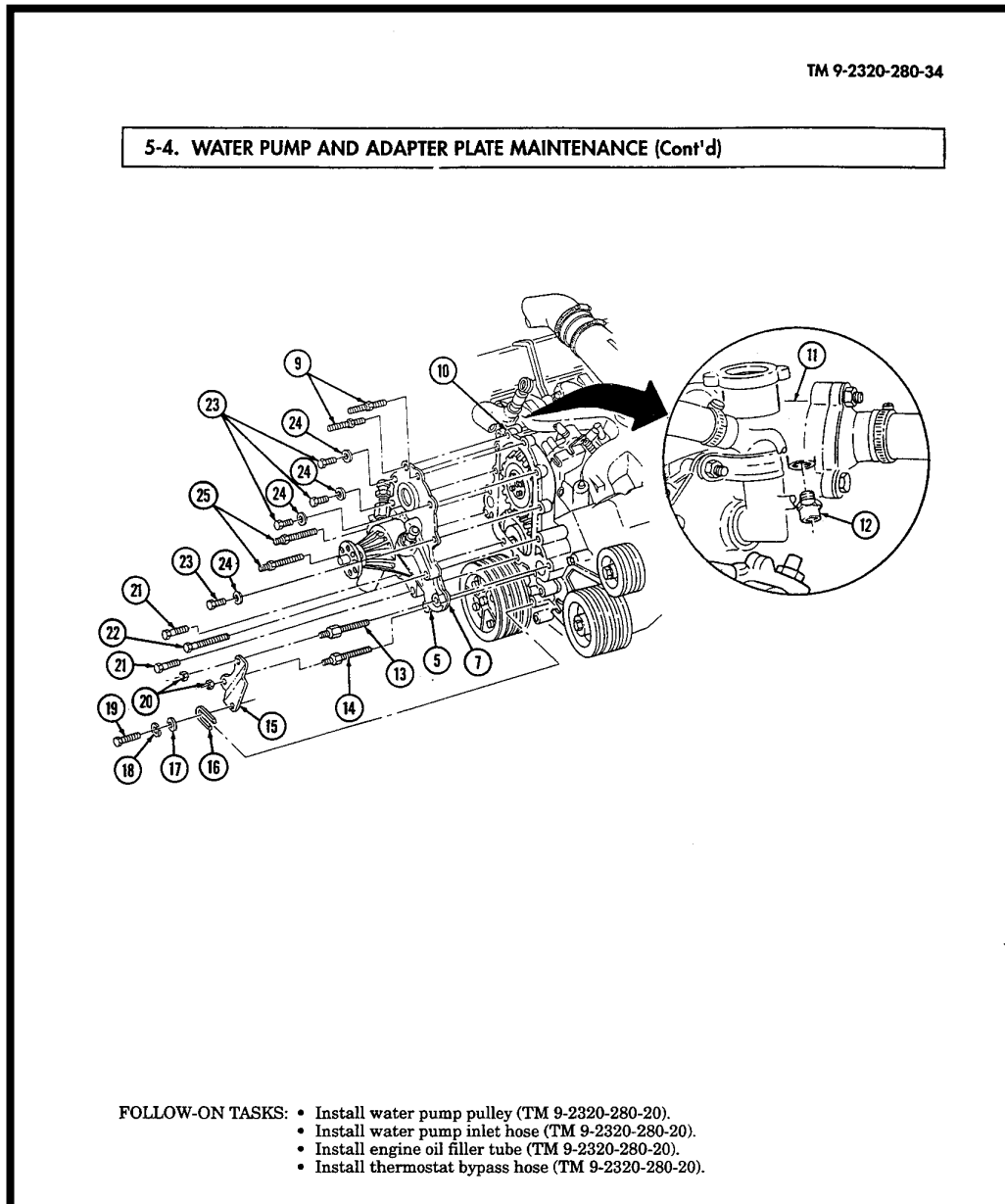
**8. Warnings, Cautions and Notes** provide supplemental information:

- **Warnings**—indicate conditions, practices or procedures which must be observed to avoid personnel injury, loss of life, or long-term health problems.
  
- **Cautions**—indicate conditions, practices, or procedures which must be observed to avoid damage to equipment or destruction of equipment.
  
- **Notes**—contain information essential to task performance.

\* AFTER DISCUSSION, GO TO SLIDE #9.

9. At the end of a procedure, “**Follow-on-Tasks**” will list those additional tasks that must be performed to complete the procedure. The follow-on-tasks for water pump replacement are:

- Install water pump pulley ..... TM 9-2320-280-20
- Install inlet Hose ..... TM 9-2320-280-20
- Install engine oil filler tube ..... TM 9-2320-280-20
- Install thermostat bypass hose ..... TM 9-2320-280-20



\* AFTER DISCUSSION, GO TO SLIDE #10.

**10. Modular Text:** Both pages of text and illustrations are to be used together. This manual was designed so that the two pages would be visible at once, making part identification and procedure sequence easy to follow.

TM 9-2320-280-34

**5-4. WATER PUMP AND ADAPTER PLATE MAINTENANCE**

This task covers:

a. Removal	c. Installation
b. Inspection	

---

**INITIAL SETUP:**

<b>Tools</b>	<b>Manual References</b>
General mechanic's tool kit.	TM 9-2320-280-20
automotive (Appendix G, Item 1)	TM 9-2815-237-34F
<b>Materials/Parts</b>	<b>Equipment Condition</b>
Water pump gasket (Appendix E, Item 17)	• Engine oil filler tube removed (TM 9-2320-280-20)
Lockwasher (Appendix E, Item 83)	• Water pump inlet hose removed (TM 9-2320-280-20)
Pipe sealing compound (Appendix B, Item 49)	• Water pump pulley removed (TM 9-2320-280-20)
Sealing compound (Appendix B, Item 50)	• Thermostat bypass hose removed (TM 9-2320-280-20)
Anaerobic gasket sealer (Appendix B, Item 45)	
	<b>Maintenance Level</b>
	Direct support

---

**a. Removal**

1. Remove capscrew (13), lockwasher (12), washer (11), and power steering pump bracket (10) from support bracket (9). Discard lockwasher (12).
2. Remove two nuts (14) and support bracket (9) from water pump (6).
3. Remove bypass nipple (4) from water crossover (3).
4. Remove two studs (1) and (19), studs (8) and (7), four capscrews (17), washers (18), two capscrews (15), capscrew (16), water pump (6), and adapter plate (5) from timing gear cover (2).
5. Remove seven capscrews (21), adapter plate (5), and gasket (20) from water pump (6). Discard gasket (20).
6. Clean remaining gasket material and sealing compound from sealing surfaces on adapter plate (5), water pump (6), and timing gear cover (2).
7. Remove elbow (22), heater hose nipple (23), and bypass hose adapter (25) from water pump (6).

**b. Inspection**

1. Inspect water pump (6) for cracks, breaks, or loose impeller. Replace if cracked, broken, or impeller is loose.
2. Inspect adapter plate (5) for corrosion. If adapter plate (5) is excessively corroded, replace.
3. Inspect elbow (22), heater hose nipple (23), and bypass hose adapter (25) for stripped threads and breaks. If defective, replace.
4. Inspect rivet (24) for damage or looseness. Replace if damaged or loose. Apply sealing compound to replacement rivet prior to installation.

5-2

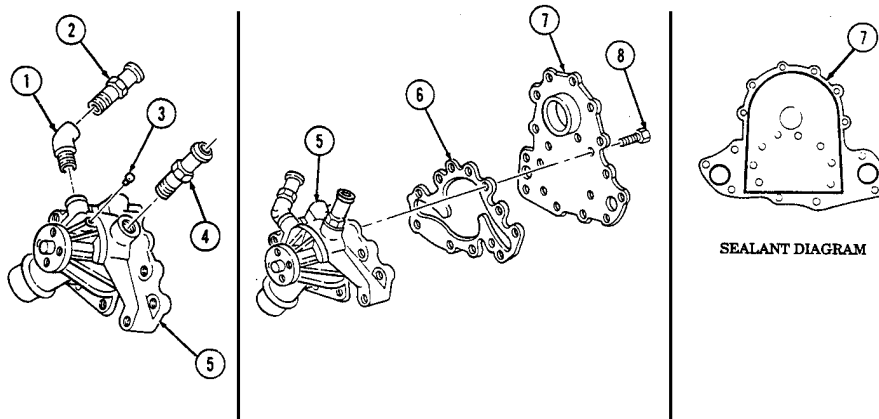
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**5-4. WATER PUMP AND ADAPTER PLATE MAINTENANCE (Cont'd)**

5-3

\* AFTER DISCUSSION, GO TO SLIDE #11.

**11. Illustrations:** An exploded diagram of the component shows part locations, attachments, and relationships. Cutaway views show the location and orientation of screws and attachments.



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\* AFTER DISCUSSION, GO TO SLIDE #12

12. You can use the **Table of Contents** page to find information about the vehicles individual systems. The table of contents is normally found near the front of the technical manual.

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CHAPTER 2.	<b>GENERAL MAINTENANCE</b> .....	2-1
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III.	Air-Conditioning Troubleshooting .....	2-20
IV.	General Maintenance Instructions .....	2-27
CHAPTER 3.	<b>ENGINE MAINTENANCE</b> .....	3-1
Section I.	General Engine Maintenance .....	3-1
II.	Engine Replacement .....	3-45
CHAPTER 4.	<b>FUEL SYSTEM MAINTENANCE</b> .....	4-1
CHAPTER 5.	<b>COOLING SYSTEM MAINTENANCE</b> .....	5-1
CHAPTER 6.	<b>ELECTRICAL SYSTEM MAINTENANCE</b> .....	6-1
CHAPTER 7.	<b>TRANSMISSION MAINTENANCE</b> .....	7-1
CHAPTER 8.	<b>TRANSFER CASE MAINTENANCE</b> .....	8-1
CHAPTER 9.	<b>PROPELLER SHAFTS, AXLES, AND SUSPENSION MAINTENANCE</b> .....	9-1
CHAPTER 10.	<b>SERVICE BRAKE SYSTEM MAINTENANCE</b> .....	10-1
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CHAPTER 15.	<b>WINCH MAINTENANCE</b> .....	15-1

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\* AFTER EXPLANATION, GO TO SLIDE #13.

**13.** The **Index** gives you an individual breakdown for quick accessing of parts and information. The index is normally found near the back of the technical manual.

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\* AFTER EXPLANATION, GO TO SLIDE #14.



**14. References:** A thorough reference file of associated publications, forms and field manuals for use with this vehicle. This reference is located in Appendix A.

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**APPENDIX A  
REFERENCES**

**A-1. SCOPE**

This appendix lists all forms, field manuals, and technical manuals for use with this vehicle.

**A-2. PUBLICATIONS INDEX**

The following index should be consulted frequently for latest changes or revisions and for new publications relating to materiel covered in this manual.

Consolidated Index of Army  
Publications and Blank Forms ..... DA PAM 25-30

**A-3. FORMS**

Recommended Changes to Publications and Blank Forms ..... DA Form 2028  
Recommended Changes to Equipment Technical  
Publications ..... DA Form 2028-2  
Hand Receipt/Annex Number ..... DA Form 2062  
Exchange Tag ..... DA Form 2402  
Equipment Inspection and Maintenance Worksheet ..... DA Form 2404  
Maintenance Request ..... DA Form 2407  
The Army Maintenance Management System (TAMMS) ..... DA Pam 738-750  
Preventive Maintenance Schedule and Record ..... DD Form 314  
Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and  
Spare Engines ..... DD Form 1397  
Quality Deficiency Report ..... SF 368

**A-4. FIELD MANUALS**

Operation and Maintenance of Army Materiel in Cold Weather (0°F to -65°F) ..... FM 9-207  
First Aid for Soldiers ..... FM 21-11  
Manual for the Wheeled Vehicle Driver ..... FM 21-305  
Browning Machinegun Caliber .50 HB, M2 ..... FM 23-65  
Machinegun 7.62, M60 ..... FM 23-67  
Basic Cold Weather Manual ..... FM 31-70  
Northern Operations ..... FM 31-71  
Army Motor Transport Units and Operations ..... FM 55-30  
Mountain Operations ..... FM 90-6

**A-5. MILITARY STANDARDS**

Inspection, Penetrant Methods ..... MIL-STD-6866  
Inspection Process, Magnetic Particles ..... MIL-STD-1949

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\* AFTER EXPLANATION GO TO SLIDE #15

**15. Expendable/Durable Supplies:** A comprehensive list of expendable supplies and material to be used in performance of maintenance tasks.

