TM 5-2410-233-10

TECHNICAL MANUAL

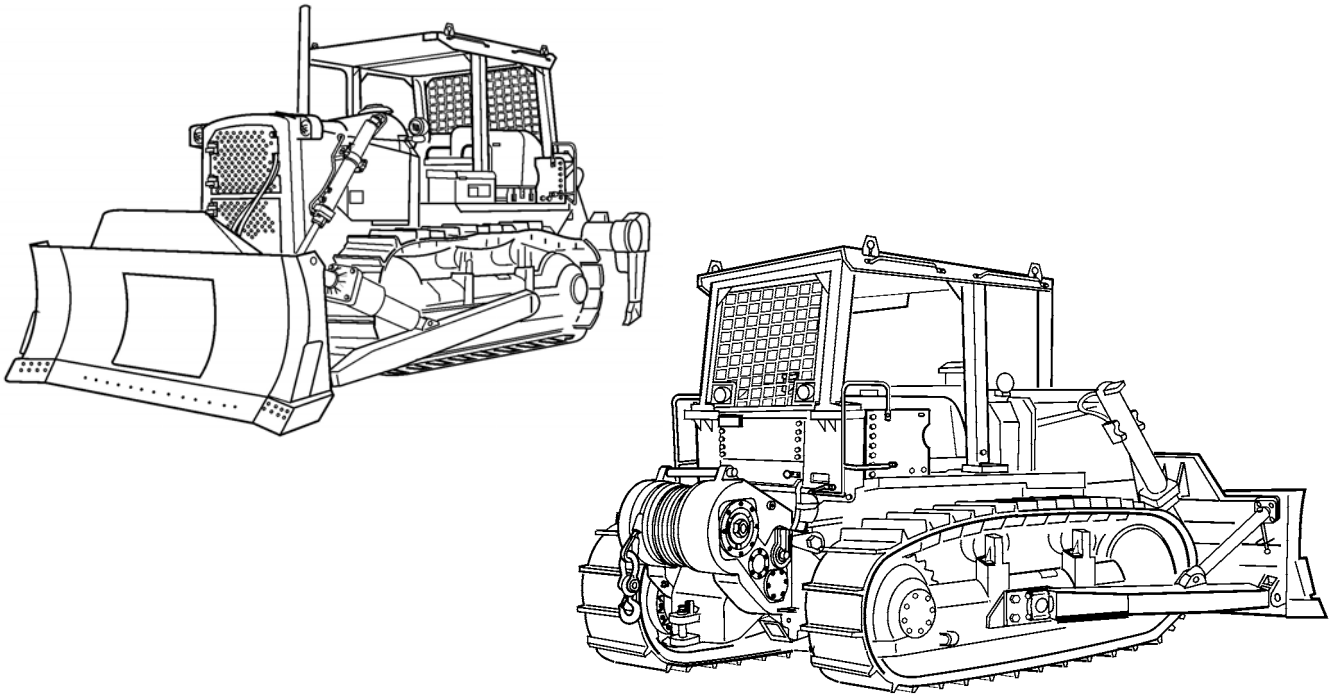
OPERATOR'S MANUAL

FOR

TRACTOR, FULL TRACKED, LOW SPEED: DED, MEDIUM DRAWBAR PULL

TRACTOR WITH RIPPER; NSN 2410-00-185-9794 (EIC: EAW)
TRACTOR WITH RIPPER AND WINTERIZED CAB; NSN 2410-00-300-6665
TRACTOR WITH WINCH; NSN 2410-00-185-9792 (EIC: EA6)
TRACTOR WITH WINCH AND WINTERIZED CAB; NSN 2410-00-300-6664

CATERPILLAR MODEL D7F



SUPERSEDURE NOTICE - This manual supersedes TM 5-2410-233-10, dated 28 November 1972.

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HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 2005

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. Also included are explanations of safety and hazardous materials icons used within the technical manual.

BIOLOGICAL - abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.

CHEMICAL - drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.

EAR PROTECTION - Headphones over ears show that noise level will harm ears.

ELECTRICAL - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.

EYE PROTECTION - person with goggles shows that the material will injure the eyes.

FIRE - flame shows that a material may ignite and cause burns.

FLYING PARTICLES - arrows bouncing off face with face shield shows that particles flying through the air will harm face.

HEAVY PARTS - heavy object on human figure shows that heavy parts present a danger to life or limb.

HOT AREA - hand over object radiating heat shows that part is hot and can burn.

HYDRAULIC FLUID PRESSURE - hydraulic fluid spraying human figure shows that fluid escaping under great pressure can cause injury or death.

RADIOACTIVE - identifies a material that emits radioactive energy and can injure human tissue or organs.

VAPOR - human figure in a cloud shows that material vapors present a danger to life or health.

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

WARNING

CARBON MONOXIDE (EXHAUST GASES) CAN KILL!

- **Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure.**
- **Carbon monoxide occurs in exhaust fumes of internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of tractor is operated.**

1. **DO NOT operate tractor engine in enclosed areas without adequate ventilation.**
2. **DO NOT idle tractor engine without adequate ventilation.**
3. **DO NOT drive tractor with inspection plates or cover plates removed.**
4. **BE ALERT for exhaust poisoning symptoms. They are:**
   - **Headache**
   - **Dizziness**
   - **Sleepiness**
   - **Loss of muscular control**
5. **If you see another person with exhaust poisoning symptoms:**
   - **Remove person from area.**
   - **Expose to fresh air.**
   - **Keep person warm.**
   - **Do not permit physical exercise.**
   - **Administer cardiopulmonary resuscitation (CPR), if necessary.**
   - **Notify a medic.**
6. **BE AWARE. The field protective mask for nuclear-biological-chemical (NBC) protection will not protect you from carbon monoxide poisoning.**

The Best Defense Against Carbon Monoxide Poisoning Is Good Ventilation!


WARNING

BATTERIES

- **To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating or electric shock, damage to equipment, and injury to personnel.**
- **Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in injury or death.**

a. **Eyes. Flush with cold water for no less than 15 minutes and seek medical attention immediately.**

b. **Skin. Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.**

c. **Internal. If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Seek medical attention immediately.**

d. **Clothing/Equipment. Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.**

WARNING

COMPRESSED AIR

Particles blown by compressed air are hazardous. DO NOT exceed 15 psi (103 kPa) nozzle pressure when drying parts with compressed air. Use a maximum of 30 psi (207 kPa) when cleaning components. DO NOT direct compressed air against human skin. Failure to follow this warning may result in injury or death. Make sure air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield.


WARNING

ETHER STARTING AID SYSTEM


Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause injury or death.

WARNING

FIRE EXTINGUISHER

Discharging large quantities of dry chemical fire extinguisher inside an enclosed winterized cab may result in temporary breathing difficulty during and immediately after the discharge event. Discharge fire extinguisher from outside the cab. Ventilate cab thoroughly prior to reentry.

WARNING

FUEL HANDLING

- **DO NOT smoke or permit any open flame in area of tractor while you are servicing fuel system. Be sure hose nozzle is grounded against filler tube during refueling to prevent static electricity. Failure to follow this warning may result in injury to personnel or equipment damage.**
- **DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing injury or death, or damage to vehicle.**

WARNING

HAZARDOUS WASTE DISPOSAL

When servicing this machine, performing maintenance or disposing of materials such as engine coolant, transmission fluid, lubricants, battery acids or batteries, 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 1-800-872-3845.

WARNING

HEARING PROTECTION

Your hearing can be PERMANENTLY DAMAGED if you are exposed to constant high noise levels of 85 DB or greater. Hearing protection is required when operating machine or when working on machine while it is operating. Failure to wear hearing protection may result in hearing loss.

WARNING

HYDRAULIC SYSTEM PRESSURE

Do NOT remove hydraulic tank filler cap or disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Hydraulic system pressure can be over 2500 psi (17,237 kPa), even with engine and pump OFF. To relieve pressure, lower all hydraulic attachments to the ground and shut down engine. Move control levers through all operating positions, then SLOWLY loosen hydraulic tank filler cap. After maintenance, tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing injury or death.

WARNING

MACHINE OPERATION

- **Use caution and maintain three-point contact at all times when mounting or dismounting machine, to avoid injury or death.**
- **BE ALERT for personnel in the area while operating machine. Always check to ensure area is clear of personnel and obstructions before moving. Failure to follow this warning may result in injury or death.**
- **Use of seat belt while operating machine is mandatory. Fasten belt BEFORE operating machine. Trying to fasten belt during operation creates a hazardous condition. Failure to follow this warning may result in injury or death.**
- **DO NOT allow riders on machine. Failure to follow this warning may result in injury or death.**

WARNING

NBC EXPOSURE

- **If NBC exposure is suspected, personnel wearing protective equipment must handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.**
- **Refer to FM 3-3, *Chemical and Biological Contamination Avoidance,* FM 3-5, *NMC Decontamination,* FM 9-204, *Nuclear Contamination Avoidance.***
- **NBC contaminated filters must be handled using adequate precautions and must be disposed of by trained personnel.**

To order this NBC decal use:

National Stock Number (NSN) - 7690-01-114-3702
Part Number (PN) - 12296626
Commercial and Government Entity Code (CAGEC) - 19207

WARNING

PRESSURIZED COOLING SYSTEM

- **DO NOT service cooling system unless engine has cooled. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.**
- **DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Loosen cap to first stop and let any pressure out of cooling system, then remove cap. Failure to follow this warning may cause serious burns.**
- **Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.**

WARNING

SLAVE STARTING

- **When slave starting tractor, use NATO slave cable that DOES NOT have loose or missing insulation.**
- **DO NOT proceed if suitable cable is not available.**

WARNING

SOLVENT CLEANING COMPOUND

Solvent cleaning compound MIL-PRF-680 Type III is an environmentally compliant and low toxic 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.

WARNING

WINCH OPERATION

Follow winch operating precautions and procedures carefully. Failure to follow safe operating precautions and procedures could result in injury or death, or damage to equipment:

- **Wear heavy gloves when handling wire rope to protect hands against injury.**
- **Stand clear of a reeled-out wire rope that is loaded. Stand clear a distance equal to 1-1/2 times the length of reeled-out wire rope.**

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LIST OF EFFECTIVE PAGES/WORK PACKAGES

Date of issue for original manual is:

Original 15 March 2005

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 30 AND TOTAL NUMBER OF WORK PACKAGES IS 20 CONSISTING OF THE FOLLOWING:

Page/WP No.	***Change No.**
Cover/(Back Blank)	0
a to g/(h Blank)	0
A/(B Blank)	0
i to iv	0
WP 0001 00 to 0020 00	0
Index-1 to Index-4	0

* Zero in this column indicates an original page or work package.

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TECHNICAL MANUAL
TM 5-2410-233-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 15 March 2005

OPERATOR'S MANUAL

FOR

**TRACTOR, FULL TRACKED, LOW SPEED:
DED, MEDIUM DRAWBAR PULL**

**TRACTOR WITH RIPPER; NSN 2410-00-185-9794 (EIC: EAW)
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TRACTOR WITH WINCH AND WINTERIZED CAB; NSN 2410-00-300-6664**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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Table of Contents

Table of Contents - Continued

HOW TO USE THIS MANUAL

NOTE

If at any time you are unsure how to use this manual or you cannot locate the information you need, notify your supervisor.

INTRODUCTION

1. A Service Life Extension Program (SLEP) has been implemented on selected D7F Tractors.
2. The major differences for the operator, between a non-SLEP and SLEP tractor, are as follows:
   a. A non-SLEP tractor is equipped with either a model D333 or early model 3306 engine. These engines use glow plugs for cold weather starting. In addition, there is no oil sampling valve for engine oil sampling.
   b. A SLEP tractor is equipped with a later model 3306 engine, with an ether starting aid system and an engine oil sampling valve. Some SLEP tractors may be equipped with a transmission oil sampling valve.
3. Refer to WP 0002 00, *Equipment Description and Data*, for further information on how to verify which tractor you have.
4. This revised manual is designed to help you operate both configurations of Caterpillar D7F Tractors and perform operator troubleshooting and maintenance on the equipment.
5. This manual is written in work package format:
   a. Chapters divide the manual into major categories of information (e.g., *Introductory Information with Theory of Operation, Operating Instructions, Operator Troubleshooting, Operator Maintenance Instructions,* and *Supporting Information*).
   b. Each Chapter is divided into work packages, which are identified by a 6-digit number (e.g. 0001 00, 0002 00, etc.) located on the upper right-hand corner of each page. The work package page number (e.g. 0001 00-1, 0001 00-2, etc.) is located centered at the bottom of each page.
   c. If a Change Package is issued to this manual, added work packages use the 5^{th} and 6^{th} digits of their number to indicate new material. For instance, work packages inserted between WP 0001 00 and WP 0002 00 are numbered WP 0001 01, WP 0001 02, etc.
6. Read through this manual to become familiar with its organization and contents before attempting to operate or maintain the equipment.

CONTENTS OF THIS MANUAL

1. A *Warning Summary* is located at the beginning of this manual. Become familiar with these warnings before operating or performing operator troubleshooting or maintenance on the machine.
2. A *Table of Contents*, located in the front of the manual, lists all chapters and work packages in the publication.
   a. The Table of Contents also provides *Reporting Errors and Recommending Improvements* information and DA Form 2028 addresses, for the submittal of corrections to this manual.
   b. If you cannot find what you are looking for in the Table of Contents, refer to the alphabetical *Index* at the back of the manual.
3. Chapter 1, *Introductory Information with Theory of Information*, provides general information on the manual and the equipment.
4. Chapter 2, *Operating Instructions*, explains and illustrates all operator controls and indicators and contains a *Stowage, Decal and Data Plate Guide*. It also describes how to perform all operating procedures for the tractor: *Operation Under Usual Conditions* and *Operation Under Unusual Conditions*.
5. Chapter 3 covers all *Operator Troubleshooting*. WP 0009 00 contains a *Troubleshooting Symptom Index*. If the tractor malfunctions, this index should always be consulted to locate the appropriate troubleshooting procedure.

CONTENTS OF THIS MANUAL - CONTINUED

6. Chapter 4 deals with *Operator Maintenance*. Major areas covered are *Preventive Maintenance Checks and Services (PMCS)* and operator level maintenance tasks.
7. Chapter 5 includes *Supporting Information: References, Components of End Item (COEI) and Basic Issue Items (BII) Lists, Additional Authorization List (AAL), Expendable and Durable Items List,* and *Warranty Information*.

FEATURES OF THIS MANUAL

1. WARNINGs, CAUTIONs, NOTEs, subject headings, and other important information are highlighted in **BOLD** print as a visual aid.

WARNING

A WARNING indicates a hazard which may result in injury or death.

CAUTION

A CAUTION is a reminder of safety practices or directs attention to usage practices that may result in damage to equipment.

NOTE

A NOTE is a statement containing information that will make the procedures easier to perform.

2. Statements and words of particular interest may be printed in CAPITAL LETTERS to create emphasis.
3. Within a procedural step, reference may be made to another work package in this manual or to another manual. These references indicate where you should look for more complete information.
   a. If you are told: “Refuel tractor (WP 0013 00)”, go to WP 0013 00 in this manual for instructions on refueling.
   b. If you are told: “For complete information on servicing batteries, refer to TM 9-6140-200-14”, go to the *References* work package (WP 0016 00) for complete information.
4. Illustrations are placed after, and as close to, the procedural steps to which they apply. Callouts placed on the art are text or numbers.
5. Numbers located at lower right corner of art (e.g. 386-001; 386-002, etc.) are art control numbers and are used for tracking purposes only.
6. Dashed leader lines used in the Lubrication Chart (WP 0011 00) and in the PMCS Table (WP 0012 00) indicate that called out lubrication points are located on both sides of the machine.
7. Technical instructions include metric units as well as standard units. For your reference, a *Metric Conversion Chart* is located on the inside back cover of the manual.

CHAPTER 1
INTRODUCTORY INFORMATION WITH THEORY OF OPERATION

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SCOPE

NOTE

- **A Service Life Extension Program (SLEP) has been implemented on selected D7F Tractors. This revised manual is designed to help you operate both configurations of D7F Tractors.**
- **The major differences for the operator, between a non-SLEP and SLEP tractor, are as follows:**
  - **a. A non-SLEP tractor is equipped with either a model D333 or early model 3306 engine. These engines use glow plugs for cold weather starting. In addition, there is no oil sampling valve for engine oil sampling.**
  - **b. A SLEP tractor is equipped with a later model 3306 engine with an ether starting aid system and an engine oil sampling valve. Some SLEP tractors may be equipped with a transmission oil sampling valve.**
- **Refer to WP 0002 00, *Equipment Description and Data*, for further information on how to verify which tractor you have.**

1. **Type of Manual.** This manual is for use in operating and performing operator troubleshooting and maintenance on the Caterpillar Model D7F Tractor.

2. **Equipment Name and Model Number.**

   a. Tractor, Full Tracked, Low Speed: DED, Medium Drawbar Pull, Caterpillar Model D7F.

   b. The D7F Tractor is available in the following configurations:

      (1) Tractor with Ripper; NSN 2410-00-185-9794 (EIC: EAW)

      (2) Tractor with Ripper and Winterized Cab; NSN 2410-00-300-6665

      (3) Tractor with Winch; NSN 2410-00-185-9792 (EIC: EA6)

      (4) Tractor with Winch and Winterized Cab; NSN 2410-00-300-6664

3. **Purpose of Equipment.**

   a. The D7F Tractor is designed for dozing soil and rocks and for clearing land of trees and brush.

   b. Tractors equipped with ripper are designed for dozing and also for ripping soil, rocks, asphalt and concrete.

   c. Tractors equipped with winch are designed for dozing and also for winching operations.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, *Functional User's Manual for the Army Maintenance Management System (TAMMS*), as contained in the Maintenance Management Update.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs)

If your tractor needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF Form 368 *(Product Quality Deficiency Report)*. Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, Illinois 61299-7630. We'll send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

1. Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.
2. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling or breaking of these materials may be a corrosion problem.
3. If a corrosion problem is identified, it can be reported using SF Form 368 (*Product Quality Deficiency Report*). Use of key words such as “corrosion,” “rust,” “deterioration,” or “cracking” will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA Pam 738-750.

OZONE DEPLETING SUBSTANCES

There are no ozone depleting substances cited in this manual or used on the D7F Tractor.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

For destruction of Army materiel to prevent enemy use, refer to TM 750-244-3.

PREPARATION FOR STORAGE OR SHIPMENT

Notify Unit Maintenance to perform preparation for storage or shipment procedures.

WARRANTY INFORMATION

SLEP machines are warranted by Caterpillar Inc. IAW *Warranty Information* (WP 0020 00). Record deficiencies on DA Form 2404 or DA Form 5988-E. Report all defects in material or workmanship to your supervisor.

NOMENCLATURE CROSS-REFERENCE LIST

COMMON NAME	OFFICIAL NOMENCLATURE
Belly Pan	Crankcase or Transmission Guard
Dipstick	Oil Level Gage
Engine Coolant	Antifreeze, Ethylene Glycol Mixture
Rock Guard	Track Roller Frame Guard, Track Roller Guard

LIST OF ABBREVIATIONS

NOTE

Refer to ASME Y14.38-1999, Abbreviations and Acronyms, for standard abbreviations.

ABBREVIATION	DEFINITION
AAL	Additional Authorization List
BII	Basic Issue Items
C	Centigrade or Celsius

LIST OF ABBREVIATIONS - CONTINUED

ABBREVIATION	DEFINITION
CCA	Cold Cranking Amps
cm	Centimeter
COEI	Components of End Item
F	Fahrenheit
GVWR	Gross Vehicle Weight Rating
IAW	In Accordance With
kg	Kilogram
km	Kilometer
kPa	Kilopascal
kph	Kilometers per Hour
L	Liter
mm	Millimeter
PMCS	Preventive Maintenance Checks and Services
ROPS	Rollover Protective Structure
SLEP	Service Life Extension Program
SU (Bulldozer Blade)	Semi-U (Bulldozer Blade)

END OF WORK PACKAGE

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EQUIPMENT DESCRIPTION AND DATA 0002 00

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

NOTE

Refer to *Equipment Data* at the end of this work package for machine dimensions, weights, fluid capacities and other miscellaneous equipment data.

1. The D7F Tractor is a full-tracked, low speed, medium drawbar pull machine designed for earthmoving and construction operations.
2. The three major assemblies of the tractor are a center section and two side sections.
   a. The center section contains the power source, the operator's controls, and the rollover protective structure (ROPS).
   b. The two side sections consist of track frames extending approximately the full length of the tractor.
3. The tractor can operate in mud or water as deep as the top of the final drive cover: 30 in. (76.2 cm).
4. Features of the D7F tractor include:
   a. Caterpillar 6-cylinder, turbocharged diesel engine;
   b. Caterpillar powershift, manual transmission with Neutral (N) and three forward and three reverse speeds and a transmission safety lock;
   c. operator station with adjustable seat and seat belt;
   d. ROPS canopy;
   e. clutch-operated steering brakes with dual brake pedals and a brake lock lever that serves as a parking brake;
   f. 24-volt electrical system with NATO slave receptacle;
   g. front-mounted Semi-U (SU) bulldozer blade;
   h. either rear-mounted ripper or rear-mounted reversible winch; and
   i. a winterized cab installed on tractors operating in arctic conditions.
5. Tractors procured from 1971-1984, that have not gone through the Service Life Extension Program (SLEP), have the following features:

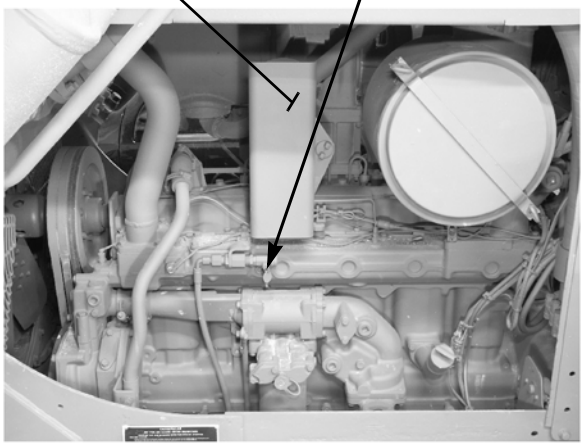
NOTE

If a non-SLEP tractor has had its original engine replaced, it may be equipped with a later model 3306 engine.

   a. engine model D333 or early model 3306 with precombustion chambers;
   b. glow plugs for cold weather starting; and
   c. old style (two-prong) NATO slave receptacle.

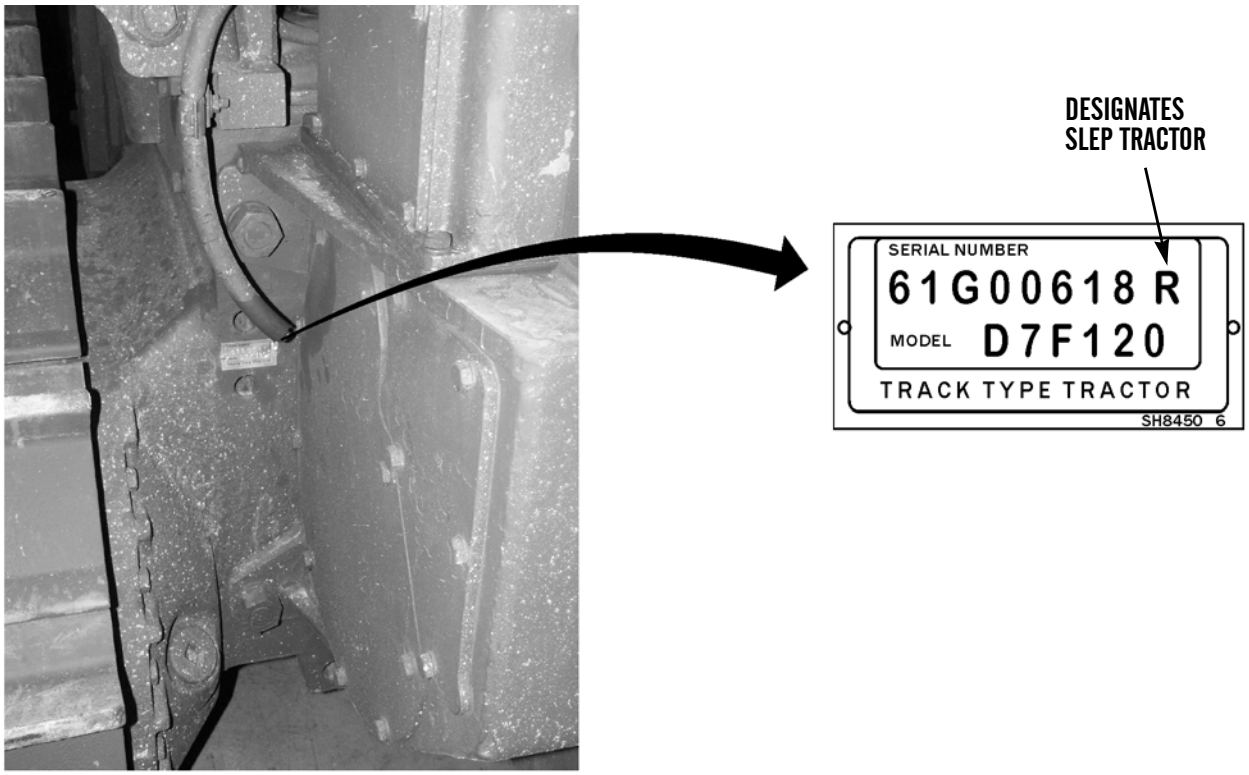
EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - CONTINUED

6. SLEP tractors have the following features:
   a. later model 3306 engine;
   b. direct injection fuel system;
   c. ether starting aid system;
   d. engine oil sampling valve;
   e. selected tractors may have a transmission oil sampling valve;
   f. backup alarm;
   g. new style (single-prong) NATO slave receptacle; and
   h. rear protective screen on ROPS.



LATER MODEL 3306 ENGINE

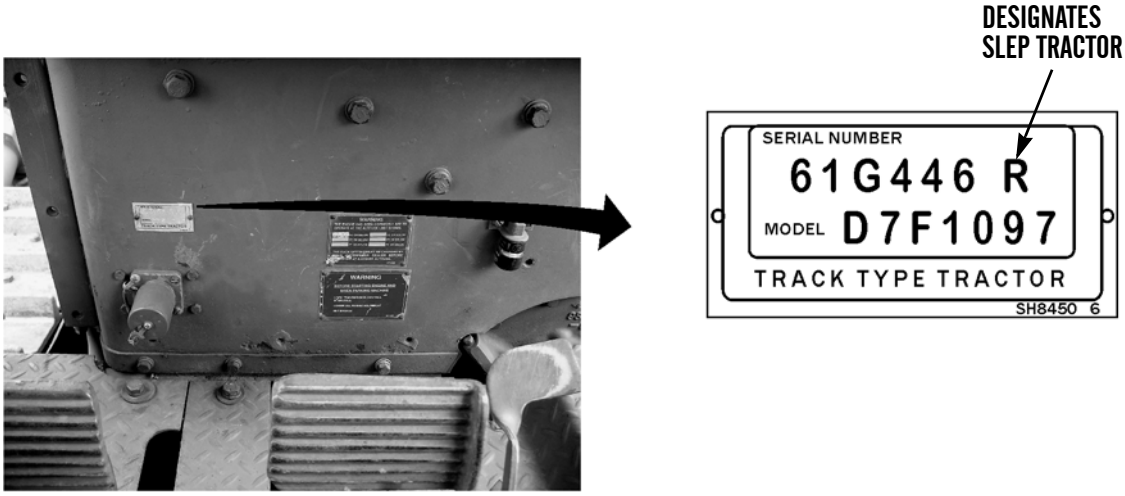
7. To determine if you have a SLEP tractor, do the following:
   a. On tractors equipped with a winch, look for the suffix “R” stamped after the serial number on the data plate at the left rear of the machine.



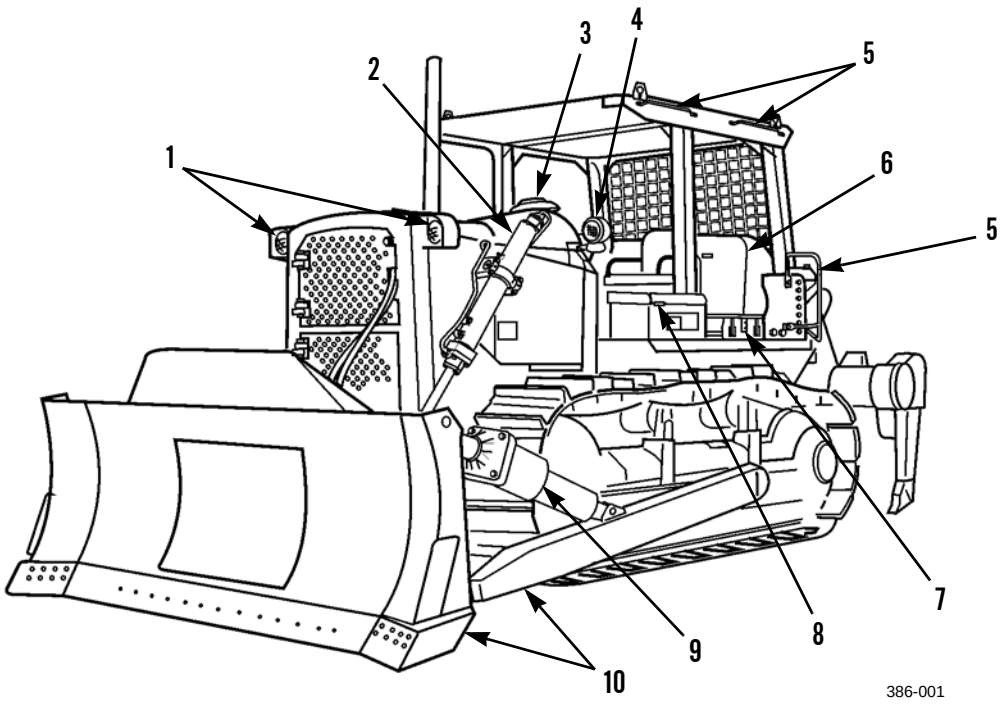
TRACTOR WITH WINCH

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - CONTINUED

b. On tractors equipped with a ripper, look for the suffix “R” stamped after the serial number on the data plate inside the operator station.

