PUBLICATIONS

STYLE GUIDE

Deployment Equipment (DE) Logistics Group Publications

"Supporting the Soldier in the Field"

Authorized by TACOM – 31 MAY 2012

PREFACE

This *STYLE GUIDE* establishes uniform rules and specifications for creating paper-based technical manuals for the Deployment Equipment (DE) Logistics Group within the ILSC. This *Style Guide* delineates, in plain language, explicit guidelines to be followed in categories ranging from writing style to the development of procedural text. Specifically, this *Style Guide* will:

1. Effectively communicate Government requirements for the technical manuals that can be distributed before work starts.
2. Communicate firm guidance and provide examples where the MIL-STD may be vague. It will create consistency in guidance, resolve conflict and remove personal interpretation.
3. When more than one option is presented in the MIL-STD, identify the DE Logistics Group preference. This will promote consistency between all DE Logistics Group publications.
4. Include samples of the preferred way to present information within a technical manual.
5. Address the TM Defects Listing and how to interpret each defect.

This *Style Guide* has been developed cooperatively by DE Logistics Group and user community and has the senior leadership buy-in from both organizations.

PUBLICATIONS STYLE GUIDE

FOR

DEPLOYMENT EQUIPMENT (DE) LOGISTICS GROUP PUBLICATIONS

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CHAPTER 1

ARMY TECHNICAL MANUAL NUMBERS

1.1 ARMY TECHNICAL MANUAL NUMBERS INTRODUCTION

1.1.1 EXPLANATION Following the Technical Manual (TM) designation, TM numbers have 10 or 11 digits separated by hyphens:

- TM X-XXXX-XXX-XX, e.g.,
  - TM 5-3805-290-10
  - TM 9-2330-331-13
- First one (or two) digits = branch of the Army, e.g.,
  - 5 = engineer (e.g., construction machine, trailer)
  - 9 = ordnance (e.g., combat vehicle)
  - 10 = quartermaster (e.g., tank rack module)
- Second four digits = FSC (type of equipment or vehicle), e.g.,
  - 3805 = earth moving and excavating equipment
  - 2330 = trailers
- Third three digits = specific equipment or vehicle designation, e.g.,
  - 290 = 924G backhoe loader
  - 331 = M872 semitrailer
- Last two digits = level(s) of maintenance:
  - 10 = Operator
  - 13 = Operator/Field Maintenance
  - 14 = Operator/Field Maintenance/Sustainment Maintenance
  - 23 = Field Maintenance
  - 24 = Field Maintenance/Sustainment Maintenance
  - 40 = Sustainment Maintenance
- There can be a “P” or “&P” after the last two digits:
  - P = RPSTL only:
    - * TM 9-1234-567-13P is Operator/Field Maintenance RPSTL
  - &P = RPSTL included in TM:
    - * TM 9-1234-567-13&P is Operator/Field Maintenance Manual w/RPSTL

1.1.1 EXPLANATION – CONTINUED

- There can be a hyphen and another number after the last two digits:
  - TM 9-1234-567-23-1 is Volume I of a Field Maintenance Manual
  - TM 9-1234-567-23-2 is Volume II of a Field Maintenance Manual
  - TM 9-1234-567-23-3 is Volume III of a Field Maintenance Manual

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Definitions

1. Operator's Manual Consists of operation procedures for the equipment/vehicle and operator-level inspecting, servicing, lubricating, and repairing of the items authorized by the Maintenance Allocation Chart (MAC) of the corresponding Field Maintenance Manual.

2. Maintenance Manual Consists of complete repair and/or replacement instructions of the equipment/vehicle including maintenance tasks such as inspecting, testing, lubricating, adjusting, and painting.

3. Repair Parts and Special Tools List (RPSTL) Contains a list of repair parts with accompanying illustrations to assist the soldier to identify and order part(s) for the equipment/vehicle. A RPSTL consists of an introduction, list of repair pars, list of special tools, and NSN and part number indexes.

For Further Explanation

1. **Federal Supply Classification (FSC) Numbers**—SB 708-21
2. **Technical Manual Number**—MIL-STD-40051-2A, Appendix A

CHAPTER 2

TECHNICAL MANUAL CONTENT REQUIREMENTS MATRIX

2.1 MATRIX DEFINITION AND DESCRIPTION

2.1.1 REQUIREMENTS MATRIX DESCRIPTION The Technical Manual Content Requirements Matrix is contained in Appendix A of MIL-STD-40051-2A (Tables A-II through A-XIX). There are multiple versions of the matrix that apply to different types of technical manuals. Each matrix defines the content and organization of its applicable technical manual. The government will indicate the types of TMs needed by filling in the blank after "TM Requirements Matrix for" at the top of each matrix.

The requirements matrix will be completed by the government and included in the initial solicitation. This matrix will ultimately become part of the contract.

2.1.2 REQUIREMENTS MATRIX COLUMN HEADERS

2.1.2.1 TM Content The first column of the matrix lists the content of the technical manual. The verbiage used in this list of content shall be used verbatim and shall appear in the same order within the technical manual. Some entries under this column may contain the CHAPTER X definition that means that at least one of the defined chapters must be present in the manual.

2.1.2.2 TM Number Column(s) The next set of columns contain the TM type number that is to be applied to the manual. This TM type number will be the last two to four characters of the unique TM number assigned (example: -10, -13, -13&P). Under this header(s) the blocks define the TM Content column as "R" for REQUIRED, "P" for PROHIBITED, or "AR" for AS REQUIRED.

2.1.2.3 MIL-STD-40051-2A Reference This column provides a reference to the paragraph or appendix in the standard that defines the content requirements named in the TM Content column.

2.1.2.4 Element Name These are the names of text elements or graphic elements (XML tags) that are used to develop the TMs. Refer to MIL-HDBK-2361 for information on Document Type Definitions (DTDs) and corresponding style sheets.

2.1.2 REQUIREMENTS MATRIX COLUMN HEADERS – CONTINUED

NOTE

The following examples are not the complete Requirements Matrix. Refer to MIL-STD-40051-2A (Appendix A) for the complete matrix.

The requiring authority will indicate the types of TMs needed by filling in this space.

MIL-STD-40051-2A
APPENDIX A

TABLE A-II. Operators and combined operator/maintenance requirements matrix for _____.

TM Content	-10	-13 -13&P	-14 -14&P	MIL-STD-40051-2A Reference	Element Name
FRONT MATTER	R	R	R	5.2.1	<paper.frnt>
Front cover	R	R	R	5.2.1.1	<frntcover>
(MC) Promulgation letter					ation>
Warning summary					>
Change transmittal page					t>
List of effective pages/work packages	R	R	R	5.2.1.6	<loepwp>
Title block page	R	R	R	5.2.1.7	<titleblk>
Table of contents	R	R	R	5.2.1.9	<contents>
How to use this manual	R	R	R	5.2.1.10	<howtouse>
CHAPTER 1. GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION	R	R	R	Appendix B	<gim>
GENERAL INFORMATION WORK PACKAGE					<ginfowp>
Scope					<scope>
Maintenance forms, records, and	R	R	R	B.5.2.4	<mfrr>
nent Improvement s (EIR)	R	R	R	B.5.2.5	<eir>
R) manuals				B.5.2.6	<handreceipt>
ion and Control	R	R	R	B.5.2.7	<cpcdata>
Substances				B.5.2.8	<odsdata>
my materiel to e	R	R	R	B.5.2.9	<destructmat>
Preparation for storage or shipment	R	R	R	B.5.2.10	<pssref>
Warranty information				B.5.2.11	<wrntyref>
Nomenclature cross-reference list	R	R	R	B.5.2.12	<nomenreflist>
List of abbreviations/acronyms	R	R	R	B.5.2.13	<loa>
Quality of material	P	R	R	B.5.2.15	<qual.mat.info>
Safety, care, and handling				B.5.2.16	<sftyinfo>
Nuclear hardness				B.5.2.17	<hcp>
Calibration				B.5.2.18	<calref>
Supporting information for repair parts, special tools, TMDE, and support equipment	P			B.5.2.25	<supdata>

"R" or "P" needs to be placed in each shaded box by the requiring authority.

"WORK PACKAGE" in this column indicates this work package shall appear in the TM, in this order (if "R" required.)

In the General Info work package, these indented titles are subheadings to be used within the work package (in this order). Those that are required ("R"), shall appear in TM.

537-0120

Figure 1. Sample of Government-Supplied TM Requirements Matrix (Sheet 1 of 3).

2.1.2 REQUIREMENTS MATRIX COLUMN HEADERS – CONTINUED

MIL-STD-40051-2A
APPENDIX A

TABLE A-II. Operators and combined operator/maintenance requirements matrix for _____.

TM Content	-10	-13 -13&P	-14 -14&P	MIL-STD-40051-2A Reference	Element Name
CHAPTER X. PMCS MAINTENANCE INSTRUCTIONS ***NOTE*** *PMCS is required as a minimum in one maintenance chapter*	R	R	R	Appendix E E.5.2.1	<mim> <pmcscategory>
PMCS INTRODUCTION WORK PACKAGE	R	R	R	E.5.3.4.1	<pmcsintrowp>
PMCS, INCLUDING LUBRICATION INSTRUCTIONS, WORK PACKAGE	R	R	R	E.5.3.4.2	<pmcswp>
CHAPTER X. MAINTENANCE INSTRUCTIONS ***NOTE*** *PMCS is required as a minimum in one maintenance chapter*	R	R	R	Appendix E E.5.2.2 E.5.2.3	<mim> <maintenancepmcscategory> <maintenancecategory>
SERVICE UPON RECEIPT WORK PACKAGE (FIELD LEVEL ONLY)	R				<surwp>
Service upon receipt tasks	R				<surtsk>
Siting					<siting>
Shelter requirements					<shltr>
Service upon receipt of materiel	R	R	R	E.5.3.2.3.3	<surmat>
Installation instructions	R	R	R	E.5.3.2.3.4	<install>
Preliminary servicing of equipment				E.5.3.2.3.4.45	<preserv>
Preliminary checks and adjustment of equipment				E.5.3.2.3.6	<prechkadj>
Preliminary calibration of equipment				E.5.3.2.3.7	<precal>
Circuit alignment					
Ammunition markings					
Classification of defects					fect>
Ammunition handling				E.5.3.2.3.9.3	<ammo.handling>
Procedures to activa					arm>
Additional maintena					other.surtsk>
Follow-on maintena					followon.maintsk>
EQUIPMENT/USER F INSTRUCTIONS WOR					perseqpwp>
PMCS INTRODUCTIO PACKAGE					pmcsintrowp>
PMCS WORK PACKAGE					pmcswp>
MAINTENANCE WORK PACKAGES	R	R	R	E.5.3.5	<maintwp>

In the Service Upon Receipt work package, these indented titles are sub-headings to be used within the work package (in this order). Those that are required ("R"), shall appear in TM.

"R" or "P" needs to be placed in each shaded box by the requiring authority.

Arrange maintenance work packages in order of the Maintenance Allocation Chart, then ordered by function. (See Figure 1, Sheet 3 of 3) to determine function order. For example, "Remove" is before "Install" under the Maintenance tasks heading, so the Removal work package for a component is before the Installation work package for the same component in the TM.

527-0121

Figure 1. Sample of Government-Supplied TM Requirements Matrix (Sheet 2 of 3).

2.1.2 REQUIREMENTS MATRIX COLUMN HEADERS – CONTINUED

MIL-STD-40051-2A
APPENDIX A

TABLE A-II. Operators and combined operator/maintenance requirements matrix for _____.

TM Content	-10	-13 -13&P	-14 -14&P	MIL-STD-40051-2A Reference	Element Name
Maintenance tasks	R	R	R	E.5.3.5.3	<maintsk>
Inspect				E.5.3.5.3.2	<inspect>
Test				E.5.3.5.3.3	<test>
Service				E.5.3.5.3.4	<service>
Adjust				E.5.3.5.3.4	<adjust>
Align				E.5.3.5.3.6	<align>
Calibrate				E.5.3.5.3.7	<calibration>
Remove				E.5.3.5.3.8	<remove>
Install					
Replace					
Repair					
Paint					
Overhaul					
Rebuild					
Lubricate				E.5.3.5.3.15	<lube>
Mark				E.5.3.5.3.16	<mark>
Pack				E.5.3.5.3.17	<pack>
Unpack				E.5.3.5.3.18	<unpack>
Preserve				E.5.3.5.3.19	<preserv>
Prepare for use				E.5.3.5.3.20	<prepforuse>
Assemble				E.5.3.5.3.21	<assem>
Disassemble				E.5.3.5.3.22	<disassem>
Clean				E.5.3.5.3.23	<clean>
Nondestructive inspection				E.5.3.5.3.24	<ndi>
Radio interference suppression				E.5.3.5.3.25	<ris>
Place in service				E.5.3.5.3.26	<pis>
Towing				E.5.3.5.3.27	<tow>
Jacking				E.5.3.5.3.28	<jack>
Parking				E.5.3.5.3.29	<park>
Mooring				E.5.3.5.3.30	<moor>
Covering				E.5.3.5.3.31	<cover>
Hoisting				E.5.3.5.3.32	<hoist>
Sling loading				E.5.3.5.3.33	<sling>
External power				E.5.3.5.3.34	<extpwr>
Preparation for shipment and storage				E.5.3.5.3.36	<pss>
Arm				E.5.3.5.3.37	<arm>
Load				E.5.3.5.3.38	<load>
Unload				E.5.3.5.3.39	<unload>
Software maintenance				E.5.3.5.3.40	<softwaremaint>
Additional maintenance task				E.5.3.5.3.41	<other.maintsk>
Follow-on maintenance				E.5.3.5.3.42	<followon.maintsk>
GENERAL MAINTENANCE WORK PACKAGE				E.5.3.7	<gen.maintwp>
LUBRICATION INSTRUCTIONS WORK PACKAGE				E.5.3.8	<lubewp>

Under the Maintenance tasks heading, these indented titles are maintenance functions that will be developed as individual work packages.

"AR" may be placed in these Maintenance tasks shaded boxes by the requiring authority, to allow for development of the maintenance concept.

537-0122

Figure 1. Sample of Government-Supplied TM Requirements Matrix (Sheet 3 of 3).

2.1.2 REQUIREMENTS MATRIX COLUMN HEADERS – CONTINUED

BLOCK ENTRY	DEFINITION	EXPLANATION
R	REQUIRED	This means that the information contained in this row is mandatory content in the manual and must be present.
P	PROHIBITED	This means that the information cannot be included in the manual.
AR	AS REQUIRED	This means that the information may be included if deemed necessary by either the acquiring agency or by the contractor during the fulfillment of the contract.
CHAPTER X		If an entry of Chapter X appears in the TM CONTENT column, it means that at least one of the defined chapters must be present in the manual.

537-0128

Figure 2. Codes for Filled and Open Blocks.

For Further Explanation

1. MIL-STD-40051-2A, Appendix A
2. MIL-HDBK-1222D
3. MIL-HDBK-2361

2.2 MATRIX USE

2.2.1 COMPLETED MATRIX The completed Technical Manual Content Requirements Matrix becomes contractually binding when included in a contract, statement of work, or any other contractual instrument. The contractor will use the completed matrix to develop TM outlines and refine the content of the manual. The requirements matrix will be completed by the government and included in the initial solicitation. This matrix will ultimately become part of the contract.

2.2.2 TAILORING Certain elements of the TM Requirements Matrix are optional and need to be assessed by the acquiring activity to determine which elements must be included in the TM. See paragraph 2.2.4.2 below.

2.2.3 PUBLICATION TITLES All technical manual titles start with the words "TECHNICAL MANUAL" and continue with the additional parts of the title as shown in Table A-I of MIL-STD-40051-2A. Depot Maintenance Work Requirements (DMWR) and National Maintenance Work Requirements (NMWR) are exceptions to this rule and their complete titles shall be as shown in Table A-I of the standard. If RPSTL information contains depot-level parts or depot special tools, the title will include this information (example: Field and Sustainment Manual with Repair Parts and Special Tools List including Depot Repair Parts and Special Tools).

PUB TYPE	TITLE	APPLICABLE TABLE
EXCLUDING CONVENTIONAL AND CHEMICAL AMMUNITION		
-10	Operator's Manual for *insert system*	Table A-II
-13	Operator and Field Maintenance Manual *insert system*	Table A-II
-13&P	Operator and Field Maintenance Manual including Repair Parts and Special Tool List for *insert system*	Table A-II

537-0129

Figure 1. Sample of Publication Type and Title.

2.2.4 COMPLETING THE MATRIX

2.2.4.1 Type of TMs Required Once the type of TM(s) has been determined, the associated Requirements Matrix will be tailored.

2.2.4.2 Filling Open Blocks The blocks within the tables that already contain a definition cannot be changed. Empty blocks and shaded blocks are considered open blocks. For each type of TM selected, the acquiring activity will indicate in the open blocks the "TM" content by entering an "R" for "REQUIRED" content or a "P" for content that is "PROHIBITED". All blocks for the selected TM types in TABLE A-II through TABLE A-XIV must be completed with an "R" or a "P" for each TM acquisition.

2.2.4 COMPLETING THE MATRIX – CONTINUED

2.2.4.3 Remarks Page A remarks page may be added to the end of the completed table if it is necessary for the acquiring activity to provide the contractor additional information, guidance, or explanation of elements contained within the table. For example, a remarks page may be used if there are elements of the manual that will be provided as Government Furnished Information (GFI).

For Further Explanation

1. MIL-STD-40051-2A, Appendix A
2. MIL-HDBK-1222D

CHAPTER 3

PROCEDURAL GUIDELINES

3.1 WORK PACKAGE LAYOUT/CONTENT/PROCEDURAL TITLES

3.1.1 MAINTENANCE WORK PACKAGE LAYOUT Maintenance work packages will all have the same basic layout with the following content:

- Title Block (see paragraph 3.1.5.1)
- Initial Setup requirements (see paragraph 3.2)
- Procedural Steps (see paragraph 3.1.5.6) and illustrations (see paragraph 3.6)
- Follow-On Maintenance (see paragraph 3.1.5.9)

3.1.1 MAINTENANCE WORK PACKAGE LAYOUT – CONTINUED

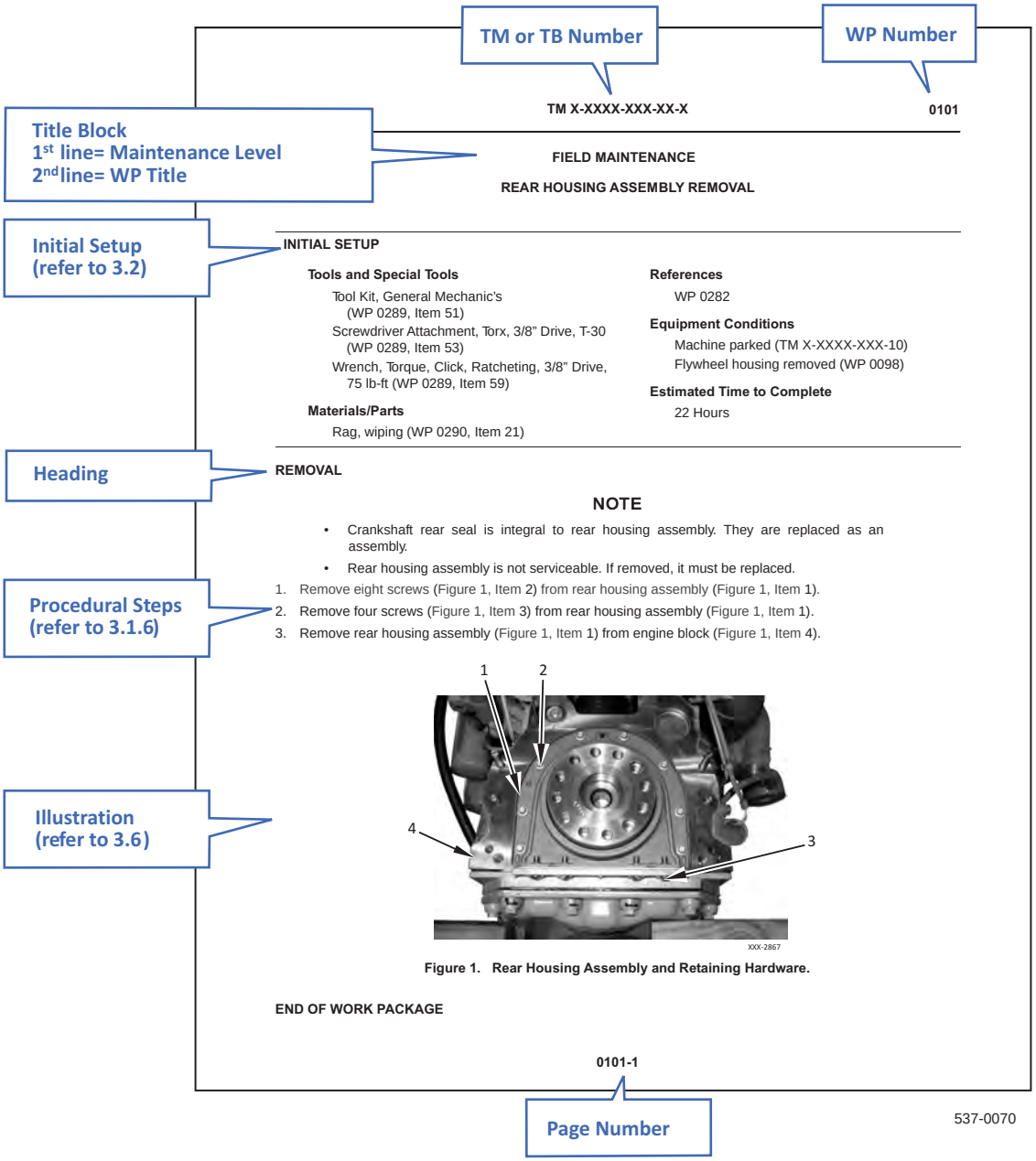


Figure 1. Example of Maintenance Work Package Layout.

3.1.2 OPERATION WORK PACKAGE LAYOUT Operation work packages will all have the same basic layout with the following content:

- Title Block (see paragraph 3.1.5.1)
- Initial Setup requirements (see paragraph 3.2)
- Procedural Steps (see paragraph 3.1.5.6) and illustrations (see paragraph 3.6)

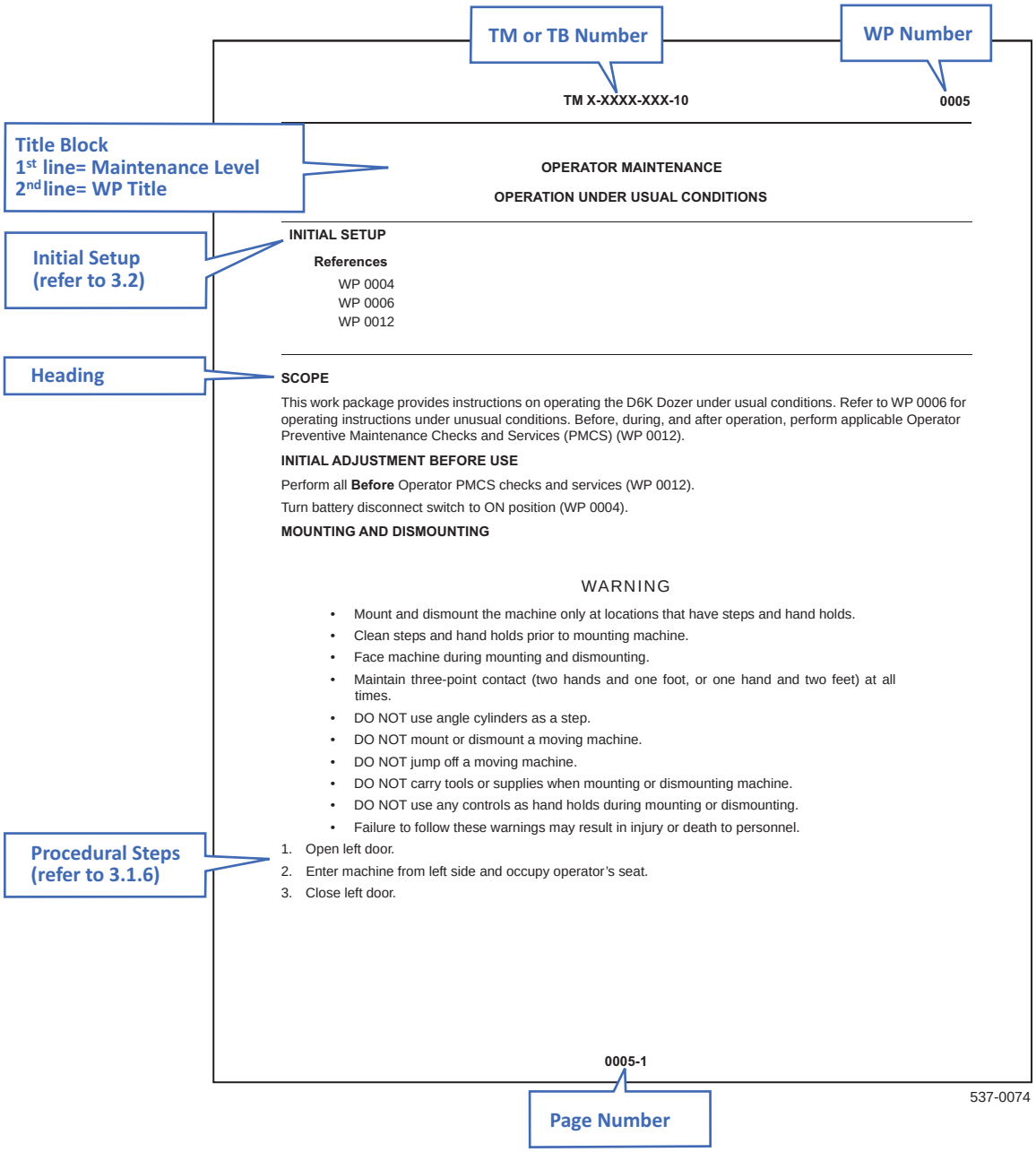


Figure 2. Example of Operation Work Package Layout (Page 1 of 6).

3.1.2 OPERATION WORK PACKAGE LAYOUT – CONTINUED

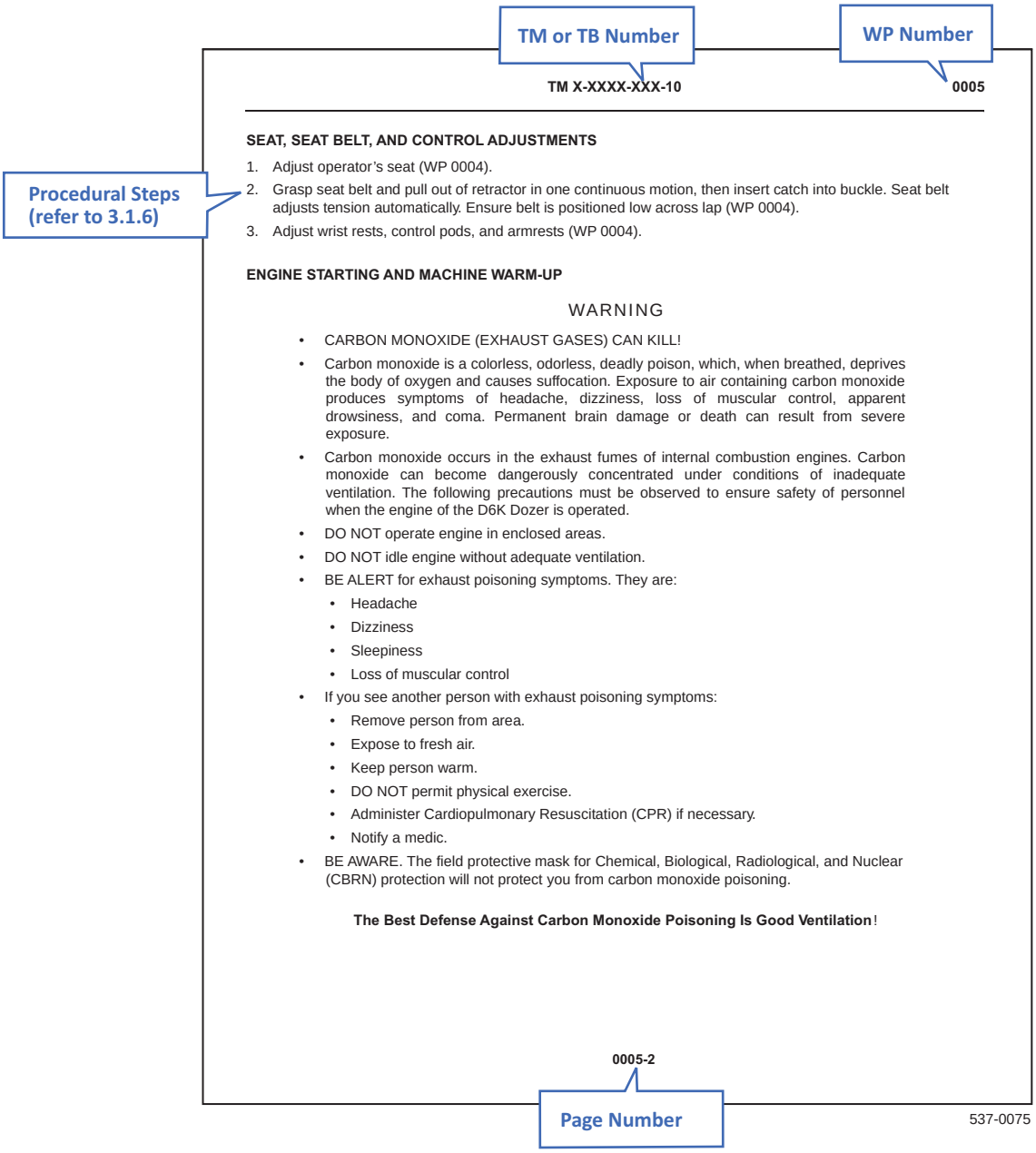


Figure 2. Example of Operation Work Package Layout (Page 2 of 6).

3.1.2 OPERATION WORK PACKAGE LAYOUT – CONTINUED

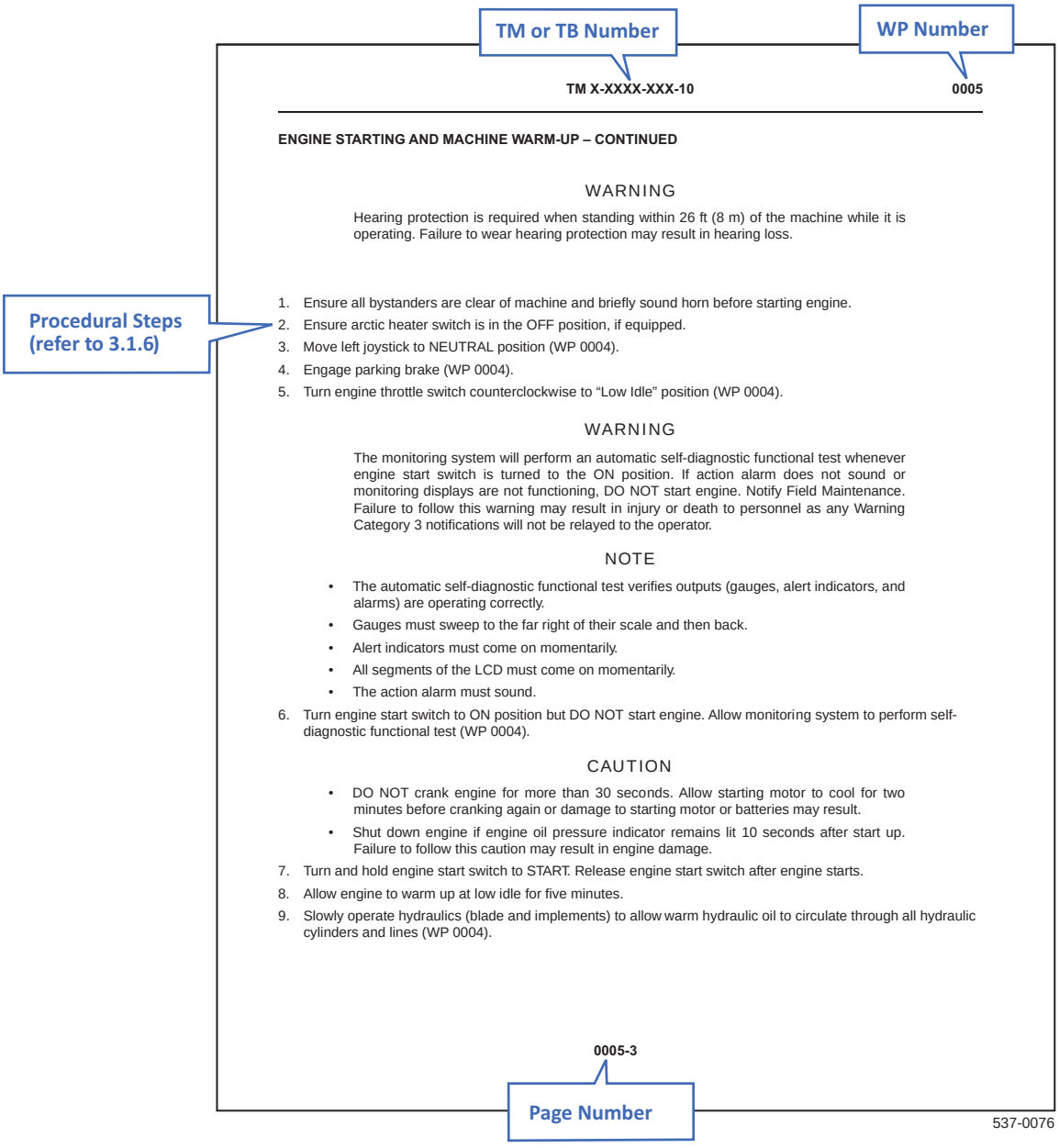


Figure 2. Example of Operation Work Package Layout (Page 3 of 6).

3.1.2 OPERATION WORK PACKAGE LAYOUT – CONTINUED

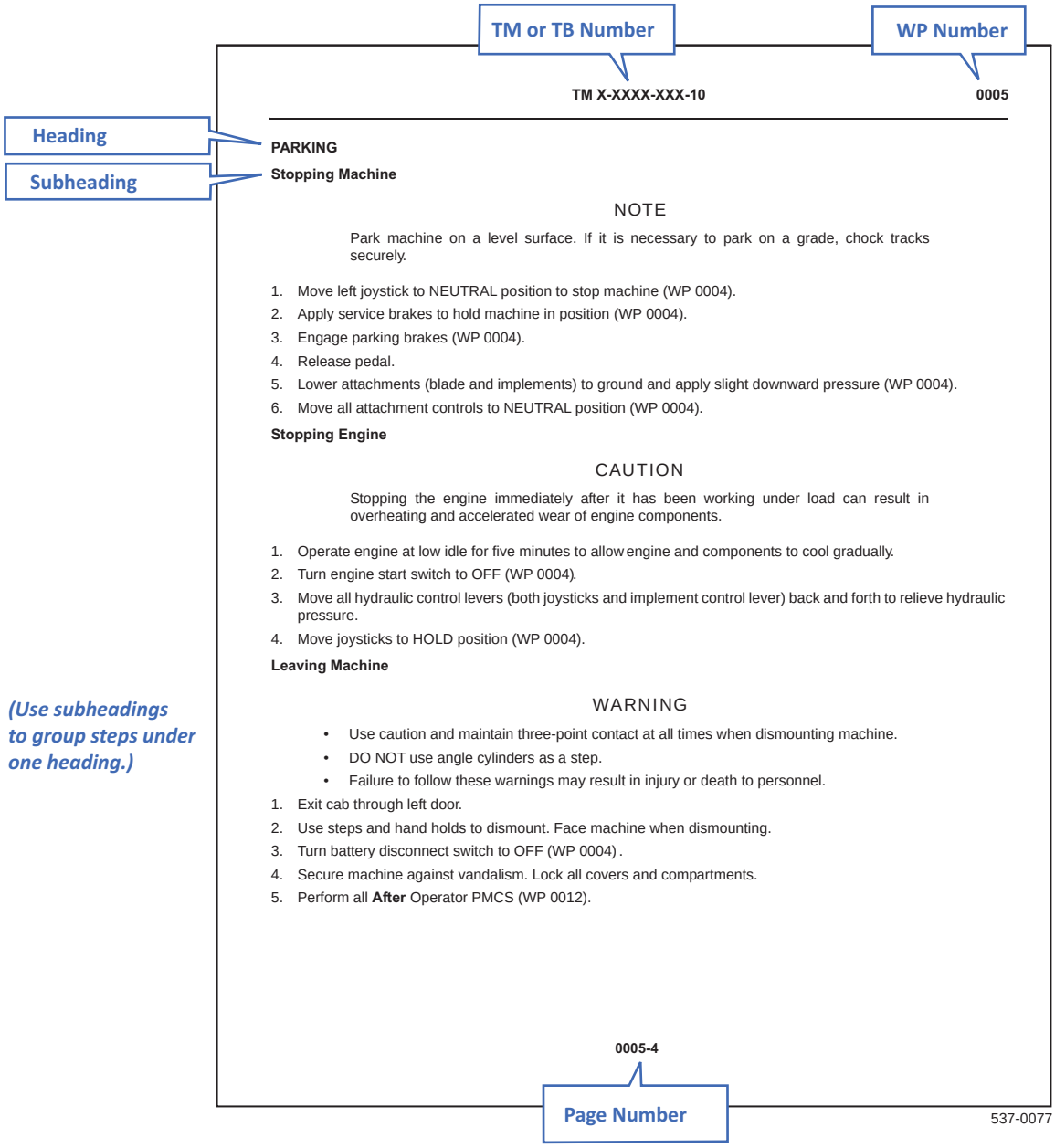


Figure 2. Example of Operation Work Package Layout (Page 4 of 6).

3.1.2 OPERATION WORK PACKAGE LAYOUT – CONTINUED

TM or TB Number

WP Number

TM X-XXXX-XXX-XX 0005

TRANSMISSION AND STEERING CONTROL

WARNING

- To prevent injury, ensure that no personnel are working on or near machine.
- To prevent injury, keep the machine under control at all times.
- Reduce ground speed when you maneuver in tight quarters or when you are going over a hill.
- Select an appropriate ground speed before you start downhill. When you go downhill, use the same speed that would be used to go uphill. DO NOT allow the engine to overspeed when you go downhill.
- Use brake/deceleration pedal or ground speed control wheel to reduce ground speed.
- To bring machine to a stop, move left joystick to HOLD position or depress brake/ deceleration pedal past detent spring.
- Failure to follow these warnings may result in injury or death to personnel.

Narrative Text

Include descriptive text when further clarification will help the user.

The machine has a hydrostatic drive system that transfers power from the engine to the tracks, eliminating the need for a conventional transmission. Hydrostatic drive function (forward or reverse machine directional control) is controlled by left joystick fore/aft movement.

In straight line driving, both tracks rotate at identical speeds. To cause the machine to turn, one track must be slowed or sped up in relation to the other track. Steering function is controlled by left joystick side-to-side movement.

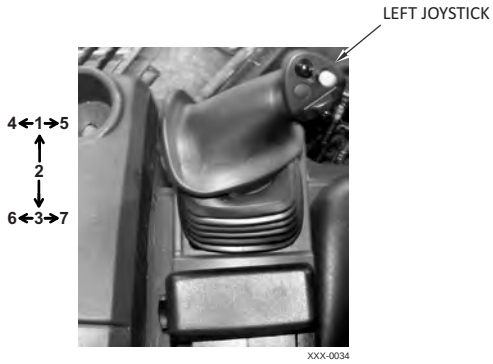


Figure 3. Left Joystick Transmission and Steering Control.

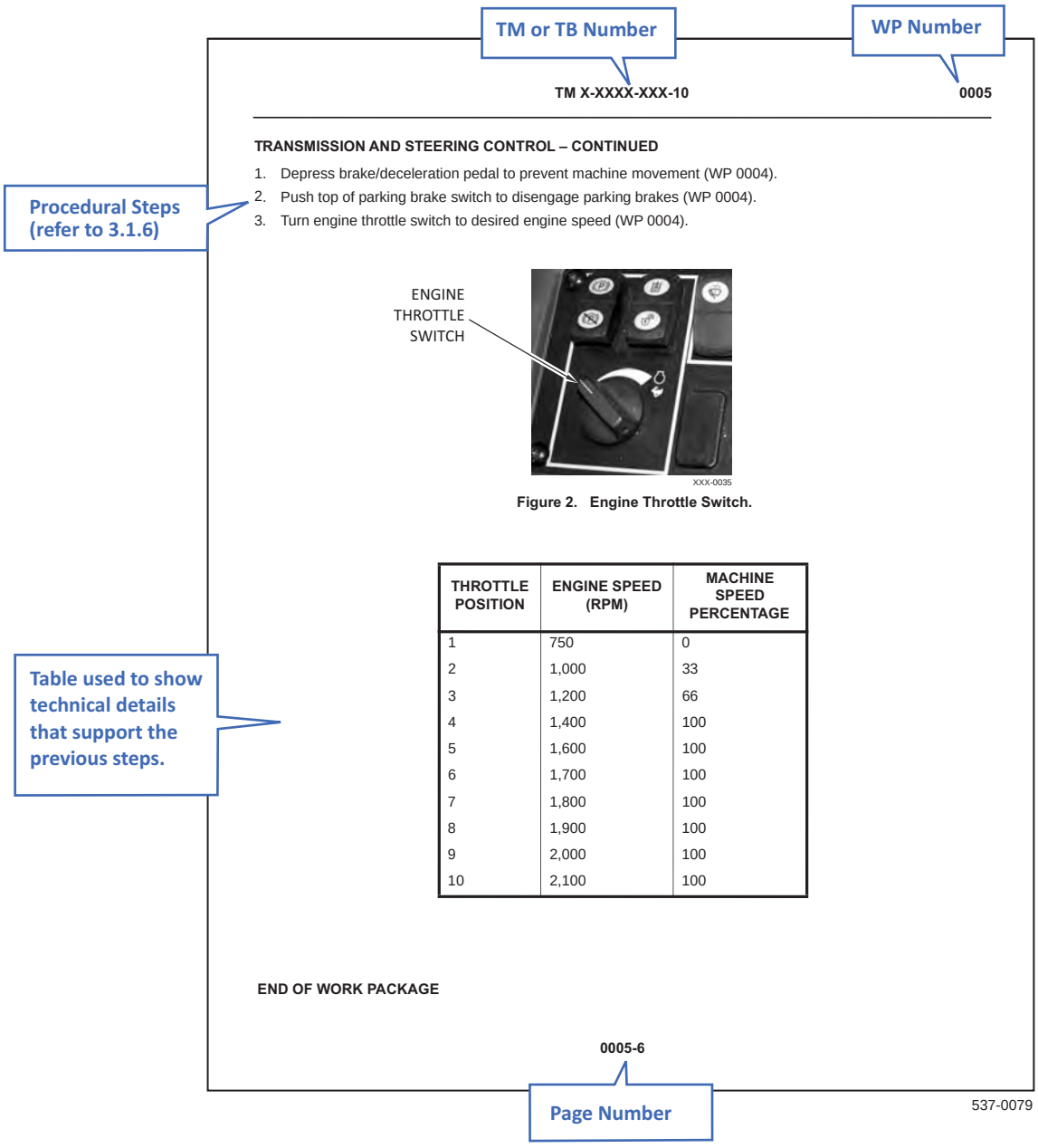
0005-5

Page Number

537-0078

Figure 2. Example of Operation Work Package Layout (Page 5 of 6).

3.1.2 OPERATION WORK PACKAGE LAYOUT – CONTINUED



THROTTLE POSITION	ENGINE SPEED (RPM)	MACHINE SPEED PERCENTAGE
1	750	0
2	1,000	33
3	1,200	66
4	1,400	100
5	1,600	100
6	1,700	100
7	1,800	100
8	1,900	100
9	2,000	100
10	2,100	100

Figure 2. Example of Operation Work Package Layout (Page 6 of 6).

3.1.3 PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) WORK PACKAGE LAYOUT

PMCS work packages will all have the same basic layout with the following content:

- Title Block (see paragraph 3.1.5.1)
- Initial Setup requirements (see paragraph 3.2)
- PMCS Table

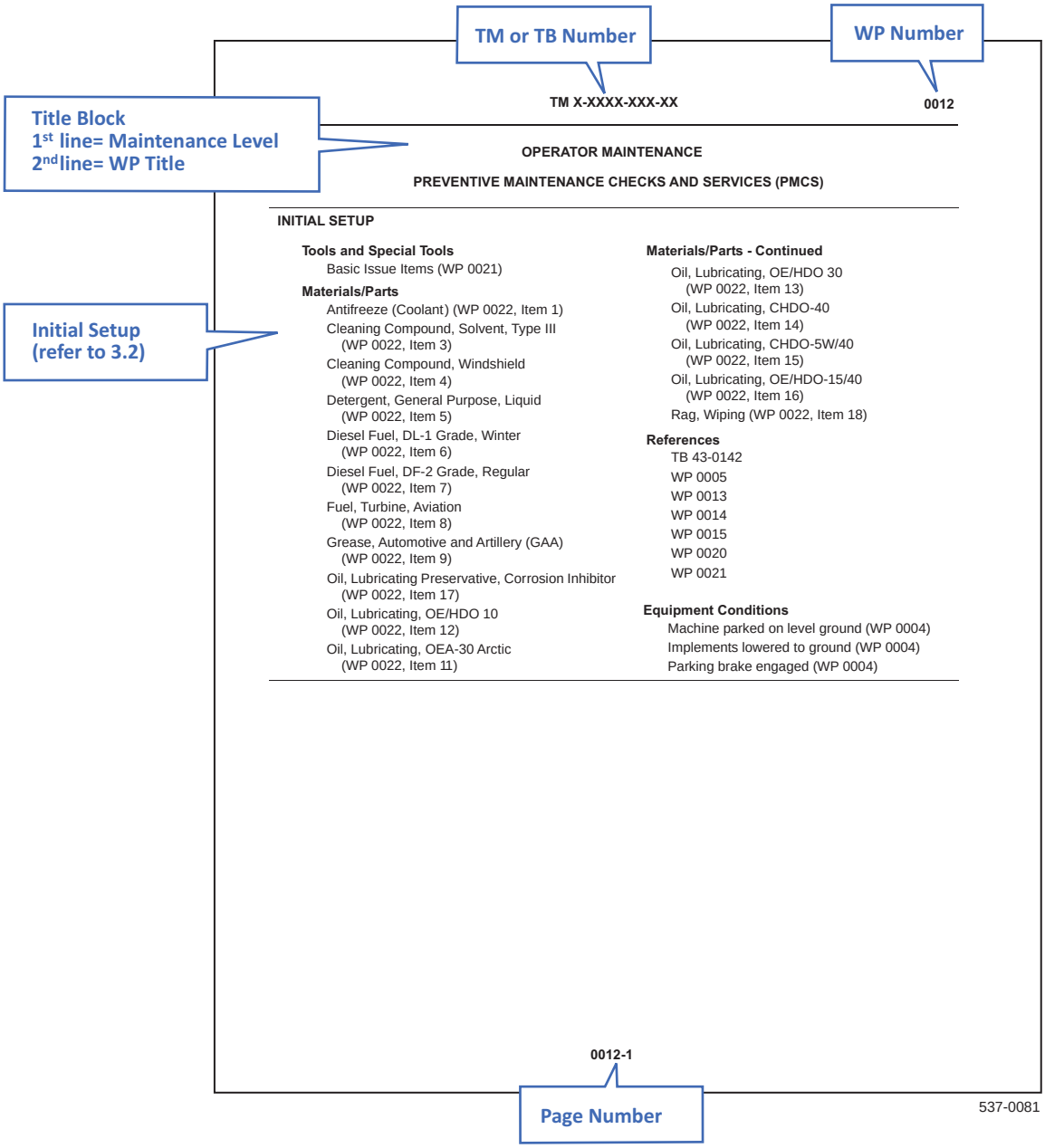


Figure 3. Example of a PMCS Work Package Layout (Page 1 of 3).

3.1.3 PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) WORK PACKAGE LAYOUT – CONTINUED

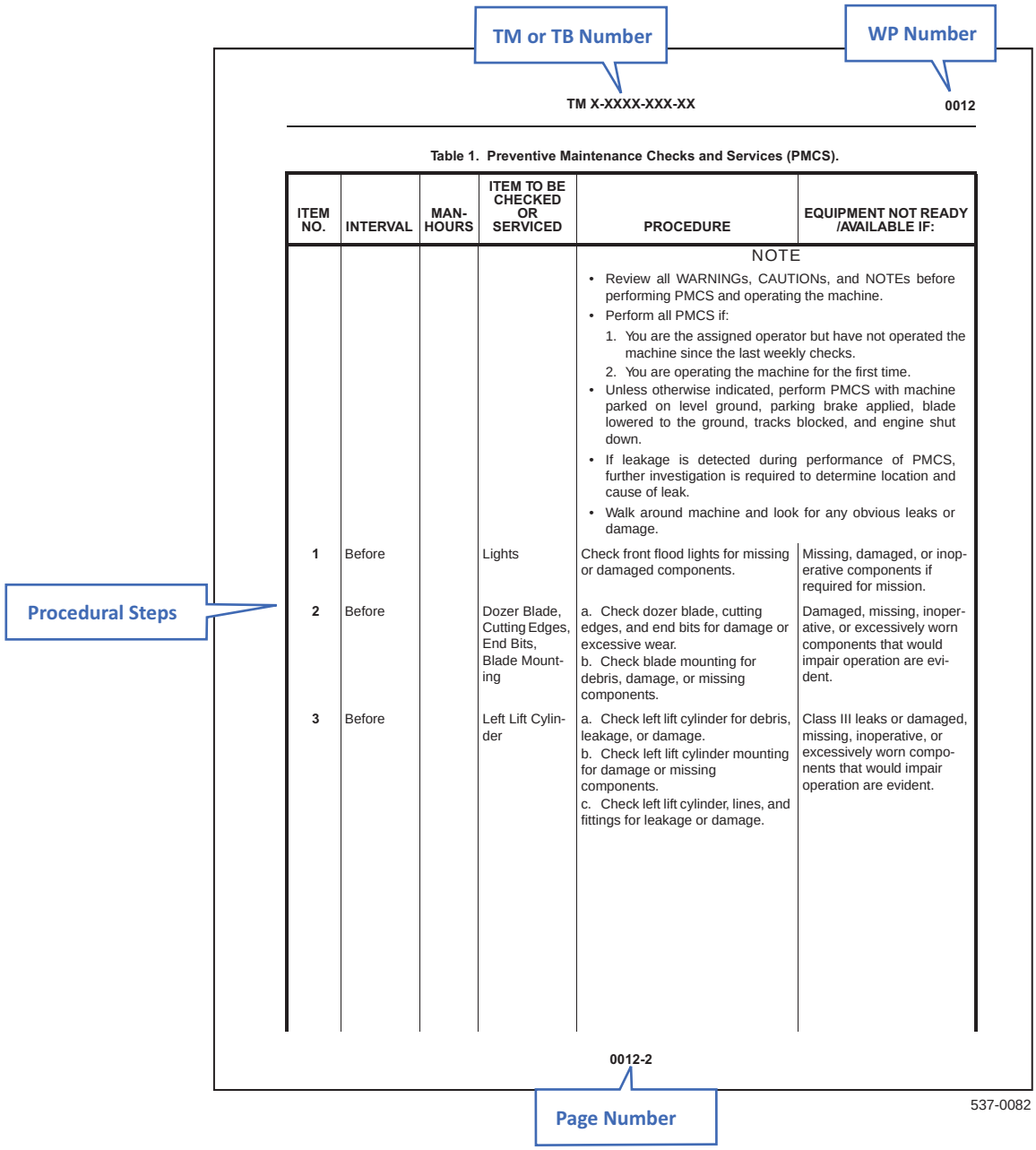


Table 1. Preventive Maintenance Checks and Services (PMCS).

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY /AVAILABLE IF:
				NOTE • Review all WARNINGs, CAUTIONs, and NOTEs before performing PMCS and operating the machine. • Perform all PMCS if: 1. You are the assigned operator but have not operated the machine since the last weekly checks. 2. You are operating the machine for the first time. • Unless otherwise indicated, perform PMCS with machine parked on level ground, parking brake applied, blade lowered to the ground, tracks blocked, and engine shut down. • If leakage is detected during performance of PMCS, further investigation is required to determine location and cause of leak. • Walk around machine and look for any obvious leaks or damage.	
1	Before		Lights	Check front flood lights for missing or damaged components.	Missing, damaged, or inoperative components if required for mission.
2	Before		Dozer Blade, Cutting Edges, End Bits, Blade Mounting	a. Check dozer blade, cutting edges, and end bits for damage or excessive wear. b. Check blade mounting for debris, damage, or missing components.	Damaged, missing, inoperative, or excessively worn components that would impair operation are evident.
3	Before		Left Lift Cylinder	a. Check left lift cylinder for debris, leakage, or damage. b. Check left lift cylinder mounting for damage or missing components. c. Check left lift cylinder, lines, and fittings for leakage or damage.	Class III leaks or damaged, missing, inoperative, or excessively worn components that would impair operation are evident.

Figure 3. Example of a PMCS Work Package Layout (Page 2 of 3).

3.1.3 PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) WORK PACKAGE LAYOUT – CONTINUED

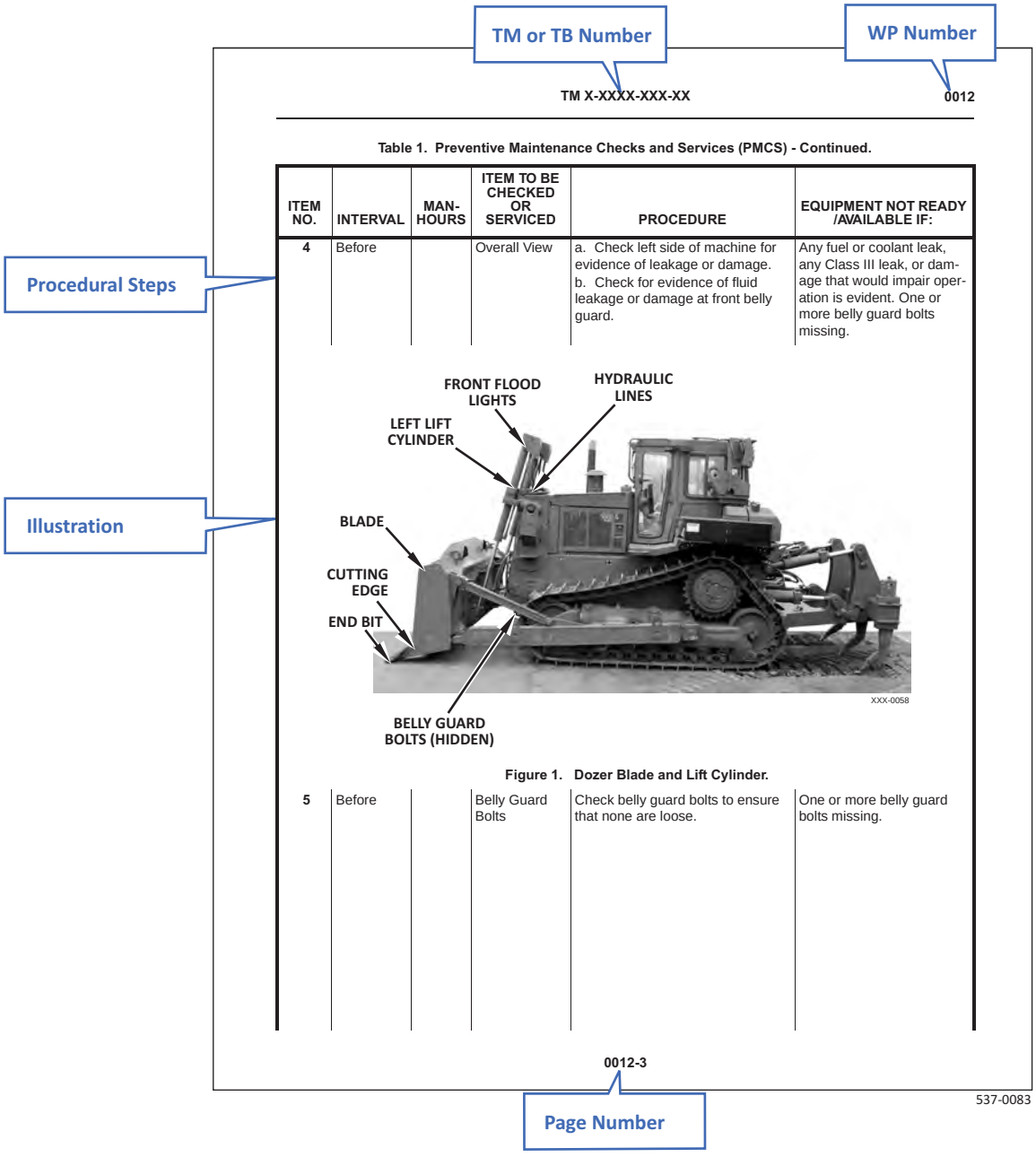


Table 1. Preventive Maintenance Checks and Services (PMCS) - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY /AVAILABLE IF:
4	Before		Overall View	a. Check left side of machine for evidence of leakage or damage. b. Check for evidence of fluid leakage or damage at front belly guard.	Any fuel or coolant leak, any Class III leak, or damage that would impair operation is evident. One or more belly guard bolts missing.