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**Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST**

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	F	8040-01-167-2613	ADHESIVE: type II, class I (80244) MIL-A-46050 5 Ounce Tube	OZ
		8040-01-090-9320	1 Pint	PT
2	O	8040-00-833-9563	ADHESIVE SEALANT: silicone, RTV, general purpose (80244) MIL-A-46106, type I 5 Ounce Tube	OZ
3	F	8040-00-078-9774	ADHESIVE SEALANT: (71984) 732 RTV	N/A
4	O	8040-00-938-1535	ADHESIVE: Silicone, RTV (81349) MIL-A-46146 12 Ounce Cartridge	OZ
		6850-00-174-1806	ANTIFREEZE: arctic-type (81349) MIL-A-11755 55 Gallon Drum	GAL.
6	C	6850-00-181-7929	ANTIFREEZE: ethylene glycol, inhibited, heavy duty, single package (81349) MIL-A-46153 1 Gallon Container	GAL.
		6850-00-181-7933	5 Gallon Container	GAL.
7	O	8030-00-059-2761	ANTISEIZE COMPOUND: conductive (81349) MIL-A-907 .25 Pound Can	LB
		8030-00-753-4953	ANTISEIZE COMPOUND: mica-base (81349) MIL-A-13881 1 Pound Can	LB
9	C	9150-01-102-9455	BRAKE FLUID: silicone, automotive, all weather, operational and preservative (81349) MIL-B-46176 1 Gallon Can	GAL.
		9150-01-123-3152	5 Gallon Can	GAL.
10	F	5350-00-221-0872	CLOTH: abrasive, crocus (58536) A-A-1206 50 Sheet Package	SH
		5350-00-268-3116	50 Yard Roll	YD
11	F	N/A	COATING COMPOUND: plastic, waterproof (15819) 989 N/A	N/A
12	F	4020-01-072-9579	CORD, FIBROUS: tying, neoprene (81349) MIL-Y-1140 668 Yard Tube	YD

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\* AFTER EXPLANATION GO TO SLIDE #16

**16. Manufacturing Instructions** is a fully illustrated list of items to be fabricated for use in performing maintenance tasks on the HMMWV.

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**Section II. ILLUSTRATED MANUFACTURING INSTRUCTIONS (Cont'd)**

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
2" X 4" (Nom) and 2" X 12" (Nom)	WOOD	MMM-L-751

LUMBER, SOFTWOOD			NAILS (FF-N-105)	
PIECE	CUT LENGTH (INCHES)	MANUFACTURED FROM	SIZE	QTY
A (2 ea)	15-3/4	2" X 4" (Nom)	12D	12 ea
B	8-1/4	2" X 4" (Nom)		
C	8-1/4	2" X 4" (Nom)		
D	8-3/4	2" X 12" (Nom)		

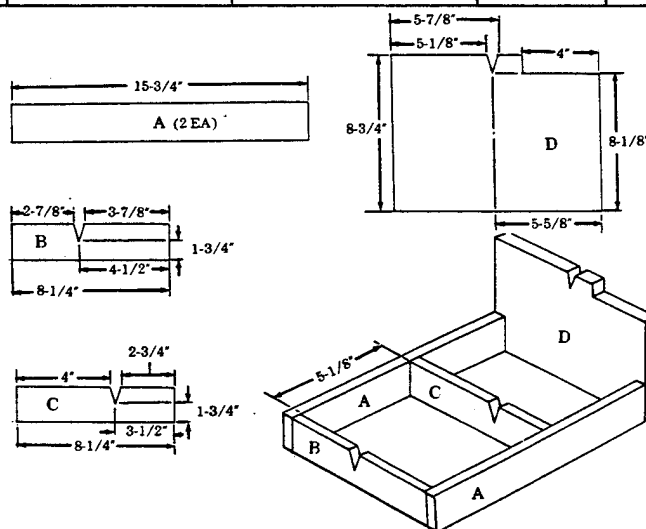


Figure C-4. Transfer Case Support Stand, 5992393

**INSTRUCTIONS:**

1. Cut four pieces of wood, "A" (2 ea), "B", and "C" to length shown, using NSN 5510-00-220-6146.
2. Cut one piece of wood, "D", to length shown, using NSN 5510-00-220-6250.
3. Cut a "VEE" notch in pieces "B", "C", and "D" in locations shown.
4. Cut a rectangular notch in piece "D" in location shown.
5. Using two nails at each joint, NSN 5310-00-753-3884 (5 pound box), assemble pieces "A", "B", "C", and "D" as shown.

C-4

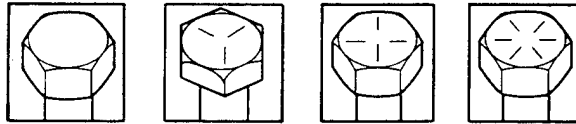
\* AFTER EXPLANATION GO TO SLIDE #17.

**17. Torque Limits:** A quick reference chart for determining torque specifications on bolts.

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Table D-1. Torque Limits for Dry Fasteners

CAPSCREW HEAD MARKINGS



SIZE			TORQUE							
			SAE GRADE NO. 1 or 2		SAE GRADE NO. 5		SAE GRADE NO. 6 or 7		SAE GRADE NO. 8	
DIA. INCHES	THREADS PER INCH	MILLIMETERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS
1/4	20	6.35	5	6.78	8	10.85	10	13.56	12	16.27
1/4	28	6.35	6	8.14	10	13.56	—	—	14	18.98
5/16	18	7.94	11	14.92	17	23.05	19	25.76	24	32.52
5/16	24	7.94	13	17.63	19	25.76	—	—	27	36.61
3/8	16	9.53	18	24.41	31	42.04	34	46.10	44	59.66
3/8	24	9.53	20	27.12	35	47.46	—	—	49	66.44
7/16	14	11.11	28	37.97	49	66.44	55	74.58	70	94.92
7/16	20	—	30	40.68	55	74.58	—	—	78	105.77
1/2	13	12.70	39	52.88	75	101.70	85	115.26	105	142.38
1/2	20	—	41	55.60	85	115.26	—	—	120	162.72
9/16	12	14.29	51	69.16	110	149.16	120	162.72	155	210.18
9/16	18	—	55	74.58	120	162.72	—	—	170	230.52
5/8	11	15.88	63	85.43	150	203.40	167	226.45	210	284.76
5/8	18	—	95	128.82	170	230.52	—	—	240	325.44
3/4	10	19.05	105	142.38	270	366.12	280	379.68	375	508.50
3/4	16	—	115	155.94	295	400.02	—	—	420	569.52
7/8	9	22.23	160	216.96	395	535.62	440	596.64	605	820.38
7/8	14	—	175	237.30	435	589.86	—	—	675	915.30
1	8	25.40	235	318.66	590	800.04	660	894.96	910	1233.96
1	14	—	250	339.00	660	894.96	—	—	990	1342.44
1-1/8	—	25.58	—	—	800-880	1084.8-1193.3	—	—	1280-1440	1735.7-1952.8
1-1/4	—	31.75	—	—	—	—	—	—	1820-2000	2467.9-2712.0
1-3/8	—	34.93	—	—	1460-1680	1979.8-2278.1	—	—	2380-2720	3227.3-3688.3
1-1/2	—	38.10	—	—	1940-2200	2630.6-2983.2	—	—	3160-3560	4285.0-4827.4

D-2

\* AFTER EXPLANATION GO TO SLIDE #18.

**18. Metric System** is a quick and accurate conversion chart for metric system and equivalents.

**THE METRIC SYSTEM AND EQUIVALENTS**

<p><b>LINEAR MEASURE</b>          1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches          1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches          1 Kilometer = 1,000 Meters = 0.621 Miles</p> <p><b>WEIGHTS</b>          1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces          1 Kilogram = 1,000 Grams = 2.2 Lb          1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons</p> <p><b>LIQUID MEASURE</b>          1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces          1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces</p>	<p><b>SQUARE MEASURE</b>          1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches          1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet          1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles</p> <p><b>CUBIC MEASURE</b>          1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches          1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p><b>TEMPERATURE</b>  <math>5 \text{ } ^\circ\text{F} - 32 = ^\circ\text{C}</math>          212° Fahrenheit is equivalent to 100° Celsius          90° Fahrenheit is equivalent to 32.2° Celsius  <math>32^\circ\text{ Fahrenheit is equivalent to } 0^\circ\text{ Celsius}</math>  <math>9/5 \text{ } ^\circ\text{C} + 32 = ^\circ\text{F}</math></p>
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**APPROXIMATE CONVERSION FACTORS**

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621

\* AFTER EXPLANATION GO TO SLIDE #19.

**19. Operator PMCS (Preventive Maintenance Checks and Services).**

Discuss:

- Before
- Fluid Leak
- Not mission capable
- Class III leaks

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Table 2-2. Preventive Maintenance Checks and Services (Cont'd)

Item No.	Interval	Location	Crewmember Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
1	Before	Left Front, Side Exterior	<p><b>DRIVER</b></p> <p><b>CAUTION</b></p> <p>If leaks are detected in the area of the transfer case oil cooler, do not attempt to tighten retaining nuts; internal damage to the transfer case oil cooler may result. Notify unit maintenance.</p> <p><b>NOTE</b></p> <p>If leakage is detected, further investigation is needed to determine the location and cause of the leak.</p> <p>a. Visually check underneath vehicle for any evidence of fluid leakage.</p> <p>b. Visually check front and left side of vehicle for obvious damage that would impair operation.</p>	<p>a. Any brake fluid leak; class III leak of oil, fuel, or coolant.</p> <p>b. Any damage that will prevent operation.</p>

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\* GO TO SLIDE #20.

## 20. Operator PMCS

Discuss:

- During
- Grabbing Brakes.

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Table 2-2. Preventive Maintenance Checks and Services (Cont'd)

Item No.	Interval	Location	Crewmember Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
16	Before	Weapon Station (Cont'd)	<p>b. (Armament carriers only). Check armament mounting plate and bearing sleeve for security of mounting and obvious damage that would impair operation.</p> <p>c. (TOW vehicles only). Check inclinometer for proper operation. Check level vial for breaks and/or bubbles.</p> <p><b>DRIVER</b></p>	<p>b. Armament weapons required for mission: Mounting plate or bearing sleeve missing or any damage that will prevent or impair mounting of armament weapons.</p> <p>c. Level vial is broken or no bubble is present.</p>
17	During	Controls and Indicators	<p>a. Monitor all gauges and speedometer.</p> <p>b. Monitor engine oil pressure gauge.</p> <p><b>DRIVER</b></p>	<p>a. Gauges drop below normal reading.</p> <p>b. Engine oil pressure gauge reads less than approximately 40 psi (276 kPa) under normal driving conditions or less than 6 psi (41 kPa) at idle.</p>
18	During	Brakes	<p><b>DRIVER</b></p> <p>Check brakes for pulling or grabbing.</p>	Brakes pull or grab.
19	During	Steering	<p><b>DRIVER</b></p> <p>Be alert for excessive sway, leaning to one side, or unstable handling. Check steering response for unusual free play, binding, or shimmy.</p>	Handling is unstable; turning is difficult or inoperative.
20	During	Power-train	<p><b>DRIVER</b></p> <p>Be alert for unusual noises or vibrations from engine, transmission, transfer, differentials, propeller shafts, axle shafts, or wheels.</p>	Unusual noise or vibration detected.
21	During	Transmission	<p><b>DRIVER</b></p> <p>Check transmission for proper operation.</p>	Transmission slips or will not shift.

2-75

\* GO TO SLIDE #21

21. Operator PMCS

Discuss:

- After
- Tires
- Not Mission Capable

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Table 2-2. Preventive Maintenance Checks and Services (Cont'd)

Item No.	Interval	Location	Crewmember Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
25	After	Left Side Tires	<p><b>DRIVER</b></p> <p><b>WARNING</b></p> <p>Operating a vehicle with a tire in an underinflated condition or with questionable defect may lead to premature tire failure and may cause equipment damage and injury or death to personnel.</p> <p>Visually check tires for under-inflation, cuts, gouges, cracks, or bulges. Remove all penetrating objects.</p>	Tire deflated or otherwise unserviceable.
26	After	Mirror (Left Side)	<p><b>DRIVER</b></p> <p><b>NOTE</b></p> <p>Vehicle operation with damaged or missing outside rearview mirrors may violate AR 385-55.</p> <p>Check mirror for presence, cracks, and serviceability.</p>	
27	After	Left Front, Side Exterior	<p><b>DRIVER</b></p> <p><b>NOTE</b></p> <p>If leakage is detected, further investigation is needed to determine the location and cause of the leak.</p> <p>a. Visually check underneath vehicle for evidence of fluid leakage.</p>	a. Any brake fluid leak; class III leak of oil, fuel, or coolant.

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\* GO TO SLIDE #22.



22. Operator PMCS:

Discuss:

- Weekly
- Tires

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Table 2-2. Preventive Maintenance Checks and Services (Cont'd)

Item No.	Interval	Location		Crewmember Procedure	Not Fully Mission Capable If:
		Item to Check/Service			
42	Weekly	Tires		<p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Do not exceed 50 psi (207 kPa) cold bias tire inflation pressure. Overinflation of tire may result in premature tire failure, damage to equipment, and injury or death to personnel.</li> <li>• Do not exceed 50 psi (345 kPa) cold radial tire inflation pressure. Overinflation of tire may result in damage to equipment and injury or death to personnel.</li> </ul> <p>Perform steps a, b, c, and d for bias tires and steps a, b, c, and e for radial tires.</p> <p><b>NOTE</b></p> <p>Check tire size designator on sidewall for tire construction identification:            36x12.50-16.5 LT-Bias ply, 37x12.50R 16.5 LT-Radial.</p>	

2-87

\* GO TO SLIDE #23.