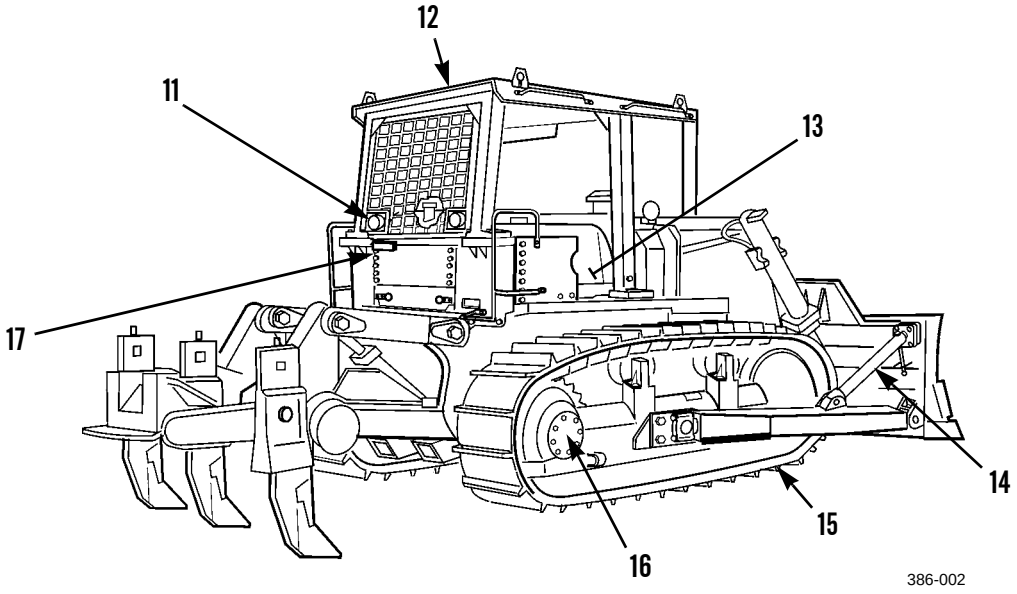


LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



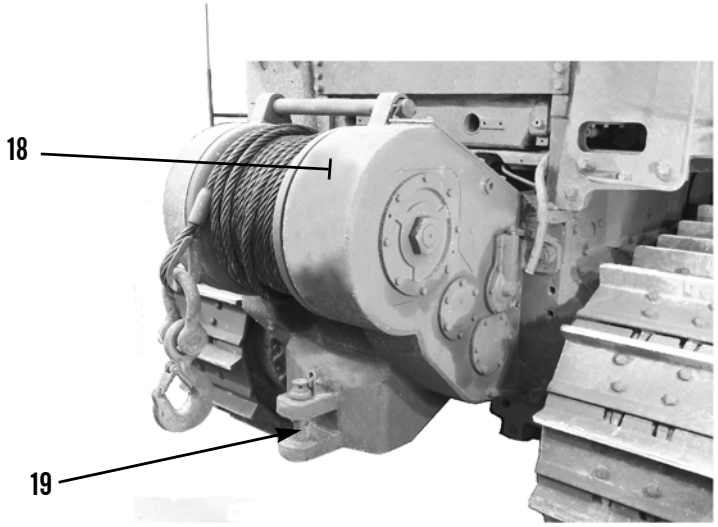
KEY	COMPONENT	DESCRIPTION
1	Front Flood Lights	Illuminate work area to front of machine.
2	Lift Cylinders	Raise or lower bulldozer blade. Located on both sides of machine.
3	Engine Air Precleaner	Prevents debris from entering engine air intake system.
4	Center Flood Lights	Illuminate track and rear of blade.
5	Grabhandles	Provide a handhold for personnel climbing on machine.
6	Fuel Tank	Stores fuel supply for engine operation.
7	Toolbox	Provides stowage for tools or other items required by operator.
8	Battery Box	Enclosure protects batteries from damage. Two batteries inside are easily accessible for servicing.
9	Tilt Cylinder	Used in conjunction with brace (on right side) to adjust angle of bulldozer blade.
10	SU Blade Assembly	Used for earthmoving operations or as a push block. Consists of moldboard, removable cutting edges and end bits, and blade pusharms that connect blade to the tractor. Reinforced plate in center of blade is used to push-assist scrapers. Back-rip scarifiers are attached to the back of the blade and can be lowered and locked in place with pins for scarifying. Blade assembly controls are operated from operator seat.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



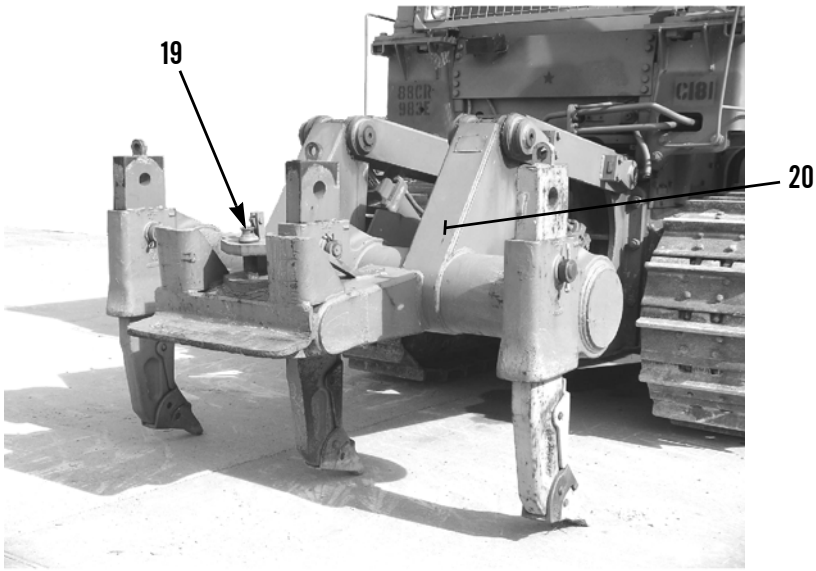
KEY	COMPONENT	DESCRIPTION
11	Rear Flood Lights	Illuminate work area at rear of machine.
12	ROPS	Provides rollover protection for operator.
13	Hydraulic Tank	Stores hydraulic oil used in machine hydraulic systems. Filler cap contains dipstick for oil level check.
14	Blade Tilt Brace	Allows for additional adjustment of blade tilt.
15	Tracks	Propel the tractor.
16	Final Drive	Provides power to the tracks.
17	Backup Alarm (If Equipped)	Alarm sounds when transmission is placed in reverse. Switch on back of alarm adjusts volume. Non-SLEP machines have no backup alarm.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



386-003

KEY	COMPONENT	DESCRIPTION
18	Winch	Driven by winch hydraulic pump mounted on engine auxiliary drive. Controls operated from operator seat.
19	Drawbar Pin	Used for towing compaction equipment, scrapers, etc.



386-719

KEY	COMPONENT	DESCRIPTION
20	Ripper	Rear-mounted implement with three shanks used to loosen soil or rip through hard compacted surfaces. Ripper controls are operated from operator seat.

EQUIPMENT DATA

Dimensions:

Length:	
With Ripper	287 in. (7.29 m)
With Winch	232 in. (5.89 m)
Width:	
With Dozer Blade	133 in. (3.38 m)
Without Dozer Blade	105 in. (2.67 m)
Ground Clearance	14.7 in. (37.34 cm)
Height	121 in. (3.10 m)

Weights:

With Fuel and Lubricants:	
With Winch and Dozer	49,400 lb (22,428 kg)
With Ripper and Dozer	54,220 lb (24,220 kg)

Capacities:

Engine Crankcase (With Filter)	29 qt (27.4 l)
Transmission, Bevel Gear and Steering Clutch Compartments	148 qt (140 l)
Fuel Tank	115 gal. (435.3 l)
Radiator	48 qt (45.4 l)
Final Drive (Each)	36 qt (34.1 l)
Hydraulic System	112 qt (106.0 l)
Hydraulic Tank	88 qt (83.2 l)
Winch	38 qt (36.0 l)

Speeds:

Forward:	
1st	0-2.2 mph (0-3.5 kph)
2nd	0-3.9 mph (0-6.3 kph)
3rd	0-5.9 mph (0-9.5 kph)
Reverse:	
1st	0-2.7 mph (0-4.3 kph)
2nd	0-4.7 mph (0-7.6 kph)
3rd	0-7.1 mph (0-11.4 kph)

Engine:

Manufacturer	Caterpillar Inc.
Type	turbocharged, 4-stroke cycle
Horsepower	208 @ 2,000 RPM
Engine RPM	2,100 (high idle); 670 (low idle)
Cylinders	6
Fuel System:	
Model D333 and Early Model 3306	precombustion chambers/glow plugs
Later Model 3306	direct injection

EQUIPMENT DATA - CONTINUED

Transmission:

Manufacturer	Caterpillar Inc.
Type	powershift, manual
Range Selection	neutral (N); 3 speeds forward and 3 speeds reverse

Steering and Brake System:

Steering Type	mechanically-operated clutches dual brake pedals
Brakes	band-type

Electrical System:

System Voltage	24 volts
Batteries:	
Quantity	2
Voltage	12 volts each
CCA	1200
Starter Rating	24 volts
Alternator Rating	24 volts, 50 amp

Winch:

Manufacturer	Hyster
Weight	3,080 lb (1,398 kg)
Power Source	hydraulic pump on engine auxiliary drive
Drum Size:	
Barrel Diameter	12 in. (30.5 cm)
Flange Diameter	22.5 in. (57.2 cm)
Barrel Length	12.37 in. (31.4 cm)
Wipe Rope	1-inch, 200 ft (61 m) long

Ripper:

Manufacturer	Caterpillar Inc.
Weight	7,515 lb (3,412 kg)
Number of Shanks	3

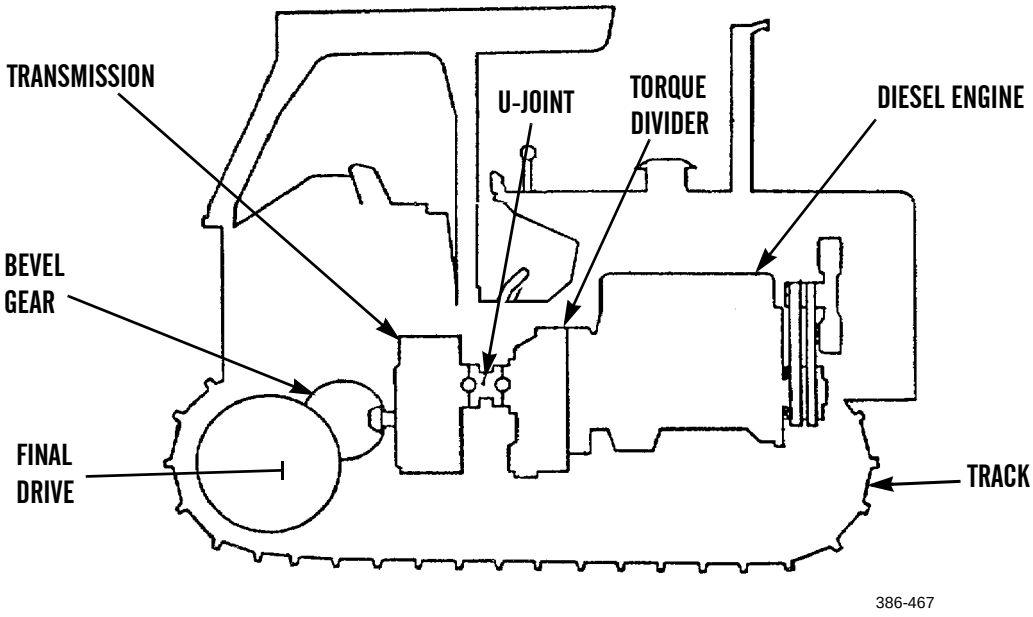
END OF WORK PACKAGE

THEORY OF OPERATION 0003 00

INTRODUCTION

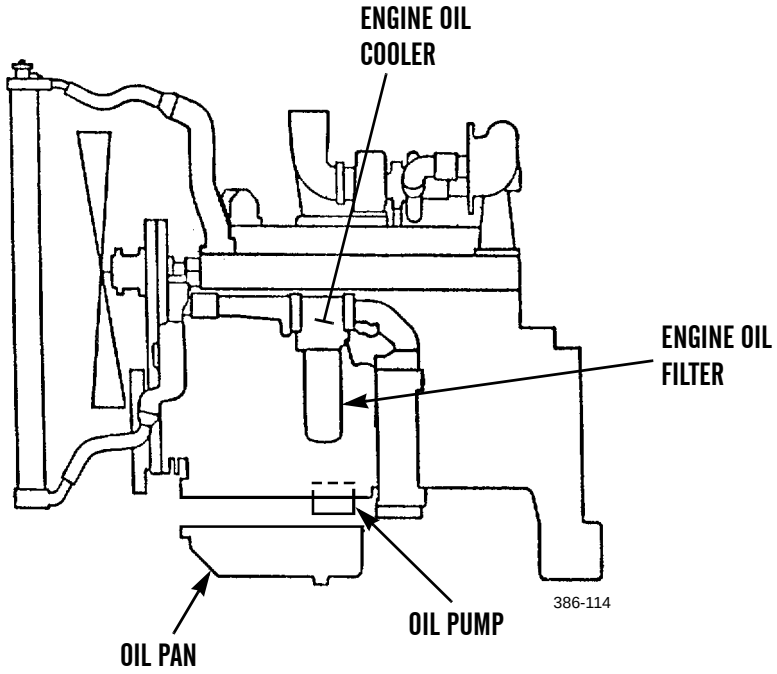
This work package explains how components of the D7F Tractor work together. A functional description of equipment operation is given for the power train, engine lubrication system, fuel system, engine cooling system, steering and brake system, electrical system, dozer hydraulic system, ripper hydraulic system and winch hydraulic system.

POWER TRAIN



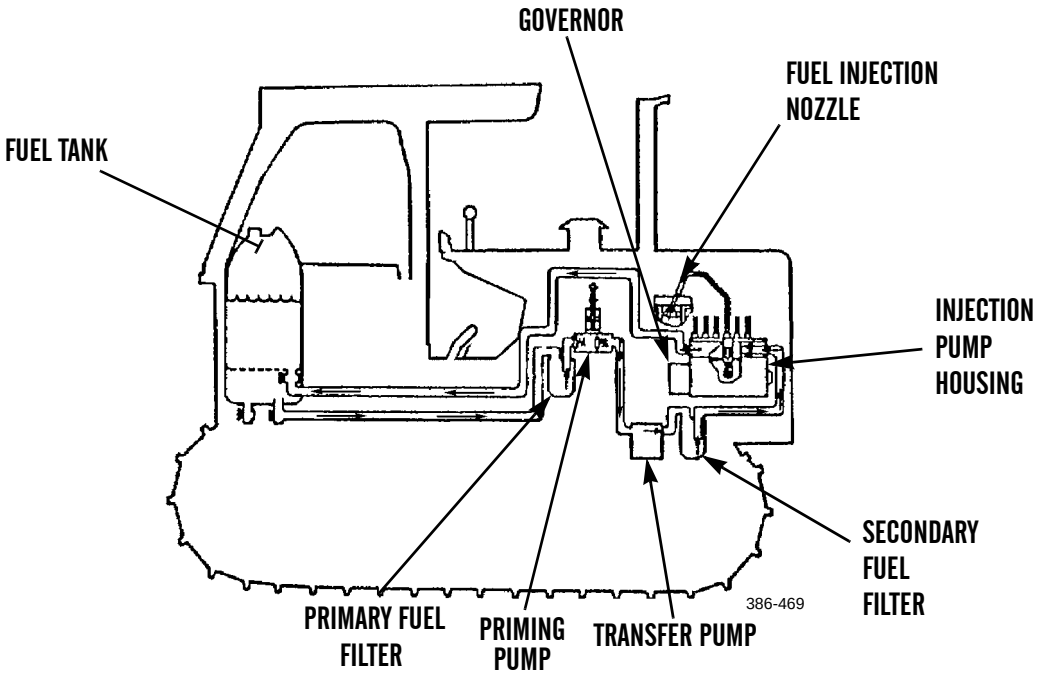
1. **Diesel Engine.** The tractor is powered by an in-line six cylinder diesel engine. SLEP engines have a direct injection fuel system. Non-SLEP engines use precombustion chambers/glow plugs.
2. **Torque Divider.** The torque divider connects the engine to the transmission. The torque divider will increase or decrease the torque from the engine depending on the load at which the tractor is working.
3. **U-Joint.** The U-joint transfers power from the torque divider to the transmission.
4. **Transmission.** The transmission controls the speed and direction of the tractor. At this point in the power train the operator can control the power by moving the transmission selector lever to neutral (N) or one of the three speeds in forward or reverse.
5. **Bevel Gear.** The bevel gear connects transmission to the final drives.
6. **Final Drive.** The final drive delivers the power of the power train to the sprocket on each side of the machine, which turns the track.
7. **Track.** The D7F has a steel roller-type track that is sealed and lubricated. Track tension may be adjusted by the operator.

ENGINE LUBRICATION SYSTEM



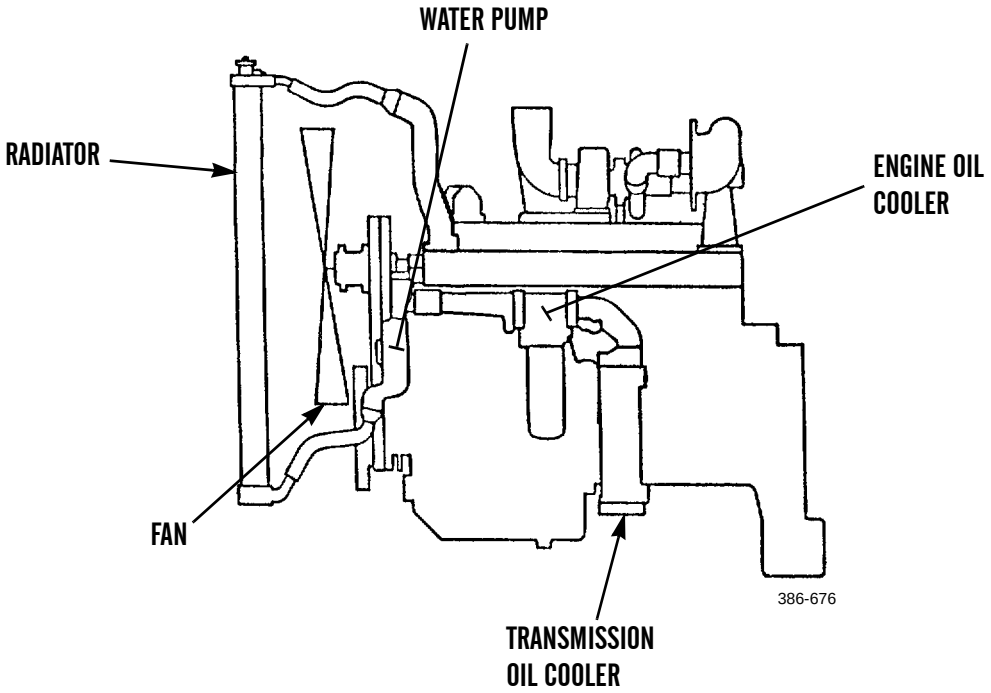
1. **Oil Pan.** The oil pan contains the oil that lubricates moving parts in the engine. It is attached to the bottom of the engine block.
2. **Oil Pump.** The pump is located just above the oil pan in the crankcase. The pump draws oil from the oil pan and sends it through the oil cooler, and then through the oil filter. From the filter the oil enters the cylinder block to lubricate the engine and is then returned to the oil pan. From the filter, oil is also sent through the turbocharger and then returned to the oil pan.
3. **Engine Oil Cooler.** Oil is sent through the oil cooler to lower its temperature.
4. **Engine Oil Filter.** The oil filter removes particles from the oil which could cause damage to the internal parts of the engine.

FUEL SYSTEM



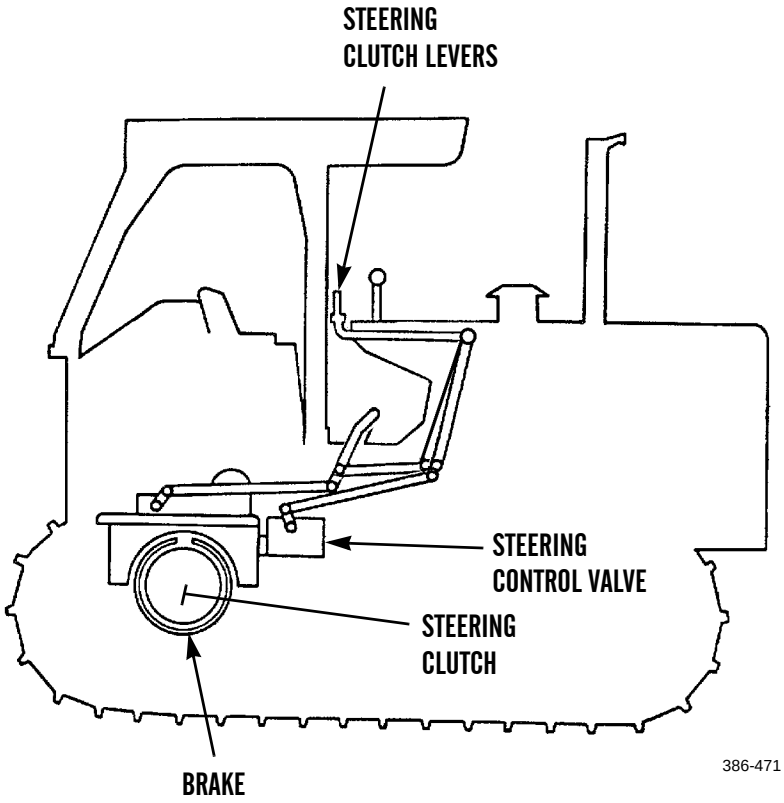
1. **Fuel Tank.** The fuel tank provides containment for the fuel. A fuel strainer and the fuel level gage are contained in the filler neck of the tank.
2. **Priming Pump.** Priming pump is used to prime the fuel system.
3. **Primary Fuel Filter.** The primary fuel filter removes larger particles from the fuel before it reaches the transfer pump.
4. **Transfer Pump.** The transfer pump pulls fuel from the fuel tank through the primary fuel filter, and pushes it onto the secondary filter and the injection pump.
5. **Secondary Fuel Filter.** The secondary fuel filter removes smaller particles from the fuel before it reaches the injection pump.
6. **Injection Pump Housing.** The injection pump housing contains six fuel injection pumps which send an exact amount of fuel to the injection nozzles.
7. **Fuel Injection Nozzle.** The nozzles turn the stream of fuel into a fine spray which permits good combustion in the cylinders. There is one nozzle for each cylinder.
8. **Governor.** The governor is attached to the fuel injection pump housing. It controls the amount of fuel needed by the engine to maintain a desired engine speed. The governor is controlled by the governor control lever in the operator station.

ENGINE COOLING SYSTEM



1. **Radiator.** The radiator has a filler cap which permits adding coolant to the system. Coolant circulates through the radiator to be cooled after leaving the cylinder block.
2. **Water Pump.** The water pump draws coolant from the radiator and sends it through the engine oil cooler, and then through the transmission oil cooler. From the transmission oil cooler, coolant enters the cylinder block to cool the engine and then returns to the radiator.
3. **Engine Oil Cooler.** Coolant passes through water passages and cools the oil going through the oil passages of the cooler.
4. **Transmission Oil Cooler.** Coolant passes through the water passages and cools the oil going through the oil passages of the cooler.
5. **Fan.** The fan is powered by the engine. It helps lower the temperature of the coolant as it passes through the radiator.

STEERING AND BRAKE SYSTEM



1. **Steering Clutch Levers.** Levers serve as mechanical linkage to the steering control valve.
2. **Steering Control Valve.** The valve is connected mechanically to the steering clutch levers. The valve directs the flow of pressurized oil in response to the movement of the levers.
3. **Steering Clutch.** There is one steering clutch for each track. They control the steering of the tractor. Mechanically operated, each steering clutch is controlled by the steering clutch lever in the operator's station. When turning left, the left clutch is released which causes the left track to stop moving and act as a pivot for the tractor to turn on. The same thing happens when turning right.
4. **Brakes.** The tractor has two band-type brakes (one on each steering clutch drum) which are used to stop the movement of the tractor and to assist with the steering of the tractor. When the steering clutch levers are pulled completely out or the brake pedals are depressed, the bands tighten around the steering clutch drums.

ELECTRICAL SYSTEM

1. **Batteries.** The batteries provide power for three circuits; the charging circuit, the starting circuit and the lighting (low amperage) circuit. Two 12-volt batteries are connected in series to provide 24-volt, 1200 CCA starting power.
2. **Alternator.** The 24-volt, 50-amp alternator, an integral part of the charging circuit, provides current when the engine is running.
3. **Starting Motor.** Part of the starting circuit, the starting motor is used to turn the engine flywheel in order to start the engine.

ELECTRICAL SYSTEM - CONTINUED

4. **Circuit Breaker.** A switch that opens the battery circuit if the current in the electrical system exceeds the switch rating. When the circuit is open, no current will flow through the electrical system.
5. **Battery Disconnect Switch.** A switch that is controlled by the operator. When it is in the OFF position, the battery circuit will be open so that no current is flowing through the electrical system.
6. **NATO Slave Receptacle.** Used by operator or maintenance personnel to slave start tractor.

MACHINE HYDRAULIC SYSTEM

1. **Blade Control Valve.** This valve is connected mechanically to the blade control lever. The valve directs the flow of pressurized oil in response to the movement of the control lever. The valve is located inside the hydraulic tank.
2. **Tilt Cylinder.** This cylinder is on the left side of the machine. It is controlled by the blade control lever. When the lever is moved to the right, pressurized oil from the hydraulic tank causes the cylinder to extend. Moving the lever to the left causes the cylinder to retract.
3. **Lift Cylinders.** These are two cylinders which are controlled by the blade control lever. When the lever is pushed forward, pressurized oil causes the cylinders to extend and lower the blade. When the lever is pulled back, the cylinders retract and raise the blade.
4. **Hydraulic Tank.** Oil reservoir contains the oil used in machine hydraulic operations.

RIPPER HYDRAULIC SYSTEM

1. **Ripper Control Valve.** This valve is located inside the hydraulic tank and is connected mechanically to the ripper control lever. This valve directs the flow of pressurized oil to the cylinders in response to the movement of the ripper control lever.
2. **Lift Cylinders.** These are two cylinders which are controlled by the ripper control lever. When the lever is moved to the left, pressurized oil causes the cylinders to extend and lift the ripper. When the lever is moved to the right, the cylinders retract and lower the ripper.
3. **Hydraulic Tank.** Oil to control ripper movement is stored in the same hydraulic tank as the machine's hydraulic system.

WINCH HYDRAULIC SYSTEM

1. **Reservoir.** The reservoir is integral to the winch. It contains oil which is used for winch lubrication and hydraulic control system.
2. **Pump.** The pump is driven directly off the engine, and is responsible for the circulation of the oil. The pump is located under the floor plates in the operator station, on the right side.
3. **Magnetic Strainer.** Oil is pulled from the reservoir and goes through the strainer before it enters the lubrication system and the hydraulic control system. The strainer removes harmful large metallic particles from the oil, which could cause damage to the systems.
4. **Filter.** Removes smaller harmful particles from the oil before the oil returns to the reservoir.
5. **Control Valve.** This valve responds to the winch selector lever. When you move the lever, the valve sends pressurized oil to engage or disengage directional clutches, which permit the drum to turn.
6. **Drum.** The gears which turn the drum are powered by the transmission. The direction the drum turns is controlled by moving the winch selector lever.

END OF WORK PACKAGE

CHAPTER 2
OPERATING INSTRUCTIONS

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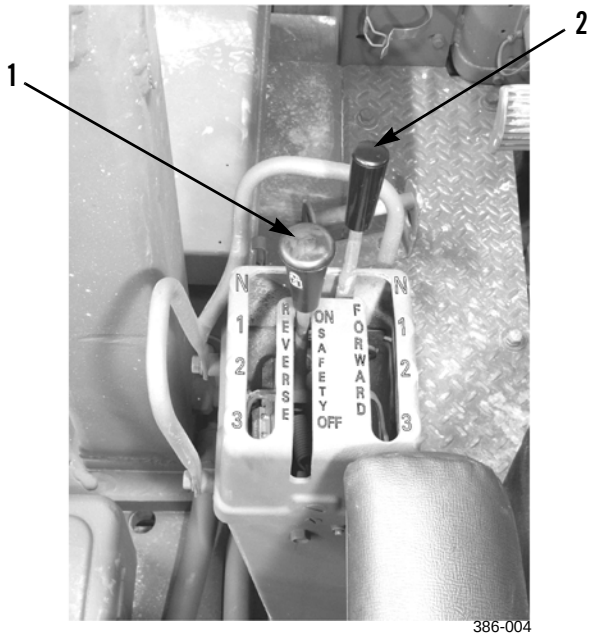
DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS 0004 00

GENERAL

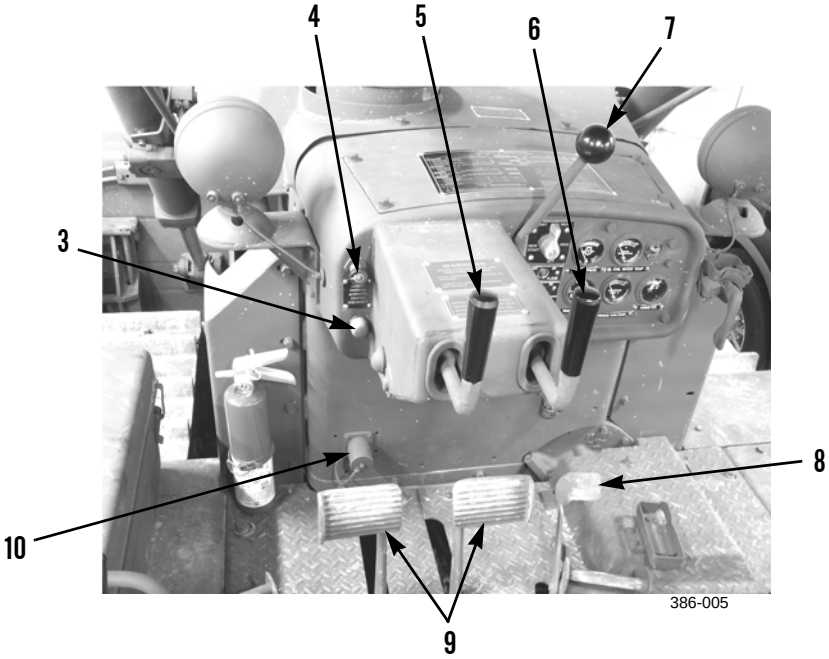
Before operating the D7F Tractor, read and become familiar with the location and function of all operator controls and indicators, as described in this work package.