Figure 1. Dozer Blade and Lift Cylinder.

5	Before		Belly Guard Bolts	Check belly guard bolts to ensure that none are loose.	One or more belly guard bolts missing.

Figure 3. Example of a PMCS Work Package Layout (Page 3 of 3).

3.1.4 RPSTL WORK PACKAGE LAYOUT

- Each stand-alone RPSTL TM, or RPSTL chapter in a combined manual, shall contain at least one repair parts list work package.
- For less complex equipment with a small RPSTL, the RPSTL may be contained in a single work package or a few work packages.
- For complex equipment, each RPSTL work package shall have one figure and one parts list. The figure may have multiple sheets.
- All RPSTL work packages shall start on a right-hand page.
- When both the figure and parts list will fit on a single page, they shall be placed on the first page of the work package.
- When the figure and parts list cannot be included on a single page, the figure illustration must be on the left-hand page preceding the associated parts list.
- Blank pages in a RPSTL can be used on both left-hand and right-hand pages to attain the applicable layout based on the number of illustration and parts list pages contained in a RPSTL figure. (See MIL-STD-40051-2A Appendix F, Figure 1 for examples of RPSTL page layout.)

3.1.5 WORK PACKAGE CONTENT

3.1.5.1 Title Block The title block is located at the beginning of the work package. The title block contains the following information:

- Technical Manual (TM) Number or Technical Bulletin (TB) Number
- Maintenance Level
- Work Package Title

3.1.5.2 Technical Manual (TM) Number or Technical Bulletin (TB) Number Document number assigned to manual. This information is repeated on each page of the technical publication.

3.1.5.3 Work Package Number Four-digit number assigned to the work package, located in the upper right-hand corner of the page (both right-hand and left-hand pages). Work package numbers are sequentially numbered throughout the manual beginning with 0001. Work packages added as the result of a change package will use a decimal point and number after the four-digit number when inserted between two existing work packages. This information is repeated on each page of the work package.

- For example, if a new work package needed to be inserted between 0001 and 0002, the new work package would be numbered 0001.1.

3.1.5.4 Work Package Title A maintenance work package title contains the component(s) covered and the maintenance function performed in the work package. The name of a work package shall be descriptive of the procedure covered within it. See Section 3.8 for an authorized list of maintenance functions.

- For example, a work package to remove an Alternator should be titled “Alternator Removal.”

3.1.5 WORK PACKAGE CONTENT – CONTINUED

3.1.5.5 Initial Setup Requirements Equipment conditions and other information required to perform the procedure (see paragraph 3.2).

3.1.5.6 Procedural Steps Procedural steps required to complete the maintenance procedure (see paragraph 3.1.6).

3.1.5.7 Illustrations Photographs or line art used to clarify procedural steps (see paragraph 3.6).

3.1.5.8 Page Numbers Located at the bottom center of the page. Page numbers have the work package number, followed by a dash, then a sequential number for the page.

3.1.5.9 Follow-On Maintenance The content of Follow-On Maintenance will vary depending on the type of work package.

- "Removal" or "Disassembly" type work package must reference the associated "Installation" or "Assembly" work package.
- "Installation" or "Assembly" type work packages are required to return equipment to a ready condition. In most cases, these steps will mirror the equipment conditions of the Removal or Disassembly work package and can include additional work packages, such as calibration or test.
- They can be work package references or steps required to complete the procedure.
- Notice that the Follow-On Maintenance verb tense is different than the Equipment Condition verb tense. Use "Install hood," *not* "Hood installed."

3.1.5.10 Scope Defines topics and procedures covered within the work package.

3.1.5.11 Hydraulic Hose Maintenance Work Package Critical routing must be covered, and source and destination must be identified. It is very important to note specific/critical routing. Clamping hardware may be covered in general content type procedures. Refer to the Hydraulic Hose Maintenance sample in Appendix A that contains three required work packages necessary to cover the maintenance details. The introductions of each of these work packages describe the content. The three work package titles are:

- Hydraulic Hose Maintenance (place in Maintenance chapter)
- Hydraulic Hose Index (place in Supporting Information chapter)
- Hydraulic Hose Reference (place in Supporting Information chapter immediately following the Hydraulic Hose Index work package)

3.1.5.12 Lifting/Jacking Work Packages Maintenance manuals shall include a work package for supporting the equipment safely on jack stands as appropriate. Raising the entire piece of equipment off the ground is not necessary for all systems. Proper location of jack stands shall be illustrated for all four corners of equipment. Custom lifting/jacking procedures may be included within other maintenance procedures to accommodate special instances.

3.1.5.13 Operation Work Package Content Work package will cover operation of equipment. There are two basic types of operation work packages: Operation Under Usual Conditions and Operation Under Unusual Conditions:

- Operation Under Usual Conditions covers operation of the equipment in normal environments and conditions.

3.1.5 WORK PACKAGE CONTENT – CONTINUED

- Operation Under Unusual Conditions covers operation of the equipment in environments and conditions that are not normal, such as extreme temperatures or extreme situations.

3.1.5.14 PMCS Work Package Content Work package covers scheduled maintenance items such as inspections, checks, and service type maintenance functions. The body of the work package is in table format and separated into a logical sequence by location and/or frequency of the task.

3.1.5.15 Maintenance Work Package Content Work packages should cover a complete, stand-alone procedure. A maintenance work package will only contain one maintenance function (e.g., “Removal” or “Installation”). Maintenance functions such as “Replace” and “Repair” are not considered to be a group of maintenance functions. The intent of MIL-STD 40051-2A is to have only one maintenance function in a work package.

3.1.5.15.1 The maximum length of a work package is 30 pages (per MIL-STD-40051-2A). See section 3.1.6 for more information on procedural content.

3.1.5.16 Mechanical General Maintenance Instructions Include a *Mechanical General Maintenance Instructions* work package in the maintainer chapter. Include a description of each of the following:

- Work Safety
- Relieving Hydraulic System Pressure
- Cleaning Instructions
  - Air Cleaner and Filter Cleaning
  - Cleaning Hoses
- Inspection Instructions
- Repair Instructions
- Lubrication Instructions
- Standard Tool Requirements
- Applying Torque
- Tagging Instructions for Wires and Hoses
- Fluid Disposal

3.1.5.17 Electrical General Maintenance Instructions Include an *Electrical General Maintenance Instructions* work package in the maintainer chapter. Include a description of each of the following:

- Multimeter Testing (Zero Out)
- Wiring Harness Connectors Specific to Equipment
  - How to Unlock, Disconnect, Connect, and Lock
- Wiring and Connection and Terminal Inspection
- Measuring Resistance
- Measuring Voltage
- Measuring Frequency and Duty Cycle
- Testing Continuity
- Testing for Open Circuits and Shorted Circuits

3.1.5 WORK PACKAGE CONTENT – CONTINUED

- Testing Diodes, Relays, and Circuit Breakers
- Wiring Repair

3.1.6 PROCEDURAL

3.1.6.1 Maintenance Procedural Steps Procedural steps are the steps required to perform a complete procedure.

3.1.6.1.1 Procedural Steps Should Meet the Following Criteria

- Steps should be as short and concise as possible. Avoid removing multiple components in one step.
- Steps shall begin with an action such as “Remove,” “Install,” or “Lubricate.”
- Steps should not contain supplemental information. Use Notes, Cautions, and Warnings when additional information is required to perform the step (see paragraph 3.5).
- Installation and assembly steps shall be in the reverse order of the removal or disassembly steps (unless there is a technical reason to alter the order).
- Specify torque values when non-standard torque is required.
- Specify torque values when precise torque is critical for safe operation of the equipment.
- Specify tightening sequence when non-standard tightening sequence is required.
- Steps shall reference callouts in illustrations by figure and callout number (see paragraph 3.7).
- Each component mentioned in a step shall include a callout reference to an illustration that is located within +/- 2 pages of the step. If the same component is used a second time in a step, figure and item number are not required for the second occurrence.
- Component/part names within procedures shall be the same names that are used in the RPSTL and the MAC.
- Only reference another work package to perform steps if all steps with the referenced work package must be completed.
- General work packages covering multiple/like items are not allowed. Procedures shall include detailed steps with illustrations that are specific to the component.
- Do not group parts by quantity if those parts have different part numbers; e.g., bolts that are different sizes, see Figure 4.

3.1.6 PROCEDURAL – CONTINUED

Bolts have different callouts because they are different sizes.

1. Remove eight bolts (Figure 1, Item 2) from rear housing assembly (Figure 1, Item 1).
2. Remove four bolts (Figure 1, Item 3) from rear housing assembly (Figure 1, Item 1).
3. Remove rear housing assembly (Figure 1, Item 1) from engine block (Figure 1, Item 4).

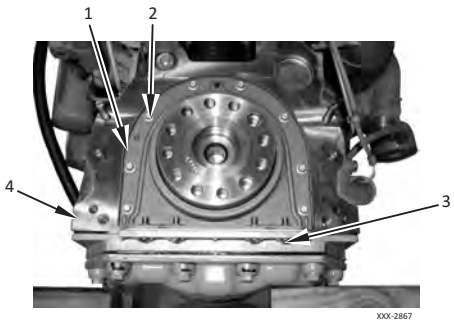


Figure 1. Rear Housing Assembly and Retaining Hardware.

END OF WORK PACKAGE

0101-1

537-0123

Figure 4. Example of Procedural Steps with Different Sizes of the Same Hardware.

3.1.6.1.2 At the end of the work package, “END OF WORK PACKAGE” will appear.

For Further Explanation

MIL-STD-40051-2A

3.2 INITIAL SETUP INFORMATION

3.2.1 INITIAL SETUP PURPOSE The intent of the Initial Setup is to provide necessary information about who can perform the work package, what tools are needed to perform the work package, and what other work packages need to be completed prior to starting the work package. In order for this information to be complete and helpful, each item needs to be referenced to a work package that contains details about the item or a reference to procedures that contain necessary steps. These references can be in the form of an internal reference (within the same manual) or an external reference (to another manual). An exception to this may be listing of "common shop items" that are known to be on hand, such as a lifting device.

3.2.2 INITIAL SETUP REFERENCING

3.2.2.1 Internal Reference

- Reference to a work package: (WP 0054)
- Reference to a specific item number in a list: (WP 0305, Item 14)
- Reference to an item in a table: (WP 0306, Table 1, Item 14). *Only used if there is more than one table in the referenced work package.*

3.2.2.2 External Reference

- Reference to another manual by its publication number: (TM 5-3805-266-10)
- It is allowable to reference a RPSTL (TM number, Figure Number, and Item Number) from a maintenance manual (TM-23), but only within the same series of manuals.

3.2.3 INITIAL SETUP ORDER Refer to paragraphs 3.2.4 through 3.2.12.

3.2.4 MAINTENANCE LEVEL

3.2.4.1 This heading is not required. The maintenance level is stated in the work package header (above the work package title).

3.2.5 TEST EQUIPMENT

3.2.5.1 This category is rarely used, and only if required by the Government. Test equipment items are normally listed under the Tools and Special Tools heading.

3.2.5.2 List each piece of equipment (in alphabetical order).

3.2.5.3 Each piece of equipment must reference an item number in the Tool Identification List work package.

3.2.6 TOOLS AND SPECIAL TOOLS

3.2.6.1 List the General Mechanic's Tool Kit (GMTK) first (if applicable).

3.2.6 TOOLS AND SPECIAL TOOLS – CONTINUED

3.2.6.2 This is followed by any other user-issued tool kits (in alphabetical order).

3.2.6.3 These are followed by individual tools (in alphabetical order):

- Tools used from an authorized tool set.
- TMDE items (don't forget TMDE items from tool kits and tool sets).
- Special tools.

3.2.6.4 For each tool kit and tool, reference the Tool Identification List work package, (sometimes) a table, and its item number.

3.2.6.5 **Special Tools** Defined as any tool required to complete the procedure that is not part of an authorized tool set or user-issued tool kit, such as a thin profile wrench needed to fit in a confined space. Refer to AR 70-1 and contract language for system-specific requirements.

3.2.6.6 See *Tool Referencing,* paragraph 3.3, for necessary items to be included here.

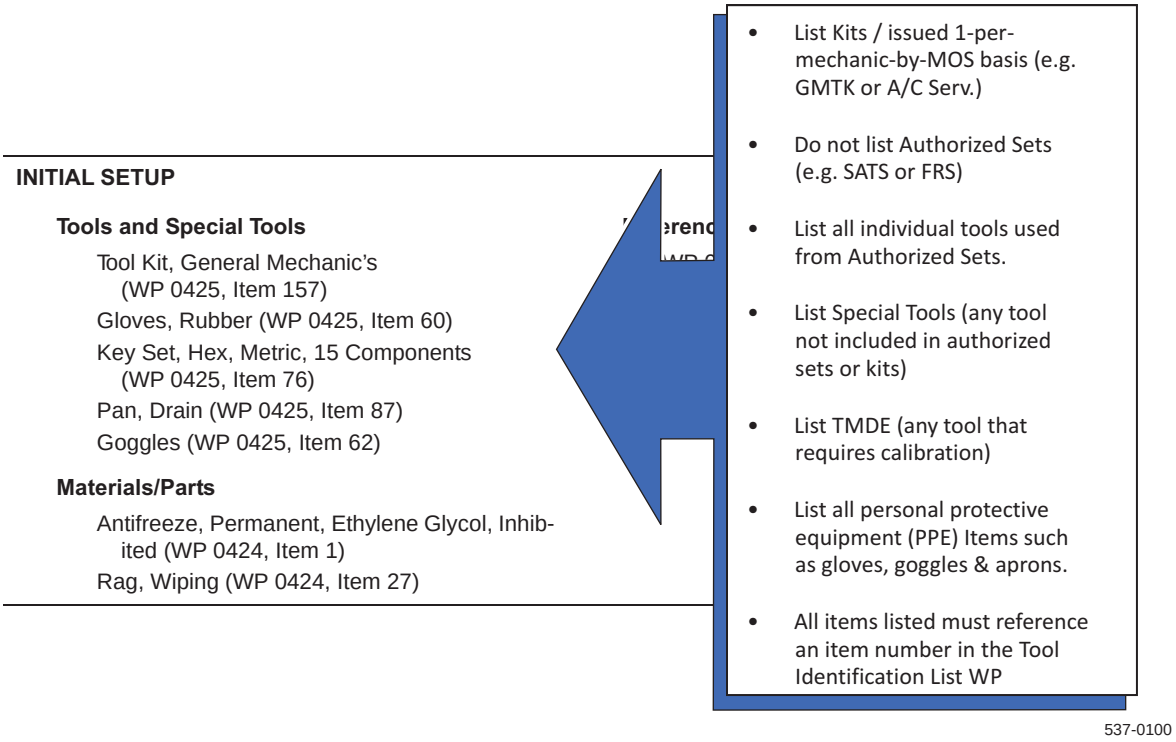


Figure 5. Example of Tools and Special Tools - How Items Should Be Arranged.

3.2.7 MATERIALS/PARTS All items under this heading must reference the item within the Expendables and Durable Items List (EDIL) work package, the Mandatory Replacement Parts (MRP) work package, or the RPSTL work package when the RPSTL is included within same TM (&P).

3.2.7.1 List Expendable/Durable Items (in alphabetical order)

- For each entry, reference the EDIL work package and its item number.

3.2.7.2 Mandatory Replacement Parts (MRPs) Listing

- Maintenance manuals (alphabetical order):
  - Reference the MRP work package number and the item number.
  - If quantity is more than 1, enter the quantity in Arabic numerals after each MRP
  - Each MRP should be singular, regardless of the quantity:
    * Gasket (WP 00303, Item 21) Qty: 4
    * Locknut (WP 00303, Item 32) Qty: 2
- Maintenance/RPSTL manuals (&P) shall be listed in:
  - Work package order first
  - Figure number order
  - Item number order

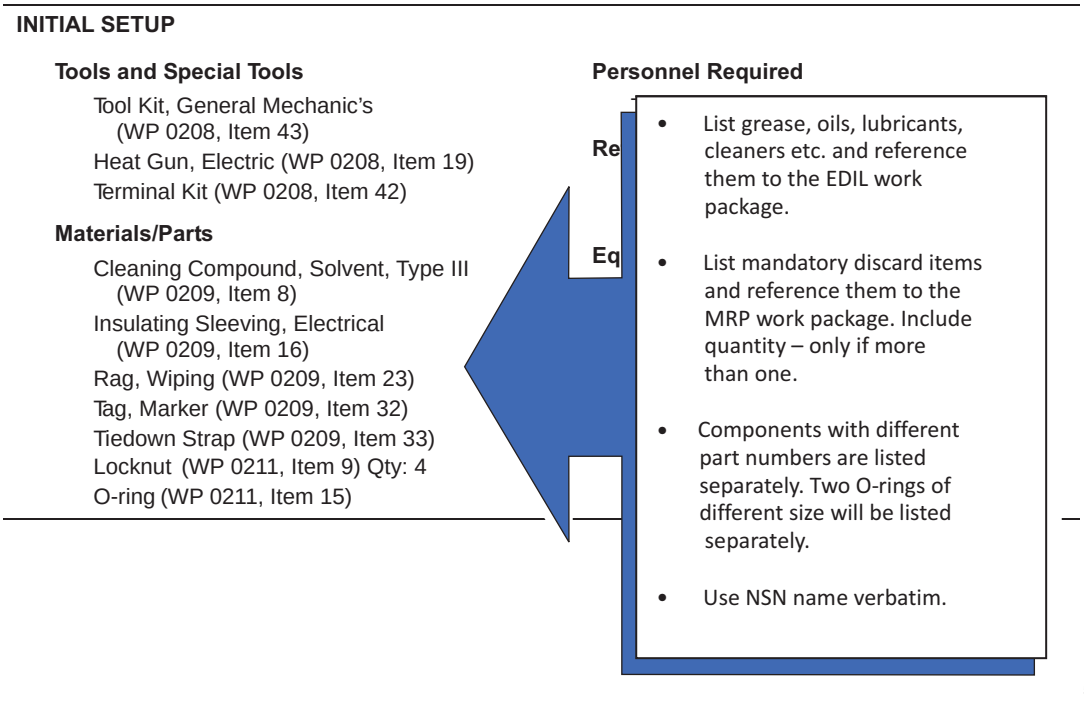


Figure 6. Example of Materials/Parts - How Items Should Be Arranged.

3.2.7 MATERIALS/PARTS – CONTINUED

3.2.7.3 Important Note An MRP work package will be included in every maintenance manual. Each Initial Setup will reference this MRP work package if any mandatory discards are consumed within the work package. Maintenance manuals that include a RPSTL shall reference the RPSTL work package for discarded items, not an MRP work package. When a TM contains a RPSTL (&P), an MRP work package is not required. *The list of Materials and Parts/MRPs in the Initial Setup is only for that particular work package. It does not include Equipment Condition MRPs.*

3.2.8 PERSONNEL REQUIRED This heading is only required in the Initial Setup if more than one person is required to perform the procedure.

3.2.8.1 List a number if more than one person of the same MOS is required to perform the procedure. Do not include lifting device operator in the Personnel Required count.

- Express the number as a word "Two" (*not* 2)

OR

3.2.8.2 List the name and MOS code if the required MOS to perform the procedure is different than the MOS listed in the General Information work package.

- Utilities Equipment Repairer 91C

3.2.9 REFERENCES List all documents referenced in the WP (ASTMs, TBs, TMs, WPs, etc.) in alphanumeric order.

3.2.9.1 A document referenced in the WP should not be included under References if it is listed somewhere else in the Initial Setup (e.g., Equipment Conditions).

3.2.10 EQUIPMENT CONDITIONS List in the order they are to be performed. Use past participle verb tense in equipment conditions, "Hood opened," *not* "Open Hood."

3.2.10.1 Provide reference to procedure in parentheses.

- Hood opened (TM 9-1234-567-10)
- Right fender removed (WP 0046)

3.2.10.2 Any equipment condition (or referenced work package) that does not require the execution of the complete work package shall be added as steps into the current work package procedure.

- Repeating the same three or four steps throughout a TM is not desired. If the steps are a complete procedure, create a separate work package containing the steps so that it can be referenced.
- If a TM covers more than one configuration, use "if equipped with..." when applicable.
- Make sure the equipment conditions are appropriate for the type of work package. For example:
  1. A Removal work package may have equipment conditions to remove other components.
  2. An Installation work package **must** have an equipment condition referring to the Removal work package for the same component.

3.2.11 DRAWINGS REQUIRED

- If required by the Government, list any drawings necessary to complete the procedure (the format will vary by program).

3.2.12 ESTIMATED TIME TO COMPLETE (For Field Level Maintenance WPs Only)

3.2.12.1 List the estimated time to complete the work package (such as 1.2 hours). Spell out the word "hours." No need to abbreviate.

3.2.12.2 Add the following times together in order to calculate the Estimated Time to Complete:

- Hours to complete steps within current work package.
- Hours to complete the Equipment Condition(s). (*Only add the hours for the work packages listed. Do not add the hours of "nested" Equipment Conditions [Equipment Conditions of Equipment Conditions]).*
- Average hours for Troubleshooting (do not include Test procedures and do not put estimated time in the Troubleshooting Initial Setup).
- Hours for any other necessary setup.
- Hours for any Follow-On Maintenance steps.

The following example is a typical calculation for determining the Estimated Time to Complete:

- Equipment condition - Batteries removed - time to complete is 0.5 hour;
- Time to complete steps within the work package you are currently in is 1.0 hour;
- There are four troubleshooting tracks that lead to this work package. Estimated time to complete each is:
  - Track #1 = 1 hour
  - Track #2 = 1 hour
  - Track #3 = 3 hours
  - Track #4 = 3 hours
- To get the estimated average time for troubleshooting, add all the track times together then divide that number by the total number of troubleshooting tracks:
  - 1+1+3+3 = 8 hours for the four tracks
  - 8 hours divided by 4 = 2

The average time of all 4 troubleshooting tracks is 2 hours.

- Follow-On Maintenance - Batteries installed - time to complete is 0.5 hour;
- Total estimated time for work package is 4 hours:
  - Equipment Conditions = 0.5 hour
  - Estimated time to complete current work package = 1 hour
  - Average troubleshooting time = 2 hours
  - Follow-On Maintenance = 0.5 hour
  - Total time to show as Estimated Time to Complete = 4 hours

3.2.12 ESTIMATED TIME TO COMPLETE – CONTINUED

3.2.12.3 The Estimated Time to Complete must match the corresponding time in the Maintenance Allocation Chart. See paragraph 3.9 for further clarification.

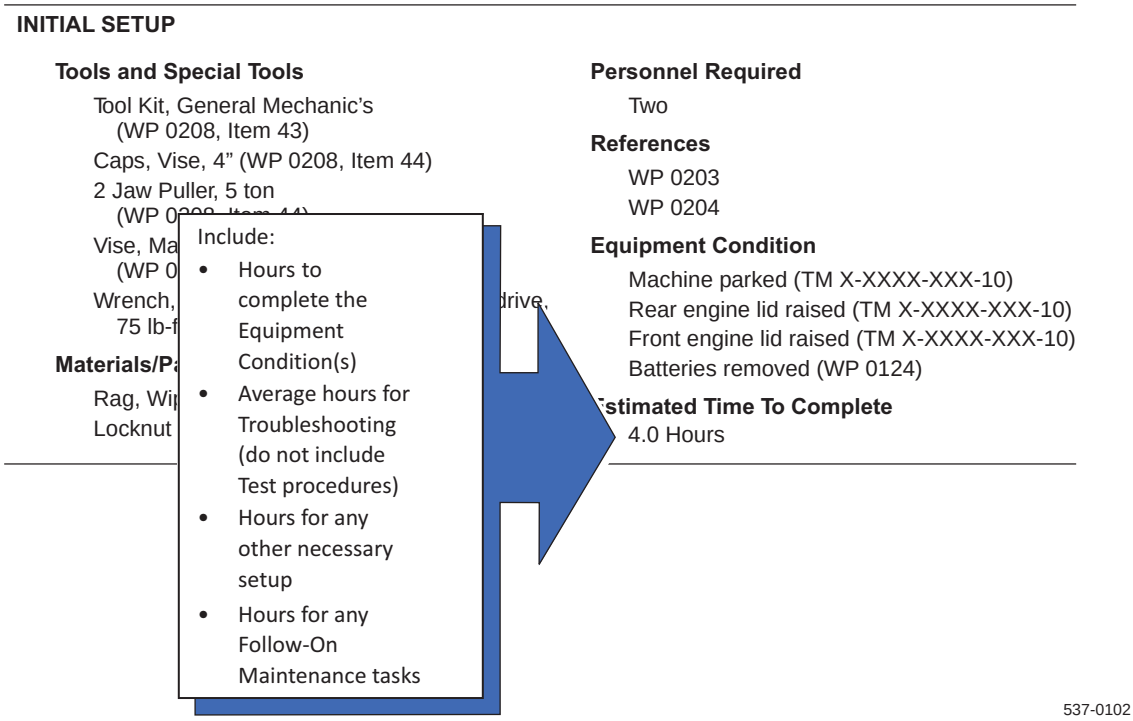


Figure 7. Example of Estimated Time to Complete - How It Should Be Displayed.

For Further Explanation

MIL-STD-40051-2A

3.3 TOOL REFERENCING

3.3.1 THE TOOL IDENTIFICATION LIST (TIL) is an overall list of tools and special tools used in troubleshooting and maintenance procedures within a technical manual.

3.3.1.1 The guidance provided below follows Maintenance Directorate (MD) Policy 11-01 published by the TACOM DE Group. See MD 11-01 for further clarification.

3.3.1.2 The TIL is a separate list of tools from the one found in Table 2 (Tools and Test Equipment) in the Maintenance Allocation Chart (MAC) (see paragraph 3.9.3.1).

3.3.1.3 Tools listed on the TIL are referenced from the initial setup section of maintenance and troubleshooting work packages. The following tools and kits shall be included in the TIL:

- Individual Issue Tool Kits - (e.g., General Mechanic's Tool Kit (GMTK) and Tool Kit Service, Refrigeration, Ordnance, issued on a one-per-soldier basis.) List these tool kits in the TIL. Do not list the individual tools used from these kits (except for TMDE items).
- Individual Tools from Unit-Issued Common Tool Sets - (e.g., Forward Repair System (FRS), Standard Automotive Tool Set (SATS)). Do not list the tool set itself in the TIL. List the individual tools from the tools sets that are used within maintenance and troubleshooting.
- Special Tools - List individually all special tools used in procedures.
- Test Measurement and Diagnostic Equipment (TMDE) - List all TMDE items in the TIL. TMDE items are listed regardless of type of tool kit (user issue or unit issue) that contains the item.
  Rule of thumb: Any tool required to be listed in an Initial Setup of a work package shall be listed in the TIL work package.

3.3.2 STRUCTURE OF THE TOOL IDENTIFICATION LIST (TIL) The Tool Identification List structure is in table format with the following five columns:

- Column (1) Item Number - Numeric sequence number for each item. Use this number when referencing tools from an Initial Setup.
- Column (2) Item Name - Use NSN-assigned name. Add extended nomenclature to differentiate between similar named items or to clarify tool name or usage if NSN assigned name does not accurately describe tool. The TIL is alphabetized by the item name.
- Column (3) National Stock Number (NSN) - Government-assigned stock number.
- Column (4) Part Number/(CAGEC) - Manufacturer-assigned part number and the Commercial and Government Entity Code (CAGEC).
- Column (5) Reference - List the tool set name with catalog listing (CL) number if item is from an authorized Army tool set. List the RPSTL TM number if the item is a special tool (i.e., not found in any authorized Army tool set).

3.3.2 STRUCTURE OF THE TOOL IDENTIFICATION LIST (TIL) – CONTINUED

It is helpful if all item names are unique.

TM X-XXXX-XXX-XX 0533

Table 1. Tool Identification List - Continued.

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER (NSN)	(4) PART NUMBER/ (CAGEC)	(5) REFERENCE
26	Bottle, Screw Cap	8125-01-568-2234	169-7372 (11083)	RPSTL TM X-XXXX-XXX-XXP
27	Brush, Battery Terminal Cleaner, Battery Post		BTC3A (55719)	FRS CL 4940-95-E42
28	Brush, Cleaning Tool and Parts	7920-01-564-6048	4C-5552 (11083)	RPSTL TM X-XXXX-XXX-XXP
29	Brush, Wire, Hand		388SS (55719)	FRS CL 4940-95-E42
30	Bushing		135-2532 (11083)	RPSTL TM X-XXXX-XXX-XXP
31	Bushing Driver Set	5120-01-039-4811	1P-0520 (11083)	RPSTL TM X-XXXX-XXX-XXP
32	Bushing, Reducer (1/4 External to 1/8 Internal)	3120-01-127-5376	4M5317 (11083)	RPSTL TM X-XXXX-XXX-XXP
33	Calibration Group		198-1758	RPSTL TM X-XXXX-XXX-XXP
34	Caliper, Digital Display	5210-01-588-7803	MCAL6A (55719)	RPSTL TM X-XXXX-XXX-XXP
35	Cap, Filler Opening	2930-01-457-7377	6V-9830 (11083)	RPSTL TM X-XXXX-XXX-XXP
36	Charger, Battery	6130-01-500-3401	746X800 (00NQ8)	RPSTL TM X-XXXX-XXX-XXP
37	Clip, Electrical	5999-01-527-2897	AC285 (89536)	RPSTL TM X-XXXX-XXX-XXP
38	Coupling Assembly, Quick Disconnect	4730-01-375-0057	1P-2376 (11083)	RPSTL TM X-XXXX-XXX-XXP
39	Coupling Half, Quick Disconnect (1/4 Internal NPT)	4730-01-170-2454	6V3989 (11083)	RPSTL TM X-XXXX-XXX-XXP

0533-3

This is a RPSTL TM number in which the item is illustrated in the Special Tool Figure.

FRS with CL number indicates this is an individual tool found in the FRS.

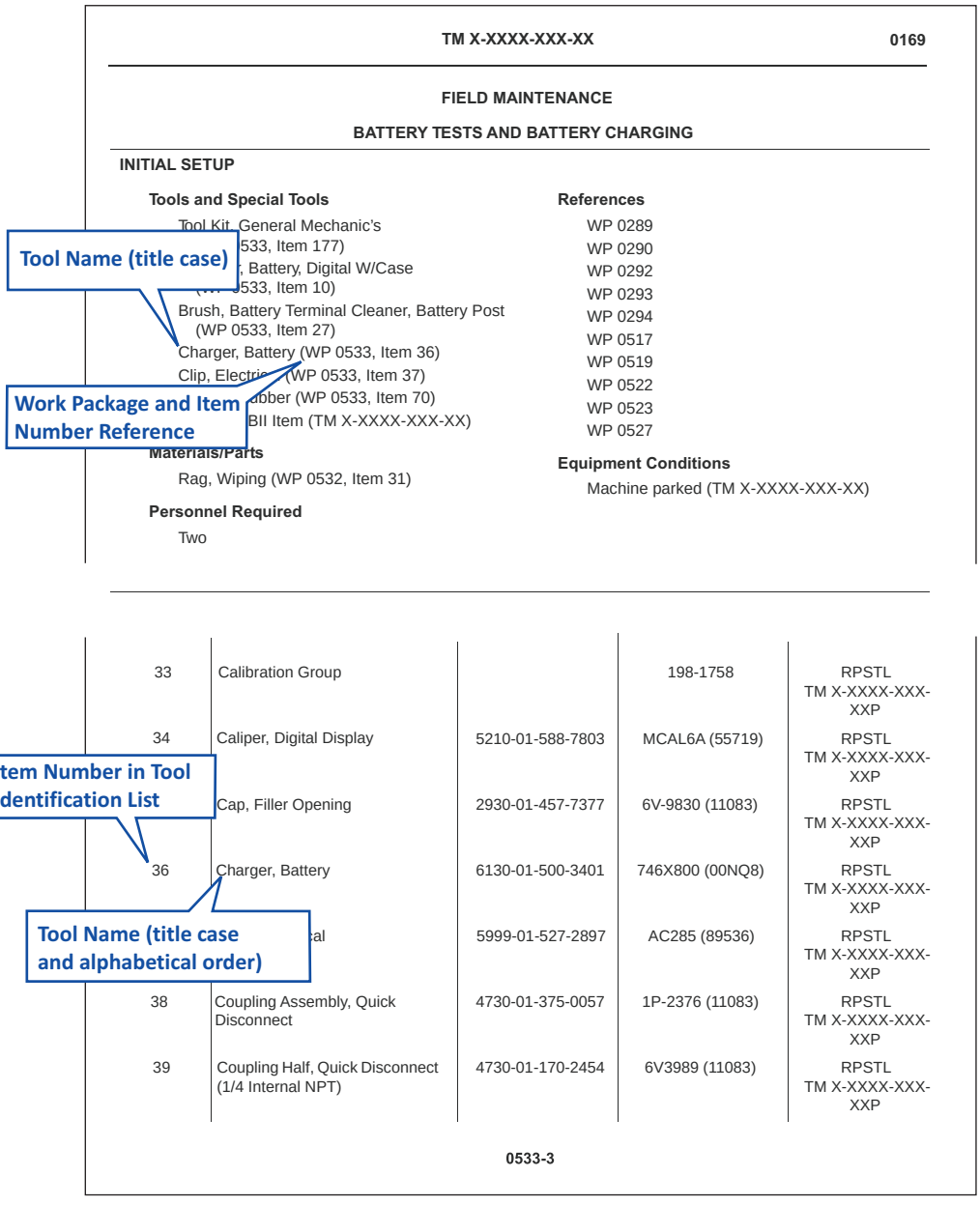
537-0086

Figure 1. Tool Identification List Structure.

3.3.3 WORK PACKAGE INITIAL SETUP - TOOLS AND SPECIAL TOOLS Refer to paragraph 3.2.6 for detailed information.

3.3.3.1 All tools listed under this heading will be referenced to the TIL work package.

3.3.3.2 The reference will give the tool name, work package number of the TIL within the technical manual, and the item number of the tool in the TIL.



TM X-XXXX-XXX-XX 0169

FIELD MAINTENANCE

BATTERY TESTS AND BATTERY CHARGING

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's
533, Item 177)
, Battery, Digital W/Case
533, Item 10)
Brush, Battery Terminal Cleaner, Battery Post (WP 0533, Item 27)
Charger, Battery (WP 0533, Item 36)
Clip, Electri (WP 0533, Item 37)
ober (WP 0533, Item 70)
BII Item (TM X-XXXX-XXX-XX)

Materials/Parts

Rag, Wiping (WP 0532, Item 31)

Personnel Required

Two

References

WP 0289
WP 0290
WP 0292
WP 0293
WP 0294
WP 0517
WP 0519
WP 0522
WP 0523
WP 0527

Equipment Conditions

Machine parked (TM X-XXXX-XXX-XX)

33	Calibration Group		198-1758	RPSTL TM X-XXXX-XXX-XXP
34	Caliper, Digital Display	5210-01-588-7803	MCAL6A (55719)	RPSTL TM X-XXXX-XXX-XXP
	Cap, Filler Opening	2930-01-457-7377	6V-9830 (11083)	RPSTL TM X-XXXX-XXX-XXP
36	Charger, Battery	6130-01-500-3401	746X800 (00NQ8)	RPSTL TM X-XXXX-XXX-XXP
	al	5999-01-527-2897	AC285 (89536)	RPSTL TM X-XXXX-XXX-XXP
38	Coupling Assembly, Quick Disconnect	4730-01-375-0057	1P-2376 (11083)	RPSTL TM X-XXXX-XXX-XXP
39	Coupling Half, Quick Disconnect (1/4 Internal NPT)	4730-01-170-2454	6V3989 (11083)	RPSTL TM X-XXXX-XXX-XXP

0533-3

537-0087

Figure 2. Initial Setup Structure.

For Further Explanation

MD 11-01 Policy Letter

3.4 NOMENCLATURE AND CONSISTENCY

3.4.1 NOMENCLATURE

3.4.1.1 Nomenclature used to name and to identify parts, assemblies, components, or tools must be consistent throughout all manuals in a series, including the RPSTL. The nomenclature used for parts, assemblies, and tools is the name assigned to the item by the government when the National Stock Number (NSN) is assigned. Extended nomenclature can be added to the RPSTL to clarify identification, or use, or to apply a more commonly understood name.

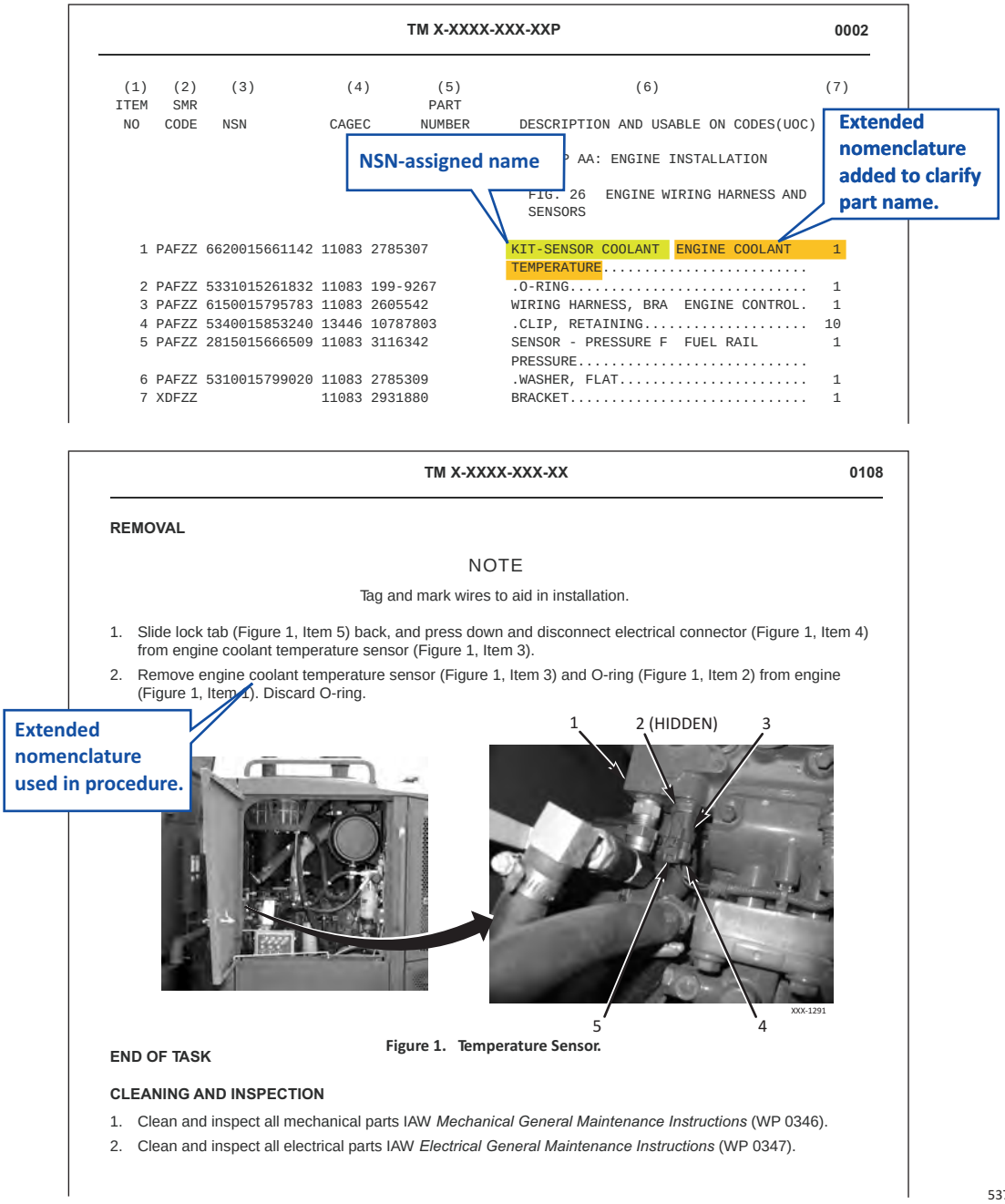


Figure 1. Consistency of Nomenclature Throughout Manual Series.

3.4.1 NOMENCLATURE – CONTINUED

3.4.1.2 A simplified version of the assigned NSN name can be used when the NSN name has part description terms that are unnecessary to the procedure.

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
12	PAFZZ	5340-01-567-7962	11083	6I9386	BRACKET,LEVER	2
13	PAFZZ		11083	9D9736	BUMPER	2
14	XDFZZ	5340-01-063-5759	11083	1705855	BRACKET-LH	1
15	PAFFZ	2510-01-585-0809	11083	3364838	DOOR,VEHICULAR	
16	PAFZZ	5325-01-586-2030	11083	3E4304	.INSERT,SCREW THREAD	
17	PAFZZ	2540-01-543-2730	11083	1099829	CYLINDER,LOCK,VEHIC	1
18	PAFZZ	5305-01-439-8514	11083	8T4181	SCREW,MACHINE M6 X 1 X 20MM	8
19	PAFZZ	5340-01-585-5715	11083	2967726	STED,FRICTION CATCH	2
20	PAFZZ	5365-01-438-9713	11083	8T0318	SHIM	8

END OF FIGURE

NSN-assigned name

TM X-XXXX-XXX-XX 0005

OPERATOR MAINTENANCE

OPERATION UNDER USUAL CONDITIONS

INITIAL SETUP

References

TB 43-0142
WP 0004
WP 0006
WP 0012

SCOPE

This work package provides instructions on operating the XXXXX, under usual conditions. Refer to WP 0006 for operating instructions under unusual conditions. Before, during, and after operation, perform applicable Operator Preventive Maintenance Checks and Services (PMCS) (WP 0012).

INITIAL ADJUSTMENT BEFORE USE

Perform all *Before* Operator PMCS procedures (WP 0012).

Turn battery disconnect switch to ON position (WP 0004).

MOUNTING AND DISMOUNTING

WARNING

- Mount and dismount the machine only at locations with steps and grab handles.
- Clean steps and grab handles prior to mounting machine.
- Face machine during mounting and dismounting.
- Maintain three-point contact (two hands and one foot, or one hand and two feet) at all times.
- Do not mount or dismount a moving machine.
- Do not jump off a moving machine.
- Do not carry tools or supplies when mounting or dismounting machine.
- Do not use any controls as grab handles during mounting or dismounting.
- Failure to follow these warnings may result in injury or death to personnel.

1. Open left door.
2. Enter machine from left side and occupy operator's seat.
3. Close left door.

Simplified use of NSN-assigned name.

537-0089

Figure 2. Use of Simplified Nomenclature in Work Packages.

3.4.1 NOMENCLATURE – CONTINUED

3.4.1.3 Nomenclature assigned to parts, assemblies, or tools may be relatively general in some cases and in others the name may be an inaccurate description. Extended nomenclature can be added to the RPSTL text to clarify or correct a part name.

21	PAFZZ	5306014398534	11083	8T6466	SCREW,MACHINE M10X1.5X60-MM..... 1
22	PAFZZ	5310013522753	11083	8T4121	WASHER,FLAT 11X21X2.5-MM THK..... 6
23	PAFZZ	5340012983216	75272	COV-1913	CLAMP,LOOP..... 2
24	PAFZZ	5365015798100	11083	6W6672	SPACER,RING..... 1
25	PAFZZ	5306013601634	11083	8T4136	BOLT,MACHINE M10 X 1.5 X 25MM..... 2
26	PAFZZ	5306013646384	11083	8T4139	BOLT,MACHINE M12X1.75X30-MM..... 1
27	PAFZZ	5310010980624	11083	5P8245	WASHER,FLAT 13.5 X 25.5 X 3MM THK.. 1
28	PAFZZ	4730015798883	11083	0070950	REDUCER, PIPE..... 1
29	PAFZZ	5310013527726	11083	8T4133	NUT,PLAIN,HEXAGON M10X1.5-THD..... 2
30	PAFZZ	3040015798980	11083	8E3431	CONNECTIN 1
31	PAFZZ	2510015798723	11083	3253650	PANEL, BO 1
32	PAFZZ	5325015596968	11083	1886185	GROMMET B 1
33	XDFZZ		11083	3253229	BRACKET AS..... 1
34	PAFZZ	5310015742722	11083	1984778	WASHER,FLAT 13.5 30 X 12MM THK... 8
35	PAFZZ	5306014138770	11083	8T4183	BOLT,SHOULDER M12 X 1.75 X 40MM.... 8
36	XDFZZ		11083	3253230	BRACKET AS..... 1
37	PAFZZ	3120014297203	11083	5P8440	BEARING,WASHER,THRU GROMMET..... 1
38	PAFZZ	5325015799271	11083	2U3085	GROMMET, NONMETALLI..... 1
39	PAFZZ	5340004264793	99953	140583	CLAMP,LOOP..... 2
40	PAFZZ	5340011519308	11083	1S0994	CLAMP,LOOP..... 1

END OF FIGURE

NSN-assigned name incorrect for part

Extended nomenclature added to part name.

0008-7/8 blank

REMOVAL

1. Route fuel line (Figure 1, Item 5), two heater hoses (Figure 1, Item 3) and electrical harness (Figure 1, Item 4) through left engine enclosure panel (Figure 1, Item 2).
2. Remove four grommets (Figure 1, Item 1) from left engine enclosure panel (Figure 1, Item 2).

Extended nomenclature used in procedure.

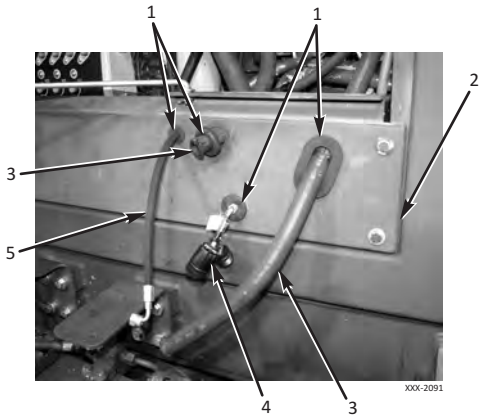


Figure 1. Fuel Line, Heater Hose and Harness Routing.

537-0090

Figure 3. When Extended Nomenclature is Added for Clarity.

3.5 WARNINGS, CAUTIONS, AND NOTES

3.5.1 WHEN TO USE WARNINGS, CAUTIONS, AND NOTES Warnings are designed for the protection of personnel; cautions are for equipment or system protection; and notes convey information.

3.5.1.1 Warning highlights an essential operating or maintenance procedure, practice, condition, or statement which, if not strictly observed, could result in injury to, or death of, personnel or long-term health hazards.

3.5.1.2 Caution highlights an essential operating or maintenance procedure, practice, condition, or statement which, if not strictly observed, could result in damage to, or destruction of, equipment or loss of mission effectiveness. *Do not use a CAUTION for health hazards.*

3.5.1.3 Warnings and Cautions should be reserved for those unique conditions, steps, or processes that require additional emphasis because of the inherently dangerous nature of the task or the potential for a "surprise" that is not readily obvious from the procedure.

3.5.1.4 Note is used for informational purposes to highlight or convey important information to the user. *A NOTE shall not contain procedural steps.*

3.5.2 PLACEMENT OF WARNINGS, CAUTIONS, AND NOTES

3.5.2.1 If a warning, caution, or note applies to an entire work package, place the warning/caution/note after the Initial Setup and before the first task title.

3.5.2.2 If a warning, caution, or note applies to an entire task, place the warning/caution/note immediately after the task title.

3.5.2.3 If a warning, caution, or note applies to a step, place the warning/caution/note immediately before the step to which it applies.

3.5.2.4 If multiple warnings, cautions, and/or notes are placed consecutively, place the warning(s) first, caution(s) second, and/or note(s) third.

3.5.3 STRUCTURE OF A WARNING

3.5.3.1 A warning consists of five parts, as applicable:

- The signal word "WARNING"
- A statement of the hazard
- Precautions
- Possible result if warning is disregarded
- Basic first aid instructions/guidance in the event of exposure/injury

3.5.3 STRUCTURE OF A WARNING – CONTINUED

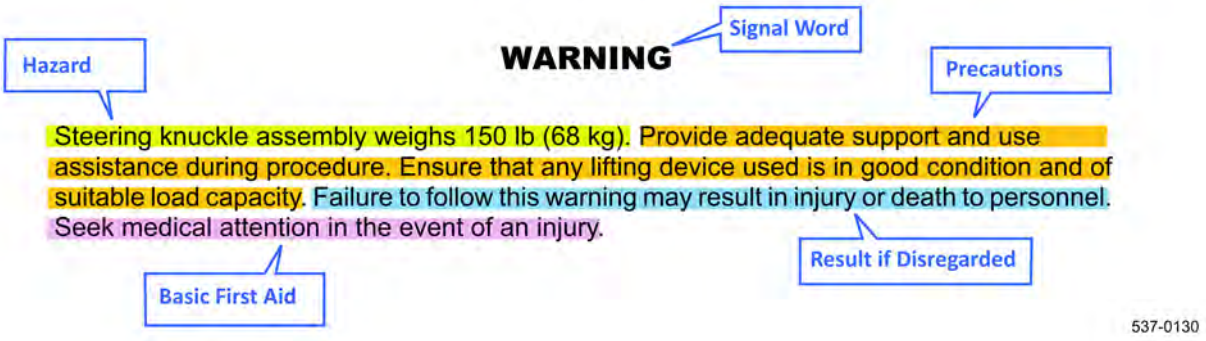


Figure 1. Example of a Warning.

3.5.3.2 A warning shall not contain procedural steps.

3.5.4 STRUCTURE OF A CAUTION

3.5.4.1 A caution consists of three parts, as applicable:

- The signal word “CAUTION”
- A statement of the hazard and/or precautions to take
- Possible result if caution is disregarded

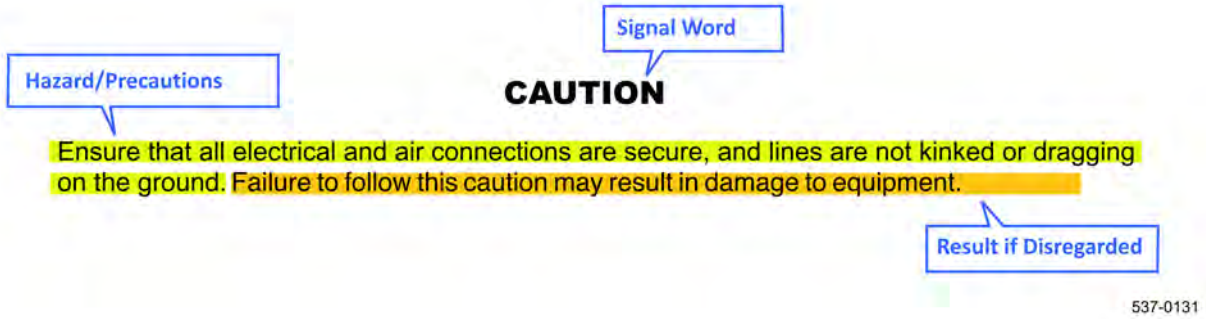


Figure 2. Example of a Caution.

3.5.4.2 A caution shall not contain procedural steps.

3.5.5 COMBINING A WARNING AND A CAUTION If a procedure that is not strictly observed could result in injury or death to personnel AND damage to equipment, the caution can be combined into the warning. For example:

WARNING

Chock all wheels before turning steering wheel. Failure to follow this warning may result in injury or death to personnel.

CAUTION

Chock all wheels before turning steering wheel. Failure to follow this caution may result in damage to equipment.

Can be combined as follows:

WARNING

Chock all wheels before turning steering wheel. Failure to follow this warning may result in injury or death to personnel or damage to equipment.

3.5.6 WARNING SUMMARY

3.5.6.1 A warning summary shall be prepared for all technical manuals containing warnings. The warning summary shall begin on the first right-hand page following the front cover.

3.5.6.2 The warning summary shall include descriptions of the general safety warnings and hazardous materials warnings that have major impact throughout the technical manual. *Only warnings that meet this criteria shall be included in the warning summary.*

3.5.6.3 The warning summary shall consist of the following parts, in the order specified, as required:

- First aid data
- General safety warning descriptions
- Hazardous materials descriptions

3.5.6.4 Example of Warning Summary See Figure 3 for an example of a warning summary.

3.5.6 WARNING SUMMARY – CONTINUED

3.5.6.4 Example of Warning Summary – Continued

TM X-XXXX-XXX-23

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel.

FOR INFORMATION ON FIRST AID, REFER TO FM 4-25.11.

GENERAL SAFETY WARNING DESCRIPTIONS

WARNING

HEAVY COMPONENTS

- Wheel assembly weighs 200 lb (91 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Caster assembly weighs 60 lb (27 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Hub and brake drum weighs 90 lb (41 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Strut weighs 80 lb (36 kg). Ensure that all front dolly components to be moved or assembled are completely supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Components you are working with may weigh 900 lb (408 kg). Ensure that all front dolly components to be moved or assembled are completely supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Components you are working with may weigh 900 lb (408 kg). Ensure that all rear dolly components to be moved or assembled are completely supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Towbar weighs 450 lb (204 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Hydraulic cylinder weighs 200 lb (91 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.

a

537-0213

Figure 3. Example of a Warning Summary (Page 1 of 3).

3.5.6 WARNING SUMMARY – CONTINUED

3.5.6.4 Example of Warning Summary – Continued

TM X-XXXX-XXX-23

WARNING SUMMARY - CONTINUED

GENERAL SAFETY WARNING DESCRIPTIONS - CONTINUED

WARNING

HYDRAULIC PUMP VALVES

Turning the hydraulic pump valves too quickly will cause the shelter to drop rapidly, possibly damaging equipment and/or injuring personnel. Stand clear of shelter during lowering operation. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.

WARNING

SAFETY PINS

DO NOT ATTEMPT TO PUSH OUT SAFETY PINS WITH FINGERS! Pushing the safety pins from the strut assemblies using the fingers should not be attempted under any circumstances, as the fingers could be severed if the strut released with a finger in the pinhole. Failure to follow this warning may result in injury to personnel. Seek medical attention in the event of an injury.

WARNING

SPRING BRAKE CHAMBER

The power spring on the spring brake chamber must be caged before attempting to remove the brake shoes or perform maintenance on rear wheel brakes. Failure to follow this warning may result in injury to personnel. Seek medical attention in the event of an injury.

b

537-0214

Figure 3. Example of a Warning Summary (Page 2 of 3).

3.5.6 WARNING SUMMARY – CONTINUED

3.5.6.4 Example of Warning Summary – Continued

TM X-XXXX-XXX-23

WARNING SUMMARY - CONTINUED

HAZARDOUS MATERIALS WARNING DESCRIPTIONS

WARNING

BRAKE DUST

Breathing of dust from brake linings is extremely hazardous. A filter mask must be worn whenever working with brake shoes. Under no circumstances should compressed air or dry brushing be used for cleaning. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.

WARNING

CLEANING COMPOUND

- Solvent cleaning compound MIL-PRF-680 Type III is an environmentally compliant and low-toxicity material. However, it may be irritating to the eyes and skin. Use protective gloves and goggles. Use in well-ventilated areas. Keep away from open flames and other sources of ignition. Failure to do so may result in injury or death to personnel.
- Improper cleaning methods and use of unauthorized cleaning liquids or solvents can injure personnel and damage equipment. To prevent this, refer to your Unit's authorized cleaning and solvents list for further instructions.
- Solvents can burn easily, give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death to personnel, keep away from open fire and use in a well-ventilated area. If solvent gets on skin or clothing, wash immediately with soap and water.

WARNING

FLAMMABLE FUEL

- DO NOT perform fuel system checks, inspections, or maintenance while smoking or near fire, flames, or sparks. Fuel may ignite.
- Allow engine to cool before performing maintenance on fuel filter. Hot metal parts can cause severe burns. Wear eye, hand, and skin protection when working with heated parts.
- Wear fuel-resistant gloves and eye protection when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing.
- Failure to follow these warnings may result in injury or death to personnel or damage to equipment.

WARNING

HYDRAULIC SYSTEM

Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury to personnel. Relieve pressure before disconnecting hydraulic lines and fittings. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject hydraulic fluid under high pressure. Use a piece of cardboard or paper to search for leaks. If any hydraulic fluid is injected into the skin, it MUST be surgically removed within a few hours by a doctor familiar with this type of injury, or gangrene may result. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.

c

537-0215

Figure 3. Example of a Warning Summary (Page 3 of 3).

For Further Explanation

1. MIL-STD-40051-2A, paragraph 4.8.7
2. MIL-STD-38784A, Appendix A

3.6 ILLUSTRATIONS AND TITLES

This section should not be considered a comprehensive review of information relating to graphics used in Deployment Equipment publications. Complete information can be found in both MIL-STD-40051-2A and MIL-HDBK-1222D. The information presented in this section represents typical types of illustrations used and how best to present them.