**23. Operator Lubrication:**

Discuss:

- Monthly
- Tailgate

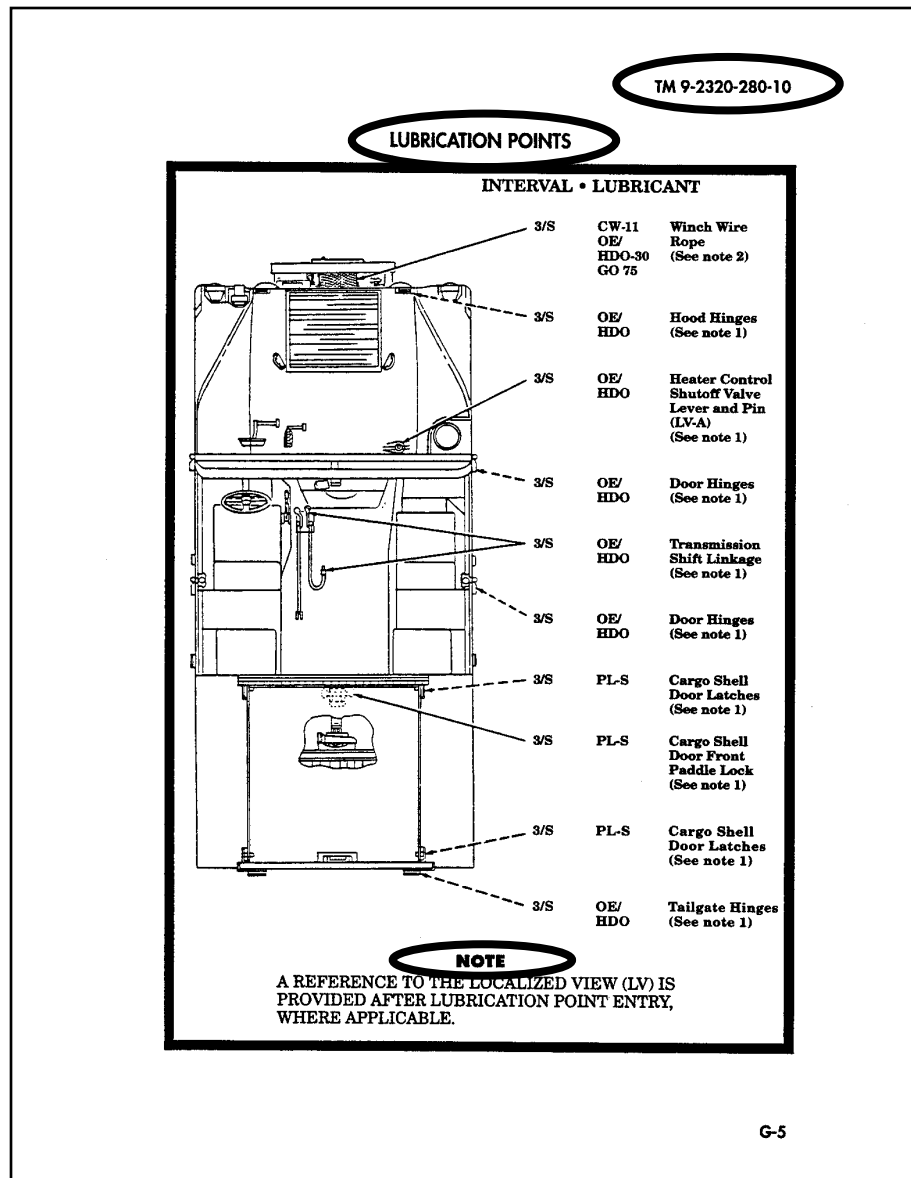
Item No.	Interval	Location	Crewmember Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
68	Monthly	Corrosion	<u>DRIVER</u> Visually inspect vehicle for indication of corrosion or cracks and/or breaks.	Any corroded-through condition or cracks or breaks that would affect vehicle operation.
69	Monthly	Tailgate	<u>DRIVER</u> Check tailgate for corroded-through condition and/or damage. If tailgate does not latch securely or is damaged, notify unit maintenance.	Any corroded-through condition or damage that would affect vehicle operation.
70	Monthly	Red Cross Plate	<u>DRIVER</u> (M996, M996A1, M997, M997A1, and M997A2 only) a. Check cross marking latches and hinges for proper operation, security of mounting, damage, or missing components. b. Inspect stowage component door hinge, seal, and latch for proper operation, damage, or missing components.	
71	Monthly	Shelter Mount Kit	<u>DRIVER</u> (M1037, M1042, M1097, M1097A1, and M1097A2 only) Inspect shelter mounting bracket for security of mounting and loose or missing bolts.	Any mounting bolt missing.

\* GO TO SLIDE #24

## 24. Operator Lubrication

Discuss

- Intervals 3,000 miles (4,827 km)
- Lubricants Six Months (Semiannually)
- Local View (LV-A)
- Notes

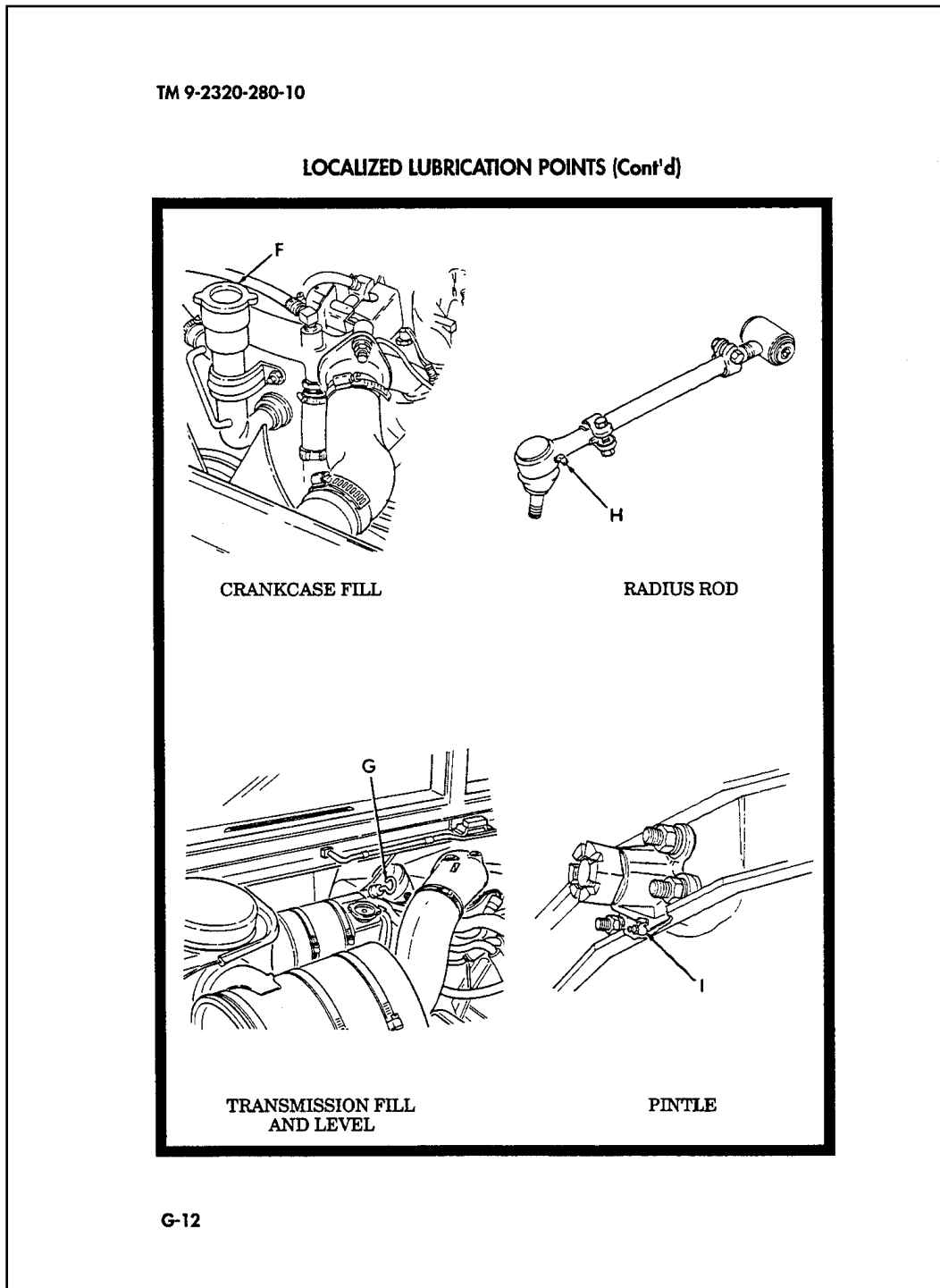


\* GO TO SLIDE #25.

**25. Operator Lubrication:**

Discuss:

- Localized Lubrication Points



\* GO TO SLIDE #26.

## 26. Operator Lubrication:

Discuss:

- Lubrication Notes

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### NOTES

#### 1. Oil Can Points.

Lubricate all oil can points every 3,000 mi (4,827 km), or semi-annually, whichever occurs first. Use seasonal grade OE on hood hinges, tailgate hinges, door hinges, door handles, transfer case shift linkage, accelerator linkage, transmission shift linkage, heater control shutoff valve lever and pin, and heater control knob and plunger. Lubricate cargo shell door front paddle lock, rear wire handle lock and cargo shell door latches with PL-S, (M996, M996A1, M1025, M1025A1, M1025A2, M1026, M1026A1, M1036, M1043, M1043A1, M1043A2, M1044, M1044A1, M1045, M1045A1, M1045A2, M1046, and M1046A1 only).

#### 2. Winch Wire Rope.

##### **WARNING**

Wear leather gloves when handling winch wire rope. Do not handle wire rope with bare hands. Broken wires cause injury.

After each use, clean and lubricate winch wire rope. Clean entire wire rope with wire brush. If used frequently, lubricate with clean OE/HDO 30. If used infrequently, or in very damp or salty conditions, lubricate with CW-II. Do not lubricate winch wire rope in dry, dusty conditions. If used in arctic conditions, lubricate with GO 75. Perform winch wire rope cleaning and lubrication every 3,000 mi (4,827 km) or semiannually, whichever occurs first, when wire rope is not used.

#### 3. Pintle.

Every 3,000 mi (4,827 km), or semiannually, whichever occurs first, clean pintle with wire brush and lubricate rear plate fitting with seasonal grade OE.

#### 4. Steering System.

Lubricate front propeller shaft, steering column, U-joints, slip yokes, tie rods, radius rods, pitman arm, intermediate steering shafts, and idler arm with GAA every 3,000 mi (4,827 km), or semiannually, whichever comes first.

#### 5. Power Steering Reservoir.

##### **CAUTION**

Use Dexron® II for filling power steering reservoir. Failure to use Dexron® II will cause damage to power steering system.

Check the fluid level in the power steering reservoir monthly and adjust level as necessary. If fluid is hot, level should be between "HOT" and "COLD" marks on the cap indicator. If cool, level should be between "ADD" and "COLD" marks. In either condition, level must be above "ADD" mark. Fluid does not require periodic changing.

G-15

\* GO TO SLIDE #27.

**27.** Operator Troubleshooting:

The troubleshooting table contains instructions that will help the operator identify and correct simple vehicle malfunctions. The table also helps the operator identify major mechanical difficulties that must be referred to unit maintenance. The listing of possible malfunctions come under major vehicle headings. They are:

- Engine
- Heating System
- Transmission
- Transfer Case
- Brakes
- Wheels and Tires
- Steering
- Winch
- Special Purpose Bodies

\* AFTER DISCUSSION GO TO SLIDE #28.

**28. Operator Troubleshooting Table:**

Table 3-1 Lists the common malfunctions which you may find during the operation or maintenance of the HMMWV or its components. You should perform the tasks and corrective actions in the order listed.

TM 9-2320-280-10

*Table 3-1. Troubleshooting*

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
<b>ENGINE</b>
<p><b>1. ENGINE FAILS TO CRANK</b></p> <p>Step 1. Check to see if transmission shift lever is in "N" (neutral) or "P" (park) for A2 vehicles. If not, place lever in "N" (neutral) or "P" (park).</p> <p>Step 2. Check battery fluid level and check battery connections for looseness, damage, or corrosion. If any of these conditions exist, notify unit maintenance.</p> <p>Step 3. Attempt to slave-start vehicle (para. 2-23).</p> <p>Step 4. Other causes. Notify unit maintenance.</p> <p><b>2. ENGINE CRANKS SLOWLY</b></p> <p>Step 1. Check battery fluid level and check battery cable connections for looseness, damage, or corrosion. If any of these conditions exist, notify unit maintenance.</p> <p>Step 2. Attempt to slave-start vehicle (para. 2-23).</p> <p>Step 3. Other causes. Notify unit maintenance.</p> <p><b>3. ENGINE CRANKS BUT DOES NOT START</b></p> <p>Step 1. Check to see if fuel gauge indicates "E" (empty). Fill fuel tank, and start engine.</p> <p>Step 2. Purge fuel system of air (para. 3-10).</p> <p>Step 3. Check to see if WAIT-TO-START lamp assembly fails to light or does not go out. Notify unit maintenance if wait-to-start lamp assembly fails to light or does not go out.</p> <p>Step 4. Other causes. Notify unit maintenance.</p> <p><b>4. VEHICLE NOT CHARGING ACCORDING TO VOLTMETER</b></p> <p>Step 1. Check battery cable connections for looseness, damage, or corrosion. Notify unit maintenance of any damage to battery cables.</p> <p>Step 2. Check for broken or missing alternator belts. Notify unit maintenance if alternator belts are broken or missing.</p> <p>Step 3. Other causes. Notify unit maintenance.</p>
3-3

\* AFTER DISCUSSION, GO TO SLIDE #29

**29. Unit Mechanics PMCS:**

The best way to maintain vehicles covered by this manual is to inspect them on a regular basis so minor faults can be detected and corrected before they result in serious damage, failure or injury.