CONTROLS AND INDICATORS



KEY	CONTROL OR INDICATOR	FUNCTION
1	Transmission Safety Lock Lever	Prevents accidental engagement of transmission. Locks transmission in neutral (N) when in ON (forward) position. When in OFF (rearward) position, transmission selector lever can be moved out of neutral (N).
2	Transmission Selector Lever	Selects neutral (N) and three forward (1, 2 and 3) and three (1,2 and 3) reverse transmission gear ranges. Backup alarm, located behind fuel tank, sounds when transmission is placed in reverse.

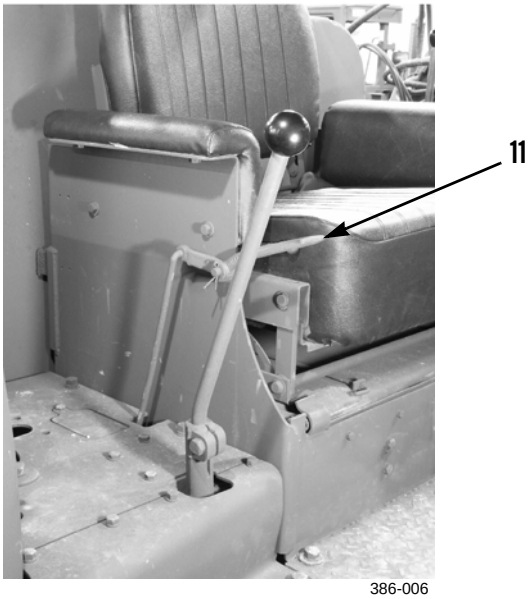
CONTROLS AND INDICATORS - CONTINUED



KEY	CONTROL OR INDICATOR	FUNCTION
3	Manual Override Switch	NOTE Automatic disconnect system cuts off current to starter to prevent inadvertent re-engagement of starter after engine has started and oil pressure is building up. Press switch to by-pass automatic disconnect system during engine cranking in temperatures below 32° F (0° C).
4	Ether Starting Aid Switch	Push down on switch and hold for 2-3 seconds. When switch is released, ether is injected into intake manifold. If engine does not start, wait 2-3 seconds before pressing switch again.
5	Left Steering Clutch Lever	Pull lever back to disengage left steering clutch and turn left. Release lever to engage left steering clutch. To make a sharp turn to the left, pull lever back while applying left brake pedal.
6	Right Steering Clutch Lever	Pull lever back to disengage right steering clutch and turn right. Release lever to engage right steering clutch. To make a sharp turn to the right, pull lever back while applying right brake pedal.

CONTROLS AND INDICATORS - CONTINUED

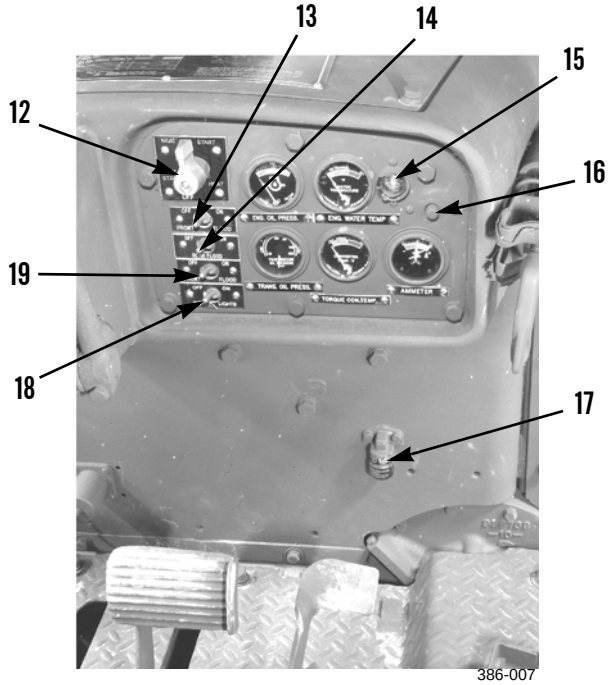
KEY	CONTROL OR INDICATOR	FUNCTION
7	Governor Control Lever	Lever controls engine RPM. Pull lever toward you to increase RPM, and push away to decrease RPM. When starting engine, pull lever all the way back, then push forward to 1/3 throttle position. To stop engine, push lever all the way forward past detent.
8	Decelerator Pedal	Depress pedal to reduce engine speed without changing governor control lever setting. Release pedal to allow engine speed to return to governor control lever setting.
9	Brake Pedals	Depress both pedals to apply brakes. Release both pedals to release brakes. When used in conjunction with left or right steering clutch lever, pressing left or right brake pedal turns machine sharply left or right.
10	NATO Slave Receptacle	Provides connection point for NATO slave cable to slave-start tractor.



386-006

KEY	CONTROL OR INDICATOR	FUNCTION
11	Brake Lock Lever	Serves as parking brake. To engage, depress both brake pedals push down on lever and hold, then release both brake pedals. To disengage, depress both brake pedals.

CONTROLS AND INDICATORS - CONTINUED

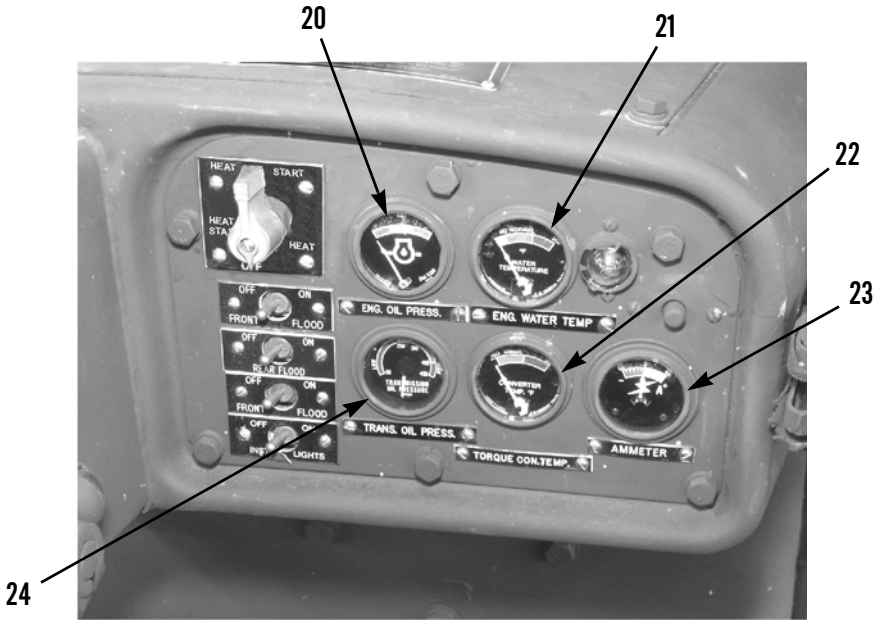


KEY	CONTROL OR INDICATOR	FUNCTION
12	Heat Start Switch	Three-position spring-loaded switch is used to start engine and energize ether starting aid system (or glow plugs, if equipped). Positions are START (HEAT START on data plate), OFF and HEAT.
		(a) To start engine, depress and turn switch to START. Release switch when engine starts.
		(b) If temperatures are below 32°F (0°C) depress and turn switch to START while, at the same time, depressing ether starting aid switch for 2-3 seconds. Release switch when engine starts.
		(c) If temperatures are below 60°F (16°C) for older engines with glow plugs, depress and turn switch to HEAT. After appropriate time interval (WP 0005 00, *Start Engine*), turn switch to START to start engine. Release switch when engine starts.
13	Front Flood Lights Switch	Toggle switch controls front flood lights. Flip switch right to ON, left to OFF.
14	Rear Flood Lights Switch	Toggle switch controls rear flood lights. Flip switch right to ON, left to OFF.

CONTROLS AND INDICATORS - CONTINUED

KEY	CONTROL OR INDICATOR	FUNCTION
15	Engine Coolant Temperature Warning Light	Illuminates to warn operator that coolant temperature in engine is too high.
16	Circuit Breaker Reset Switch	Press switch to reset circuit breaker that protects dash panel circuits.
17	Air Cleaner Service Indicator	Indicates air cleaner airflow is adequate if yellow band is in green zone on gage. If restricted, yellow band will rise to red area on gage. After air cleaner is serviced, press reset button at bottom of gage before resuming operation.
18	Dash Lights Switch	Toggle switch controls both dash panel lights, one light on each side of steering clutch control lever console. Flip switch right to ON, left to OFF.
19	Center Flood Lights Switch	Toggle switch controls center flood lights. Flip switch right to ON, left to OFF.

CONTROLS AND INDICATORS - CONTINUED



386-026

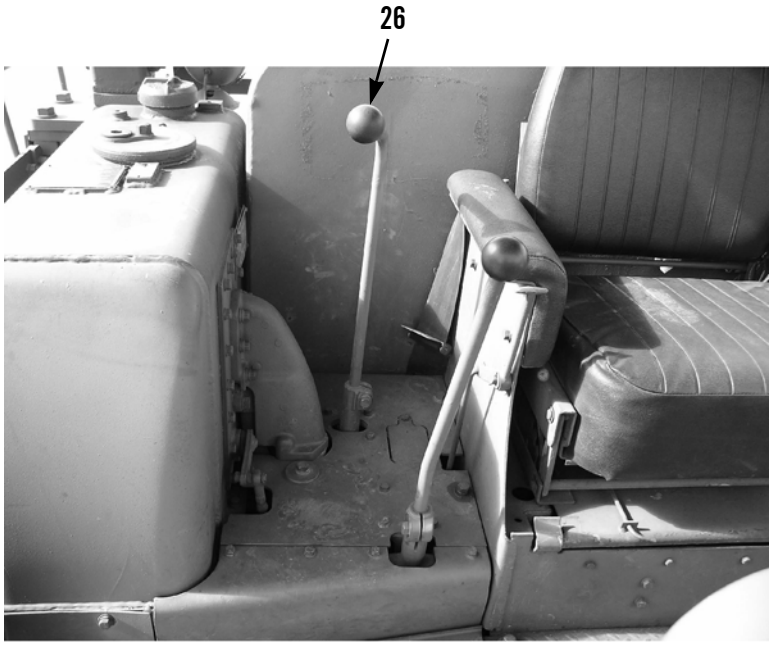
KEY	CONTROL OR INDICATOR	FUNCTION
20	Engine Oil Pressure Gage	Indicates pressure in engine oil lubrication system when engine is running. Normal range at low idle is 38-58 psi (262-400 kPa). Minimum allowable pressure is 20 psi (138 kPa).
21	Engine Water Temperature Gage	Indicates temperature of engine coolant. Normal operating range is in GREEN zone on gage. If gage indicates in RED zone, stop engine and troubleshoot.
22	Torque Converter Temperature Gage	Indicates temperature of torque converter oil. Normal range is indicated by GREEN zone on gage, 150-250°F (66-121°C). If temperature exceeds normal range, reduce load on machine. If needle stays in elevated RED zone on gage, stop engine and notify Unit Maintenance.
23	Ammeter	Indicates rate of battery charge or discharge in volts: • Pointer in GREEN zone on gage shows normal battery condition. • Pointer in upper RED zone indicates overcharge condition. • Pointer in lower RED zone indicates undercharge condition. When ammeter shows either an undercharged or overcharged condition for extended period, notify Unit Maintenance.
24	Transmission Oil Pressure Gage	Normal range is indicated by GREEN zone on gage. If needle is in RED zone on gage, shut down engine and notify Unit Maintenance.

CONTROLS AND INDICATORS - CONTINUED

386-006

KEY	CONTROL OR INDICATOR	FUNCTION
25	Blade Control Lever	(a) Lever controls bulldozer blade raising, lowering and tilting. (b) Raising and lowering functions: • Pull lever all the way back to RAISE blade. • Center HOLD position holds blade in position. • Push lever all the way forward to LOWER. • To allow blade to float (follow surface contour without using pressure), push lever all the way forward past LOWER position to detented FLOAT position. (c) Tilting functions: • Move lever all the way left to lower left side of blade. • Move lever all the way right to lower right side of blade. • Move lever to middle position to HOLD tilt position. (d) When hydraulic lift and tilt cylinders have reached the limit of their stroke, return blade control lever to HOLD.

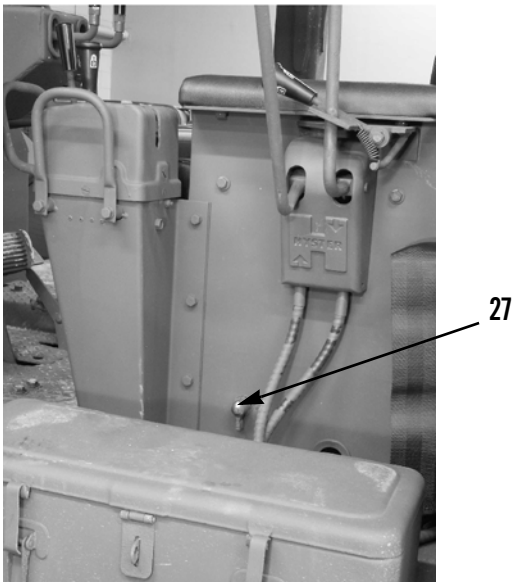
CONTROLS AND INDICATORS - CONTINUED



386-720

KEY	CONTROL OR INDICATOR	FUNCTION
26	Ripper Control Lever (If Equipped)	Three-position lever controls position of rear-mounted ripper. Positions are: • Pull lever all the way toward operator (to the left) to RAISE. • Center HOLD position holds ripper in position. • Push lever all the way away from operator (to the right) to LOWER.

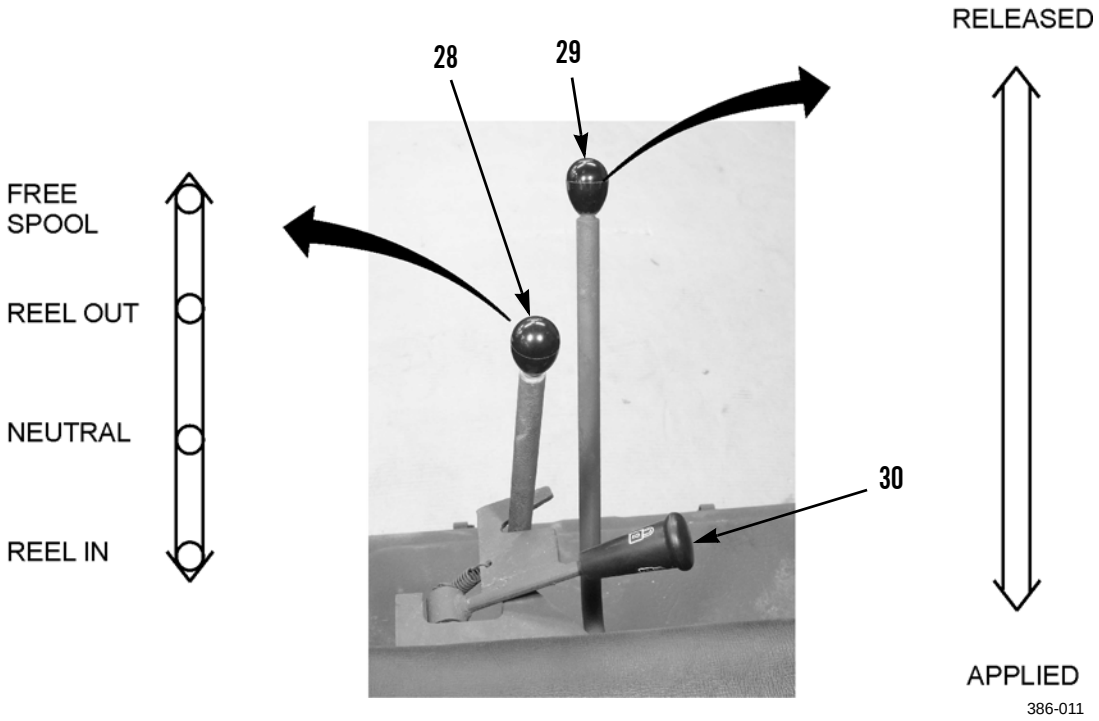
CONTROLS AND INDICATORS - CONTINUED



386-010

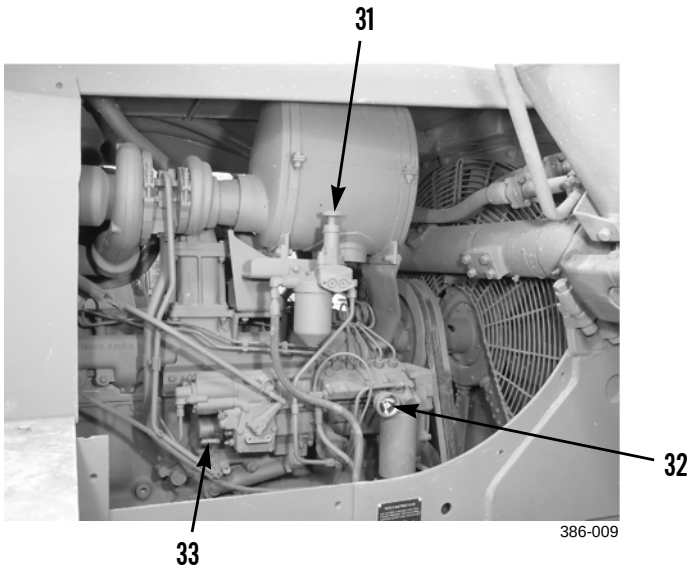
KEY	CONTROL OR INDICATOR	FUNCTION
27	Battery Disconnect Switch	Cuts off battery power from machine electrical systems. From operator seat, switch is OFF with pointer at 12 o'clock. Turn pointer toward rear of machine (2 o'clock) to turn switch ON.

CONTROLS AND INDICATORS - CONTINUED



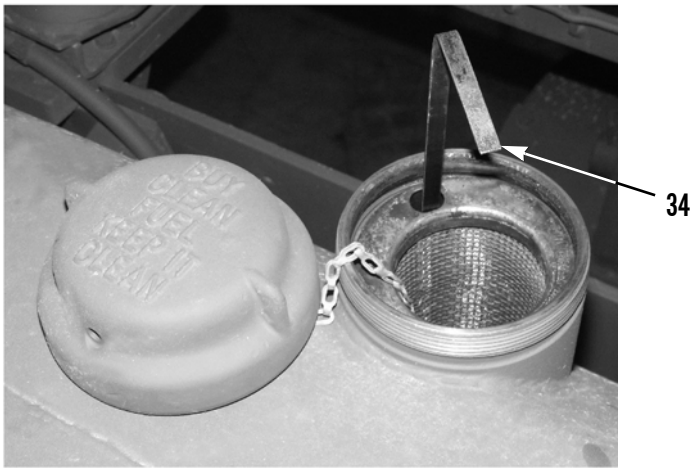
KEY	CONTROL OR INDICATOR	FUNCTION
28	Winch Selector Lever (If Equipped)	Four position lever (with three detents) controls winch: • Pull lever toward operator and hold lever to REEL IN cable. • To automatically apply brake, push lever away from operator to first detent NEUTRAL position (fully vertical). In NEUTRAL, winch selector lever can be locked by safety lever (30). • Push lever away from operator, to third detent, FREE SPOOL position, to release cable as required. Vary cable speed by throttling engine.
29	Winch Brake Lever (If Equipped)	Operate lever to winch a load. Pull lever toward operator to APPLIED position. Push lever away from operator to RELEASED position.
30	Safety Lever (If Equipped)	Locks winch selector lever, when winch selector lever is in NEUTRAL. Pull lever back to unlock winch selector lever. Push lever forward to lock winch selector lever.

CONTROLS AND INDICATORS - CONTINUED



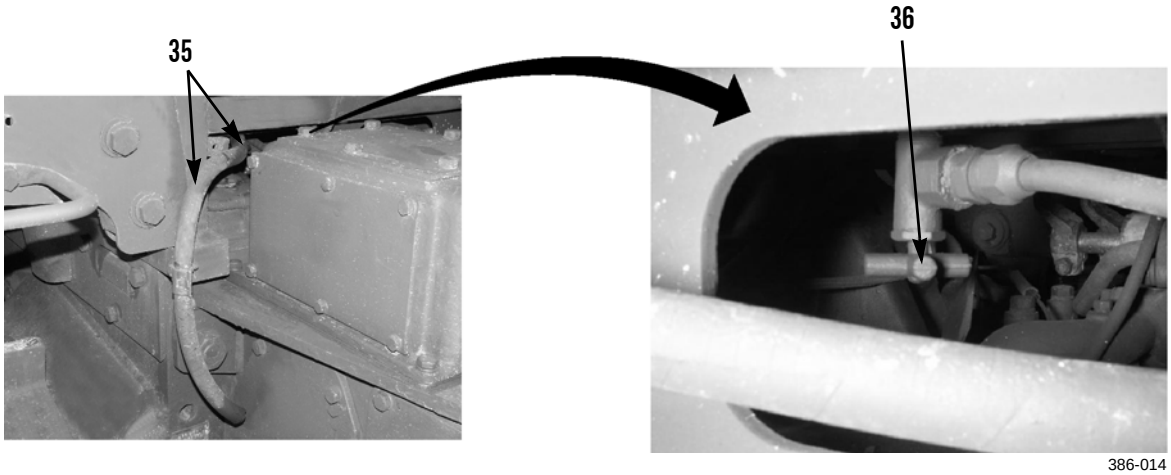
KEY	CONTROL OR INDICATOR	FUNCTION
31	Fuel Priming Pump Plunger	Located on right side of engine. Allows fuel system priming in the event engine fails to start. Rotate to the left to open pump. Operate plunger until a strong pressure is felt. Tighten securely all the way to the right after use.
32	Fuel Pressure Gage	Normal range is in GREEN zone on gage. When gage needle is in RED zone, fuel filter service is required.
33	Hourmeter	Used by maintenance personnel to schedule maintenance services based on hours of operation.

CONTROLS AND INDICATORS - CONTINUED



386-014

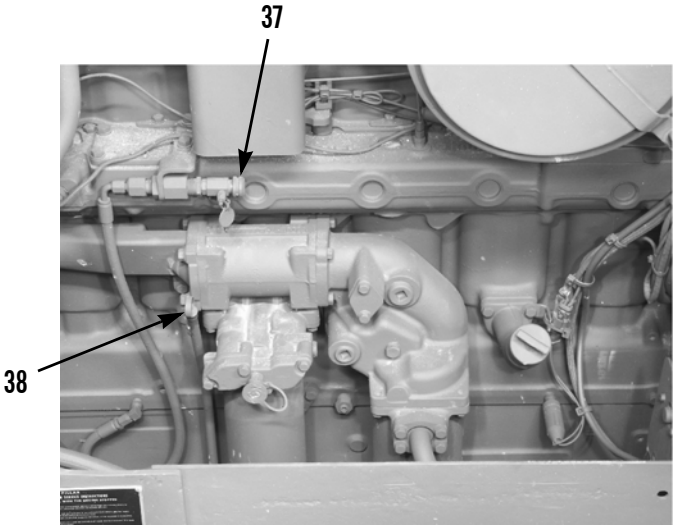
KEY	CONTROL OR INDICATOR	FUNCTION
34	Fuel Level Dipstick	Indicates level of fuel in tank. Markings on dipstick are: FULL, 1/4, 1/2 and 3/4.



386-014

KEY	CONTROL OR INDICATOR	FUNCTION
35	Fuel Tank Drain Valve and Hose	Use valve to drain water and sediment from fuel tank. Located on left side of fuel tank. Turn valve to the left to open and to the right to close.
36	Fuel Shutoff Valve	Turn valve to the right to OFF position to shut off fuel supply from fuel tank to rest of fuel system. Valve is normally turned left to ON.

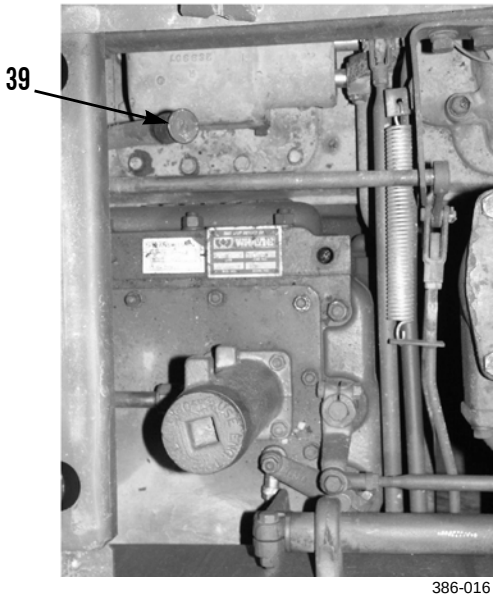
CONTROLS AND INDICATORS - CONTINUED



386-013

KEY	CONTROL OR INDICATOR	FUNCTION
37	Engine Oil Sampling Valve	Used by Unit Maintenance to obtain engine oil sample.
38	Engine Oil Level Dipstick	Indicates level of oil in engine crankcase: (a) With engine shut down and cold (COLD CHECK), level should be within cross-hatched area on side of dipstick labeled SAFE STARTING RANGE WITH ENGINE STOPPED AND OIL COLD. (b) With engine at low idle and warm (HOT CHECK), level should be at FULL mark on side of dipstick labeled ENGINE RUNNING AT LOW IDLE WITH OIL WARM.

CONTROLS AND INDICATORS - CONTINUED



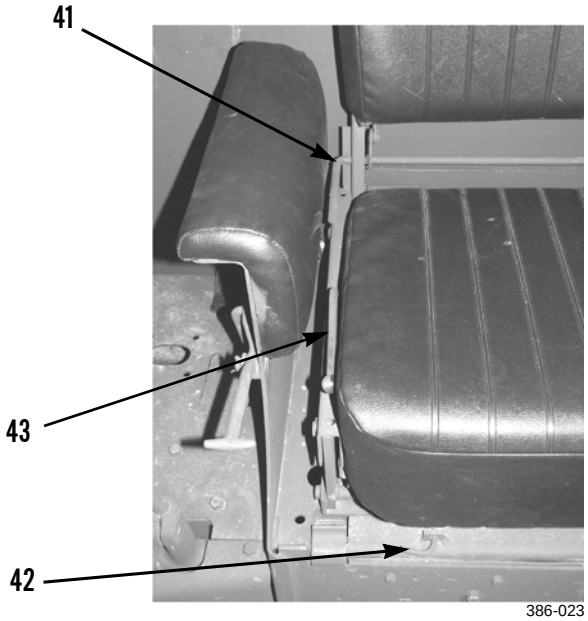
386-016

KEY	CONTROL OR INDICATOR	FUNCTION
39	Transmission Oil Level Dipstick	Accessible under seat. Indicates level of oil in transmission. With engine at low idle and transmission in neutral (N) and warm, level should be at FULL mark on dipstick. For cold check, level must be above ADD mark on dipstick.

386-012

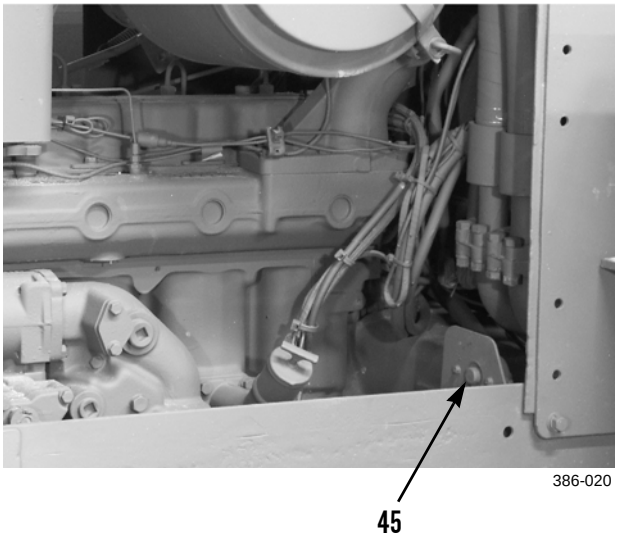
KEY	CONTROL OR INDICATOR	FUNCTION
40	Hydraulic Tank Oil Level Dipstick	Indicates level of oil in hydraulic tank. With all machine implements fully lowered, level of oil should be at FULL mark on dipstick. Add oil if level falls below ADD mark on dipstick.

CONTROLS AND INDICATORS - CONTINUED



KEY	CONTROL OR INDICATOR	FUNCTION
41	Seat Back Adjustment Lever	Two-position lever adjusts height of seat back. To raise seat back height, place lever in downward horizontal position. To lower seat back height, pull lever up to vertical position.
42	Seat Release Lever	Pull out on lever to tip seat forward for access to transmission and other components under seat.
43	Seat Adjustment Lever	Two-position lever. To adjust seat, pull up on lever and move seat forward and up or rearward and down. Push down on lever to lock seat in desired position.

CONTROLS AND INDICATORS - CONTINUED



KEY	CONTROL OR INDICATOR	FUNCTION
44	Blade Tilt Brace Adjusting Bar	Used to adjust length of tilt brace.
45	Circuit Breaker Reset Switch	Press switch to reset circuit breaker that protects starting and charging circuits.