3.6.1 ILLUSTRATIONS

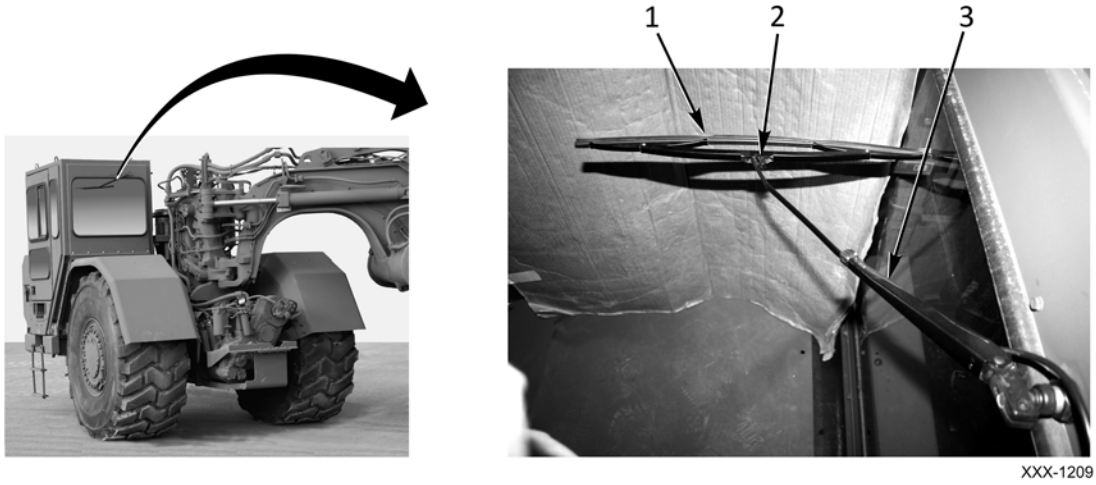
- Photographs may be used for illustrations. They must be clear, detailed, and sharp. Remove cluttered foregrounds and backgrounds. Use a minimum of 300 dpi. Retouch photos only to emphasize detail, exclude unwanted detail, correct slight photographic defects, and eliminate undesirable shadows from that portion of the photo related to the text only.
- Remove manufacturer's name, symbol, or trademark from figures.
- Unless specified otherwise by the acquiring activity, use black and shades of black (one color) for illustrations.
- Assign a unique identification number to each illustration. The identification should be in 4-to-6 point type and placed in the lower right corner of the illustration (within the graphics area), sufficiently removed to avoid being confused as part of the illustration.

3.6.1 ILLUSTRATIONS – CONTINUED

Figure 1. Illustrations - Photographs.

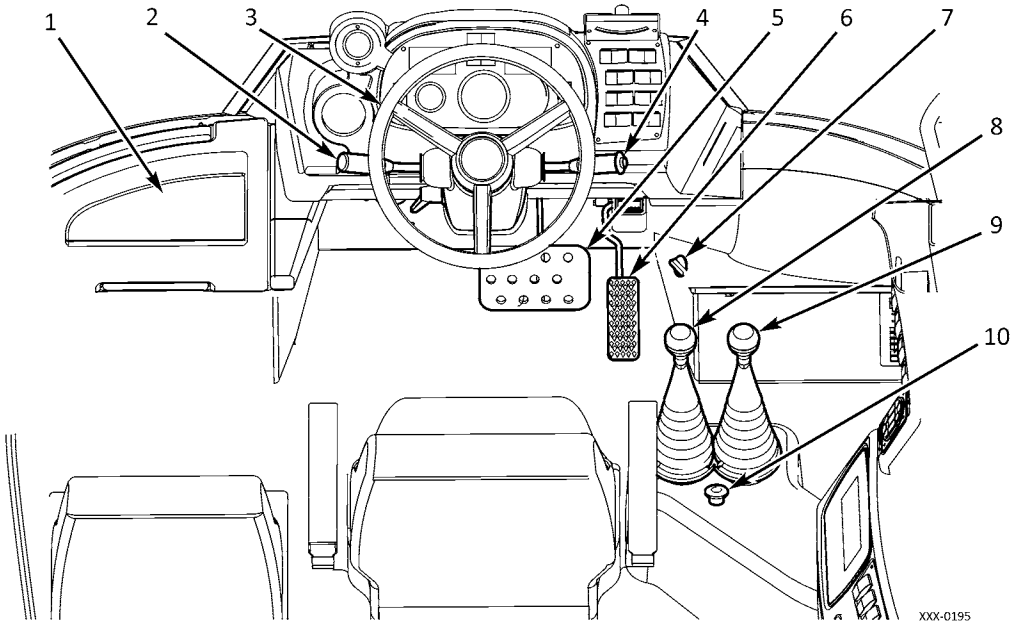
3.6.1 ILLUSTRATIONS – CONTINUED

- Use locator views as needed to help identify the location of the component on the system/machine.



537-0188

Figure 2. Illustrations - How to Use Locators.



537-0189

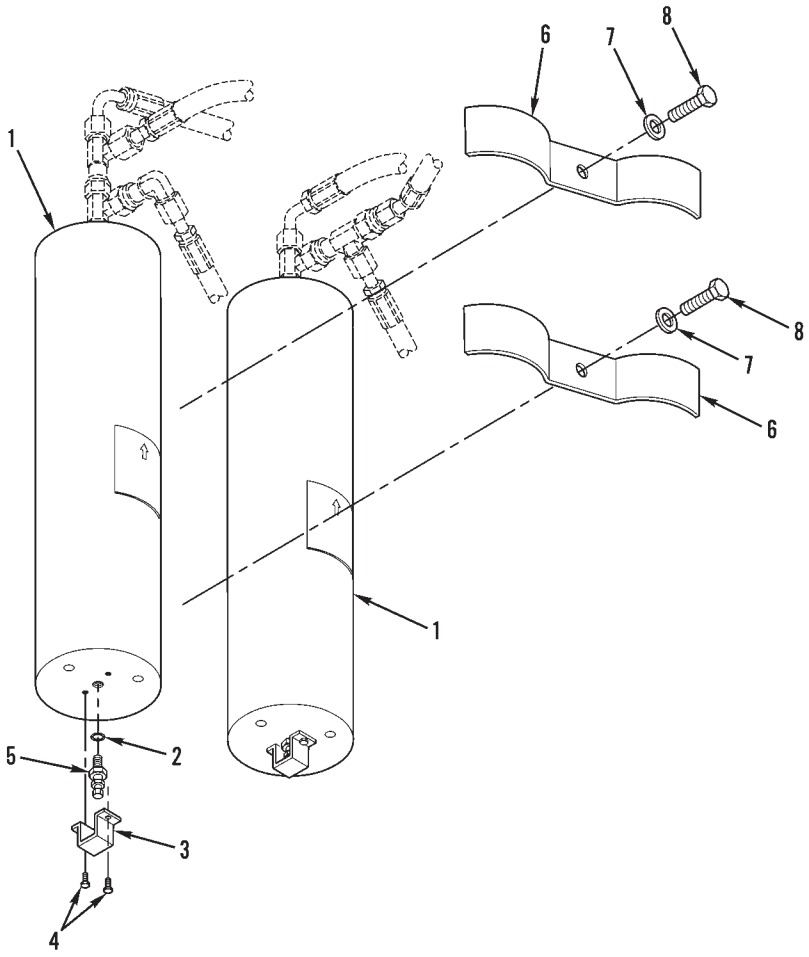
Figure 3. Illustrations - How to Use Locators.

3.6.1 ILLUSTRATIONS – CONTINUED

- Do not use locators on RPSTL figures.

CORRECT

1
2 THRU 5



537-0190-2

Figure 4. Illustrations - RPSTL Figures and Locator Use (Sheet 1 of 2).

3.6.1 ILLUSTRATIONS – CONTINUED

NOT CORRECT

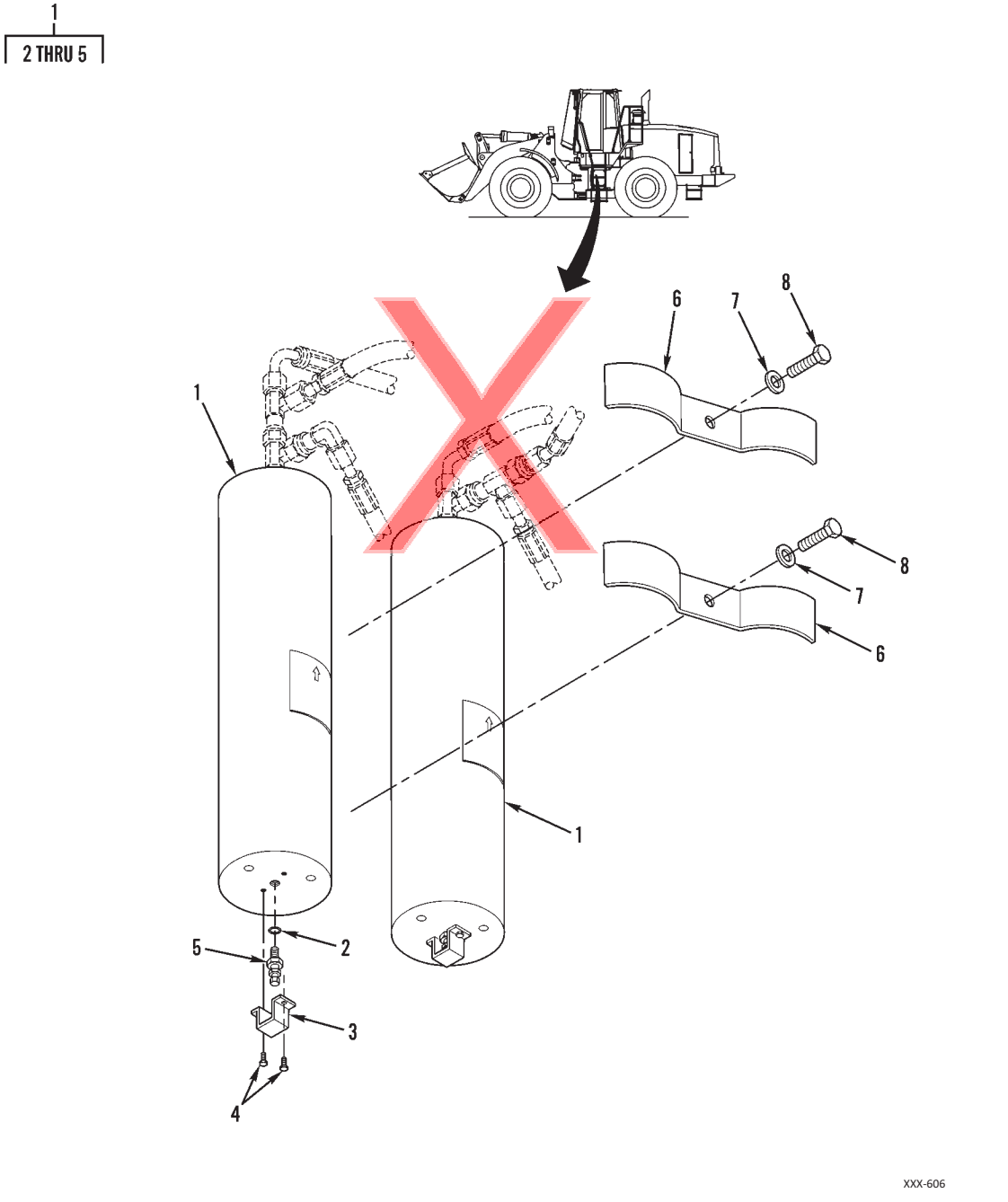


Figure 4. Illustrations - RPSTL Figures and Locator Use (Sheet 2 of 2).

3.6.1 ILLUSTRATIONS – CONTINUED

- Use detailed views as needed when the illustration does not adequately or clearly depict the subject matter or part(s).
- Use border rules or boxes to separate multisection illustrations on the same page or for the same locator/detail views.
- Do not use border rules or boxes for single illustrations.

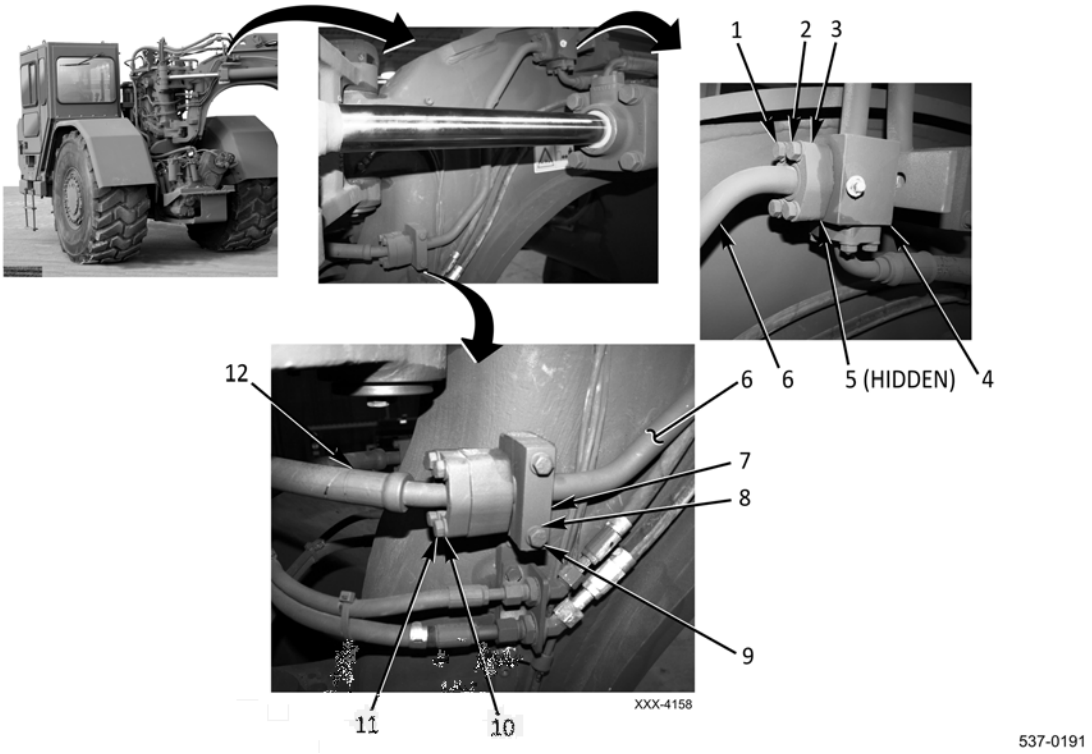


Figure 5. Illustrations - Detailed Views.

- Do not repeat an illustration unless it is necessary to support multipage descriptions of tasks or to support a different requirement in another part of the TM.
- Place narrative/step text above and below illustrations, not to the left or right.
- Place illustrations as close to their reference in text as possible (within +/- 2 pages). Illustrations may float on a page to reduce the white space on a page. Whenever possible, place illustrations on the same or facing page of associated text.
- Refer to figures within a work package by figure number (for example, Figure 2), and when applicable, the sheet number for multisheet illustrations (for example, Figure 17, Sheet 1).
- Refer to figures in a different work package by work package sequence number and figure number (for example, WP 0012, Figure 2). References shall be made only to figures within the same manual or another volume of the same manual.
- Reference shall be made to a figure number followed by the index number (for example, Figure 6, Item 34).

3.6.2 FIGURE NUMBERS

- All illustrations except inline graphics will have a figure number.
- Number figures using Arabic numerals.
- Number figures sequentially within each work package, beginning with Arabic numeral 1.
- Figure number precedes figure title.
- Figure number and title are not a part of the illustration. They are separate from the graphic so that the title may be searched electronically.

3.6.2.1 RPSTL Figure Numbers

- Number RPSTL figures sequentially within the RPSTL, not within each work package (see MIL-STD-40051-2A, paragraph 4.8.28.4.2).
- Number figures using Arabic numerals, beginning with the Arabic numeral 1.

3.6.2.2 Multisheet Figure Numbers

- Number multisheet figures consecutively.
- The total number of sheets follows the figure title.
  - Figure 1. Hydraulic Lines and Fittings (Sheet 1 of 2).

3.6.2.3 Foldout Figure Numbers

- Number foldout figures in consecutive ascending numerical sequence within each TM, beginning with Arabic numeral 1 (e.g., FO-1, FO-2, etc.).
- Number figures in the order of reference in the text.
- Place figure number preceding the figure title under the illustration.

3.6.3 FIGURE TITLES

- All illustrations except inline graphics will have a figure title.
- Include “Figure” in title case, followed by the figure number, a period, and the title, for example, “Figure 5. Airbrake Chamber.”
- Capitalize the first letter of the first and each major word of the title.
- End with a period following the last word.
- Center the figure title on the graphic image area below the graphic.
- Begin the title on the same line as the figure number.
- When title is too long to fit on one line, align the second line with the first letter of the title.

For Further Explanation

1. MIL-STD-40051-2A
2. MIL-HDBK-1222D

3.7 CALLOUTS

3.7.1 PURPOSE Index numbers and letters, reference designators, nomenclature, leader lines, sweep arrows, legends, and other identifiers are used in illustrations, when necessary, to identify significant features.

- When practical, all callouts should be placed outside the boundaries of the parts illustrated so that the parts are not obscured.
- Use a sans serif font and type size no smaller than 8 points and no larger than 10 points.

3.7.2 INDEX NUMBERS AND LETTERS A number or letter (on a graphic or an illustration) is usually attached to a line or an arrow which points to an object on the illustration. This number or letter corresponds to the same number or letter in a legend or text, which defines or identifies the object in the illustration.

3.7.2.1 Index Numbers

- Start with the number 1 and continue consecutively within an illustration.
- Are assigned in a clockwise order beginning at 11 o'clock (except in PMCS procedures).
- Shall not be placed within circles.
- For multisheet illustrations, index numbers shall continue in sequence from one sheet to another.
- Within a multisheet illustration, if an item that has already been assigned an index number is used on another sheet in the same illustration, it shall retain the same index number.
- Place leader lines at an angle.
- Do not let leader lines cross or come in contact with other callout lines.
- Do not stack index numbers.

3.7.2 INDEX NUMBERS AND LETTERS – CONTINUED

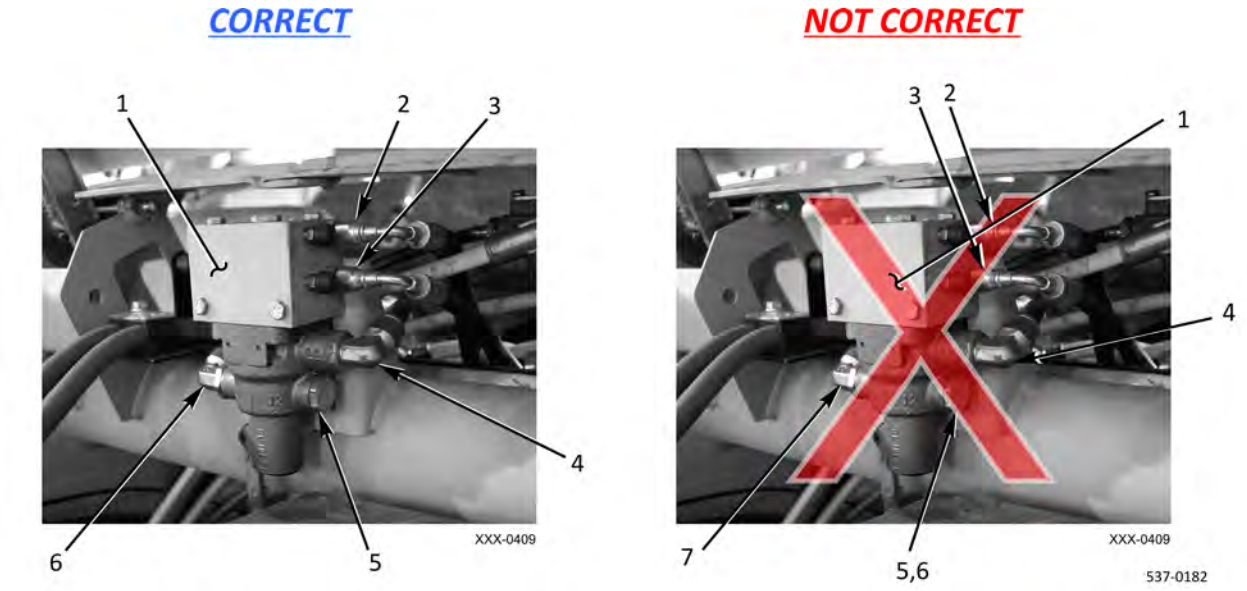


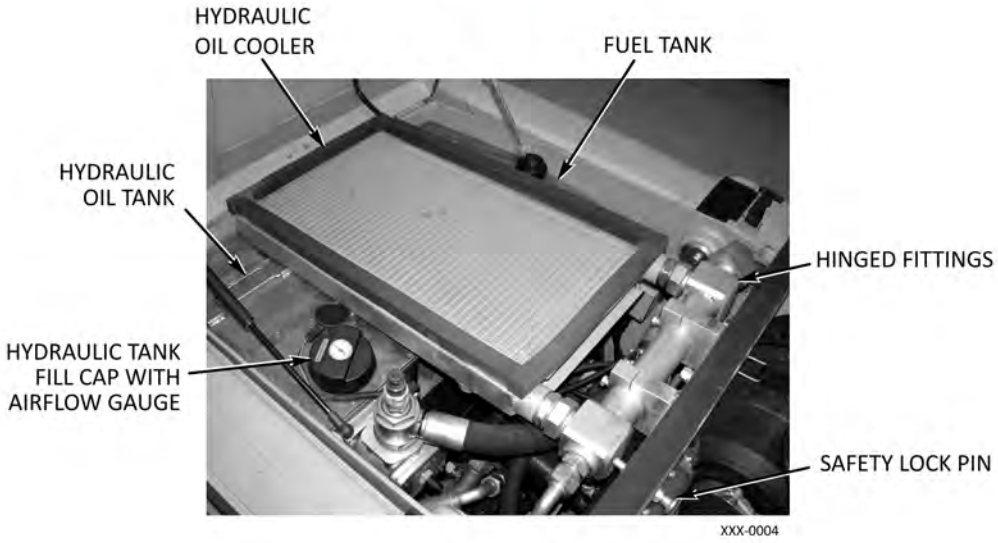
Figure 1. Index Numbers.

3.7.2.2 Nomenclature

- Nomenclature may appear on illustrations only if it can be done without crowding or reducing type size so as to make reading difficult.
- Use uppercase lettering for nomenclature callouts.
- Both nomenclature and numbers may be used on graphics in the same document, but not within the same figure.
- Nomenclature of more than one line should have the left margin justified when placed within the right side of the illustration, right margin justified when placed on the left side, or stacked with the text centered when placed on the top or bottom of the illustration. All lines of copy should parallel the horizontal edges of the figure, whenever possible.

3.7.2 INDEX NUMBERS AND LETTERS – CONTINUED

CORRECT



NOT CORRECT

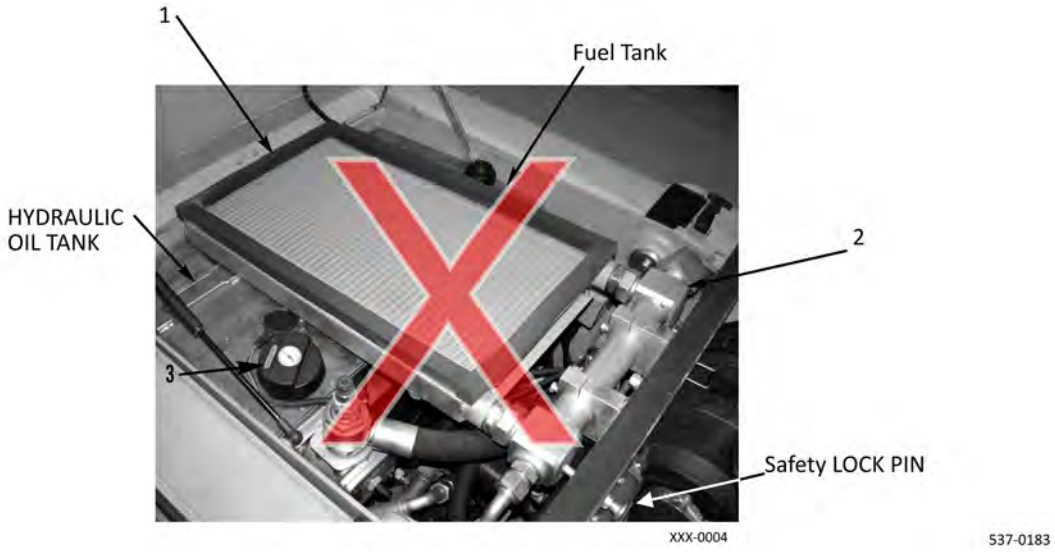


Figure 2. Nomenclature.

3.7.2 INDEX NUMBERS AND LETTERS – CONTINUED

3.7.2.3 Leader Lines, Arrowheads, and Sweep Arrows

- Leader lines and their callouts should be easily distinguishable from components and other lines of the illustration.
- Leader lines shall be uniform, short, and as straight as possible; avoid the use of dogleg-shaped lines unless absolutely necessary.

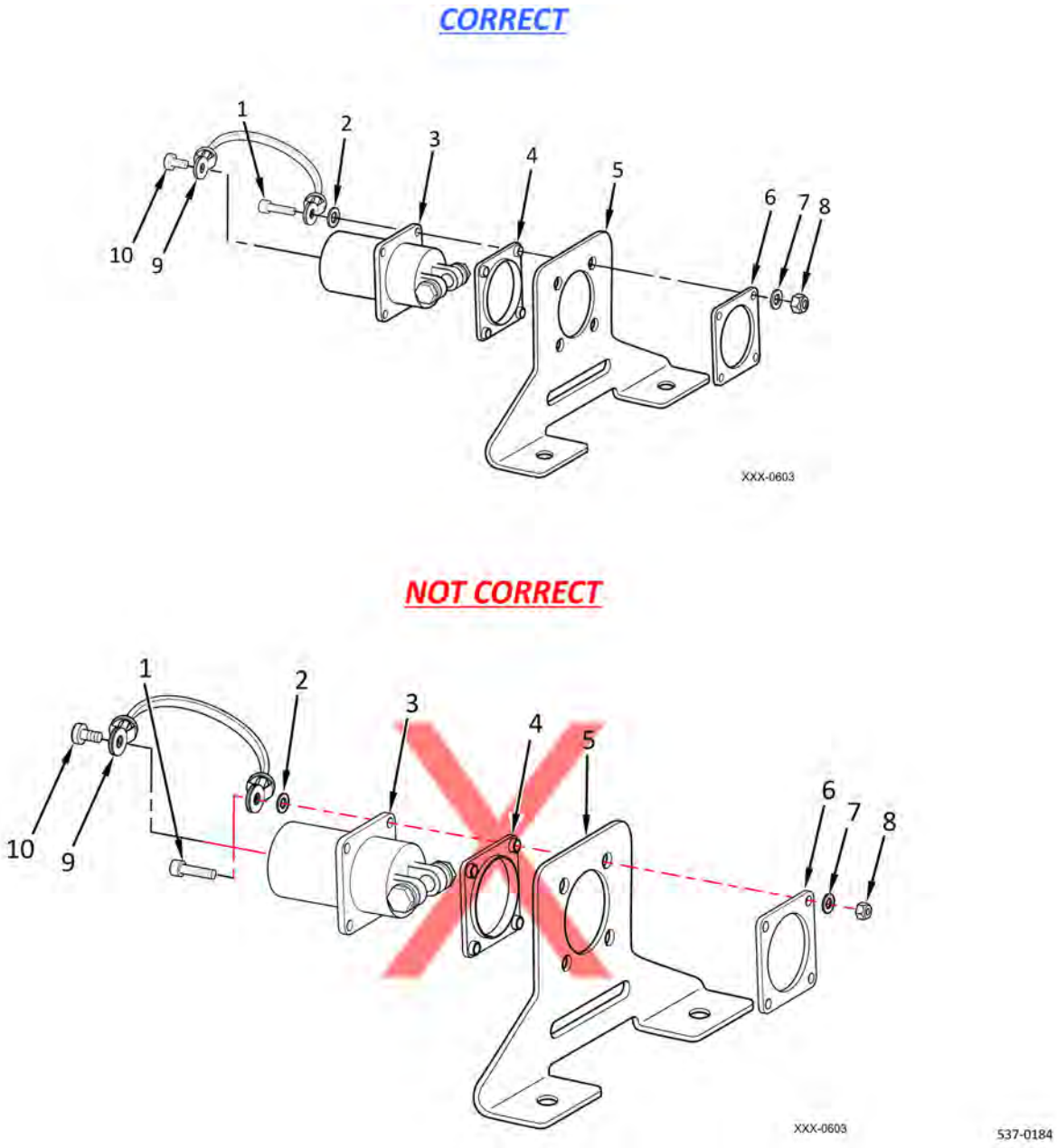


Figure 3. Leader Lines.

3.7.2 INDEX NUMBERS AND LETTERS – CONTINUED

- Arrowheads shall be added for clarity. Do not allow leader lines to touch the callout.
- Arrowheads shall be uniform in shape and size when multiple arrowheads are used on a page.
- Arrowheads shall not be allowed to enter the object to which they apply, but they should touch the object. If it is necessary to enter the object with the leader line to provide for greater clarity, a breakoff symbol shall be used in lieu of an arrowhead.

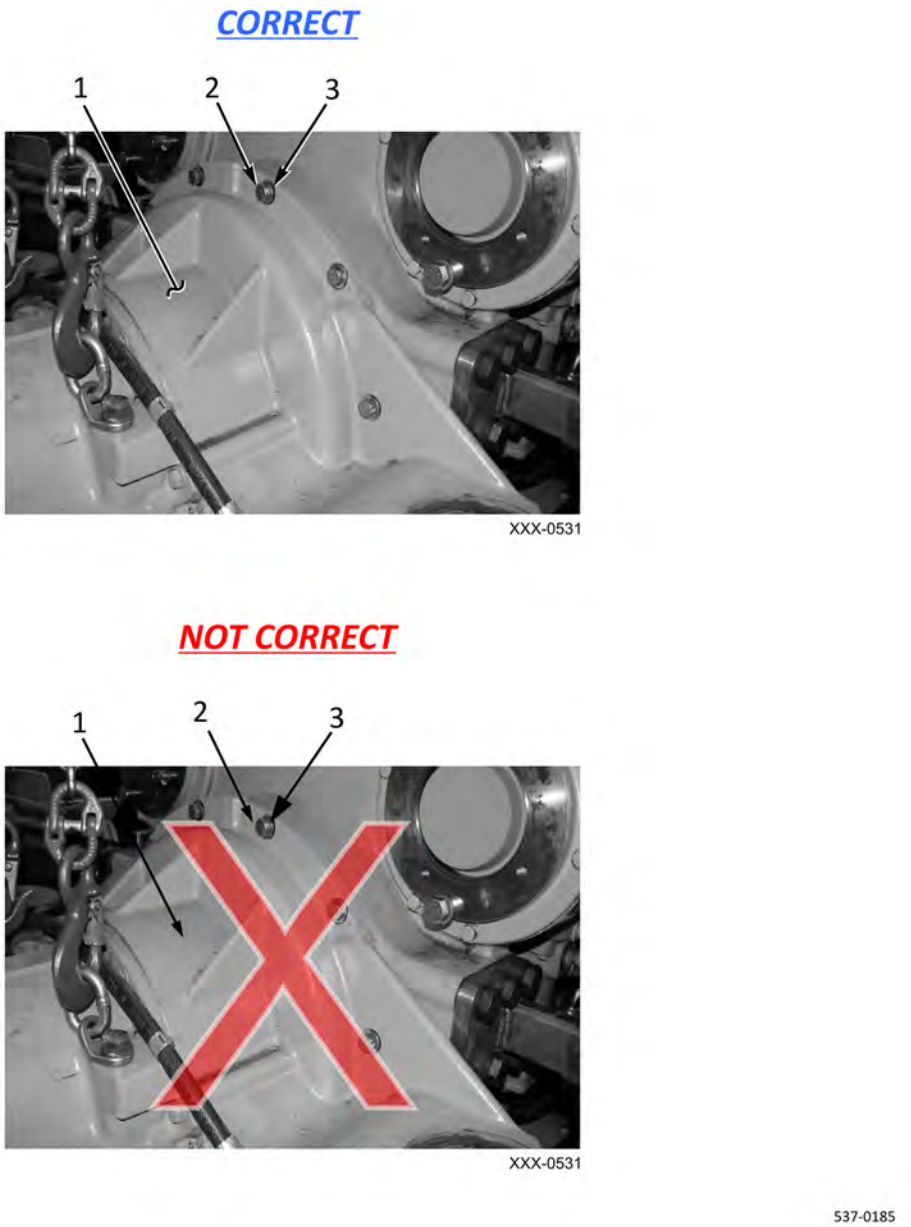


Figure 4. Arrowheads.

3.7.2 INDEX NUMBERS AND LETTERS – CONTINUED

- Use leader lines or sweep arrows to help the readers orient themselves with respect to the illustration and to provide directional movement in tasks.
- Make sure origin of arrows is at proper location of component.
- Upward sweeping arrows are used to locate items under component.

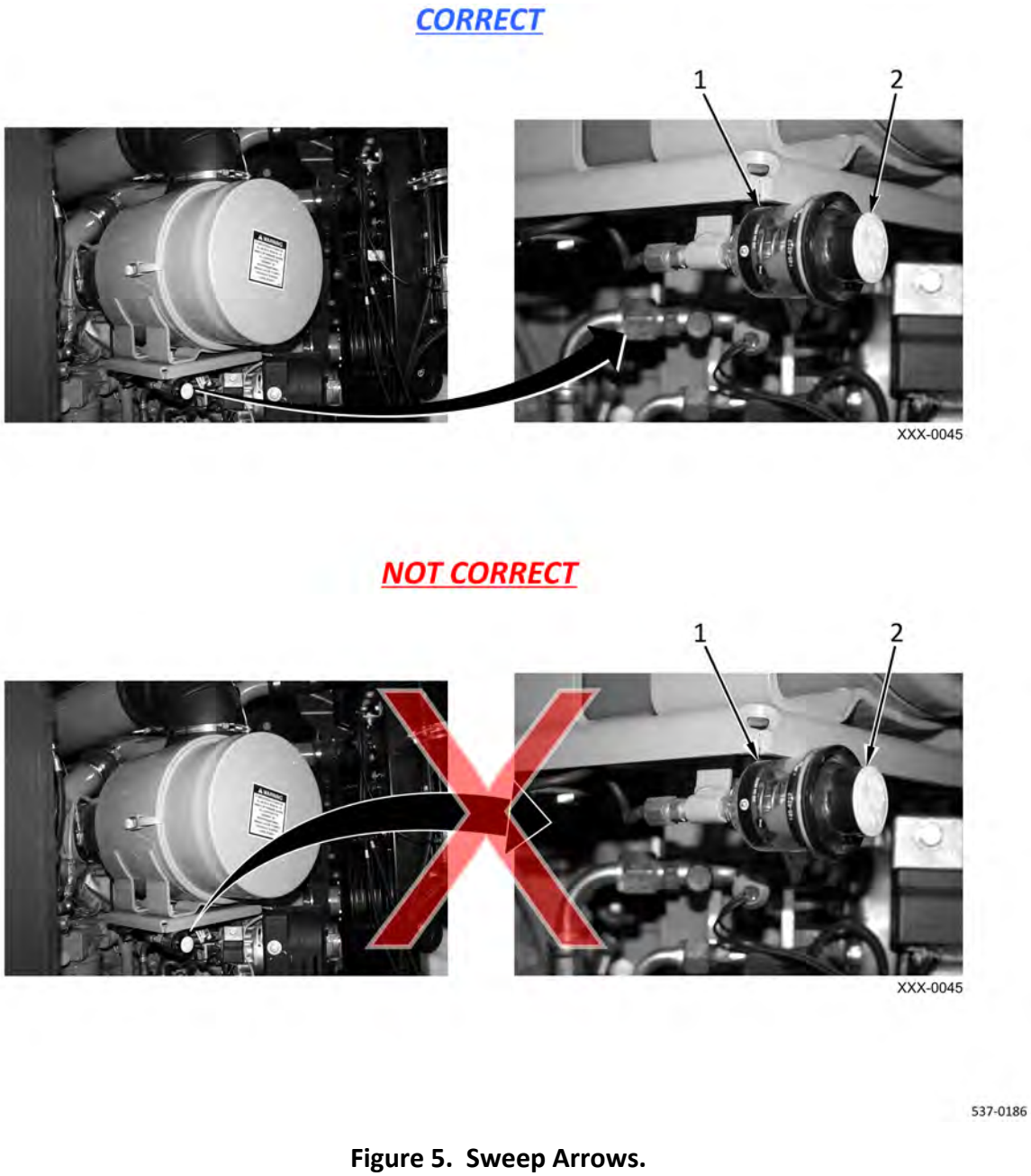


Figure 5. Sweep Arrows.

3.7.2 INDEX NUMBERS AND LETTERS – CONTINUED

- Downward sweeping arrows are used to locate items above component.

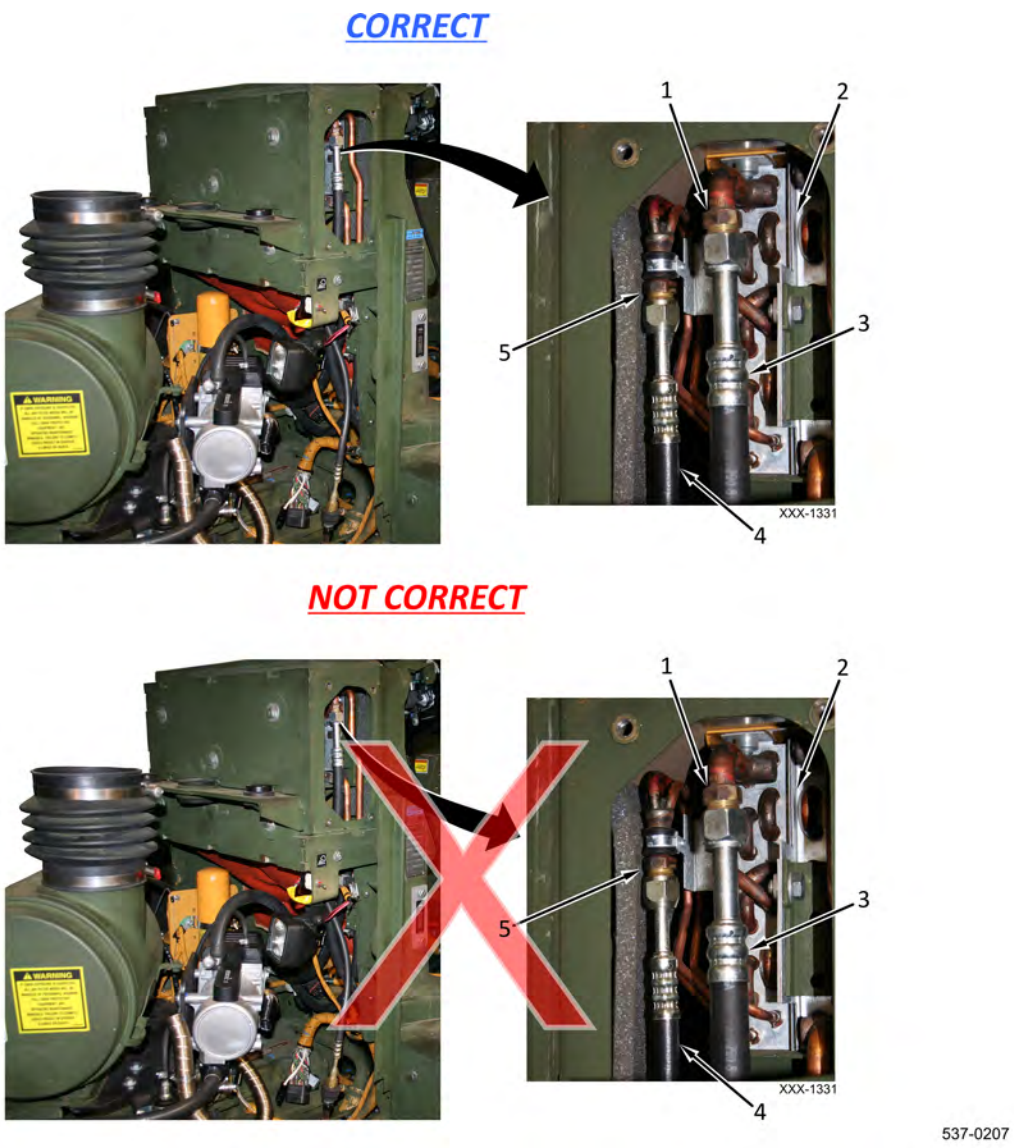


Figure 6. Sweep Arrows.

For Further Explanation

1. MIL-STD-40051-2A
2. MIL-HDBK-1222D

3.8 MAINTENANCE FUNCTIONS

The following is a list of approved maintenance functions from MIL-STD 40051-2A. An alternate explanation has been provided to help describe the usage of each.

3.8.1 **INSPECT** An examination to determine the physical, mechanical, and/or electrical quality of a part or piece of equipment is within normal range (e.g., by sight, sound, or touch).

3.8.2 **TEST** To verify and measure mechanical, pneumatic, hydraulic, or electrical capabilities of an item are within manufacturer specifications (e.g., Engine oil pressure test, Battery load test, Circuit test).

3.8.3 **SERVICE** To perform routine maintenance procedures to keep an item in proper operating condition, such as replacing lubricants, filters, fluids, or gaskets.

3.8.4 **ADJUST** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specifications (e.g., adjust engine timing, rocker arm adjustment).

3.8.5 **ALIGN** To adjust specifications of an item to bring about proper positioning (e.g., front end alignment, headlight alignment, door alignment).

3.8.6 **CALIBRATE** To adjust or mark (something, such as a measuring device) so that it can be used in an accurate and exact way or to measure (something) in an exact and precise way (e.g., scale, torque wrench, multimeter).

3.8.7 **REMOVE** To take off a sub-component allowing repair or replacement of that sub component, or to ease other maintenance (e.g., Remove valve cover from cylinder head to adjust rocker arms).

3.8.8 **INSTALL** To place, position, or locate a component or sub-component to make it part of an assembly (e.g., Install alternator on engine).

NOTE

Use of the “Replace” function should be avoided. Use separate work packages for Removal and Installation.

3.8.9 **REPLACE** To remove a component and install new or remanufactured component (e.g., Remove alternator from engine; Install new alternator on engine).

NOTE

- Use of the "Repair" function should be avoided. Use separate work packages for Removal, Disassembly, Assembly, and Installation.
- The following definitions are applicable to the "Repair" maintenance function:
  - Fault location/troubleshooting
    * The process of investigating and detecting the cause of equipment malfunctioning.
    * The act of isolating a fault within a system or Unit Under Test (UUT).
  - Actions, such as welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

3.8.10 REPAIR The application of maintenance actions, including fault location/trouble-shooting, removal, installation, disassembly, assembly, or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in the item (e.g., The engine was repaired by replacing the cylinder head gasket).

3.8.11 PAINT This is a function to prepare and apply coats of paint. When used with munitions, the paint is applied so the ammunition can be identified and protected.

3.8.12 OVERHAUL This is the maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition. Overhaul does not normally return an item to a like-new condition.

3.8.13 REBUILD This consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles).

3.8.14 LUBRICATE Applying oil or grease to reduce friction and allow a component to operate in a more smooth and efficient manner (e.g., Applying grease to pivot joint grease fitting on a front-end loader pivot pin).

3.8.15 MARK The process of identification by Data Plate, decal, or stencil on an asset.

3.8.16 PACK To place an item into a container for either storage or shipment after service and other maintenance operations have been completed.

3.8.17 UNPACK The act or removing an asset from a storage or shipping container in preparation to perform further maintenance (e.g., repair or install).

3.8.18 PRESERVE To treat systems and equipment whether installed or stored, to ensure a serviceable condition. To keep from rusting, corroding, dry rotting or deteriorating (e.g., Apply grease to the hydraulic cylinder rod to prevent rust).

3.8.19 PREPARE FOR USE Those steps required to make an asset ready for other maintenance (e.g., remove preservatives, lubricate, etc.).

3.8.20 ASSEMBLE The step-by-step instructions to join the component pieces of an asset together to make a complete serviceable asset.

3.8.21 DISASSEMBLE The step-by-step breakdown (taking apart) (i.e., Disassembly of hydraulic lift cylinder to replace internal seals and O-rings.).

3.8.22 CLEAN Step-by-step instructions on how to remove dirt, corrosion, or other contaminants from equipment.

3.8.23 NON-DESTRUCTIVE INSPECTION Step-by-step instructions on preparation and accomplishment of inspections which do not destroy or damage the equipment. To disassemble without breaking or damaging seals, gaskets, or parts.

3.8.24 RADIO INTERFERENCE SUPPRESSION Step-by-step instructions to ensure installed equipment, either communication or other electronics, does not interfere with installed communication equipment.

3.8.25 PLACE IN SERVICE Step-by-step instructions required to place an item into service that is not covered in the service upon receipt work package.

3.8.26 TOWING The step-by-step instructions to connect two vehicles together for the purpose of having the first vehicle move, drag, or pull a second vehicle behind the first vehicle by using the first vehicle's power.

3.8.27 JACKING The step-by-step instructions to mechanically raise or lift a vehicle to facilitate maintenance on the vehicle.

3.8.28 PARKING Step-by-step instructions to safely place a vehicle in a lot, ramp area, or other designated location.

3.8.29 MOORING Step-by-step instructions to secure a vehicle by chains, ropes, or other means to protect the vehicle from environmental conditions or secure for transportation.

3.8.30 COVERING Step-by-step instructions to place a protective wrapping over a vehicle to protect it from environmental conditions or to hide (e.g., camouflage) it.

3.8.31 HOISTING Step-by-step instructions to allow a vehicle to be raised by cables or ropes through attaching points.

3.8.32 SLING LOADING Step-by-step instructions to place a sling around a vehicle to allow it to be raised.

3.8.33 EXTERNAL POWER Step-by-step instructions on how to apply electrical power from any authorized power source (e.g., external generator or facility power).

3.8.34 PREPARATION FOR STORAGE OR SHIPMENT Step-by-step instructions for preparing the equipment for placement into administrative storage or for special transportation requirements.

3.8.35 ARM Detailed instructions on activating munitions prior to use.

3.8.36 LOAD One of two definitions depending on type of system.

3.8.36.1 For transportation, the act of placing assets onto a transportation medium (e.g., pallet, truck, container).

3.8.36.2 For weapons/weapons systems, the act of placing munitions into the weapon/ weapons system.

3.8.37 UNLOAD One of two definitions depending on type of system.

3.8.37.1 For transportation, the act of removing assets from a transportation medium (e.g., pallet, truck, container).

3.8.37.2 For weapons/weapons systems, the act of removing munitions from the weapon/ weapons system.

3.8.38 SOFTWARE MAINTENANCE Step-by-step instructions for software maintenance (e.g., installing, un-installing, etc.).

For Further Explanation

MIL-STD-40051-2A, Appendix G

3.9 MAINTENANCE ALLOCATION CHART (MAC) ORGANIZATION

3.9.1 MAINTENANCE ALLOCATION CHART (MAC) WORK PACKAGE Provides a list of all maintenance work packages, labor times, personnel requirements, tool requirements, and tool information.

3.9.1.1 MAC will include every "component, assembly, sub-assembly, and modules for which maintenance is authorized."*With few exceptions, all maintenance work packages will be listed in the MAC.*

3.9.1.2 A single entry in the MAC may cover more than one "like" component - such as LH and RH - only if task time and tools required are equal.

- the use of "and" or "or" in the MAC entry will determine if the time is for one or both of the "like" tasks.

3.9.1.3 TMs shall be constructed in Functional Group Code (FGC) order and structure unless specifically approved otherwise by CASCOM and/or the Office of the Chief of Ordnance.

3.9.1.4 FGC TB 750-93-1 is the baseline for structuring maintenance manuals and RPSTLs. An optional LCN structure will be allowed if the system does not fall within the categories of TB 750-93-1.

3.9.1.5 RPSTL load data/provisioning data must be structured to support Logistics Modernization Program (LMP) rules. Parent and child relationship must be built completely for each major component and tied to the end item.

3.9.1.6 The MAC Work Package Contains Three Tables:

- Table 1. Maintenance Allocation Chart (MAC)
- Table 2. Tools and Test Equipment
- Table 3. Remarks

3.9.2 MAINTENANCE ALLOCATION CHART (MAC) Table 1 consists of six columns of information including Functional Group Code, Component/Assembly, Maintenance Function, Maintenance Level, Tools and Equipment, and Remarks.

- Column 1 – Functional Group Code
  - Functional group code obtained from TB 750-93-1 is assigned to the component, sub-assembly, or assembly.
  - Functional group codes are listed in numerical order.
  - For more information, see *3.10 – Maintenance/MAC/RPSTL Relationship*.
- Column 2 – Component/Assembly
  - List each component, sub-assembly, or assembly that is authorized for maintenance.
  - For more information, see *3.10 – Maintenance/MAC/RPSTL Relationship*.
- Column 3 – Maintenance Function
  - List the function being performed (Test, Remove, Install, etc.)
  - For a detailed list of approved maintenance functions, see *3.8 – Maintenance Functions*

3.9.2 MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

- Column 4 – Maintenance Level (two-level maintenance)
  - Field – divided into two sub-columns
    * C - Crew
    * F - Maintainer
  - Sustainment – divided into two sub-columns
    * H - Below Depot
    * D - Depot
  - The “estimated time to complete” is entered in the column of the maintenance level required to complete the maintenance function.
  - The column in which the time is entered designates which maintenance level is required to complete the maintenance function.
  - The estimated time to complete shall match the work package estimated time to complete listed in the initial setup.
- Column 5 – Tools and Equipment (including Special Tools, TMDE)
  - Enter the reference code of all tools required to complete the maintenance function.
  - For these reference codes, refer to Table 2 – Tools and Test Equipment, Column 1.
  - See paragraph 3.3 for tool referencing information.
- Column 6 – Remarks
  - If applicable, this contains a letter code (A, B, C, etc.) referring to a remark or additional information in Table 3 – Remarks, Column 1.

3.9.2 MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

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FIELD MAINTENANCE

MAINTENANCE ALLOCATION CHART (MAC)

Table 1. Maintenance Allocation Chart (MAC) for XXXX.

(1)	(2)	(3)	(4) MAINTENANCE LEVEL				(5)	(6)
			FIELD		SUSTAINMENT			
GROUP NUMBER	COMPONENT/ ASSEMBLY	MAINTENANCE FUNCTION	CREW	MAINTAINER	BELOW DEPOT	DEPOT	TOOLS AND EQUIPMENT REFERENCE CODE	REMARKS CODE
			C	F	H	D		
01	ENGINE							
0100	Engine Assembly	Remove		13.5			6,12,24,26,34, 37,43,44,50	A
		Install		13.5			6,12,24,26,34, 37,43,44,50	
	Front and Rear Engine Mounts and Brackets	Remove		0.5			43	
		Install		0.5			43	
0101	Timing Case Cover	Remove		1.0			9,43,44,50	
		Install		1.0			9,43,44,50	
	Rear Oil Seal and Housing Assembly	Remove		0.5			35,43,50	
		Install		0.5			35,43,50	
	Cylinder Head Assembly	Remove		6.5			17,38,43,44, 50,51	
		Install		6.5			17,38,43,44, 50,51	
0102	Crankshaft Damper and Pulley	Remove		0.5			43,50,51	
		Install		0.5			43,50,51	
	Front Oil Seal	Remove		0.5			1,5,23,27,32, 43	
		Install		0.5			1,5,23,27,32, 43	
0103	Flywheel Assembly	Remove		1.0			25,33,43,51	
		Install		1.0			25,33,43,51	
	Flywheel Housing	Remove		1.0			43,50	
		Install		1.0			43,50	
0105	Valve Cover and Gasket	Remove		0.5			43,52	
		Install		0.5			43,52	

0208-1

537-0041

Figure 1. Sample of Table 1 - Maintenance Allocation Chart (MAC).

3.9.3 TOOLS AND TEST EQUIPMENT

3.9.3.1 Table 2 consists of five columns of information including Tool or Test Equipment Reference Code, Maintenance Level, Nomenclature, National Stock Number (NSN), and Tool Number. See paragraph 3.3 for tool referencing information.

3.9.3.2 Include the following types of tools in Table 2:

- Special tools (tools that are not within an authorized Army kit or set)
- User-Authorized Tool Kit (e.g., GMTK) (not the individual tools)
- Unit-Authorized Tool Set (SATS, FRS, etc.) (not the individual tools)
- Test, Measure, and Diagnostic Equipment (TMDE) (also include TMDE items found in the authorized tool kits and sets)

3.9.3.3 For example, torque wrenches are included in the Forward Repair Set (FRS), but must be listed in Table 2 of the MAC because it is a TMDE item. Any tool that requires calibration is a TMDE item.

IMPORTANT NOTE

Authorized tool kits and sets are determined by the government. This information must be provided before starting any maintenance manual development process.

3.9.3.4 The contents of Table 2 in the MAC work package are different than the contents of the "Tool Identification List" work package. See paragraph 3.3 for more tool referencing information.

3.9.3.5 List Tools Alphabetically:

- Column 1 – Tool or Test Equipment Reference Code
  - Each tool is assigned a numeric reference code (1, 2, 3, etc.). These reference codes are used in MAC Table 1, Column 5 to indicate which tools are required for a particular maintenance function.
- Column 2 – Maintenance Level
  - Enter the maintenance level of the authorized user of the tool or test equipment.
- Column 3 – Nomenclature
  - Enter the name of the tool or test equipment. Use NSN name verbatim.
- Column 4 – National Stock Number (NSN)
  - Enter the NSN of the tool or test equipment.
- Column 5 – Tool Number (CAGEC)
  - Enter the part number of the tool or test equipment followed by the CAGEC in parentheses.

3.9.3 TOOLS AND TEST EQUIPMENT – CONTINUED

Table 2. Tools and Test Equipment for XXXX.

(1) TOOL OR TEST EQUIPMENT REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER	(5) TOOL NUMBER
1	F	Adapter		276-1209 (11083)
2	F	Adapter, Slide Hammer		8117 (1JEK9)
3	F	Adapter, Torque Wrench	5120-01-429-7337	FRDHM10 (55719)
4	F	Adapter, Vise Grip	5120-01-574-8236	205378 (16734)
5	F	Anchor Plate (Perkins #21825580)		21825580 (13446)
6	F	Bracket, Link (9,000-lb Capacity)	5340-01-476-1734	138-7574 (11083)
7	F	Brush, Scrub	7920-00-061-0037	7920-00-061-0037 (80244)
8	F	Cable Assembly Set, Electrical	6150-01-546-1006	2080059 (11083)
9	F	Centralizing Tool		21825574 (13446)
10	F	Crowbar (Tanker Bar)	5120-00-224-1390	5120-00-224-1390 (80244)
11	F	Diagnostic Kit, Hydraulic Pressure		MA101402000A (0BHP2)
12	F	Double Open-Ended Spanner 27 x 24 mm		12-00-03
13	F	Double Open-Ended Spanner 41 x 36 mm		12-00-44
14	F	Double Open-Ended Spanner 50 x 46 mm		12-00-45
15	F	Filter Unit, Fluid, Pressure	4330-01-456-0327	GT4-10C-6 (05779)
16	F	Fuel Injection Pump Timing Pin		27610032
17	F	Gauge, Torque Angle	5210-01-388-2682	TA360 (55719)
18	F	Handle (Oil Pump)		01-18-04-01 (SU345)
19	F	Heat Gun, Electric	4940-01-391-7046	AA-59435-001 (58536)
20	F	Hose, Draining		05-26-00-OT2
21	F	Hydraulic Key, 41 Long		05-23-05
22	F	Hydraulic Key, 41 Small		05-23-04
23	F	Installer, Seal		21825577 (13446)
24	F	Kit, Caps, Plugs		MA101430001A (0BHP2)

537-0042

Figure 2. Sample of Table 2 - Tools and Test Equipment.

3.9.4 REMARKS Table 3 consists of two columns, Remarks Code and Remarks.

- Column 1 – Remarks Code
  - Each remark is assigned a letter (A, B, C, etc.)
  - These reference codes are used in MAC Table 1, Column 6 to indicate which additional remarks, if any, apply to any particular maintenance function.
- Column 2 – Remarks
  - Add remarks as needed to communicate additional information about a component or the performance of a maintenance task.