Intervals:

1. **Semiannually (s):** Every six months or 3,000 miles (4,827 km), which ever comes first.
2. **Annually (A):** Every twelve months or 6,000 miles (9,654 km) whichever comes first.
3. **Biennially (B):** Every 24 months or 12,000 miles (19,308 km), whichever comes first.

\* GO TO SLIDE #30.



### 30. Preventive Maintenance Checks and Services (PMCS):

Discuss:

- Interval
- Prior to road test
- Road test procedures

TM 9-2320-280-20-1

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
1	Semi-Annual	Pre-Service Checks	<p><b>PRIOR TO ROAD TEST</b></p> <p>Ensure Operator/Crew has performed PMCS listed in TM 9-2320-280-10.</p> <p><b>ROAD TEST</b></p> <p>Maintenance personnel will be with vehicle operator to assist in performing PMCS checks and verify pre-service checks.</p> <p>a. Notice if starter engages smoothly and turns the engine at normal cranking speed.</p> <p>b. Listen for unusual noise at idle, at operating speed, and under acceleration. Be alert for excessive vibration and the smell of oil, fuel, and exhaust.</p> <p>c. Check for transmission response to shifting and for smoothness of operation in all gear ranges. Be alert for unusual noises and difficulty in shifting in any speed range.</p> <p><b>NOTE</b> If desired range cannot be selected, turn engine off, select range, and re-start engine.</p> <p>d. Check for transfer response to shifting and for smoothness of operation in all gear ranges. Be alert for unusual noises and difficulty in shifting in any gear range.</p> <p>e. Test for response to accelerator feed. Observe for sticking pedal.</p> <p>f. With vehicle speed approximately 5 mph (8 kph) turn steering wheel to left, then right, to detect hard steering, steering backlash, or shimmy. Vehicle should respond instantly. With vehicle moving on straight, level terrain, lightly hold steering wheel to check for pull and wandering.</p> <p>g. Apply brake pedal with steady force. Vehicle should slow and stop without pulling to one side or jerking. Release brake pedal. The brakes should release immediately and without difficulty.</p>	<p>a. Starter inoperative or makes excessive grinding sound.</p> <p>b. Engine knocks, rattles, or smokes excessively.</p> <p>c. Transmission shifts improperly, does not shift, or makes excessive noises.</p> <p>d. Transfer jumps out of gear or makes excessive noises.</p> <p>e. Pedal sticking or binding.</p> <p>f. Steering binds, grabs, wanders, or has excessive freeplay.</p> <p>g. Brakes chatter, pull to one side, or inoperative. Brakes will not release.</p>

2-5

\* AFTER DISCUSSION GO TO SLIDE #31.

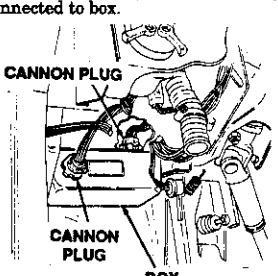
**31. PMCS (Unit Level):**

Discuss:

- E, F, B, Procedures
- Cover "B" in detail
- Not mission capable

TM 9-2320-280-20-1

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
3	Semi-Annual	Fuel System (Cont'd)	<p>d. Inspect all fuel lines for loose connections, splits, cracks, and bends that could leak.</p> <p>e. Disconnect the leads from each glow plug (paragraph 3-38) and check for resistance between glow plug terminal and ground. Reading should be continuity.</p> <p>f. Check each glow plug for looseness and damage. Tighten each plug to 8-12 lb-ft (11-16 N·m).</p>	<p>d. Any class III leak.</p> <p>e. Reading is not continuity.</p> <p>f. Glow plugs are loose or damaged.</p>
4	Semi-Annual	Engine Accessory Drive and Serpentine Belts	<p>a. Check for missing, broken, cracked, and frayed drivebelts.</p> <p>b. (All models except "A2" vehicles) Check all drivebelts tension using belt tension gauge. Belt tension should be 70 lbs (311 N) minimum. If belt tension is not at least 70 lbs (311 N), adjust drivebelts (paragraph 3-82). Tension should not be greater than 110 lbs (489 N) for new belts; old belts 95 lbs (422 N).</p>	<p>a. Any drivebelt is missing, broken, frayed, or dry rotted. Belt fiber has more than one crack (1/8 inch in depth or 50% of belt thickness) or has frays more than 2 inches long.</p> <p>b. Tension below 70 lbs (311 N), or greater than 110 lbs (489 N) new belt and 95 lbs (422 N) old belts.</p>
5	Semi-Annual	Protective Control Box	<p>a. Inspect four nuts for security of mounting.</p> <p>b. Ensure cannon plugs are securely connected to box.</p> 	<p>a. Mounting not secure, four nuts loose.</p>

2-7

\* AFTER DISCUSSION GO TO SLIDE #32.

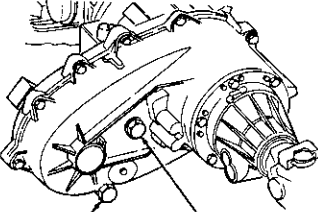
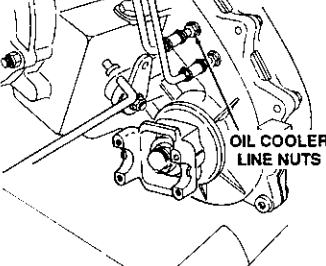
### 32. PMCS (Unit Level):

Discuss

- C and D
- Not mission capable

TM 9-2320-280-20-1

Table 2-1. Unit Level Preventive Maintenance Checks and Services HMMWV (Cont'd)

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED	PROCEDURES	NOT FULLY MISSION CAPABLE IF:
15	Semi-Annual	Transfer (Cont'd)	<p><b>CAUTION</b> Use Dexron® II for filling transfer case. Failure to use Dexron® II will cause damage to transfer case.</p> <p>c. Check transfer case fluid level every 3,000 (4,800 km) or semiannually, whichever occurs first. Remove fill plug and gasket. Level should be within 1/2 in. (12.7 mm) of fill plug opening when vehicle is on level ground. Install fill plug and gasket, and tighten to 35 lb-ft (47 N·m).</p>  <p><b>TRANSFER CASE DRAIN</b>      <b>TRANSFER CASE CHECK AND FILL</b></p> <p><b>TRANSFER CASE</b></p> <p><b>CAUTION</b> Do not overtorque retaining nuts. Hold end of oil cooler stationary, and using a pound-inch torque wrench, tighten line nuts to 192-216 lb-in. (22-24 N·m).</p> <p>d. Inspect oil cooler lines for leaks. Check for loose oil cooler line nuts.</p>  <p><b>OIL COOLER LINE NUTS</b></p>	<p>d. Any class III oil leak.</p>

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\* AFTER DISCUSSION, GOT O SLIDE #33.

**33. Lubrication Table:**

Discuss:

- Usage
- Lubricants
- Capacities

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BIENNIALY (12,000 MILE) PMCS PARTS LIST

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1.	6437741	2520-01-121-6350	Parts Kit, Fluid Transmission	1
2.	PH13	2940-00-082-6034	Filter Fluid, Engine Oil	1
3.	SA910044	4330-01-198-7590	Filter Element Kit	1
4.	MSS1943-31	5305-00-061-4650	Locknut	1
5.	5599033	5310-00-252-2999	Nut and Lockwasher Assembly	4
6.	MS21245-L10	5310-00-448-2381	Locknut	4
7.	MS35756-6	5315-00-616-5526	Woodruff Key	1
8.	MS24665-355	5315-00-012-0123	Cotter Pin	-1
9.	MSS1943-43	5310-00-061-4651	Locknut	1
10.	MSS1943-35	5310-00-935-9021	Locknut	1
11.	MSS1943-39	5310-00-488-3899	Locknut	4
12.	MSS1967-18	5310-00-763-8919	Locknut	2
13.	MS35338-45	5310-00-407-9566	Lockwasher	2

LUBRICATION TABLE

USAGE	FLUID/LUBRICANT	CAPACITIES	EXPECTED TEMPERATURE
Engine Oil	OE/HDO 30 OE/HDO 10 OEA	Crankcase: w/filter 7 qt (6.6 L) w/filter 8 qt (7.6 L) Dry System 10 qt (9.5 L) (INC. oil cooler)	Above +15°F (-5°C) 40° to -15°F (4° to -26°C) 40° to -65°F (4° to -54°C)
6.5L	15W40		
Engine Coolant	Ethylene Glycol and Water 1/4 Ethylene Glycol/ 3/4 Water 2/5 Ethylene Glycol/ 3/5 Water 3/5 Ethylene Glycol/ 2/5 Water	Radiator: 5 qt (4.7 L) Complete System: 26 qt (24.6 L)	15°F (-9°C) and above 40° to -15°F (4° to -26°C) 40° to -65°F (4° to -54°C)
Brake System (All except M1097, "A1", and "A2" series)  (M1097, "A1" and "A2" series)	Fluid Silicone BFS	Master Cylinder: 0.69 pt (0.33 L) Complete System: 1.2 pt (0.56 L)  Master Cylinder: 1.12 pt (0.53 L) Complete System: 1.63 pt (0.78 L)	All Temperatures

OE/HDO 15/40 (Grade 15W-40) lubricant may be used when expected temperatures are above +5°F (-15°C).  
If OEA lubricant is required to meet the temperature ranges prescribed in the table, then the OEA lubricant is to be used in place of OE/HDO 10 lubricant for all temperature ranges.  
If operating conditions are severe or abnormal, service chassis lubrication points at 1,000 miles (1,600 kilometers).

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LUBRICATION TABLE (Cont'd)

USAGE	FLUID/LUBRICANT	CAPACITIES	EXPECTED TEMPERATURE
Transmission (3L80) (4L80-E)	Dexron® II or Dexron® III Dexron® III only (Do not use Dexron II) OEA	Dry: 11 qt (10.4 L) Drain & Refill: 6 qt (5.7 L) Dry: 13.5 qt (12.8 L) Drain & Refill: 7.7 qt (7.3 L)	All Temperatures Except Arctic  Arctic Temperatures
Transfer (218) Case (242)	Dexron® II or Dexron® III	3.5 qt (3.3 L) 3.35 qt (3.17 L)	All Temperatures
Steering System	Dexron® II or Dexron® III	1 qt (0.95 L) w/Cooler 1.25 qt (1.18 L)	All Temperatures
Gear Hub (4)	Multipurpose Gear GO 80/90	1 pt ea. (0.47 L)	All Temperatures
Axles (2)	Multipurpose Gear GO 80/90	2 qt ea. (1.9 L)	All Temperatures
Ball Joints, Tie Rod Ends, Pitman Arm, Propeller Shafts, etc.	GAA	As Required	All Temperatures
Hinges, Cables, and Linkages	OE/HDO	As Required	All Temperatures

Section IV. ELECTRICAL/MECHANICAL SYSTEMS TROUBLESHOOTING

**2-12. GENERAL**

- This section provides information to diagnose and correct malfunctions of the electrical/mechanical system.
- Principles of operation showing system operation can be found in chapter 1. It should be used as a reference when performing electrical/mechanical troubleshooting.
- Each malfunction symptom given for an individual component or system is followed by step(s) you should take to determine the cause and corrective action you must take to remedy the problem.
- Before taking any action to correct a possible malfunction, the following rules should be followed:
  - Question operator to obtain any information that might help you determine the cause of the problem.
  - Never over look the chance that the problem could be of simple origin. The problem could be corrected with minor adjustment.
  - Use all senses to observe and locate troubles.
  - Use test instruments or gauges to help you determine and isolate problem.
  - Always isolate the system where the malfunction occurs and then locate the defective component.
  - Use standard automotive theories and principles when troubleshooting the vehicles covered in this manual.
- The STE/ICE-R is an integral part of these troubleshooting procedures. It should be used whenever possible, although other options are given, when available. The Vehicle Identification Number (VIN) assigned to the M598 series vehicles is 21 (14 is the temporary VIN). On page 2-753, you will find information on STE/ICE-R description and operation. Use this information to become familiar with STE/ICE-R operation and the equipment contained in the test set. On page 2-763 you will find STE/ICE-R setup and internal checks. These must be performed prior to performing tests.

2-30

\* AFTER DISCUSSION FO TO SLIDE #34.

### 34. Troubleshooting Index:

Discuss:

- General Systems

TM 9-2320-280-20-1	
<b>2-13. ELECTRICAL/MECHANICAL SYSTEMS TROUBLESHOOTING</b>	
<b>ELECTRICAL/MECHANICAL TROUBLESHOOTING</b>	
<b>PARA NO.</b>	<b>PAGE NO.</b>
2-14. How to use this troubleshooting guide . . . . .	2-32
2-15. Glossary of abbreviations and commonly used terms . . . . .	2-38
2-16. Electrical circuit description . . . . .	2-39
2-17. Startability tests . . . . .	2-41
2-18. Engine running tests . . . . .	2-47
2-19. Cooling system tests . . . . .	2-57
2-20. Lubrication system tests . . . . .	2-65
2-21. Electrical tests . . . . .	2-71
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2-26. Engine lubrication tests . . . . .	2-187
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2-42. DCA troubleshooting . . . . .	2-723
2-43. STE/ICE-R test procedures . . . . .	2-733
2-44. Vehicle testing . . . . .	2-761
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\* AFTER DISCUSSION, GO TO SLIDE #35.