END OF WORK PACKAGE

OPERATION UNDER USUAL CONDITIONS 0005 00

GENERAL

WARNING

Your hearing can be permanently damaged if you are exposed to constant high noise levels of 85 DB or greater. Hearing protection is required when operating machine or when working on machine while it is operating. Failure to wear hearing protection may result in hearing loss.

1. This work package contains instructions for safely operating the D7F Tractor under usual conditions. Unusual conditions are defined and described in WP 0006 00.
2. Refer to WP 0004 00 for the location and function of all controls and indicators required for machine operation.

INITIAL ADJUSTMENTS AND DAILY CHECKS

1. Perform *Before* operation Preventive Maintenance Checks and Services (PMCS) (WP 0012 00).

WARNING

Use caution and maintain three-point contact at all times when mounting machine, to avoid injury or death.

2. Face machine to mount, use grabhandles and maintain three-point contact at all times.
3. Occupy seat. Adjust seat if necessary.

WARNING

Use of seat belt while operating machine is mandatory. Fasten belt BEFORE operating machine. Trying to fasten seat belt during operation creates a hazardous condition. Failure to follow this warning may result in injury or death.

4. Fasten seat belt. Adjust as needed so that belt is snug across lap with buckle in the center.

START ENGINE


WARNING


- **DO NOT start tractor engine in enclosed areas without adequate ventilation. Failure to follow this warning may result in permanent brain damage or death due to carbon monoxide poisoning.**
- **Your hearing can be permanently damaged if you are exposed to constant high noise levels of 85 DB or greater. Hearing protection is required when operating machine or when working on machine while it is operating. Failure to wear hearing protection may result in hearing loss.**

NOTE

- **Follow this procedure to start engine at any temperature.**
- **Tractors with ether starting aid system use ether to start engines at temperatures below 32°F (0°C).**
- **If your tractor is equipped with glow plugs, use glow plugs to preheat precombustion chambers at temperatures from 60°F (16°C) to 0°F (-18°C).**
- **Before attempting to start engine in extreme cold, refer to instructions in WP 0006 00 to prepare tractor for operation in extreme cold.**

1. Ensure brake lock lever is engaged.
2. Ensure transmission is in neutral (N) with safety lock lever in ON position.
3. Ensure all implements are lowered and control levers are in HOLD.
4. Ensure all accessories are off.
5. Turn battery disconnect switch to ON.
6. Pull governor control lever all the way back past detent position, then push forward to 1/3 throttle position.

NOTE

Perform steps 7 and 8 if machine is equipped with a D333 or early model 3306 engine that has glow plugs.

7. If temperature is below 60°F (16°C), push in and turn heat start switch to HEAT, for time specified below:
   a. From 32-60°F (0-16°C), place heat start switch to HEAT for one (1) minute.
   b. From 0-32°F (-18-16°C), place heat start switch to HEAT for two (2) minutes.
   c. Below 0°F (-18°C), place heat start switch to HEAT for three (3) minutes.
8. Release heat start switch when preheat time has elapsed.

NOTE

Perform step 9 if machine is equipped with a later model 3306 engine with an ether starting aid system.

9. If temperature is 32°F (0°C) or below, push in and turn heat start switch to START (HEAT START on data plate). Hold switch in START position while at the same time injecting ether with ether starting aid switch. Push ether starting aid switch for 2-3 seconds, then release. Proceed to step 10.

START ENGINE - CONTINUED

CAUTION

- **DO NOT operate starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or early starter failure.**
- **Engine MUST have adequate oil pressure within 15 seconds after starting. DO NOT leave engine on if oil pressure is not indicated on gage after 15 seconds. Damage to engine will result.**

10. Crank engine as follows:
    a. Push in and turn heat start switch to START and crank engine:
    b. Press manual override switch to by-pass automatic disconnect system, if temperature is below 32° F (0°C).

NOTE

If temperature is <u>below</u> 60°F (16°C) and your engine is equipped with glow plugs, return heat start switch to HEAT until engine runs smoothly. As soon as engine is running smoothly, release heat start switch.

    c. Release heat start switch and manual override switch as soon as engine starts.
    d. Run engine at low idle after initial start to allow lubrication to reach turbocharger.
11. If engine fails to start, perform the following:
    a. If engine is equipped with glow plugs and does not start, return heat start switch to HEAT for 30 seconds, then attempt to start engine again.
    b. If engine is equipped with ether starting aid system and does not start, push ether starting aid switch for 2-3 seconds, then release for 2-3 seconds, at the same time engine is cranked. Continue to use ether at 2-3 second intervals during cranking, until engine starts and is running smoothly.

CAUTION

DO NOT operate starter motor for more than 30 seconds at a time. After 30 seconds, allow starter motor to cool for at least two minutes before attempting to start engine again. Excessive heating of starter motor may result in damage or early starter failure.

12. If engine still does not start, continue to crank engine at the following intervals:
    a. Wait for two (2) minutes.
    b. Repeat 30-second starting cycles, with 2-minute waits in between cycles, for a total of six (6) more times.
    c. If engine still fails to start, wait for 30 minutes.
    d. Repeat 30-second starting cycles, with 2-minute waits, four (4) more times.
    e. If needed, wait another 30 minutes, then repeat four (4) additional 30-second starting cycles.

CAUTION

Limit idling time. Excessive idling can cause carbon buildup and damage to engine.

13. Before applying load, warm up engine for at least five (5) minutes with governor control lever at 1/4- to 1/2-speed position.
14. Check gages and instruments to ensure they register in normal operating range.

OPERATE TRACTOR

WARNING

- **BE ALERT for personnel in area while operating machine. Always check to ensure area is clear of personnel and obstructions before moving out. Failure to follow this warning may result in injury or death.**
- **DO NOT allow riders on machine. Failure to follow this warning may result in injury or death.**

CAUTION

If at any time an abnormal gage reading is noted or engine coolant temperature warning light comes on, adjust load on machine until reading on gage has returned to safe operating range. If gage does not return to a safe operating range, shut down and investigate cause.

1. Move governor control lever to position that will provide desired engine speed.
2. Disengage brake lock lever by depressing both brake pedals.
3. Use appropriate control lever(s) to raise implement(s) off ground.
4. Move transmission safety lock lever to OFF.

WARNING

Keep tractor under control at all times. DO NOT put transmission selector lever in neutral (N) and allow tractor to coast downhill. Select gear range necessary BEFORE starting downgrade. DO NOT change gears while going downhill. Failure to follow this warning may result in loss of machine control, resulting in injury or death.

5. Move transmission selector lever to desired direction and speed.

NOTE

DO NOT use brake pedals as foot rests.

6. Slowly release both brake pedals and move tractor.

NOTE

- **Steering operation depends on whether tractor is pushing a load or a load is pushing tractor.**
- **Perform step 7 to steer on level ground or downhill, when tractor is pushing load.**
- **Perform step 8 to steer on a moderate downgrade, when load is pushing tractor.**

7. To steer when tractor is pushing load:
   a. Gradual LEFT turn: pull left steering clutch lever back to disengage left steering clutch.
   b. Sharp LEFT turn: pull left steering clutch lever all the way back to disengage left steering clutch. Depress left brake pedal.
   c. Gradual RIGHT turn: pull right steering clutch lever back to disengage right steering clutch.
   d. Sharp RIGHT turn: pull right steering clutch lever all the way back to disengage right steering clutch. Depress right brake pedal.

OPERATE TRACTOR - CONTINUED

WARNING

DO NOT turn on a steep downgrade. Machine could roll over, causing injury or death.

8. To steer on a moderate downgrade, when load is pushing tractor:
   a. Gradual LEFT turn: pull right steering clutch lever back to disengage right steering clutch.
   b. Sharp LEFT turn: pull left steering clutch lever all the way back while simultaneously depressing left brake pedal.
   c. Gradual RIGHT turn: pull left steering clutch lever back to disengage left steering clutch.
   d. Sharp RIGHT turn: pull right steering clutch lever all the way back while simultaneously depressing right brake pedal.
   e. If engine starts to overspeed when going downhill, depress both brake pedals.
9. To slow down, use decelerator pedal to reduce engine speed without disturbing governor control lever setting.
10. To stop tractor, decelerate and depress both brake pedals.
11. To make gear and directional shifts:

CAUTION

Gear and directional shifts at full engine speed are permissible. However, for maximum service life of power train components, decelerating and/or braking are recommended.

   a. Decrease engine speed by depressing decelerator pedal or pushing in on governor control lever.
   b. Depress both brake pedals.
   c. Make direction and gear selection with transmission selector lever.
   d. Release brake pedals.
   e. Increase engine speed by releasing decelerator pedal or pulling out on governor control lever.
12. When tractor is stopped with engine running, move transmission selector lever to neutral (N) and transmission safety lock lever to ON position. This will prevent accidental engagement of transmission.

OPERATE BULLDOZER BLADE

1. **General Information.**

   a. Ensure that machine is fully warmed up before operating bulldozer blade.

   b. To raise and lower bulldozer blade, operate blade control lever as follows:

      (1) Pull lever all the way back to RAISE blade.

      (2) Push lever all the way forward to LOWER blade.

      (3) Center HOLD position holds blade in position.

      (4) To allow blade to float (follow surface contour without applying pressure), push lever all the way forward past LOWER to detented FLOAT position.

CAUTION

When control lever is returned to HOLD position, oil stops bypassing valves, thereby reducing oil heat and valve wear. Be sure to return lever to HOLD, when lift cylinders have reached limit of their stroke, to prevent damage to control valve.

      (5) When lift cylinders have reached limit of their stroke (either raised or lowered), return lever to HOLD position.

   c. To tilt bulldozer blade, operate blade control lever as follows:

      (1) Move lever all the way left to lower left side of blade.

      (2) Move lever all the way right to lower right side of blade.

      (3) Move lever to middle position to HOLD tilt position.

CAUTION

When control lever is returned to HOLD position, oil stops bypassing valves, thereby reducing oil heat and valve wear. Be sure to return lever to HOLD position, when tilt cylinder has reached limit of its stroke, to prevent damage to control valve.

      (4) When tilt cylinder has reached limit of its stroke, return lever to HOLD position.

      (5) If additional tilt in blade is needed, perform *Bulldozer Blade Adjustment* as described below.

2. **Bulldozer Blade Adjustment.**

NOTE

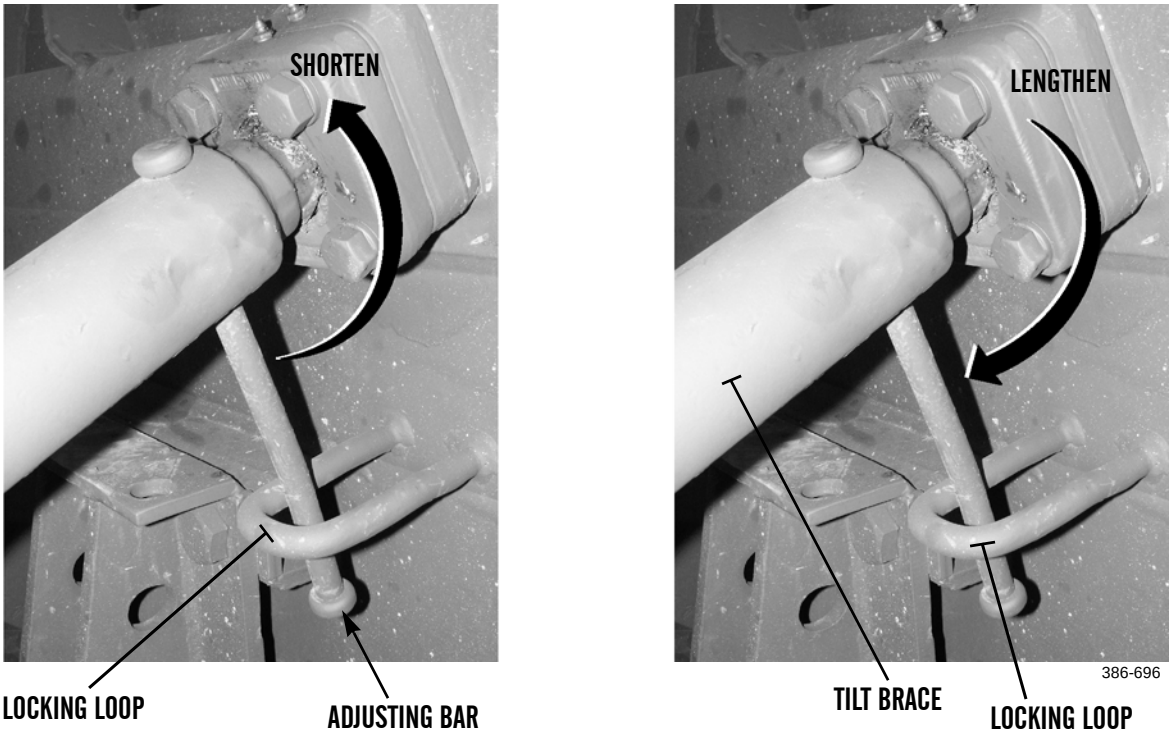
- **Bulldozer blade should never be operated with more than 1/2 in. (13 mm) of threads of tilt brace screw exposed.**
- **Unit Maintenance assistance is required to adjust length of diagonal braces.**

   a. Digging angle of dozer blade can be changed by adjusting length of tilt brace and diagonal braces, and by using tilt cylinder.

   b. To shorten tilt brace, unstow adjusting bar from locking loop and turn bar left.

   c. To lengthen tilt brace, unstow adjusting bar from locking loop and turn bar right.

OPERATE BULLDOZER BLADE - CONTINUED



d. After adjustment, lock tilt brace by inserting end of adjusting bar in locking loop.

3. **Dozing Techniques.**

a. **General Precautions.**

WARNING

Use caution when crossing side hills, ridges, logs and ditches. Ensure that safety belt is fastened. Tractor could tip and roll over, causing injury or death.

(1) When running over an obstruction, such as a log or ditch bank, both steering clutches may be released slightly until tractor balances on top of obstruction. One clutch may be engaged gradually so that tractor moves forward at an angle, over and down. If tractor is operating without a load, it may be necessary to use brakes.

CAUTION

Lift cylinder rods may be damaged if dirt spills over top of blade.

(2) DO NOT allow load to spill over top of blade.

b. **Straight Dozing.**

(1) If blade digs in and rear of tractor rises, raise blade to continue with an even cut.

(2) Moving a heavy load will cause engine speed to drop. Shift to a lower gear and/or raise blade slowly.

(3) When doing finishing or leveling work, a full blade works better than a partially loaded blade.

OPERATE BULLDOZER BLADE - CONTINUED

c. **Slot Dozing.**

(1) This involves working tractor within the trench formed when successive passes are made in the same slot.

(2) For maximum possible loads, slot dozing is preferred.

(3) Slot dozing is used in stockpiling and high-production bulldozing.

d. **Side-by-Side Dozing.**

(1) Move two or more machines side by side when moving large quantities of loose material.

(2) Keep blades close together and machines parallel to each other.

e. **Tilt Dozer Ditching.**

(1) Tilt blade and work with low side of blade in center of ditch.

(2) Level blade when required depth and slope are reached.

f. **Straight Dozer Ditching.**

(1) Tilt blade to cut shallow “V” ditches.

(2) For larger ditches, doze at right angles to center line of ditch.

(3) When desired depth is reached, doze length of ditch to smooth sides and bottom.

g. **Straight Dozer Backfilling.** Push material at a 90 degree angle to fill in ditch.

h. **Push Loading Scrapers.**

(1) Position blade cutting edge slightly above ground level.

(2) Use reinforced plate at center of blade to contact scraper.

WARNING

Make gradual contact with scraper push block. Ensure contact is made with a moving scraper. Ensure contact is made squarely. Injury to scraper operator could occur if contact is too forceful. Damage to scraper tires could occur if contact is not made squarely.

(3) Gradually contact push block of scraper while scraper is moving. Ensure contact is made squarely with scraper push block.

(4) Do NOT lift scraper off ground.

(5) When scraper cut is complete, upshift tractor to help scraper accelerate out of cut area.

i. **Large Tree Removal.**

WARNING

- **When removing trees, precautions must be taken to avoid injury and damage to equipment. Machines should never work close together as one may push a tree over on the other. Do NOT follow too closely when a tree starts to fall as rootball may catch under front of tractor, which will then require assistance to back off. Bottom of tractor may be damaged.**
- **Be alert for any dead limbs that could fall while tree is being removed.**

(1) Use bulldozer to cut roots of tree on side opposite direction of fall.

(2) Cut roots on sides parallel to direction of fall.

OPERATE BULLDOZER BLADE - CONTINUED

WARNING

Do not allow machine to straddle tree trunk while tree is falling. Back away immediately when tree starts to fall, to avoid injury, or damage to tractor.

(3) Ease into tree. Push in direction of fall with blade high. Build earth ramp if higher contact is needed.

j. **Large Brush and Medium Size Tree Removal.**

(1) Make contact with tree 12-16 in. (30.5-40.6 cm) above ground.

(2) Move forward while lifting blade.

k. **Brush Clearing.**

(1) Lower blade a few inches into the ground and move forward.

(2) Lift blade when brush is out, to loosen earth from roots.

l. **Stump Removal.**

(1) Depending on size of stump, cut roots as in *Large Tree Removal*.

(2) Contact stump near ground and lift blade while pushing.

m. **Side Hill Cutting.**

(1) Start cut downgrade if possible.

(2) Slope to inside of cut.

(3) Doze cut wide enough for bulldozers that will follow.

n. **Rock or Boulder Removal.**

(1) Tilt blade, place corner of blade under rock and work it up and down while pushing on rock.

(2) Disengage steering clutch on side opposite point of blade contact with rock.

OPERATE SCARIFIER

1. **Scarifier Mounting.**

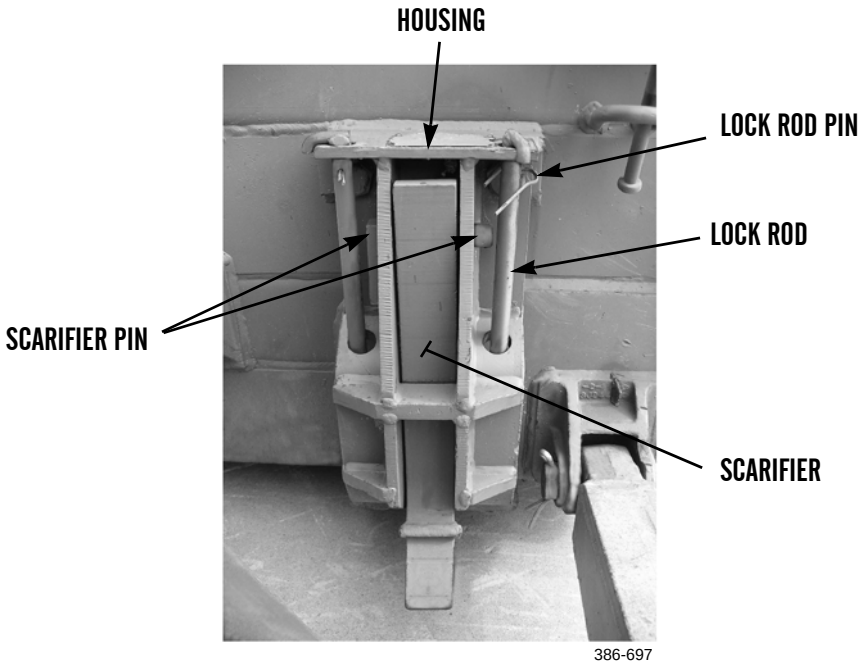
WARNING

Scarifier is heavy. Use caution and assistance when lifting scarifier to avoid injury.

NOTE

- **Each scarifier weighs 84 lb (38 kg).**
- **Install scarifiers in balanced pairs.**

a. Raise blade and support on suitable cribbing.
b. Remove pin and lock rod from each side of housing.
c. With assistance, support scarifier and remove pin and scarifier from stowed (raised) position.
d. Reposition scarifier at working (lowered) position, with tooth angled toward rear of machine. Reinstall pin.
e. Secure with lock rod and pin on each side of housing.



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OPERATE SCARIFIER - CONTINUED

2. **Scarifier Operation.**

   a. Lower bulldozer blade to the ground and place blade control lever in FLOAT.

CAUTION

DO NOT turn tractor while shanks are in the ground. Twisting puts strain on shanks and tips that may cause failure. Inspect scarifier tips frequently for damage.

   b. Back up machine in a straight line. Do NOT turn machine.

   c. Raise bulldozer blade, reposition machine for another pass and repeat steps a and b.

3. **Scarifier Stowage.**

WARNING

Scarifier is heavy. Use caution and assistance when lifting scarifier to avoid injury.

NOTE

Each scarifier weighs 84 lb (38 kg).

   a. Raise blade and support on suitable cribbing.

   b. Remove pin and lock rod from each side of housing.

   c. With assistance, support scarifier and remove pin and scarifier from working (lowered) position.

   d. Reposition scarifier at stowed (raised) position. Reinstall pin.

   e. Secure with lock rod and pin on each side of housing.

OPERATE WINCH

WARNING

Follow winch operating precautions and procedures carefully. Failure to follow safe operating precautions and procedures could result in injury or death, or damage to equipment:

- **Wear heavy gloves when handling wire rope to protect fingers and hands from injury.**
- **Do NOT use winch to pull when there are fewer than three wraps of wire rope on drum. A bare drum pull can cause wire rope to break away from drum, causing injury or death.**
- **Stand clear of reeled-out wire rope that is loaded. Stand clear a distance equal to 1-1/2 times the length of reeled-out wire rope.**

1. **Introduction.**

   a. Engine must be running when operating winch. Winch line speed is controlled by engine RPM.

   b. Ensure engine is at idle when moving winch selector lever from NEUTRAL to any other gear.

   c. Use a pair of heavy gloves when handling winch wire rope.

   d. Do not use winch to pull when there are fewer than three wraps of wire rope on drum.

   e. Keep personnel clear of wire rope when it is loaded.

OPERATE WINCH - CONTINUED

f. Exercise care with suspended loads. Maintain engine speed at a high enough RPM. If engine speed is too low, weight of load may cause it to drop, even with winch selector lever in REEL IN position.

CAUTION

Damage to wire rope may result if load is winched at an angle greater than five (5) degrees to either side of longitudinal axis of tractor.

g. Always winch with wire rope in as straight a line as possible behind tractor. Do not winch a load at an angle greater than five (5) degrees to either side of longitudinal axis of tractor.

h. Assistance is needed when reeling in wire rope (without a load) onto drum, to ensure wire rope windings are properly wound.

i. Always lock winch selector lever in NEUTRAL position, with safety lever, when not operating winch.

2. **Winch Operation.**

a. To lock wire rope so that it will not move, move winch selector lever to NEUTRAL position. When towing, holding a load or when winch in not in use, selector lever should be in NEUTRAL position.

b. To reel out wire rope by moving tractor away from a heavy load, or to lower a load by its own weight:

(1) Move winch brake lever to APPLIED position.

CAUTION

DO NOT leave winch selector lever in FREE SPOOL position for extended periods of time. When moving away from a load, operate tractor in low gear to prevent overspeeding of winch components.

(2) Move winch selector lever to FREE SPOOL position.

(3) Slowly lower load using winch brake lever.

(4) Move winch selector lever to NEUTRAL position, to automatically apply brake.

c. To lower a light load with power, or when moving away from a load in 1st gear:

(1) Move winch selector lever to REEL OUT position.

(2) Control speed by varying engine RPM.

(3) Move winch selector lever to NEUTRAL position, to automatically apply brake.

d. To pull a load toward tractor:

(1) Move and hold winch selector lever in REEL IN position.

CAUTION

To ensure maximum service life of wire rope, engage winch at lowest practical engine speed.

(2) Engage winch at lowest possible speed. Heavy line loads will require higher engine RPM than lighter loads.

(3) Move winch selector lever to NEUTRAL position, to automatically apply brake.

e. To inch out a load (fine control operation):

(1) Move winch brake lever to APPLIED position.

(2) Move winch selector lever to FREE SPOOL or REEL OUT position.

(3) Use winch brake lever to control load.

(4) Move winch selector lever to NEUTRAL position, to automatically apply brake.

OPERATE RIPPER

CAUTION

DO NOT turn or back tractor while shanks are in ground. Twisting puts strain on shanks and tips that may cause failure. Inspect ripper tips frequently for damage.

NOTE

Rip downhill whenever possible.

1. **General Use.**
   a. Operate transmission in 1st gear for most ripping operations. It is better to use additional shanks where practical, rather than to increase speed.
   b. Always use center shank when ripping with one shank only. If material breaks up easily, more shanks may be added.

NOTE

It may be necessary to raise and lower ripper to keep tractor from stalling and to properly break up material.

   c. Move tractor straight into material to be ripped and lower ripper gradually to desired depth as tractor moves forward.
   d. When ripping in preparation for scraper loading, rip in the same direction that scraper will load.
   e. Cross rip only when necessary.
   f. In most cases, it is preferable to rip as deeply as possible. Sometimes it is better to rip at partial depth and to remove the material in its natural layers.

WARNING

Shanks are heavy. Assistance from Unit Maintenance is required to adjust ripper shank depth of penetration. Suitable lifting device must be used to ensure adjustment is performed in a safe manner. Failure to follow this warning may cause injury or death.

NOTE

Each shank weighs 328 lb (149 kg).

   g. Depth of penetration can be adjusted by removing cotter pin, retainer, and pin, and placing each shank in one of two positions. Higher shank mounting position provides penetration of 15 in. (38.1 cm).
   h. Keep several inches of material on top of unripped formation to cushion machine and provide traction.
   i. When final material size must be relatively small, close spacing of passes is recommended.

2. **Ripping Hard Materials.**
   a. **Solid Rock or Granite.** Use one shank in tough-to-rip material (solid rock) or material that tends to break off in large slabs or pieces (granite).
   b. **Asphalt Road Surfaces.** On asphalt, raise shanks to lift out and break material.
   c. **Concrete Road Surfaces.** On concrete, a single shank is effective in severing reinforcement rods or mesh.
   d. **Packed Soil, Hard Pan, Clay, Shale or Cemented Gravel.** Three shanks work well in these materials. Use as many shanks as possible to break up material, without stalling or hanging up tractor.

OPERATE RIPPER- CONTINUED

e. **Rock With Fractures, Faults and Planes of Weakness.** Use two shanks where rock breaks out in small pieces. If tractor begins to stall or tracks spin, use only the center shank.

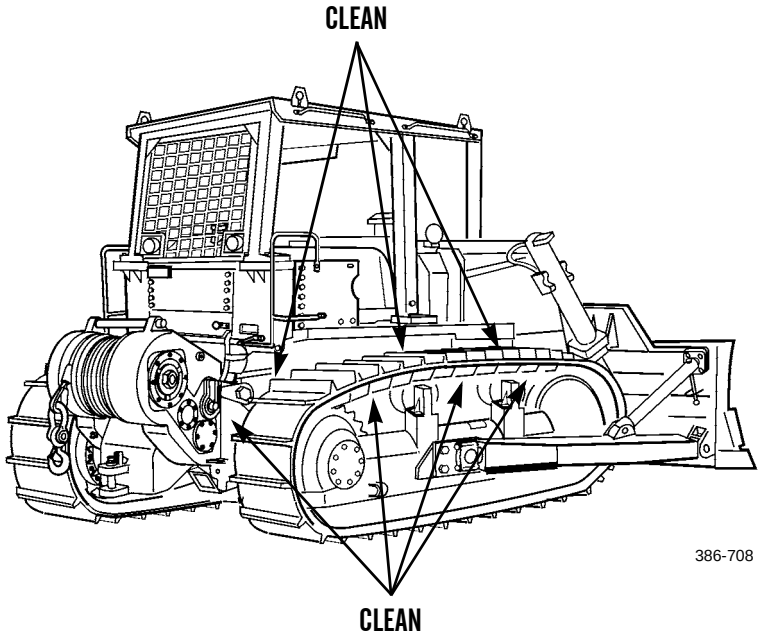
SHUT DOWN TRACTOR

1. Position machine on level surface and decelerate engine to idle speed.
2. Apply brakes and pull brake lock lever to engage brake lock.
3. Move transmission selector lever to neutral (N).
4. Move transmission safety lock lever to ON.
5. Lower all implements to the ground.
6. Turn off all accessories.

CAUTION

Shutting down engine immediately after operating under a load can result in overheating, accelerated wear of engine components and damage to turbocharger. DO NOT shut down without idling engine for appropriate time period.

7. Move governor control lever to idle and idle engine for five (5) minutes.
8. Move governor control lever all the way forward to shut down engine.
9. Place battery disconnect switch in OFF position.
10. Remove all rocks, mud, dirt or debris clear of tracks.
11. Perform *After* operation PMCS (WP 0012 00).



OPERATE PORTABLE FIRE EXTINGUISHER

WARNING

Discharging large quantities of dry chemical fire extinguisher inside an enclosed winterized cab may result in temporary breathing difficulty during and immediately after the discharge event. Discharge fire extinguisher from outside the cab. Ventilate cab thoroughly prior to reentry.

1. Remove fire extinguisher from mounting bracket inside cab.
2. Hold fire extinguisher upright. Stand back 8 ft (2.4 m) from fire, point nozzle toward base of fire, break seal and pull safety pin.
3. Squeeze lever, discharging chemical at base of fire. Use a side-to-side motion to spread chemical.
4. After using fire extinguisher, notify Unit Maintenance to have fire extinguisher recharged.

END OF WORK PACKAGE

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OPERATION UNDER UNUSUAL CONDITIONS 0006 00

GENERAL

This work package contains instructions for safely operating the D7F Tractor under unusual conditions. In addition to normal preventive maintenance, special care must be taken to keep tractor operational in extreme temperatures and other environmental conditions.

SLAVE START TRACTOR

WARNING

- **To avoid possible electric shock when slave starting tractor, use NATO slave cable that DOES NOT have loose or missing insulation.**
- **DO NOT proceed with slave starting if suitable slave cable is not available.**

CAUTION

- **DO NOT allow "live" and "dead" machines to come in contact with each other during slave starting. Failure to follow this caution may cause electrical system damage.**
- **Under no circumstances can the tractor be started by being towed or pushed. Failure to follow this caution will damage transmission.**

NOTE

If machine other than another D7F is used to slave start tractor, refer to Operator's Manual for that machine for any special slave starting procedures.