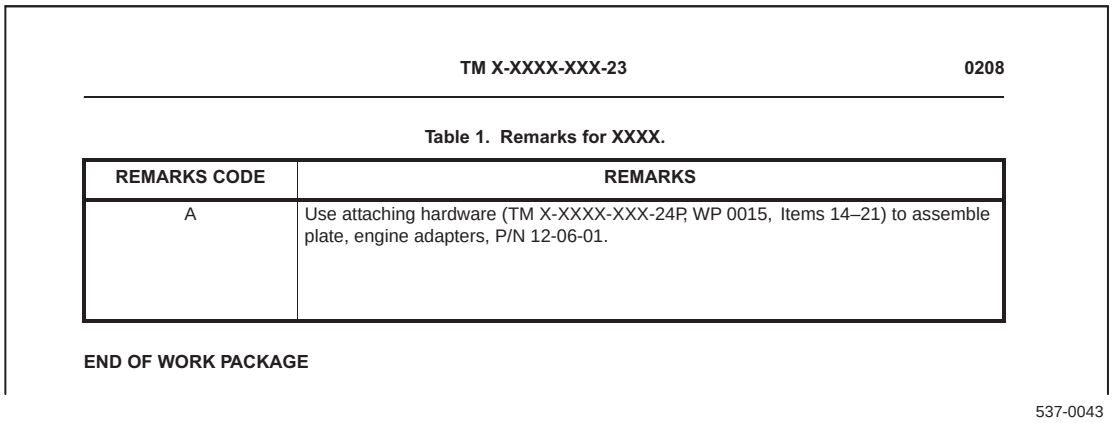

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Table 1. Remarks for XXXX.

REMARKS CODE	REMARKS
A	Use attaching hardware (TM X-XXXX-XXX-24P, WP 0015, Items 14–21) to assemble plate, engine adapters, P/N 12-06-01.

END OF WORK PACKAGE

537-0043

Figure 3. Sample of Table 3 - Remarks.

For Further Explanation

MIL-STD-40051-2A, Appendix G

3.10 MAINTENANCE/MAC/RPSTL RELATIONSHIP

3.10.1 THE MAC, WORK PACKAGE, AND RPSTL ORDER

3.10.1.1 The MAC determines the order of the maintenance work packages as well as the order of the RPSTL figures. The MAC lists all components that are authorized for maintenance.

3.10.1.2 The order of the MAC is determined by maintenance analysis and Function Group Code (FGC) TB 750-93-1 (see Appendix B).

3.10.2 COMPONENT NAMES

3.10.2.1 Component names used in the MAC must match the names used in the operation work packages, maintenance work packages and the names used in the RPSTL. Primary source for component names is the NSN name. In some cases, the NSN name may be less than descriptive. When this is the case, add extended nomenclature to the NSN name in order to keep names consistent.

3.10.2.2 This consistent order and consistent nomenclature is essential for the user. Consistency will greatly improve the usability and navigation of operation, maintenance, and parts manuals.

3.10.3 CROSSWALK

A crosswalk between the MAC, maintenance procedures, and RPSTL must be done at each development stage (draft and final). During a crosswalk effort, the order, the component names, maintenance functions, maintenance level, task times, and component coverage is to be checked for consistency.

3.10.4 EXAMPLES

3.10.4.1 Example of Consistent FGC Usage in MAC and RPSTL

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW	MAINTAINER	BELOW DEPOT	DEPOT		
			C	F	H	D		
01	**ENGINE**							
0100	Engine Assembly	Test		4.0			29,30,31,32,33	
		Remove		20.0			6,12,24,26,34,37,43 ,44,50	A
		Install		13.5			6,12,24,26,34,37,43 ,44,50	
0101	Cylinder Head	Test		1.0			43,50	
		Remove		3.25			43,50	
		Install		3.25			43,50	
0103	Flywheel Housing	Remove		6.25			43,50	
		Install		6.25			43,50	
0105	Valve Cover Base	Remove		1.25			43,50	
		Install		1.25			43,50	
03	**FUEL SYSTEM**							
0302	Injection Pump	Test		2.0			43,50	
		Disassembly		1.75			43,50, 64	
		Assembly		1.75			43,50, 64	

Functional Group Code

537-0105

Figure 1. Maintenance Allocation Chart.

TM X-XXXX-XXX-XXX

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP	
					GROUP 0100	
					FIG. 1 ENGINE ASSEMBLY, LIFT BRACKETS, AND MOUNTING BRACKETS	
1	PAFZZ		13446	3654W007	BRACKET,VEHICULAR C.....	1
2	PAFZZ	5305013362956	13446	2314J003	SCREW,MACHINE.....	4
3	AFFFF		A008B	06-04-00-A	FRONT ENGINE MOUNT.....	1
4	PAFZZ		A008B	06-04-01-R	.MOUNT,ENGINE RH FRONT.....	1
4	PAFZZ		A008B	06-04-01-L	.MOUNT,ENGINE LH FRONT.....	1
5	PAFZZ		A008B	06-04-06	.WASHER,LOCK M16.....	8
6	PAFZZ	5306015849527	A008B	06-04-05	.BOLT,MACHINE M16X40 10.9.....	8
7	PAFZZ	5306015852432	A008B	06-04-03	.BOLT,MACHINE M12X 50 12,9.....	8
8	PAFZZ	5310015301932	39428	91812A233	.WASHER,LOCK M12.....	16
9	PAFZZ	5310015335671	39428	91166A290	.WASHER,FLAT M12.....	8
10	PAFZZ	5306015849492	SU345	06-04-07	.BOLT,MACHINE DIN931 M12X30 10.9...	4
11	PAFZZ	5340015849518	A008B	06-04-02	.MOUNT,RESILIENT,GEN.....	2
12	PAFZZ	5306015859120	SU345	06-04-04	.BOLT,MACHINE M12X 30 DIN 931 10.9.	4

Functional Group Code

537-0106

Figure 2. RPSTL Text Page.

3.10.4 EXAMPLES – CONTINUED

3.10.4.2 Example of Consistent Order in MAC and Maintenance Work Packages

NOTE

The MAC lists a “Removal” procedure under the valve cover base and there is a corresponding work package for removing the valve cover.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW	MAINTAINER	BELOW DEPOT	DEPOT		
			C	F	H	D		
01	ENGINE							
0100	Engine Assembly	Test		4.0			29,30,31,32,33	
		Remove		20.0			6,12,24,26,34,37,43 44,50	A
		Install		13.5			6,12,24,26,34,37,43 44,50	
0101	Cylinder Head	Test		1.0			43,50	
		Remove		3.25			43,50	
		Install		3.25			43,50	
0103	Flywheel Housing	Remove		6.25			43,50	
		Install		6.25			43,50	
0105	Valve Cover Base	Remove		1.25			43,50	
		Install		1.25			43,50	
03	FUEL SYSTEM							
0302	Injection Pump	Test		2.0			43,50	
		Disassembly		1.75			43,50, 64	
		Assembly		1.75			43,50, 64	

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TABLE OF CONTENTS

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Figure 3. Order of MAC and Maintenance Work Packages.

3.10.4 EXAMPLES – CONTINUED

3.10.4.3 Example of MAC/Maintenance Work Package/RPSTL Relationship

- A crosswalk compares an entry in MAC to the maintenance work package and RPSTL figure.
- The main component shall be listed in MAC.
- The main component and all associated hardware shall be shown in the maintenance procedure and RPSTL.

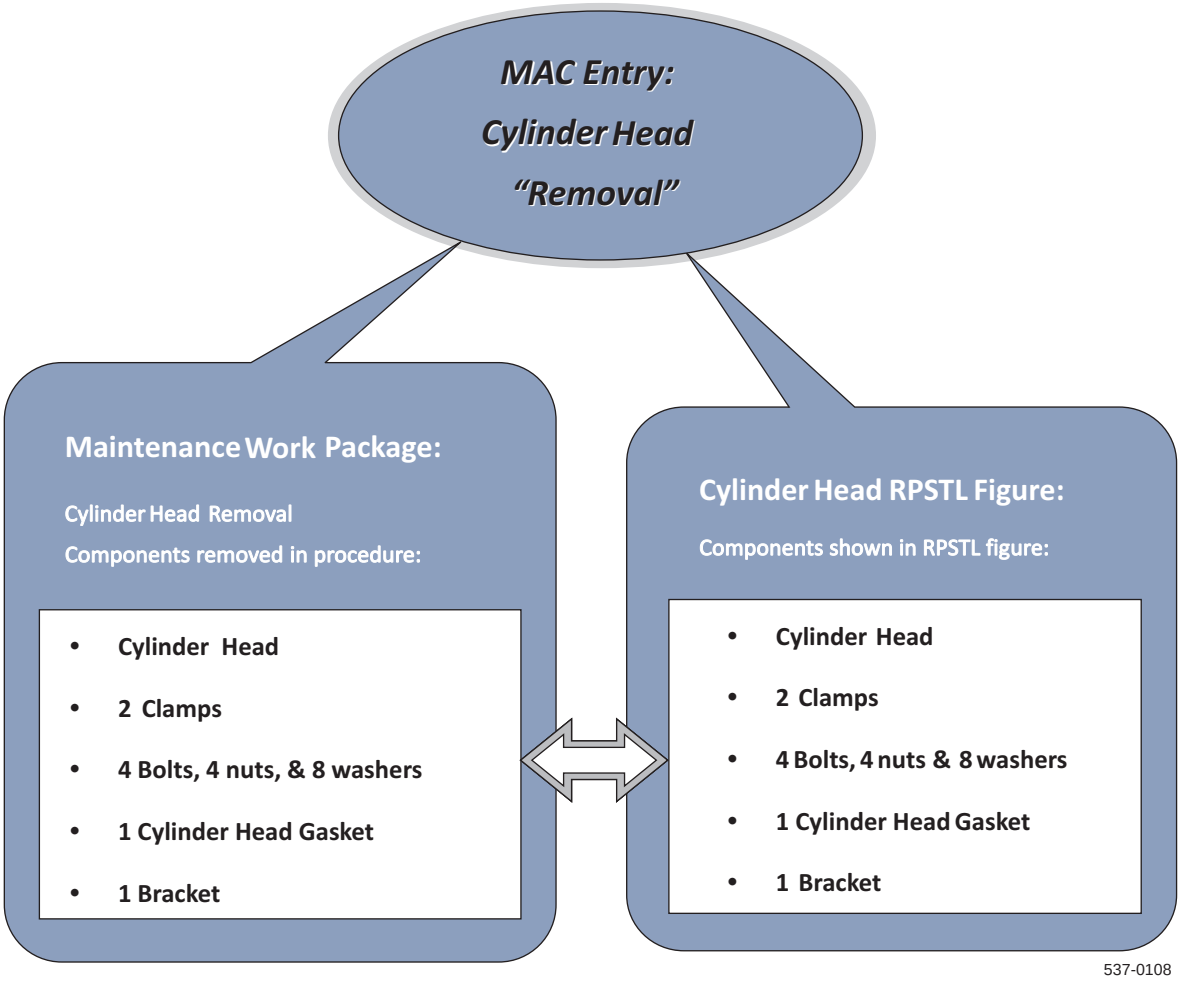

Figure 4. MAC/Maintenance Work Package/RPSTL Relationship.

3.11 TROUBLESHOOTING METHODOLOGY AND PROCEDURES

3.11.1 INTRODUCTION

- Create separate chapters for operator and maintainer troubleshooting.
- Follow all of the writing and procedural style guidelines found in Chapter 3 and Chapter 5 of this document when creating operator and maintainer troubleshooting.
- Use Troubleshooting Fault Process (Method B) for operator troubleshooting (refer to paragraph 3.11.3).
- Use Troubleshooting Logic Process (Method A) for maintainer troubleshooting (refer to paragraph 3.11.5).

3.11.2 OPERATOR TROUBLESHOOTING METHODOLOGY (FAULT PROCESS - METHOD B)

3.11.2.1 Organize operator troubleshooting work packages in the operator troubleshooting chapter as the operator would initialize and operate the equipment.

- Electrical
- Operator Controls
- Engine/Power Unit
- Transmission

3.11.2.2 Use the most direct approach of testing, and organize each operator troubleshooting work package starting from the most probable to least probable faults, balanced with the least intrusive to most intrusive faults. Use visual, audible, touch, and smell, as well as on-board monitors where available, to determine the symptoms for operator troubleshooting.

3.11.2.3 Diagnose one fault at a time using on-board monitors and tools available to the operator. This troubleshooting process requires the user to go to the next malfunction until the symptom is corrected.

3.11.2.4 Each of the following work packages is required in the operator troubleshooting chapter:

- Operator Troubleshooting Introduction work package.
- Operator Troubleshooting Index work package.
- As many Operator Troubleshooting Fault Process (Method B) work packages as necessary to diagnose the equipment.

3.11.2 OPERATOR TROUBLESHOOTING METHODOLOGY (FAULT PROCESS - METHOD B) – CONTINUED

MIL-STD-40051-2A
APPENDIX A

TABLE A-II. Operators and combined operator/maintenance requirements matrix for _____.

TM Content	-10	-13 -13&P	-14 -14&P	MIL-STD-40051-2A Reference	Element Name
CHAPTER X. TROUBLESHOOTING PROCEDURES ***NOTE*** *The notation (*) indicates that at least one of the these content items shall be included*		R	R	Appendix D D.5.4.2	**<tim> <troublecategory>**
INTRODUCTION WORK PACKAGE	R	R	R	D.5.5.3	**<tsintrowp>**
TROUBLESHOOTING INDEX WORK PACKAGE	R	R	R	D.5.5.5	**<tsindxwp>**
**OPERATIONAL CHECKOUT WORK PACKAGES*				D.5.5.8.3	**<opcheckwp>**
**TROUBLESHOOTING WORK PACKAGES*	R	R	R	D.5.5.8.4	**<tswp>**
**COMBINED OPERATIONAL CHECKOUT AND TROUBLESHOOTING WORK PACKAGES*				D.5.5.8.5	**<opcheck-tswp>**

537-0208

Figure 1. TM Requirements Matrix for Operator Troubleshooting.

3.11.3 OPERATOR TROUBLESHOOTING CHAPTER

3.11.3.1 Operator Troubleshooting Introduction The operator troubleshooting introduction work package describes how to use the troubleshooting found in the operator troubleshooting chapter. Use the verbiage in the following example as a guide.

3.11.3 OPERATOR TROUBLESHOOTING CHAPTER – CONTINUED

TM X-XXXX-XXX-10 0006

OPERATOR MAINTENANCE

TROUBLESHOOTING INTRODUCTION

NOTE

Review the associated maintenance procedure(s) and determine the amount of disassembly required to perform a test or inspection before beginning a troubleshooting procedure. Disassemble the machine only as far as necessary to test/inspect/repair the damaged, broken, or faulty component.

INTRODUCTION

1. This chapter provides information for identifying and correcting symptoms that may develop during operation of the XXXXX.
2. The *Troubleshooting Index* (WP XXXX) lists common symptoms that may occur and refers to the proper page in the troubleshooting procedures.
3. If you are unsure of the location of an item mentioned in troubleshooting, refer to *General Information* (WP XXXX), or *Equipment Description and Data* (WP XXXX), or for referenced connector end views and their location see *Component Location and Connector End View* (WP XXXX).
4. Perform PMCS (WP XXXX) before beginning any troubleshooting procedure.
5. Read and follow all safety instructions found in the Warning Summary at the front of this manual before starting any troubleshooting procedures.
6. The *Troubleshooting Index* (WP XXXX) cannot list all symptoms that may occur, nor can troubleshooting list all tests and corrective actions.

NOTE

This troubleshooting process requires the user to automatically proceed to the next applicable malfunction until the symptom is resolved, provided the corrective action does not correct the malfunction.

7. When troubleshooting, perform the following actions:
   a. Locate the symptom in the *Troubleshooting Index* (WP XXXX) that best describes the symptom.
   b. Turn to the page in the troubleshooting work package(s), which addresses the particular symptom.
   c. Read each step before performing the troubleshooting procedure. Most troubleshooting procedures require isolation and testing of multiple components. To achieve this, the troubleshooting fault procedure is broken down as follows:
      (1) **Symptom.** Is a descriptive statement of the symptom (e.g., Coolant temperature gauge in the red zone.). Each symptom is followed by all possible malfunctions.
      (2) **Malfunction.** Each malfunction will be a descriptive statement identifying the malfunction (e.g. Coolant level low.). There may be numerous malfunctions for each symptom. Each malfunction is followed by a corrective action.
      (3) **Corrective Action.** A corrective action may include steps and sub-steps in order to perform the procedure. If the corrective action does not identify a fault, proceed to the next malfunction until all malfunctions have been performed.

      (e.g. Step 1. Turn engine off (TM X-XXXX-XXX-10), Step 2. Allow engine to completely cool. Step 3. Remove radiator cap and verify coolant level is at top of radiator tank. step a. fill radiator, and inspect coolant hoses for Class III leaks. If leaks are found tighten clamps or replace coolant hoses.)

END OF WORK PACKAGE

0006-1/2 blank

537-0159

Figure 2. Operator Troubleshooting Introduction.

3.11.3 OPERATOR TROUBLESHOOTING CHAPTER – CONTINUED

3.11.3.2 Operator Troubleshooting Index The operator troubleshooting index work package contains a list of all symptoms found in the operator troubleshooting chapter. Organize the operator troubleshooting index work package in the same order as the operator troubleshooting work packages.

- Index Organized by System.
- Symptom/Work Package Title and number.

TM X-XXXX-XXX-10 0009

OPERATOR MAINTENANCE

TROUBLESHOOTING INDEX

Malfunction/Symptom	Troubleshooting Procedure
ELECTRICAL SYSTEM	
Air Conditioning Inoperative	WP XXXX
Domelamp Inoperative	WP XXXX
Dozer Blade Inoperative	WP XXXX
Fan Inoperative	WP XXXX
Heater and Air Conditioning Inoperative	WP XXXX
Horn Inoperative When Button Is Pressed	WP XXXX
All Lights Inoperative	WP XXXX
Ripper Inoperative	WP XXXX
Seat Controls Inoperative	WP XXXX
Window Washers Inoperative	WP XXXX
Window Wipers Inoperative	WP XXXX
ENGINE SYSTEM	
Coolant Temperature Too High	WP XXXX
Engine Cannot Reach Top Engine RPM	WP XXXX
Engine Cranks But Will Not Start	WP XXXX
Engine Does Not Crank When Engine Start Switch is Engaged	WP XXXX
Engine Does Not Idle Properly, Misfires, Or Runs Rough After Warmup Period	WP XXXX
Engine Starts But Dies	WP XXXX
Excessive Exhaust Smoke At Normal Operating Temperature	WP XXXX
Excessive Oil Consumption	WP XXXX
Intermittent Engine Shutdown	WP XXXX
Low Engine Oil Pressure	WP XXXX
HYDRAULIC SYSTEM	
Travel Time For Blade Lift, Angle Or Tilt Cylinders Is Slow	WP XXXX
Travel Time For Ripper is Slow	WP XXXX
Winch Does Not Operate	WP XXXX
Winch Operates Inconsistently, Winch Brake Not Releasing	WP XXXX

END OF WORK PACKAGE

0009-1/2 blank

537-0160

Figure 3. Operator Troubleshooting Index.

3.11.3.3 Operator Troubleshooting Fault Process (Method B) Use as many operator troubleshooting fault process (Method B) work packages as necessary to completely diagnose the equipment. The following figure is a complete operator troubleshooting work package.

3.11.3 OPERATOR TROUBLESHOOTING CHAPTER – CONTINUED

TM X-XXXX-XXX-13&P 0007

OPERATOR MAINTENANCE

DOME LAMP TROUBLESHOOTING

INITIAL SETUP

References	Equipment Conditions
WP XXXX	Machine parked (TM X- XXXX-XXX-10)
WP XXXX	

TROUBLESHOOTING PROCEDURE

DOME LAMP TROUBLESHOOTING

SYMPTOM

Dome lamp inoperative.

MALFUNCTION

Dome lamp switch turned off.

CORRECTIVE ACTION

STEP 1. Turn dome lamp switch on (WP XXXX).

MALFUNCTION

Dome lamp fuse faulty (open).

CORRECTIVE ACTION

STEP 1. Turn dome lamp switch off (WP XXXX), and replace dome lamp fuse (WP XXXX).

a. Turn dome lamp switch on (WP XXXX).

(1) If dome lamp fuse is open, notify Field Maintenance for diagnosis and repair.

(2) If dome lamp fuse is OK, notify Field Maintenance for diagnosis and repair.

MALFUNCTION

Electrical malfunction.

CORRECTIVE ACTION

STEP 1. Notify Field Maintenance for diagnosis and repair.

SYMPTOM

Dome lamp on at all times.

MALFUNCTION

Dome lamp switch turned on.

CORRECTIVE ACTION

STEP 1. Turn dome lamp switch off (WP XXXX).

MALFUNCTION

Cab door switch malfunction.

CORRECTIVE ACTION

STEP 1. Notify Field Maintenance for diagnosis and repair.

END OF WORK PACKAGE

0007-1/2 blank

537-0155

Figure 4. Fault Process Troubleshooting (Method B).

3.11.4 MAINTAINER TROUBLESHOOTING METHODOLOGY (LOGIC PROCESS-METHOD A)

3.11.4.1 Organize maintainer troubleshooting in the maintainer troubleshooting chapter by Functional Group Code (FGC).

3.11.4.2 Use the most direct approach of testing. Organize each maintainer troubleshooting logic process (Method A) work package starting from the most probable to least probable, balanced with the least intrusive to most intrusive, least expensive to most expensive.

3.11.4.3 Diagnose one fault at a time using on-board and external monitors when applicable.

3.11.4.4 Organize maintainer troubleshooting work packages which diagnose electrical systems using the following guidelines:

1. *Battery, ignition, switched positive voltage supply circuits.*
2. *Ground, or low reference circuits.*
3. *Signal, control, or output circuits.*

3.11.4.5 For maintainer troubleshooting work packages which diagnose hydraulic or pneumatic systems, test and inspect mechanical components and connections prior to performing pressure tests.

3.11.4.6 Include at least one each of the following work packages in the maintainer troubleshooting chapter:

- Maintainer Troubleshooting Introduction work package.
- Maintainer Troubleshooting Index work package.
- Diagnostic Code Index.
- Component Location/Connector End View work package (as needed).
- As many Maintainer Troubleshooting Logic Process (Method A) work packages as necessary to diagnose the equipment.
- Operational Checkout work package(s) (as needed).
- Combined Operational Checkout and Troubleshooting work package(s) (as needed).

3.11.4 MAINTAINER TROUBLESHOOTING METHODOLOGY (LOGIC PROCESS-METHOD A) – CONTINUED

MIL-STD-40051-2A
APPENDIX A

TABLE A-IV. Combined maintenance and maintenance with parts requirements matrix for _____.

TM Content	-23 -23&P	-24 -24&P	MIL-STD-40051-2A Reference	Element Name
				< >
CHAPTER X. TROUBLESHOOTING PROCEDURES ***NOTE*** *The notation (*) indicates that at least one of the these content items shall be included*	R	R	Appendix D D.5.4.2	**<tim>** **<troublecategory>**
INTRODUCTION WORK PACKAGE	R	R	D.5.5.3	**<tsintrowp>**
TROUBLESHOOTING INDEX WORK PACKAGE	R	R	D.5.5.5	**<tsindxwp>**
**OPERATIONAL CHECKOUT WORK PACKAGES*			D.5.5.8.3	**<opcheckwp>**
**TROUBLESHOOTING WORK PACKAGES*	R	R	D.5.5.8.4	**<tswp>**
**COMBINED OPERATIONAL CHECKOUT AND TROUBLESHOOTING WORK PACKAGES*			D.5.5.8.5	**<opcheck-tswp>**

537-0209

Figure 5. TM Requirements Matrix for Maintainer Troubleshooting.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER

3.11.5.1 Maintainer Troubleshooting Introduction The maintainer troubleshooting introduction work package describes how to use the troubleshooting procedures found in the maintainer troubleshooting chapter. Use the following verbiage as a guide.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

FIELD MAINTENANCE

TROUBLESHOOTING INTRODUCTION

NOTE

Review the associated maintenance procedure(s) and determine the amount of disassembly required to perform a test or inspection before beginning a troubleshooting procedure. Disassemble the machine only as far as necessary to test/inspect/repair the damaged, broken, or faulty component.

INTRODUCTION

1. This chapter provides information for identifying and correcting symptoms that may develop during operation of the XXXXX.
2. If you are unsure of the location of an item mentioned in troubleshooting, refer to *General Information* (WP XXXX), or *Equipment Description and Data* (WP XXXX), or for referenced connector end views and their location see *Component Location and Connector End View* (WP XXXX).
3. Perform PMCS (WP XXXX) before beginning any troubleshooting procedure.
4. Read and follow all safety instructions found in the Warning Summary at the front of this manual before starting any troubleshooting procedures.
5. The *Troubleshooting Index* (WP XXXX) lists common symptoms and diagnostic codes by system that may occur and refers to the proper work package in the troubleshooting procedures.
6. The *Troubleshooting Index* (WP XXXX) cannot list all symptoms that may occur, nor can troubleshooting list all tests and corrective actions.
7. The *Troubleshooting Index* (WP XXXX) lists all possible diagnostic codes for this machine. Troubleshoot the diagnostic code first, then the event code, then the symptom unless otherwise directed by troubleshooting. During testing, components and wiring harness connectors will be disconnected and may set unrelated diagnostic codes.
8. The *Diagnostic Code Index* (WP XXXX) will list all possible diagnostic codes in alphanumeric order.
9. When troubleshooting, perform the following actions:
   a. Locate the symptom in the *Troubleshooting Index* (WP XXXX) that best describes the symptom.
   b. Turn to the page in the troubleshooting work package(s) which addresses the particular symptom.
   c. Review applicable schematics before troubleshooting the machine.
   d. Read each step before performing the troubleshooting procedure. Most troubleshooting procedures require isolation and testing of multiple components. To achieve this, the troubleshooting logic procedure is broken down as follows:
      (1) **Step.** Each step contains a sequence number and an action to perform to carry out the diagnostic process (e.g., Step 1. Turn ignition switch ON (TM X-XXXX-XXX-10)). The step may have bulleted or sequenced sub-steps in order to perform the actions in the parent step. Each sequenced step may be followed by another step or a Condition/Indication.
      (2) **Condition/Indication.** Each condition/indication will be in the form of a question, and is based on the action in the preceding steps (Does voltage measure less than 18V?). When a condition/indication is used, a decision will always follow.

537-0140-1

Figure 6. Maintainer Troubleshooting Introduction (Page 1 of 2).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

(3) **Decision.** A decision will usually be “YES” or “NO” but may also be “PASS, FAIL, TRUE, or NOT TRUE”. The positive and negative responses will always be paired in the decision. The result from each decision will direct a repair, continue troubleshooting to the next step, another step or refer to another troubleshooting procedure. If the decision results in a repair, connect all wiring harness connectors, and install components removed/disassembled to perform the troubleshooting procedure. If sent to a troubleshooting procedure from an operational checkout, return to the operational checkout to verify system operation.

NOTE

Use the operational checkout work packages, if available, before proceeding to any troubleshooting procedure.

e. The troubleshooting procedures may also include an operational checkout or operational checkout with troubleshooting. Each operational checkout is designed to test a component or system, and may not be necessary for each component or system. Read each step before performing the operational checkout. To achieve this, the operational checkout is broken down as follows:

(1) **Step.** Each step contains a sequence number and an action to perform to carry out the diagnostic process (e.g., Step 1. Press and hold service brake [TM X-XXXX-XXX-10]). If there is only a single step, then the sequence step number will not be included. The step may have bulleted or sequenced substeps in order to perform the actions in the parent step. Each sequenced step may be followed by another step or a Condition/Indication.

(2) **Condition/Indication.** Each condition/indication will usually be in the form of a statement of abnormal condition, and is based on the action in the preceding steps (e.g., Both brake lights are not on.). When an abnormal condition or indication is observed, a corrective action is provided. When a condition/indication is used, a correction action will always follow. There may be multiple condition/indication and correct actions after a step. If the correct condition/indication is observed, proceed to the next step until all steps have been performed. If the correct condition/indication is always observed, the operational checkout is complete, and no further troubleshooting is required.

(3) **Corrective Action.** When using an operational checkout with troubleshooting, a corrective action may be a limited repair action (e.g., Replace open fuse [TM X-XXXX-XXX-10]) or a reference to a troubleshooting procedure.

END OF WORK PACKAGE

537-0140-2

Figure 6. Maintainer Troubleshooting Introduction (Page 2 of 2).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

3.11.5.2 Maintainer Troubleshooting Index The maintainer troubleshooting index work package contains a list of all symptoms found in the maintainer troubleshooting chapter. Organize the maintainer troubleshooting index work package by system.

TM X-XXXX-XXX-23 0009

FIELD MAINTENANCE

TROUBLESHOOTING INDEX

Malfunction/Symptom	Troubleshooting Procedure
ENGINE SYSTEM	
Coolant in Engine Oil or Engine Oil in Coolant	WP XXXX
Engine Cranks but Does Not Run	WP XXXX
Engine Does Not Crank or Cranks Slowly	WP XXXX
Engine Misfires, Runs Rough, or Is Unstable	WP XXXX
Engine Is Hard to Start When Cold	WP XXXX
Engine Shutdown Switch Does Not Operate	WP XXXX
E0119 Low Fuel Level Event Code	WP XXXX
E0172 High Air Filter Restriction Event Code	WP XXXX
E0360 Low Engine Oil Pressure Event Code	WP XXXX
E0361 High Engine Coolant Temperature Event Code	WP XXXX
0001 Fuel Injector 1 Diagnostic Code	WP XXXX
0002 Fuel Injector 2 Diagnostic Code	WP XXXX
0003 Fuel Injector 3 Diagnostic Code	WP XXXX
0004 Fuel Injector 4 Diagnostic Code	WP XXXX
0041 8-Volt Supply Voltage Diagnostic Code (Engine ECM)	WP XXXX
0091 Throttle Position Sensor Diagnostic Code	WP XXXX
0100 Engine Oil Pressure Sensor Diagnostic Code	WP XXXX
0110 Engine Coolant Temperature Sensor Diagnostic Code	WP XXXX
0168 Electrical System Voltage Diagnostic Code (Engine ECM)	WP XXXX
TRANSMISSION SYSTEM	
E0155 High Torque Converter Termperature Ev ent Code	WP XXXX
E0329 Transmission Filter Plugged Event Code	WP XXXX
Transmission Does Not Operate in Any Gear	WP XXXX
Transmission Operates in Forward Only	WP XXXX
Transmission Does Not Operate in First Gear Forward or Reverse	WP XXXX
Transmission Does Not Operate in Second Gear Forward or Reverse	WP XXXX
Transmission Does Not Operate in Third Gear Forward or Reverse	WP XXXX
Transmission Does Not Operate in Fourth Gear Forward	WP XXXX
Transmission Slips or Is Slow to Engage in Any Gear	WP XXXX
0041 8-Volt Supply Voltage Diagnostic Code (Transmission ECM)	WP XXX X
0168 Electrical System Voltage Diagnostic Code (Transmission ECM)	WP XXXX
0177 Transmission Oil Temperature Sensor Diagnostic Code	WP XXXX
0247 J1939 Data Link Diagnostic Code	WP XXXX
0426 Transmission Neutralizer Pressure Sensor Diagnostic Code	WP XXXX

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537-0145-1

Figure 7. Maintainer Troubleshooting Index.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

3.11.5.3 Diagnostic Code Index The master diagnostic code index work package contains a list of all diagnostic codes found in the maintainer troubleshooting chapter. Organize the master diagnostic code index work package in alphanumeric order.

TM X-XXXX-XXX-23 0010

FIELD MAINTENANCE

DIAGNOSTIC CODE INDEX

0010-1/2 blank

537-0145-2

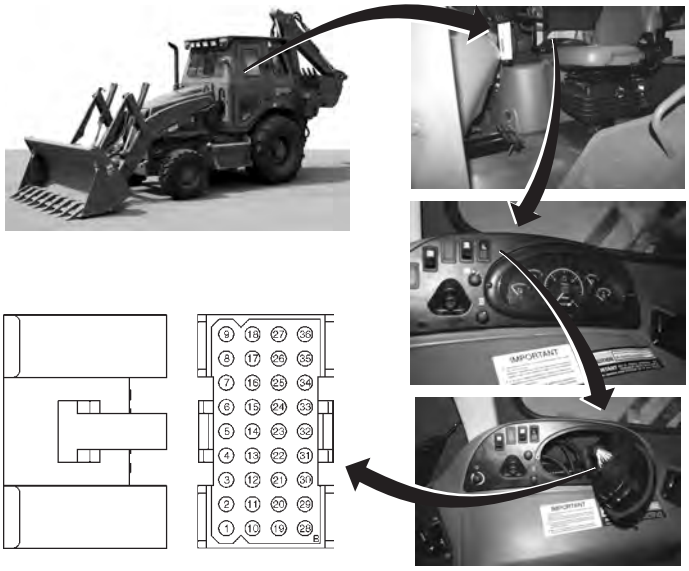
Figure 8. Diagnostic Code Index.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

3.11.5.4 Component Location/Connector End View

- The maintainer troubleshooting chapter has one component location/connector end view work package when electrical troubleshooting is necessary.
- The component location/connector end view work package provides detailed locator views of each electrical component and wiring harness connector on the equipment.
- The component location/connector end view work package provides a detailed view of each wiring harness connector body and terminal position on the wiring harness connector.
- The component location/connector end view work package provides a table identifying each wire by circuit number or functional name as they appear on the electrical schematics/diagrams.
- The component location/connector end view work package is referenced from within the troubleshooting work package as needed.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED



Terminal Number	Circuit Number	Circuit Function
1	23F	Ignition Positive Voltage Input
2	31P	Oil Pressure Sender Signal
3	38	Air Filter Restriction Switch Signal
4	36H	Hydraulic Filter Restriction Switch Signal
5	34A	Alt. Charge Signal
6	33T	Rear Axle Oil Temp. Sender Signal
7	36P	Parking Brake Switch Input
8	52	Neutral Safety Switch Input
9	36R	Seat Switch Input
10	60A	
11	-	-
12	59B	
13	-	-
14	-	-
15	-	-
16	31C	Cold Start Enable Signal
17	-	-
18	-	-

Terminal Number	Circuit Number	Circuit Function
19	31S	Tachometer Signal
20	36F	Fuel Level Sender Signal
21	32T	Transmission Temperature Sender Signal
22	31T	Engine Coolant Temperature Sender Signal
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-
33	-	-
34	-	-
35	37A	Alarm Control
36	20A	Ground

Figure 28. Side Console Wiring Harness Connector to Instrument Cluster.

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537-0152

Figure 9. Component Location/Connector End View.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

3.11.5.5 Maintainer Troubleshooting Logic Process (Method A) Use as many maintainer troubleshooting logic process (Method A) work packages as necessary to completely diagnose the equipment. The following four figures are a complete maintainer troubleshooting work package.

TM X-XXXX-XXX-23 0009

FIELD MAINTENANCE

NO POWER FROM 12-VOLT POWER CONVERTER OR 12-VOLT AUXILIARY PORT

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's (WP XXXX, Item XXX)
Multimeter, Digital (WP XXXX, Item XXX)
Tip, Needle (WP XXXX, Item XXX)

Materials/Parts

Rag, Wiping (WP XXXX, Item XX)
Tag, Marker (WP XXXX, Item XX)

References

WP XXXX
WP XXXX
WP XXXX
WP XXXX

Equipment Conditions

Machine parked (TM X-XXXX-XXX-10)

GENERAL

This work package contains field maintenance troubleshooting information for the XXXX. Use this work package to help isolate and correct system problems. Perform all PMCS and operator troubleshooting procedures (TM X-XXXX-XXX-10) first.

TROUBLESHOOTING PROCEDURE

NO POWER FROM 12-VOLT POWER CONVERTER OR 12-VOLT AUXILIARY PORT

NOTE

- Always inspect wiring harness connectors that are involved in the circuit. Poor connections can often be the cause of a problem in an electrical circuit. Verify that all connections in the circuit are clean and secure and that all connections are in good condition. If a problem with the connection is found, correct the problem and verify that this malfunction or diagnostic code is active before performing this procedure.
- Perform open or short-circuit test at each wiring harness connection to identify the correct wiring harness to replace.
- Tag all wiring harnesses to aid in installation.
- Perform this test only if condition is active.

0009-1

537-0153-1

Figure 10. Maintainer Troubleshooting Logic Process (Method A) Work Package (Page 1 of 4).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

NO POWER FROM 12-VOLT POWER CONVERTER OR 12-VOLT AUXILIARY PORT – CONTINUED

STEP

Test Power Converter Fuse

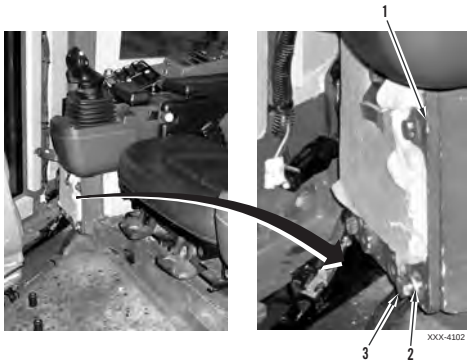


Figure 1. Fuse Cover Plate.

1. Turn battery disconnect switch and ignition switch to OFF position (TM X-XXXX-XXX-10).
2. Remove fire extinguisher (TM X-XXXX-XXX-10).
3. Remove four bolts (Figure 1, Item 3), washers (Figure 1, Item 2), and fuse cover plate (Figure 1, Item 1).
4. Remove fuse F17 (TM X-XXXX-XXX-10).
5. Using digital multimeter (WP XXXX), measure resistance between terminals of fuse F17.

CONDITION/INDICATION

Is resistance greater than 5.0 ohms?

DECISION

YES – Proceed to Step 15.
NO – Proceed to Step 6.

STEP

Measure Voltage at 12-Volt Power Port.

6. Install power converter fuse F17 (TM X-XXXX-XXX-10).
7. Disconnect connector P-C10 (WP XXXX, Figure XXX) from 12-volt power port (WP XXXX, Figure XXX).
8. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
9. Using digital multimeter (WP XXXX), measure voltage between connector P-C10 terminal 1 and terminal 2 (WP XXXX, Figure XXX).

CONDITION/INDICATION

Does voltage measure 11–13 V?

DECISION

YES – Proceed to Step 10.
NO – Proceed to to Malfunction: Fuse panel wiring harness faulty.

537-0153-2

Figure 10. Maintainer Troubleshooting Logic Process (Method A) Work Package (Page 2 of 4).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

NO POWER FROM 12-VOLT POWER CONVERTER OR 12-VOLT AUXILIARY PORT – CONTINUED

MALFUNCTION

Fuse panel wiring harness faulty.

ACTION

1. Replace fuse panel wiring harness (WP XXXX).
2. Connect all wiring harness connectors, and install all removed components.
3. Connect accessory component to 12-volt power port (TM X-XXXX-XXX-10).
4. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
5. Verify that accessory component operates.

STEP

Measure Resistance of Fuse Panel Wiring Harness Ground Circuit.

10. Turn ignition switch to OFF position (TM X-XXXX-XXX-10).
11. Disconnect connector CG-C8 (WP XXXX, Figure XXX) from power converter (WP XXXX, Figure XXX).
12. Connect jumper wire between terminal 5 and terminal 6 of connector CG-C8 (WP XXXX, Figure XXX).
13. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
14. Using digital multimeter (WP XXXX), measure resistance between connector CG-C8 terminal 1 (WP XXXX, Figure XXX) and ground.

CONDITION/INDICATION

Is resistance greater than 5 ohms?

DECISION

YES – Proceed to to Malfunction: Fuse panel wiring harness faulty.
NO – Proceed to to Malfunction: 5A voltage converter faulty.

MALFUNCTION

Fuse panel wiring harness faulty.

ACTION

1. Replace fuse panel wiring harness (WP XXXX).
2. Connect all wiring harness connectors, and install all removed components.
3. Connect accessory component to 12-volt power port (TM X-XXXX-XXX-10).
4. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
5. Verify that accessory component operates.

MALFUNCTION

5A voltage converter faulty.

ACTION

1. Replace 5A voltage converter (WP XXXX).
2. Install new power converter fuse F17 (TM X-XXXX-XXX-10).
3. Connect all wiring harness connectors, and install all removed components.
4. Connect accessory component to 12-volt power port (TM X-XXXX-XXX-10).

537-0153-3

Figure 10. Maintainer Troubleshooting Logic Process (Method A) Work Package (Page 3 of 4).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

NO POWER FROM 12-VOLT POWER CONVERTER OR 12-VOLT AUXILIARY PORT – CONTINUED

5. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
6. Verify that accessory component operates.

STEP

Test 12-Volt Power Port Voltage Supply Circuit for a Short.

15. Disconnect connector P-C10 (WP XXXX, Figure XXX) from 12-volt power port (WP XXXX, Figure XXX).
16. Using digital multimeter (WP XXXX), test for continuity between connector P-C10 terminal 1 and terminal 2 (WP XXXX, Figure XXX).

CONDITION/INDICATION

Does meter display OL?

DECISION

YES – Proceed to to Malfunction: Fuse panel wiring harness faulty.

NO – A faulty accessory component may cause the fuse to open; verify that accessory component is OK. If accessory component is OK, proceed to Malfunction: 5A voltage converter faulty.

MALFUNCTION

Fuse panel wiring harness faulty.

ACTION

1. Replace fuse panel wiring harness (WP XXXX).
2. Install new power converter fuse F17 (TM X-XXXX-XXX-10).
3. Connect all wiring harness connectors, and install all removed components.
4. Connect accessory component to 12-volt power port (TM X-XXXX-XXX-10).
5. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
6. Verify that accessory component operates.

MALFUNCTION

5A voltage converter faulty.

ACTION

1. Replace 5A voltage converter (WP XXXX).
2. Install new power converter fuse F17 (TM X-XXXX-XXX-10).
3. Connect all wiring harness connectors, and install all removed components.
4. Connect accessory component to 12-volt power port (TM X-XXXX-XXX-10).
5. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
6. Verify that accessory component operates.

END OF WORK PACKAGE

537-0153-4

Figure 10. Maintainer Troubleshooting Logic Process (Method A) Work Package (Page 4 of 4).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

3.11.5.6 Operational Checkout Use the operational checkout work packages to determine normal machine operation. When the equipment does not respond correctly, the operational checkout work package will direct the maintainer to another troubleshooting work package to diagnose the symptom. The following example is a complete operational checkout work package.

TM X-XXXX-XXX-23 0020

FIELD MAINTENANCE

STEERING OPERATIONAL CHECKOUT

INITIAL SETUP

References	Equipment Conditions
WP XXXX	Machine parked (TM X-XXXX-XXX-10)
WP XXXX	
WP XXXX	

STEERING OPERATIONAL CHECKOUT

General

This work package contains field maintenance operational checkout information for the XXXX. Each condition/indication is followed by the possible corrective actions. Use this work package to verify correct system operation. Perform all PMCS and operator troubleshooting procedures (TM X-XXXX-XXX-10) first.

WARNING

- Chock rear wheels and clear area before turning steering wheel.
- Failure to follow this warning may result in injury or death to personnel or damage to equipment.

STEP

Test steering operation.

1. Turn battery disconnect switch to ON position (TM X-XXXX-XXX-10).
2. Turn ignition switch to ON position and start engine (TM X-XXXX-XXX-10).
3. Release parking brake (TM X-XXXX-XXX-10).
4. Turn steering wheel to left steering stop, then to right steering stop (TM X-XXXX-XXX-10).

CONDITION/INDICATION

Steering wheel turns abnormally hard.

CORRECTIVE ACTION

Diagnose steering metering valve; proceed to Steering Metering Valve troubleshooting procedure (WP XXXX).

CONDITION/INDICATION

Steering wheel turns, but machine does not respond.

CORRECTIVE ACTION

Test steering relief valve; proceed to Steering Relief Valve Test and Adjustment procedure (WP XXXX).

CONDITION/INDICATION

Steering wheel turns in both directions, but machine turns in only one direction.

CORRECTIVE ACTION

Test steering crossover valve; proceed to Steering Crossover Valve Test and Adjustment procedure (WP XXXX).

END OF WORK PACKAGE

0020-1/2 blank

537-0157

Figure 11. Operational Checkout.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

3.11.5.7 Combined Operational Checkout and Troubleshooting Use combined operational checkout and troubleshooting work packages to determine normal machine operation. When the equipment does not respond correctly, the combined operational checkout and troubleshooting work package will diagnose the symptom by performing the following:

- minor or limited tests and inspections
- minor repairs
- direct the maintainer to another troubleshooting work package to diagnose the symptom

The following two figures are a complete combined operational checkout and troubleshooting work package.

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

TM X-XXXX-XXX-23 0026

FIELD MAINTENANCE

DOME LAMP OPERATIONAL CHECKOUT AND TROUBLESHOOTING

INITIAL SETUP

Tools and Special Tools

Tool Kit General Mechanic's (WP XXXX, Item XXX)

Multimeter, Digital (WP XXXX, Item XXX)

Materials/Parts

Rag, Wiping (WP XXXX, Item XX)

Tag, Marker (WP XXXX, Item XX)

References

WP XXXX

WP XXXX

WP XXXX

WP XXXX

Equipment Conditions

Machine parked (TM X-XXXX-XXX-10)

DOME LAMP OPERATIONAL CHECKOUT

General

This work package contains field maintenance operational checkout and troubleshooting information for the XXXX. Perform all PMCS and operator troubleshooting procedures (TM X-XXXX-XXX-10) first.

NOTE

- Always inspect wiring harness connectors that are involved in the circuit. Poor connections can often be the cause of a problem in an electrical circuit. Verify that all connections in the circuit are clean and secure and that all connections are in good condition. If a problem with the connection is found, correct the problem and verify that this malfunction or diagnostic code is active before performing this procedure.
- Perform open or short-circuit test at each wiring harness connection to identify the correct wiring harness to replace.
- Tag all wiring harnesses to aid in installation.
- Perform this test only if condition is active.

STEP

Verify operation of headlights.

1. Turn battery disconnect switch to ON position (TM X-XXXX-XXX-10).
2. Turn the military light switch to Ser. Drive position (TM X-XXXX-XXX-10).
3. Observe operation of headlights.

CONDITION/INDICATION

Headlights are off.

CORRECTIVE ACTION

Diagnose headlights; proceed to Headlights Do Not Operate troubleshooting procedure (WP XXXX).

STEP

Test cab door switch.

4. Turn dome lamp switch off(TM X-XXXX-XXX-10).

0026-1

537-0158-1

Figure 12. Combined Operational Checkout and Troubleshooting (Page 1 of 3).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

TM X-XXXX-XXX-23 0026

DOME LAMP OPERATIONAL CHECKOUT – CONTINUED

5. Close cab door (TM X-XXXX-XXX-10).

CONDITION/INDICATION

Dome lamp is on.

CORRECTIVE ACTION

Diagnose cab door switch; proceed to Cab Door Switch troubleshooting procedure (WP XXXX).

STEP

Test for faulty dome lamp bulb.

6. Turn dome lamp switch on (TM X-XXXX-XXX-10).

CONDITION/INDICATION

Dome lamp is off.

CORRECTIVE ACTION

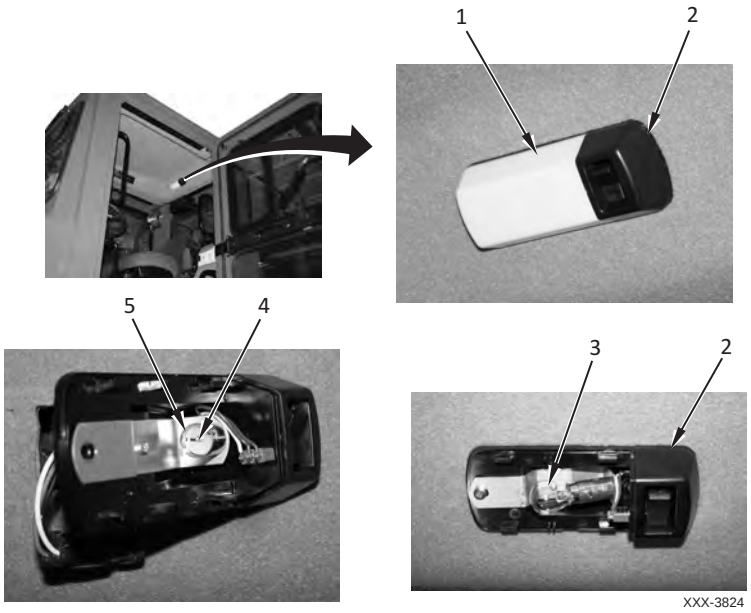


Figure 1. Dome Lamp.

0026-2

537-0158-2

Figure 12. Combined Operational Checkout and Troubleshooting (Page 2 of 3).

3.11.5 MAINTAINER TROUBLESHOOTING CHAPTER – CONTINUED

DOME LAMP OPERATIONAL CHECKOUT – CONTINUED

7. Turn battery disconnect switch to OFF position (TM X-XXXX-XXX-10).
8. Remove cover (Figure 1, Item 1), from dome lamp (Figure 1, Item 2).
9. Remove dome lamp bulb (Figure 1, Item 3) from dome lamp socket (Figure 1, Item 5).
10. Turn battery disconnect switch to ON position (TM X-XXXX-XXX-10).
11. Turn the military light switch to Ser. Drive position (TM X-XXXX-XXX-10).
12. Turn dome lamp switch on (TM X-XXXX-XXX-10).
13. Using digital multimeter (WP XXXX), measure voltage at dome lamp socket connection (Figure 1, Item 4) and socket (Figure 1, Item 5) (ground).

CONDITION/INDICATION

Voltage 18–28 V.

CORRECTIVE ACTION

Replace dome lamp bulb (TM X-XXXX-XXX-10).

CONDITION/INDICATION

Voltage less than 18 V.

CORRECTIVE ACTION

Replace headliner wiring harness (WP XXXX).

END OF WORK PACKAGE

0026-3/4 blank

537-0158-3

Figure 12. Combined Operational Checkout and Troubleshooting (Page 3 of 3).

For Further Explanation

MIL-STD-40051-2A, Appendix D
MIL-HDBK-1222D, paragraph A.4.3.3
MIL-HDBK-2361C, paragraph 37

CHAPTER 4

EQUIPMENT PUBLICATIONS DEFECTS LIST

4.1 EQUIPMENT PUBLICATIONS DEFECTS LIST DEFINITION AND USE

4.1.1 DEFINITION The Equipment Publications Defects List is a tool that is used to determine the quality and acceptability of a technical manual. It is a checklist which contains likely errors/defects that can be made in a technical manual. See paragraph 4.2, Figure 1 for an example of an Equipment Publications Defects List for a technical manual.

4.1.2 EXAMPLES OF DEFECTS See paragraph 4.3 for examples of the defects specified in the Equipment Publications Defects List.

NOTE

Samples do not cover all possible defects. Examples provided are representative.

4.2 DESCRIPTION OF THREE CLASSES OF DEFECTS

4.2.1 CRITICAL A critical defect affects safety of personnel or can cause damage/destruction to equipment. Such a defect is serious enough to warrant an immediate change to the manual to prevent injury to personnel or damage to equipment.

- *No more than 10% of WPs allowed with critical defects.*

4.2.2 MAJOR A major defect can cause lost time to the publication user or affects materiel readiness. Because of inadequate or inaccurate information, this type of defect may prevent the user from performing the particular test or repair function, or it may cause the user considerable loss of time or difficulty in performing a particular function. Inability to access referenced material is a major defect.

- *No more than 25% of WPs allowed with major defects.*

4.2.3 OTHER/MINOR

4.2.3.1 An other/minor defect involves deviation from equipment publication standards only if the defects do not materially reduce the usability of the equipment publication. These defects may cause inconvenience and difficulty to the user in following instructions or in obtaining the required information. Typographical or editorial errors not affecting accuracy or clarity are included.

4.2.3.2 These defects also include material that was presented correctly at the time of preparation, but which has been outdated since publication. These comments result from Government standards being changed, revised, or newly formulated, which affect material that has already been prepared or published. Normally, 6 months is considered sufficient time to implement new directives.

4.2.3.3 These defects normally need not be corrected or implemented by separate change action, but may be included, where feasible, in changes produced for correction of major or critical defects. Separate changes may be produced for other defects when importance or quantity of changes warrant it, or when corrections would significantly aid the user in following instructions or accessing required information.

4.2.4 ACCEPTABLE QUALITY LEVEL (AQL) The Government's goal is to ensure the Contractor performed sufficient quality assurance to eliminate from the TM all defects as defined in the Equipment Publications Defects List (Figure 1). The DEP/PTM must meet AQLs before the Government will accept the DEP/PTM and move forward to plan Government verification. The Government plans to review 100 percent of DEP/PTM; however, if any DEP/TM submission fails to meet either AQL criterion–Percentage of Critical Errors or Percentage of Major Errors–the DEP/PTM will immediately be rejected through official notice to the Procuring Contracting Officer (PCO). Critical and Major errors are defined in the Equipment Publications Defects List.

4.2.4 ACCEPTABLE QUALITY LEVEL (AQL) – CONTINUED

AQLs				
TM Size	**Sample Review Size**	**Percent of Critical Errors***	**Percent of Major Errors***	**Rejected**
Less Than 50 WPs	All WPs	10 Percent	25 Percent	Yes
50 or More WPs	25 Percent of Total WPs	10 Percent	25 Percent	Yes
*Refers to the percentage of Sample Review Size that contains that particular type of error.				

4.2.4 ACCEPTABLE QUALITY LEVEL (AQL) – CONTINUED

Equipment Publications Defects List

Document Number _____ **Equipment** _____

Signature _____ **Date** _____

Defect	Class	TM	MWO	TB	NMWR	IETM
IETM Only						
1. Text or graphic not legible in screen display.	M					X
2. Link displays the incorrect information.	M					X
3. Button does not perform the intended function.	C					X
4. Text to graphics or charts association is incorrect.	M					X
5. Publication runs incorrect diagnostic check or procedure.	M					X
6. Publication obtains incorrect or inappropriate test result.	M					X
Front Matter						
7. Cover or title page does not meet content requirements.	M	X	X	X	X	X
8. Warning data omitted or does not meet requirements.	C	X		X	X	X
9. Table of contents information does not coincide with publication content or incorrect references present.	M	X		X	X	X
10. Mandatory statements or content missing.	M	X	X		X	X
11. Publication does not conform to specified format or screen display requirements.	M	X	X	X	X	X
12. Numbering of content material incorrect or inconsistent.	O	X	X	X		X
Illustrations						
13. Type size in illustrations or text below limits, but legible.	O	X	X	X	X	X
14. Type size below limits and not legible.	M	X	X	X	X	X
15. Illustrations excessively large or not required to support text.	O	X	X	X	X	X
16. Illustrations poor quality where parts cannot be identified.	M	X	X	X	X	X
17. Illustration poor quality, but parts can be identified.	O	X	X	X	X	X
18. Required illustration is omitted.	M	X	X	X	X	X
19. Item details (tolerances, dimensions, reference points) that must be identified are not properly identified in illustration.	M	X	X	X	X	X
20. Inconsistency or disagreement between text and illustration.	M	X	X	X	X	X
21. Required tabular information omitted.	M	X	X	X	X	X
22. Tabular data does not support text.	O	X	X	X	X	X
PMCS						
23. PMCS does not conform to requirements.	M	X				X
24. PMCS does not show all information needed to accomplish a given check or service.	M	X				X

537-0210

Figure 1. Equipment Publications Defects List (Sheet 1 of 3).

4.2.4 ACCEPTABLE QUALITY LEVEL (AQL) – CONTINUED

Equipment Publications Defects List

Document Number _____ **Equipment** _____

Signature _____ **Date** _____

Defect	Class	TM	MWO	TB	NMWR	IETM
PMCS—continued						
25. PMCS omits necessary reference (link) or reference is incorrect.	M	X				X
26. PMCS schedule incorrect or not sequenced properly.	M	X				X
Troubleshooting						
27. Troubleshooting procedures do not identify cause of problem or do not tell what action is required to correct the problem.	M	X				X
28. Troubleshooting procedure is beyond the capability of the maintenance level indicated.	M	X				X
Narrative						
29. Operating procedure omitted, incomplete or incorrect.	M	X	X	X	X	X
30. Narrative maintenance procedure, omitted, incomplete or incorrect.	M	X	X	X	X	X
31. Maintenance procedure inconsistent with MAC (MAC authorized function missing from TM or procedures include work not authorized by the MAC).	M	X	X	X	X	X
32. Maintenance or troubleshooting task contains instructions that may be detrimental to personnel safety or equipment serviceability without appropriate WARNING or CAUTION.	C	X	X	X	X	X
33. Warning or caution information incorrect.	C	X	X	X	X	X
34. Warning or caution improperly placed.	M	X	X	X	X	X
35. Note omitted, incorrect or improperly placed.	M	X	X	X	X	X
36. Information required by STD or other applicable directive is omitted or incorrect.	M	X	X	X	X	X
37. Information is included that is not required.	M	X	X	X	X	X
38. Referenced information cannot be located or is difficult to locate (or not available to the user).	M	X	X	X	X	X
39. Reference is indirect or unnecessary.	O	X	X	X	X	X
40. Equipment conditions in the Initial Setup list multiple levels of equipment conditions (should not list equipment conditions of equipment conditions). Should only list first level of equipment conditions.	M	X	X	X	X	
41. Measurement or tolerance omitted or incorrectly stated.	M	X	X	X	X	X
42. Nomenclature is incomplete, incorrect or inconsistent.	O	X	X	X	X	X
43. Text and supporting illustration not within +/- 2 pages.	M	X	X	X	X	X

537-0211

Figure 1. Equipment Publications Defects List (Sheet 2 of 3).