**35. Troubleshooting Guide:**

There are 16 foldouts that are supplied with this manual, one for each of the system level tests. Take the foldouts and place them after the last page of diagnostics at the end of each paragraph. That way, the foldout for each test procedure will be with the diagnostics for that test.

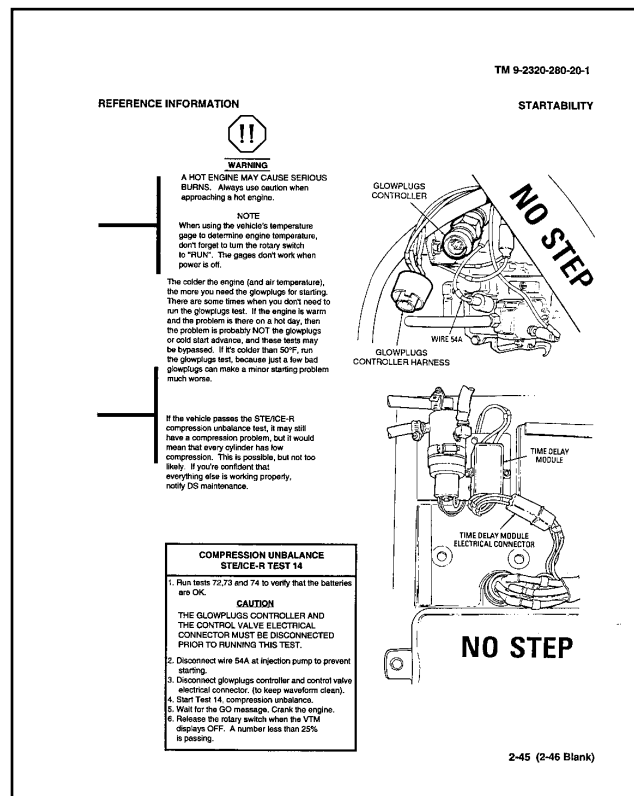
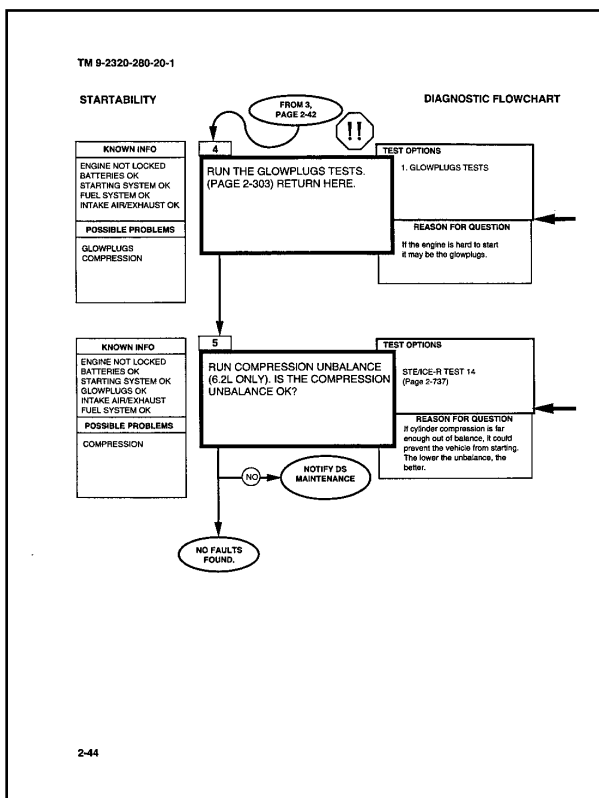
<u>System Level Tests</u>	<u>Paragraph</u>	<u>Foldout Number</u>
Fuel	2-22	FO-1
Air Intake/Exhaust	2-23	FO-2
Compression/Mechanical	2-24	FO-3
Engine Cooling	2-25	FO-4
Engine Lubrication	2-26	FO-5
Alternator	2-27	FO-6
Battery Circuit	2-28	FO-7
Starter Circuit	2-29	FO-8
Glowplugs	2-30	FO-9
Instruments	2-31	FO-10
Lights	2-32	FO-11
Transmission	2-33	FO-12
Brakes	2-34	FO-13
Steering	2-35	FO-14
Drivetrain	2-36	FO-15
DCA Troubleshooting	2-37	FO-16

\* AFTER DISCUSSION, GO TO SLIDE #36.

### 36. Troubleshooting Chart:

Discuss:

- All callouts
- Note that all diagnostic and flowcharts are on the left hand page, while supporting information, help, test instructions and vehicle operation on the right.

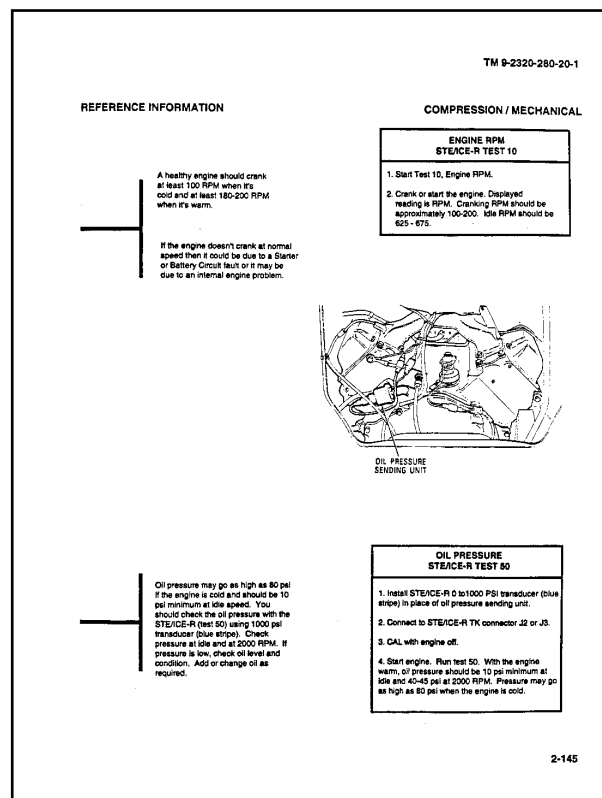
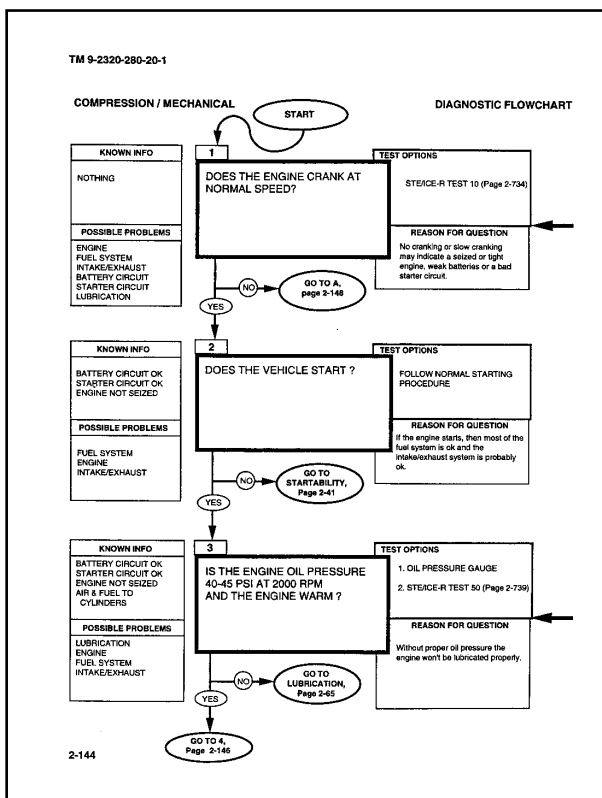


\* AFTER DISCUSSION GO TO SLIDE #37.

### 37. Troubleshooting Chart:

Discuss:

- Complete Chart



\* AFTER DISCUSSION GO TO SLIDE #38.

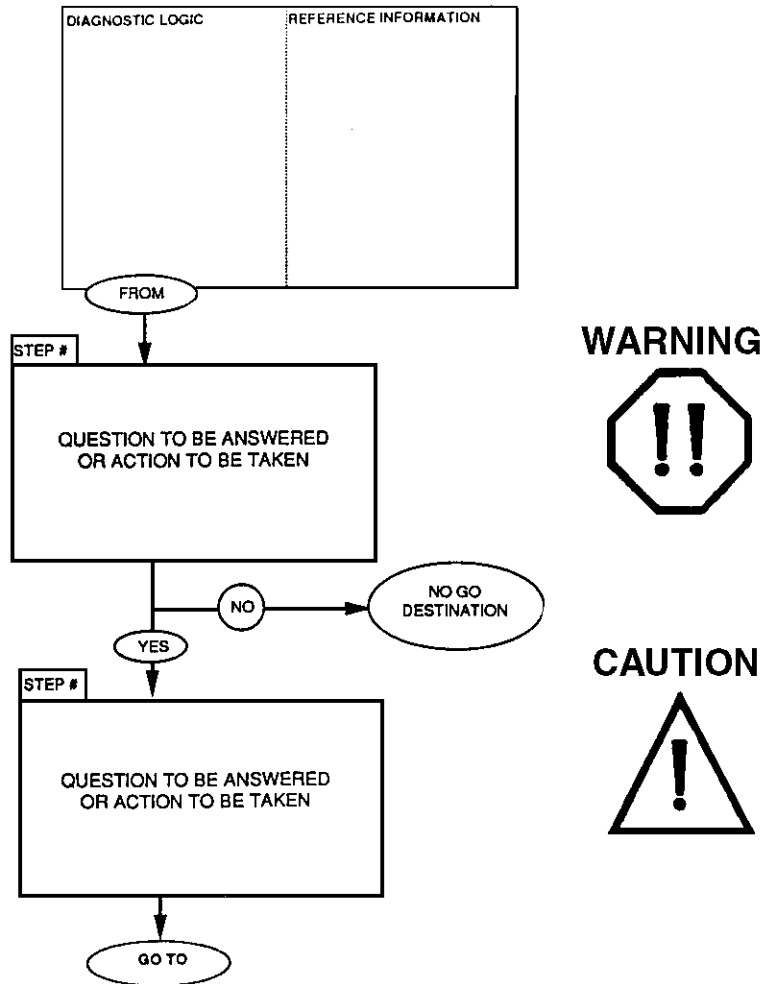


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**38. Troubleshooting Chart:**

Discuss:

- Complete Chart

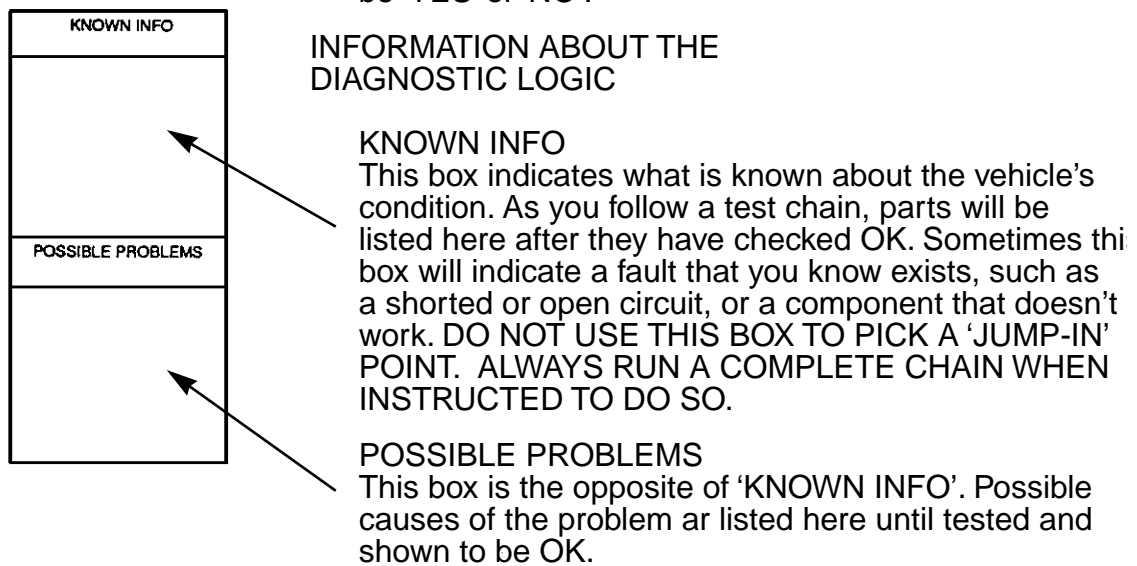
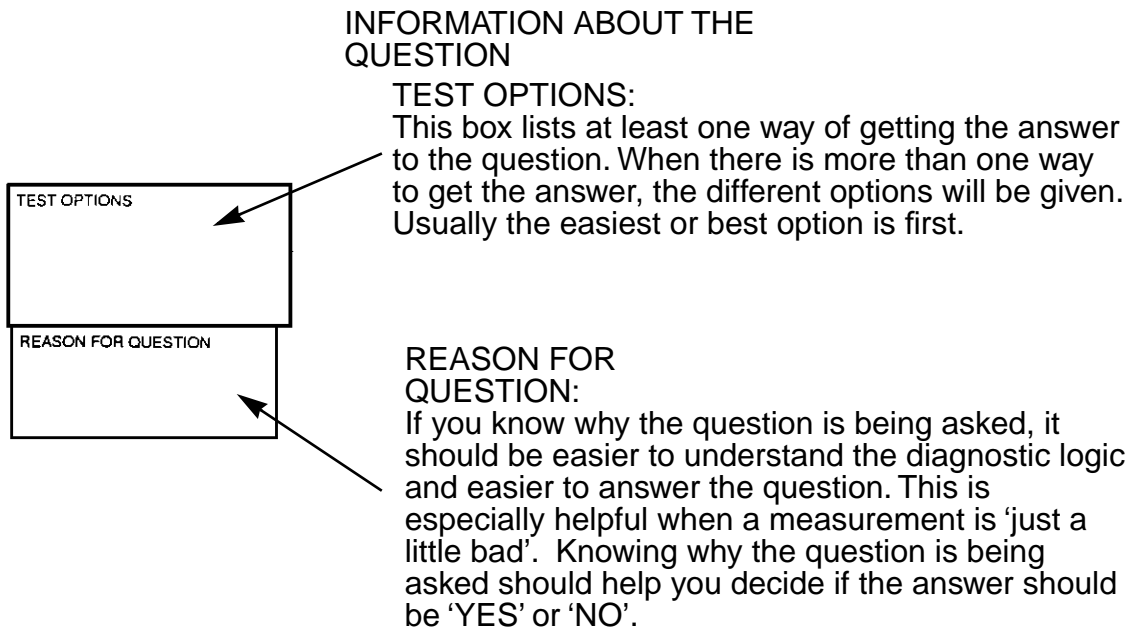


\* AFTER DISCUSSION, GO TO SLIDE #39.