1. Ensure battery disconnect switch is in OFF position on "dead" and "live" machines.

NOTE

NATO slave receptacle is located inside operator's station.

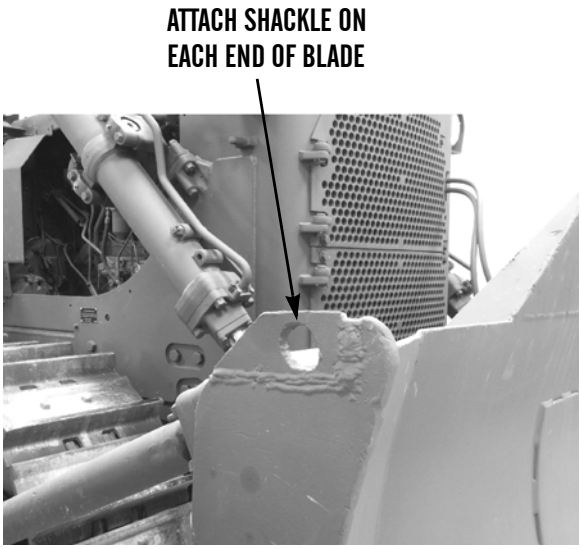
2. Connect NATO slave cable to receptacle on "dead" machine.
3. Connect other end of NATO slave cable to receptacle on "live" machine.
4. Start engine of "live" machine and run at high idle.
5. Place battery disconnect switch and engine start switch on "dead" machine to ON position.
6. Allow "live" machine to run for 2-3 minutes to charge batteries on "dead" machine.
7. Start engine of "dead" machine (WP 0005 00).
8. Disconnect NATO slave cable from both machines.

TRACTOR EVACUATION AND RECOVERY

NOTE

If tractor becomes inoperative during a work cycle, the following procedure will allow bulldozer blade and ripper to be raised to allow tractor evacuation and recovery.

1. **Raise Bulldozer Blade to Transport Height.**
   a. Ensure tractor is secure against movement, with transmission in neutral (N), safety lock lever ON, and brake lock lever engaged. Shut down engine.
   b. Move blade control lever to FLOAT.
   c. Install shackle to lift point on each side of blade.



386-710

WARNING

All personnel must stand clear when bulldozer blade is being lifted. Failure to do so could result in injury or death in the event lifting device slips or fails.

   d. Attach any suitable lifting device (lift truck, crane, winch, etc.) to shackles and raise blade to sufficient height to allow blade to clear ramp of trailer used to transport tractor.
   e. Move blade control lever to HOLD.

TRACTOR EVACUATION AND RECOVERY - CONTINUED

2. **Raise Ripper to Transport Height.**

NOTE

Assistance from Unit Maintenance is required.

a. Ensure tractor is secure against movement, with transmission in neutral (N), safety lock lever ON, and brake lock lever engaged. Shut down engine.

b. Move ripper control lever to FLOAT.

c. Remove cotter pin, retainer and pin from each ripper shank and ripper beam.

WARNING

All personnel must stand clear when ripper is being lifted. Failure to do so could result in injury or death in the event lifting device slips or fails.

d. Use any suitable lifting device (lift truck, crane, winch, etc.) to raise ripper beam to sufficient height to allow shanks to be removed.

e. Move ripper control lever to HOLD.

f. Remove ripper shanks clear of beam.

g. Reinstall each ripper shank in ripper beam, in inverted position, with pin, retainer and cotter pin.

OPERATE IN EXTREME COLD

NOTE

- **Tractors operating in arctic conditions are equipped with a winterized cab.**
- **Refer to FM 9-207, *Operations and Maintenance of Ordinances Materiel in Cold Weather,* FM 31-70, *Basic Cold Weather Manual,* and FM 31-71, *Northern Operations,* for additional information on cold weather operation and maintenance.**

1. **Introduction.** Extreme cold causes many problems:

a. Lubricants thicken or congeal.

b. Batteries may freeze or lose their electrical efficiency.

c. Fuel may not readily atomize for combustion.

d. Various materials become hard, brittle, and easily damaged.

e. Cooling system requires adequate protection from extreme cold.

f. Fuels, lubricants, and antifreeze require special storage, handling, and use.

OPERATE IN EXTREME COLD - CONTINUED

2. **Operation.**

CAUTION

Low idling speeds during extremely cold temperatures can result in incomplete combustion and heavy deposit formations on valves. These deposits can cause burned valves, bent pushrods or other damage to valve components.

a. Carefully follow engine start and warmup procedures in WP 0005 00. Allow engine time to thoroughly warm up so that it idles smoothly. However, do NOT allow to idle excessively or at speeds that are too low. Run engine at reduced speed ONLY long enough to circulate oil through engine, then increase speed.

b. To avoid water condensation in fuel tank, completely fill fuel tank after each operating period. Also drain water from fuel tank.

c. Remove snow, ice and mud from engine compartment, hydraulic cylinders, track components, and implements before operation.

d. Ensure tractor and all implements are clean before parking machine. Park in a sheltered area out of the wind. Place tracks and implements on planking, to keep them from freezing to the ground.

e. If shelter is not available, park tractor so it does not face into the wind. Cover machine if possible, to protect engine, accessories and controls from ice and snow.

CAUTION

Do NOT attempt to break tracks loose under engine power. Do NOT move tractor with large frozen lumps of material in tracks. Failure to follow this caution may cause damage to equipment.

f. If tracks freeze to the ground, notify Unit Maintenance.

OPERATE IN EXTREME HEAT

CAUTION

Limit engine idling time. Under no condition should idling time exceed a maximum of 10 minutes. Excessive idling can cause carbon buildup and damage to engine.

NOTE

Refer to FM 90-3, *Desert Operations*.

1. During very hot weather, avoid continuous long, hard pushes or pulls. Allow engine to idle if it becomes overheated. If engine does not cool sufficiently after a maximum of 10 minutes of idling, shut down and notify Unit Maintenance.

2. If water temperature gage indicates in RED zone or engine coolant temperature warning light comes on, allow engine to cool down 3-5 minutes at idle. Notify Unit Maintenance if engine does not cool down.

3. Check cooling system, air cleaner service indicator and engine oil level frequently. Ensure that radiator is free of debris or foreign matter. Perform necessary services and notify Unit Maintenance of any unusual gage readings or problems.

4. Clean and lubricate tractor more frequently than indicated in PMCS.

5. Park tractor under cover or in the shade, if possible.

OPERATE IN DEEP MUD OR SALTWATER

NOTE

To ensure all salt residue has been removed, all rock guards and belly pans must be removed and all surrounding areas thoroughly flushed with fresh water.

1. Clean tractor with fresh water, if available.
2. Notify Unit Maintenance.

OPERATE IN SANDY OR DUSTY CONDITIONS

NOTE

Refer to FM 90-3, *Desert Operations*.

1. Check engine coolant temperature and engine oil pressure frequently.
2. Keep radiator core free of obstructions to air circulation.
3. Keep engine air precleaner free of debris. Maintain air cleaner filters as clean as possible. Notify Unit Maintenance to service air cleaner if service indicator is showing RED.
4. Ensure engine and transmission oil dipstick tubes are cleaned before dipsticks are removed to check fluid levels. Clean accumulations of sand and dirt from around any fluid filler location before checking or adding fluids.
5. Clean spouts of fuel containers and areas around filler caps on fuel tank before adding fuel. Under extremely sandy or dusty conditions, filter fuel when filling tank.
6. When not in use, cover engine compartment and operator station to prevent entry of windblown sand or dust.

OPERATE AT HIGH ALTITUDE

CAUTION

If engine is operated at an altitude higher than marked on warning plate on dash, damage to equipment may result from turbocharger overspeeding.

NOTE

High altitude operation concerns are NOT an issue with Service Life Extension Program (SLEP) machines, due to the new engines installed in these machines.

1. Fuel rack and high idle speed settings, for maximum turbocharger speed, have been adjusted to permit engine operation at altitude marked on warning plate on dash.
2. Engine can be operated at lower altitudes without changing the adjustment, but with less than maximum performance.

FORDING

1. Test depth of water and ensure firmness and consistency of the bottom. Do NOT attempt to ford if depth exceeds 30 in. (76.2 cm) to top of final drive cover.
2. Ensure all gages are indicating normal operating pressure and temperature.
3. Shift transmission into 1st gear and increase engine speed to minimize stalling.
4. Enter water slowly to reduce surges of backwash into engine compartment. Fording speed should not exceed 3-4 mph (4.9-6.4 kph).
5. After fording, wash tractor with fresh water, if available.

FORDING - CONTINUED

6. Perform *Operator PMCS* as soon as possible (WP 0011 00 and WP 0012 00).
7. Notify Unit Maintenance.

END OF WORK PACKAGE

STOWAGE, DECAL AND DATA PLATE GUIDE 0007 00

INTRODUCTION

1. This work package shows the location for stowage of equipment and material required to be carried on the D7F Tractor.
2. This work package also includes illustrations showing the location of all decals and data plates on the machine.
3. There may be instances when a data plate on your machine is not located where indicated in this work package.

STOWAGE GUIDE

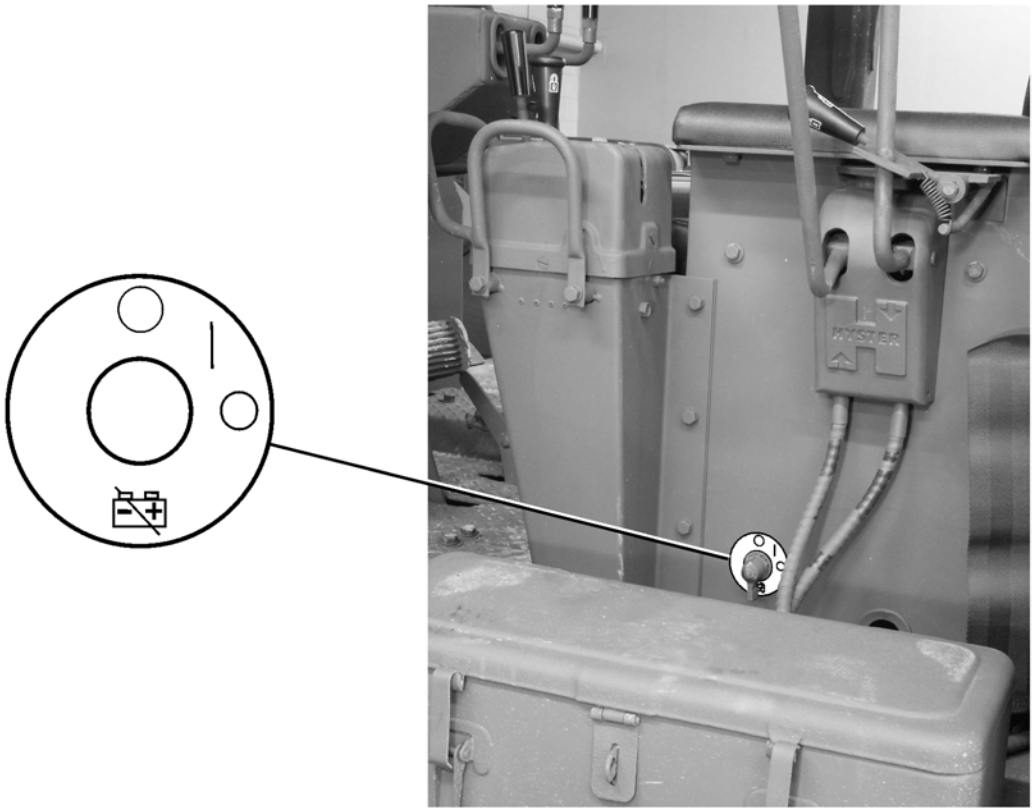
NOTE

Items listed in Table 1 below are illustrated in WP 0017 00, *Components of End Item (COEI) and Basic Issue Items Lists*.

Table 1. Stowage Guide.

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION
1	Case, Maintenance and Operational Manuals	1	Inside operator station, behind seat
2	Extinguisher, Fire	1	Mounted to bracket inside operator station
3	Key, Socket Head Screw	1	Inside toolbox
4	Lubricating Gun, Hand	1	Inside toolbox
5	Wrench, Adjustable	1	Inside toolbox

DECALS



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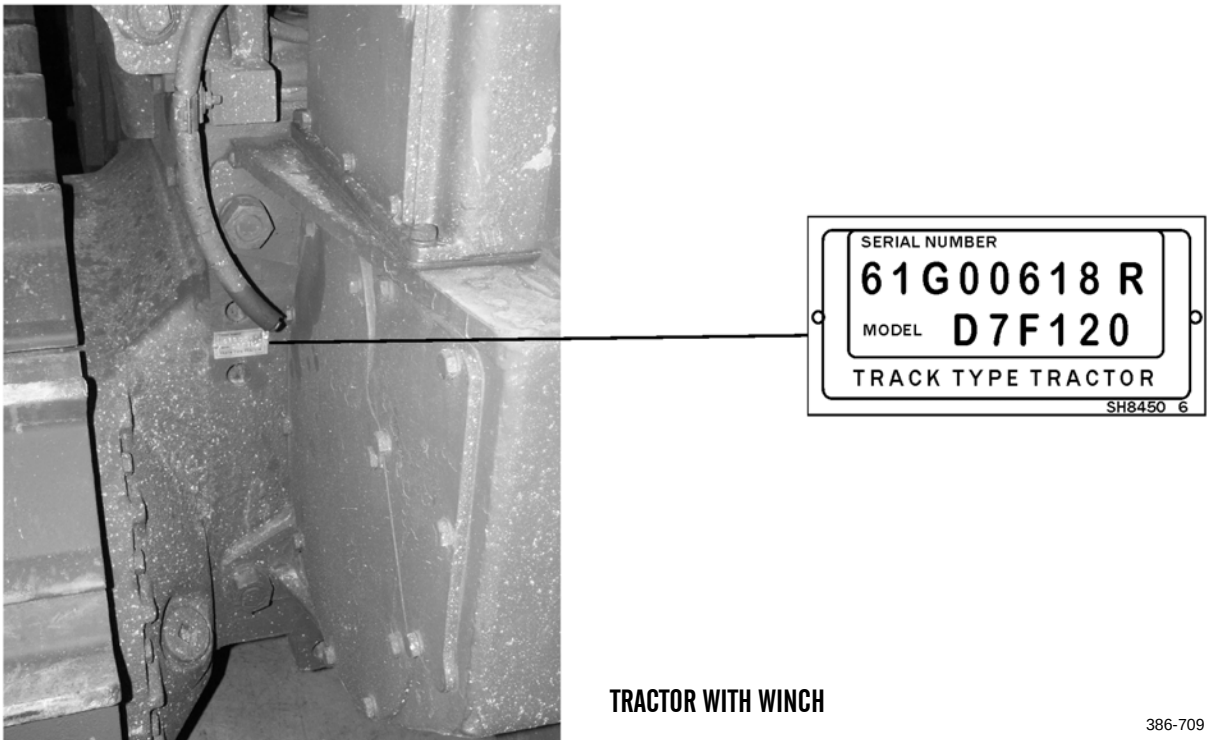
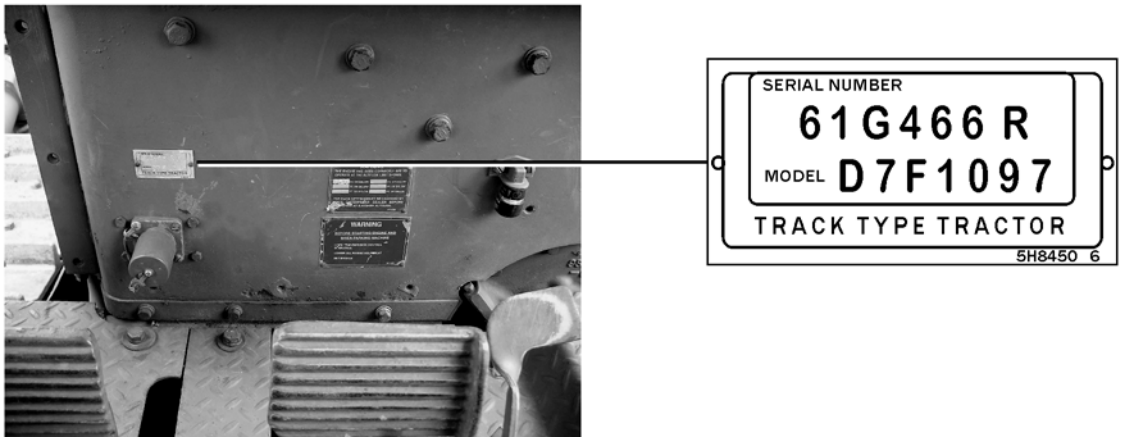


TRACTOR WITH WINCH

386-709

DATA PLATES



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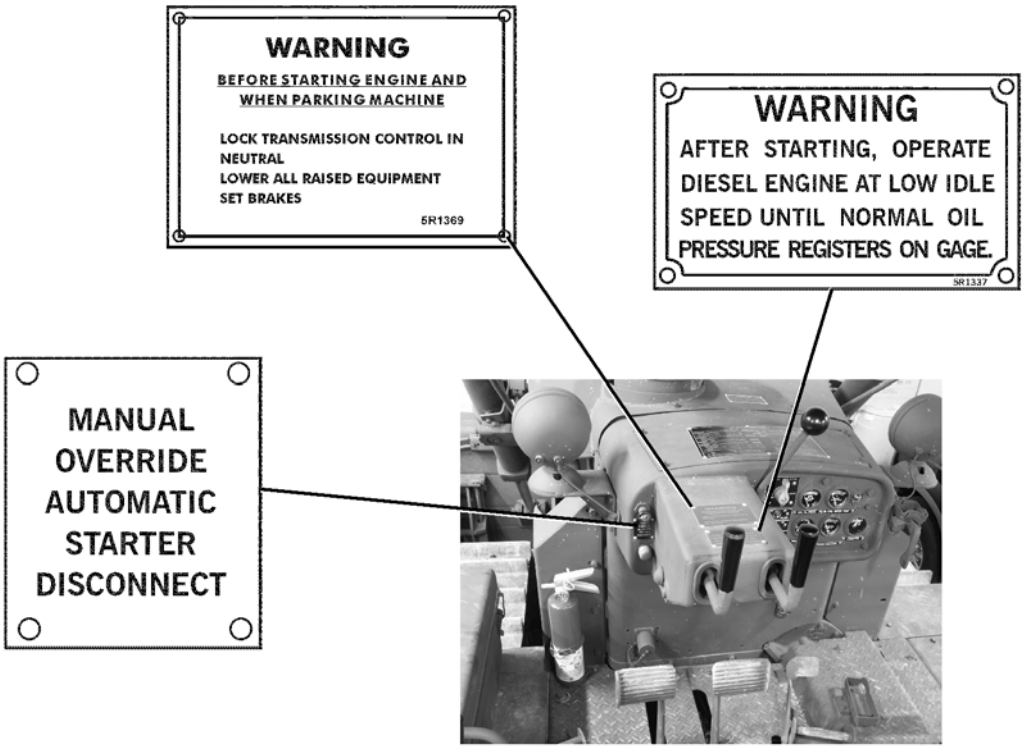
TRACTOR WITH RIPPER



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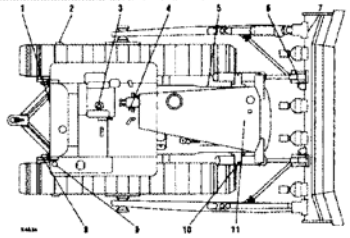
DATA PLATES - CONTINUED

D7 TRACTOR LUBRICATION

INCLUDING No. 7S HYDRAULIC BULLDOZER

ITEM	IDENTIFICATION	SERV.	SERV. POINTS	LUBRI-CANT	QUANTITY (U.S. MEASURE)
	EVERY 10 SERVICE HOURS OR DAILY				
1	TRACK ROLLER FRAME INNER BEARINGS	L	2	GAA	
2	TRACK ROLLER FRAME OUTER BEARINGS	L	2	GAA	****5 Strokes
3	TRANSMISSION BEVEL GEAR AND STEERING CLUTCH COMPARTMENT	✓	1	HDO	
5	DIESEL ENGINE CRANKCASE OIL SYSTEM	✓	1	HDO	
6	LIFT CYLINDER LOWER TRUNNION BEARINGS	L	2	GAA	
9	HYDRAULIC SYSTEM	✓	1	HDO	
	EVERY 50 SERVICE HOURS OR WEEKLY				
10	CYLINDER UPPER TRUNNION AND SUPPORT BEARINGS	L	8	GAA	
3	TRANSMISSION BEVEL GEAR AND STEERING FILTER ELEMENTS	***C	1		
	MAGNETIC STRAINER	***W	1		
	EVERY 100 SERVICE HOURS OR 2 WEEKS				
7	BLADE TILT BALL AND SOCKET JOINTS AND TILTING BRACE THREADS	L	2	GAA	
8	FINAL DRIVES	✓	2	GO	
	EVERY 250 SERVICE HOURS OR MONTHLY				
3	TRANSMISSION BEVEL GEAR AND STEERING FILTER ELEMENTS	C	1		
	MAGNETIC STRAINER	W	1		
5	DIESEL ENGINE CRANKCASE OIL SYSTEM	*C	1	HDO	29 Qt.
	OIL FILTER ELEMENT	*C	2		
	BREATHER	W	1		
11	FAN BEARINGS	L	1	GAA	
8	FINAL DRIVE BREATHERS	WO	2		

ITEM	IDENTIFICATION	SERV.	SERV. POINTS	LUBRI-CANT	QUANTITY (U.S. MEASURE)
	EVERY 500 SERVICE HOURS OR 3 MONTHS				
9	HYDRAULIC SYSTEM	**C	1	HDO	24 Gal. (Tank)
	FILTER ELEMENT	C	1		
	FILLER STRAINER	W	1		
	EVERY 1000 SERVICE HOURS OR 6 MONTHS				
3	TRANSMISSION BEVEL GEAR AND STEERING COMPARTMENT	**C	1	HDO	31 Gal.
	BREATHER	C	1		
4	UNIVERSAL JOINT	L	2	GAA	
8	FINAL DRIVES	CW	2	GO	9 Gal. (Ea.)



Key to Symbols:
C — Change
L — Lubricate
W — Wash
WO — Wash and Oil
✓ — Check, Add Oil When Needed

Key to Lubricants:
OE/HDO — Crankcase Lubricating Oil, MIL-L-2104F
GO — Multipurpose-type Gear Lubricant, MIL-L-2105D
GAA — Multipurpose-type Grease, MIL-L-10924F

* Normal change interval when fuel sulphur content is 0.4% or less. When sulphur content is 0.4% to 1.0%, reduce interval one-half — above 1.0%, reduce to one-fourth the normal interval. Change every 125 Service Hours when MIL-L-2104F Oil is used.
** Working conditions may require reduced service intervals. Refer to Lubrication and Maintenance Guide for details.
*** Initial Service intervals for new machines or reconditioned units.
**** Amount of grease required from a lever type grease gun.

5R1365 1

CATERPILLAR

SELF-CLEANING PRECLEANER SERVICE INSTRUCTIONS

INSPECT THE PRECLEANER, TUBING, AND DUST EJECTOR WHEN SERVICING THE AIR CLEANER. CLEAN THE SYSTEM AS NECESSARY USING A STIFF FIBER BRUSH. OBSTRUCTIONS OR DAMAGE TO THE TUBING OR EJECTOR MAY PREVENT PROPER SELF-CLEANING OF THE PRECLEANER AND CAN MAKE FREQUENT SERVICING OF THE AIR CLEANER NECESSARY.

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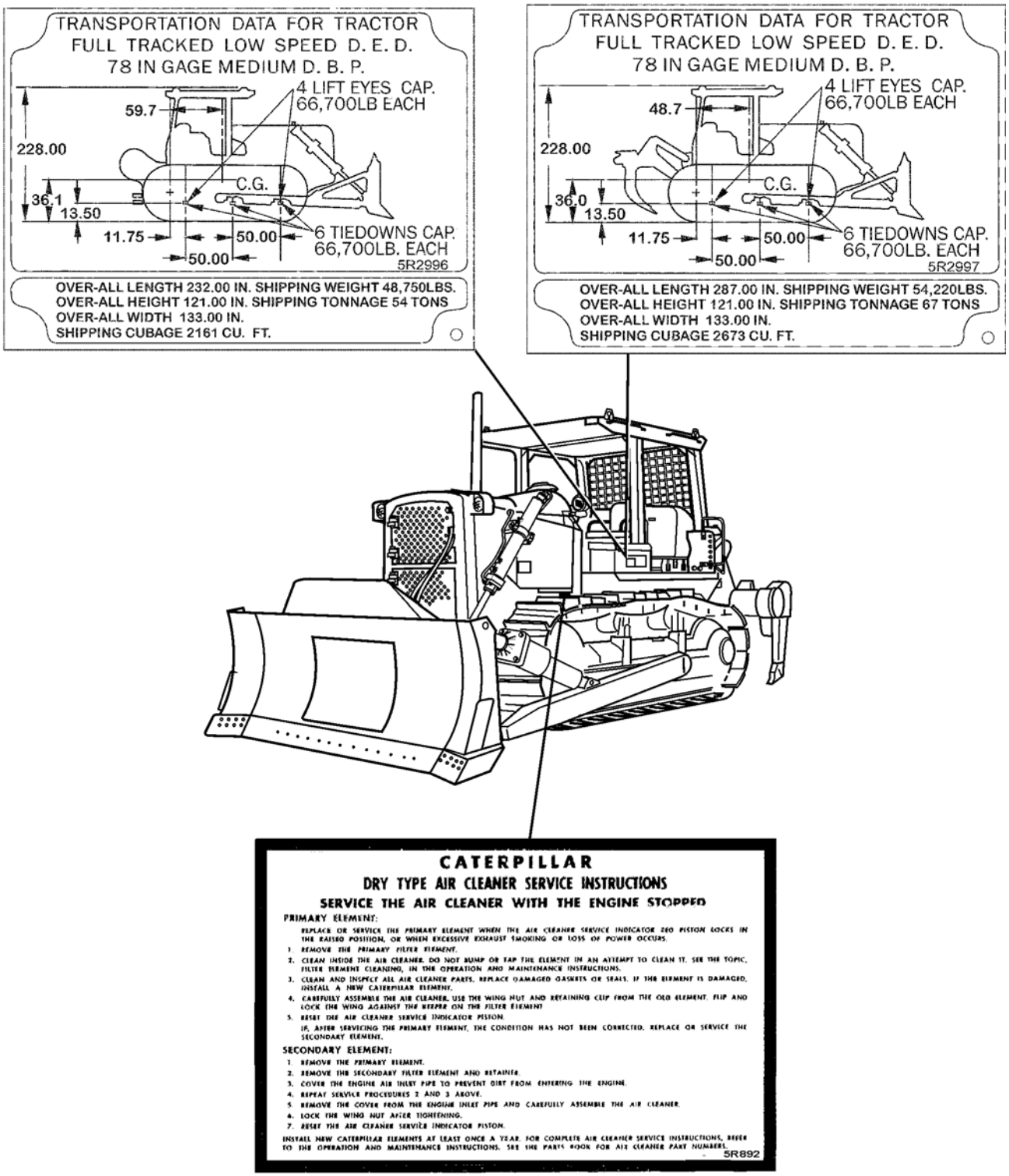
386-058

DATA PLATES - CONTINUED



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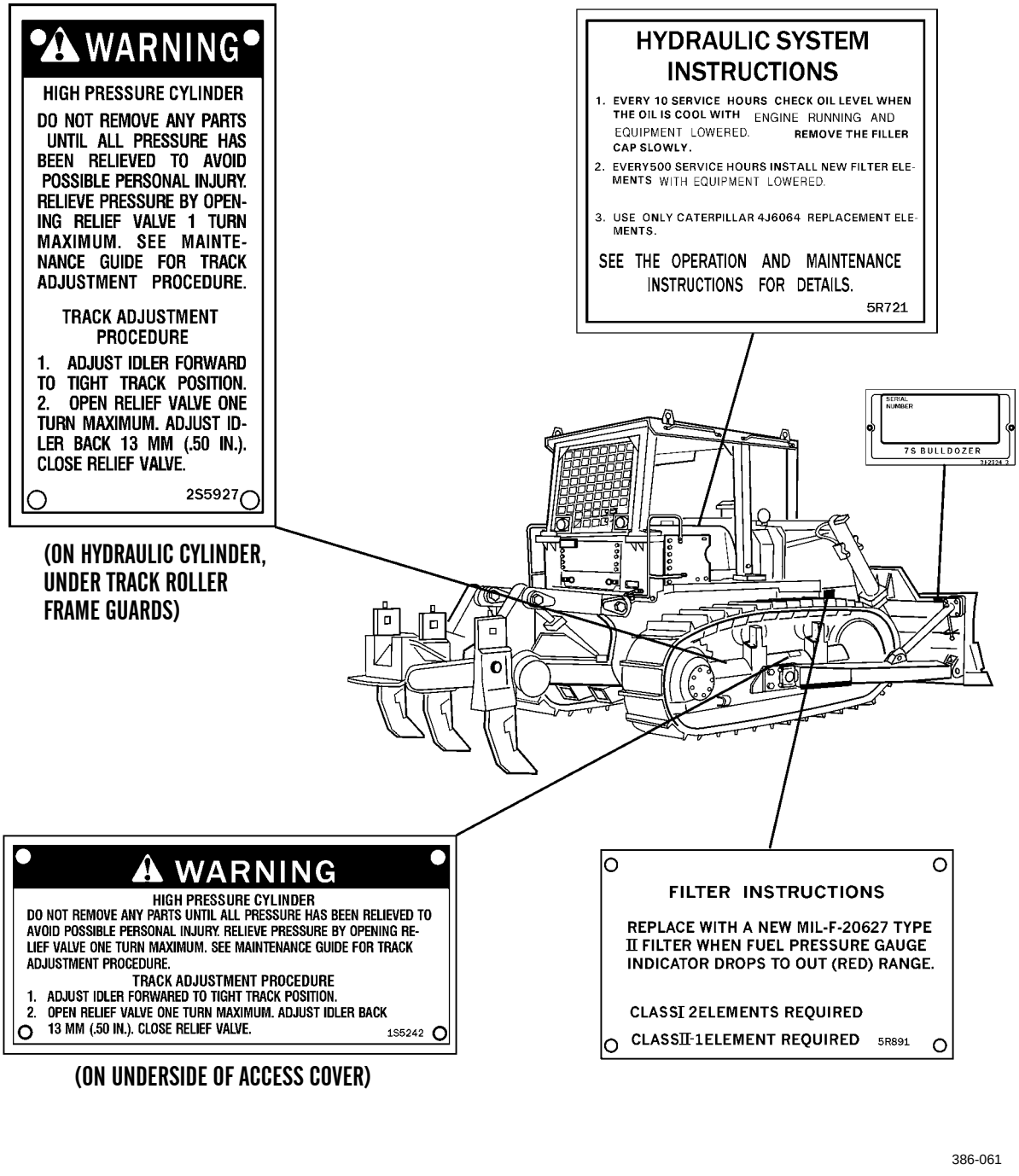