4.2.4 ACCEPTABLE QUALITY LEVEL (AQL) – CONTINUED

Equipment Publications Defects List

Document Number _____ **Equipment** _____

Signature _____ **Date** _____

Defect	Class	TM	MWO	TB	NMWR	IETM
Supporting Information						
44. References work package (if applicable) omits referenced material or contains incorrect references.	O	X			X	
45. Manufacture details omitted, incomplete, or require materials, processes or tools not available to the user.	M	X	X		X	X
46. Functional group code or name in the MAC is not consistent with the RPSTL or narrative publication.	M	X				X
47. Necessary tools or test equipment not listed in MAC, or not available to user, or not stipulated in the TM procedure.	M	X	X		X	X
48. COEI, BII, or AAL list item omitted, incorrect or inconsistent with SMR code.	M	X			X	X
49. Expendable/Durable Supplies & Materials (EDS&ML) item omitted or incorrect.	C	X	X		X	X
50. Narrative text does not correlate expendable item with its EDS&ML number.	C	X				X
Readability Level						
51. Readability level of text exceeds that identified for the intended audience.	M	X	X	X		X
Index						
52. Index contains incorrect reference, omits topic reference, or topic cannot be identified.	M	X			X	X
TM Crosswalk						
53. TM crosswalk: MAC, maintenance WPs, and RPSTL WPs are not complete, consistent, and coordinated	M	X				X

CLASSIFICATION OF DEFECTS:

Critical (C). A critical defect affects safety of personnel or can cause damage/destruction to equipment. Such a defect is serious enough to warrant an immediate change to the manual to prevent injury to personnel or damage to equipment.

Major (M). A major defect can cause lost time to the publication user or affects materiel readiness. Because of inadequate or inaccurate information, this type of defect may prevent the user from performing the particular test or repair function, or it may cause the user considerable loss of time or difficulty in performing a particular function. Inability to access referenced material is a major defect.

Minor/Other (O). A minor/other defect involves deviation from equipment publication standards only if the defects do not materially reduce the usability of the equipment publication. These defects may cause inconvenience and difficulty to the user in following instructions or in obtaining the required information. Typographical or editorial errors not affecting accuracy or clarity are included.

537-0212

Figure 1. Equipment Publications Defects List (Sheet 3 of 3).

4.3 EXAMPLES OF 47 DEFECTS: FAILURES AND CORRECTED VERSIONS

NOTE

There are no examples of Defects 1 through 6, because they are IETM-only defects.

Defect 7. Cover or title page does not meet content requirements. (M)

NOT CORRECT	CORRECT
TM 5-3805-293-23-3 TECHNICAL MANUAL FIELD MAINTENANCE MANUAL FOR MOTORIZED ROAD GRADER MODEL 120M NSN missing	TM 5-3805-293-23-3 TECHNICAL MANUAL FIELD MAINTENANCE MANUAL FOR MOTORIZED ROAD GRADER MODEL 120M (NSN 3805-01-560-2834)

537-0019

Defect 8. Warning data omitted or does not meet requirements (Sheet 1 of 2). (C)

NOT CORRECT

TM X-XXXX-XXX-XX&P

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel.

FOR INFORMATION ON FIRST AID, REFER TO FM 4-25.11.

Warning header missing

HEAVY COMPONENTS

- Wheel assembly weighs 200 lb (91 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Caster assembly weighs 60 lb (27 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Hub and brake drum weighs 90 lb (41 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Strut weighs 80 lb (36 kg). Ensure that all front dolly components to be moved or assembled are completey supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Components you are working with may weigh 900 lb (408 kg). Ensure that all front dolly components to be moved or assembled are completely supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Components you are working with may weigh 900 lb (408 kg). Ensure that all rear dolly components to be moved or assembled are completely supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Towbar weighs 450 lb (204 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Hydraulic cylinder weighs 200 lb (91 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.

537-0213-1

Defect 8. Warning data omitted or does not meet requirements (Sheet 2 of 2). (C)

CORRECT

TM X-XXXX-XXX-XX&P

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel.

FOR INFORMATION ON FIRST AID, REFER TO FM 4-25.11.

GENERAL SAFETY WARNING DESCRIPTIONS

WARNING

HEAVY COMPONENTS

- Wheel assembly weighs 200 lb (91 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Caster assembly weighs 60 lb (27 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Hub and brake drum weighs 90 lb (41 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Strut weighs 80 lb (36 kg). Ensure that all front dolly components to be moved or assembled are completey supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Components you are working with may weigh 900 lb (408 kg). Ensure that all front dolly components to be moved or assembled are completely supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Components you are working with may weigh 900 lb (408 kg). Ensure that all rear dolly components to be moved or assembled are completely supported/suspended and that adequate manpower is available to move components. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Towbar weighs 450 lb (204 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.
- Hydraulic cylinder weighs 200 lb (91 kg). Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Failure to follow this warning may result in injury or death to personnel. Seek medical attention in the event of an injury.

537-0213-2

Defect 9. Table of contents information does not coincide with publication content or incorrect references present. (M)

NOT CORRECT

Work Package Title

0171

FIELD MAINTENANCE

FRONT AND REAR TURN SIGNAL/HAZARD LIGHTS REMOVAL

Table of Contents (TOC) Entry

Front and Rear Turn Signal/Hazard Lights Removal . . . . . .WP 0189

WP number incorrect in TOC

CORRECT

Table of Contents Entry

Front and Rear Turn Signal/Hazard Lights Removal . . . . . .WP 0171

537-0192

Defect 10. Mandatory statements or content missing. (M)

NOT CORRECT

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 27 July 2010

TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

MOTORIZED ROAD GRADER
MODEL XXXM
(NSN XXXX-XX-XXX-XXXX)

Reporting errors statement missing

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

CORRECT

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 27 July 2010

TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

MOTORIZED ROAD GRADER
MODEL XXXM
(NSN XXXX-XX-XXX-XXXX)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet on the TACOM Unique Logistics Support Applications (TULSA) Website. The Internet address is https://tulsa.tacom.army.mil. Access to all applications requires CAC authentication, and you must complete the Access Request form the first time you use it. The DA Form 2028 is located under the TULSA Applications on the left-hand navigation bar. Fill out the form and click on SUBMIT. Using this form on the TULSA Website will enable us to respond more quickly to your comments and better manage the DA Form 2028 program. You may also mail, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727, 6501 E. 11 Mile Road, Warren, MI 48397-5000. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 786-1856 or Commercial (586) 282-1856. A reply will be furnished to you.

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

537-0028

Defect 11. Publication does not conform to specified format or screen display requirements. (M)

NOT CORRECT

TM X-XXXX-XXX-XX-X 0079

OIL PRESSURE CHECK

Font size incorrect

WARNING

Lubricating oil is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury or death to personnel.

CAUTION

Do not operate engine with oil pressure switch passage open (no oil pressure switch or gauge installed). Failure to follow this caution will cause damage to machine.

1. Disconnect main chassis wiring harness connector (Figure 2, Item 4) from oil pressure sending unit (Figure 2, Item 2).
2. Remove oil pressure sending unit (Figure 2, Item 2) and O-ring (Figure 2, Item 3) from engine (Figure 2, Item 1). Discard O-ring.

CORRECT

TM X-XXXX-XXX-XX-X 0079

OIL PRESSURE CHECK

WARNING

Lubricating oil is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury or death to personnel.

CAUTION

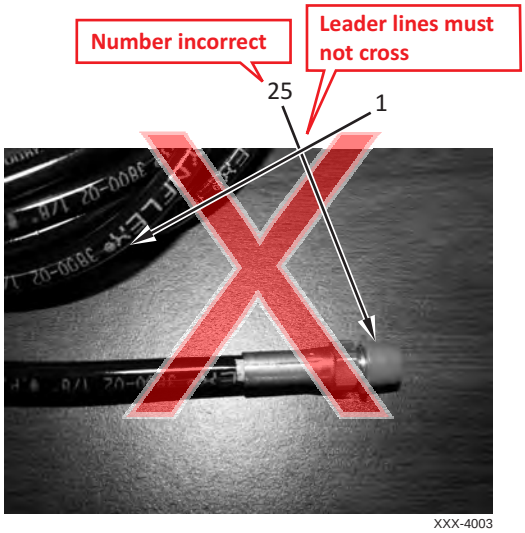
Do not operate engine with oil pressure switch passage open (no oil pressure switch or gauge installed). Failure to follow this caution will cause damage to machine.

1. Disconnect main chassis wiring harness connector (Figure 2, Item 4) from oil pressure sending unit (Figure 2, Item 2).
2. Remove oil pressure sending unit (Figure 2, Item 2) and O-ring (Figure 2, Item 3) from engine (Figure 2, Item 1). Discard O-ring.

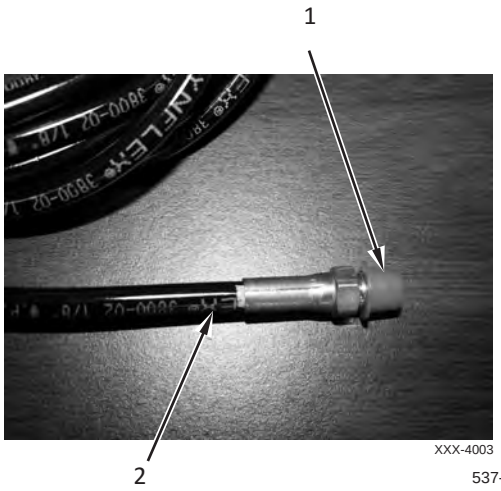
537-0193

Defect 12. Numbering of content material incorrect or inconsistent. (O)

NOT CORRECT



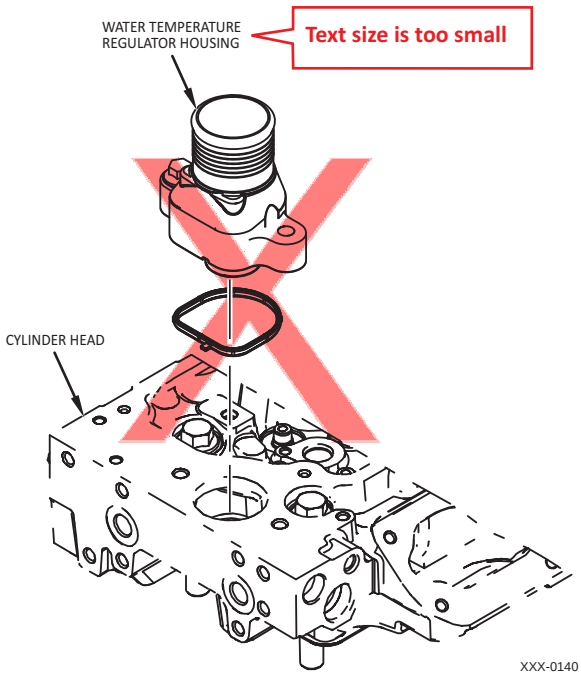
CORRECT



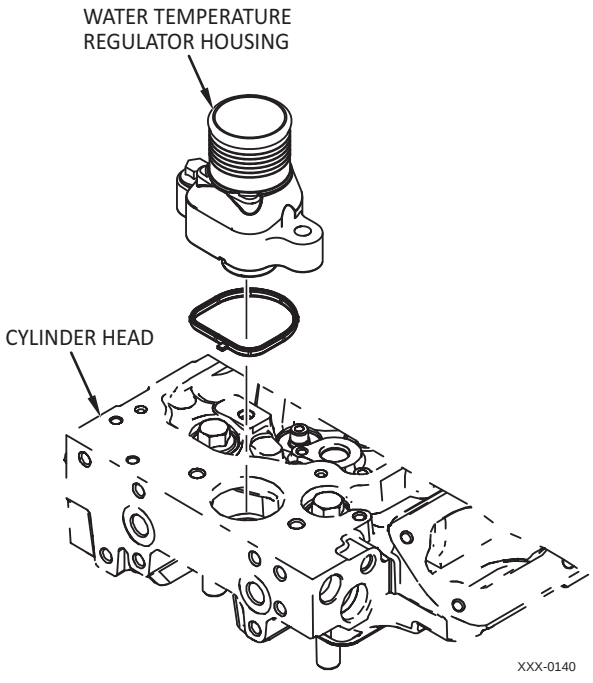
537-0020

Defect 13. Type size in illustration or text below limits, but legible. (O)

NOT CORRECT

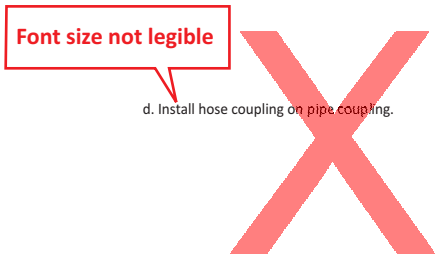


CORRECT



537-0002

Defect 14. Type size below limits and not legible. (M)

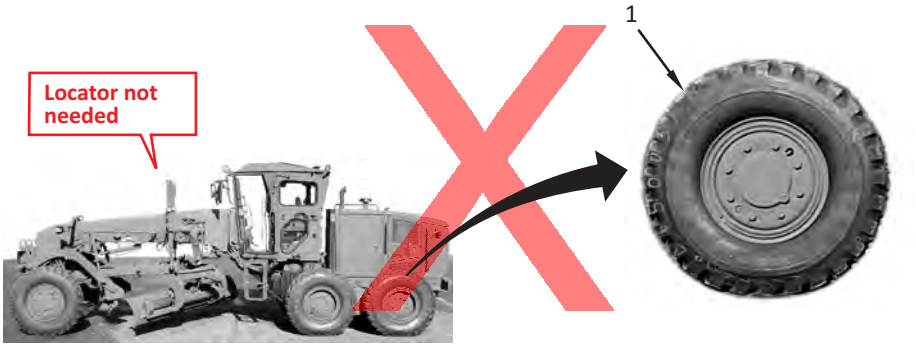
NOT CORRECT	CORRECT
	d. Install hose coupling on pipe coupling.

537-0021

Defect 15. Illustrations excessively large or not required to support text. (O)

NOT CORRECT

1. Remove wheel assembly (Figure 1, Item 1).



XXX-0335

Figure 1. Wheel Assembly.

CORRECT

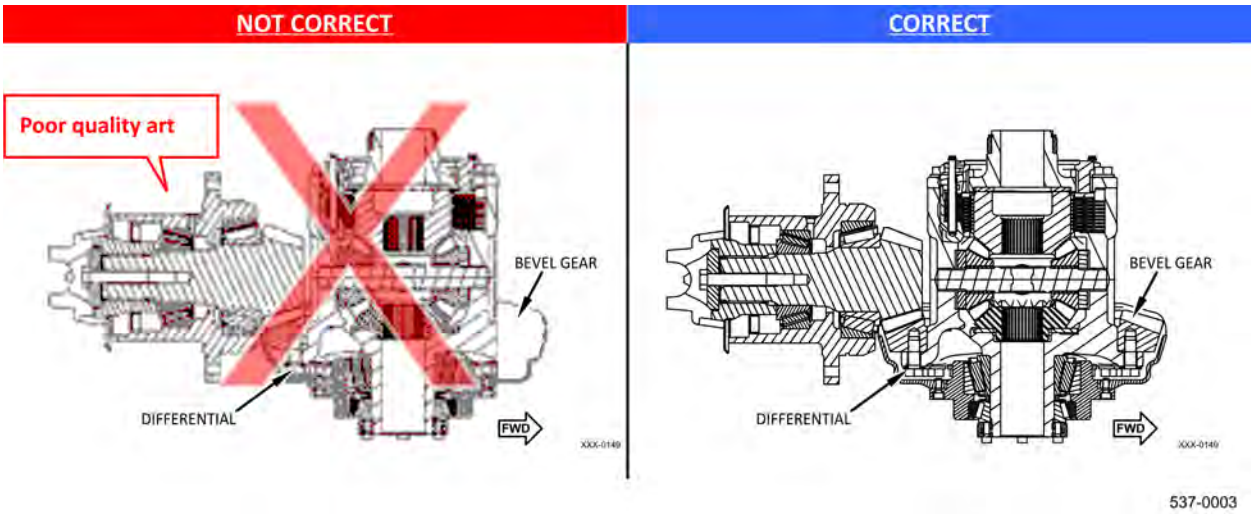
1. Remove wheel assembly (Figure 1, Item 1).

XXX-0335

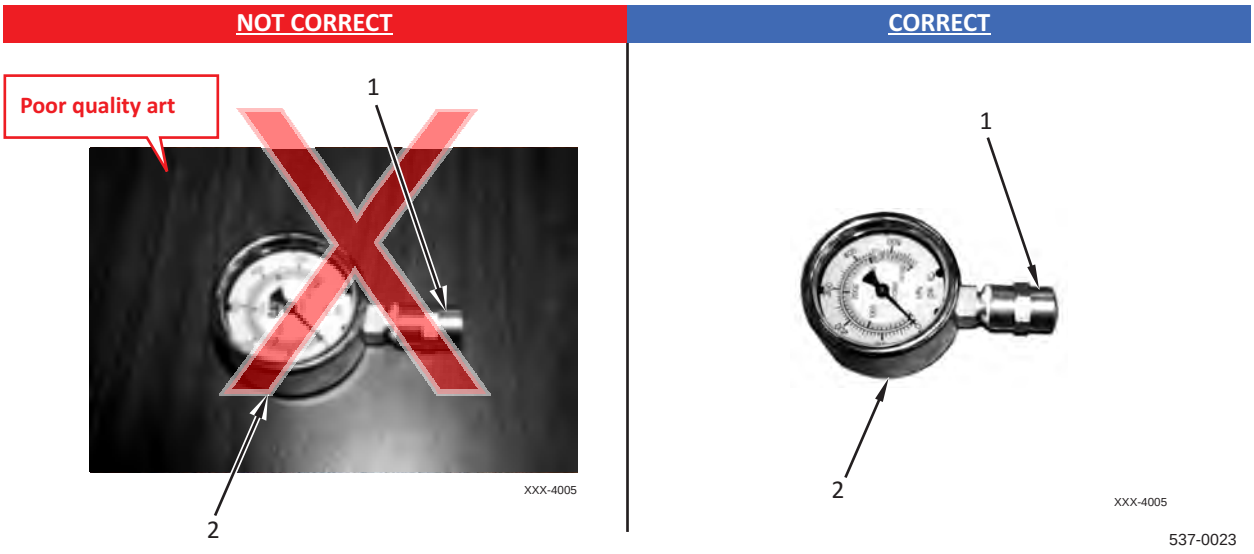
Figure 1. Wheel Assembly.

537-0022

Defect 16. Illustrations poor quality where parts cannot be identified. (M)



Defect 17. Illustration poor quality, but parts can be identified. (O)



Defect 18. Required illustration is omitted. (M)

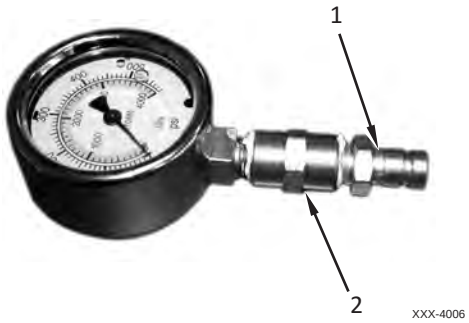
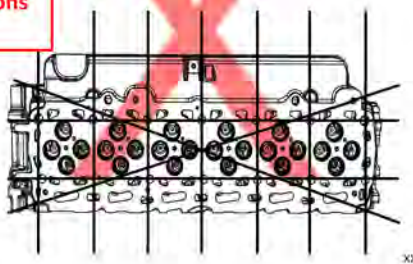
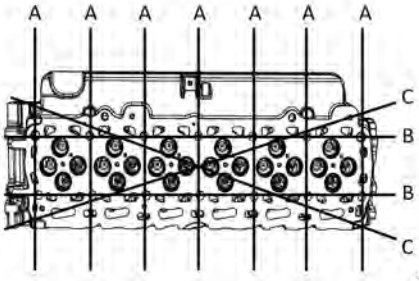
NOT CORRECT	CORRECT
d. Install hose coupling (Figure 7, Item 1) on pipe coupling (Figure 7, Item 2). Illustration missing	d. Install hose coupling (Figure 7, Item 1) on pipe coupling (Figure 7, Item 2). 

Figure 7. Hose Coupling and Pipe Coupling.

537-0024

Defect 19. Item details (tolerances, dimensions, reference points) that must be identified are not properly identified in illustration. (M)

NOT CORRECT	CORRECT
Measure Cylinder Head for flatness across shown areas. Specifications missing 	a. Measure from side to side (A). Maximum permissible distortion 0.0012 in. (0.03 mm). b. Measure from end to end (B). Maximum permissible distortion 0.0020 in. (0.05 mm). c. Measure from corner to corner (C). Maximum permissible distortion 0.0020 in. (0.05 mm). 

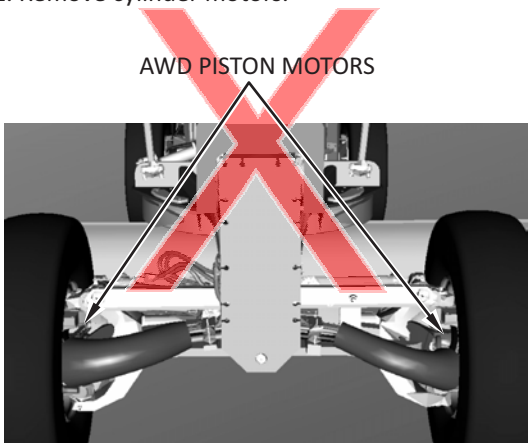
537-0025

Defect 20. Inconsistency or disagreement between text and illustration. (M)

NOT CORRECT

Text incorrect

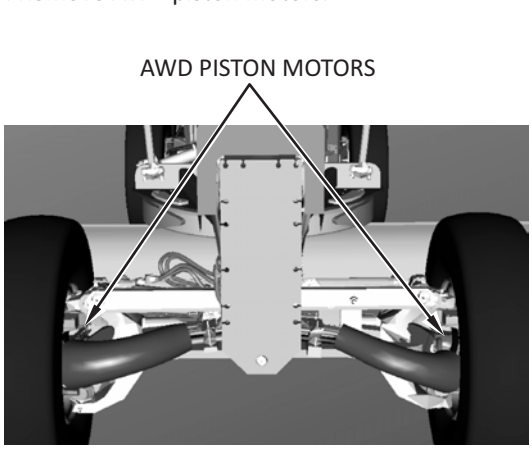
1. Remove cylinder motors.



XXX-0127

CORRECT

1. Remove AWD piston motors.



XXX-0127

537-0004

Defect 21. Required tabular information omitted. (M)

NOT CORRECT

Column heading and table title missing

14°F (-10°C)	536 psi (3,701 kPa)
23°F (-5°C)	547 psi (3,771 kPa)
32°F (0°C)	557 psi (3,841 kPa)
41°F (5°C)	567 psi (3,909 kPa)
50°F (10°C)	577 psi (3,978 kPa)
59°F (15°C)	587 psi (4,047 kPa)

CORRECT

Table 1. Temperature and Pressure.

TEMPERATURE	PRESSURE
14°F (-10°C)	536 psi (3,701 kPa)
23°F (-5°C)	547 psi (3,771 kPa)
32°F (0°C)	557 psi (3,841 kPa)
41°F (5°C)	567 psi (3,909 kPa)
50°F (10°C)	577 psi (3,978 kPa)
59°F (15°C)	587 psi (4,047 kPa)

537-0026

Defect 22. Tabular data does not support text. (O)

NOT CORRECT

17. Add indicated amount of refrigerant.

Table placed with wrong step

TEMPERATURE	PRESSURE
14°F (-10°C)	536 psi (3,701 kPa)
23°F (-5°C)	547 psi (3,771 kPa)
32°F (0°C)	557 psi (3,841 kPa)
41°F (5°C)	567 psi (3,909 kPa)
50°F (10°C)	577 psi (3,978 kPa)
59°F (15°C)	587 psi (4,047 kPa)

CORRECT

17. Compare ambient air temperature to pressure in Table 1.

Table 1. Temperature and Pressure

TEMPERATURE	PRESSURE
14°F (-10°C)	536 psi (3,701 kPa)
23°F (-5°C)	547 psi (3,771 kPa)
32°F (0°C)	557 psi (3,841 kPa)
41°F (5°C)	567 psi (3,909 kPa)
50°F (10°C)	577 psi (3,978 kPa)
59°F (15°C)	587 psi (4,047 kPa)

537-0029

Defect 23. PMCS does not conform to requirements. (M)

NOT CORRECT

TM X-XXXX-XXX-XX-X 0083

FIELD MAINTENANCE

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) AND LUBRICATION INSTRUCTIONS

Initial Setup missing

Table 1. Preventive Maintenance Checks and Services (PMCS).

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED/ SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				NOTE • Review all WARNINGs, CAUTIONs, and NOTEs before performing PMCS on the Backhoe Loader (BHL). • Unless otherwise indicated, perform all preventive maintenance and lubrication with machine parked on level ground, engine shut down, parking brake engaged, and hydraulic system pressure relieved.	

CORRECT

TM X-XXXX-XXX-XX-X 0083

FIELD MAINTENANCE

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) AND LUBRICATION INSTRUCTIONS

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's (WP 0366, Item 121)

Materials/Parts
Cleaning Compound, Solvent, Type III (WP 0367, Item 6)
Oil, Engine, 15W40 (WP 0367, Item 22)
Rag, Wiping (WP 0367, Item 24)

References
TM X-XXXX-XXX-XX
WP 0085
WP 0090
WP 0093
WP 0095
WP 0104

References
WP 0119
WP 0129
WP 0140
WP 0149
WP 0197
WP 0208
WP 0212
WP 0259
WP 0292
WP 0359
WP 0360
WP 0361

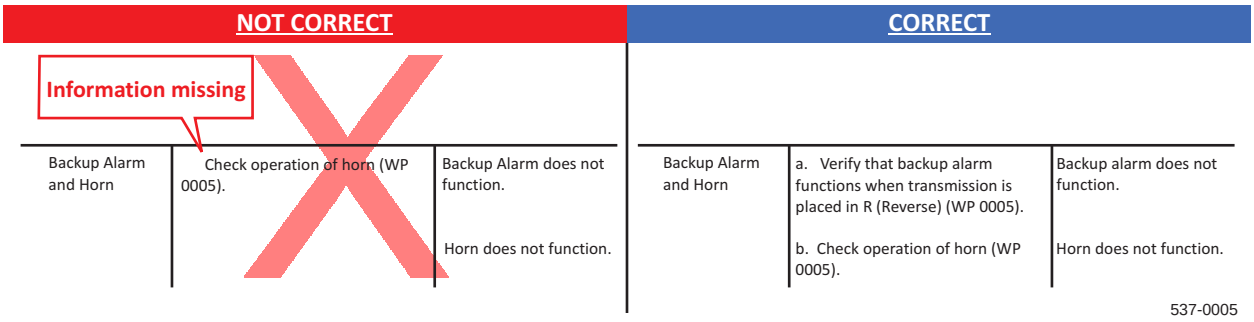
Equipment Conditions
Machine parked (TM X-XXXX-XXX-XX)

Table 1. Preventive Maintenance Checks and Services (PMCS).

ITEM NO.	INTERVAL	MAN-HOURS	ITEM TO BE CHECKED/ SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
				NOTE • Review all WARNINGs, CAUTIONs, and NOTEs before performing PMCS on the Backhoe Loader (BHL). • Unless otherwise indicated, perform all preventive maintenance and lubrication with machine parked on level ground, engine shut down, parking brake engaged, and hydraulic system pressure relieved.	

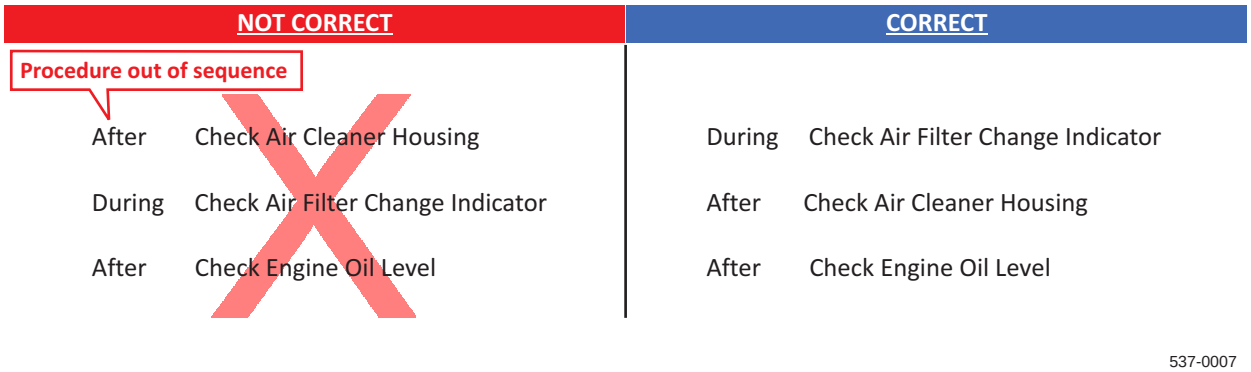
537-0194

Defect 24. PMCS does not show all information needed to accomplish a given check or service. (M)



Defect 25. PMCS omits necessary reference (link) or reference is incorrect. (M)

Defect 26. PMCS schedule incorrect or not sequenced properly. (M)



Defect 27. Troubleshooting procedures do not identify cause of problem or do not tell what action is required to correct the problem. (M)

NOT CORRECT

STEP

Measure Resistance of Fuse Panel Wiring Harness Ground Circuit.

11. Turn ignition switch to OFF position (TM X-XXXX-XXX-10).
12. Disconnect connector CG-C8 (WP XXXX, Figure XXX) from power converter (WP XXXX, Figure XXX).
13. Connect jumper wire between terminal 5 and terminal 6 of connector CG-C8 (WP XXXX, Figure XXX).
14. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
15. Using digital multimeter (WP XXXX), measure resistance between connector CG-C8 terminal 1 (WP XXXX, Figure XXX) and ground.

CONDITION/INDICATION

Is resistance greater than 5 ohms?

DECISION

YES – Proceed to step 16.
NO – Proceed to step 17.

MALFUNCTION

Does not identify cause

16. No problem found.

ACTION

Does not identify all corrective actions

STEP 1. Connect all wiring harness connectors, and install all removed components.
STEP 2. Connect accessory component to 12-volt power port (TM X-XXXX-XXX-10).
STEP 3. Repeat troubleshooting from step 1.

CORRECT

STEP

Measure Resistance of Fuse Panel Wiring Harness Ground Circuit.

11. Turn ignition switch to OFF position (TM X-XXXX-XXX-10).
12. Disconnect connector CG-C8 (WP XXXX, Figure XXX) from power converter (WP XXXX, Figure XXX).
13. Connect jumper wire between terminal 5 and terminal 6 of connector CG-C8 (WP XXXX, Figure XXX).
14. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
15. Using digital multimeter (WP XXXX), measure resistance between connector CG-C8 terminal 1 (WP XXXX, Figure XXX) and ground.

CONDITION/INDICATION

Is resistance greater than 5 ohms?

DECISION

YES – Proceed to step 16.
NO – Proceed to step 17.

MALFUNCTION

16. Fuse panel wiring harness faulty.

ACTION

STEP 1. Replace fuse panel wiring harness (WP XXXX).
STEP 2. Connect all wiring harness connectors, and install all removed components.
STEP 3. Connect accessory component to 12-volt power port (TM X-XXXX-XXX-10).
STEP 4. Turn battery disconnect switch and ignition switch to ON position (TM X-XXXX-XXX-10).
STEP 5. Verify that accessory component operates.

537-0195

Defect 28. Troubleshooting procedure is beyond the capability of the maintenance level indicated. (M)

NOT CORRECT

OPERATOR MAINTENANCE

DOME LAMP TROUBLESHOOTING

INITIAL SETUP

References	Equipment Conditions
WP XXXX	Machine parked (TM X- XXXX-XXX-10)
WP XXXX	

TROUBLESHOOTING PROCEDURE

DOME LAMP TROUBLESHOOTING

SYMPTOM

Dome lamp inoperative.

MALFUNCTION

Dome lamp switch turned off.

CORRECTIVE ACTION

STEP 1. Turn dome lamp switch on (WP XXXX).

MALFUNCTION

Dome lamp fuse faulty (open).

CORRECTIVE ACTION

STEP 1. Turn dome lamp switch off (WP XXXX), and replace dome lamp fuse (WP XXXX).

a. Turn dome lamp switch on (WP XXXX).

(1) If dome lamp fuse is open, use digital multimeter to diagnose and repair shorted wiring harness.

(2) If dome lamp fuse is OK, replace dome lamp.

Above operator level.

CORRECT

OPERATOR MAINTENANCE

DOME LAMP TROUBLESHOOTING

INITIAL SETUP

References	Equipment Conditions
WP XXXX	Machine parked (TM X- XXXX-XXX-10)
WP XXXX	

TROUBLESHOOTING PROCEDURE

DOME LAMP TROUBLESHOOTING

SYMPTOM

Dome lamp inoperative.

MALFUNCTION

Dome lamp switch turned off.

CORRECTIVE ACTION

STEP 1. Turn dome lamp switch on (WP XXXX).

MALFUNCTION

Dome lamp fuse faulty (open).

CORRECTIVE ACTION

STEP 1. Turn dome lamp switch off (WP XXXX), and replace dome lamp fuse (WP XXXX).

a. Turn dome lamp switch on (WP XXXX).

(1) If dome lamp fuse is open, notify Field Maintenance for diagnosis and repair.

(2) If dome lamp fuse is OK, notify Field Maintenance for diagnosis and repair.

537-0196

Defect 29. Operating procedure omitted, incomplete, or incorrect. (M)

NOT CORRECT	CORRECT
Shut down 1. Park machine on level ground. 2. Lower work tool to the ground. 3. Engage parking brake. Step missing	**Shut down** 1. Park machine on level ground. 2. Lower work tool to the ground. 3. Shut down engine. 4. Engage parking brake.

537-0008

Defect 30. Narrative maintenance procedure, omitted, incomplete, or incorrect. (M)

NOT CORRECT	CORRECT
Step missing 15. With assistance, remove starter motor (Figure 5, Item 1) and gasket (Figure 5, Item 3) from machine. Discard gasket.	14. Remove three bolts (Figure 5, Item 2) from starter motor (Figure 5, Item 1). 15. With assistance, remove starter motor (Figure 5, Item 1) and gasket (Figure 5, Item 3) from machine. Discard gasket.

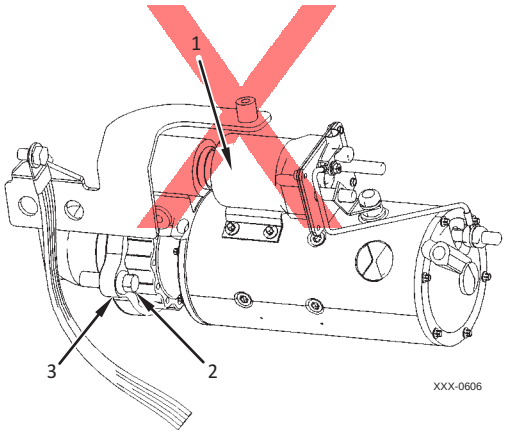
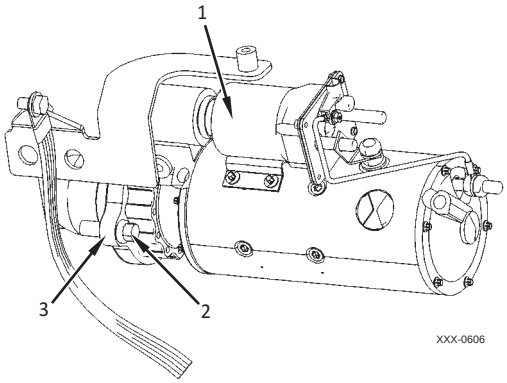

	

Figure 5. Starter Motor.	Figure 5. Starter Motor.

537-0027

Defect 31. Maintenance procedure inconsistent with MAC (MAC authorized function missing from TM or procedures include work not authorized by the MAC). (M)

NOT CORRECT	CORRECT
Work Package Title and Maintenance Function	**Work Package Title and Maintenance Function**
FIELD MAINTENANCE **ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION**	**FIELD MAINTENANCE** **ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION**
MAC Entry	**MAC Entry**
Engine Coolant Temperature Sensor — Inspect, Remove	Engine Coolant Temperature Sensor — Inspect, Remove, Install
Maintenance function missing	

537-0009

Defect 32. Maintenance or troubleshooting task contains instructions that may be detrimental to personnel safety or equipment serviceability without appropriate WARNING or CAUTION. (O)

NOT CORRECT

Warning missing

TM X-XXXX-XXX-XX 0135

REMOVAL

1. Remove two bolts (Figure 1, Item 4), lockwashers (Figure 1 Item 5), and accelerator bracket (Figure 1 Item 6) from high-pressure fuel pump (Figure 1, Item 3). Discard lockwashers.
2. Disconnect vacuum line (Figure 1, Item 1) and remove seal (Figure 1, Item 2) from high-pressure fuel pump (Figure 1, Item 3).

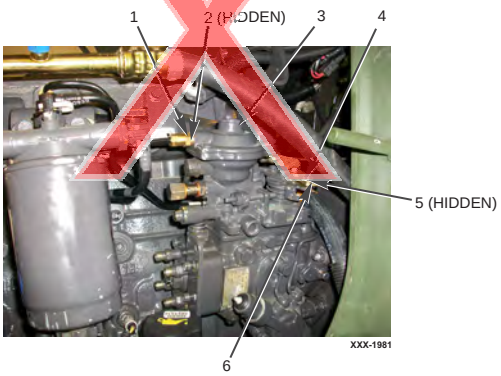


Figure 1. High-Pressure Fuel Pump.

CORRECT

TM X-XXXX-XXX-XX 0135

WARNING

- Diesel fuel is combustible and an irritant. Skin and eye protection is required. Ensure work area is well ventilated.
- Keep away from open flame and other ignition sources.
- Failure to follow these warnings may result in injury or death to personnel.

REMOVAL

1. Remove two bolts (Figure 1, Item 4), lockwashers (Figure 1 Item 5), and accelerator bracket (Figure 1 Item 6) from high-pressure fuel pump (Figure 1, Item 3). Discard lockwashers.
2. Disconnect vacuum line (Figure 1, Item 1) and remove seal (Figure 1, Item 2) from high-pressure fuel pump (Figure 1, Item 3).

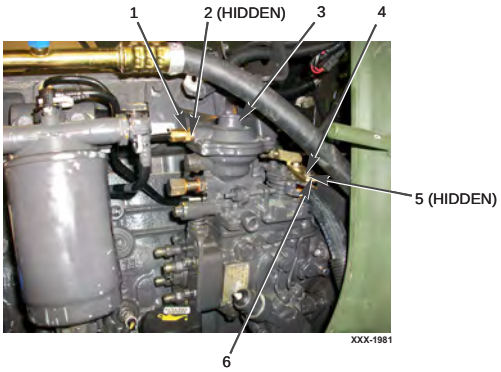


Figure 1. High-Pressure Fuel Pump.

537-0197

Defect 33. Warning or caution information incorrect. (C)

NOT CORRECT	CORRECT
WARNING Allow engine to cool off before performing maintenance on engine. Hot metal parts can cause severe burns. Content missing	WARNING Allow engine to cool off before performing maintenance on engine. Hot metal parts can cause severe burns. Wear eye, hand, and skin protection when working with heated parts. Failure to follow this warning may result in injury to personnel.

537-0010

Defect 34. Warning or caution improperly placed. (M)

NOT CORRECT	CORRECT
5. Mark and remove valve bridges from cylinder head. **CAUTION** Mark valve bridges with location and orientation information so they can be reinstalled in original locations and orientation. DO NOT interchange positions of used valve bridges. Failure to follow this caution may result in damage to equipment. Caution incorrectly placed	**CAUTION** DO NOT interchange positions of used valve bridges. Failure to follow this caution may result in damage to equipment. **NOTE** Mark valve bridges with location and orientation information so they can be reinstalled in original locations and orientation. 5. Mark and remove valve bridges from cylinder head.

537-0011

Defect 35. Note omitted, incorrect, or improperly placed. (O)

NOT CORRECT	CORRECT
3. Position rocker shaft assembly (Figure 1, Item 2) on cylinder head (Figure 1, Item 3). **NOTE** Ensure adjustment screws are properly seated in cup ends of pushrods. Note incorrectly placed	**NOTE** Ensure adjustment screws are properly seated in cup ends of pushrods. 3. Position rocker shaft assembly (Figure 1, Item 2) on cylinder head (Figure 1, Item 3).

537-0012

Defect 36. Information required by STD or other applicable directive is omitted or incorrect. (M)

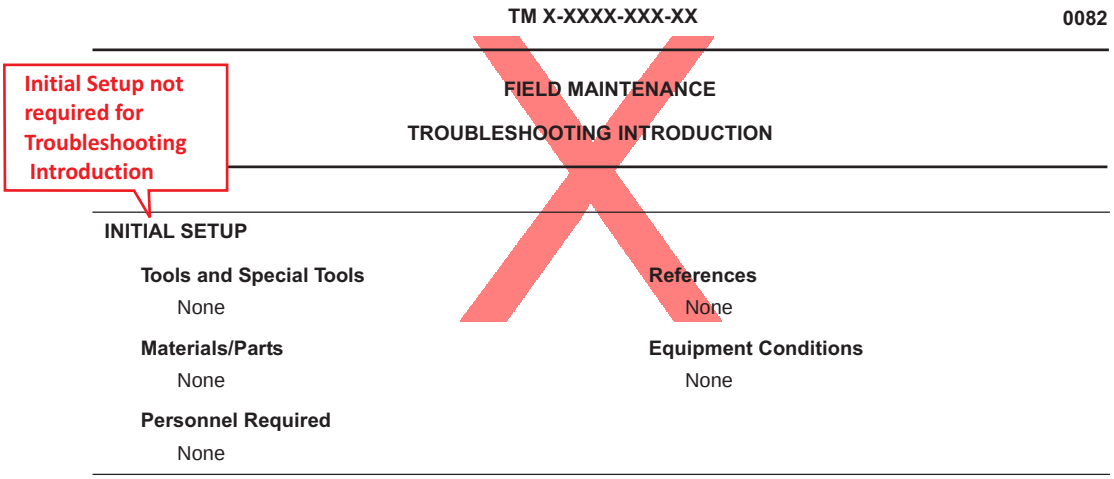
NOT CORRECT	CORRECT
Materials/Parts Detergent, General Purpose, Liquid Rag, Wiping (WP 0355, Item 24) Sealing Compound (WP 0355, Item 28) Link missing to Expendable and Durable Items List	**Materials/Parts** Detergent, General Purpose, Liquid *(WP 0355, Item 11)* Rag, Wiping (WP 0355, Item *24*) Sealing Compound (WP 0355, Item 28)

537-0030

Defect 37. Information is included that is not required. (M)

NOT CORRECT

Work Package Content



CORRECT

Work Package Content

TM X-XXXX-XXX-XX 0082

FIELD MAINTENANCE

TROUBLESHOOTING INTRODUCTION

INTRODUCTION

NOTE

Before beginning a task, find out how much repair, modification, or replacement is needed to fix equipment as described in this manual. Sometimes the reason for equipment failure can be seen right away and complete teardown is not necessary. Disassemble equipment only as far as necessary to repair or replace damaged or broken parts.

1. This chapter provides information for identifying and correcting malfunctions that may develop during operation of the XXXXX.

537-0198

Defect 38. Referenced information cannot be located or is difficult to locate (or not available to the user). (M)

Referenced Item:

Remove wheel assembly (WP 0111)

NOT CORRECT

Work Package Content

TM X-XXXX-XXX-XX 0208

FIELD MAINTENANCE

TRANSMISSION OIL AND FILTER SERVICE

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's
(WP 0366, Item 121)

Materials/Parts - Continued

Rag, Wiping (WP 0367, Item 24)

Equipment Conditions

Wheel removed — WP reference missing

CORRECT

Work Package Content

TM X-XXXX-XXX-XX 0208

FIELD MAINTENANCE

TRANSMISSION OIL AND FILTER SERVICE

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's
(WP 0366, Item 121)

Materials/Parts - Continued

Rag, Wiping (WP 0367, Item 24)

Equipment Conditions

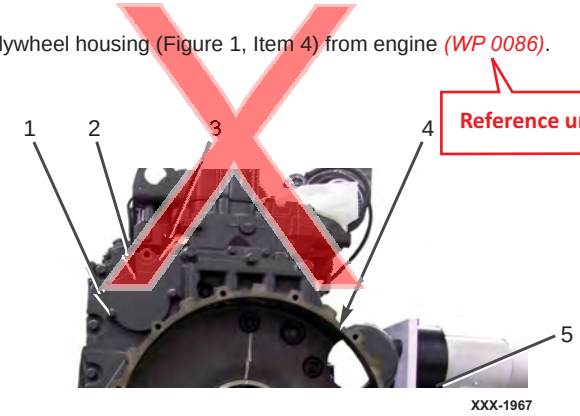
Wheel removed (WP 0111)

537-0199-1

Defect 39. Reference is indirect or unnecessary. (O)

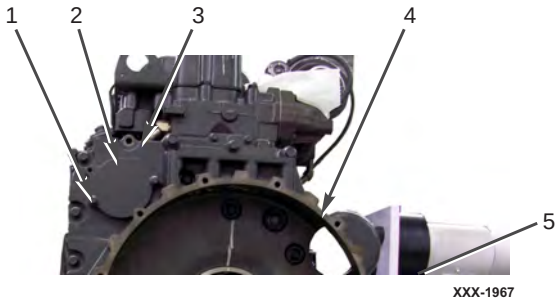
NOT CORRECT

3. With assistance, remove flywheel housing (Figure 1, Item 4) from engine *(WP 0086)*.



CORRECT

3. With assistance, remove flywheel housing (Figure 1, Item 4) from engine.



537-0200

Defect 40. Equipment conditions in the Initial Setup list multiple levels of equipment conditions. (should not list equipment conditions of equipment conditions.) Should only list first level of equipment conditions. (M)

NOT CORRECT

INITIAL SETUP

Tools and Special Tools

Engine Turning Tool (WP 0366, Item 33)
Jack, Dolly Type, Hydra, 10-ton Floor Jack (WP 0366, Item 61)
Lifting Device (1,500-lb minimum capacity)

Materials/Parts

Cap Set, Protective, Dust and Moisture (WP 0367, Item 3)
Oil, Engine, 15W40 (WP 0367, Item 22)
Rag, Wiping (WP 0367, Item 24)
Tape, Antiseizing Teflon (WP 0367, Item 33)
Tiedown Strap (WP 0367, Item 34)

Equipment Conditions

Coolant pack removed (WP 0087)
Hood and side panels removed (WP 0293)
Air cleaner assembly removed (WP 0094)
Hood plate and exhaust pipe removed (WP 0294)
Starter removed (WP 0144)
Engine oil drained (WP 0119)
Alternator removed (WP 0145)

Equipment condition of WP 0087

Equipment condition of WP 0293

CORRECT

INITIAL SETUP

Tools and Special Tools

Engine Turning Tool (WP 0366, Item 33)
Jack, Dolly Type, Hydra, 10-ton Floor Jack (WP 0366, Item 61)
Lifting Device (1,500-lb minimum capacity)

Materials/Parts

Cap Set, Protective, Dust and Moisture (WP 0367, Item 3)
Oil, Engine, 15W40 (WP 0367, Item 22)
Rag, Wiping (WP 0367, Item 24)
Tape, Antiseizing Teflon (WP 0367, Item 33)
Tiedown Strap (WP 0367, Item 34)

Equipment Conditions

Coolant pack removed (WP 0087)
Hood plate and exhaust pipe removed (WP 0294)
Starter removed (WP 0144)
Engine oil drained (WP 0119)
Alternator removed (WP 0145)

537-0201

Defect 41. Measurement or tolerance omitted or incorrectly stated. (M)

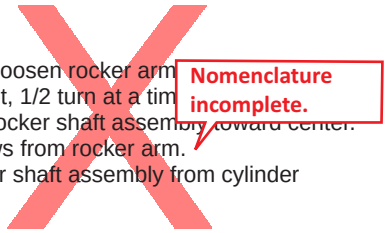
NOT CORRECT	CORRECT
1. Drill three 0.252 in. equally spaced holes.	1. Drill three 0.252 in. (6.40 mm) equally spaced holes.

Content missing

537-0013

Defect 42. Nomenclature is incomplete, incorrect, or inconsistent. (O)

NOT CORRECT	CORRECT
1. Progressively loosen rocker arm inverted socket, 1/2 turn at a tim from ends of rocker shaft assembly toward center. 2. Remove screws from rocker arm. 3. Remove rocker shaft assembly from cylinder head.	1. Progressively loosen rocker arm screws using inverted socket, 1/2 turn at a time, working from ends of rocker shaft assembly toward center. 2. Remove screws from rocker *shaft assembly*. 3. Remove rocker shaft assembly from cylinder head.



537-0014

Defect 43. Text and supporting illustration not within +/- 2 pages. (M)

NOT CORRECT

REMOVAL – CONTINUED

14. Disconnect four high-pressure fuel lines (Figure 8, Item 9) from high-pressure fuel pump (Figure 8, Item 8).
15. Remove nut (Figure 8, Item 10), two gaskets (Figure 8, Item 4), and fuel return line (Figure 8, Item 3) from high-pressure fuel pump (Figure 8, Item 8). Discard gaskets.
16. Disconnect wiring harness (Figure 8, Item 1) from cold start temperature switch (Figure 8, Item 2).
17. Remove clamp (Figure 8, Item 6) and disconnect coolant hose (Figure 8, Item 7) from cylinder head (Figure 8, Item 5).
18. Disconnect four high-pressure fuel lines (Figure 9, Item 2) from fuel injectors (Figure 9, Item 1).
19. Remove four bolts (Figure 9, Item 5) and injector return line gaskets (Figure 9, Item 4) from fuel injectors (Figure 9, Item 1). Discard gaskets.
20. Remove high-pressure fuel line assembly (Figure 9, Item 3) from machine.

REMOVAL – CONTINUED

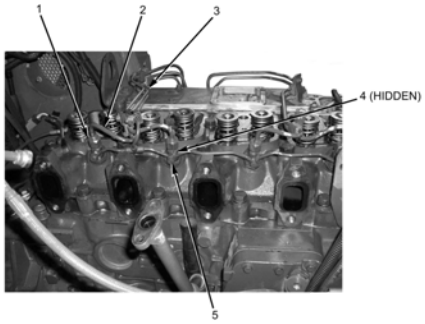


Figure 8. High-Pressure Fuel Lines.

Supporting illustration not within +/- 2 pages

CORRECT

REMOVAL – CONTINUED

14. Disconnect four high-pressure fuel lines (Figure 8, Item 9) from high-pressure fuel pump (Figure 8, Item 8).
15. Remove nut (Figure 8, Item 10), two gaskets (Figure 8, Item 4), and fuel return line (Figure 8, Item 3) from high-pressure fuel pump (Figure 8, Item 8). Discard gaskets.
16. Disconnect wiring harness (Figure 8, Item 1) from cold start temperature switch (Figure 8, Item 2).
17. Remove clamp (Figure 8, Item 6) and disconnect coolant hose (Figure 8, Item 7) from cylinder head (Figure 8, Item 5).

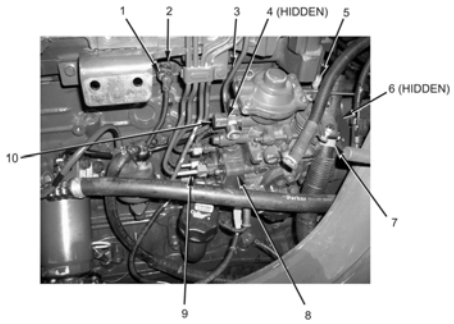


Figure 8. Fuel Pump Connections.

18. Disconnect four high-pressure fuel lines (Figure 9, Item 2) from fuel injectors (Figure 9, Item 1).

REMOVAL – CONTINUED

19. Remove four bolts (Figure 9, Item 5) and injector return line gaskets (Figure 9, Item 4) from fuel injectors (Figure 9, Item 1). Discard gaskets.
20. Remove high-pressure fuel line assembly (Figure 9, Item 3) from machine.

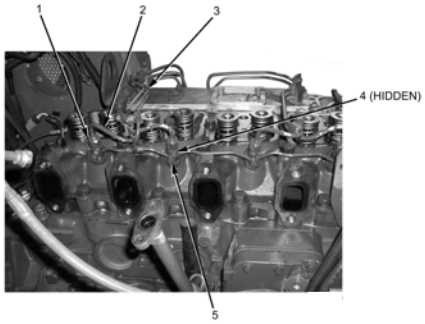
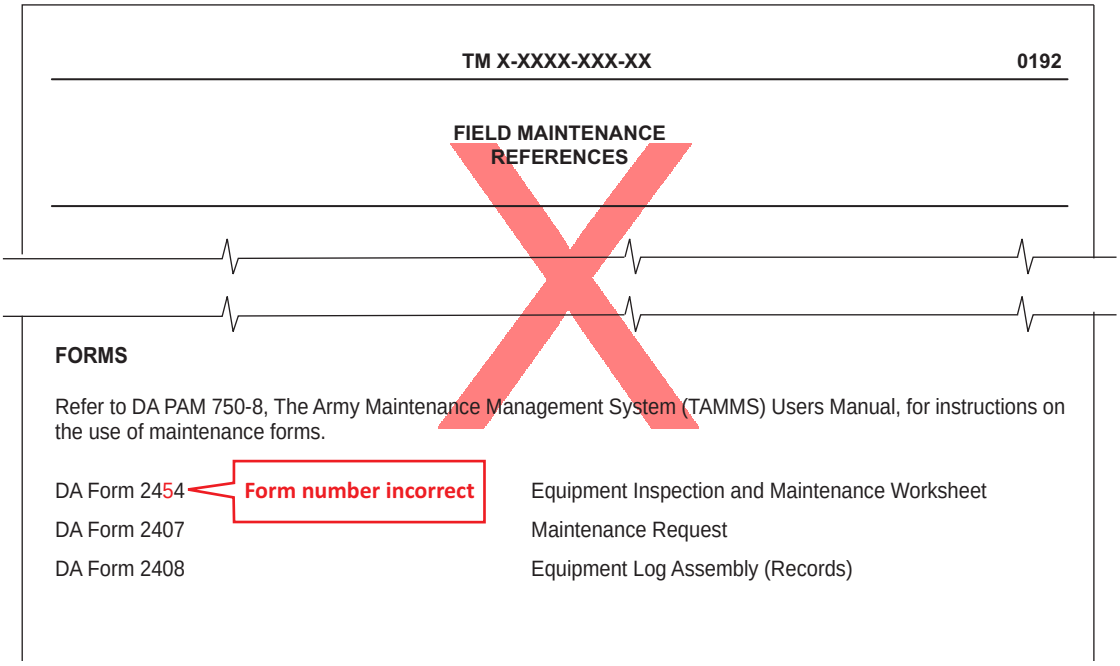


Figure 9. High-Pressure Fuel Lines.