### 39. Troubleshooting Chart:

Discuss:

- Complete Chart



\* AFTER DISCUSSION, GO TO SLIDE #40.

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## 40. Troubleshooting Chart:

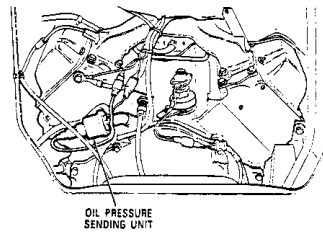
Discuss

- Complete Chart

TYPE OF MEASUREMENT TYPE OF EQUIPMENT
Procedure for performing the measurement using the type of equipment listed above

OIL PRESSURE STE/ICE-R TEST 80
1. Install STE/ICE-R 0 to 1000 PSI transducer (blue stripe) in place of oil pressure sending unit.
2. Connect to STE/ICE-R TK connector J2 or J3.
3. CAL with engine off.
4. Start engine. Run test 50. With the engine warm, oil pressure should be 10 psi minimum at idle and 40-45 psi at 2000 RPM. Pressure may go as high as 80 psi when the engine is cold.

PICTURES ARE PROVIDED WHEREVER POSSIBLE.
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\* AFTER DISCUSSION GO TO SLIDE #41.

**41. Maintenance Task Initial Setup:**

Discuss:

- All Items

TM 9-2320-280-34

**6-3. 60 AMPERE ALTERNATOR REPAIR**

This task covers:

- a. Removal
- b. Cleaning
- c. Inspection
- d. Assembly
- e. Bench Testing

---

**INITIAL SETUP:**

<p><u>Tools</u> General mechanic's tool kit: automotive (Appendix G, Item 1)</p> <p><u>Test Equipment</u> Multimeter (Appendix G, Item 120)</p> <p><u>Special Tools</u> Torx socket (Appendix G, Item 28)</p> <p><u>Materials/Parts</u> Locknut and woodruff key kit (Appendix E, Item 67) Slip ring end kit (Appendix E, Item 202) Drive end kit (Appendix E, Item 12) Fifteen lockwashers (Appendix E, Item 83) Two screw and lockwasher assemblies (Appendix E, Item 147) Strap (Appendix E, Item 206) Adhesive sealant (Appendix B, Item 2)</p>	<p><u>Materials/Parts (Cont'd)</u> Grease (Appendix B, Item 20) Insulating compound (Appendix B, Item 26) Lubricating oil (Appendix B, Item 33) Silicone compound (Appendix B, Item 56) Seal sleeve tool (Appendix C, Fig. 6)</p> <p><u>Manual References</u> TM 9-214 TM 9-2320-280-20 TM 9-2320-280-24P</p> <p><u>Personnel Required</u> One mechanic One assistant</p> <p><u>Equipment Condition</u> • Alternator removed (TM 9-2320-280-20). • Alternator pulley removed (TM 9-2320-280-20).</p> <p><u>Maintenance Level</u> Direct support</p>
---	---

\* AFTER DISCUSSION GO TO SIDE #42

## 42. Maintenance Task Initial Setup:

Discuss:

- All Items

TM 9-2320-280-34

### 6-4. 200 AMPERE ALTERNATOR (A0013036AA) TESTING AND REPAIR

This task covers:

- |                              |             |
|------------------------------|-------------|
| a. Alternator Output Testing | c. Cleaning |
| b. Disassembly/Testing       | d. Assembly |

#### INITIAL SETUP:

##### Applicable Models

M996, M996A1, M997, M997A1, M997A2

##### Tools

General mechanic's tool kit:  
automotive (Appendix G, Item 1)

##### Test Equipment

Multimeter (Appendix G, Item 120)  
Test stand (Appendix G, Item 94)

##### Materials/Parts

Two brush gaskets (Appendix E, Item 2)  
Gasket kit (Appendix E, Item 38)  
Six lockwashers (Appendix E, Item 73)  
Four lockwashers (Appendix E, Item 75)  
Six lockwashers (Appendix E, Item 76)  
O-ring (Appendix E, Item 115)  
Seal (Appendix E, Item 162)  
Seal (Appendix E, Item 164)  
Two seals (Appendix E, Item 165)  
Seal (Appendix E, Item 166)  
Locknut and woodruff key kit  
(Appendix E, Item 67)  
Grease (Appendix B, Item 20)

##### Personnel Required

One mechanic  
One assistant

##### Manual References

TM 9-214  
TM 9-2320-280-20  
TM 9-2320-280-24P  
TM 9-4910-485-12  
TM 9-4910-663-12

##### Equipment Condition

- Alternator removed (TM 9-2320-280-20).
- Regulator removed (TM 9-2320-280-20).

##### General Safety Instructions

Always support alternator rotor during removal  
and installation.

##### Maintenance Level

Direct support

\* AFTER DISCUSSION GO TO SIDE #43

**43. Maintenance Allocation Chart:**

Discuss:

- Located in TM 9-2320-280-20-3, Appendix-B

**ARMY TM 9-2320-280-20-3**  
**AIR FORCE TO 36A12-1A-2092-1-3**  
**MARINE CORPS TM 2320-20/7C**

**Volume No. 3** (SUPERSEDES TM 9-2320-280-20-3, 1 NOVEMBER 1993)

### TECHNICAL MANUAL UNIT MAINTENANCE

<p>TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998 (2320-01-107-7155) (EIC: BBD); M998A1 (2320-01-371-9577) (EIC: BBN);</p> <p>TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH, M1038 (2320-01-107-7156) (EIC: BBE); M1038A1 (2320-01-371-9578) (EIC: BBP);</p> <p>TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: BBN); M1097A1 (2320-01-371-9583) (EIC: BBU); M1097A2 (2320-01-380-8604) (EIC: BB6);</p> <p>TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, M966 (2320-01-107-7153) (EIC: BBC); M966A1 (2320-01-372-3932) (EIC: BBX);</p> <p>TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1036 (2320-01-107-7154) (EIC: BBH);</p> <p>TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1045 (2320-01-146-7191); M1045A1 (2320-01-371-9580) (EIC: BBR); M1045A2 (2320-01-380-8229) (EIC: BB5);</p> <p>TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1046 (2320-01-146-7188); M1046A1 (2320-01-371-9582) (EIC: BBT);</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025 (2320-01-128-9551) (EIC: BBF); M1025A1 (2320-01-371-9584) (EIC: BBV); M1025A2 (2320-01-380-8233) (EIC: BB3);</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026 (2320-01-128-9552) (EIC: BBG); M1026A1 (2320-01-371-9579) (EIC: BBQ);</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1043 (2320-01-146-7190); M1043A1 (2320-01-372-3933); M1043A2 (2320-01-380-8213) (EIC: BB4);</p> <p>TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1044 (2320-01-146-7189); M1044A1 (2320-01-371-9581);</p> <p>TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) (EIC: BBK);</p> <p>TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);</p> <p>TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) (EIC: BBB); M996A1 (2310-01-372-3935) (EIC: BB2);</p> <p>TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274) (EIC: BBA); M997A1 (2310-01-372-3934) (EIC: BB2); M997A2 (2310-01-380-8225) (EIC: BB8);</p> <p>TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) (EIC: BBW); M1035A2 (2310-01-380-8290) (EIC: BB9).</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">BODY AND ACCESSORIES MAINTENANCE</td> <td style="padding: 5px; text-align: center;">10-1</td> </tr> <tr> <td style="padding: 5px;">SPECIAL PURPOSE BODIES MAINTENANCE</td> <td style="padding: 5px; text-align: center;">11-1</td> </tr> <tr> <td style="padding: 5px;">SPECIAL PURPOSE KITS MAINTENANCE</td> <td style="padding: 5px; text-align: center;">12-1</td> </tr> <tr> <td style="padding: 5px;">PREPARATION FOR STORAGE OR SHIPMENT</td> <td style="padding: 5px; text-align: center;">13-1</td> </tr> </table>	BODY AND ACCESSORIES MAINTENANCE	10-1	SPECIAL PURPOSE BODIES MAINTENANCE	11-1	SPECIAL PURPOSE KITS MAINTENANCE	12-1	PREPARATION FOR STORAGE OR SHIPMENT	13-1
BODY AND ACCESSORIES MAINTENANCE	10-1								
SPECIAL PURPOSE BODIES MAINTENANCE	11-1								
SPECIAL PURPOSE KITS MAINTENANCE	12-1								
PREPARATION FOR STORAGE OR SHIPMENT	13-1								

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**DEPARTMENTS OF THE ARMY, THE AIR FORCE,  
AND HEADQUARTERS, MARINE CORPS**

**JANUARY 1995**

\* SLIDE DISCUSSION, GO TO SLIDE #44.

#### 44. Explanation of Columns in the MAC. Section II:

- Column #1-Group number: To identify the maintenance significant components, Assemblies, Subassemblies and modules with the next higher component.
- Column #2-Component/Assembly: Contains the names of components, assemblies, subassemblies and modules for which maintenance is authorized.
- Column #3-Maintenance Function: Functions to be performed on the item listed in column #2.
- Column #4-Maintenance Level: This column lists the maintenance level authorized to perform the maintenance repair task and allowable maintenance time.

Note: .1=6 minutes

C Operator or Crew

O Unit Maintenance

F Direct Support Maintenance

H General Support Maintenance

D Depot Maintenance

- Column #5-Tools and Equipment: This column specifies by code, those common tool sets and special tools, TMDE, required to perform the maintenance task.
- Column #6-Remarks: this column will contain a letter code which will be keyed to the remarks section.

TM 9-2320-280-20-3

**Section II. MAINTENANCE ALLOCATION CHART**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit	Direct Support	General Support	Depot			
			C	O	F	H	D		
01	ENGINE								
0100	Engine Assembly	Inspect	0.2	0.7				1,37,40	(G)
		Test			1.0			1,2	
		Service		0.5				41,42	
		Adjust			1.0			43,145	
		Replace			32.7			1,7,10,43-45	
		Repair				16.0			
		Overhaul					30.0	1,7,10,44-49, 147,148,155- 161	
	Mount, Engine	Inspect		0.1				2,144,145	
		Replace			1.6			1,2,43,144- 146,149	

\* AFTER DISCUSSION GO TO SLIDE #45.

45. Maintenance Allocation Chart:

Discuss:

- All Columns

TM 9-2320-280-20-3

Section II. MAINTENANCE ALLOCATION CHART (Cont'd)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remark Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
0309	Filter Assembly, Fuel	Inspect Service Replace	0.1	0.1 0.5 0.5				1 2	B
0311	Glow Plugs	Test Replace		0.3 0.7				2 1,2,155	
0312	Accelerator Linkage	Inspect Adjust Replace		0.2 0.2 0.8				1 1,2	
	Hand Throttle	Inspect Adjust Replace	0.1	0.1 0.2 0.5				1 1,2	
04	EXHAUST SYSTEM								
0401	Muffler	Inspect Replace		0.2 1.9				1,2	
	Crossover Pipe	Inspect Replace		0.2 1.2				1,2,145, 150	
	Tailpipe	Inspect Replace		0.2 0.5				1,2	
05	COOLING SYSTEM								
0501	Radiator	Inspect Test Replace Repair	0.1	0.2 0.5 4.3		3.0		2,66 1 5	
	Surge Tank	Inspect Service Replace	0.1 0.1	0.5 0.6				2 1	C
0502	Shroud, Fan	Inspect Replace Repair		0.1 4.4 F				1	F,M
0503	Hoses, Lines, and Clamps	Inspect Replace	0.1	0.1 2.5				1	
	Thermostat	Test Replace		0.2 0.3				2	
0504	Pump, Water	Replace				3.5		6	
0505	Fan and Fan Drive	Inspect Replace Repair	0.1	0.1 1.0		4.7		1,2,161 1,6	
	Pulley, Water Pump	Replace		4.8				1,157	

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\* AFTER DISCUSSION GO TO SLIDE #46



## 46. Tools and test equipment requirements:

Discuss

- All columns

TM 9-2320-280-20-3

### Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	O	Tool Kit, General Mechanic's Automotive	5180-00-177-7033	
2	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common #1, Less Power	4190-00-754-0654	
3	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Supplemental #1, Less Power	4910-00-754-0653	
4	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common #2, Less Power	4910-00-754-0650	
5	O	Tool Kit, Body and Fender	5180-00-754-0643	
6	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	
7	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental #1, Less Power	4910-00-754-0706	
8	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental #2, Less Power	4910-00-754-0707	
9	F	Shop Equipment, Fuel and Electrical System Engine: Field Maintenance, Basic, Less Power	4910-00-754-0714	
10	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Wheeled Vehicles, Post, Camp and Station, Set A	4910-00-348-7696	
11	O	Special Tool Kit, Organizational	5180-01-387-5455	57K0267
		Special Tool Kit, Organizational, Supplemental ("A2" series only)	5180-01-410-8467	
12	F	Special Tool Kit, Direct Support	5180-01-389-7560	57K0268
13	H	Special Tool Kit, General Support	5180-01-389-7561	57K0266
		Special Tool Kit, General Support, Supplemental ("A2" series only)	5180-01-408-7050	
		<b>NOTE</b>		
		The optional metric tool sets listed below are required for maintenance of this vehicle.		
14	O	Metric Wrench Set, 10-32 mm, Open End/Box End	5120-01-119-0010	
15	O	Metric Socket Set, 6-26 mm, Std., 6 pt., 3/8 in. Drive	5120-01-117-3876	

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\* AFTER DISCUSSION, GO TO SLIDE #47.