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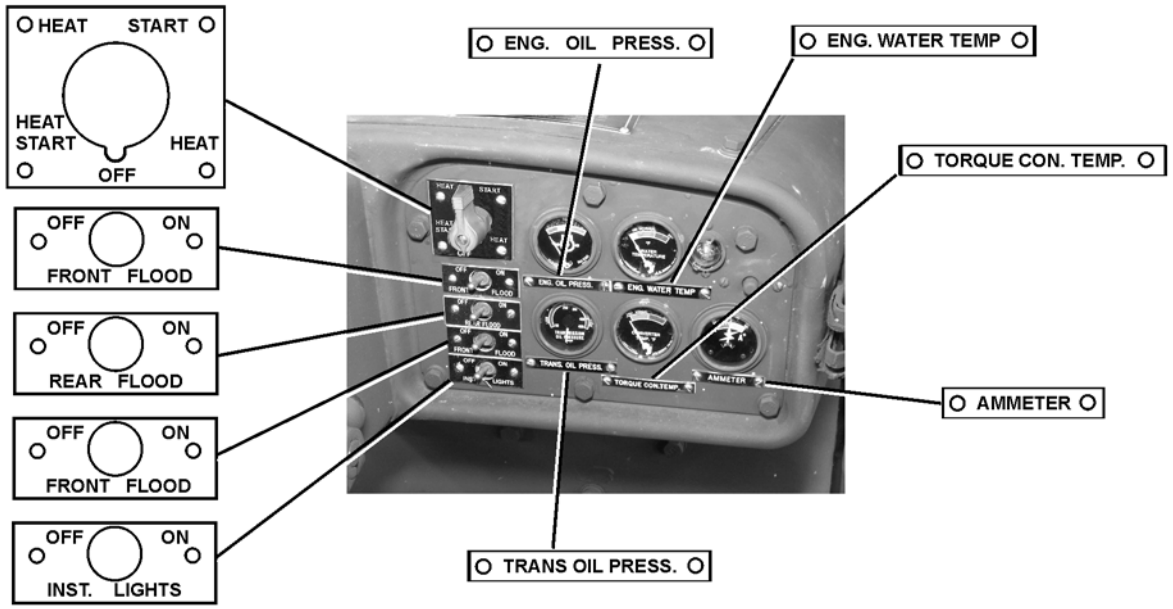

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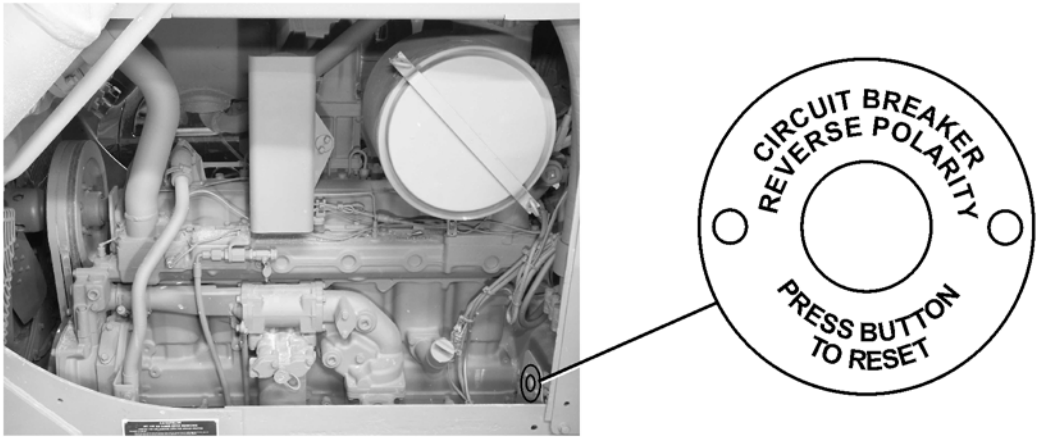

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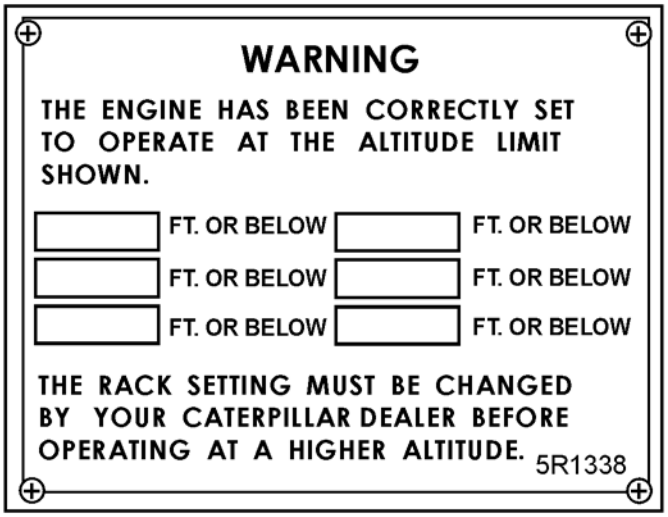

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END OF WORK PACKAGE

CHAPTER 3
OPERATOR TROUBLESHOOTING

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TROUBLESHOOTING INSTRUCTIONS 0008 00

GENERAL

1. This chapter provides information for identifying and correcting malfunctions which may develop while operating the D7F Tractor.
2. The Troubleshooting Symptom Index in WP 0009 00 lists common malfunctions which may occur and refers you to the proper page in WP 0010 00 for a troubleshooting procedure.
3. If you are unsure of the location of an item mentioned in troubleshooting, refer to WP 0002 00 or WP 0004 00.
4. Before performing troubleshooting, read and follow all safety instructions found in the Warning Summary at the front of this manual.
5. The Troubleshooting Symptom Index cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by the listed corrective actions, notify your supervisor.
6. When troubleshooting a malfunction:
   a. Locate the symptom or symptoms in WP 0009 00 that best describe the malfunction.
   b. Turn to the page in WP 0010 00 where the troubleshooting procedures for the malfunction in question are described. Headings at the top of each page show how each troubleshooting procedure is organized: MALFUNCTION, TEST OR INSPECTION (in step number order), and CORRECTIVE ACTION.
   c. Perform each step in the order listed until the malfunction is corrected. DO NOT perform any maintenance task unless the troubleshooting procedure tells you to do so.

EXPLANATION OF COLUMNS

The columns in Table 1 in WP 0010 00 are defined as follows:

1. **MALFUNCTION.** A visual or operational indication that something is wrong with the equipment.
2. **TEST OR INSPECTION.** A procedure to isolate the problem in a system or component.
3. **CORRECTIVE ACTION.** A procedure to correct the problem.

END OF WORK PACKAGE

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TROUBLESHOOTING SYMPTOM INDEX 0009 00

END OF WORK PACKAGE

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Table 1. Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	ENGINE	
1. Engine Fails to Crank When Switch is Turned to Start.	1. Check battery disconnect switch for ON position.	Turn battery disconnect switch ON.
	2. Check circuit breaker reset button on dash panel.	Push circuit breaker reset button on dash panel.
	3. Check circuit breaker reset button on left side of engine firewall.	Push circuit breaker reset button on left side of engine firewall.
	4. Check to see if electrolyte level in batteries is over plates (WP 0012 00, Item 44).	If electrolyte level is below top of plates, add distilled water until level is 3/8 in. (9.5 mm) above tops of plates. Notify Unit Maintenance to recharge batteries.
	5. Inspect for loose, corroded or broken battery cables or terminals.	Notify Unit Maintenance.
2. Engine Fails to Start When Engine Cranks.	1. Check governor control lever for correct starting position (WP 0004 00, Item 7).	Move lever to correct starting position.
	2. Check for empty fuel tank.	Fill tank if empty or low (WP 0013 00).
	3. Ensure fuel shutoff valve is all the way ON.	Turn fuel shutoff valve all the way ON.
3. Engine Hard to Start or Stalls Frequently.	1. Check air cleaner service indicator reading.	If red band is showing, service air cleaner primary elements. Remember to reset air cleaner service indicator (WP 0014 00).
	2. Check for clogged fuel filter.	Check fuel pressure gage reading. Notify Unit Maintenance for filter servicing if gage needle is in RED zone.
	3. Check for low fuel supply.	Fill tank with proper grade of fuel (WP 0013 00).

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. Engine Overheats.	1. With engine shut down and cool, check radiator for obstructions, dirt, leaves, etc.	Remove obstructions, dirt, leaves, etc.
	2. Check fan belt for wear and tension.	Notify Unit Maintenance for replacement or adjustment.
	 WARNING  **DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Loosen cap to first stop and let any pressure out of cooling system, then remove cap. Failure to follow this warning may cause burns.**	
	3. Allow engine to cool, then remove radiator fill cap and check coolant level (WP 0012 00, Item 4).	Add coolant as needed (WP 0011 00 and WP 0012 00, Item 41).
	4. Check level of engine oil (WP 0012 00, Item 5).	Fill crankcase with proper grade of oil to FULL mark on dipstick (WP 0011 00 and WP 0012 00, Item 5).
5. Engine Runs Erratically and Vibrates.	1. Check operation of governor control lever by moving it back and forth.	1. If control lever does not operate linkage, notify Unit Maintenance. 2. If control lever and linkage are OK, go to Step 2.
	2. Check for clogged fuel filter by observing fuel pressure gage reading.	Notify Unit Maintenance for filter servicing if gage needle is in RED zone.
6. Low Engine Power.	1. Ensure fuel shutoff valve is all the way ON.	Turn fuel shutoff valve all the way ON.
	2. Check air cleaner service indicator reading.	If red band is showing, service air cleaner primary element. Remember to reset air cleaner service indicator (WP 0014 00).
	3. Check for clogged fuel filter by observing fuel pressure gage reading.	Notify Unit Maintenance for filter servicing if gage needle is in RED zone.
	4. Check operation of governor control lever.	1. If control lever does not operate linkage, notify Unit Maintenance. 2. If control lever and linkage is OK, go to Step 5.
	5. Check exhaust for excessive smoke.	Notify Unit Maintenance for turbocharger inspection.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	ELECTRICAL SYSTEM	
	WARNING **DO NOT check V-belts with engine running. Injury could result.**	
7. Alternator Output Low, Unsteady or Not Charging.	1. Visually check for loose or broken V-belts.	Notify Unit Maintenance for adjustment or replacement of V-belts.
	2. Check to see that alternator mounting and wiring is secure.	Notify Unit Maintenance for repair.
	TRANSMISSION	
8. Tractor Will Not Move.	1. Check transmission oil pressure gage for normal reading (GREEN zone on gage).	Notify Unit Maintenance if reading is not in green zone.
	2. Check transmission oil level.	Fill with proper grade of oil to FULL mark on dipstick (WP 0011 00 and WP 0012 00, Item 21).
	3. Check shifting levers and linkages.	Notify Unit Maintenance for linkage and lever adjustments.
	4. In cold weather, ensure tractor is not frozen in mud.	Refer to WP 0006 00, before trying to move tractor.
	WINCH	
9. Winch Fails to Operate or Operates Slowly.	1. Oil level in winch may be low.	Notify Unit Maintenance.
	2. Check adjustment of levers.	Notify Unit Maintenance for lever adjustment.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
EARTH MOVING EQUIPMENT COMPONENTS		
10. Bulldozer Blade Fails to Raise or Lower.	1. Check that blade control lever moves freely in all directions.	1. If lever does not move freely, notify Unit Maintenance. 2. If lever is OK, go to Step 2.
	2. Check oil level in hydraulic tank (WP 0012 00, Item 13).	Fill tank to correct level with proper grade of oil (WP 0011 00 and WP 0012 00, Item 13).
11. Ripper Fails to Raise or Lower.	1. Check that ripper control lever moves freely in all directions.	1. If lever does not move freely, notify Unit Maintenance. 2. If lever is OK, go to Step 2.
	2. Check oil level in hydraulic tank (WP 0012 00, Item 13).	Fill tank to correct level with proper grade of oil (WP 0011 00 and WP 0012 00, Item 13).

END OF WORK PACKAGE

CHAPTER 4
OPERATOR MAINTENANCE INSTRUCTIONS

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OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION 0011 00

GENERAL

1. To ensure that the D7F Tractor is ready for operation at all times, it must be inspected on a regular basis so that defects may be found and corrected before they result in injury, damage or equipment failure.
2. The PMCS Table in WP 0012 00 contains systematic instructions on inspections, lubrications, services, adjustments and corrections to be performed by the operator to keep your equipment in good operating condition and ready for its primary mission.

EXPLANATION OF TABLE ENTRIES

1. **Item Number (Item No.) Column.** Numbers in this column are for reference. When completing DA Form 2404 or DA Form 5988-E *(Equipment Inspection and Maintenance Worksheet)*, include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must perform checks and services for the interval listed.
2. **Interval Column.** This column tells you when you must perform the procedure in the procedure column.
   a. *Before* procedures must be done immediately before you operate the tractor.
   b. *During* procedures must be done while you are operating the tractor.
   c. *After* procedures must be done immediately after you have operated the tractor.
   d. *Weekly* procedures must be done once each week.
   e. *Monthly* procedures must be done once each month.
3. **Man-Hours Column.** This column indicates man-hours required to complete prescribed lubrication.
4. **Location, Item to Check/Service Column.** This column provides the location and item to be checked or serviced.

NOTE

The WARNINGs and CAUTIONs appearing in your PMCS table should always be observed. WARNINGs and CAUTIONs appear before applicable procedures. You must observe these WARNINGs to prevent serious injury to yourself and others, and CAUTIONs to prevent your equipment from being damaged.

5. **Procedure Column.** This column gives the procedure you must perform to check or service the item listed in the Item to Check/Service column, to know if the equipment is ready or available for its intended mission. You must perform the procedure at the time stated in the interval column.
6. **Not Fully Mission Capable If: Column.** Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you perform check/service procedures that show faults listed in this column, the equipment is not mission-capable. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

GENERAL PMCS PROCEDURES

1. Always perform PMCS in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry. If the machine does not perform as required, refer to the appropriate troubleshooting procedure in Chapter 3.
2. If anything looks wrong and you can't fix it, write it on your DA Form 2404 or DA Form 5988-E. If you find something seriously wrong, IMMEDIATELY report it to your supervisor.
3. Before performing preventive maintenance, read all the checks required for the applicable interval and prepare all that is needed to make all the checks. You'll always need a rag (Item 12, WP 0019 00) or two.

GENERAL PMCS PROCEDURES - CONTINUED

WARNING

Solvent cleaning compound MIL-PRF-680 Type III is an environmentally compliant and low toxic 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.

a. **Keep It Clean.** Dirt, grease, oil and debris get in the way and may cover up a serious problem. Clean as you work and as needed. Use solvent cleaning compound (Item 2, WP 0019 00) on all metal surfaces. Use detergent (Item 3, WP 0019 00) and water when you clean rubber, plastic and painted surfaces.

WARNING

When servicing this machine, 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 1-800-872-3845.

b. **Hazardous Waste Disposal.** Ensure all spills are cleaned up and disposed of IAW local policy and ordinances.

c. **Rust and Corrosion.** Check metal parts for rust and corrosion. If any bare metal or corrosion exists, clean and apply a light coat of lubricating oil (Item 9, WP 0019 00). Report it to your supervisor.

d. **Bolts, Nuts and Screws.** Check bolts, nuts and screws for obvious looseness, missing, bent or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal or rust around bolt heads. If you find one is loose, notify your supervisor.

e. **Welds.** Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.

f. **Electric Wires and Connectors.** Look for cracked or broken insulation, bare wires and loose or broken connectors. Reconnect loose connectors. Ensure that wires are in good condition.

g. **Hoses and Fluid Lines.** Look for wear, damage and signs of leaks. Check for loose clamps and fittings. Wet spots indicate leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, notify your supervisor. If something is broken or worn out, report it to your supervisor.

h. **Fluid Leakage.** It is necessary for you to know how fluid leakage affects the status of your machine. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your machine. Learn and be familiar with them, and remember - when in doubt, notify your supervisor.

CAUTION

Operation is allowable with Class I and Class II leakage, EXCEPT for fuel, where NO leaks are allowed. WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR. When operating with Class I or Class II leaks, check fluid levels more frequently. Class III leaks must be reported immediately to your supervisor. Failure to do this will result in damage to vehicle and/or components.

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED 0011 00

GENERAL PMCS PROCEDURES - CONTINUED

NOTE

Notify your supervisor of any leaks you cannot fix.

Leakage Definitions for PMCS

Class I	Leakage indicated by wetness or discoloration, but not great enough to form drops.
Class II	Leakage great enough to form drops, but not enough to cause drops to drip from the item being checked/inspected.
Class III	Leakage great enough to form drops that fall from the item being checked/ inspected.

GENERAL LUBRICATION PROCEDURES

NOTE

- **Lubrication instructions contained in this PMCS are MANDATORY.**
- **Overall view of lubrication points is located at the end of this work package. Localized views are located, together with specific lubrication instructions, in the PMCS Table in WP 0012 00.**
- **The tractor is no longer enrolled in the Army Oil Analysis Program (AOAP).**
- **Refer to FM 9-207 for lubrication in arctic operation.**

1. Included in this PMCS are lubrication services to be performed by the operator.
2. Lubrication intervals are based on normal operation. Lubricate more during constant use and less during inactive periods. Use correct grade of lubricant for seasonal temperature expected. Refer to the *KEY* at the end of this work package.
3. For equipment under manufacturer's warranty, hardtime intervals shall be followed. Shorten intervals if lubricants are known to be contaminated or if operation is under adverse conditions (e.g., longer than usual operating hours, extended idling periods, extreme dust, etc.).
4. Keep all lubricants in a closed container and store in a clean, dry place away from extreme heat. Keep container covers clean and do not allow dust, dirt or other foreign material to mix with lubricants. Keep lubrication equipment clean and ready for use.

Solvent cleaning compound MIL-PRF-680 Type III is an environmentally compliant and low toxic 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.

5. Clean area around lubrication points with solvent cleaning compound (Item 2, WP 0019 00) or equivalent before lubricating equipment. Keep all external parts of equipment not requiring lubrication free of lubricants. After lubrication, wipe off excess lubricant to prevent accumulation of foreign matter.
6. Maintain a record of lubrication performed and report any problems noted during lubrication. Refer to DA Pam 738-750 for forms and procedures to record and report any findings.

NOTE

Only lubricants authorized for use by the operator are listed in this KEY.

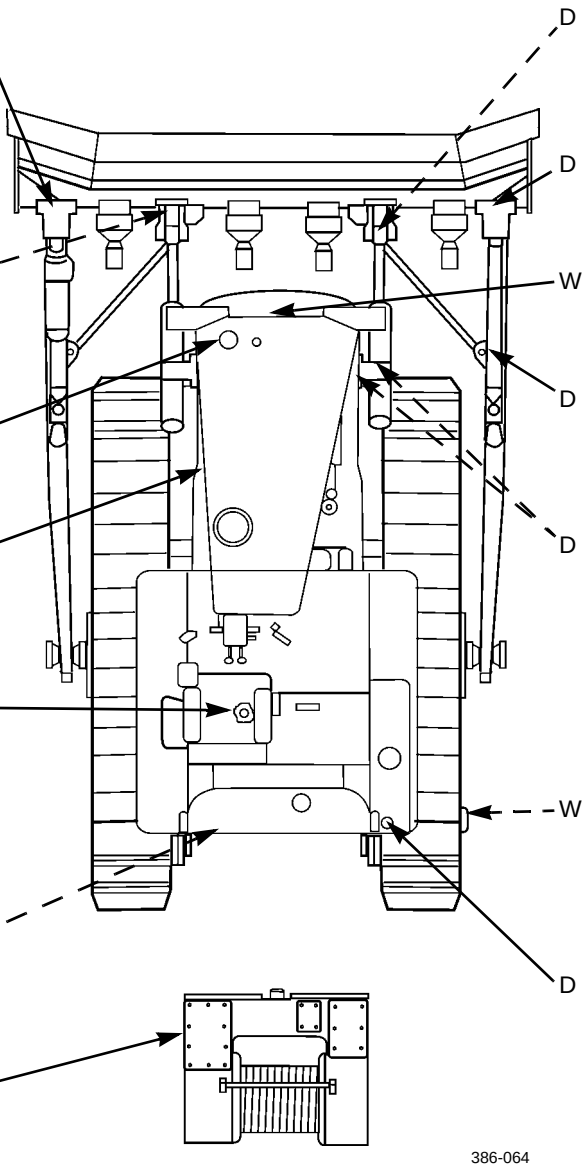
- KEY -

LUBRICANT/ COMPONENT	REFILL CAPACITY	EXPECTED TEMPERATURES*			INTERVALS
		Above +15°F (Above -9°C)	**+40°F to -15°F (+4°C to -26°C)**	**+40°F to -65°F (+4°C to -54°C)**	
OE/HDO Lubricating Oil, ICE, Tactical Service (MIL-PRF-2104)					D - Daily W - Weekly
OEA-30 Lubricating Oil, ICE, Arctic (MIL-PRF-46167)					
Engine Crankcase	29 qt (27.4 l)	OE/HDO - 15/40 or OE/HDO-30 See Note	OE/HDO - 15/40 or OE/HDO-10 See Note	OEA-30	
Transmission, Bevel Gear and Steering Clutch Compartments	148 qt (140.0 l)				
Hydraulic Tank	88 qt (83.2 l)	OE/HDO-15/40 or OE/HDO-10 See Note		OEA-30	
Hydraulic System	112 qt. (106.0 l)				
GAA Grease, Automotive and Artillery					
Track Roller Frame Inner and Outer Bearings	As Reqd	All Temperatures			
Blade Lift Cylinder Support and Upper and Lower Trunnion Bearings	As Reqd	All Temperatures			
Blade Tilt Brace and Tilt Cylinder Ball and Socket	As Reqd	All Temperatures			
Blade Tilt Brace Screw Threads	As Reqd	All Temperatures			
Blade Adjustable Brace	As Reqd	All Temperatures			
Ripper Linkage and Cylinder Bearings	As Reqd	All Temperatures			
Fan Drive Pulley Bearing	As Reqd	All Temperatures			
ANTIFREEZE Permanent, Ethylene Glycol, Inhibited (MILA46153)					
Cooling System	48 qt. (45.4 l)	Refer to PMCS Table			

* For arctic operation, refer to FM 9-207.

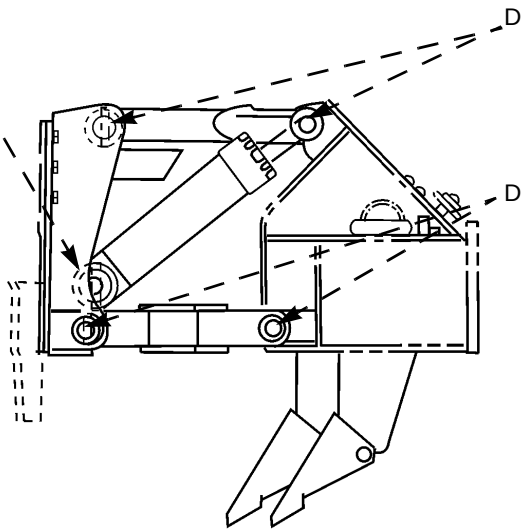
Note: Grade 15W-40 (OE/HDO-15/40) is the preferred lubricant but should only be used when temperatures are above 0°F (-18°C).

LUBRICANT	INTERVAL	
Blade Tilt Cylinder Ball and Socket (2 Fittings)	GAA	D
Blade Lift Cylinder Lower Trunnion Bearings (1 Fitting Each Side)	GAA	D
Radiator Check Level/Add		D
Engine Crankcase Check Level/Add	OE/HDO or OEA-30	D
Transmission Assembly Check Level/Add	OE/HDO or OEA-30	D
Track Roller Frame Inner Bearings (1 Fitting Each Side)	GAA	W
Winch Check Level/Add	OE/HDO or OEA-30	D



INTERVAL	LUBRICANT	
GAA	Blade Adjustable Brace (2 Fittings Each Side)	D
GAA	Blade Tilt Brace Ball and Socket (2 Fittings)	D
GAA	Fan Drive Pulley Bearing (1 Fitting)	W
GAA	Blade Tilt Brace Screw Threads (1 Fitting)	D
GAA	Lift Cylinder Support and Upper Trunnion Bearings (4 Fittings Each Side)	D
GAA	Track Roller Frame Outer Bearings (1 Fitting Each Side)	W
OE/HDO or OEA-30	Hydraulic Tank Check Level/Add	D

LUBRICANT	INTERVAL		INTERVAL	LUBRICANT
Ripper Cylinder Pins (2 Fittings Each Cylinder)	GAA	D	GAA	Ripper Link Pivot Pins (4 Fittings Each Link)
			GAA	Ripper Beam Pivot Pins (4 Fittings Each Beam)



RIPPER

END OF WORK PACKAGE

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) 0012 00

PMCS INITIAL SETUP

Tools and Test Equipment

Basic issue items (WP 0017 00)

Materials/Parts

Antifreeze (Item 1, WP 0019 00)

Detergent (Item 3, WP 0019 00)

Grease, GAA (Item 7, WP 0019 00)

Oil, lubricating, OE/HDO-10 (Item 9, WP 0019 00)

Oil, lubricating, OE/HDO-15/40 (Item 10, WP 0019 00)

Oil, lubricating, OEA-30 (Item 8, WP 0019 00)

Materials/Parts - Continued

Oil, lubricating, OE/HDO-30 (Item 11, WP 0019 00)

Rags (Item 12, WP 0019 00)

Personnel Required

Driver/operator

Equipment Condition

Tractor parked on level ground (WP 0005 00, Page 0005 00-14)

Engine OFF (WP 0005 00, Page 0005 00-14)

Blade lowered to ground (WP 0005 00, Page 0005 00-14)

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
				NOTE • **Review all WARNINGs, CAUTIONs and NOTEs before performing Operator PMCS on the D7F Tractor.** • **Perform all weekly and before operation PMCS checks if:** **a. You are the assigned operator but have not operated the tractor since the last weekly checks.** **b. You are operating the tractor for the first time.** • **Unless otherwise indicated, perform all lubrication and preventive maintenance with tractor parked on level ground, transmission in N (Neutral) with transmission lock lever in locked position, brake lock lever engaged, implements lowered to the ground and engine shut down.** • **After one week of initial operation of a SLEP D7F Tractor, notify Unit Maintenance to replace transmission, bevel gear and steering clutch oil filter element and clean magnetic strainer.** • **After one month of initial operation of a SLEP D7F Tractor, notify Unit Maintenance to check level of oil in final drives.**	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor.

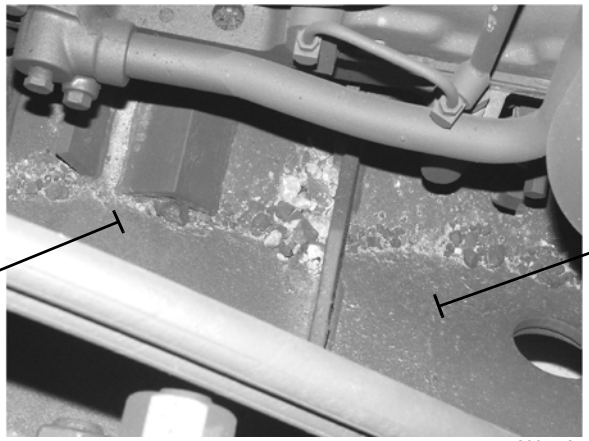
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			FRONT AND LEFT SIDE		
1	**Before**		**Overall View**	a. Check on ground under tractor for evidence of fluid leakage such as oil, coolant or fuel.	Class III leaks are evident.
				b. Check tractor for obvious damage that would impair operation.	Damage that would impair operation is evident.
				c. Check for evidence of fluid leakage at tractor belly pans.	Class III leaks are evident.
				 386-712	
2	**Before**		**Lift Cylinders, Tilt Cylinder and Lines and Fittings**	a. Check lift cylinders on both sides at front of machine for leakage. Also check tilt cylinder on left side of machine.	Class III leaks are evident.
				b. Check exposed tilt cylinder and lift cylinder lines for leaks.	Class III leaks are evident.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
3	Before		Ether Starting Aid System	 WARNING  **Ether fuel is extremely flammable and toxic. DO NOT smoke and make sure you are in a well-ventilated area away from heat, open flames or sparks. Wear eye protection. Avoid contact with skin and eyes and avoid breathing ether fumes. If fluid enters or fumes irritate the eyes, wash immediately with large quantities of clean water for 15 minutes. Seek medical attention immediately if ether is inhaled or causes eye irritation. Failure to follow this warning may cause injury or death.**	
				a. If required for cold weather starting, check to ensure ether canister is present and securely installed. b. If canister is not installed, loosen thumbscrew, open cover and ensure cap is installed on solenoid valve.	Ether canister is missing or loose, if required for cold weather starting.
4	Before	0.3 Hours	Radiator	 WARNING  • **DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.** • **DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Loosen cap to first stop and let any pressure out of cooling system, then remove cap. Failure to follow this warning may cause serious burns.** • **Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.**	
				a. Check for coolant leaks, worn or damaged hoses and debris buildup. Remove buildup of debris. b. With engine off and cool, remove radiator cap and check coolant level. Coolant level should be within 1/2 in. (13 mm) of bottom of fill pipe.	Class III leaks are evident.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
4 (Con't)				c. Note color of coolant. Coolant should not appear rusty or brownish. Notify your supervisor if coolant is rusty or brownish.	
				NOTE • **If unsure of coolant type in your tractor, notify your supervisor.** • **Use clean water that is low in scale-forming minerals. Do NOT use softened water.**	
				d. If level of coolant is low, add a 50/50 mixture of antifreeze (Item 1, WP 0019 00) and clean water to bring level up to correct level.	
				e. Wipe pressure cap clean with a clean rag (Item 12, WP 0019 00).	
				f. Inspect radiator cap for damage to cap or cap gasket, foreign material and deposits.	Gasket is missing or damaged.
				g. Install radiator cap.	
5	**Before**	**0.2 Hours**	**Engine Oil Level**	NOTE **To ensure an accurate COLD CHECK reading, engine must be shut down and cold.**	
				a. Wipe area clean around dipstick and oil filler tube.	
				b. Remove dipstick, wipe clean, then reinsert fully into dipstick tube. Remove dipstick and take reading.	
				c. Level must be within cross-hatched area on side of dipstick labeled SAFE STARTING RANGE WITH ENGINE STOPPED AND OIL COLD.	
				d. If required, add lubricating oil (Item 8, 9, 10 or 11, WP 0019 00). Refer to *KEY* at end of WP 0011 00 for correct grade of oil for expected temperature range.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
5 (Con't)				(1) Turn filler cap to the left and remove. (2) Add oil through filler tube opening until level is within cross-hatched area on SAFE STARTING RANGE WITH ENGINE STOPPED AND OIL COLD side of dipstick. (3) Reinstall filler cap and turn to the right until tight.	