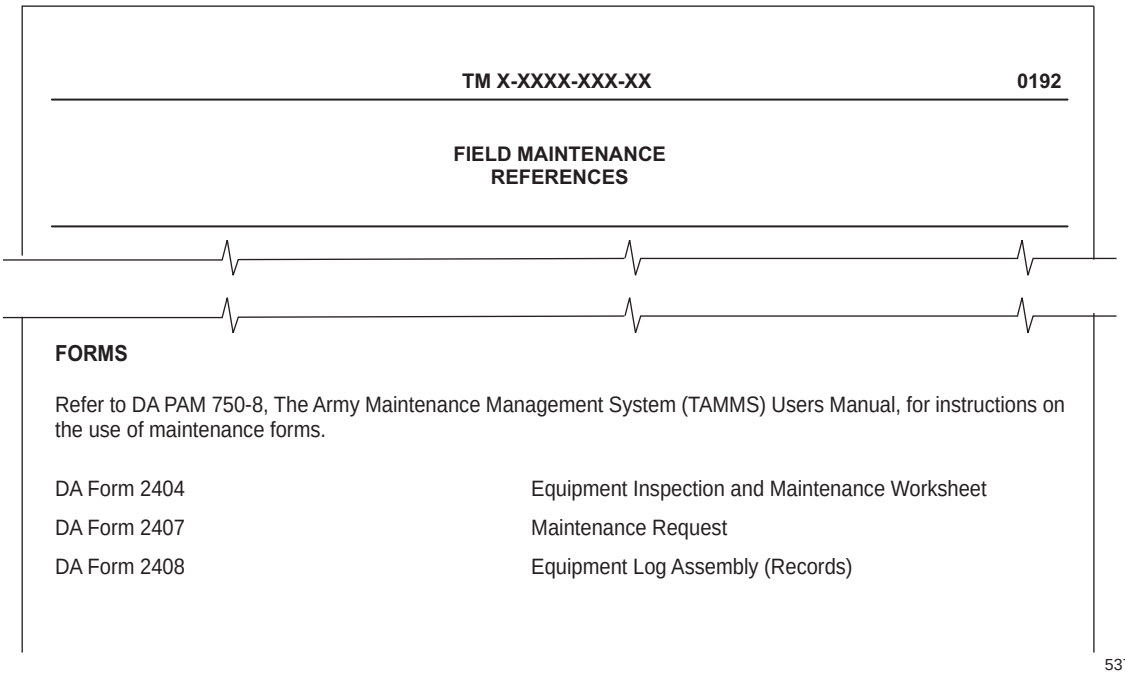
537-0202

Defect 44. References work package (if applicable) omits referenced material or contains incorrect references. (O)

NOT CORRECT



CORRECT

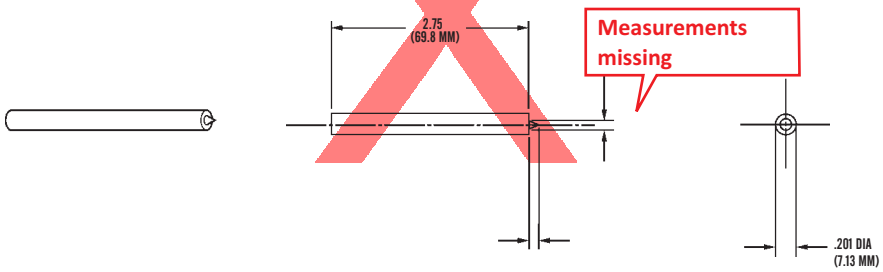


537-0203

Defect 45. Manufacture details omitted, incomplete, or require materials, processes, or tools not available to the user. (M)

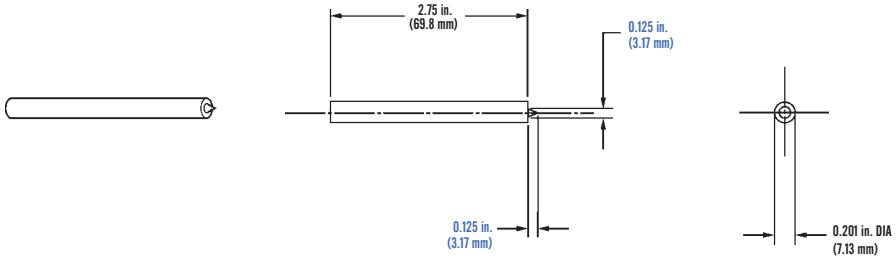
NOT CORRECT

Material Chart			
Item	Quantity	Name	Material
—	1	Rod	Steel



CORRECT

Material Chart			
Item	Quantity	Name	Material
—	1	Rod	SAE 4140 Steel



537-0036

Defect 46. Functional group code or name in the MAC is not consistent with the RPSTL or narrative publication. (M)

MAC Entry

0113	Diesel Engine Governor	Inspect Remove Install		0.5 2.0 2.0			9,29	

NOT CORRECT	CORRECT
Narrative Entry	**Narrative Entry**
2. Remove bolt, limiter, and O-ring from fuel injection pump.	2. Remove bolt, *diesel engine governor,* and O-ring from fuel injection pump.
Nomenclature incorrect	

537-0015

Defect 47. Necessary tools or test equipment not listed in MAC, or not available to user, or not stipulated in the TM procedure. (M)

NOT CORRECT

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0354, Item 83)
Adapter Kit, Test (WP 0354, Item 1)
Adapter (C 6.6 Engine) (WP 0354, Item 3)
Adapter, Timing Pin (Crankshaft) (WP 0354, Item 4)
Adapter, Torque Wrench (WP 0354, Item 5)
Ammeter (WP 0354, Item 7)

Tool not listed in MAC

MAC Table 2

Table 2. Tools and Test Equipment for XXXX.

(1) TOOL OR TEST EQUIPMENT REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER (NSN)	(5) TOOL NUMBER
1	F	Adapter Kit, Test	4940-01-585-5980	317-7484 (11083)
2	F	Adapter, Cylinder Compression Tester	4910-01-458-8404	J26999-10 (33287)
3	F	Detector Kit, Water, Automotive - Aviation Fuel	6635-01-582-5426	301-1501 (11083)
4	F	Ammeter	6625-01-343-3370	225-8266 (11083)
5	F	Bolt, Guide	5315-01-435-7176	9U-6238 (11083)
6	F	Bolt, Tee Head	5306-01-474-1540	110-2218 (11083)
7	F	Bracket, Mounting	5340-01-582-0745	4C-9998 (11083)

CORRECT

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0354, Item 83)
Adapter Kit, Test (WP 0354, Item 1)
Adapter (Engine) (WP 0354, Item 3)
Adapter, Timing Pin (Crankshaft) (WP 0354, Item 4)
Adapter, Torque Wrench (WP 0354, Item 5)

MAC Table 2

Table 2. Tools and Test Equipment for XXXX.

(1) TOOL OR TEST EQUIPMENT REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER (NSN)	(5) TOOL NUMBER
1	F	Adapter Kit, Test	4940-01-585-5980	317-7484 (11083)
2	F	Adapter, Cylinder Compression Tester	4910-01-458-8404	J26999-10 (33287)
3	*F*	*Adapter (Engine)*		*351-0236 (11083)*
4	*F*	*Adapter, Timing Pin (Crankshaft)*		*268-1966(11083)*
5	*F*	*Adapter, Torque Wrench*	*5120-00-215-8200*	*0TCCEDBX15-16 (45225)*
6	F	Detector Kit, Water, Automotive - Aviation Fuel	6635-01-582-5426	301-1501 (11083)
7	F	Ammeter	6625-01-343-3370	225-8266 (11083)
8	F	Bolt, Guide	5315-01-435-7176	9U-6238 (11083)
9	F	Bolt, Tee Head	5306-01-474-1540	110-2218 (11083)
10	F	Bracket, Mounting (Transmission Repair)	5340-01-582-0745	4C-9998 (11083)

537-0032

Defect 48. COEI, BII, or AAL list item omitted, incorrect, or inconsistent with SMR code. (M)

NOT CORRECT

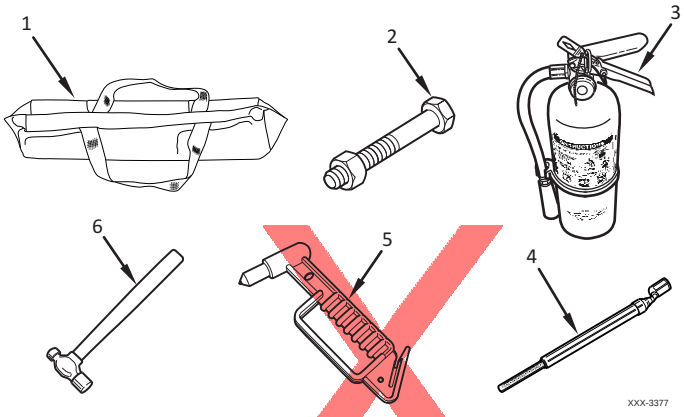


Table 1. Basic Issue Items (BII).

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER (NSN)	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	5140-01-524-7563	Bag, Tool 211-0136/(11083)		EA	1
2	5306-01-438-9715	Bolt, Machine 8T0670/(11083)		EA	1
3	4910-01-545-3635	Gauge, Tire Pressure 1P-545/(11083)		EA	1
4	–	Glass Hammer 8Y-6379 (11083)		EA	1
5	5120-00-061-8546	Hammer 11677028-3/(19207)		EA	1

Fire extinguisher missing

CORRECT

Table 1. Basic Issue Items (BII).

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER (NSN)	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	5140-01-524-7563	Bag, Tool 211-0136/(11083)		EA	1
2	5306-01-438-9715	Bolt, Machine 8T0670/(11083)		EA	1
3	*4210-01-493-8162*	*Extinguisher, Fire B500T/(54905)*		*EA*	*1*
4	4910-01-545-3635	Gauge, Tire Pressure 1P-545/(11083)		EA	1
5	–	Glass Hammer 8Y-6379 (11083)		EA	1
6	5120-00-061-8546	Hammer 11677028-3/(19207)		EA	1

537-0033

Defect 49. Expendable/Durable Supplies and Materials (EDS&ML) item omitted or incorrect. (C)

NOT CORRECT

INITIAL SETUP

Materials/Parts

Antiseize Compound (WP 0355, Item 1)
Brush, Scrub (WP 0355, Item 5)

Item number incorrect

Table 1. Expendable and Durable Items List.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
1	F		Antiseize Compound (81349) MIL-A-13881	
		8030-00-753-4953	1 Pound Can	LB
2	F	7920-00-061-0038	Brush, Scrub (83421) 7920-00-061-0038	EA
3	F	5340-01-454-2505	Cap Set, Protective, Dust and Moisture (73030) GS23815-1	EA

CORRECT

INITIAL SETUP

Materials/Parts

Antiseize Compound (WP 0355, Item 1)
Brush, Scrub (WP 0355, Item 2)

Table 1. Expendable and Durable Items List.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
1	F		Antiseize Compound (81349) MIL-A-13881	
		8030-00-753-4953	1 Pound Can	LB
2	F	7920-00-061-0038	Brush, Scrub (83421) 7920-00-061-0038	EA
3	F	5340-01-454-2505	Cap Set, Protective, Dust and Moisture (73030) GS23815-1	EA

537-0034

Defect 50. Narrative text does not correlate expendable item with its EDS&ML number. (C)

Expendable and Durable Items List Entry

8	F	6850-01-158-3928	Cleaning Compound, Solvent, (10136) 05089	CN

NOT CORRECT	CORRECT
Narrative Entry Cleaning Compound, Solvent, Type III (WP 0355, Item 7)	**Narrative Entry** Cleaning Compound, Solvent, Type III (WP 0355, *Item 8*)

Item number incorrect

537-0016

Defect 51. Readability level of text exceeds that identified for the intended audience. (M)

NOT CORRECT	CORRECT
Be cognizant of valve bridges with locality and point of reference data so they can be repositioned in primary locations and point of reference. DO NOT change arrangement of worn-out valve bridges. Failure to follow this admonition may contribute to impairment of equipment.	Mark valve bridges with location and orientation information so they can be reinstalled in original locations and orientation. DO NOT interchange positions of used valve bridges. Failure to follow this caution may result in damage to equipment.

537-0017

Defect 52. Index contains incorrect reference, omits topic reference, or topic cannot be identified. (M)

NOT CORRECT

Circle Drive Hydraulic Motor Lines Removal (WP 0320)

WP number incorrect in Index

Circle Drive Hydraulic Motor
Removal . . . . . WP 0319-1

CORRECT

Circle Drive Hydraulic Motor Lines Removal (WP 0320)

Circle Drive Hydraulic Motor
Lines Removal . . . . . .WP 0320-1
Removal . . . . . .WP 0319-1

537-0035

Defect 53. TM Crosswalk: MAC, maintenance WPs, and RPSTL WPs are not complete, consistent, and coordinated. (M)

NOT CORRECT

MAC

0114	Engine *Breather*	Remove		0.2			64	
0115	Cylinder Head	Remove		3.4			9,29,64, 33,66	

Maintenance WP

TM X-XXXX-XXX-XX 0104

FIELD MAINTENANCE

ENGINE *BREATHER* REMOVAL

INITIAL SETUP

RPSTL Figure

RPSTL figure title does not match

Figure 11. Engine PCV Valve.

CORRECT

MAC

0114	Engine *Breather*	Remove		0.2			64	
0115	Cylinder Head	Remove		3.4			9,29,64, 33,66	

Maintenance WP

TM X-XXXX-XXX-XX 0104

FIELD MAINTENANCE

ENGINE *BREATHER* REMOVAL

INITIAL SETUP

RPSTL Figure

Figure 11. Engine Breather.

537-0204

CHAPTER 5
WRITING STYLE GUIDELINES

5.1 GRAMMAR

5.1.1 NOUN A noun names a person, place, thing, quality, or action.

Remove eight **locknuts** (Figure 3, Item 1).

5.1.2 PRONOUN Pronouns take the position of nouns and function as nouns do.

A battery must be replaced when **it** no longer holds a charge. (The word *it* replaces battery).

5.1.3 VERB A verb identifies action or a state of being.

Install the battery cover (Figure 1, Item 4).

5.1.4 ADJECTIVE An adjective modifies a noun or pronoun.

Turn **front** window handle (Figure 4, Item 3) to release lock.

5.1.5 ADVERB An adverb modifies a verb, adjective, or another adverb.

Ensure that wiring harness is **properly** connected.

5.1.6 PREPOSITION A preposition shows a relationship between a noun or pronoun, and other parts of the sentence.

Do not direct compressed air **against** human skin.

5.1.7 ARTICLE An article is the word a, an, or the used before a noun.

Submit **the** form to **the** address specified in DA PAM 750-8.

5.1.8 CONJUNCTION A conjunction joins words, phrases, or clauses.

Keep loaded bucket as low as possible **and** travel at slow speeds.

For Further Explanation

1. 2008 U.S. Government Printing Office (GPO) Style Manual
2. MIL-HDBK-1222D

5.2 PUNCTUATION

5.2.1 AMPERSAND (See *Definitions* Below)

5.2.1.1 With the exception of a technical manual number (TM 9-1234-567-13&P), do not use ampersands in a technical manual.

5.2.1.2 Do not use an ampersand in a work package title of a technical manual (Wheel and Tire Removal, *not* Wheel & Tire Removal).

5.2.1.3 Do not use an ampersand in the name of a government agency or command (Bureau of Alcohol, Tobacco, Firearms, and Explosives, *not* Bureau of Alcohol, Tobacco, Firearms & Explosives).

5.2.1.4 If it is necessary to use an acronym with an ampersand, do not use a space before or after the ampersand (R&D, *not* R & D).

5.2.2 APOSTROPHE

5.2.2.1 Use an apostrophe with an "s" to form the possessive case of singular nouns (trailer's spare tire).

5.2.2.2 Use an apostrophe with an "s" to form the possessive case of acronyms (LED's socket).

5.2.2.3 Use an apostrophe only (no "s") to form the possessive case of plural nouns (trailers' spare tires).

5.2.2.4 Do not use contractions in a technical manual (Do not smoke near equipment, *not* Don't smoke near equipment) with the exception of o'clock (contraction of "of the clock").

5.2.2.5 It's vs. its. "It's" is the contraction of "it is" (or "it has") and is not to be used in a technical manual (spell out "it is"). "Its" is the possessive form of "it" (Do not remove bracket or its associated hardware, *not* Do not remove bracket or it's associated hardware).

5.2.3 BRACKETS

When necessary, use brackets as "parentheses" inside parentheses: Check for excessive play (more than 0.5 in. [12.7 mm]).

5.2.4 COLON

5.2.4.1 Use a colon to introduce information (The Internet address is: https://peocscss.tacom.army.mil; Operation Under Usual Conditions: Starting and Driving Procedures). Use one space only after a colon that introduces information.

5.2.4.2 Use a colon to introduce a list:

- crowbar
- socket wrench
- hydraulic jack
- wheel chock

5.2.4 COLON – CONTINUED

5.2.4.3 Use a colon with no space before or after the colon in a ratio or proportion (12:1 compression ratio).

5.2.4.4 Use a colon with no space before or after the colon when specifying time (10:30 p.m.).

5.2.5 COMMA

5.2.5.1 Use a comma to separate items in a series of three or more (Toolbox includes hammer, screwdriver, and pliers), including a comma before the "and" or "or" (see "serial comma" in *Definitions* below).

5.2.5.2 Use a comma to separate two or more adjectives, adverbs, or unit modifiers (see *Definitions* below) that modify the same word (4-wheel-drive, pneumatic-tired, heavy loader).

5.2.5.3 Where a comma and a closing quotation mark are together, put the comma inside the closing quotation mark. (Defects are "corrosion," "rust," "deterioration," and "cracking." *not* Defects are "corrosion", "rust", "deterioration", and "cracking".)

5.2.6 DASH (See *Definitions* Below)

5.2.6.1 An en dash can be used in place of the word "to" in a range (2–4 ft). Do not use a space before or after an en dash.

5.2.6.2 An em dash can be used in place of a colon to introduce information (Operation Under Usual Conditions—Starting and Driving Procedures). Do not use a space before or after an em dash.

5.2.7 ELLIPSIS (See *Definitions* Below)

Do not use ellipses in a technical manual.

5.2.8 EXCLAMATION POINT

Use a single exclamation point to emphasize a forceful word or statement.

5.2.9 HYPHEN

5.2.9.1 Use a hyphen to link items of a compound word (man-hour; J-hook) or unit modifier (see *Definitions* below) (high-speed drill; 8-cylinder engine).

5.2.9.2 Use a hyphen to connect the numbers of a technical manual number (TM 9-1234-567-13&P).

5.2.9.3 Use a hyphen as a minus sign (-10°F).

5.2.10 PARENTHESES

5.2.10.1 Use parentheses to enclose supplemental information that is not part of the main statement: List all tools (standard or special) required to perform task.

5.2.10.2 Use parentheses to enclose an acronym when first spelled out in a chapter in a technical manual: Maintenance Allocation Chart (MAC).

5.2.10 PARENTHESES – CONTINUED

5.2.10.3 Use parentheses to enclose figure numbers with item numbers in procedure text.

Remove bolt (Figure 1, Item 1) from bracket (Figure 1, Item 2).

5.2.10.4 Use parentheses to enclose referenced or supplemental information in an initial setup.

Tool Kit, General Mechanic's (WP 0100, Item 3).

5.2.11 PERIOD

5.2.11.1 Use a period to end a sentence.

5.2.11.2 Where a period and a closing quotation mark are together, put the period inside the closing quotation mark. (Disconnect battery before performing "service." *not* Disconnect battery before performing "service".)

5.2.11.3 Use a period for most abbreviations (see "exceptions" in paragraph 5.5.1.2).

5.2.11.4 Do not use a period for abbreviations of most units of measurement (see paragraph 5.6.2).

5.2.11.5 Use periods for items in a bulleted list if they form a complete sentence; do not use periods if the items in a bulleted list are words, phrases, or incomplete sentences.

5.2.11.6 Do not mix both sentences and words/phrases/incomplete sentences in a bulleted list.

5.2.12 QUESTION MARK

With the exception of troubleshooting, do not use question marks in a technical manual.

5.2.13 QUOTATION MARKS

5.2.13.1 Use quotation marks to enclose quoted material; however, there is little reason to quote material in a technical manual.

5.2.13.2 Use quotation marks to highlight words or phrases (Defects are "corrosion," "rust," "deterioration," and "cracking.").

5.2.13.3 Where a comma or period and a closing quotation mark are together, put the comma or period inside the closing quotation mark. (Disconnect battery before performing "service." *not* Disconnect battery before performing "service".)

5.2.14 SEMICOLON (See *Definitions* Below)

Use a semicolon to separate independent clauses that are joined together in a sentence without a conjunction (Approved for public release; distribution is unlimited).

5.2.15 SLASH (See *Definitions* Below)

5.2.15.1 Use a slash to represent the word "or" (and/or), "per" (50 ft/min), or "to" (60/40 mix).

5.2.15.2 Use a slash after "w" to abbreviate "with" (w/blink code 32).

5.2.15 SLASH – CONTINUED

5.2.15.3 Use a slash in technical specifications (OE/HDO 15W/40).

5.2.15.4 Do not use a space before or after a slash (and/or, *not* and / or).

Definitions

Ampersand (&): The symbol for “and.”

Dashes: Not to be confused with the hyphen (-), the two types of dashes are the en dash (–) and the em dash (—).

Ellipsis (. . .): A group of periods (usually three) that are used to signal the omission of words or sentences from quoted material, to indicate a pause, or to indicate a trailing off of speech (in which case a fourth period is included).

Semicolon: Often said to be used as a strong comma or a weak period.

Serial Comma: The last comma before the “and” or “or” in a series of three or more items.

Slash (/): Also known as a slash mark, virgule, oblique, solidus, slant, stroke, shilling mark, diagonal, or diagonal mark. It is sometimes called a forward slash to distinguish it from a backslash (\ ).

Unit Modifier (also called a compound adjective or compound modifier): Where two (or more) words together modify another word (e.g., 4-wheel-drive loader where “4-wheel-drive” is a unit modifier that modifies “loader.”

For Further Explanation

1. **Punctuation**—2008 GPO Style Manual, Chapter 8
2. **Serial Commas**—2008 GPO Style Manual, Chapter 8, paragraph 8.42
3. **Unit Modifiers**—2008 GPO Style Manual, Chapter 6, paragraph 6.15

5.3 PROCEDURAL TEXT AND SENTENCE STRUCTURE

5.3.1 PROCEDURAL TEXT

5.3.1.1 Procedural text is task oriented and is typically used in:

- Maintenance procedures
- Troubleshooting procedures

5.3.1.2 Limit each procedural step to a single operation.

5.3.1.3 Present detailed, step-by-step instructions for performing an operational, maintenance, inspection, or troubleshooting task for equipment/system.

1. *Remove priming pump plunger (Figure 3, Item 2) from bracket (Figure 3, Item 4).*
2. *Operate plunger until resistance is felt.*
3. *Push plunger in and hand-tighten to lock plunger in place.*

5.3.1.4 Present information in a logical sequence, and in the order in which the task is actually performed.

1. *Open battery compartment cover (Figure 1, Item 3).*
2. *Open fuse panel access door (Figure 1, Item 2) and remove fuse cover (Figure 1, Item 1).*
3. *Using fuse chart (Table 1), identify correct fuse or circuit breaker for inoperative system/circuit.*

5.3.2 SENTENCE STRUCTURE

5.3.2.1 Eliminate articles (see *Definitions* below).

Remove cover (Figure 1, Item 1) from battery box (Figure 1, Item 2).

5.3.2.2 Begin sentences with an action verb.

Close and secure nosecone and hood.

5.3.2.3 Use the imperative mood (see *Definitions* below).

Install secondary air filter element (Figure 1, Item 4).

5.3.2.4 Write using the active voice (see *Definitions* below).

Loosen clamp, ***not*** *The clamp will be loosened.*

Definitions

Article: The word **a, an,** or **the** used before a noun.

Imperative Mood: Expresses a command or gives a direction. It omits the subject of the sentence, *you*.

Active Voice: The subject of the sentence is the doer of the action.

For Further Explanation

Procedural Text—MIL-HDBK-1222D, paragraph 4.10

5.4 VOICE AND WRITING TONE

5.4.1 VOICE

5.4.1.1 Voice in Narrative Text (see *Definitions* below)

5.4.1.1.1 Narrative text is information oriented.

- Write using simple word order (subject, verb, object).
- Do not use compound or complex sentences.
- Place modifiers, including prepositional phrases, as close as possible to the word modified.
- When necessary, begin the paragraph with a topic sentence which describes or summarizes the content of the paragraph. All content of the paragraph will relate to the topic sentence.
- Use one idea for each paragraph.
- Write using the active voice.
- Use illustrations as necessary to support narrative text.

5.4.1.1.2 Narrative text is typically used in:

- General Information
- Equipment Description
- Theory of Operation
- Introductions to PMCS, RPSTL, MAC—most are verbatim from MIL-STD-40051-2A
- Supporting Information WPs—EDIL, COEI, BII

5.4.1.2 Voice in Procedural Text (see *Definitions* below)

5.4.1.2.1 Procedural text is task oriented. As much as possible:

- Limit each procedural step to a single operation.
  1. *Remove eight nuts (Figure 1, Item 15).*
  2. *Lift vent valve (Figure 1, Item 5) from studs (Figure 1, Item 13).*

  not

  1. *Remove eight nuts (Figure 1, Item 15). Lift vent valve (Figure 1, Item 5) from studs (Figure 1, Item 13).*
- Eliminate articles (see *Definitions* below).
- Begin sentences with an action verb.
- Use the imperative mood (see *Definitions* below).
- Write using the active voice (see *Definitions* below).
- Present detailed, step-by-step instructions for performing an operational, maintenance, inspection, or troubleshooting task for equipment/system.
- Present information in a logical sequence, and in the order in which the task is actually performed.

5.4.1 VOICE – CONTINUED

5.4.1.2.2 Procedural text is typically used in:

- Maintenance procedures
- Troubleshooting procedures

5.4.2 WRITING TONE

Audience dictates tone and level of information needing to be provided. Tone is technical, yet level of difficulty must cover basic to expert.

Definitions

Active Voice: The subject of the sentence is the doer of the action.

Article: The word **a, an,** or **the** used before a noun.

Imperative Mood: Expresses a command or gives a direction. It omits the subject of the sentence, *you*.

Narrative Text vs. **Procedural Text: Narrative text** is distinguished from **procedural text** in that **narrative text** supplies information using proper English, while **procedural text** commands something to be done using simple sentence structure.

For Further Explanation

1. **Narrative Text—**MIL-HDBK-1222D, paragraph 4.9
2. **Procedural Text—**MIL-HDBK-1222D, paragraph 4.10

5.5 ABBREVIATIONS AND ACRONYMS

5.5.1 ABBREVIATIONS

5.5.1.1 General Rule for Abbreviations: Use lowercase letters and a period for abbreviations (cont. for continued; misc. for miscellaneous).

5.5.1.2 The following are exceptions to this General Rule:

- AC (alternating current)
- A/C (air conditioning)
- AR (Army Regulation)
- A/R (as required)
- DC (direct current)
- ID (inside diameter or identification)
- OD (outside diameter)
- OK (okay)
- P/N (part number)

5.5.1.3 Use lowercase letters, an "s", and a period for plural abbreviations:

- app., apps. (appendix, appendixes)
- ch., chs. (chapter, chapters)
- par., pars. (paragraph, paragraphs)
    - *but* No., Nos. (number, numbers)
    - *but* pg., pgs. (page, pages)

5.5.1.4 The following are abbreviations that are often confused with one another because of their similarities:

- AC (alternating current); A/C (air conditioning)
- AR (Army Regulation); A/R (as required)
- m (meter); mi (mile); min (minute); min. (minimum)

5.5.1.5 Degrees vs.°. Use the word "degrees" for angles (45 degrees is an acute angle) and the symbol ° for temperatures (it is 72°F outside).

5.5.1.6 See paragraph 5.6.3 for abbreviations of units of measurement.

5.5.2 ACRONYMS

5.5.2.1 General Rule #1 for Acronyms: Use capital letters and no periods or spaces for acronyms (MAC, RPSTL, TACOM).

5.5.2.2 General Rule #2 for Acronyms: The first time an acronym is used in a chapter in a technical manual, capitalize and spell out each word with the acronym in parentheses immediately following; thereafter in the rest of the chapter, use the acronym only.

5.5.2.3 Use a lowercase "s" for plural acronyms (two LEDs, *not* two LED's).

5.5.1 ABBREVIATIONS – CONTINUED

5.5.2.4 Use an apostrophe and lowercase “s” for possessive acronyms (LED’s socket).

5.5.2.5 Do not be redundant (MAC, *not* MAC chart).

5.5.2.6 Define all uncommon acronyms in the “list of abbreviations/acronyms” paragraph of the General Information work package.

Definitions

Abbreviation: A shortened form of a word that is formed by omitting some letters of the word.

Acronym: A shortened form of a phrase that is usually formed by the first letter of each word in the phrase.

For Further Explanation

1. **Abbreviations—**MIL-STD-40051-2A, paragraph 4.8.18; 2008 GPO Style Manual, Chapter 9
2. **Acronyms—**MIL-STD-40051-2A, paragraph 4.8.18; 2008 GPO Style Manual, Chapter 9

5.6 NUMBERS AND UNITS OF MEASUREMENT

5.6.1 NUMBERS

5.6.1.1 General Rule for Spelling Out Numbers: Spell out numbers less than 10; use Arabic numerals (see *Definitions* below) for numbers 10 and over.

5.6.1.2 The following are exceptions to this General Rule:

- When 2 or more numbers appear in a sentence and 1 of them is 10 or more, use Arabic numerals for each number.
- Use Arabic numerals for units of measurement (2 ft) and time (7 hr).
- Use Arabic numerals for fractions (3/4 in.; 1-1/2 ft).
- Use Arabic numerals for mathematical expressions (2 times; 1/2 turn).
- Use Arabic numerals for unit modifiers (4-wheel-drive loader) (see *Definitions* below).
- Spell out a number less than 100 that precedes a unit modifier containing an Arabic numeral (twenty 3-in. bolts).

5.6.1.3 Decimal Numbers Less Than 1: Use a zero before the decimal mark for decimal numbers less than 1 (0.38, *not* .38).

5.6.1.4 Use commas in Arabic numerals over 999 (1,234, *not* 1234).

5.6.2 UNITS OF MEASUREMENT

5.6.2.1 General Rule #1 for Units of Measurement: Abbreviate all units of measurement in a technical manual.

5.6.2.2 General Rule #2 for Units of Measurement: Use lowercase letters with no period for abbreviations of units of measurement (hp, psi, rpm).

5.6.2.3 The following are exceptions to General Rule #2:

- Use a period for in. and gal.
- Use L for liter and mL for milliliter
- Use a capital letter if the unit it abbreviates is based on a person's name:
    * A (ampere), mA (milliampere) (Andrè-Marie Ampére)
    * dB (decibel) (Alexander Graham Bell)
    * Hz (hertz), kHz (kilohertz), mHz (millihertz) (H. R. Hertz)
    * N (newton), N•m (newton-meter) (Sir Isaac Newton)
    * Pa (pascal), kPa (kilopascal) (Blaise Pascal)
    * V (volt), kV (kilovolt), mV (millivolt) (Alessandro Volta)
    * W (watt), kW (kilowatt), mW (milliwatt) (James Watt)

5.6.2.4 Do not use an "s" for plural abbreviations of units of measurement (70 lb, *not* 70 lbs).

5.6.2 UNITS OF MEASUREMENT – CONTINUED

5.6.2.5 Use the unit of measurement only once in a tolerance (26.5±0.5 in.) or range (3 to 4 lb), unless the unit of measurement is a symbol:

- 72°F to 80°F
- 25% to 35%
- $4.50 to $5.00

5.6.2.6 Spacing Between an Arabic Numeral and the Unit of Measurement: Use a space between an Arabic numeral and a unit of measurement (3 mm; 5 VDC; 4.375 in.), except when the unit of measurement is a symbol (72°F; 25%; $4.50), in which case, use no space.

5.6.2.7 Spacing Between an Arabic Numeral and the Mathematical Sign

5.6.2.7.1 Do not use a space between an Arabic numeral and a mathematical sign (+, -, x, ±, and ÷) (20±5 VDC; +20; -50; 2x4=8).

5.6.2.7.2 Use a lowercase "x" with no spaces for "by" (4x4, *not* 4 x 4, *nor* 4X4, *nor* 4 X 4).

5.6.2.8 Dual Dimensions (see *Definitions* below)

5.6.2.8.1 Specify units of measurement in U.S. standard units, followed by the metric equivalent in parentheses:

- 23 in. (548 mm)
- 63 lb (29 kg)
- 2.3 psi (16 kPa)
- 71 lb-ft (96 N•m)
- 24-25 in. (610-635 mm)

5.6.2.8.2 Make sure the metric equivalent is the same accuracy as the U.S. standard.

5.6.2.8.3 Do not use dual dimensions in Initial Setups.

5.6.2.9 Torque. Specify torque in lb-ft (or lb-in.) and its metric equivalent in N•m.

5.6.3 LIST OF ABBREVIATIONS OF COMMON UNITS OF MEASUREMENT

AC	alternating current
bhp	brake horsepower
Btu	British thermal unit
cid	cubic inch displacement
cm	centimeter
dB	decibel
DC	direct current
°C	degree Celsius
°F	degree Fahrenheit

5.6.3 LIST OF ABBREVIATIONS OF COMMON UNITS OF MEASUREMENT – CONTINUED

$	dollar
ft	feet
gal.	gallon
gpm	gallons per minute
hp	horsepower
hr	hour
Hz	hertz
ID	inside diameter
in.	inch
inHg	inch(es) of mercury
kg	kilogram
kHz	kilohertz
km	kilometer
kPa	kilopascal
km/h	kilometer per hour
kV	kilovolt
kW	kilowatt
L	liter
lb	pound
lb-ft	pound-foot
lb-in.	pound-inch
Lpm	liter(s) per minute
MB	megabyte
m	meter
mA	milliampere
mg	milligram
mi	mile
min	minute
mL	milliliter
mm	millimeter
mph	mile(s) per hour

5.6.3 LIST OF ABBREVIATIONS OF COMMON UNITS OF MEASUREMENT – CONTINUED

mHz	millihertz
mV	millivolt
mW	milliwatt
N	newton
N•m	newton-meter
OD	outside diameter
oz	ounce
Pa	pascal
%	percent
psi	pound(s) per square inch
pt	pint
qt	quart
rpm	revolution(s) per minute
s	second
V	volt
VAC	volts alternating current
VDC	volt direct current
W	watt
yd	yard

Definitions

Arabic numeral: Any of the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 that is used to represent a number.

Dual Dimension: A measurement that is specified in both the U.S. standard unit and its metric equivalent.

Unit Modifier (also called a **compound adjective** or **compound modifier**)**:** Two (or more) words that together modify another word (e.g., 4-wheel-drive loader, *where* "4-wheel-drive" is a unit modifier that modifies "loader."

For Further Explanation

1. **Abbreviations of Units of Measurement—**2008 GPO Style Manual, Chapter 9; ASME Y14.38
2. **Dual Dimensions—**MIL-STD-40051-2A, paragraph 4.8.24.6
3. **Numbers—**2008 GPO Style Manual, Chapter 12
4. **Unit Modifiers—**2008 GPO Style Manual, Chapter 6, paragraph 6.15

APPENDIX A
HYDRAULIC HOSES

A.1 HYDRAULIC HOSE MAINTENANCE SAMPLE

A.1.1 RATIONALE Critical routing must be covered, and source and destination must be identified. It is very important to note specific/critical routing. Clamping hardware may be covered in general content type procedures. Please refer to the following sample when creating a hydraulic hose maintenance work package.

FIELD MAINTENANCE

HYDRAULIC HOSE MAINTENANCE

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's (WP 0425, Item 157)
Apron, Rubber Coated (WP 0425, Item 12)
Brush, Wire, Hand (WP 0425, Item 27)
Gloves, Rubber (WP 0425, Item 60)
Visor, Clear (WP 0425, Item 163)
Goggles

Materials/Parts

Brush, Scrub (WP 0424, Item 3)
Cap Set, Protective (WP 0424, Item 4)
Cleaning Compound, Solvent, Type III (WP 0424, Item 5)

Materials/Parts - Continued

Detergent, General Purpose, Liquid (WP 0424, Item 9)
Oil, Lubricating OEA, Arctic (WP 0424, Item 20)
Oil, Lubricating OE/HDO-10 (WP 0424, Item 21)
Oil, Lubricating OE/HDO-40 (WP 0424, Item 23)
Rag, Wiping (WP 0424, Item 27)
Tag, Marker (WP 0424, Item 35)

References

TM X-XXXX-XXX-XXP

INTRODUCTION

Most hydraulic hoses are removed and installed in the same manner. This work package contains procedures to relieve hydraulic system pressure, cleaning, inspection, tagging, and examples of the different styles of fittings that may be encountered when working on XXX equipment. Refer to the Hydraulic Hose Index work package (WP 0081) and the Hydraulic Hose Reference work package (WP 0082) for specific information on hydraulic hose maintenance.

RELIEVE HYDRAULIC SYSTEM PRESSURE

WARNING

- DO NOT disconnect or remove any hydraulic system hoses, tubes, or fittings unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate skin.
- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before removing any hydraulic fitting.
- Wear protective eye covering and gloves.
- Lubricating/hydraulic oils used in performance of maintenance can be very slippery. Immediately wipe up any spills.
- Failure to follow these warnings may result in injury or death to personnel.

CAUTION

When servicing this machine, performing maintenance, or disposing of hazardous materials, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact the Army Environmental Hotline at 1-800-XXX-XXXX.

1. Park machine on a smooth, level surface.
2. Ensure FNR switch is set to N (Neutral).
3. Engage parking brake.
4. Lower work tool (bucket or forks) to ground.
5. Shut down engine.
6. Turn ignition switch to ON position without starting engine.
7. Move control levers through full range of travel several times. This will relieve any pressure that may be present in hydraulic system.
8. Push and release service brake pedal 15 - 20 times. This will relieve any pressure that may be present in brake system.
9. Slowly loosen hydraulic tank filler cap and allow any pressure to escape.
10. Tighten filler cap on hydraulic tank.
11. Hydraulic system pressure has been released and lines or components can be removed.

CLEANING HOSES, TUBES, AND FITTINGS

NOTE

If available, use steam cleaner to clean hoses, tubes, and fittings and dry with compressed air.

1. Fasten parts to rack as nearly vertical as possible to allow water to drain.
2. Clean exterior surfaces of parts thoroughly.
3. Clean interior surfaces of parts. Use hot water with soap solution first. Then use clean hot water to rinse.

CLEANING HOSES, TUBES, AND FITTINGS – CONTINUED

NOTE

If steam cleaner does not have a soap injection system, spray an oil solvent into the parts. This will dissolve oil film that holds contaminants inside parts. Then use clean hot water to rinse.

4. Fasten components to rack so that components can be flushed from opposite ends. Repeat steps 2 and 3.
5. Use compressed air to dry inside of each part. Dry parts from both ends to make sure that all water has been removed.
6. Install caps or plugs in ends of each hose, tube, or fitting as soon as parts are dry to prevent entry of airborne contaminants.
7. Remove caps or plugs from component only when component is in position on machine and connection is to be made.

HOSE AND FITTING INSPECTION INSTRUCTIONS

1. Inspect lines for sharp kinks, cracks, bends, or dents.
2. Inspect hoses for fraying, evidence of leakage, or loose fittings or connectors.
3. Check all fittings and connectors for thread damage. Check for hex heads that are worn or rounded.
4. Mark all damaged material for repair or replacement.

TAGGING INSTRUCTIONS

1. Use marker tags to identify all hydraulic lines, with related parts and attachment points. Fasten tags to hoses during removal by wrapping wire fasteners around or through parts and twisting ends together. Position tags out of the way during cleaning, inspection, and repair. Mark tags with a pencil, pen, or marker.
2. Identify hydraulic hoses when removing more than one line at the same time. Mark tags with related parts and attachment points. If it is not obvious which end of a line goes where, tag each end of the line.
3. Identify and tag other parts by name and installed location as required.

LINES AND PORTS

To keep dirt from contaminating fluid systems when removing and installing hydraulic lines, perform these steps:

a. Clean fittings and surrounding area before disconnecting lines.
b. Cover, cap, plug, or tape lines and ports after disconnecting lines. When these specialized covers are not available, use plastic bags and rubber bands, clean rags, duct tape, or other similar materials to prevent dirt from entering system.
c. Ensure new and used parts are clean before installing.
d. Replace all removed tiedown straps.
e. Wait to remove covers, caps, plugs, or tape from lines and ports until just before installing lines.

HYDRAULIC HOSE REPAIR INSTRUCTIONS

NOTE

- Cap or plug lines, hoses, and fittings to protect against contamination.
- Tag and mark lines, hoses, and fittings, and note hose routing to aid installation.
- Use container to catch any fluid that may drain from hydraulic system. Dispose of fluid IAW local policy and ordinances. Ensure all spills are cleaned up.

A. Tube Nut and Fittings EXAMPLE

Removal

1. Loosen tube nut (Figure 1, Item 2) and remove hose (Figure 1, Item 1) and O-ring (Figure 1, Item 3) from fitting (Figure 1, Item 4). Discard O-ring.
2. If leaking, remove fitting (Figure 1, Item 4) and O-ring (Figure 1, Item 5) from machine. Discard O-ring.
3. Loosen tube nut (Figure 1, Item 8) and remove tee fitting (Figure 1, Item 10) and O-ring (Figure 1, Item 9) from tee fitting (Figure 1, Item 6). Discard O-ring.
4. Loosen jam nut (Figure 1, Item 7) and remove tee fitting (Figure 1, Item 6) and O-ring (Figure 1, Item 11) from machine. Discard O-ring.

Installation

1. Install new O-ring (Figure 1, Item 11), tee fitting (Figure 1, Item 6), and jam nut (Figure 1, Item 7) on machine.
2. Install new O-ring (Figure 1, Item 9) and tee fitting (Figure 1, Item 10) on tee fitting (Figure 1, Item 6).
3. If removed, install new O-ring (Figure 1, Item 5) and fitting (Figure 1, Item 4) on machine.
4. Install new O-ring (Figure 1, Item 3), hose (Figure 1, Item 1), and tube nut (Figure 1, Item 2) on fitting (Figure 1, Item 4)

B. Quick Disconnect/Connect Fitting EXAMPLE

Removal

NOTE

There are no serviceable seals on a quick disconnect/connect fitting. If leaks are present, fittings should be replaced.

1. Insert removal tool between rubber collar (Figure 1, Item 12) and fitting (Figure 1, Item 13), pushing the rubber collar into the component.
2. Disconnect hose (Figure 1, Item 14) from machine.
3. Remove removal tool from between rubber collar (Figure 1, Item 12) and fitting (Figure 1, Item 13).

HYDRAULIC HOSE REPAIR INSTRUCTIONS – CONTINUED

B. Quick Disconnect/Connect Fitting EXAMPLE – Continued

Installation

NOTE

There are no serviceable seals on a quick disconnect/connect fitting. If leaks are present fittings should be replaced.

Connect hose (Figure 1, Item 14) on machine. Push in until a click is heard. Once a click is heard, firmly pull out on hose to ensure connection is complete.

C. Split Flange Clamps EXAMPLE

Removal

Remove four bolts (Figure 1, Item 16), washers (Figure 1, Item 17), two split flange clamps (Figure 1, Item 19), hose (Figure 1, Item 15), and O-ring (Figure 1, Item 18) from machine. Discard O-ring.

Installation

Install new O-ring (Figure 1, Item 18), hose (Figure 1, Item 15), two split flange clamps (Figure 1, Item 19), four washers (Figure 1, Item 17), and bolts (Figure 1, Item 16) on machine.

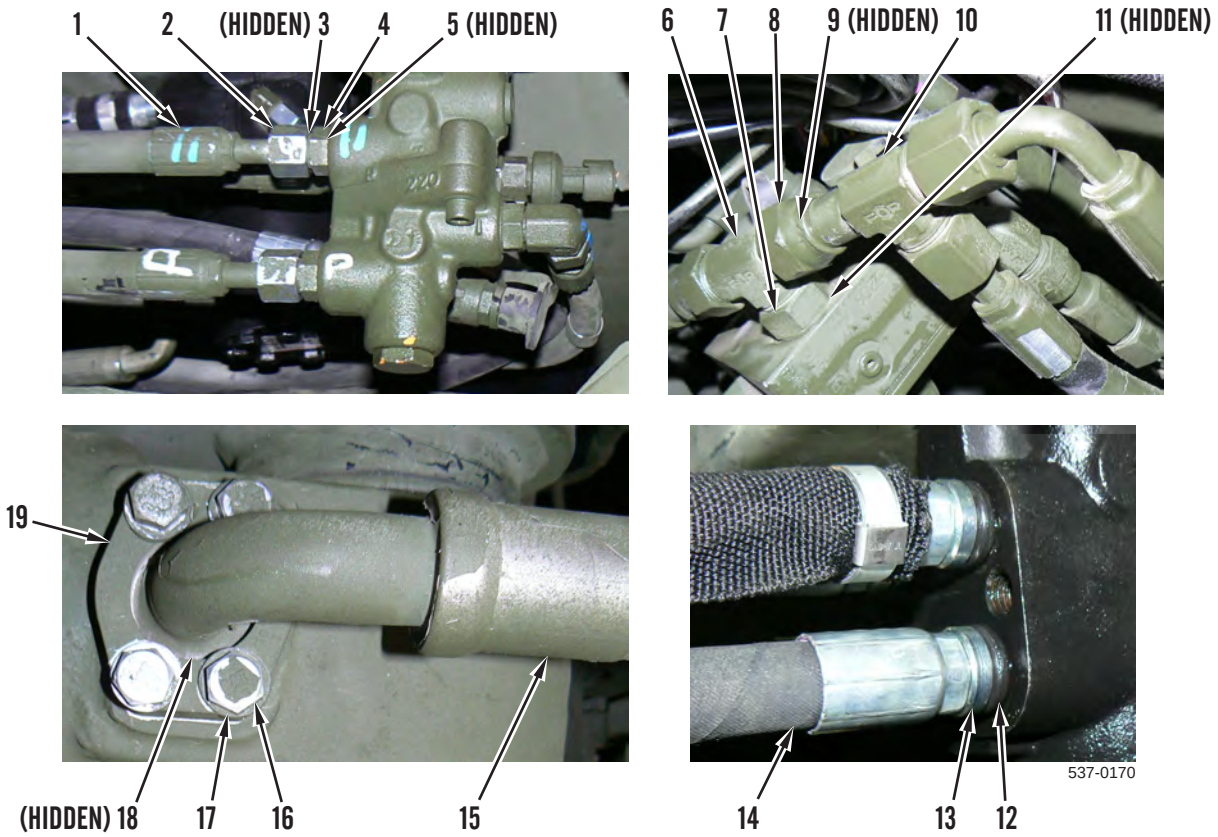


Figure 1. Fittings and Clamps.

FLUID DISPOSAL

WARNING

To prevent injury, personnel must wear protective eye covering and gloves.

CAUTION

When servicing equipment, performing maintenance, or disposing of materials such as engine coolant, hydraulic fluid, lubricants, battery acids or batteries, and CARC paint, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact the Army Environmental Hotline at 1-800-XXX-XXXX.

Dispose of contaminated drained fluids in accordance with the Standard Operating Procedures (SOP) of your unit.

END OF WORK PACKAGE

FIELD MAINTENANCE

HYDRAULIC HOSE INDEX

INTRODUCTION

This work package lists all hydraulic hoses for the XXX equipment. Each hose listed includes a description, a reference to the Hydraulic Hose Reference work package (WP 0082), and the applicable RPSTL figure/item number. Use the description to locate a hose or identify the hose in TM X-XXXX-XXX-XXP (RPSTL) and use the figure/item number to locate the hose in this work package. Once identified, proceed to the Hydraulic Hose Reference work package (WP 0082) for maintenance information.

EXPLANATION OF COLUMNS

1. **Columns 1 and 2 – Figure Number and Item Number.** Identify the figure and item numbers for the applicable hose in the Hydraulic Hose Reference work package (WP 0082).
2. **Column 3 - Description.** Identifies the specific hose for inspection, maintenance, or repair.
3. **Columns 4 and 5 - Figure Number and Item Number.** Identifies the RPSTL figure and item number of the applicable hose.

Table 1. Hydraulic Hose Index.

(1)	(2)	(3)	(4)	(5)
REFERENCE WP 0082			RPSTL	
FIGURE NUMBER	ITEM NUMBER	DESCRIPTION	FIGURE NUMBER	ITEM NUMBER
1	1	Powertrain oil cooler (Supply)	75	29
1	2	Transmission to transmission oil cooler bypass (Supply)	75	1
1	3	Transmission oil cooler bypass to transmission (Bypass)	75	9
1	4	Transmission oil cooler bypass to transmission (Return)	75	13

END OF WORK PACKAGE

FIELD MAINTENANCE

HYDRAULIC HOSE REFERENCE

INTRODUCTION

This work package contains figures and tables that identify each hydraulic hose on XXX equipment. Each table includes a description of the hose, equipment conditions that need to be met prior to servicing the hose, mandatory replacement part and quantity, and tools required. To repair/replace a particular hydraulic hose, use the illustrations to locate the hose or refer to the Hydraulic Hose Index work package (WP 0081).

EXPLANATION OF COLUMNS

1. **Column 1 – Item Number.** References item number of the figure for the specified hydraulic hose.
2. **Column 2 – Description.** Description of the hydraulic hose.
3. **Column 3 – Equipment Conditions.** Equipment condition necessary to remove the hydraulic hose.
4. **Column 4 – Tools.** Identifies all tools necessary to remove the hydraulic hose.
5. **Column 5 – MRP (Qty).** Lists the mandatory replacement parts and quantity for the hydraulic hose.

Table 1. Transmission Oil Cooler Lines.

(1) ITEM NUMBER	(2) DESCRIPTION	(3) EQUIPMENT CONDITION	(4) TOOLS	(5) MRP (QTY)
1	Powertrain oil cooler (Supply)	N/A	GMTK	N/A
2	Transmission to transmission oil cooler bypass (Supply)	Right engine access panel removed (WP 0346).	GMTK	Gasket (1)
3	Transmission oil cooler bypass to transmission (Bypass)	Right engine access panel removed (WP 0346). Operator platform removed (WP 0341).	GMTK	Gasket (1)
4	Transmission oil cooler bypass to transmission (Return)	Right engine access panel removed (WP 0346).	GMTK	Gasket (2)

Use as many tables and figures as necessary to cover all hoses on equipment. Separate hoses by location on equipment or by function.

537-0218

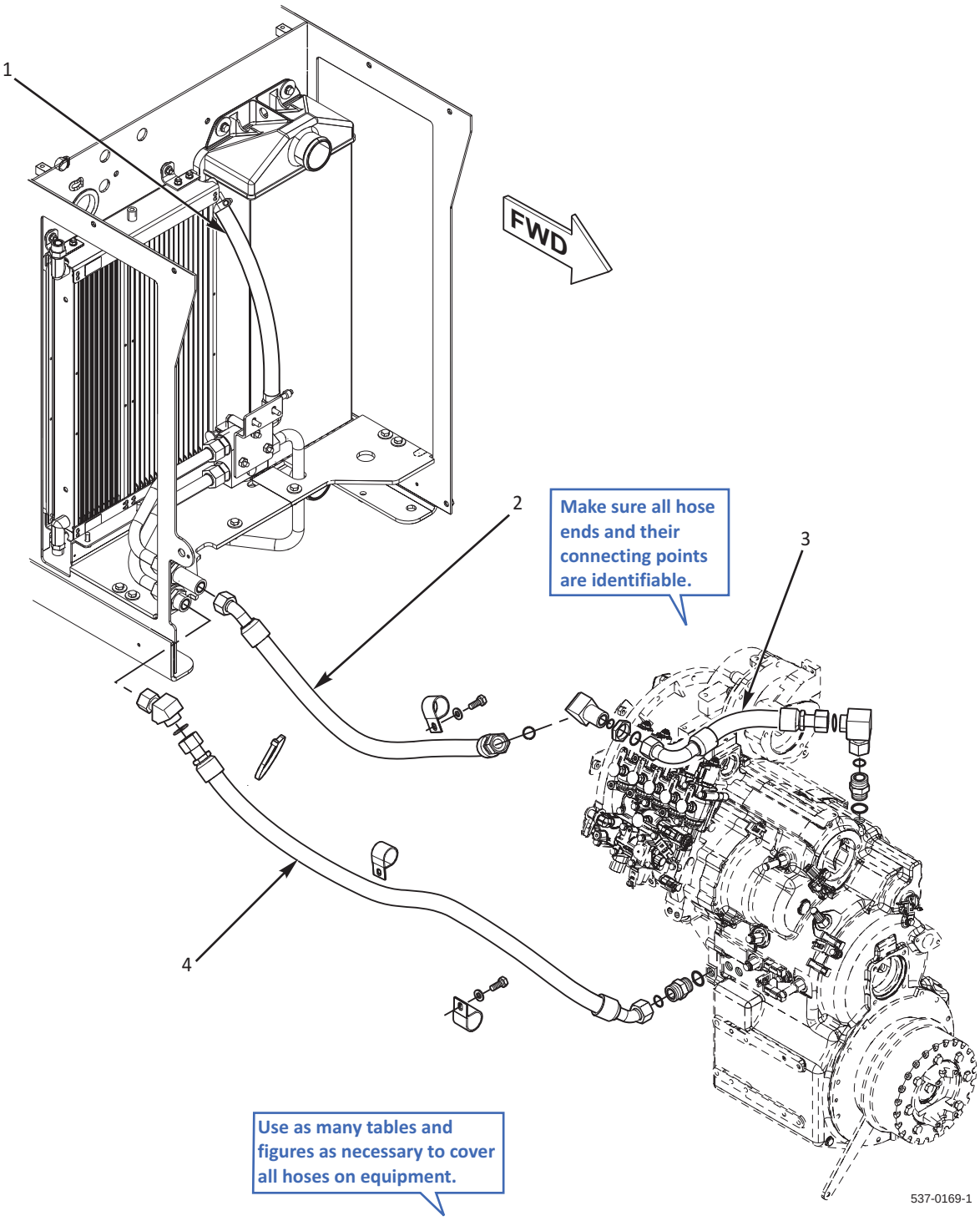


Figure 1. Transmission Oil Cooler Lines.

END OF WORK PACKAGE

APPENDIX B

TB 750-93-1 FUNCTIONAL GROUP CODES

TB 750-93-1

DEPARTMENT OF THE ARMY
TECHNICAL BULLETIN

FUNCTIONAL GROUPING CODES: COMBAT, TACTICAL, AND SUPPORT VEHICLES AND SPECIAL PURPOSE EQUIPMENT

This copy is a reprint which includes current pages from Change 5.

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1968

DEPARTMENT OF THE ARMY SUPPLY BULLETIN

FUNCTIONAL GROUPING CODES COMBAT, TACTICAL, AND SUPPORT VEHICLES AND SPECIAL PURPOSE EQUIPMENT - CHANGE 5 REQUIREMENTS

Headquarters, Department of the Army, Washington, DC 27 June 1983

This is the current TB 750-93-1, 2 May 1968, with the changes incorporated 25 February 2010.

1. Page 3, paragraph 6. The following group headings are changed to read:
   a. 08 TRANSFER, FINAL DRIVE, PLANETARY, AND DROP GEAR BOX ASSEMBLIES
   b. 09 PROPELLER, PROPELLER SHAFTS, UNIVERSAL JOINTS, COUPLER, AND CLAMP ASSEMBLY
   c. 15 FRAME, TOWING ATTACHMENTS, DRAWBARS, AND ARTICULATION SYSTEMS
   d. 22 BODY, CHASSIS, AND HULL ACCESSORY ITEMS
   e. 24 HYDRAULIC AND FLUID SYSTEMS (Exclude systems and/or components located in other groups)
   f. 43 GAS, AIR, AND VACUUM SYSTEMS (Exclude brake system and/or systems/components located in other related groups)
   g. 52 REFRIGERATION, AIR CONDITIONER/HEATER AND AIR CONDITIONING COMPONENTS
   h. 58 SANITATION AND FUMIGATION COMPONENTS (Also see Group 91)
   i. 62 ILLUMINATING EQUIPMENT (Other than Electrical) (For electrical see Group 39)
2. Page 4, paragraph 6. The following group heading is changed to read:

   84 NUCLEAR POWER PLANTS
3. Page 7, Group 07, Transmission. The following subgroup information is changed to read:

NOTE

The following sub-groups, 0700 thru 0707, are for mechanical transmissions only, except for group 0705 which is applicable to all transmissions.

   a. 0705 TRANSMISSION SHIFTING COMPONENTS

      Include functional components located in the vehicle or on the transmission. Include hydraulic, air, and/or vacuum tubing and controls and all electrical contacts, switches, relays, connectors, and wiring directly associated with the transmission selection or shifting mechanism. List in-vehicle shift or selector levers: linkages and arms, and cantilevers and bell cranks used for selection or shifting.

   b. 0710 TRANSMISSION ASSEMBLY (HYDRAULIC), (HYDRO-STATIC), (TORQUAMATIC), (CROSS-DRIVE), AND ASSOCIATED PARTS

      Include input shaft, bearings, gears, intermediate planetary units, low planetary unit, reverse planetary unit, high planetary unit, high & low splitter planetary unit, out-put shaft, bearings and gears, parking brake, housing, covers, gaskets, mounts, lifting eyes, and plugs, etc. (To include torque converter and/or associated components when integral part of transmission)

   c. 0801 POWER TRANSFER, FINAL DRIVE, PLANETARY OR DROP GEAR BOX ASSEMBLIES

      Include cases, housing, carriers, caps, covers, input shafts, idler shafts, reduction gear shafts, transfer gear shafts, output shafts, main power shafts, power take-off shafts. countershafts, gasket sets, gaskets, shim sets, gears, gear clusters, bearings, retainers, spacers, seals, planetary units, final drives, mountings, brackets, breathers, filler pipes, plugs, pinions, balancing units and attaching parts, etc.
4. Page 8, paragraph 7. The following subgroup heading is changed to read:

   0804 LUBRICATION, COOLING OR HYDRAULIC COMPONENTS AND SERVO UNITS.
5. Paragraph 7. Delete subgroup 0806 Servo Units

6. Paragraph 7. The following group and subgroup is changed to read:
   a. 09 PROPELLER, PROPELLER SHAFTS, UNIVERSAL JOINTS, COUPLER AND CLAMP ASSEMBLY
   b. 0900 PROPELLER SHAFT

      Include universal joints, pillow blocks, bearings, couplers and clamp assemblies, etc. (From power unit to functional unit.)
7. Page 10, paragraph 7. The following group and subgroup is changed to read:
   a. 15 FRAME, TOWING ATTACHMENTS, DRAWBARS, AND ARTICULATION SYSTEMS
   b. 1503 PINTLES AND TOWING ATTACHMENTS

      Includes drawbars, lunettes, articulation joint assemblies, etc.
8. Page 11, paragraph 7. The following subgroups are changed to read:
   a. 1802 FENDERS, RUNNING BOARDS WITH MOUNTING AND ATTACHING PARTS, OUTRIGGERS, WINDSHIELD, GLASS, ETC. Exclude Items in Group 21.
   b. 1812 SPECIAL PURPOSE BODIES

      Include medical van, shop van, wrecker, rolling wheel type liquid transporter, power receptacles, post hole digger, telephone maintenance, heating units (other than personnel or winterization heaters), etc., and all parts peculiar to special bodies.
9. Page 12, paragraph 7. The following group and subgroup are changed to read:
   c. 22 BODY, CHASSIS, AND HULL ACCESSORY ITEMS
   d. 2202 ACCESSORY ITEMS

      Include mirrors, reflectors, defrosters, wipers, horns, intercom devices, personnel heaters and mounted accessories, including all components. (Do not reference components to other indexes.) Include fuel, water, air gas, or liquid transfer hose assemblies, etc., when mounted on cable reels and unmounted accessories such as hoses or cables externally connected and readily coupled or uncoupled, etc.
10. Page 12, Paragraph 7. Group 24 is superseded as follows:
    a. 24 HYDRAULIC AND FLUID SYSTEMS (Exclude systems and/or components located in other groups)

NOTE

For hydraulic steering system, see Group 14.

    b. 2400 HYDRAULIC AND FLUIDS SYSTEMS (COMPLETE ASSEMBLY)

       Insert applicable nomenclature, and use following Indexes for subassembly breakdown
    c. 2401 PUMP AND MOTOR

       Include pump drive, pump drive universal joint, motor, accumulator, etc.
    d. 2402 MANIFOLD AND/OR CONTROL VALVES

       Include relief valves, check valves, regulating feed valves and mounting parts, etc.
    e. 2403 HYDRAULIC CONTROLS AND/OR MANUAL CONTROLS

       Include linkage, hydraulic clutch controls and accumulators, etc.
    f. 2404 TILT CYLINDERS AND TILT CRANK
    g. 2405 MAST COLUMN

       Include lift cylinder, lift carriage forks, lift chain, etc.
    h. 2406 STRAINERS, FILTERS, LINES AND FITTINGS, ETC.
    i. 2407 HYDRAULIC CYLINDERS.

j. 2408 LIQUID TANKS OR RESERVOIRS.