**47. Tools and test equipment requirements:**

Discuss

- All columns

TM 9-2320-280-20-3

**Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS (Cont'd)**

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
16	F	Metric Socket Set, Std., 6 pt., 3/8 in. Drive, Deep Reach	5120-01-112-9543	
17	F	Metric Allen Wrench Kit	5120-01-046-5079	
18	F	Metric Tap and Die Kit	5136-01-119-0005	
19	F	Tool Kit, Service Refrigeration Unit	5180-00-596-1474	
01 ENGINE				
20	F	Adapter, Compression Gage	4910-01-238-2551	J 26999-30
21	F	Quick Disconnect		J 25209
22	F	90° Elbow	4730-00-854-5837	MS51815
23	F	Remover, Hydraulic Valve Lifter	5120-01-209-6870	J 29834
24	F	Remover, Injector Nozzle	5120-01-171-5233	J 29873
25	F	Engine Lifting Sling	4910-01-193-7808	J 33139
26	F	Tester, Engine Compression	4910-01-355-7815	J 6692A
27	H	Installer, Rear Crankshaft Seal	5120-01-210-8792	J 33153
28	H	Tool, Driveshaft Seal	5120-01-208-7752	22727
29	H	Extractor, Delivery Valve	5120-00-816-7059	26081
30	H	Fixture, Pump Hold Engine	5120-01-208-7753	23615
31	H	Fixture, Roller to Roller	5210-01-200-4526	19969
32	H	Installer, Bearing	5120-01-208-7771	23805
33	H	Kit, Replacement Bushing	5180-01-189-0448	18411
34	H	Mandrel, Pilot Tube	5120-01-208-1767	16314
35	H	Socket, End Cap	5120-01-287-5563	20548
36	H	Support, Governor Weight	5120-01-197-0236	16313
37	F	Tester, Compression	4910-00-785-6437	J 6692
38	F	Adapter	4910-01-238-2551	J 26999-30
39	F	Elbow	4730-00-985-4804	MS51815-4P
40	F	Coupling	4730-01-842-5266	J 35209
41	F	Gauge, Timing	6620-01-231-3671	MT95
42	F	Meter, Dynamic Timing	5180-01-186-3114	J 33127
43	F	Sling, Engine Lifting	4910-01-193-7808	J 33139
44	H	Stand - Engine Repair	4910-00-506-0037	1725A
45	F	Remover, Hydraulic Valve Lifter	5120-01-209-6870	J 29834

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\* AFTER DISCUSSION GO TO SLIDE #48.

**48. Remarks:**

Discuss:

- Codes
- Remarks

TM 9-2320-280-20-3

**Section IV. REMARKS**

(1) REMARKS CODE	(2) REMARKS
A	Calibration time will be established when support equipment requirements are identified.
B	Operator drains water from fuel filter assembly. All other service is performed at unit level.
C	Operator replenishes coolant. All other service is performed at unit level.
D	Operator inspects shift lever. All other inspections are performed at unit level.
E	Direct support maintenance repairs coupling shaft by replacing center bearing. All other repair is performed at unit level.
F	In this category, no specific times can be established. Time required for repair will depend on the extent of repair required for damaged components.
G	Simplified test equipment/internal combustion engine (STE/ICE-R) testing times may vary depending on the type of tests being performed.
H	For vehicles with new brake adapters, P/N 10453002.
I	It is authorized to remove spindle to replace the seal. All other repair is performed at direct support level.
J	Runflat compressor to be used with rubber runflat.
K	If the puller kit is not available at unit level, it can be found in the GSA catalogue, Blind Hole Puller Set, NSN 5120-00-140-3557.
L	This tool can be found in the MCRL or GSA catalogue, Manometer, U-Tube, NSN 6685-00-857-4895.
M	Fan shroud repair is limited to repairs that can be made using fiberglass repair kit (Appendix C, Item 50). Only these repairs that can be made while the shroud is installed on the vehicle are authorized.
N	Operator can remove and replace wheel assembly, but must notify unit maintenance to tighten lug nuts to proper torque as soon as possible.
O	Direct support replaces fuel injection pump governor cover gasket, shut-off solenoid, and cold advance solenoid.

B-27 (B-28 blank)

\* AFTER DISCUSSION GO TO SLIDE #49.

**49. Parts Manual (TM 9-2320-280-24P-1)**

Discuss:

- Meaning of TM Numbers
- Meaning of P/1, P/2 and P/3
- TM for vehicle Parts

**ARMY TM 9-2320-280-24P-1  
AIR FORCE TO 36A12-1A-2094-3  
MARINE CORPS TM 2320-34P/8A**

**VOLUME NO. 1**

This manual in conjunction with TM 9-2320-280-24P-1 supersedes TM 9-2320-280-20P, 1-October 1993 and TM 9-2320-280-34P, 22 August 1991.

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**TECHNICAL MANUAL  
UNIT, DIRECT SUPPORT AND  
GENERAL SUPPORT MAINTENANCE  
REPAIR PARTS AND SPECIAL TOOLS LIST  
FOR**

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, M998 (2320-01-107-7155) (EIC: B8D);  
M998A1 (2320-01-371-9577) (EIC: B8N);

TRUCK, UTILITY: CARGO/TROOP CARRIER, 1-1/4 TON, 4X4, W/WINCH, M1038 (2320-01-107-7156) (EIC: B8E);  
M1038A1 (2320-01-371-9578) (EIC: B8P);

TRUCK, UTILITY: HEAVY VARIANT, 4X4, M1097 (2320-01-346-9317) (EIC: B8M);  
M1097A1 (2320-01-371-9583) (EIC: B8U); M1097A2 (2320-01-380-8604) (EIC: B86);

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, M966 (2320-01-107-7153) (EIC: B8C);  
M966A1 (2320-01-372-3932) (EIC: B8X);

TRUCK, UTILITY: TOW CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH,  
M1036 (2320-01-107-7154) (EIC: B8H);

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1045 (2320-01-146-7191);  
M1045A1 (2320-01-371-9580) (EIC: B8R); M1045A2 (2320-01-380-8229) (EIC: B85);

TRUCK, UTILITY: TOW CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1046 (2320-01-146-7188);  
M1046A1 (2320-01-371-9582) (EIC: B8T);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, M1025  
(2320-01-128-9551) (EIC: B8F); M1025A1 (2320-01-371-9584) (EIC: B8V); M1025A2 (2320-01-380-8233) (EIC: B83);

TRUCK, UTILITY: ARMAMENT CARRIER, ARMORED, 1-1/4 TON, 4X4, W/WINCH, M1026 (2320-01-128-9552) (EIC: B8G);  
M1026A1 (2320-01-371-9579) (EIC: B8Q);

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, M1043 (2320-01-146-7190);  
M1043A1 (2320-01-372-3933); M1043A2 (2320-01-380-8213) (EIC: B84);

TRUCK, UTILITY: ARMAMENT CARRIER, W/SUPPLEMENTAL ARMOR, 1-1/4 TON, 4X4, W/WINCH, M1044 (2320-01-146-7189);  
M1044A1 (2320-01-371-9581);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, M1037 (2320-01-146-7193) (EIC: B8K);

TRUCK, UTILITY: S250 SHELTER CARRIER, 4X4, W/WINCH, M1042 (2320-01-146-7187);

TRUCK, AMBULANCE, 2-LITTER, ARMORED, 4X4, M996 (2310-01-111-2275) (EIC: B8B);  
M996A1 (2310-01-372-3935) (EIC: B82);

TRUCK, AMBULANCE, 4-LITTER, ARMORED, 4X4, M997 (2310-01-111-2274) (EIC: B8A); M997A1  
(2310-01-372-3934) (EIC: B8Z); M997A2 (2310-01-380-8225) (EIC: B88);

TRUCK, AMBULANCE, 2-LITTER, SOFT TOP, 4X4, M1035 (2310-01-146-7194); M1035A1 (2310-01-371-9585) (EIC: B8W);  
M1035A2 (2310-01-380-8290) (EIC: B89).

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**DEPARTMENTS OF THE ARMY, THE AIR FORCE,  
AND HEADQUARTERS, MARINE CORPS**

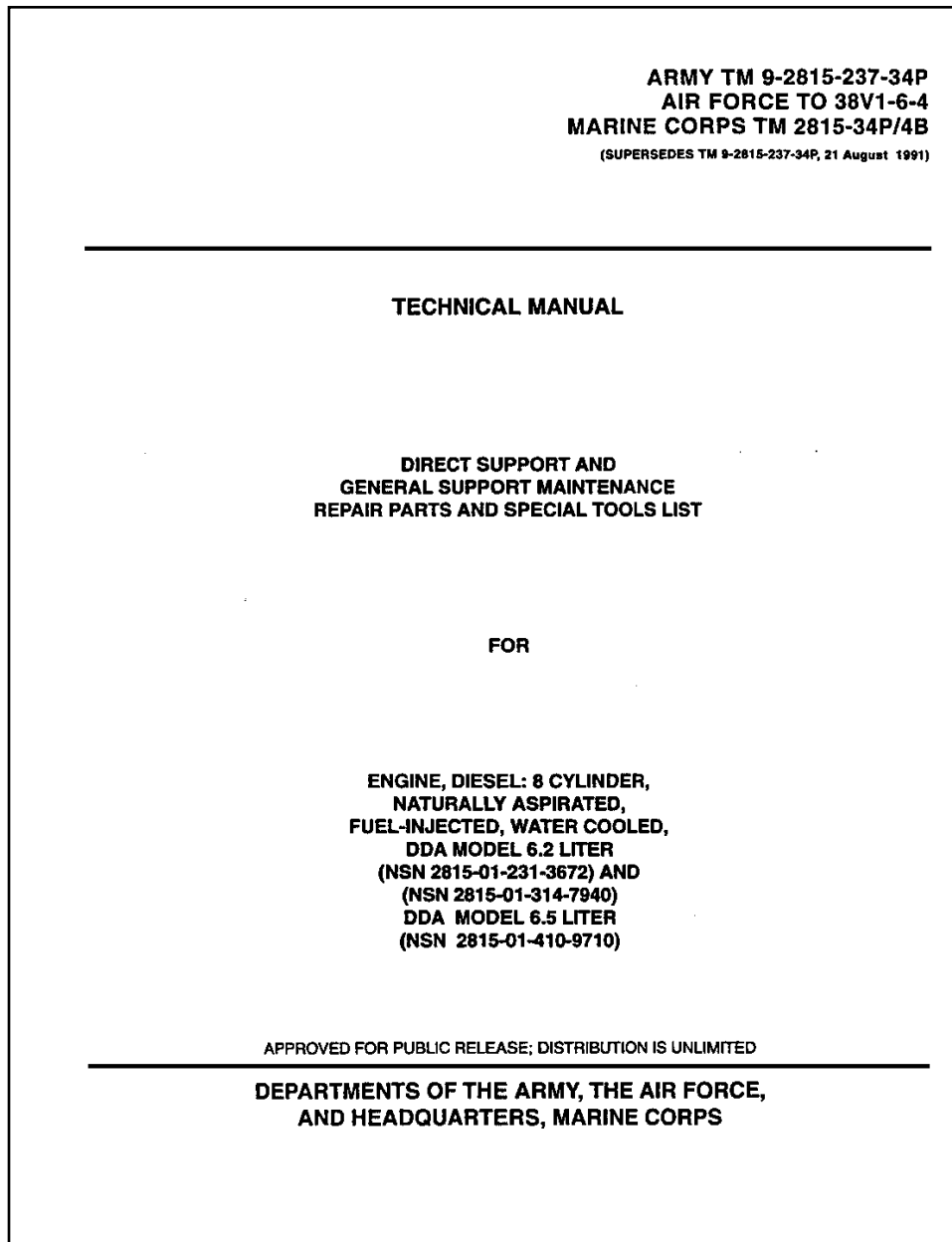
\* AFTER DISCUSSION, GO TO SLIDE #50.