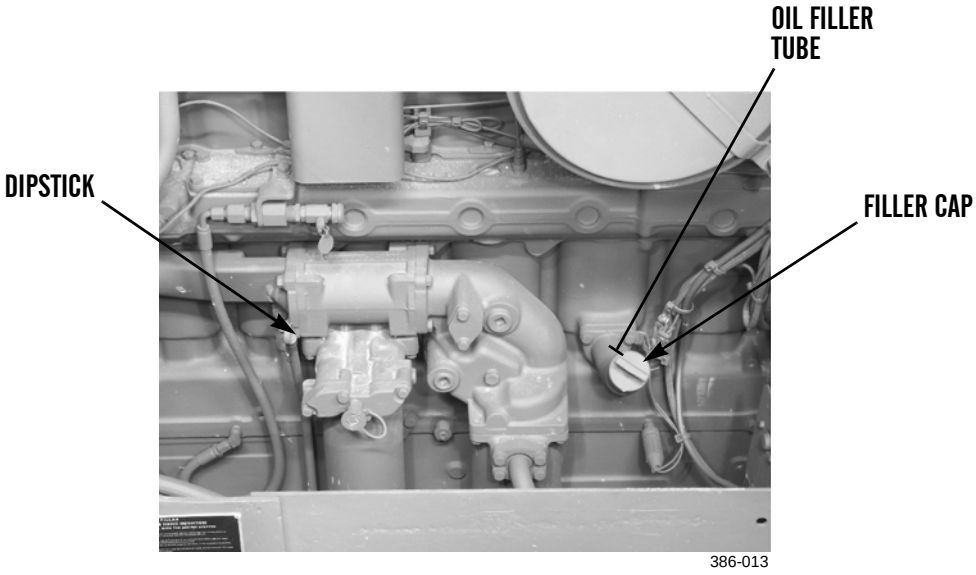


Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

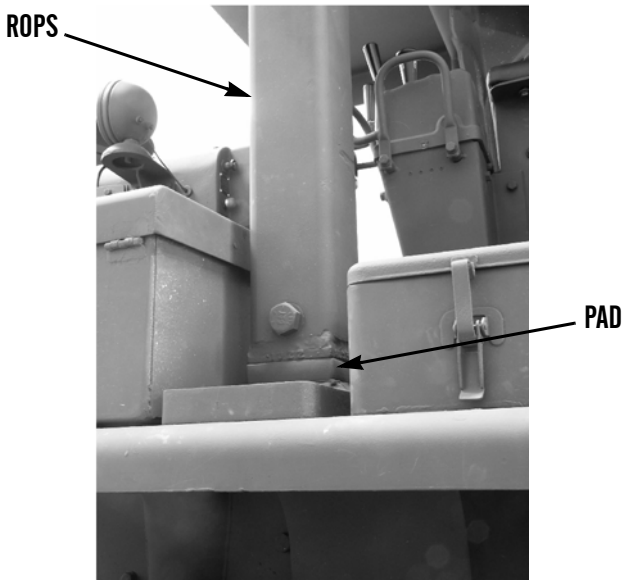
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
6	**Before**		**ROPS**	Inspect for loose mounting bolts and cracks, bends or broken welds in ROPS and pads.	ROPS and pads have loose or missing bolts or cracks, bends or broken welds.
				 386-711	
			REAR AND RIGHT SIDE		
7	**Before**		**Overall View**	NOTE **Notify Unit Maintenance to check final drive oil level if Class III leaks are noted from final drive.** a. Check on ground under tractor for evidence of transmission and final drive oil leakage. Be alert for leaks from final drive check level/fill and drain plugs.	Class III leaks are evident.
				b. Check tractor for obvious damage that would impair operation.	Damage that would impair operation is evident.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

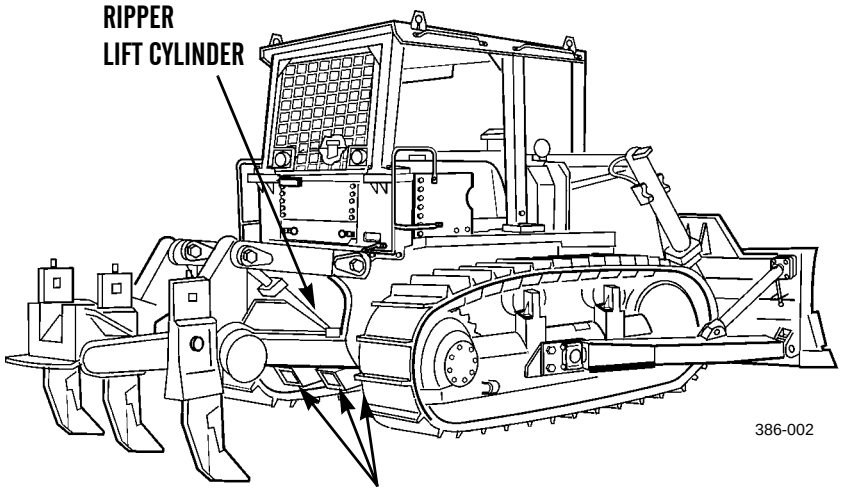
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
8	**Before**		**Ripper (If Equipped)**	Inspect ripper lift cylinder and lines for leakage.	Class III leaks are evident.
					
9	**Before**		**Winch (If Equipped)**	a. Inspect for structural damage or leakage.	Class III leaks are evident.
				b. Ensure hook and clevis are present and securely installed on end of wire rope.	Hook and clevis are missing, if required for mission.
				c. Ensure safety latch is present on hook.	Safety latch is missing.
10	**Before**		**Drawbar**	Ensure pin and safety latch are present.	Pin and safety latch are missing, if required for mission.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

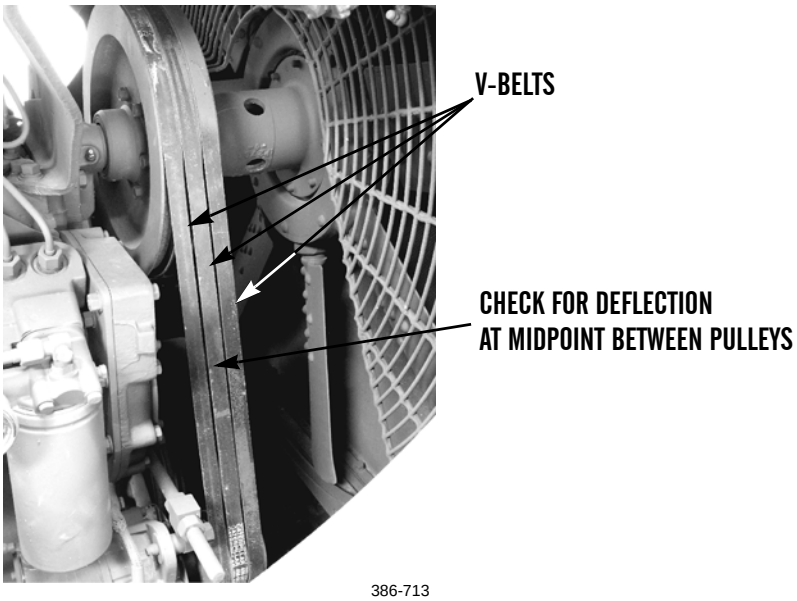
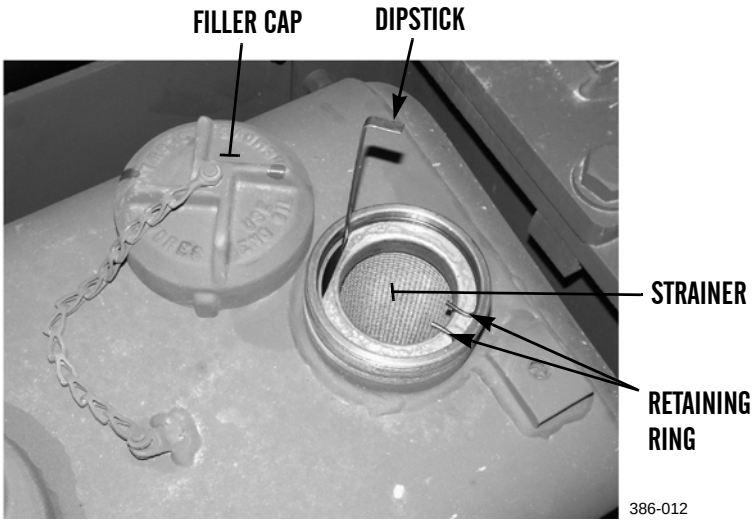
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
11	**Before**		**V-belts**	Check fan and alternator V-belts. Check for loose, torn frayed, missing, excessively worn or unevenly worn belts. Belt deflection should be no more than 1/2 in. (13 mm), checked at midpoint between pulleys.	V-belts are loose, torn, frayed, missing or excessively/unevenly worn.
				 386-713	
12	**Before**		**Belly Pans**	Check for evidence of fluid leaks at tractor belly pans.	Class III leaks are evident.
13	**Before**	**0.2 Hours**	**Hydraulic System Oil Level**	Check level of oil in hydraulic tank: a. Wipe area clean around filler cap. b. Slowly turn filler cap to the left and allow any pressure to release, then remove cap.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
13 (Con't)					



c. Remove dipstick from filler opening, wipe clean, reinstall, then remove to check reading on dipstick. Oil must be between ADD and FULL lines on dipstick.

d. If level is low, first ensure that strainer is clean and free of debris. Remove and clean, if necessary, as follows:

WARNING

Wear eye protection to avoid injury.

(1) Compress and remove retaining ring.

(2) Remove dipstick and strainer. Clean strainer.

(3) Reinstall dipstick and strainer. Secure strainer with retaining ring.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION / ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
13 (Con't)				e. Add oil (Item 8, 9 or 10, WP 0019 00) through filler opening until level on dipstick is between ADD and FULL lines on dipstick. Refer to *KEY* at end of WP 0011 00 for correct grade of oil for expected temperature range.	
				f. Reinstall dipstick.	
				g. Reinstall filler cap and turn to the right until tight.	
			OPERATOR STATION		
14	**Before**		**Seat, Seat Belt, Gages and Indicators**	a. Occupy and adjust seat (WP 0004 00, Items 41 through 43).	
				b. Check all gages and indicators for damage.	Damage is evident that would impair operation.
				c. Check for damage to governor and steering clutch levers, brake pedals and decelerator pedal. There should be free movement.	Damage is evident that would impair operation.
				d. If equipped with winterized cab, check for broken or damaged windows. Ensure windows are clean, to ensure an unobstructed view.	
				e. Start engine and allow to warm up (WP 0005 00).	
				f. Ensure all indicators and gages are functioning properly. Be sure to check fuel pressure gage on right side of engine compartment (WP 0004 00, Items 20 through 24).	Needle is in RED zone on gage.
				WARNING **Use of seat belt while operating machine is mandatory. Fasten belt BEFORE operating machine. Trying to fasten seat belt during operation creates a hazardous condition. Failure to follow this warning may result in injury or death.**	
				g. Fasten seat belt (WP 0005 00, page 0005 00-1). Adjust as needed so that belt is snug across lap with buckle in the middle.	Seat belt is missing or will not buckle or adjust.
				h. Check operation of flood lights and dash lights.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
15	**Before**		**Winterized Cab (If Equipped)**	a. Check defroster fans for proper operation.	
				b. Check windshield wipers for proper operation.	
				c. Check heater for proper operation.	
16	**Before**		**Steering Brake and Steering Clutch Controls**	a. Move tractor ahead slowly. Depress both brake pedals and ensure tractor stops.	Brakes do not function.
				b. Test right and left steering clutch levers while moving ahead slowly.	Either lever fails to turn tractor.
17	**Before**		**Implement Controls**	Check controls of bulldozer blade and winch (if equipped) or ripper (if equipped) for proper operation.	Controls do not function properly.
				NOTE **Non-SLEP machines do not have a backup alarm.**	
18	**Before**		**Backup Alarm (If Equipped)**	a. Place transmission in reverse and listen for backup alarm to sound.	
				b. Return transmission to neutral (N) and lock.	
19	**During**		**Indicators, Gages and Dash Panel Lights**	a. Check oil pressure gage for proper operating pressure.	Needle is in RED zone on gage.
				b. Check engine water temperature gage for proper operating temperature.	Needle is in RED zone on gage.
				c. Check transmission oil pressure gage and torque converter temperature gage for proper pressure and operating temperature.	Needle is in RED zone on gages.
				d. Check air cleaner indicator for proper operation. If red band is visible, service air cleaner (WP 0014 00).	
				e. Check ammeter for proper operation.	Needle is in RED zone on gage.
				f. Check operation of dash lights.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
20	**During**		**Overall Machine**	a. Be alert for evidence of fluid leaks such as oil, coolant or fuel. b. Be alert for proper operation of steering brakes and power train components. c. Be alert for proper operation of implement controls.	Class III leaks are evident.
			FRONT AND LEFT SIDE		
				NOTE • **Ensure tractor is parked on level ground with transmission in neutral (N), transmission safety lock lever in locked position, brake lock lever engaged and implements lowered to ground.** • **Leave engine running for transmission and engine HOT oil level checks, and until track inspection has been performed.**	
21	**After**	**0.2 Hours**	**Transmission Oil Level**	Check level of oil in transmission with engine running at low idle speed and transmission warm: a. Tilt operator seat forward to access transmission dipstick and filler tube under seat. b. Wipe area clean around dipstick and oil filler tube and cap. c. Remove dipstick, wipe clean, then reinstall. Remove dipstick and check level on dipstick. Maintain level at FULL line on dipstick. d. If level is low, use square key (Item 3, WP 0017 00) and adjustable wrench (Item 5, WP 0017 00) to remove filler cap. Add lubricating oil (Item 8, 9, 10 or 11, WP 0019 00) until level indicated on dipstick is at FULL line. Refer to *KEY* at end of WP 0011 00 for correct grade of oil for expected temperature range.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

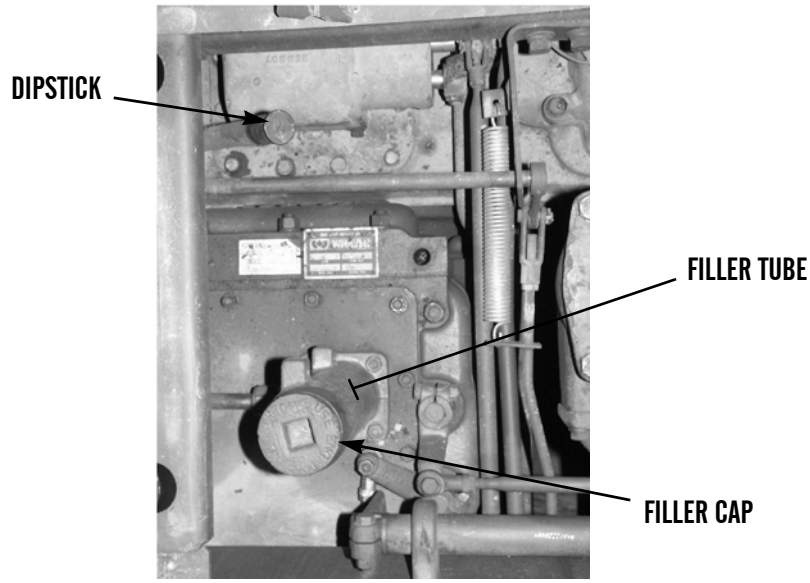
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
21 (Con't)					
					
22	**After**	**0.2 Hours**	**Engine Crankcase**	With engine running, warm and operating at low idle, check level of oil in engine crankcase: a. Wipe area clean around dipstick and oil filler tube and cap. b. Remove dipstick, wipe clean, then reinsert fully into dipstick tube. Remove dipstick and take reading. c. Level must be at FULL mark on side of dipstick labeled ENGINE RUNNING AT LOW IDLE WITH OIL WARM. d. If required, add lubricating oil (Item 8, 9, 10 or 11, WP 0019 00). Refer to *KEY* at end of WP 0011 00 for correct grade of oil for expected temperature range.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
22 (Con't)				(1) Turn filler cap to the left and remove. (2) Add oil through filler tube opening until level is at FULL mark on ENGINE RUNNING AT LOW IDLE WITH OIL WARM side of dipstick. (3) Reinstall filler cap and turn to the right until filler cap is tight.	

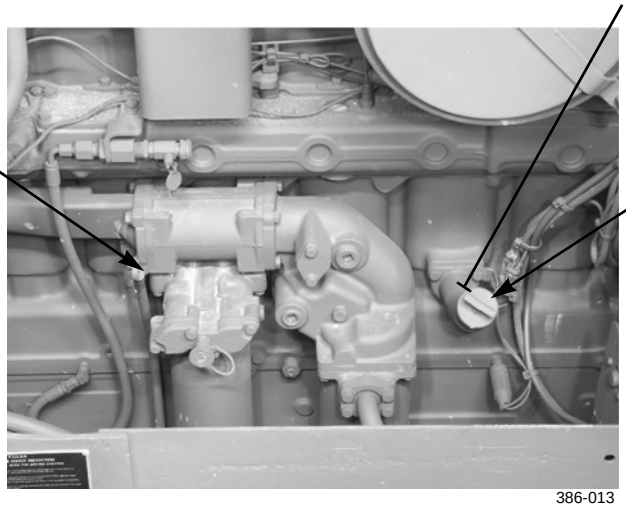


Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

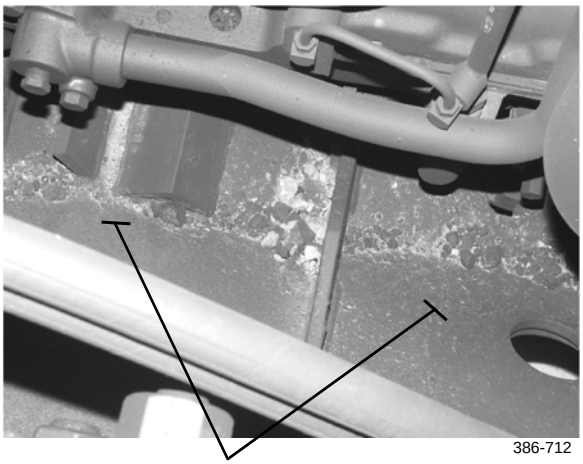
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
23	**After**		**Overall View**	a. Check on ground under tractor for evidence of fluid leakage such as oil, coolant or fuel.	Class III leaks are evident.
				b. Check tractor for obvious damage that would impair operation.	Damage that would impair operation is evident.
				c. Check for evidence of fluid leakage at tractor belly pans.	Class III leaks are evident.
				 386-712 CHECK FOR LEAKS AT BELLY PANS	
24	**After**		**Bulldozer Blade Assembly**	a. Check blade cutting edges and end bits for cracks, wear or damage and missing or loose mounting bolts.	Edge is cracked, damaged or worn to less than 3/4 in. (19 mm) from edge of moldboard. End bits are worn/damaged in the same manner. Mounting bolts are missing or loose.
				b. Check that all four scarifiers are present, securely mounted and in good condition.	Scarifier is missing or mounting is loose. Teeth are missing or damaged, if required for mission.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
25	**After**		**Lift Cylinders, Tilt Cylinder and Lines and Fittings**	a. Check lift cylinders on both sides at front of machine for damage or leakage. Also check tilt cylinder on left side.	Class III leaks are evident or damage that would impair operation.
				b. Check exposed tilt cylinder and lift cylinder lines for leaks or for damage or wear that could cause leaks.	Class III leaks are evident. Lines show wear or damage that could cause leaks.
				c. Check for pitting or rust on exposed cylinder rods.	Pitting or rust are evident.
26	**After**		**Radiator Guards**	Check upper and lower guards for damage and loose or missing bolts.	Guard is touching radiator. Guard dents or damage prevent air circulation to radiator. Loose or missing bolts are evident.

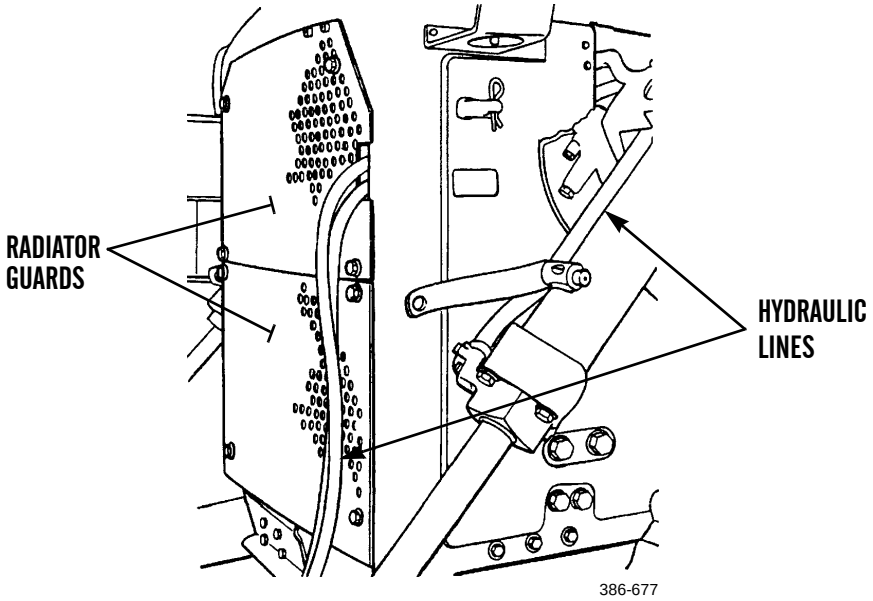
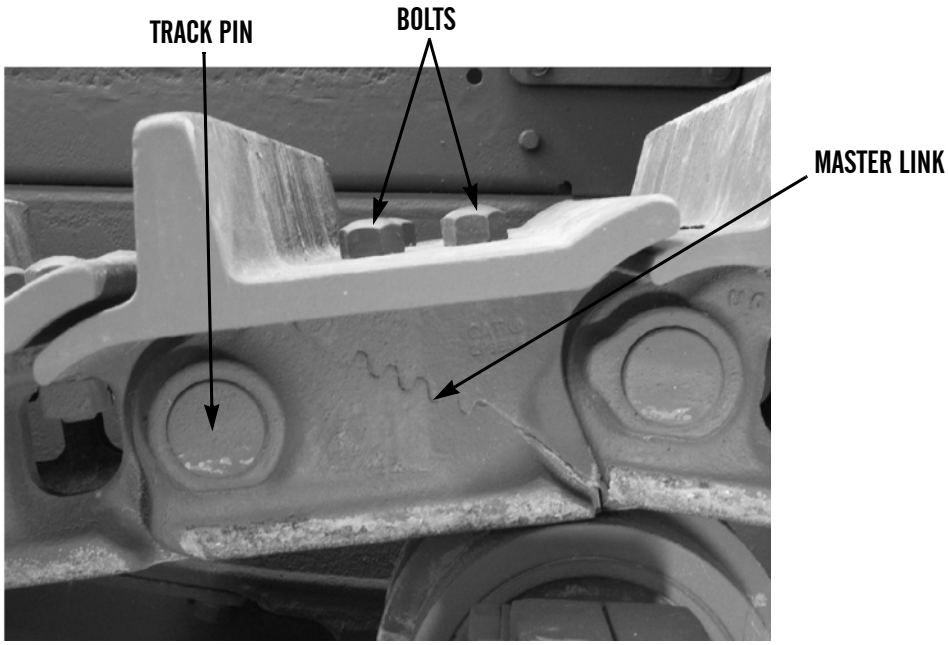


Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

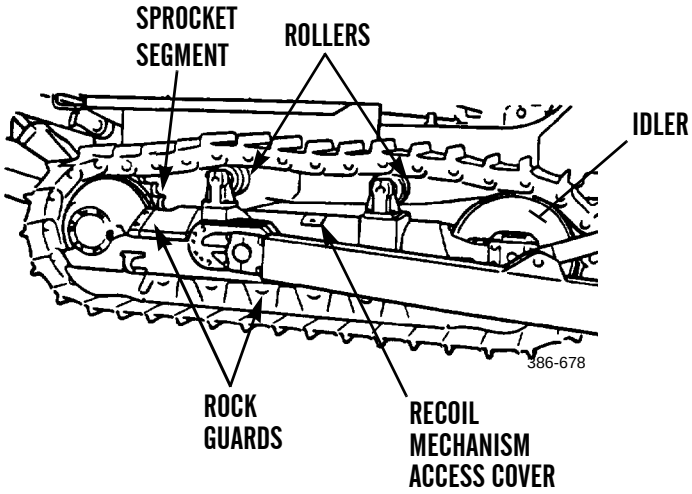
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
27	**After**	**0.3 Hours**	**Tracks**	a. Inspect tracks on left side of machine for damaged shoes and missing or loose bolts. Check master link for missing or loose bolts.	Any bolts are missing or loose.
				b. Check recoil mechanism access cover for damage and loose or missing bolt.	Access cover is damaged and cannot be securely closed.
				c. Check all rock guards for damage and loose or missing bolts.	Guard is missing or loose.
				d. Check idler and rollers for wear, leaks, damage and loose or missing hardware. Notify your supervisor if any leaks are evident.	Damaged or worn idlers or rollers are evident. Loose or missing hardware is noted.
				e. Inspect track pins for evidence of leaking oil. Any wetness in area of track pin bushings indicates a problem. Notify your supervisor.	



386-714

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
27 (Con't)				WARNING **BE ALERT for personnel in the area while moving tractor to perform inspection. While operator moves tractor, an assistant must look for damage to sprocket segments. Ensure assistant is clear, to the side of tracks, and all other personnel are clear of the area. Failure to follow this warning may cause injury or death.**	
				f. Check sprocket segments for missing or broken segments.	Any sprocket segment is missing or damaged.



RIGHT SIDE IS SHOWN. LEFT SIDE IS THE SAME.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
27 (Con't)				g. Check track tension as follows: (1) Place a straight edge on top of grousers, between idler and front carrier roller. (2) Measure track sag between bottom edge of straight edge and top of grouser, at midpoint between idler and front carrier roller. (3) If sag, distance A, is 1 1/2 - 2 in. (3.8-5.1 cm), track tension is OK. (4) Adjust track if too tight or too loose (WP 0015 00).	
28	**After**		**Belly Pans**	Look under tractor and check for damage to belly pans. Check for loose or missing mounting bolts.	Belly pan is missing, severely bent or loose.