11. Page 13, paragraph 7. The following groups and subgroups are added:
    a. 31 BASIC ISSUE ITEMS, MANUFACTURER INSTALLED
    b. 3100 BASIC ISSUE ITEMS, MANUFACTURER OR DEPORT INSTALLED. (This group to be used for identification and initial provisioning purposes only.)
    c. 32 BASIC ISSUE ITEMS, TROOP INSTALLED
    d. 3200 BASIC ISSUE ITEMS, TROOP INSTALLED OR AUTHORIZED (This group to be used for identification and initial provisioning purposes only.)
12. Page 13, paragraph 7. The following subgroup is changed to read:

    3401 PRIMARY ARMAMENT

    Includes repair parts for guns, howitzers, mortars, launchers, recoilless rifles, related mounts, coaxial machine gun mounts, remote gun stations, manual or automatic loaders and main gun scavenging system.

13. Page 16, paragraph 7. Group 43 is superseded as follows:
    a. 43 GAS, AIR, AND VACUUM SYSTEMS (EXCLUDE BRAKE SYSTEM)
    b. Delete Functional Groups 4300 thru 4309.
    c. 4315 GAS, AIR, OR VACUUM SYSTEM

    Include tent, shelter, or balloon inflaters, etc.

NOTE

Use following indexes, as applicable, for breakdown.

    d. 4316 ASSEMBLED HOSE, FITTING, LINERS, BREATHERS, FILTERS AND TRAPS (For accessory hose, see group 22)
    e. 4317 MANIFOLD AND/OR CONTROL VALVES

    Include relief valves, relay valves, check valves, mounting parts, etc.

    f. 4318 CYLINDERS ASSEMBLIES

    Include diaphragms, chambers, cylinders, etc.

    g. 4319 PUMPS AND PUMP DRIVES (For compressor units, see group 50).
    h. 4320 MANUAL CONTROLS

    Include linkage.

    i. 4321 TANKS OR RESERVOIRS
    j. 4322 AIR FLOTATION SYSTEM: For floatable vehicles
    k. 4323 AIR PRESSURIZATION SYSTEM: For vehicles equipped with front axle steering knuckle boot.
14. Page 16, paragraph 7. Add the following subgroup:

    4325 EQUIPMENT COMPONENT VENT SYSTEM

    Include hoses, lines, fittings, valves, manifolds, filters, etc. (Exclude breather and relief valves that are not a part of the common vent system, or located in the component related groups/subgroups.

15. Page 18, paragraph 7. Group 5 is superseded as follows:
    a. 52 REFRIGERATION, AIR CONDITIONER HEATER, AND AIR CONDITIONING COMPONENTS
    b. 5200 AIR CONDITIONER/HEATER ASSEMBLY AND GAS COMPRESSOR ASSEMBLY.

16. Page 35, paragraph 7. The following group is added:

90 MAINTENANCE AND OPERATING SUPPLIES:

Include petroleum products, minerals, chemicals, gages, abrasives, etc., required for operation and maintenance of the equipment.

DEPARTMENT OF THE ARMY SUPPLY BULLETIN

FUNCTIONAL GROUPING CODES COMBAT, TACTICAL, AND SUPPORT VEHICLES AND SPECIAL PURPOSE EQUIPMENT - INDEX

DEPARTMENT OF THE ARMY SUPPLY BULLETIN

FUNCTIONAL GROUPING CODES COMBAT, TACTICAL, AND SUPPORT VEHICLES AND SPECIAL PURPOSE EQUIPMENT - CHANGE 5 INCORPORATED

Headquarters, Department of the Army, Washington, DC 27 June 1983

GENERAL

1. **Purpose.** This bulletin provides Functional Grouping Codes to identify items of materiel for combat, tactical, and support vehicles and special purpose equipment. These codes will be used as identifying elements in Department of the Army equipment publications for the identification of materiel on which inspection, maintenance and/or service is required. Their use is intended primarily for repair parts list and maintenance allocation charts.
2. **Scope.** The functional group codes are applicable to all equipment logistically assigned to elements of the ITS. Army Materiel Command. They include items such as combat, tactical, and special purpose vehicles, mapping and geodesic equipment, electric power generation equipment, construction and services equipment, barrier equipment (including mine warfare and demolition), bridging and stream crossing equipment, petroleum handling and dispensing equipment, general support equipment and supplies (fire fighting, industrial engines, heating and air conditioning, water purification, materials handling, woodworking field and garrison), CBR equipment, and other similar items.
3. **Definitions.** The following definitions apply to terms used in this bulletin:
   a. *Component.* A group of physically connected assemblies and/or parts which are capable of independent operation or may be externally controlled and may derive their power from another source. When combined with other components, assemblies, and/or parts, they form a subsystem or end item.
   b. *Functional Group Code.* A standardized system to index materiel for ready identification. The basic or two-digit code identifies the major assembly, and the next two digits identify the subassembly and/or part within the major assembly.

      Example: Code 01 identifies an engine assembly and Code 0102 identifies the crankshaft and related parts within the engine assembly.
4. **General.** The grouping of items is functional in so far as practicable. Only a minor portion of the groupings are based on location or application for reasons considered unavoidable. It is essential that such groupings be kept to an absolute minimum. The use of miscellaneous categories has been avoided wherever possible. In establishing the basic groups (two-digit numbers), the grouping previously used by former technical services has been followed as closely as possible. By this method, the various groups such as 01 Engine, 07 Transmission, 12 Brakes, etc., are standardized and will be universally recognized by the man in the field, regardless of the branch of service. Due to the diversity of equipment, other basic groups have been added, some of which apply to items which are peculiar to individual equipment of the former technical services.
5. **Instructions.**
   a. When the title of a respective group includes several items, select only those items for the final title which apply to the equipment being covered.
   b. Additional unspecified items may belong in any given group, if functionally associated with the item names or if they are merely different names of the same parts.
   c. The subgroups following each respective group in the index are considered adequate, and change will not be made without prior approval. Request for additions will be forwarded on DA Form 2028 directly to Commanding General, U.S. Army Tank Automotive Command, ATTN: AMSTA-TP, Warren, Mich. 48090.
   d. Where a main or subgroup covers several variations of like equipment, the insertion of the item name in lieu of the words “Major Assemblage” is intended. In the subgroup entries following these insertions, only those applicable to the inserted name will be used for coverage of the major assemblage breakdown.

GENERAL – CONTINUED

e. The descriptive nomenclature following many of the functional group codes uses the phrase “etcetera (etc).” This is intended to cover any items or accessories that are not otherwise specifically listed therein, which normally would belong under that index title. It is also intended to cover future items that may come into the Army Materiel Command area of responsibility and minimize requests for minor changes to the functional group codes. Addition to descriptive nomenclature may be made at the discretion of the user upon the introduction of materiel not previously covered. The added materiel must be functionally related to the subgroup. In this case, prior approval is not required, since the numerical designators are not affected.

COMPONENT FUNCTIONAL GROUP CODE NUMBERING SYSTEM INDEX

FGC NO.	FGC TITLE
01	Engine
02	Clutch
03	Fuel System
04	Exhaust System
05	Cooling System
06	Electrical System (Engine and Vehicular, Etc.)
07	Transmission
08	Transfer, Final Drive, Planetary, and Drop Gear Box Assemblies
09	Propeller, Propeller Shafts, Universal Joints, Coupler, and Clamp Assembly
10	Front Axle
11	Rear Axle
12	Brakes (Other Than Special Purpose)
13	Wheels and Tracks
14	Steering
15	Frame, Towing Attachments, Drawbars, and Articulation Systems
16	Springs and Shock Absorbers
17	Railway Car Body and Underframe
18	Body, Cab, Hood, and Hull
19	Turret
20	Hoist, Winch, Capstan, Windlass, Power Control Unit, and Power Take-off
21	Bumpers, Guards, and Marine Fenders
22	Body, Chassis, and Hull Accessory Items
24	Hydraulic and Fluid Systems
26	Tools and Test Equipment
29	Auxiliary Generator and Engine and Controls (Special Purpose)
30	Elevators, Special Purpose (Hydraulically Operated)
33	Special Purpose Kits
34	Armament and Sighting and Fire Control (Electric/Electronic) Materiel
35	Pulleys, Belts, Shaft's (Not Related To Other Functional Groups)
39	Searchlight and Electrical Illuminating Equipment
40	Electric Motors and Generators

FGC NO.	FGC TITLE
42	Electrical Equipment (Not Contained in Other Functional Groups)
43	Gas, Air, and Vacuum Systems
44	Welding, Metalizing, Metal Heating, and Plating Equipment
45	Office Machinery, Equipment, and Furniture (Include Household Furniture)
46	Repair Equipment (Shoes, Clothing, Textile)
47	Gages (Non-Electrical), Weighing and Measuring Devices
48	Food Preparation Equipment (Mobile and Field)
50	Pneumatic Equipment (Air Compressors, Pneumatic Motors, Etc.)
51	Water Purification System
52	Refrigeration, Air Conditioner/Heater, and Air Conditioning Components
53	Laundry Equipment
54	Tentage, Equipage, and Special, Purpose Clothing Components
55	Pumps (Exclude Engine and Special Pumps)
56	Filters, Separators, and Purifiers
57	Spray Equipment Components
58	Sanitation and Fumigation Components (Also See Group 91)
59	Water Supply Systems
60	Steam Boilers, Water Heaters, Heating Units, Burners
61	Gas Generating Equipment Components
62	Illuminating Equipment (Other Than Electrical)
63	Control Panels and Control Compartments
64	Ventilating Fans and Blowers (Special Purpose)
65	Reproduction Equipment Components
67	Precision Instruments and Systems (Mechanical, Electrical, Electronic)
68	Warning, Scanning, Signaling Devices, and Navigational Instruments (Land, Air, and Water)
69	Sawmill Components
70	Machine Tools and Related Equipment
71	Snow Removal, Mowing, and Sweeping Equipment Components
72	Dispensing and Servicing Equipment Components

FGC NO.	FGC TITLE
73	Concrete and Asphalt Equipment Components (Mixers, Pavers, Spreaders, Dust Collectors, Finishers, Etc.)
74	Cranes, Shovels, and Earth Moving Equipment Components
75	Conveying, Feeding and Crushing, Screening, and Washing Equipment Components
76	Fire Fighting Equipment Components
77	Musical and Tonal Instruments
80	Storage Equipment Components
84	Nuclear Power Plants
85	Nuclear Components (Secondary System)
86	Nuclear Components (System Controls and Instrumentation)
87	Nuclear Components (Auxiliary Equipment and Plant Accessories)
90	Maintenance and Operating Supplies
91	Chemical, Biological, and Radiological (CBR) Equipment
95	General Use Standardized Parts
99	Parts Peculiar

01 ENGINE

0100 Engine Assembly:

Internal combustion (Starting engine included) attaching parts, mounting, lifting eyes, brackets, gasket sets, when supplied by the manufacturer, etc., for diesel engines as well as starting engines will be listed in this group.

NOTE

For Gas or Steam Turbine Engines, subgroups 0120 thru 0127

0101 Crankcase, Block, Cylinder Head:

Include cylinders and cylinder sleeves when applicable. (Include core and expansion plugs.) List housings, side plates, covers, etc., in groups with which they are associated.

0102 Crankshaft:

Include bearings, balancers or dampers, drive pulleys when on crankshaft, cranksaw, oil slingers, thrust washers, oil seals, and miscellaneous hardware.

0103 Flywheel Assembly:

Include ring gear, rear end plate housing, and miscellaneous parts, etc.

0104 Pistons, Connecting Rods:

Include bearings, pins, rings, retainers, etc.

0105 Valves, Camshafts, and Timing System:

Include rocker arm, push rods, shafts, lifters, springs, guides, seats, covers, gaskets, adjusting screws, tappets, bearings, cam rings, thrust washers, camshaft drive, timing gears, chains, sprockets. etc.

0106 Engine Lubrication System:

Include oil pumps, scavenger pumps, relief valves, oil filters, oil coolers, pressure regulators, breathers, fillers, oil pan, gaskets, tanks, lines, fittings, level gages, oil temperature controls, etc.

0107 Engine Starting Systems (Other than electric):

Include hand cranking devices, air motors, valves, air distributor, tanks, lines, filters, fittings, traps, levers, shafts, cams, etc.

0108 Manifolds:

Include intake and exhaust manifolds, heat controls, gasket, etc.

0109 Accessory Driving Mechanisms:

Include accessory drive, gears, shafts, quills, bearings, retainers and fan drive, when a part of accessory drive.

0110 Diesel Starting Controls and Conversion Units:

Include valves, guides, springs, retainers, levers, seals, gears, brackets, magneto grounding controls, carburetor controls, manifold controls, primer, governor control and automatic trip mechanism, tanks, lines, fittings, filters, strainers, cranking devices, etc.

0111 Bearings, Shafts:

Include couplings, cross drives, belts, transfer gears, chains etc. (Item used to change speed and/or move power to a different level.)

0112 Engine Brake:

Include bands, linings, controls and related parts, etc.

0120 Engine Assembly, Gas, or Steam Turbine

01 ENGINE – CONTINUED

0121 Compressor Assembly (Including compressor and housing):

Compressor Housing: Includes inlet air ducts, screens, air plenum, diffuser, deswirl assemblies and miscellaneous parts. Compressor: Includes radial or axial impellers, shafts, quills, bearings, oil slingers, oil and air seals, bleed valves, and miscellaneous parts, etc.

0122 Combustion Assembly:

Include turbine plenum, flame tube and cap assembly, torus or exhaust shroud, muffler and miscellaneous hardware, etc.

0123 Turbine Assembly:

Include turbine wheel shaft, quills, bearings, bearing housing, seals, nozzle box assembly and miscellaneous parts, etc.

0124 Regenerator Assembly:

Include regenerators, seals, regenerator drive, shaft assemblies, bearings and miscellaneous items, etc.

0125 Accessory Drive Assembly:

Include housing, gears, bearings, quills, seals and miscellaneous parts, etc.

0126 Fuel or Steam Control:

Include fuel pump, fuel governor, fuel scheduling valve, fuel filter, fuel nozzles or atomizers, fuel boost pump, fuel tank, lines, fittings, shutoff valves, drain valves, throttle control and hydraulic governor, and miscellaneous parts, etc.

0127 Lubricating System:

Include oil tank assembly, oil pump assembly, filter, gas separators, relief valves, lines, fittings, oil cooler assembly and miscellaneous parts, etc.

02 CLUTCH

NOTE

Special clutches or special design combination clutch and brake will usually be listed in group with which they are associated. This will aid In preventing losing identity of component parts of same.

0200 Clutch Assembly:

Include clutch assembly, housing and clutch drive ring gear when not furnished as part of clutch assembly and is bolted to engine flywheel. List attaching hardware, and disks, pressure and driving plates, facings, linings, hubs, springs, bearings, spindles or shafts, carriers, pilot bearings, etc.

0202 Clutch Release Mechanism:

Include yokes, fork bearings, pedals and pedal linkage, cross shafts, boosters, bearing lubricating items etc.

NOTE

Do not Include parts beyond throw out bearing or collar.

0203 Fluid Coupling, Torque Converter:

(Torque Converter with separate unit) Include converter output, flywheel, pilot cooler, gage, bearings, hub disk, shaft stator gears, turbine, etc.

02 CLUTCH – CONTINUED

0204 Clutch Cooling:

Include hose, lines, fittings, etc.

0205 Clutch Coupling (Mechanical only)

0206 Clutch Brake (Use only when a part of master or primary clutch.)

0207 Hydraulic Clutch System:

Include master cylinder, slave cylinder, lines, fittings, hoses, clips, etc.

03 FUEL SYSTEM

0301 Carburetor, Fuel Injector:

Include nozzle, clamp, stud, tube, sealing, overhaul kits, etc.

0302 Fuel Pumps:

Include transfer pumps, injector pumps, diesel fuel pumps, gasoline fuel pumps, lines, fittings, relief valves, drive forks, etc.

0304 Air Cleaner:

Include pipes, hoses, clamp, etc.

0305 Supercharger, Blower, Turbocharger, or Altitude Compensator:

Include air intake manifold, piping, silencer, etc.

0306 Tanks, Lines, Fittings, Headers:

Include shutoff valves, controls, lines, and fuel manifolds, (high and low pressure).

0307 Fuel Oil Wedge:

Include pin, etc.

0308 Engine Speed Governor and Controls:

Include governor assembly, connecting rod or link, governor drive, controls, etc.

0309 Fuel Filters:

Include fuel filters, strainers, etc.

0311 Engine Starting Aids:

Include pumps, air heaters, flame primer, lines, fittings, glow plug, wiring, gaskets, etc.

0312 Accelerator, Throttle, or Choke Controls

04 EXHAUST SYSTEM

0401 Muffler and Pipes:

Include muffler, exhaust and tail pipes, shields, brackets or clamps, insulation, etc.

05 COOLING SYSTEM

0501 Radiator, Evaporative Cooler, or Heat Exchanger:

Include radiator, shell core, expansion tanks, evaporative cooler assembly, caps, grilles, shutters, shutter thermostats, mountings, braces, electrodes, controls. sprays, etc.

0502 Cowling, Deflectors, Air Ducts, Shrouds, etc.

0503 Water Manifold, Headers, Thermostats, and Housing Gasket:

Include lines, fittings, hoses, pipes, clamps, etc.

05 COOLING SYSTEM – CONTINUED

0504 Water Pump:

Include fresh water pump assembly, raw water pump assembly, overhaul kit, packing, gaskets, seals, drive, lines, hoses, pipes, clamps, etc.

0505 Fan Assembly:

Include fan, drive belts, pulleys, guards, hydraulic motor, etc.

0507 Auxiliary Cooling

0508 Water Filter

0509 Keel Cooler:

Includes lines, etc.

06 ELECTRICAL SYSTEM (ENGINE AND VEHICULAR, ETC.)

NOTE

All storage batteries will be covered in this group except electronic system batteries (for electronics system see Group 67).

0601 Generator, Alternator:

Include special drive, mounting, attaching parts, repair kits, etc.

0602 Generator Regulator (Voltage)

0603 Starting Motor:

Include mounting, attaching parts, solenoids, relays, wiring, switches, (other than instrument panel).

0605 Ignition Components:

Include distributor, magneto, booster coil, ignition coil, wiring, spark plugs, igniter coil, igniter plug, igniter wiring, etc.

0606 Engine Safety Controls:

Automatic safety devices; include solenoids, circuit breakers, switches, overspeed governor, pressure switches, etc.

0607 Instrument or Engine Control Panel:

Include wiring, instruments, switches, circuit breakers, lights, lamps, and ECM’s etc gages electrical only (Include electric hourmeter and tachometer.) (For other gages see Group 47). (See 0610 for sending units.)

0608 Miscellaneous Items:

Include light switches, fuses, terminal, junction boxes, and joysticks, etc. (Items not otherwise accounted for).

0609 Lights:

Include head, tail, marker lights, lamps, lamp units, and any other additional lights, etc.

0610 Sending Units and Warning Switches:

0611 Horn, Siren:

Include button and related switches, etc.

0612 Batteries, Storage (Wet or Dry):

Include hangers, boxes, cables, etc. (Include only cables directly connected to battery.) (Do not include electronic system batteries.) (For A or B type batteries, see Group 67).

06 ELECTRICAL SYSTEM (ENGINE AND VEHICULAR, ETC.) – CONTINUED

0613 Hull or Chassis Wiring Harness:

Include trailer couplings and intervehicular connectors (Electrical only).

0614 Turret Slip Ring Box

0615 Radio Interference Suppression:

Do not include capacitors or ground straps unless specifically related to radio suppression. Exclude like items in Group 40.

0616 Ventilating Equipment

0618 Turret Terminal and Junction Boxes and Switches:

Include control boxes, accessory panels and safety panels, wiring harness, etc.

0619 Turret Cubicle Assembly:

Include signal generator, traversing generator-elevating generator amplifier, accessory box, switches and controls, etc.

0620 Turret Wiring Tiring Harness

07 TRANSMISSION

NOTE

The following subgroups 0700 thru 0709 are for the regular Mechanical Transmissions only, except for subgroup 0705 which is applicable to all transmissions.

0700 Transmission Assembly:

(dill and/or secondary Include transmission case, gasket sets, shim sets, mountings brackets, filler pipes, plugs, covers.

0701 Transmission Shafts:

Include input shaft, output shaft, main shaft, idler shaft counter shafts, power-take-off shaft, gears, bearings, gaskets, seals, retainers, spacers, etc.

0702 Opposed Output:

Include differential, gears, pinions, shafts, carrier, idlers, covers, retainers, gaskets, etc. (Primarily for use where transmission and differential are combined in a single case, but also applies to opposed output where no differential is involved).

0703 Transmission Clutch and Clutch Controls:

(When an integral part of the transmission)

0704 Transmission Top Cover Assembly:

Include shifter shafts, forks, levers, control shafts, rods, U-joints, bell cranks, housings, etc.

0705 Transmission Shifting Components:

Include functional components located in the vehicle or on the transmission. Include hydraulic, air, and/or vacuum tubing and controls and all electrical contacts, switches, relays, connectors, and wiring directly associated with the transmission selection or shifting mechanism. List in-vehicle shift or selector levers: linkages and arms, and cantilevers and bell cranks used for selection or shifting.

0707 Transmission Brake

0708 Torque Converter or Fluid Coupling:

(When component of Transmission) Include lines and fittings.

07 TRANSMISSION – CONTINUED

0710 Transmission Assembly (Hydraulic, Hydro-Static, Torquamatic, Cross-Drive) and Associated Parts:

Include input shaft, bearings, gears, intermediate planetary units, low planetary unit, reverse planetary unit, high planetary unit, high and low splitter planetary unit, output shaft, bearings and gears, parking brake, housing, covers, gaskets and plugs, etc. (See group 0708 for torque converter and components).

0713 Intermediate Clutch:

Include Torquamatic brake or retarder, low clutch, high clutch, reverse clutch, high and low splitter clutch.

0714 Serve Unit:

Include servo bands, governor, front servo, rear servo control valves, vacuum lines, main control valves and related parts.

0719 Reduction or Transfer Gears, Shafts, and Bearings

0720 Accessory Drive

0721 Coolers, Pumps, Motors:

Include pumps, filters, coolers, pressure regulators, relief valves, blowers, breathers, vents, pipes, lines, fittings, sending units. etc.

0722 Pump Manifold

0723 Power Gear Train

0724 Clutch Pack of Steering Clutch:

Include all components.

0725 Idler Gears

0726 Brakes, (Special)

08 TRANSFER, FINAL DRIVE, PLANETARY, AND DROP GEAR BOX ASSEMBLIES

0801 Power Transfer, Final Drive, Planetary, or Drop Gear Box Assemblies:

Include transfer case, gasket sets, shim sets, mountings, brackets, filler pipes, plugs, covers, input shafts, idler shafts, reduction gear shafts, transfer gear shafts, output shaft, main shaft, power take-off shaft, gaskets, gears, bearings, covers, retainers, spacers, countershafts planetary units, final drive, etc.

0802 Clutch and Clutch Controls:

Include all clutch components.

0803 Gear Shift, Vacuum Booster, and Controls:

Include levers, shafts, yokes, forks, seals, covers, boosters, controls, etc.

0804 Lubrication, Cooling, or Hydraulic Components and Servo Units:

Include oil pumps, oil filters, oil coolers, oil pressure regulators, relief valves, breathers, blowers, lines, fittings, etc.

0805 Brakes (Special)

0806 DELETED

0807 Right Angle Drive Assembly Components

0820 Hydromatic Transfer Assembly

09 PROPELLER, PROPELLER SHAFTS, UNIVERSAL JOINTS, COUPLER, AND CLAMP ASSEMBLY

0900 Propeller Shafts:

Include universal joints, pillow blocks, bearings, couplers and clamp assemblies, etc.

0901 Propeller Shaft, Bearings, and Propeller (Marine):

Include stuffing box, stern tube and/or strut bearings, universal joint assemblies. propellers, seals, pillow blocks, etc.

10 FRONT AXLE

1000 Front Axle Assembly:

Include axle, tongue, drawbar, lunette, beam, housing, gears, covers, seals, plugs, breathers, shafts, sprockets, chains, bearings, retainers, gasket sets, etc.

1002 Differential:

Include gears, pinions, shafts, carriers, bearings, gaskets, cages, seals, caps, companion flanges or yokes, etc.

1003 Planetary or Final Drive:

Include housings, carriers, caps, shafts, gears, seals, bearings, etc.

1004 Steering and Leaning Wheel Mechanism:

Include knuckles, arms, flanges, pins, seals, gaskets, bearings, Shim, shafts, universals, gears, etc. (Include all drive parts up to power control unit. Hydraulic motor or cylinder. If manually operated, include all drive parts and controls).

1005 Caster Forks:

Include axles, bearings, seals. etc.

11 REAR AXLE

1100 Rear Axle Assembly:

Include complete rear bogie, tandem axle, attaching parts, mountings, breathers, gasket sets, shafts, gears, sprockets, bearings, gaskets, chains, seals, retainers, spacers, etc.

1101 Housing, Beam, Housing Covers, Plugs, Seals, etc.

Include planetary final drive housings.

1102 Differential:

Include gears, pinions, shafts, carriers, bearings, gaskets, cages, seals, caps, companion flanges or yokes, pumps, relief valves, coolers, blowers, regulators, oil sump, oil pressure regulator, universal joints and propeller shafts, etc.

1103 Planetary or Final Drive:

Include housings, carriers, caps, covers, shafts, gears, bearings, seals, planetary, mountings, brackets, attaching parts, breathers, fillers, pinions, carriers, balancing units, gear clusters, etc.

1104 Steering, Sideshift and Wheel Leaning Mechanism:

Include knuckles, arms, flanges, pins, seals, gaskets, bearings, shims, etc. (Include all drive parts to power control unit), hydraulic motor or cylinder. If manually operated, include all drive parts and controls.

1105 Tandem Drive Assembly:

Include case, gasket sets, shim sets, filler pipes, breathers, plugs, covers.

1107 Caster Forks:

Include axles, bearings, seals, etc.

11 REAR AXLE – CONTINUED

1108 Walking Beams, Stub Axles and Parts:

Applies to those parts commonly used with tandem wheels where there is no through axle to support the weight.

NOTE

The following groups are to be used only for those vehicles having controlled differentials and/or final drive.

1124 Steering Brakes, Differential and Planetary Drive:

Include all component parts.

1130 Column and Wheel Drive Assembly:

Include lever pivot bearing assembly.

12 BRAKES (OTHER THAN SPECIAL PURPOSE)

NOTE

Special purpose brakes or combination of brakes and clutch are to be listed in groups with which they are associated.

1201 Hand Brakes:

Include shoes or bands, facings, supports, anchors, levers, springs, adjusting parts; all and only those parts peculiar to the hand brakes (emergency and parking) system as different from the service brakes.

1202 Service Brakes:

Include shoes, facings, supports, guides, anchors, springs, adjusting parts, cams, camshaft, cam shoes, flange plates, etc. (Parts listed are normally found in all types of brake systems, hydraulic. air and electrical). Exclude linkage and controls.

1204 Hydraulic Brake System:

Includes master cylinders, power clusters, wheel cylinders, lines, fittings, hoses, clips, etc.

1205 Vacuum System Components:

Include vacuum booster lines, fittings, etc.

1206 Mechanical Brake System:

Include rods, cables, brackets, cross shafts, pedal, slack adjusters, etc. (List all parts and controls peculiar to mechanical brakes; also mechanical parts of air, vacuum, hydraulic and electric brakes).

1207 Electrical Brake System:

Include cables, connectors, switches, magnets, etc. (Parts and electrical controls peculiar to electric brakes, etc.).

1208 Air Brake System:

Include brake chambers, diaphragms, valves, filters, air reservoir, lines, hoses, fittings, etc.

1209 Air Compressor Assembly.

Include governor and related parts.

12 BRAKES (OTHER THAN SPECIAL PURPOSE) – CONTINUED

NOTE

See Group 50 for breakdown.

1211 Trailer Brake Connections and Controls:

Include all items on tractor for operation of trailer brakes. (Exclude electrical couplings).

13 WHEELS AND TRACKS

1301 Suspension Assembly:

Include track frame torsion bars, hydro pneumatic wheel suspension and components.

1302 Track Support Rollers and Brackets

1303 Track Idlers and Brackets:

Include track tension parts, compensating wheels, etc.

1304 Track Drive Sprockets:

Include hubs, drums, bearings, seals, etc.

1305 Track Assembly:

Include links, pins, pads, nuts, bolts, etc.

1311 Wheel Assembly:

Include nuts, studs, wheel rings, bead locks, bearings, seals, hubs, drums, tire inflation hub device, fittings and lines.

1313 Tires, Tubes, Tire Chains

14 STEERING

1401 Mechanical Steering Gear Assembly (Tractors, tanks, etc.):

Include steering wheel, steering levers, steering column, gears, drag links, tie rods, bellcranks, grease fittings, jackshaft box assembly bushings, seals, etc.

1402 Tractor Hitch Steering

1403 Steering Brakes:

Include clutches, linkage, hand and/or foot controls, etc. (For differential steering brakes, see subgroup 1124).

1404 Chains, Sprocket, Shafts, Gears, Housings

1405 Steering Yokes (As used on rollers, tractors, etc.):

Include brackets, bushings, bearings, caps, swivel pins, king pins, collars, etc.

1406 Marine Steering:

Include steering gear assembly, motor assembly, motor control assembly. brake assembly, clutch assembly, steering stand assembly, miter gear boxes, shafting, universal joins, couplings, bearing hanger, bearings, cable, chain, etc.

1407 Power Steering Gear Assembly:

1410 Hydraulic Pump or Fluid Motor Assembly:

Include pump drive, brackets, mounting parts, etc.

1411 Hoses, Lines, Fittings

1412 Hydraulic or Air Cylinders

1413 Tanks, Reservoirs

14 STEERING – CONTINUED

1414 Steering System Valves:

Include steering valves, relief valves, etc.

1415 Remote Control Devices (Steering):

15 FRAME, TOWING ATTACHMENTS, DRAWBARS, AND ARTICULATION SYSTEMS

1501 Frame Assembly:

Include platforms, superstructures, ramps, catwalks, bumpers, ladder guards, rollers, brackets, hangers, attaching parts, etc.

1502 Counterweights

1503 Pintles and Towing Attachments:

Include drawbars, lunettes, articulation joint assemblies, etc.

1504 Spare Wheel Carrier and Tire Lock

1505 Bridge Launching and retrieving Components

1506 Fifth Wheel

1507 Landing Gear, Leveling Jacks (Mechanical or Hydraulic):

Include support legs, frame supports, etc.

1508 Bridging Equipment

16 SPRINGS AND SHOCK ABSORBERS

1601 Springs:

Include main springs, front springs, rear springs, auxiliary springs, overload springs, helper springs, road wheel arm bumper springs, spring bumpers, shackles, attaching parts, etc.

1604 Shock Absorber Equipment:

Include shock absorbers, snubbers, etc.

1605 Torque, Radius, and Stabilizer Rods

17 RAILWAY CAR BODY AND UNDERFRAME

1701 Car, Body, and Frame Attachments:

Include tipping blocks, hand holds, grab irons, sill steps, etc.

1705 Coupler, Buffer, and Draft Gear

1706 Foundation Brake:

Include bushings, keys, pins, rods, brake shoes, etc.

1707 Car Propelling, Crank Assembly, Axle Drive:

Include bearings, bearing caps, gear shafts, nuts, washers, etc.

1708 Traction Transmission Assembly:

Include gears, pinions, etc.

1710 Truck Assembly:

Include bolster, frame, springs, motor suspension, journal box, wheel, axel, truss rod, bearings, dust guard, lid packing, hearing wedges, etc.

1715 Outrigger

1717 Rail Clamps (Used for tiedown of car body to rail)

18 BODY, CAB, HOOD, AND HULL

1801 Body, Cab, Hood, and Hull Assemblies:

Include covers, doors, hatches, guards, pillars, sills, bulkhead molding, cowl, cowl ventilators, grommets, seals, gun tube travel lock and components, sand shield, splash plates, dash panels, engine side panels, hull panels, etc. Exclude items in subgroups 1810, 1811, 1812, and Group 21.

1802 Fenders, Running Boards with Mounting and Attaching Parts, Outriggers, Windshield, Glass, etc. (Exclude items in Group 21).

1803 Driver's Hatches, Driver's Periscopes, etc.

1804 Drain Valves, Drain Plugs, etc.

1805 Floors, Subfloors, and related Components:

Exclude items in subgroups 1810, 1811, and 1812.

1806 Upholstery Seats and Carpets:

Include trim and trim accessories, sun visors, crash pads, pads, etc.

1807 Ammunition Loading Devices

1808 Stowage Racks, Boxes, Straps, Carrying Cases, Cable Reels, Hose Reels, etc.:

Include mounting and attaching parts.

1810 Cargo Body (Dump, Stake, and Platform)

1811 Tank Bodies (Gasoline, Water, etc.)

1812 Special Purpose Bodies:

Include medical van, shop van, wrecker, rolling wheel type liquid transporter, power receptacles, post hole digger, telephone maintenance, heating units (other than personnel or winterization heaters), etc., and all parts peculiar to special bodies.

19 TURRET

1901 Turret Race, Traversing Locks:

Include crash pad, seats, machine gun mount stands, platform and basket, antenna mounting.

1902 Driver's Capsule:

Include basket, seat assembly, vision devices, controls, doors, seals, wiring harness, connectors, etc., not associated with other specific functional groups.

1903 Doors and Ports:

Include grommets, seals, locks, periscope mountings, gunner's sighting equipment, commander's cupola, ballistic shield, etc.

1904 Manual Traverse and Elevating Mechanism:

Include reservoir lines, hand drive, hydraulic motor and hydraulic pump, feed back and feed back controls, hand pump, cylinder exterior valves, booster pump and accumulator, gunner's control, commander's control, electric motors, gear boxes.

1905 Power Elevating and Traversing Mechanism:

Include hydraulic motors and adapters, hydraulic pumps, controls, reservoirs, lines, electric motors, etc.

1906 Interior and Exterior Stowage Racks, Boxes, and Straps

1907 Machine Gun Ammunition Box and Booster

1908 Electrically Operated Ammunition Hoist

1909 Rammer and Spade Hoist Motor:

Include controls, lines, fittings, etc.

19 TURRET – CONTINUED

1911 Stabilizers

1912 Automatic Loading Device:

Include motors, gearboxes, ports, hoses, fittings, mechanical devices, etc., not associated with other specific functional groups.

1913 Hydraulic Power Supply:

Include mechanical couplings, drives, pumps, and lines, fittings, valves, accumulators, and reservoirs, not associated with other specific functional groups.

20 HOIST, WINCH, CAPSTAN, WINDLASS, POWER CONTROL UNIT, AND POWER TAKE-OFF

2001 Hoist, Capstan, Windlass, Crane, or Winch Assembly:

Include case, housing, filler pipes, vents or breathers, plugs, covers and related gaskets, bearings, drums, gears, shafts, blocks, cables, pulleys, external drives clutch and brake drums, controls, hydraulic motor and pump and component parts (when an integral part of hoists or winches).

2002 Power Control Unit Assembly:

Assembly case, filler pipes, vents or breathers, plugs, covers, gaskets, bearings, drums, gears, shafts, pulleys sprockets, belts, chains, universal joints, couplings, brackets, controls, etc.

2004 Power Take-Off Assembly (Wrecker, Auxiliary Transmission, etc.):

Include case or housing, controls, gears, shafts, spindles, clutch, pulleys, sprockets, cable drums and related parts.

2005 Spade and Parts

2006 Bulldozer Tripod, Main Frame, Jack and Mounting:

Include hydraulic pump control valve, oil reservoir, lines and fittings, hydraulic jack support, guards and brackets, etc.

2007 Chain Hoist Assembly: (When an integral part of vehicle.) Include hoist mounting frame and parts, snatch block, etc.

21 BUMPERS, GUARDS, AND MARINE FENDERS

NOTE

Special usage type, not to be covered in subgroup 1801.

2101 Bumpers, Brackets, Guards, and Protective Devices:

NOTE

These items are primarily for safeguarding operators against injury in combat/tactical vehicles, etc.

22 BODY, CHASSIS, AND HULL ACCESSORY ITEMS

2201 Canvas, Rubber, or Plastic Items:

Include covers, curtains, shelters, tents, struts, base and erection support, etc.

2202 Accessory Items:

Include mirrors, reflectors, defrosters, wipers, horns, intercom devices, personnel heaters and mounted accessories, including all components. (Do not reference components to other indexes.) Include fuel, water, air gas, or liquid transfer hose assemblies, etc., when mounted on cable reels and unmounted accessories such as hoses or cables externally connected and readily coupled or uncoupled, etc.

22 BODY, CHASSIS, AND HULL ACCESSORY ITEMS – CONTINUED

2203 Tire Pumps:

Include power and hand pumps (For tent shelter or balloon inflation equipment, see Group 43.)

2205 Bilge Pumps (Special application) (Not covered in Group 55)

2207 Winterization Equipment (Standard vehicular type only, for special Winterization Kits, see Group 33)

Include heating blankets and strips, and all items pertaining to winterization of the equipment, including equipment heater assemblies and components mounted in or on the end item. (Do not reference components to other indexes.) For all other heaters, see subgroup 2202 or Group 60.

2210 Data Plates and Instruction Holders:

Include caution plates, instruction plates, identification plates, shipping data plates, etc.

24 HYDRAULIC AND FLUID SYSTEMS

NOTE

Exclude systems and/or components located in other groups.

2400 Hydraulic and Fluids Systems (Complete Assembly):

Insert applicable nomenclature, and use following Indexes for subassembly breakdown

2401 Pump and Motor:

Include pump drive, pump drive universal joint, motor, accumulator, etc.

2402 Manifold and/or Control Valves:

Include relief valves, check valves, regulating feed valves and mounting parts, etc.

2403 Hydraulic Controls and/or Manual Controls:

Include linkage, hydraulic clutch controls and accumulators, etc.

2404 Tilt Cylinders and Tilt Crank

2405 Mast Column:

Include lift cylinder, lift carriage forks, lift chain, etc.

2406 Strainers, Filters, Lines and Fittings, etc.

2407 Hydraulic Cylinders

2408 Liquid Tanks or Reservoirs

26 TOOLS AND TEST EQUIPMENT

2604 Special Tools:

Include tools that are end item peculiar.

2606 Test Equipment:

Hydrometers, thermometers, test tubes, scales, and laboratory type test equipment, etc.

29 AUXILIARY GENERATOR AND ENGINE AND CONTROLS (SPECIAL PURPOSE)

2901 Generator and Engine Assembly

2910 Engine Assembly

2911 Crankcase, Cylinder Sleeve, Cylinder Head and Block:

Include core and expansion plugs.

2912 Crankshaft:

Include bearings, balancer, fan drive pulley, crankjaw, oil slingers, thrust washers, oil seals, etc.

29 AUXILIARY GENERATOR AND ENGINE AND CONTROLS (SPECIAL PURPOSE) – CONTINUED

2913 Flywheel Assembly:

Include ring gear and rear end plate housing.

2914 Pistons and Connecting Rods:

Include bearings, rings, pins, retainers, etc.

2915 Valves, Camshaft, and Timing System:

Include rocker arms, push rods, shafts, lifters, springs, guides, seats, covers, gaskets, adjusting screws, tappets, bearings, cam rings, thrust washers, camshaft drive, timing gear, chains, sprockets, etc.

2916 Engine Lubrication System:

Include oil pumps, scavenger pumps, relief valves, oil filters, oil coolers, pressure regulators, breathers, fillers, oil pan, gaskets, tanks, lines, fittings, level gages, oil temperature controls, etc.

2917 Special Starting Devices

2918 Manifolds:

Include intake and exhaust manifolds, heat controls, gaskets, etc.

2919 Driving Mechanisms (Multiple accessories):

Include accessory drive, gears, shafts, quills, bearings, retainers, and fan drive, etc.

2920 Engine Clutch Assembly and Housing

2921 Engine Clutch Disk

2922 Engine Carburetor

2932 Engine Fuel Pump

2933 Engine Air Cleaner

2934 Engine Supercharger or Blower

2935 Engine Fuel Tank

2936 Engine Speed Governor and Controls

2937 Engine Fuel Filter

2938 Engine Priming System, Lines and Pumps

2939 Engine Throttle and Choke Controls

2941 Engine Muffler, Exhaust and Tail Pipes

2942 Engine Exhaust Ducts

2951 Engine Radiator, Shell, Core, and Expansion Tank

2952 Engine Cowling Deflectors, Air Ducts, and Shrouds

2953 Engine Cooling System Lines

2954 Engine Water Pump

2955 Engine Fan, Fan Drive, Fan Belts, Fan

2960 Sending Units

2961 Generator

2962 Regulator

2963 Starter, Solenoids, Circuits Breakers, Wiring, and Switches

2964 Distributor of Magneto:

Include ignition system ventilating equipment and magneto booster coil.

29 AUXILIARY GENERATOR AND ENGINE AND CONTROLS (SPECIAL PURPOSE) – CONTINUED

2965 Ignition Coil:

Include wiring spark plugs and switches.

2967 Instrument Panel

2968 Switches, Circuit Breakers, and Fuses

30 ELEVATORS, SPECIAL PURPOSE (HYDRAULICALLY OPERATED)

3000 Hydraulic Elevator Assembly:

Include mounting parts, installation kits, etc.

3001 Equalizer Assembly:

Include pulleys and cables.

3002 Doors, Hinges, and Panels

3003 Chassis, Platform, and Guide Rail Assembly

3006 Pedestals, Leveling Jacks

3007 Bar Assembly Locking

31 BASIC ISSUE ITEMS, MANUFACTURER INSTALLED

3100 Basic Issue Items, Manufacturer, or Deport Installed (This group to be used for identification and initial provisioning purposes only.)

32 BASIC ISSUE ITEMS, TROOP INSTALLED

3200 Basic Issue Items, Troop Installed, or Authorized (This group to be used for identification and initial provisioning purposes only.)

33 SPECIAL PURPOSE KITS

3301 Reusable Shipping Containers

3303 Winterization Kits (Special purpose, not included in subgroup 2207)

3305 Deep Water Fording Kits

3307 Special Purpose Kits

34 ARMAMENT AND SIGHTING AND FIRE CONTROL (ELECTRIC/ELECTRONIC) MATERIEL

3401 Primary Armament:

Includes repair parts for guns, howitzers, mortars, launchers, recoilless rifles, related mounts, coaxial machine gun mounts, remote gun stations, manual or automatic loaders and main gun scavenging system.

3402 Small Arms:

Include repair parts for machine guns and related mounts except coaxial machine gun mounts.

3403 Sighting and Fire Control (Electric/Electronic) Materiel:

Include repair parts.

3404 Sighting, Fire Control Tools, and Equipment:

Include repair parts.

35 PULLEYS, BELTS, SHAFT'S (NOT RELATED TO OTHER FUNCTIONAL GROUPS)

3501 Pulleys, Belts, Shafts

39 SEARCHLIGHT AND ELECTRICAL ILLUMINATING EQUIPMENT

3901 Searchlight or Illuminating, Light Assembly:

Include extended hand controls, mounting, and attaching parts, etc.

3902 Box Assemblies and Relay Assemblies:

Include ballast-resistor, relay and reactor boxes, taps and busbar assembly, etc.

3903 Base Assemblies:

Including housings, stowing locks and transportation bars; tripods, etc.

3904 Control Box Assemblies:

Include azimuth and elevation gearing, etc.

3905 Turntables:

Include trunnion arms, bearings, housings, collector rings and brush assemblies, etc.

3906 Rear Lamp Housing Assembly:

Include rear section with reflecting mirror; ducts and ventilating system, etc.

3907 Front Lamp Housing Assembly:

Include drum section with doors, shutters, lens, recarboning lamps and carbon rack, etc.

3908 Lamp, Electrodes, and Lamp Mechanism:

Include feeding, rotating and focusing mechanism, lamp control box assemblies, sockets, etc.

3909 Cables:

Include power, internal control and soundlocator; special cable reels.

3910 Control Station:

Include controller base, carrying bars, hand wheels; distant electrical control systems with operator instruments, binocular mounting, etc.

3911 Switches:

Include boxes, switches, signal keys, capacitors, and electrical connectors, etc.

40 ELECTRIC MOTORS AND GENERATORS

Other than engine accessories include motor generators and dynamotors when unitized construction, except welding equipment. For welding equipment, see Group 44.

4000 Major Assemblage: Motor Generator and Rotating Exciter Assemblies:

Insert applicable nomenclature and use indexes following for subassembly breakdown.

4001 Rotor Assemblies:

Include coils, rotor bars, end rings, commutators, slip rings, cores, spiders, pole pieces and shoes, insulation, shafts, hardware, etc.

4002 Stator Assemblies:

Include coils, cores, pole pieces and shores, frames, insulation, hardware, etc.

4003 Brush Holders:

Include rocker rings, interconnections and miscellaneous wiring; brush holder assemblies, brushes, terminal lugs, leads and miscellaneous wiring, etc.

4004 Ventilating System:

Include fans, blowers, dust guards, baffles, etc.

4005 Frame Support and Housing:

Include bases, end brackets and shields, bearings, seals, caps, junction boxes, etc.

40 ELECTRIC MOTORS AND GENERATORS – CONTINUED

4006 Starting and Protective Devices (Electric motors only):

Include capacitors, built in switches, fusing and overload devices, etc.

4008 Brake (Electric motor only):

Include hub, plate, coil and rings, etc.

4009 Control Panels, Housing, Cubicles:

Include mounting parts, lights, instruments, metering converters, wiring, etc., mounted on or attached to panel.

4010 Master or Auxiliary Control Assembly:

Include contactor assembly, rheostats for controller output, local or remote, etc. subpanels) include electric governing and control units. (Electronic items are covered in Group 67).

4011 Circuit Breakers, Cutouts, Fuse and Fuse Holders (Exclude master or auxiliary control parts).

4012 Switches:

Include reversing polarity, meter switches, toggle, thermostatic controlled switches, etc. (Do not include built-in starting devices).

4013 Regulator, Voltage or Current:

Include components and mounting hardware.

4014 Resistors (Fixed variable or tapped):

Include control rheostat and potentiometers, etc.

4015 Relay or Assembly (Exclude component of contractor assembly and battery circuit components).

4016 Coils: Choke or Filter (Exclude rectifier circuit and excitation circuit).

4017 Transformers: Rectifiers (Exclude excitation components).

4018 Terminal Blocks, Junction Boxes:

Include main power receptacles, terminal boards, busbars, etc.

4019 Radio Interference Suppression:

Include capacitors, filters, ground straps, mounting hardware, etc., and all items directly related to radio interference suppression in Group 40 only. (Exclude like items in Groups 06, 42, or 44.)

4020 Static Exciter Components:

Include rectifiers, diodes, reactors, inductors, transformers, etc.

42 ELECTRICAL EQUIPMENT (NOT CONTAINED IN OTHER FUNCTIONAL GROUPS)

4201 Transformer, Power Line, or Distribution:

Include primary and secondary windings, cores, lead in insulators, cases and covers, insulation brackets, etc.

4202 Electrical Controls (Main and auxiliary):

Include panels, terminal studs and lugs, binding posts, terminal strips, panel wiring, insulators, frames, cabinets, covers, doors, brackets, supports, lifting eyes and mounting parts, etc.

4203 Circuit Breakers, Cut Out Devices, Fuse, and Fuse Holders:

Include relays, switches, safety controls, etc. (Do not list items that promote engine shut down.) (See subgroup 0606).

4204 Voltage and Current Regulators:

Include choke coils and reactors, etc.

42 ELECTRICAL EQUIPMENT (NOT CONTAINED IN OTHER FUNCTIONAL GROUPS) – CONTINUED

4205 Control Resistances (All fixed and variable resistors, potentiometers, and/or rheostats):

Include mounting hardware.

4206 Thermostatic, Automatic, and Manual Control Devices:

Include trip and travel devices, solenoids, automatic power transfer switch, mounting parts, sending units, etc.

4207 Idling Controls:

Include engine speed controls on generator sets, etc.

4208 Special Remote Controls:

Include light-actuated relay units, selsyn devices, etc.

4209 Signaling Devices:

Include warning lights, buzzers, bells, sirens and sending units, etc. (Do not include intercom devices listed in subgroup 2202).

4210 Instruments:

Include all voltmeters, ammeters, watt hour meters, frequency meters, etc. (Transformer or chokes for same) and panels.

4211 Power Receptacles

4212 Heating Units:

Include all coil or strip resistances used for heating purposes, other than items covered in Group 22.

4213 Non Rotating Rectifiers, Converters, Inverters:

Include transformers, filter chokes, coils and condensers, frequency changers, dry and wet type rectifiers, inverters, converters, etc. (Do not include transformers covered in subgroup 4201).

4214 Radio Interference Suppression:

Include all capacitors, resistors, choke coils, filters, etc. (Those items used primarily for radio interference suppression) Exclude similar items used on ignition systems and rotating electrical equipment, etc., coverable in Groups 06, 40, and 44. All other radio interference suppression circuits will be covered here.

4215 Electrical Test Equipment: (Portable or Mounted) (If electronic type see Group 67).

4216 Miscellaneous Wiring and Fittings

4217 Magnet (Crane, Sweeper, etc.):

Include controller, exciter generator assembly, reel assembly resistor, etc.

43 GAS, AIR, AND VACUUM SYSTEMS

NOTE

- Exclude brake system and/or systems/components located in other related groups.
- For hydraulic steering system see Group 14.

4300 DELETED

4301 DELETED

4302 DELETED

4305 DELETED

4306 DELETED

4307 DELETED

43 GAS, AIR, AND VACUUM SYSTEMS – CONTINUED

4308 DELETED

4309 DELETED

4315 Gas, Air, or Vacuum System:

Include tent, shelter, or balloon inflaters, etc.

NOTE

Use following indexes, as applicable, for breakdown.

4316 Assembled Hose, Fitting, Liners, Breathers, Filters, and Traps (For accessory hose, see Group 22)

4317 Manifold and/or Control Valves:

Include relief valves, relay valves, check valves, mounting parts, etc.

4318 Cylinder Assemblies:

Include diaphragms, chambers, cylinders, etc.

4319 Pumps and Pump Drives (For compressor units, see Group 50).

4320 Manual Controls:

Include linkage.

4321 Tanks or Reservoirs

4322 Air Flotation System (For floatable vehicles)

4323 Air Pressurization System:

For vehicles equipped with front axle steering knuckle boot.

4325 Equipment Component Vent System:

Include hoses, lines, fittings, valves, manifolds, filters, etc. (Exclude breather and relief valves that are not a part of the common vent system, or located in the component related groups/subgroups.

44 WELDING, METALIZING, METAL HEATING, AND PLATING EQUIPMENT

4400 Major Assemblage (Arc Welders, Electro Plating, Flame Cutting, or Gas Welding Units, etc.):

Insert applicable nomenclature and use groups following for sub-assembly breakdown.

4401 Rotor Assembly:

Include motor, generator, exciter, etc.

4402 Stator Assembly:

Include motor, generator, exciter, etc.

4403 Brush Holder Assembly:

Include motor, generator, exciter, etc.

4404 Drive Components:

Include belts, pulleys, couplings, etc.

4405 Frame Support, Housing, Carrier, etc.

Include all mounting parts and lifting eyes, etc.

4406 Ventilating, Cooling System

4407 Control Panels, Housing, Cubicles:

Include indicators, instruments, wiring assemblies, etc.

44 WELDING, METALIZING, METAL HEATING, AND PLATING EQUIPMENT – CONTINUED

4408 Connecting Devices:

Include terminal blocks, junction boxes, connectors, hoses, wiring harness assemblies, etc. See subgroup 2202 for hose or cable of accessory type.

4409 Protective Devices, Electrical:

Include fuses, fuse holders, insulation, etc.

4410 Switching, Timing and Speed Control:

Include circuit breakers, thermal overload switches, relays, solenoids, electron tubes, bypass and blacking capacitors, etc.

4411 Resistor Components

4412 Transformer Components

4413 Rectifier Components

4414 Radio Interference Suppression:

Include resistors, capacitors, filters and grounding, etc., used for R. F. suppression. Exclude like items used in Groups 06, 40, 42.

4415 Head, Torch, and Gun Initialing Components

45 OFFICE MACHINERY, EQUIPMENT, AND FURNITURE (INCLUDE HOUSEHOLD FURNITURE)

4501 Office Machinery and Equipment

4502 Furniture:

Include household furniture.

46 REPAIR EQUIPMENT (SHOES, CLOTHING, TEXTILE)

4601 Repair Equipment (Shoes)

4602 Repair Equipment (Textile)

4603 Repair Equipment (Clothing)

47 GAGES (NON-ELECTRICAL), WEIGHING AND MEASURING DEVICES

NOTE

Do not include in these groups items (gears, etc.) located in the Accessory Drive, Transmission, Transfer, etc. Which are integral parts thereof, and which may have dual functions. Use cross references to identify those items and the group in which they are listed.

4701 Instruments (Speed and distance):

Include speedometers, tachometers, odometers, revolution counters, drive shafts, adapters, etc.

4702 Gages, Mountings, Lines, and Fittings:

Include pressure, quantity, temperature, vacuum, measuring, liquid level, etc.

4703 Hourmeter:

Include drive and related parts.

4704 Density Indicator:

Include batchometer, bitumeter, thickness control, scale, screws, handles, pedals, linkage, etc.

47 GAGES (NON-ELECTRICAL), WEIGHING AND MEASURING DEVICES – CONTINUED

4705 Flow Meters and Regulators:

Include water meters, motor oil meters, viscometers, etc. (Applies to devices for measuring and, for controlling rate of flow of liquids, air, gases, etc.).

4706 Weighing or Balancing Devices:

Include beam scales, spring scales, etc. (For laboratory type scales, see Group 26.)

48 FOOD PREPARATION EQUIPMENT (MOBILE AND FIELD)

4801 Coffee Urn

4802 Exhaust Fan and Grease Trap

4810 Immersion Heater

4815 Range

4820 Refrigerator

4825 Sink

4830 Toaster

4835 Other Food Preparation Equipment

50 PNEUMATIC EQUIPMENT (AIR COMPRESSORS, PNEUMATIC MOTORS, ETC.)

5000 Air Compressor Assembly (For brake compressor assembly, see Group 12) (For refrigeration compressor, see Group 52).

5001 Crankcase, Block, Cylinder Head:

Include rotor housing, cylinders, sleeves, warming devices, (non-electrical) attaching parts, mountings, lifting eyes, etc. (Covers are to be listed in those groups with which they are associated.)