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**50.** Parts Manual (TM 9-2815-237-34P)

Discuss:

- Meaning of TM numbers
- Meaning of 34P
- TM for engine parts



\* AFTER DISCUSSION GO TO SLIDE #51.

**51. Table of Contents**

Discuss:

- Use of Table

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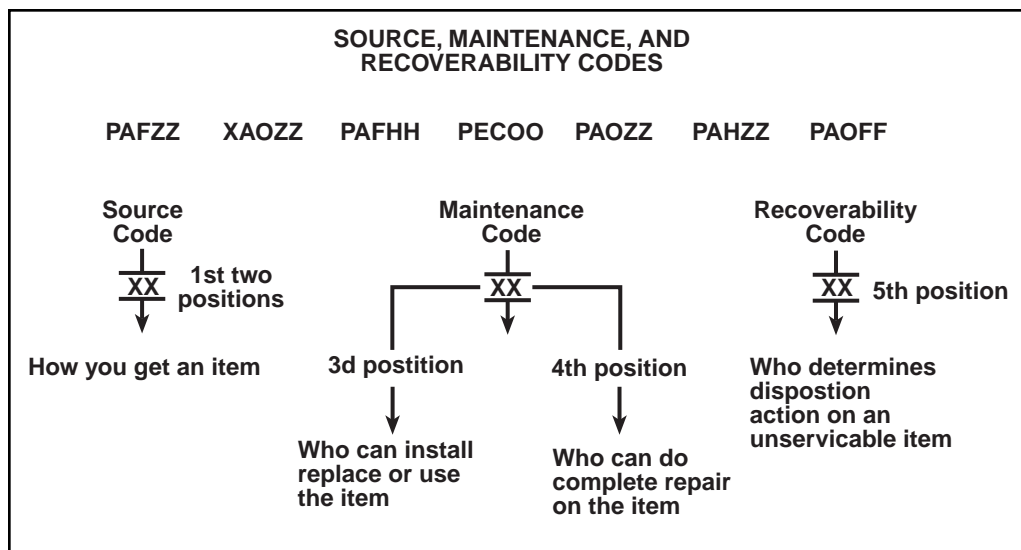
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\* AFTER DISCUSSION GO TO SLIDE #52.

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## 52. SMR Codes

- SMR codes are located in the front of the parts manual.
- The Source, Maintenance and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria and disposition instructions, as shown in the following slide.



\* AFTER DISCUSSION GO TO SLIDE #53.

**53. Source Code:**

Discuss: All items.

**Explanation**

<p>PA      PB                  PC**   PD                  PE      PF      PG</p>	<p>Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code.                  **NOTE: Items coded PC are subject to deterioration.</p>
<p>KD                  KF                  KB</p>	<p>Items with these codes are not to be requested/requisitioned individually. they are part of a kit which is authorized to the maintenance category indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.</p>
<p>MO Made at Org Level                  MF Made at DS Level                  MH Made at GS Level                  ML Made at SRA/                  Commercial                  MD Made at Depot Level</p>	<p>Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UCO) column and listed in the bulk material group of the repair parts list in the RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.</p>
<p>AO Assembled by Org Level                  AF Assembled by DS Level                  AH Assembled by GS Level                  AL Assembled by SRA/                  Commercial                  AD Assembled by Depot Level</p>	<p>Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorized you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher.</p>
<p>XA Do not requisition an "XA" coded item. Order its next higher assembly.                  XB If an "XB" item is not available from salvage, order it using CAGEC and part number given                  XC Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.                  XD Item is not stocked. Order and "XD" coded item through normal supply channels using the CAGEC and part number given, if no NSN is available.</p>	



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**54. Maintenance Codes:**

Discuss:

- Third position codes
- Fourth position codes

**Third Position Codes**

- C Crew or operator maintenance done within organizational maintenance.
- O Organizational level can remove, replace, and use the item.
- F Direct support level can remove, replace, and use the item.
- H General support level can remove, replace, and use the item.
- L Specialized repair activity can remove, replace, and use the item.
- D Depot level can remove, replace, and use the item.

**Fourth Position Codes**

- O Organizational is the lowest level that can do complete repair of the item.
- F Direct support is the lowest level that can do complete repair of the item.
- H General Support is the lowest level that can do complete repair of the item
- L Specialized repair activity (designate the specialized repair activity) is the lowest level that can do complete repair of the item
- D Depot is the lowest level that can do complete repair of the item
- Z Nonreparable. No repair is authorized.
- B No repair is authorized. (No parts or special tools are authorized for the maintenance of a "B" coded item.) However, the item may be reconditioned by adjusting, lubricating, etc. at the user level.

\* AFTER DISCUSSION, GO TO SLIDE #55.

**55. Recoverability Codes:**

Discuss:

- All Codes

- Z Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR code.
- O Reparable item. When uneconomically repairable, condemn and dispose of the item at organizational level.
- F Reparable item. When uneconomically repairable, condemn and dispose of the item at the direct support level.
- H Reparable item. When uneconomically repairable, condemn and dispose of the item at the general support level.
- D Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
- L Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
- A Item requires special handling or condemnation procedures because of specific reasons (e.g.; precious metal content, high dollar value, critical material, or hazardous material). refer to appropriate manuals/directives for specific instructions.

\* AFTER DISCUSSION, GO TO SLIDE #56.

## 56. Parts Identification:

Discuss:

1. Item Column: The item number identifies a part or tool in the associated figure.
2. SMR Code: Source, Maintenance, Recoverability codes.
3. CAGEC Column: A 5-digit numeric code which is used to identify the manufacturer or government agency that supplies the item.
4. Part Number: Indicates the primary number used by the manufacturer, corporation, or government activity that supplies the item.
5. Description and Usable-on Code (UOC): This column identifies the vehicle that the part is used on.
6. Qty. Column: Indicates the quantity of the item used on the component or vehicle.

SECTION II			TM9-2320-280-24P-1			
(1)	(2)	(3)	(4)	(5)	(6)	
ITEM	SMR	CAGEC	PART	DESCRIPTION AND USABLE ON CODES(UOC)	QTY	
NO	CODE	CAGEC	NUMBER			
				GROUP 0613 HULL OR CHASSIS WIRING HARNESS		
				FIG. 86 NBC WIRING HARNESS,M997, M997A1,AND M997A2 AMBULANCE		
1	PF000	19207	12341207	WIRING HARNESS .....	1	
2	PA0ZA	96906	M527144-1	UOC: A15,B15,H15 CONNECTOR,PLUG,ELEC.....	8	
3	PA0ZZ	81349	M43436/3-1	UOC: A15,B15,H15 BAND,MARKER.....	37	
4	PA0ZZ	98953	100828-HN37	UOC: A15,B15,H15 TERMINAL,LUG.....	5	
5	PA0ZZ	96906	M520659-103	UOC: A15,B15,H15 TERMINAL,LUG.....	5	
6	PF0ZZ	34623	5597277	UOC: A15,B15,H15 GROMMET.....	1	
7	PA0ZZ	77060	2973850	UOC: A15,B15,H15 TERMINAL,LUG.....	2	
8	MD0ZZ	81349	M23053/4-302-2	UOC: A15,B15,H15 INSULATION SLEEVING MAKE FROM HEAT SHRINK,P/N M23053/4-302-2,2 INCHES LONG.....	2	
9	PA0ZZ	96906	M520659-105	UOC: A15,B15,H15 TERMINAL,LUG.....	3	
10	PA0ZZ	96906	M520659-106	UOC: A15,B15,H15 TERMINAL,LUG.....	1	
11	MD0ZZ	81349	M23053/4-304-2	UOC: A15,B15,H15 TUBING,HEATSHRINK MAKE FROM INSULATION, P/N M23053/4-304-2,4 INCHES LONG.....	4	
12	PA0ZZ	96906	M520659-108	UOC: A15,B15,H15 TERMINAL,LUG.....	2	
13	MD0ZZ	81349	M23053/4-203-2	UOC: A15,B15,H15 INSULATION SLEEVING RED,MAKE FROM HEATSHRINK P/N M23053/4-203-2,3 INCHES LONG.....	5	
14	PF0ZZ	19207	5597208	UOC: A15,B15,H15 GROMMET,MOLDED.....	1	
15	PA0ZZ	77060	2984172	UOC: A15,B15,H15 TERMINAL,LUG.....	2	
16	PA0ZZ	96906	M520659-129	UOC: A15,B15,H15 TERMINAL,LUG.....	1	
17	PA0ZZ	96906	M520659-163	UOC: A15,B15,H15 TERMINAL,LUG.....	1	
18	MD0ZZ	81349	M23053/4-303-2	UOC: A15,B15,H15 INSULATION SLEEVING RED,MAKE FROM INSULATION,P/N M23053/4-303-2,3 INCHES LONG.....	1	
19	PA0ZZ	77060	2962409	UOC: A15,B15,H15 TERMINAL,LUG.....	1	

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\* AFTER DISCUSSION GO TO SLIDE #57.

**57. Usable on Code (UOC)**

- The UOC is found in the front of the manual.
- The usable on code appears on the lower left-hand corner of the description column heading. Uncoded items are applicable to all models.

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**5. Special Information.**

**a. Usable on Code.** The usable on code appears in the lower left corner of the Description column heading. Usable on codes are shown as "UOC: . . . . ." in the Description Column (justified left) on the first line applicable item description/nomenclature. Uncoded items are applicable to all models. Identification of the usable on codes used in the RPSTL are:

Code	Used On	Code	Used On	Code	Used On
AVY	M1097A1	B16	M996A1	H15	M997
A11	M966A1	B17	M1025A1	H16	M996
A13	M998A1	B18	M1026A1 W/W	H17	M1025
A14	M1038A1 W/W	B20	M1035A2	H18	M1026 W/W
A15	M997A1	B24	M1045A2	H20	M1035
A20	M1035A1	B25	M1043A2	H21	M1037
A24	M1045A1	C17	M1025A2	H24	M1045
A25	M1043A1	HVY	M1097	H25	M1043
A26	M1044A1 W/W	H11	M966	H26	M1044 W/W
A27	M1046A1 W/W	H13	M998	H27	M1046 W/W
BVY	M1097A2	H14	M1038 W/W	H28	M1042 W/W
B15	M997A2				

Code	Used On
HPM	M1097 W/W and L119 Prime Mover Kit
SLT	M1097 W/W and S250 Shelter Kit
KTV	M1097 W/W and Towed Vulcan System Kit

\* AFTER DISCUSSION GO TO SLIDE #58.

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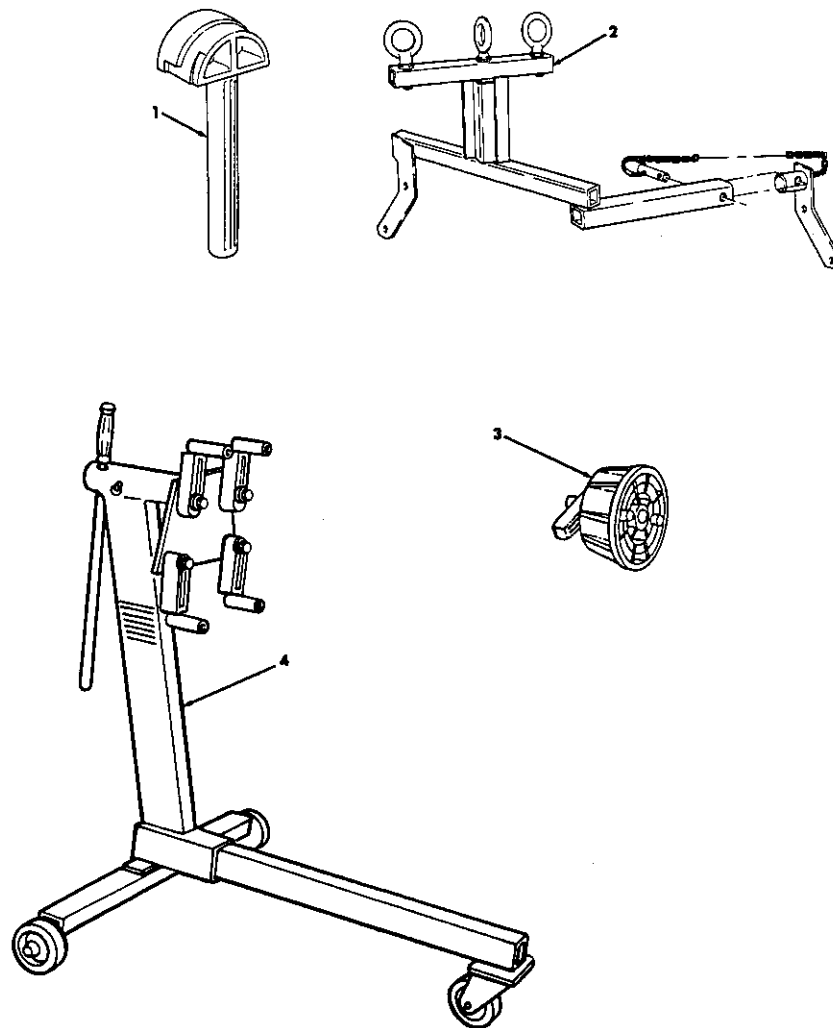
**58. Special Tools:**

Discuss:

- Show tool slide
- All columns

**Section III.**

**TM 9-2815-237-34P**



*Figure 30. Special Tools.*

END OF PROGRAM.