5002 Crankshaft:

Include bearings, balancers, gear, fan drive pulley, etc.

5003 Flywheel Assembly:

Include flywheel housing, clutch, clutch

5004 Pistons, Connecting Rods, and Rotors:

Include rings, pins, bushings, hearings etc.

5005 Valves, Camshaft, and Timing Mechanism:

Include valves, springs, seats, guides, lifters, arms, rockers, camshafts, bearings, gears, drives, etc.

5006 Lubrication System:

Include oil pump, relief valves, breathers, fillers, oil pan, coolers, filters, lines, fittings, regulators, etc.

5007 Compressor Drive:

Include shafts, gears, belts, pulleys, etc.

5008 Air Intakes:

Include manifold, pipes, air cleaner, etc.

5009 Unloader System Components:

Include unloader pilot, regulator bleed valves, relief valves, blow down valve, filters, traps, pipes, cleaners, strainers, etc.

5010 Compressor Cooling and Heating:

Include intercooler, fans, brackets, pumps, radiator, hoses, pipes, air blowers, etc. (Include internal or external heating devices not covered in 2207.)

50 PNEUMATIC EQUIPMENT (AIR COMPRESSORS, PNEUMATIC MOTORS, ETC.) – CONTINUED

5012 Throttling Devices:

Include diaphragms, pressure switches, etc.

5013 Hose Reel:

(See Group 18 for breakdown of reel; see Group 22 for hose assemblies.)

5014 Air Receiver:

Include governing valves.

5015 Air Discharge System:

Include manifolds, lines and fittings, etc.

5019 Pneumatic Motor Assembly:

Include grinders, sanders, drills, tampers, hammers, chisels, jack, etc. Include components, attaching parts, and accessories not covered in other index groups.

5020 Governor (Pneumatic motor):

Include handles, throttle valves, air inlet, strainer, controls, etc.

51 WATER PURIFICATION SYSTEM

5100 Water Purification Unit (Major assemblage or demineralization unit):

Insert applicable nomenclature and use groups following for sub-assembly breakdown.

5101 Hypochlorinator Assembly:

Include pumping block, clamp plate, distribution block, diaphragm, camshaft, drive shaft, springs, valves, etc.

5102 Tanks, Containers:

Include baffles, filters, etc.

5103 Piping, Valves:

Include fittings, connection, etc.

5104 Water Testing Equipment

5105 Demineralization Equipment Components:

Include all components not contained in Group 51 that are applicable.

5106 Heat Exchanger:

Include exhaust heat exchangers, engine water coolers, heat exchangers, after coolers, etc.

5107 Evaporators, Condensers:

Include steam chests, heads, separators, ducts, shells, vents, condensers, air ejectors, air ejector pumps, etc.

5108 Compressors, Air Blowers:

Include housings, bearings, shafts, gears, rotors, drive pulleys, belts, and related parts.

5109 Multiple Take-Off (Line drive)

52 REFRIGERATION, AIR CONDITIONER/HEATER, AND AIR CONDITIONING COMPONENTS

5200 Air Conditioner/Heater Assembly and Gas Compressor Assembly:

Include attaching parts, mountings, lifting eyes, brackets, etc.

5201 Compressor Columns and Cylinder Heads:

Include covers, housings, gaskets, studs, etc.

52 REFRIGERATION, AIR CONDITIONER/HEATER, AND AIR CONDITIONING COMPONENTS – CONTINUED

5202 Crankshaft:
Include bearings, stuffing boxes, glands, etc.

5203 Compressor Drive, Pedestal, Base:
Include drive pulley, outboard bearings, etc.

5204 Pistons, Connecting Rods:
Include rings, pins, bearings, etc.

5205 Suction and Discharge Components:
Include safety head, discharge valves, suction valves, springs, plates, seats, cages. etc.

5206 Oil Pressure Relief Valve (When integral part of compressor)

5207 Vacuum Pump:
Includes crankshaft, pistons, connecting rods, suction and discharge valves, drive forks, etc

5210 Compressor Manifold:
Include valve bonnet, packing unit, etc.

5211 Manifold Valve Stem:
Include button, hand wheel, etc.

5212 Suction Strap Cap:
Include screen gasket stud, etc.

5213 Safety Valve Bonnet:
Include cone, seal cap, spring guide, spring rod, button, valve, spring, etc.

5214 Compressor Iubricating Pump:
Include oil pump drive, gears, shafts, shaft extensions, keys, lines, fittings, etc.

5215 Unloader System

5216 Oil Piping:
Include valves, elbows, tees, flanges, etc.

5217 Refrigerant Piping:
Include valves, tees, flanges, couplings, etc.

5218 Water Connections

5220 Ice Tank Crane:
Include crane truck parts.

5222 Ice or Freezing Tank:
Include coils, headers, flanges, etc.

5221 Refrigerant Accumulator

5228 Oil Separator:
Include heads, baffles, flanges, etc.

5230 Condenser (Water or air cooled):
Include water pan, coils, eliminator, overflow hood, float valve, etc.

5232 Brine Agitator:
Include housings, propeller, shafts, bearings, etc.

5235 Hydrating Equipment

52 REFRIGERATION, AIR CONDITIONER/HEATER, AND AIR CONDITIONING COMPONENTS – CONTINUED

5240 Humidifiers or De-Humidifiers

5241 Evaporator

5242 Cooling Tower

5243 Blower Assembly:

Include shafts, bearings. etc.

5244 Thermostatic Controls (Air temperature and moisture)

5245 Air Filters

5246 Air Cycle Conditioner System (Used primarily with gas turbines):

Include valves, controls, water separators, heat exchangers, cooling turbines, fans, flow regulators, and miscellaneous items, etc.

5247 Heating Units:

Include all components, attaching parts, etc.

53 LAUNDRY EQUIPMENT

5301 Extractors

5302 Tumblers

5303 Washers (Clothing)

54 TENTAGE, EQUIPAGE, AND SPECIAL, PURPOSE CLOTHING COMPONENTS

5401 Tent Body (Main fabric components)

5402 Tent Liners

5403 Tent Support Components (Frames, poles, arches, etc)

5404 Tent Anchoring Components (Pins, anchors, guy lines, anchor ropes, etc.)

5405 Tent Accessories (Covers, reusable containers, flies, stovepipe sleeves, etc.)

5406 Helmet and Hood Body (Fabric plastic, metal)

5407 Helmets and Hood Visual Components

5408 Helmet and Hood Communications Components

5409 Helmet and Hood Respiratory Components

5410 Helmet, Hood and Clothing (Heating and cooling components)

5411 Bulk Materials (Include fabrics, tapes, webbing, thread and other items not supplied as piece parts).

5412 Hardware, Fastening Devices, and Findings

55 PUMPS (EXCLUDE ENGINE AND SPECIAL PUMPS)

NOTE

See subgroup 2205 for bilge pumps.

5500 Pump Assembly:

Include volute housing, spindle housing, lifting eyes, mountings, attaching parts, brackets, stator, bowl, base, body, etc.

5501 Shafts, Rotors, Impellers:

Include impeller shaft, crankshaft, eccentric shaft seals, bearings, etc.

55 PUMPS (EXCLUDE ENGINE AND SPECIAL PUMPS) – CONTINUED

5502 Pistons, Rings, Pins, Rods, Bearings, Diaphragms

5503 Crank Case:

Include gear case and plates, etc.

5504 Cylinder, Cylinder Head

5505 Suction and/or Discharge Assembly:

Include valves, heads, priming devices, etc.

5507 Pump Drive:

Include shafts, belts, gears, clutch and related parts, pump drive jack assembly, pump auxiliary drive.

5508 Lubricators:

Include steam lubricators, grease cups, oil cups, oiler, etc.

5509 Force Attachments

5510 Inlet and Outlet Components:

Include sand traps, foot valves, strainers, formed hose, fittings, etc.

5511 Couplings:

Include flexible shaft couplings, cable drive couplings, racket couplings, etc.

5512 Column Assembly

5513 Fluid lines:

Include connections, valves, controls, etc.

5514 Steam Chest

5515 Cross Stand

5516 Cross Head Assembly

5517 Proportioner, Mixer, Regulator:

Include water motor.

5518 Manifold Assembly (Distribution):

Include mounting and attaching parts, valves, gaskets, plates, etc., which are part of the assembly.

56 FILTERS, SEPARATORS, AND PURIFIERS

NOTE

The following subgroups (5600 thru 5605) apply to FILTERS AND SEPARATE AND MISSILE AIR PURIFICATION SYSTEMS.

5600 Fuel, Water, Air, Filter/Separation, or Purifier Assembly

5601 Automatic Discharge and Relief Valve

5602 Auxiliary Control Valve

5603 Float Chamber

5604 Canisters and Elements

5605 Common Valves, Lines, and Fittings

56 FILTERS, SEPARATORS, AND PURIFIERS – CONTINUED

NOTE

The following subgroups (5406 thru 5624) apply to PURIFIERS.

5606 Purifiers (Diesel fuel, lubricating oil)
5607 Lubricating Oil Purifier Assembly
5608 Diesel Fuel Oil Purifier Assembly
5609 Frame Cover and Inlet Arm
5610 Pulley Assembly:
Include belts, pulleys, collets, nuts, etc.
5611 Idler Assembly
5612 Bowl Assembly
5613 Wormwheel and Friction Clutch
5614 Housing Plate and/or Pump Assembly
5615 Top Bearing and Bowl Spindle
5616 Bearing Assembly
5617 Brake and/or Drag Assembly
5618 Speed Indicator
5619 Bottom Screw
5620 Heater, Filter, and Lines
5621 Strainer or Filter Assembly
5622 Instruments and/or Controls
5623 Motor Assembly
5624 Controller Assembly

57 SPRAY EQUIPMENT COMPONENTS

5700 Major Assemblage (Insert applicable nomenclature and use groups following for subassembly breakdown)
5701 Insect Spray Gun
5702 Insect Spray Components
5703 Air Blower Assembly:
Include shafts, belts, guards, etc.
5704 Spray Ducts and Manifolds:
Include jets, fittings and controls
5706 Dust Bin:
Include filter screens and controls, etc.
5707 Instrument Panel
5708 Tanks, valves, Lines. Hoses, Fittings and Liquid Strainer (See Group 22 for hoses).
5709 Metalizing Gun
5710 Paint Spray Gun
5711 Paint Spray Extension
5712 Paint Spray Tank

57 SPRAY EQUIPMENT COMPONENTS – CONTINUED

5713 Paint Spray Air Control Unit

5714 Paint Spray, Hose:

Include valves fittings, connection, etc. (See Group 22 for hose).

5715 Paint Spray Pressure Cup

5716 Paint Spray Strainer and Air Filter

58 SANITATION AND FUMIGATION COMPONENTS (ALSO SEE GROUP 91)

5801 Sanitation Equipment Components

5802 Fumigation Equipment Components

59 WATER SUPPLY SYSTEMS

5900 Water Pump Assembly (See Group 55 for breakdown)

5901 Motor (Electric) (See Group 40 for breakdown)

5902 Air Valve

5903 Water Closet

5904 Lavatory and Shower

5905 Water Cooler

5907 Water Heating Electric) (See Group 42 for controls)

5308 Water Purification (See Group 51 for breakdown)

5909 Water Reservoir

60 STEAM BOILERS, WATER HEATERS, HEATING UNITS, BURNERS

NOTE

Exclude heaters in Groups 22, 33, and 59.

6000 Major Assemblage (Heaters, Air, Water, Steam, Chemical, Electric):

Includes personnel or space heaters not covered in Groups 22 and 33 (Insert applicable nomenclature and use groups following for subassembly breakdown) (For electric controls, etc., see Group 42).

6001 Housing and Insulation

6002 Feed Water Line:

Include fittings valves, injectors, etc.

6003 Steam Jet Assembly:

Include hose, valves, fittings, etc.

6004 Fuel System:

Include pumps, strainers, etc.

6005 Burner Assembly:

Include igniters, igniter coils, or transformer, jets, nozzles, preheaters, strainers, burner blowers, valves, lines, fittings, etc.

6006 Motor Assembly:

Include brushes, brush holders, bearings, etc.

6007 Fuel Tank:

Include valves, lines, hoses, fittings, etc.

60 STEAM BOILERS, WATER HEATERS, HEATING UNITS, BURNERS – CONTINUED

6008 Blower Assembly:
Include housing, panels, etc.

6009 Ventilating System

6010 Exhaust System:
Include piping, stack and heating coil, etc.

6011 Combustion Chamber:
Include lines, insulation, etc.

6012 Circulating Pump (Hot Water) Assembly

6013 Heat Exchanger Assembly

6014 Unit Heater (Personnel):
Includes electric, steam, water, etc.

6015 Water Heater Assembly:
Include auxiliary equipment, damper control, flexible drive coupling, etc.

61 GAS GENERATING EQUIPMENT COMPONENTS

6100 Major Assemblage (Liquid Oxygen, Nitrogen, Hydrogen, etc.)
Insert applicable nomenclature and use groups following for subassembly breakdown.

6101 Compressor and Manifold Assembly

6102 Crankcase, Cylinder, Cylinder Heads

6103 Rotor and Housing:
Include bearing, seals, etc.

6104 Crankshaft and Flywheel:
Include bearings, balancer, seals, housing, etc.

6105 Piston Connecting Rods:
Include rings, bearings, crossheads, guides, etc.

6106 Compressor Valves:
Include springs, seats, etc.

6107 Oil Pan Lines:
Include connections, fillers, plugs, etc.

6108 Flash Arrestors, Pressure Reducers:
Include strainers, pressure regulators, leak testing units, etc.

6109 Lubrication System (oil, soap, etc.)

6111 Heat Exchanger Assembly:
Include casing, guard, collecting pan, brackets, baffles, grilles

6112 Air Blower Assembly:
Include casing, shaft bearings, drive pulley belts, etc.

6113 Cooling Coils, Manifolds, Valves, Piping:
Include pins, spray heads, floats, switches, valves, etc.

6114 Hot Air Heater Assembly

61 GAS GENERATING EQUIPMENT COMPONENTS – CONTINUED

6115 Air Manifolds, Condenser, Receiver, Dryers, Separators:
Include inlet, outlet, dividing, bypass, suction and discharge trap.

6116 Tanks, Formed, Hose, lines, Fittings, etc. (Other than fuel) (See Group 22, for auxiliary hose).

6117 Power Train:
Include clutches, shafts, belts, pulleys, etc.

6118 Distillation Tower Unit:
Include liquefier oxygen column, control station, instrument panel, intercooler, fans, brackets, etc.

6119 Charging Manifold

6120 Air and Gas Drying Cylinders:
Include valves, lines, fittings, etc.

6121 Expansion Engine Assembly

6122 Crankshaft, Bearings

6124 Piston, Crossheads

6125 Valves, Spring, Guides:
Include pushrods, bushings, inserts, etc.

6126 Manifolds Ports

6127 Scrubbers

6128 Absorbers

6129 Gas Coolers

6130 Reactivators

6131 Mixer, Agitators

62 ILLUMINATING EQUIPMENT (OTHER THAN ELECTRICAL)

NOTE

For Electrical, see Group 39.

6200 Major assemblage (Chemical, Gas, or Oil Lights, etc.):
Insert applicable nomenclature and use groups following for sub-assembly breakdown.

6201 Light Assembly:
Include reflectors holder, swing joint, etc.

6202 Combination Container Assembly:
Include carbide container carbic cake container, gage, guide cylinder cap, etc.

6203 Inside Cylinder Assembly:
Include cylinder, container lock, baffle plate, cylinder top, cylinder band, pipes, fittings, etc.

6204 Tank and Filter Assembly:
Include tank, band, bottom, bottom bar, cylinder lock, handle, cleats, screen, pipes, reducer, etc.

6205 Burner Control Valve:
Include stem, tip cleaner, valve stem tip, packing washer, packing nut, handle, burner tip, etc.

63 CONTROL PANELS AND CONTROL COMPARTMENTS

To be used for control stations and/or control compartments on equipment such as liquid oxygen, nitrogen or gas generating plants, missile systems, or remotely located central control units, used to control multiple pieces of equipment, etc.

6300 Major Assemblage:

Insert applicable nomenclatures and use groups following for subassembly breakdown.

6301 Gages:

Exclude engine gages. Include mountings.

6302 Controls:

Exclude engine controls.

6303 Lines and Fittings:

Include clamps, brackets, mountings, etc.

64 VENTILATING FANS AND BLOWERS (SPECIAL PURPOSE)

6401 Ventilating Fan Assembly

6102 Blower Assembly

6403 Motor Assembly:

Include brushes, brush holders, bearings, etc.

6404 Starter Switch Assembly

6405 Controller Assembly

65 REPRODUCTION EQUIPMENT COMPONENTS

6500 Major Assemblage, Printing Presses, Cameras, Projectors Reproduction Equipment, etc.:

Insert applicable nomenclature and use indexes following for sub-assembly breakdown.

6501 Offset Press File Feeder:

Include component parts.

6502 Offset Press Feeder:

Include Component parts.

6503 Offset Main Press Assembly

6504 Offset Press Inker:

Include component parts.

6505 Offset Press Water System:

Include component parts.

6506 Pile Delivery:

Include component parts.

6509 Camera Assembly:

Include component parts.

6510 Projector Assembly:

Include component Parts.

6511 Enlarger Assembly:

Include component parts.

65 REPRODUCTION EQUIPMENT COMPONENTS – CONTINUED

6513 Whirler:

Include component parts.

6515 Printing and Developing Machines:

Include component parts.

6517 Grainer:

Include component parts.

6519 Duplicator Assembly:

Include component parts.

6521 Dryers:

Include component parts.

6523 Frame, Printing Multiplex:

Include component parts.

6525 Pantograph:

Include component parts.

6527 Sketch Master:

Include component parts.

6529 Table, Negative Paper Cutting Equipment, or Multiplex, etc.

Include component parts.

6531 Cooling Unit Multiplex:

Include component parts.

67 PRECISION INSTRUMENTS AND SYSTEMS (MECHANICAL, ELECTRICAL, ELECTRONIC)

NOTE

For fire control, see Group 34.

6700 Major Assemblage (Mine detectors, sniper scope weapons sights, surveying instruments, gyro compass, oscillators, electronic tester apparatus, pyrometers, etc.) Insert applicable nomenclature and use groups following for subassembly breakdown.

6701 Telescope Assembly:

Include tube, mounts, etc.

6702 Optics (Reflecting and transmitting type):

Include filters.

6703 Mechanical, Structural, and Precision Parts:

Include housing, covers, panels, frames, chassis, hardware, drive, dial mechanisms, knobs, etc.

6704 Batteries:

Include internal, external wet and dry types.

6705 Fuses and Lamps:

Include fuse holder and socket assemblies, mounting parts, etc.

6706 Rotating Equipment:

Include motors selsyns, etc.

67 PRECISION INSTRUMENTS AND SYSTEMS (MECHANICAL, ELECTRICAL, ELECTRONIC) – CONTINUED

6707 Modules

6708 Electronic Tubes and Semi Conductors:

Include all types of vacuum and gas tubes, photo tubes, cathode ray tubes, transistors, rectifiers, etc.

6709 Infra Red Elements:

Include image tubes, thermal and photo detectors, etc.

6710 Circuit Components:

Include resistors, capacitors, coils, chokes, printed circuit boards, transformers, potentiometers, etc. Both fixed and variable types.

6711 Controls, Indicators and Special Components:

Include switches, radio phones, etc.(Meters are covered in Group 42).

6712 Mounted Connecting Devices:

Include terminal blocks, receptacles, lugs, tube sockets, tube shields, etc.

6713 Miscellaneous Wiring and Fittings:

Include internal and external wiring and fittings.

6714 Antennas, Grounds and Related Equipment

6715 Special Electronic Testing Equipment, Mounted, or Portable

6716 Oscillating Equipment (When used as a major subassembly, components are not to be referenced to other indexes).

6717 Power Supply (Self contained):

Include vibrator, rectifier, wiring harness, etc.

6718 Compass and Level:

Include items that are not major components, but are essential to the end item.

6719 Tripods:

Include tripod cover plates, firing plate assembly, brackets, etc.

68 WARNING, SCANNING, SIGNALING DEVICES, AND NAVIGATIONAL INSTRUMENTS (LAND, AIR, AND WATER)

6801 Gyro Compass System:

Include ballistic assembly, amplifier unit, inverter unit, cable harness, connectors, gaskets, lamps, mercury, packing, switches, tubes, fuses, armatures, bearings, brushes, etc.

6802 Magnesium Compass System

6803 Magnetic Compass

6804 Loran Equipment

6805 Shoran Equipment

6806 Radar System:

Include radar receiver, transmitter, radar indicator control, antenna, heater control box, motor generator set, starter for “G” set and safety switch.

6807 Radio Direction Finder:

Include radio direction finder unit, power unit.

6808 Underwater Sound System:

Include sonar equipment; underwater listening equipment, fathometers.

68 WARNING, SCANNING, SIGNALING DEVICES, AND NAVIGATIONAL INSTRUMENTS (LAND, AIR, AND WATER) – CONTINUED

6809 Radio Telephone System:

Include radio transmitter-receiver, converter, connection box, switch box, power panel.

6810 Infra-Red System

6820 Laser and Maser Systems

6830 White Light System

6840 IFF Radar System

69 SAWMILL COMPONENTS

6901 Husk or Operating Controls:

Include levers, pulleys, bearings, mandrels, etc.

6902 Carriage:

Include setworks, head block, dog, etc.

6903 Trackway:

Include rails, ropes, pulleys, bearings, etc.

6904 Edger:

Include idlers, bearings rollers, shafts, etc.

6905 Cut-Off Rig:

Include controls, drives, bearing, etc.

6906 Dust Blower and Conveyor:

Include collector pipes, fittings, chains, rollers, sprockets, etc.

6907 Saws (Head, edger, cut-off):

Include component parts.

70 MACHINE TOOLS AND RELATED EQUIPMENT

NOTE

For pneumatic tools see Group 50, for arc welders see Group 44.

7001 Lathes:

Include component parts and cutting tools.

7002 Shapers:

Include component parts and cutting tools.

7003 Milling Machines:

Include component parts and cutting tools.

7004 Planer, Surfacer of Jointer (Woodworking equipment):

Include component parts and cutting tools.

7005 Drills: Power Wrenches (Other than pneumatic):

Include component parts.

7006 Power Hammers (Other than pneumatic):

Include component parts.

70 MACHINE TOOLS AND RELATED EQUIPMENT – CONTINUED

7007 Power Grinders (Other than pneumatic):

Include component parts.

7008 Power Saws (other than pneumatic):

Include component parts.

7009 Heat Treating Equipment (Bake ovens, furnaces, etc.):

Include component parts.

7010 Foundry Equipment (Forges, blast furnaces. etc.):

Include component parts.

7011 Track Jacks, Shifters, Tampers:

Include component parts.

71 SNOW REMOVAL, MOWING, AND SWEEPING EQUIPMENT COMPONENTS

NOTE

Following subgroups (7100 thru 7103) apply generally to snow plows.

7100 Snow Plow Assembly

7101 Frames, Semi-Circles:

Include brackets, braces, struts, handers. etc.

7102 Moldboard, Blades:

Include side wings plowboards, shoes, attaching parts, etc.

7103 Feed and Discharge Activating Mechanism:

Include rotor, rake, blade, fan shafts, auger bearings, drive controls, tilting attachments, etc.

NOTE

Following subgroups (7107 thru 7115) apply generally to mowers and sweepers

7107 Pushbars:

Include hinges, bellcranks, couplings, etc.

7108 Housing:

Include power gears, bearings, seals, shields, etc.

7109 Crankshaft, Crankhead:

Include bearings and related parts.

7110 Wheels and Axles:

Include gears, pawls, bearings, etc.

7111 Cutter and/or Boom Assembly:

Include cutting attachments, grass board, brooms, suspension drives, pitman, chain tightening devices, etc.

7112 Clutch and Clutch Controls:

Include gears, shafts, and related parts.

7113 Lifting and Tilting Devices

71 SNOW REMOVAL, MOWING, AND SWEEPING EQUIPMENT COMPONENTS – CONTINUED

7114 Spray System:

Include tanks, hoppers, lines, fittings, etc.

7115 Magnet, Lifting:

Include components, leads, mountings, etc.

72 DISPENSING AND SERVICING EQUIPMENT COMPONENTS

7201 Lubricating Equipment:

Include power and hand guns, reservoir, oilers, etc.

7202 Pumps and Meters:

Include component parts.

7203 Valves, Fittings, Lines:

NOTE

For hose reels, see Group 18. For hose, see Group 22.

7204 Miscellaneous Parts and Accessories

7205 Brake Service Unit:

Include component parts.

7206 Steam Cleaning Units:

Include component parts.

7207 Brake Relining Machine:

Include component parts.

7208 Saw Filing, Setting, and Retoothing Machines:

Include component parts.

7209 Presses:

Include component parts.

73 CONCRETE AND ASPHALT EQUIPMENT COMPONENTS (MIXERS, PAVERS, SPREADERS, DUST COLLECTORS, FINISHERS, ETC.)

7300 Major Assemblage (Mixers, pavers, spreaders, dust collectors finishers, etc.):

Insert applicable nomenclature and use groups following for sub-assembly breakdown.

7301 Power Loader Skip:

Include skip extension leader, hoist, controls, counter shaft, and attaching parts.

7302 Drums (Mixer or dryer):

Include drum drives, rollers, shafts, gears, transfer doors, mounting parts, etc.

7303 Controls (Machinery):

Include all machine operating controls, taper, screed, vibrator, hoppers, gates, chutes, feeder controls, speed change lever thickness and crown controls, etc.

7304 Hoppers, Gates, and Chutes:

Include charging and discharging doors opening and closing devices, attaching parts, etc.

73 CONCRETE AND ASPHALT EQUIPMENT COMPONENTS – CONTINUED

7305 Main Drive:

Include countershafts, gears, sprockets, chains, belts, bearings, bearing housings, seals, retainers, oilers, pulleys, chain tighteners, idlers, shims, spacers, guards, housings, covers, etc.

7306 Pugmill:

Include shafts, paddles, liners, bearings, arm tips, shims, spacers, fittings, oilers, seals, bearing housings, etc.

7307 Feeding and Conveyor Frames:

Include supports, guards, flashing, wear plates, etc.

7308 Reciprocating and Vibrating Feeders or Conveyors:

Include traveling rollers, supports, support wheels, shafts bearings, oilers, fittings, sprockets, pulleys, chains, associated and attaching parts, guards, extensions, etc.

7309 Vane or Screw Feeders or Conveyors:

Include shafts, bearings, bearing housings, seals, oilers, fittings, belts, sprockets, pulleys, chains, attaching parts, guards, extensions, etc.

7310 Pan Feeder or Conveyors:

Include gears, sprockets, plates, pans, chains, belts, pulleys, oilers, fittings, seals, retainers, shafts, cleats, drag pans, track, attaching parts, etc.

7311 Feeding or Conveyor Shaft:

Include gears, sprockets, belts, pulleys, bearings, seals, retainers, oilers, fittings, head shafts, tail shafts, counter shafts, idlers, chain and belt tighterners, clutches, bearing housings, spacer, shims, attaching parts, etc.

7312 Feeder or Conveyor Discharge:

Include test gates, chutes, spouts, troughs, flashings, guards, wear plates, chains, cables, hooks, locks, supports, brackets, pins, attaching parts, etc.

7313 Screed, Vibrator Agitator:

Include shafts, chains, belts, sprockets, gears, gear box, seals, bearings, retainers, bearing housings, spacers, shims, brackets, supports, pulleys, end cutoff and deflector plates, attaching parts, etc.

7314 Tampers and Tamper Drive:

Include shafts, arms, hammers, extensions, bars, frames, brackets, plates, bearings, oilers, seals, retainers, sprockets, chains, pulleys, eccentrics, clutch, flywheel, tamper, jackknife drive, guards, etc.

7315 Traction Drive:

Include wheels, shafts, bearings, retainers, seals, fittings, sprockets, chains, pulleys, oilers, belts, etc.

7316 Form Oiler:

Include lines, fittings, tanks, strainers, etc.

7317 Material Spray Bar:

Include mounting and attaching parts.

7318 Tanks, Valves, Formed, Hoses, Lines, Fittings (For accessory hoses, see Group 22).

7319 Water System:

Include nozzles, lines, tanks, valves, glands, drives, feed hand controls, etc.

7320 Boom and Attaching Parts

73 CONCRETE AND ASPHALT EQUIPMENT COMPONENTS – CONTINUED

7321 Dust Collector Assembly:

Include mounting parts, drive components, ducts, housings, storage compartments, etc.

7322 Blower Assembly:

Include mounting parts, drive component parts, etc.

7323 Boom Lift, Swing, Clutches, Gears, Shafts, Bearings

7324 Bucket, Carrier Assembly, Trip Mechanism

7325 Bucket, Travel Drum, Clutches, Gears, Shaft, and Bearings

7326 Screens:

Include attaching parts.

7327 Mechanical Level Indicator:

Include steering indicator, leveling arm and parts, level match gauge, attaching parts, etc.

74 CRANES, SHOVELS, AND EARTH MOVING EQUIPMENT COMPONENTS

NOTE

The following subgroups (7401 thru 7407) apply to marine cranes.

7401 Crane:

Include swinger rack pivot assembly, turntable truck assembly, king pin assembly, boom foot securing assembly, fleeting sheave assembly, main load and auxiliary hoist lead sheave assembly, “A” frame hanger assembly, boom hanger assembly, main hoist load block assembly, auxiliary hoist load block assembly, main boom block sheave assembly, whip line load block assembly, boom point sheave assembly, cable assembly, etc.

7402 Hoist:

Include boom hoist drum assembly, main load drum assembly, whip line drum assembly, pillow block assembly, gear reducer assembly, drive shaft and pinion assembly, control shaft assembly, flexible coupling assembly, hydraulic brake assembly, hoist motor assembly, motor brake assembly, brake control assembly, brake band pawl assembly.

7403 Swinger:

Include brake assembly, motor assembly, flexible coupling assembly, gear reducer assembly, pillow block assembly, etc.

7404 Electrical Controls:

Include boom hoist control assembly, main line and whip line control assembly, swinger control assembly, master switch assembly, limit switch assembly, ammeter panel assembly, generator and main line control panel assembly, collector ring assembly, magnetic brake assembly, etc.

7407 Hull and Deck Machinery (accessories):

Include air horn and signal bell, anchor, anchor hoist, cable, cab heater, fresh water pump, fuel oil pump, lighting fixtures, floodlights, portable bilge pump, ballast pump, radio suppression rotary collector, running lights, trolley hoist, windshield wiper, light switch, unit heater, water circulating pump (see Group 55 for breakdown), fuel oil transfer pump, hull fittings, etc.

74 CRANES, SHOVELS, AND EARTH MOVING EQUIPMENT COMPONENTS – CONTINUED

NOTE

The following subgroups (7410 thru 7427) apply to power cranes and shovels.

7410 Shovel Front Attachments:

Include boom shipper shaft, crowd and rerack mechanism, dipper, handle, padlock block, etc.

7411 Crane Dragline or Clamshell Attachments:

Include boom, jib boom, mast, boom harness, safety boom stop hook block, tagline, fairlead, buckets, cables, pulleys, pins, bushings.

7412 Backhoe Attachments:

Include boom, mast, bucket, handles, pulleys, block, pull drum, cradle, telescopic harness, etc.

7413 Pile Drive Attachment

7414 Base Deck:

Including rotating base, catwalks, brackets and related parts.

7415 Clutch:

Include auxiliary clutch, hoist clutch, luffing clutch, propelling clutch, swing clutch, etc.

7416 Shafts:

Include drive shaft, drum shaft, slewing shafts, clutch shaft, jack shaft, center drive shaft, horizontal shaft, intermediate shaft, travel shaft, crowd shaft, swing shaft, (Use applicable heading).

7417 Hoists:

Include boom hoist, main hoist, swivel joints, tagline.

7418 Transmission Assembly:

Include speed reducer mechanism, bearings, couplings, gears, etc.

7419 Turntable:

Include turntable hubs, turntable pivot post, turntable rollers, swing lock, swing brake (when not a part of the swing shaft).

7420 Machinery Gear Case or Frame

7421 Independent or precision Boom Hoist

7422 Machinery Mechanism Controls

7423 Gantry

7424 Crawler Bed, Frame, and Ring Gear

7425 Propel and Steering Mechanism

7426 Mounting Base (other than crawler)

7427 Miscellaneous Valves:

Include double check and check valves, pilot unloader, pressure regulator, quick release valve, diaphragm, relay release control retainer, reservoir release valve, safety, three-way shut-off valve, whistle, horn, etc.

74 CRANES, SHOVELS, AND EARTH MOVING EQUIPMENT COMPONENTS – CONTINUED

NOTE

The following subgroups (7435 thru 7443) apply generally to graders and dozers.

7435 Moldboard Assembly:

Include blades, extensions, bits, ditching boots, back slopers, points, etc.

7436 Lift Arms and Pivot Assemblies:

Include guides, shafts, cradles, rods, linkage, springs, steps, etc.

7437 Loader Bucket Assembly or Forklift:

Include shafts, cutting edges, teeth, pins, bushings, springs, cables, chains, latches, etc.

7438 Circle and Drawbar Assembly:

Include supports, connections, adjusting bars, adjusting brackets, lift shafts, tilt linkage, etc.

7439 Circle Reverse Drawbar Side Shift and Lift Mechanism:

Include gear cases, gears, pins, bearings, shafts, universal joints, gaskets, seals, etc. (Include all drive parts up to power control unit, hydraulic motor or cylinder, If manually operated, include all drive parts and controls).

7440 Scarifier Assembly:

Include drawbar, hinge rod or pins, bushings, angle adjusting items.

7441 Scarifier Actuating:

Include lift shafts, arms, gear cases, gears, pins, bearings, bushings, drive shafts, universal joints, gaskets, seals, etc. (Include all drive parts up to power control unit or hydraulic motor or cylinder). If manually operated, include all drive parts and controls.

7442 Leaning Frame Mechanism

7443 Main Frame Assembly:

Include tripod, jack and mountings, etc.

NOTE

The following subgroups (7444 thru 7448) apply generally to scrapers and dump wagons.

7444 Main Body:

Include pulleys, pins, bearings, bushings, wedges, rollers, blocks, ground plates, etc.

7445 Tail Gate Components:

Include tail gate, gate return rollers, pulleys, bearings, pins, wedges, springs. pull plates, etc.

7446 Rear Truck Components:

Include pulleys, bearings, pins, etc.

7447 Push Beam and Yoke Components:

Include push beam, yoke, fairleads, pulleys, bearings, pins, rollers, wedges, kingpins, universal yokes, etc.

7448 Bowl and Discharge Components:

Include bowl tilting discharge, pulleys, pins, bearings, apron, etc.

74 CRANES, SHOVELS, AND EARTH MOVING EQUIPMENT COMPONENTS – CONTINUED

NOTE

The following subgroups (7449 thru 7465) apply generally to ditchers and trenchers.

7449 Digging Wheels:

Include buckets, teeth, cutting edges, side cutters, rims, gear segments, rooters, etc.

7450 Upper Trucks:

Include pillow blocks, shafts, wheels, collars, bearings, seals, etc.

7451 Lower Trucks:

Include closures, bearings, seals, wheels, supports, etc.

7452 Boom:

Include pulleys, pins, bearings, cables, clamps, thimbles, sliders, etc.

7453 Digging Wheel Drive:

Include sprockets, bearings, boxes, seals, differential case, gear case, covers, gaskets, gears, pins, chains, idlers, springs, plates, etc. (Include all drive parts to main drive train).

7454 Bucket Line:

Include buckets, links, teeth, side cutters, etc.

7455 Bucket Line Boom:

Include rollers, pin, plates, guides, foot shafts, foot sprockets, bearings, idlers, pulleys, etc.

7456 Boom Headshaft:

Include sprockets, gears, shafts, take-ups, safety sprockets, springs, pins, etc.

7457 Boom Erection Sheave Shaft:

Include pulleys, plates, spacers, collars, springs, etc.

7458 Boom Push Arms:

Include trunnions, links, shafts, pins, shims, arms, boots, plates, pivot shafts, bearings, etc.

7459 Connecting Links:

Include arms, angles, chains, pins, bushings, etc.

7460 Bucket Line Drive:

Include sprockets, bearings, collars, chain idlers, controls, etc. (Cover drive from train to headshaft safety sprocket).

7461 Multiple Take-Off (Line drive, main drive):

Include jack shaft, sprockets, collars, flexible coupling, housings, clutch rollers, plates, forks, springs, shafts, etc.

7162 Conveyor Discharge:

Include belts, drums, rollers, shafts, side shifters, gears, bearings, seals, guide hoists, lifts, etc.

7463 Follow Up Scraper:

Include scraper, crumbling shoe, cutting edges, lift parts, hanger, push arms, springs, plates, pins, pivots, etc.

7461 Boom Hoist Assembly:

Include drums, bearings, shafts, gears, clutch, jaws, shoes, spiders, bands, controls, etc.

74 CRANES, SHOVELS, AND EARTH MOVING EQUIPMENT COMPONENTS – CONTINUED

7465 Rooters, Rippers, Plows, Harrows, and Rotary Tillers:

Include component parts.

NOTE

The following subgroups (7466 thru 7474) apply generally to road rollers.

7466 Steering Rolls:

Includes axles, caps, plugs, seals, bushings, bearings, plates, etc.

7467 Center Rolls (Three axle tandems)

7468 Drive Rolls:

Include attached gears, axles, caps, plugs, seals, spikes, gaskets, etc.

7469 Rolls, Miscellaneous (Usually towed):

Include axles, snow rolls, single tow rolls, cluster tow rolls, bearings, feet, feet bands, plugs, plates, gasket, etc.

7470 Roll Scrapers:

Include blades, brackets, rods, springs, shafts, controls, linkage, etc.

7471 Sprinkler System:

Include tank pipes, valves, regulators, mat, mat holder, shields, etc.

7472 Towing Wheel, Lowering, and Elevating:

Include jack box, handles, shafts, gears, bushings, plates, pins, etc. (See Group 43 for hydraulic components).

7473 Lift and Swing Mechanism:

Include frame boom, tower gears, shafts, bushings, clutches, housing covers, bearings, seals, springs, locks, brakes. jack screw, mounting brackets, guide rails, spacer bars, centralizers, leg points, etc.

7474 Drive Mechanism:

Include housings, shafts, bearings, bushings, gears, retainers, etc.

7475 Spindle and Cutter:

Include chuck, helix, cutter lips, shutter plates, shanks, teeth, yokes, points, guards, etc.

7476 Feed and Leveling (Hand or mechanical):

Include chain, chain guide and roller, shafts, eccentrics, sockets, bearings, gears, pinions, housing covers, recoil mechanisms, clutch, ratchet, cylinders, pistons, rods, packing, rings, bumpers, etc.

7477 Hand Control and Linkage:

Include lever brackets, bushings, shafts, arms, yokes, rods, pins, valves, controls, bushings, springs, etc.

NOTE

The following subgroups (7478 thru 7488) apply generally to well-drilling equipment.

7478 Countershaft Assembly:

Include clutches, wheels, bearings, retainers, seals, gears, belts, chains, etc.

74 CRANES, SHOVELS, AND EARTH MOVING EQUIPMENT COMPONENTS – CONTINUED

7479 Bull Reel or Hoisting Drum:

Include brakes, clutches, dividers, traveling blocks, hook shafts, bearings, mountings, sprockets, gears, etc.

7480 Sand Reel:

Include clutches, brake divider, eccentrics, shafts, bearings, mountings, gears, etc.

7481 Crankgear and Pitman:

Include pins, gears, bushings, blocks, arms, etc.

7482 Spudder Beams:

Includes shafts, pulleys, springs, bearings, shoes, seats, heads, brackets, rods, etc.

7483 Rotary Table:

Include drill heads, housings, yokes, chucks, locks, slides kelleys, bushings, etc.

7484 Cathead:

Include gears, sprockets, bearings, mountings, shaft, drums, clutches, etc.

7485 Mud Pump:

Include drive, power end, clutch, crosshead, cylinders, valves, water swivel, hoisting plug, bearings, seals, etc.

7486 Mast:

Include crown block, mast head, hoist, stem guide, mast supports, shafts, bearings, mountings, pulleys, etc.

7487 Hand Controls and Linkage:

Include yokes, levers, links, pins, rods, etc.

7488 Pipe, Hose, Valves, etc.:

NOTE

See Group 22 for hoses.

7499 Cables and Ropes (Applies to reeving cables only)

75 CONVEYING, FEEDING AND CRUSHING, SCREENING, AND WASHING EQUIPMENT COMPONENTS

NOTE

The following subgroups (7501 thru 7508) apply to conveying and elevating equipment components.

7501 Belting, Chain:

Include supports, hoppers, skirtboards, etc.

7503 Drums, Pulleys, Sprockets:

Include bearings, shafts, etc.

7504 Rolls:

Include bearings, shafts, etc.

7505 Clutch and Controls

7506 Shafts:

Include countershafts, etc.

75 CONVEYING, FEEDING AND CRUSHING, SCREENING, AND WASHING EQUIPMENT COMPONENTS – CONTINUED

7507 Winding, Folding and Hoisting:

Include Ratchets, drums, etc.

7508 Elevating Wheel:

Include drum, shield, plates, shafts, rollers, etc.

NOTE

The following subgroups (7510 thru 7515) apply to feeding equipment components.

7510 Feeding Frames:

Include hoppers, guards, etc.

7511 Reciprocating and Vibrating Plates and Grizzleys:

Include traveling rollers, supports, support wheels and shafts, etc.

7512 Feeding Shafts:

Include gears, clutches, eccentrics, etc.

7513 Feeder Discharge:

Include test gates, chutes, spouts, and controls, etc.

7514 Vane Feeder:

Include shafts, sprockets, chains, etc.

7515 Pan Feeder:

Include plates, pans, chains, sprockets, shafts, cleats, etc.

NOTE

The following subgroups (7520 thru 7523) apply to crushing components.

7520 Crusher Frames:

Include springs, hopper, spouts, etc.

7521 Crushing Jaws, Base and Pitman:

Include wedges, springs, etc.

7522 Rolls:

Include segments, spiders, etc.

7523 Shafts:

Include gears, sprockets, pulleys, etc.

NOTE

The following subgroups (7525 thru 7529) apply to screening components.

7525 Screening Base, Box:

Include supports, springs, hoppers, etc.

7526 Clutch Shafts:

Include gears, idlers, etc.

7527 Screen Hoisting Mechanism

75 CONVEYING, FEEDING AND CRUSHING, SCREENING, AND WASHING EQUIPMENT COMPONENTS – CONTINUED

7528 Screens and Attaching Parts

7529 Eccentric or Gyrator Shaft:

Include pulleys, housings, bearings, seals, shims, etc.

NOTE

The following subgroups (7532 thru 7536) apply to washing and dehydrating components.

7532 Drums, Hoppers, Chutes:

Include baffles, liners, flumes, guards, etc.

7533 Screw or Flight Shafts:

Include bearings, collars, sprockets, gears, pulleys, etc.

7534 Piping, Valves, Hoses:

Include couplings, fittings, nozzles, etc. See Group 22 or 26 for hoses.

7535 Mechanically Driven Lubricators

7536 Traction Drive (Items not included in Groups 07, 11 or 13)

76 FIRE FIGHTING EQUIPMENT COMPONENTS

NOTE

For platforms, walkways, ladders, etc., see Group 15.

7601 Fire Pump Assembly

7602 Relief Valve Assembly

7603 Control Relief Valve Assembly

7604 Priming Pump Assembly

7605 Primer Valve Assembly

7606 Drain Valve Assembly

7607 Clutch Operating Lever Assembly

7608 Propeller Shaft Assembly

7609 Engine Throttle Assembly

7610 Foam Proportioner Assembly (Includes Jet Ejector, Check Valve, Ball Valve, and Metering Valve)

7611 Foam Turret Assembly

7612 Foam Tank Assembly

7613 Water Tan-r Assembly

7614 Hose Reel Assembly

7615 Instrument Housing Assembly (Includes all parts shown on Drawing 10572-15 and related parts)

7620 Siren Assembly

7621 Warning Light Assembly

7622 Spotlights (Front and Rear)

7623 Dome and Engine Light Assemblies

7624 Turn Signal Light Assembly

76 FIRE FIGHTING EQUIPMENT COMPONENTS – CONTINUED

7625 Storage Battery, 12 Volts

7626 Miscellaneous Electrical Equipment:

Includes Battery Cables, Battery Charging Receptacles. Circuit Breakers, Wiring Harness, etc.

7627 Heater, Vehicular Compartment

7628 Oil Pan heat Exchanger

7629 Auxiliary Engine Cooling Assembly

7630 Piping, Water and Foam:

Includes Drain Lines

7631 Control Valves:

Includes all Control Valves, except 7610

7632 Rods, Control Valves

7635 Special Purpose Body:

Includes all Body parts

7636 Mounting Brackets, Fuel Tank and Air Reservoir

7638 Portable Fire Fighting Equipment:

Includes Fire Extinguishers

7639 Fixed Fire Fighting Equipment (Vehicular)

7645 Identification and Instructions Plates (Excludes Data Plates incorporated in Assemblies)

7650 Heater Assembly, Coolant

7651 Heater Assembly, Space

7652 Pump Assembly, Circulating

7653 Motor-Generator Assembly

7654 Radiator Shutter

7655 Miscellaneous Winterization Equipment:

Includes Piping and Fittings, Wiring Harness, Motor-Generator Power Receptacle, etc.

77 MUSICAL AND TONAL INSTRUMENTS

7701 Pianos, Organs (Hand, electric, or electronic)

7702 Cabinet, Bench:

Include doors, covers, racks, woodwork, hardware and fabrics, etc. applicable.

7703 Console:

Include brackets, cams, capacitors, coil assembly, connectors, tubes, grommets, heating element, motors, resistors, suppressors, switches (toggle), transformers, crystal, drive, knobs and tablets, lever.

7704 Manual Chassis Assembly:

Include terminal strips, keys, contact springs with precious metal points, busbar with precious metal points.

7705 Tone Generator:

Include generator, shaded pole induction motor, non-self-starting synchronous motor, drive shaft with driving gears, tone or phonic wheels (geared), magnetized rods, magnets and coils, transformers, and condensers.

77 MUSICAL AND TONAL INSTRUMENTS – CONTINUED

7706 Reverberation Unit (Sound):

Include fluid type or dry type, coil driver unit, coil springs, crystal, reflecting pin.

7707 Pedal Switch Assembly:

Include busbars, contact springs, terminals, choke coil, resistors, filters, pistons, contact.

7708 Amplifier:

Include capacitors, connectors, tubes, reactors, sockets (tube), condensers, transformers.

7709 Loudspeaker:

Include coil, transformer, cone, frame.

7710 Cable:

Include cable (power, electric), cable (special purpose electric), connectors and sockets.

7711 Miscellaneous Attachments:

Include items not covered in groups 7701 thru 7710 above.

80 STORAGE EQUIPMENT COMPONENTS

NOTE

Include all empty containers which are recoverable type items, for example: acetylene containers, oxygen containers, steel or metal drums which are reusable and can be recharged, etc. This group will also cover transportable or skid mounted tanks such as used for Lox storage.

8000 Major Assemblage:

Instructions: Insert end item or major component nomenclature) Include component parts.

84 NUCLEAR POWER PLANTS

NOTE

Subgroups 8400, 8500, 8600, and 8700 inclusive are to be used for nuclear power equipment exclusively. All components will be kept in these indexes and not referred to other indexes.

8400 Nuclear Components (Primary System)

8401 Vapor Container:

Include doors, seals, sprays, etc.

8402 Rod Drive Sump Pump

8403 Reactor

8404 Pressure Vessel

8405 Core Assembly:

Include fuel elements

8406 Control Rod

8407 Drive Mechanism

8408 Motor

8409 Drive Shaft Assembly

8410 Clutch Drive Assembly

84 NUCLEAR POWER PLANTS – CONTINUED

8411 Water Seal Assembly
8412 Instrument Bracket Assembly
8413 Pressurizer
8414 Primary Coolant and Fill Pumps
8415 Motor
8416 Pump
8417 Steam Generator (Heat Exchanger):
Include lines, fittings, thermocouple, etc.
8418 Seal Leakage System:
Include valve switches, lines, fittings, etc.
8419 Seal Assemblies
8420 Seal Leakage Pumps
8421 Motors
8422 Pump
8423 Tank
8424 Primary Coolant Blowdown System:
Include cooler piping
8425 Primary Coolant Blowdown Pump
8426 Motor
8427 Water Cooler
8428 Control Valves (Electrical)
8429 Control Valves (Pneumatic)
8430 Monitoring (Radiation)
8431 Demineralizers
8432 Filters:
Include elements, gaskets, seals, etc.
8433 Measuring Devices:
Include conductivity, temperature, pressure flow meters, etc.
8434 Primary Coolant Make-Up System:
Include tank, lines, fittings, etc.
8435 Make-Up Pump
8436 Pump
8437 Variable Speed Drive
8438 Motor
8439 Lubricator
8440 Transmission
8441 Filters
8442 Control Valves:
Include check valve, safety valve, etc.

84 NUCLEAR POWER PLANTS – CONTINUED

8443 Gages

8444 Differential Pressure Converter:

Include safety valve, pressure switch alarm, etc.

8445 Hydrogen System:

Include flow indicator pressure control, helium valve, etc.

8446 Moderator Water System

8447 Shield Water System

8448 Spend Fuel Pit Storage and Chute:

Include chute plug, cover, etc.

8449 Fuel Shipping Container

8450 Movable Platform

8451 Recirculating Pumps

8452 Pump

8453 Motors

8454 Contaminated Waste System:

Include hot waste tank, tank pressure indicator, level control, temperature indicator, etc.

8455 Reprocessing Skids:

Include tanks, lines, fittings, etc.

8456 Hot Waste Discharge Pumps

8457 Pumps

8458 Motors

8459 Laboratory Waste Storage Tank:

Include level indicator, line, fittings, etc.

8460 Water Ejector

85 NUCLEAR COMPONENTS (SECONDARY SYSTEM)

8501 Feedwater System:

Include feedwater heater and lines.

8502 Boiler Feed Pumps

8503 Electric Motor:

Include controls.

8504 Steam Turbine:

Include controls.

8505 Pumps

8506 Evaporator:

Include lines, flow meters, etc.

8507 Regulating Valves

8508 Preheater

8509 Evaporator Feed Pump

8510 Pumps

85 NUCLEAR COMPONENTS (SECONDARY SYSTEM) – CONTINUED

8511 Motors
8512 Pressure Control System
8513 Level Control System
8514 High and Low Water Alarm
8515 Secondary Blowdown System
8516 Rotameter
8517 Main Water Supply and Booster Pumps
8518 Pump
8519 Motor
8520 Condensate Recirculating Pump
8521 Pump
8522 Motor
8523 Check Valves
8524 Rotameter
8525 Pressure Switch
8526 Control and Regulating Valves
8527 Chlorinator:
Include injector.
8528 Pump
8529 Motor
8530 Scale-Cylinders
8531 Service Water System:
Include storage tank and controls.
8532 Main Air Compressor
8533 Compressor
8534 Motor
8535 Receiver
8536 After Cooler
8537 Condensing Filters
8538 Standby Compressor
8539 Compressor
8540 Motor
8541 Compressor Controls
8542 Steam or Gas Turbine
8543 Oil System:
Include lines, valves, etc.
8544 Main Oil Pump:
Include drive.
8545 Auxiliary Oil Pump, Motor Driven

85 NUCLEAR COMPONENTS (SECONDARY SYSTEM) – CONTINUED

8546 Auxiliary Oil Pump, Turbine Driven
8547 Speed Controls
8548 Load Limit Controls
8549 Inlet Pressure Controls
8550 Overspeed Controls
8551 Turbine Gage Board
8552 Condenser
8553 Air Ejector
8554 Inter Condenser
8555 After Condenser
8556 Flow Control Valves
8557 Controller
8558 Manual Load Station
8559 Transmitter
8560 Reduction Gear
8561 Generator
8562 Generator Exciter
8563 Space Air Cooler
8564 Skid Frames and Shock Mounts (Portable units only)
8565 Process Tubing and Hardware
8566 Bus and Switch Gear
8567 Circuit Breakers
8568 Transformers
8569 Relays
8570 Batteries
8571 Inverter, Converter/and Rectifier Charger
8572 Seal Pit Monitor Pump
8573 Pump
8574 Motor
8575 Chemical Feed Pump
8576 Pump
8577 Motor
8578 Chemical Feed Tank
8579 Steam Traps and Strainers
8580 Gages
8581 Thermometers
8582 Pipe Pit Sump
8583 Pump
8584 Motor

85 NUCLEAR COMPONENTS (SECONDARY SYSTEM) – CONTINUED

8585 Oxygen and PH Analyzer

86 NUCLEAR COMPONENTS (SYSTEM CONTROLS AND INSTRUMENTATION)

8601 Control Room
8602 Operators Console
8603 Annunciator Panel
8604 Rod Control Panel
8605 Miscellaneous Control Panel
8606 Front Graphic Panel
8607 Rear Graphic Panel
8608 Electrical Panel
8609 Generator Section
8610 Station Service Section
8611 Battery and Motor Control Section
8612 Synchronizing Section
8613 Nuclear Panel
8614 Radiation Panel

87 NUCLEAR COMPONENTS (AUXILIARY EQUIPMENT AND PLANT ACCESSORIES)

8701 Air Conditioner
8702 Heating System
8703 Closed Circuit Television
8704 Public Address System
8705 Sanitary System
8706 Fire Protection System
8707 Storage Containers and Gas Cylinders
8708 Fuel Element Replacement Equipment
8709 Operator Tools, Common
8710 Operator Power Tools
8711 Operator Tools, Special
8712 Maintenance Tools, Common
8713 Maintenance Team Tools, Special
8714 Radiation Monitoring Stations, (fixed)
8715 Radiation Monitoring Devices, (portable)
8716 Test Equipment, Chemical
8717 Test Equipment, Electrical
8718 Test Equipment, Instruments
8719 Test Equipment, Mechanical
8720 Chemical Supplies
8721 Hardware Supplies, Common
8722 Hardware Supplies, Special

87 NUCLEAR COMPONENTS (AUXILIARY EQUIPMENT AND PLANT ACCESSORIES) – CONTINUED

8723 Electrical Supplies, Common

8724 Instrument Components

8725 Maintenance and Operating Supplies

8726 Hoist

8727 Portable Demineralizer

8728 Decontamination and Vent Fans

8729 Vacuum Pump

8730 Radiation Counting Equipment

8731 Laundry Equipment

8732 Washer

8734 Washer Dryer

8735 Samplers

8736 Health Physics Equipment and Supplies

90 MAINTENANCE AND OPERATING SUPPLIES

(Include Petroleum Products, Minerals, Chemicals, Gages, Abrasives, Etc., Required For Operation and Maintenance of The Equipment)

91 CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL (CBR) EQUIPMENT

9110 Collective Protection Equipment

9111 Gas Particulate Filter Units:

Include precleaner, housing assembly, motor-blower assembly, gas filter, particulate filter, etc.

9112 Control Systems:

Include control panels, flow control valves, pressure sensitive switches, alarm assembly, indicators, etc.

9113 Shipping and Storage Containers

9114 Liners

9115 Protective Entrances:

Include mounting and attaching frames, permeable membrane doors, light and communication assemblies, etc.

9116 Associated Kits:

Include installation kits, modification kits, repair kits, tool kits, test kits, etc.

9120 Decontamination Equipment

9121 Tank Assembly:

Include covers, agitators, hoppers, valves, attached piping, etc.

9122 Power Systems:

Include engine and all associated controls, gages, and fuel system, all components of power take-off system, etc.

9123 Discharge Hoses:

Include gun assemblies, couplings, reels, etc.

9124 Suction Hoses:

Include foot valve and strainer.

91 CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL (CBR) EQUIPMENT – CONTINUED

9125 Shower Assembly:

Include piping, brackets, supports, etc.

9126 Pump Assembly:

Include valves, controls and piping.

9127 Prime-Foam Tank Assembly:

Include valves and controls.

9128 Water Heaters:

Include all components and accessories for the heater.

9129 Special Tools and Accessories:

Include all special tools, accessories, repair parts kits, and components not included under previous headings.

9130 Warning and Detection Systems

9131 Chemical Agent Alarms:

Include all components and associated items.

9132 Personnel Detectors

9133 Chemical Agent Detection Kits

9134 Radioactive Test Kits

9140 Personnel Protection Equipment

9141 Masks and Respirators:

Include filter, eye lens, water drinking equipment, resuscitation equipment, voice mitter, microphone, carrier, etc.

9143 Breathing Apparatuses:

Include the tanks, harness assembly, carrying case, winterization kit, tools, etc.

9142 Protective Suits and Overgarments:

Include gloves, boots, hoods, etc.

95 GENERAL USE STANDARDIZED PARTS

9501 Hardware Supplies and Bulk Materiel, Common

99 PARTS PECULIAR

9901 Multi-Listed Parts

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