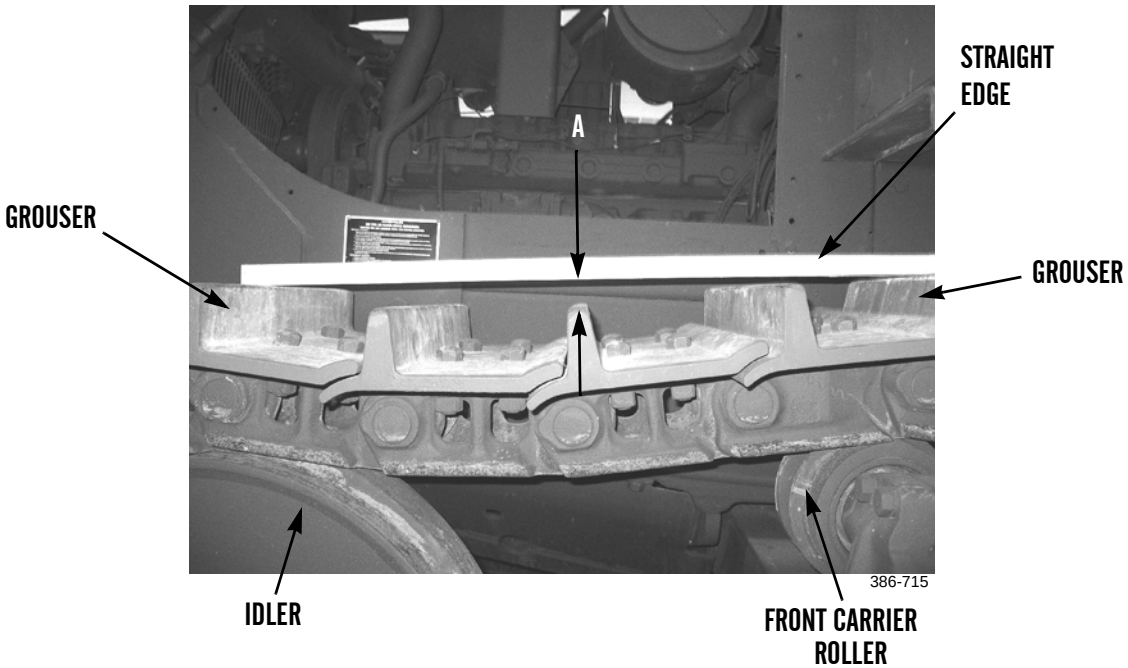


Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

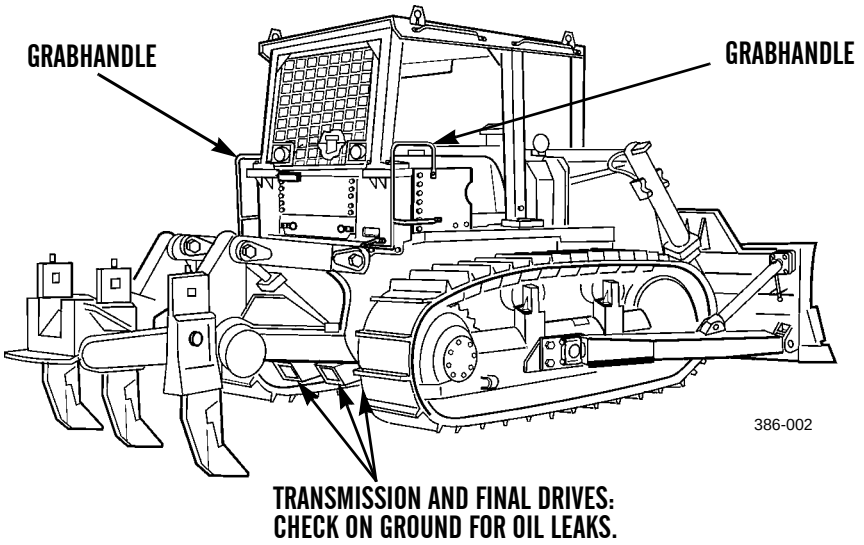
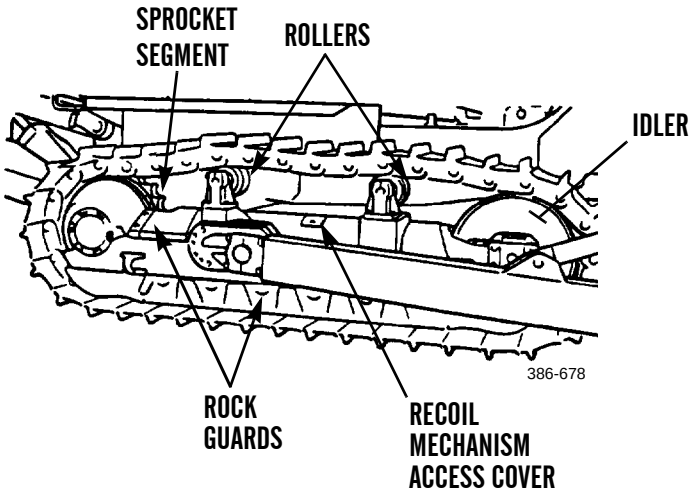
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
29	**After**		**Grabhandles**	Check for presence and security of grabhandle mounting at left rear of cab.	
					
			REAR AND RIGHT SIDE		
30	**After**		**Overall View**	a. Check on ground under tractor for evidence of transmission and final drive oil leakage.	Class III leaks are evident.
				b. Check tractor for obvious damage that would impair operation.	Damage that would impair operation is evident.
31	**After**		**Ripper (If Equipped)**	a. Inspect ripper teeth and shanks for cracks, breaks, looseness or wear. Teeth are worn if a hole has developed in tip.	Cracks, breaks, looseness or holes in teeth are evident.
				b. Inspect ripper lift cylinder and lines for damage or leakage.	Damage that would impair operation or Class III leaks are evident.
				c. Check for pitting or rust on exposed cylinder rods.	Pitting or rust are evident.
32	**After**		**Grabhandles**	Check for presence and security of grabhandle mounting at right rear of cab.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
33	**After**		**Belly Pans**	Look under tractor and check for damage to belly pans. Check for loose or missing mounting bolts.	Belly pan is missing, severely bent or loose.
34	**After**	**0.3 Hours**	**Tracks**	a. Inspect tracks on right side of machine for damaged shoes and missing or loose bolts. Check master link for missing or loose bolts.	Any bolts are missing or loose.
				b. Check recoil mechanism access cover for damage and loose or missing bolt.	Access cover is damaged and cannot be securely closed.
				c. Check all rock guards for damage and loose or missing bolts.	Guard is missing or loose.
				d. Check idler and rollers for wear, leaks, damage and loose or missing hardware. Notify your supervisor if any leaks are evident.	Damaged or worn idlers or rollers are evident. Loose or missing hardware is noted.
				e. Inspect track pins for evidence of leaking oil. Any wetness in area of track pin bushings indicates a problem. Notify your supervisor.	



RIGHT SIDE IS SHOWN. LEFT SIDE IS THE SAME.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
34 (Con't)				**WARNING** **BE ALERT for personnel in the area while moving tractor to perform inspection. While operator moves tractor, an assistant must look for damage to sprocket segments. Ensure assistant is clear, to the side of tracks, and all other personnel are clear of the area. Failure to follow this warning may cause injury or death.**	
				f. Check sprocket segments for missing or broken segments.	Any sprocket segment is missing or damaged.
				g. Check track tension as follows: (1) Place a straight edge on top of grousers, between idler and front carrier roller. (2) Measure track sag between bottom edge of straight edge and top of grouser, at midpoint between idler and front carrier roller. (3) If sag, distance A, is 1 1/2 - 2 in. (3.8-5.1 cm), track tension is OK. (4) Adjust track if too tight or too loose (WP 0015 00).	

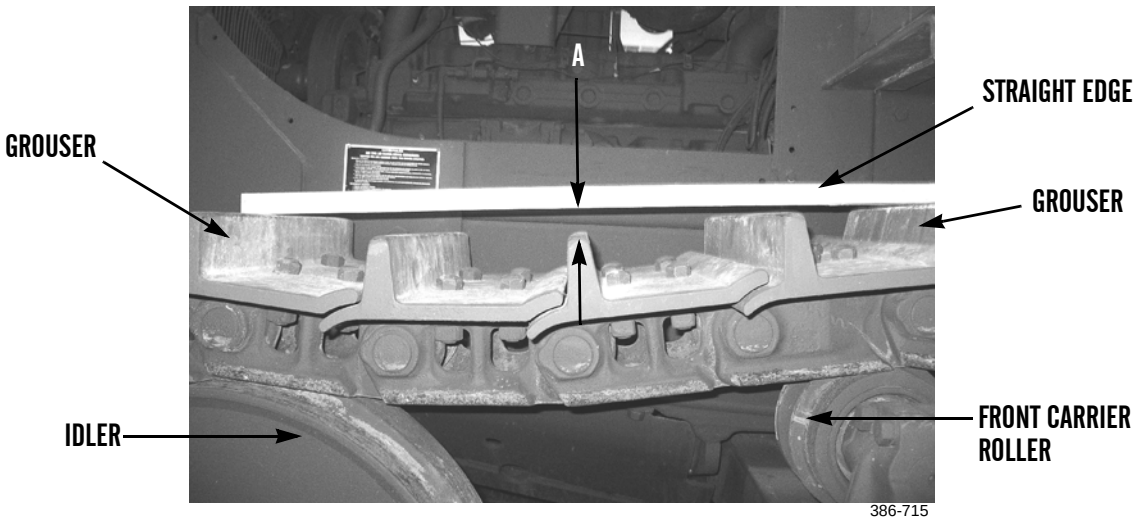


Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

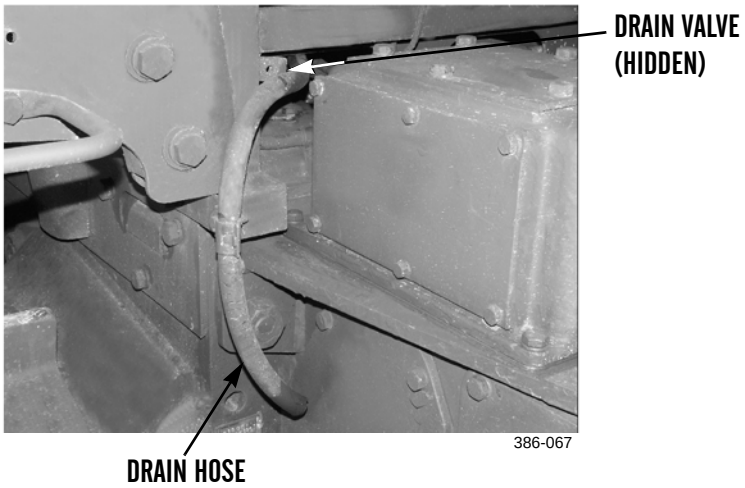
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
34 (Con't)				NOTE **Ensure tractor is parked on level ground with transmission in neutral (N), transmission safety lock lever in locked position, brake lock lever engaged and implements lowered to the ground.**	
				h. Shut down engine (WP 0005 00).	
35	**After**		**Turbocharger**	Visually check for oil leaks at turbocharger. Check for black soot between turbocharger and muffler.	Any oil leaks or soot are evident.
36	**After**		**Exhaust System**	Check for evidence of leaks. Ensure mounting is secure.	Any exhaust leaks are evident.
37	**After**		**Engine Air Precleaner**	Check precleaner for damage. Ensure precleaner is securely installed and housing is free of debris.	Precleaner is damaged or clogged.

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
38	**After**	**0.2 Hours**	**Fuel Tank**	 WARNING • **DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to machine and injury or death.** • **DO NOT smoke or permit any open flame in area of machine while you are servicing fuel system. Be sure hose nozzle is grounded against filler tube during refueling to prevent static electricity. Failure to follow this warning may result in injury to personnel or equipment damage.** • **Ensure fire extinguisher is in fuel servicing area.** NOTE **Use a suitable container to capture draining water or sediment. Dispose of drained fluid IAW local policy and ordinances. Ensure all spills are cleaned up.** a. Drain water or sediment from fuel tank as follows: (1) Place a suitable container under drain hose at left rear of fuel tank. Open drain valve and allow all water or sediment to drain. (2) Close drain valve. (3) Dispose of drained water and sediment IAW local policy and ordinances.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
38 (Con't)					



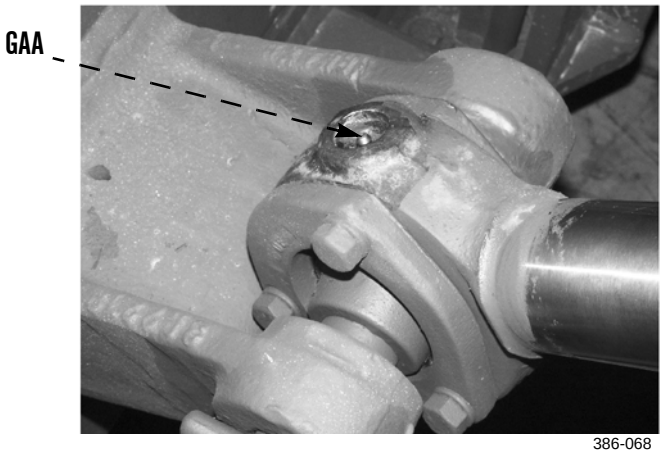
386-067

				b. Check level of fuel in tank and refuel as needed (WP 0013 00).	
39	**After**	**0.2 Hours**	**Blade Tilt Cylinder Ball and Socket**	Apply GAA grease (Item 7, WP 0019 00) to two grease fittings on blade tilt cylinder ball and sockets, on left side of machine.	

386-083

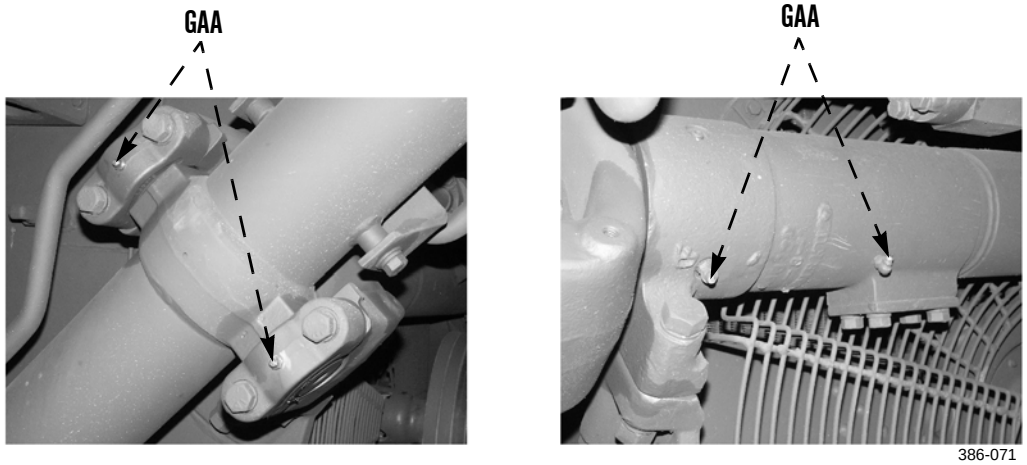
Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
40	**After**	**0.3 Hours**	**Lift Cylinder Lower Trunnion Bearings**	Apply GAA grease (Item 7, WP 0019 00) to grease fitting at each lift cylinder lower trunnion bearing.	



386-068

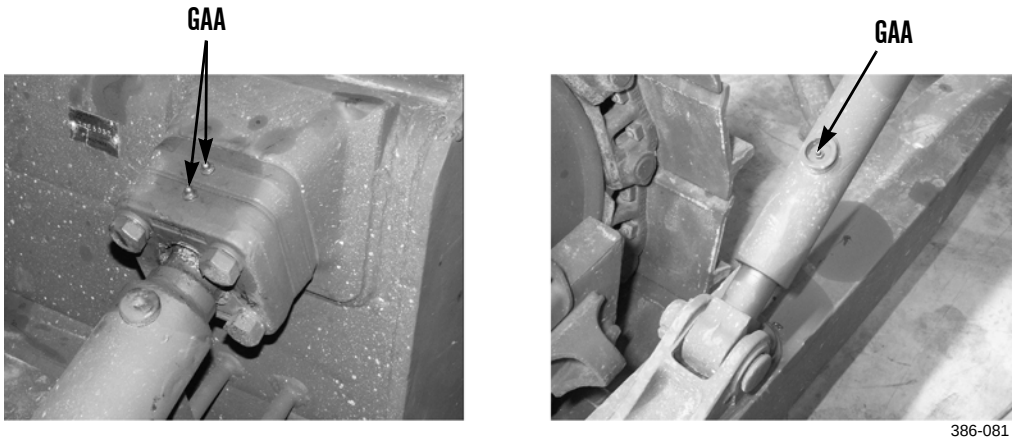
41	**After**	**0.5 Hours**	**Blade Lift Cylinder Upper Trunnion Bearings and Lift Cylinder Support**	a. Apply GAA grease (Item 7, WP 0019 00) to four grease fittings (two each side) on lift cylinder upper trunnion bearings. b. Apply GAA grease (Item 7, WP 0019 00) to four grease fittings (two each side) on lift cylinder support.	



386-071

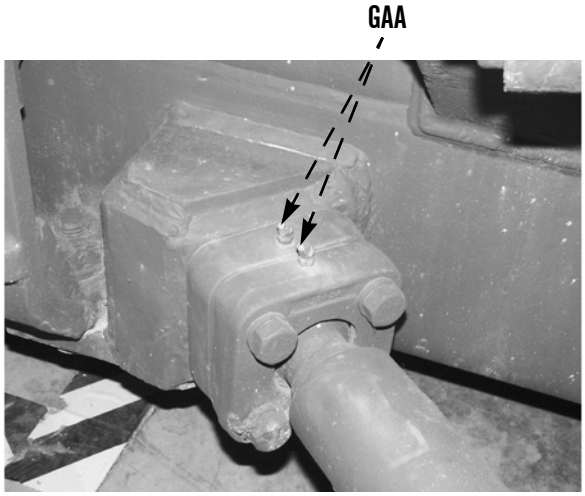
Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
42	**After**	**0.3 Hours**	**Blade Tilt Brace - Ball and Socket and Screw Threads**	a. Apply GAA grease (Item 7, WP 0019 00) to two blade tilt brace ball and socket grease fittings, on right side of machine. b. Apply GAA grease (Item 7, WP 0019 00) to blade tilt brace screw threads grease fitting.	



386-081

43	**After**	**0.4 Hours**	**Blade Adjustable (Diagonal) Brace**	Apply GAA grease (Item 7, WP 0019 00) to two grease fittings on blade adjustable (diagonal) brace ball and sockets, on each side of machine.	



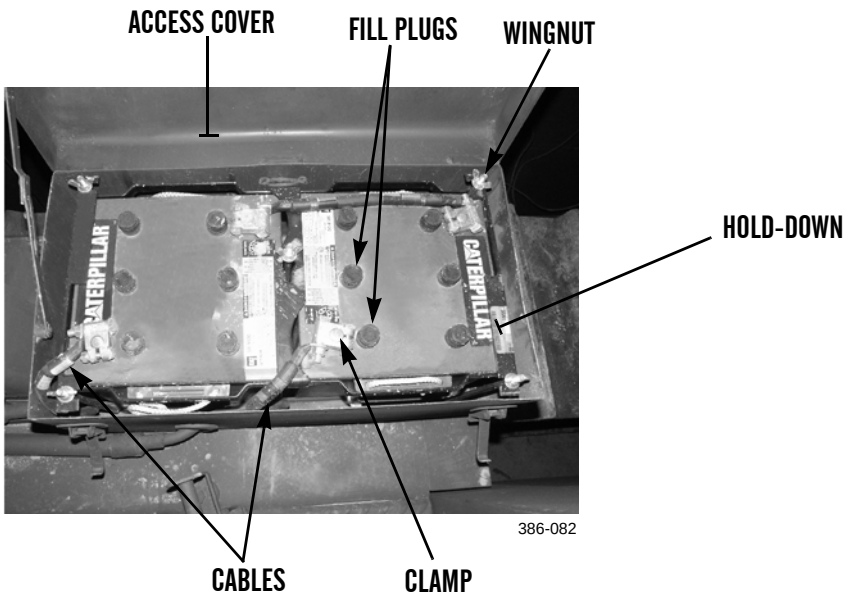
386-084

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
44	**Weekly**	**0.3 Hours**	**Batteries**	 **WARNING** • **To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.** • **Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in injury or death.** NOTE **For complete information on servicing batteries, refer to TM 9-6140-200-14.**	
				a. Release two latches and open battery box access cover on left side of tractor.	One or both batteries are missing.
				b. Inspect batteries for obvious damage such as a cracked case and electrolyte leakage.	Any electrolyte leakage is evident.
				c. Check battery hold-down for looseness and damage. If loose, tighten wingnuts.	Hold-down is damaged or loose.
				d. Check batteries for broken and corroded connections or frayed/ burned/melted cables and clamps.	Broken and corroded connections or frayed/ burned/melted cables and clamps are evident.
				e. Remove fill plugs and check electrolyte level in cells of both batteries. Level should be 1/8 in. (3 mm) above tops of plates. Add distilled water as needed to maintain correct level.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
44 (Con't)				f. Ensure batteries are clean and battery cables are secure. g. Close access cover and secure with two latches.	Battery cables are not secure.



45	**Weekly**	**0.3 Hours**	**Track Roller Frame Inner Bearings**	Apply GAA grease (Item 7, WP 0019 00) to two track roller frame inner bearings under rear of machine.	

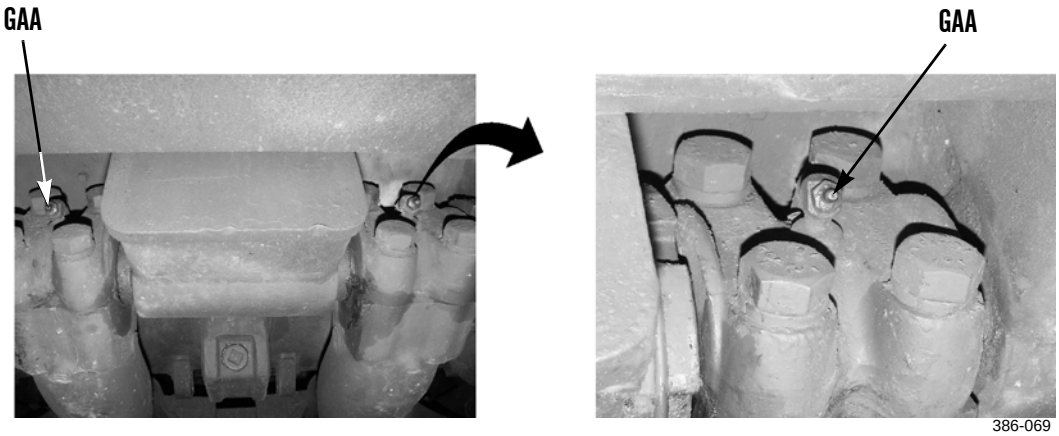


Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

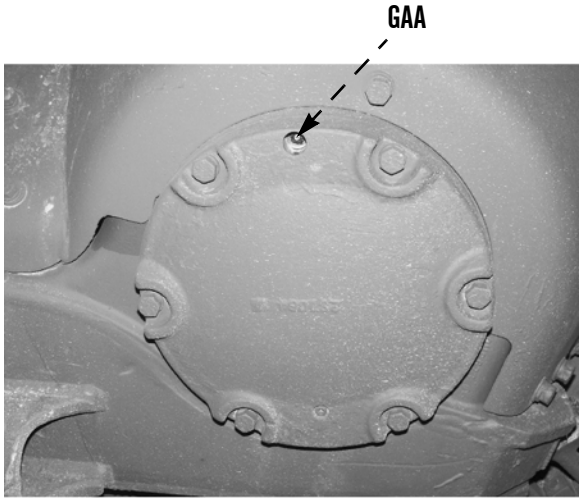
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
46	**Weekly**	**0.3 Hours**	**Track Roller Frame Outer Bearings**	On each side, completely fill retainer cavity with GAA grease (Item 7, WP 0019 00) to lubricate track roller frame outer bearings. Pump grease gun until you can hear grease being expelled.	
				 386-070	
47	**Weekly**	**0.5 Hours**	**Ripper (If Equipped)**	Apply GAA grease (Item 7, WP 0019 00) to 20 ripper linkage and cylinder bearing grease fittings, 10 on each side.	
48	**Weekly**	**0.2 Hours**	**Fan Drive**	Apply GAA grease (Item 7, WP 0019 00) to fan drive grease fitting.	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

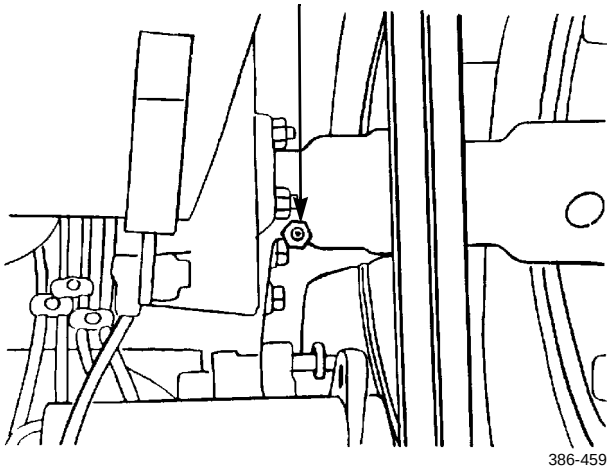
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
48 (Con't)					
				 386-459	
49	**Monthly**		**Winch Wire Rope (If Equipped)**	**WARNING** **When handling winch wire rope, wear a pair of heavy gloves. Damaged or frayed wires can injure fingers and hands.** a. Unreel full length of wire rope (WP 0005 00, Page 0005 00-11).	
				 **WARNING** **Wear eye protection when using wire brush to protect against injury.** b. Clean entire length of wire rope with a wire brush.	
				c. Inspect entire length of wire rope for flat spots, fraying, kinks and signs of rusting.	Wire rope has any flat spot more than 1/2 the diameter of the wire rope. Any frays or kinks are evident.
				d. Reel in wire rope (WP 0005 00, Page 0005 00-11).	

Table 1. Operator Preventive Maintenance Checks and Services (PMCS) for D7F Tractor - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION ITEM TO CHECK/ SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
50	**Monthly**		**Winterized Cab (If Equipped)**	a. Check window latch on working window for proper operation. b. Check door stop and securing bolt for proper operation. c. Check door handles and locks for proper operation.	
51	**Monthly**		**Decals and Data Plates**	Ensure all decals and data plates are present and legible (WP 0007 00).	

END OF WORK PACKAGE

REFUELING AND FUEL SYSTEM PRIMING 0013 00

THIS WORK PACKAGE COVERS

Refueling, Fuel System Priming

INITIAL SETUP

Support Equipment

Extinguisher, fire (Item 2, WP 0017 00)

Materials/Parts

Fuel (Item 4, 5 or 6, WP 0019 00)

Rag, wiping (Item 12, WP 0019 00)

Equipment Condition

Engine OFF (WP 0004 00, Item 12)

Battery disconnect switch in OFF position (WP 0004 00, Item 27)

REFUELING

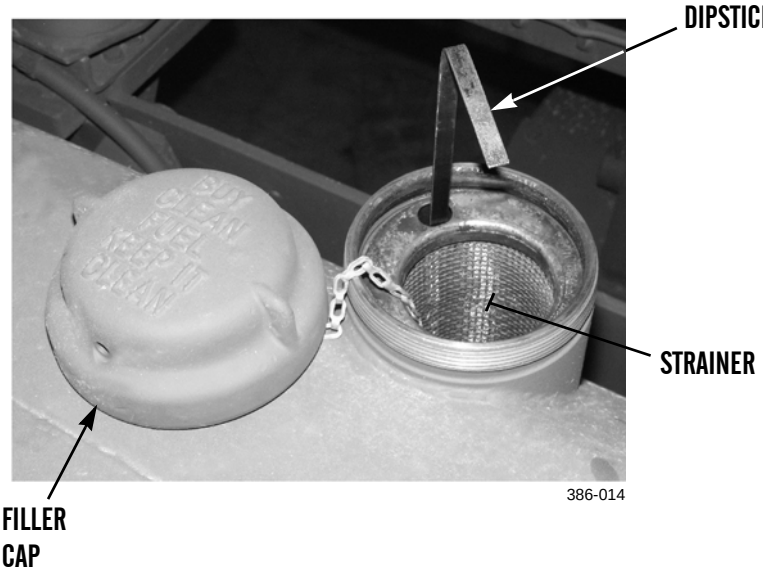
WARNING

- **DO NOT smoke or permit any open flame in area of tractor while you are servicing fuel system. Be sure hose nozzle is grounded against filler tube during refueling to prevent static electricity. Failure to follow this warning may result in injury to personnel or equipment damage.**
- **If equipped with a winterized cab, turn heater off during refueling.**

NOTE

- **Ensure portable fire extinguisher is within reach prior to refueling.**
- **DO NOT overfill fuel tank. If fuel starts foaming from fuel tank, stop IMMEDIATELY to avoid fuel spillage.**

1. Wipe off dirt from around filler cap.
2. Turn filler cap to the left and remove cap.
3. If strainer is filled with debris, remove strainer and dipstick. Remove debris and reinstall strainer and dipstick.
4. Fill tank with fuel to FULL line on dipstick. Use correct grade of fuel IAW expected temperature range of operation.
5. Install filler cap by turning cap to the right.

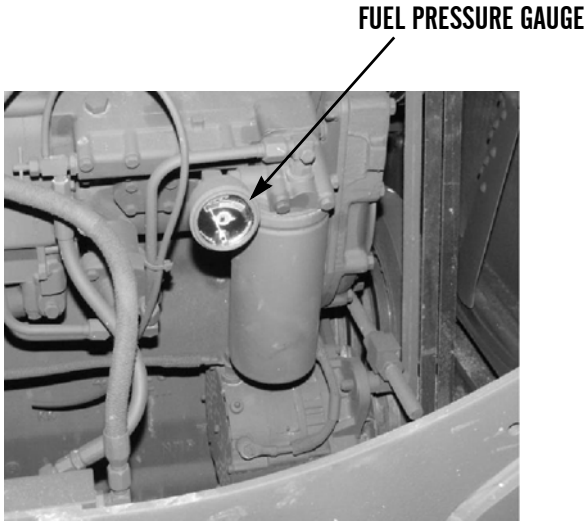


FUEL SYSTEM PRIMING

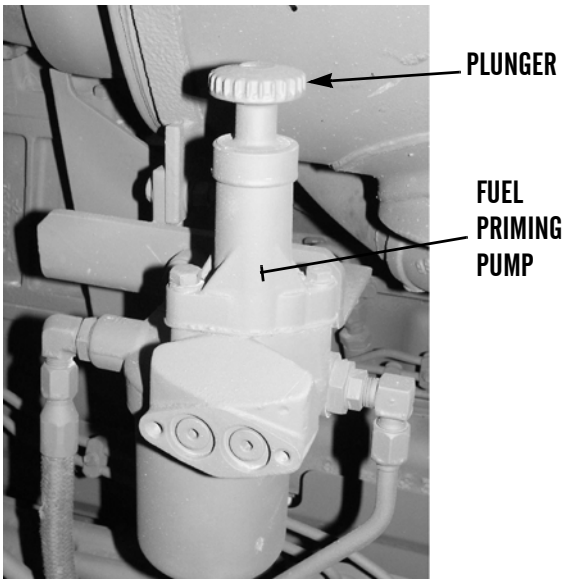
NOTE

- **If engine fails to start because tractor ran out of fuel, it may be necessary to prime fuel system.**
- **Fuel priming pump is located on right side of engine.**

1. Rotate fuel priming pump plunger to the left to open pump.
2. Pull out and then push in pump plunger by hand. Continue to pump until a strong pressure is felt and fuel pressure gage indicates in GREEN zone.
3. After use, push down on plunger, then turn plunger all the way to the right until closed.



386-128



386-044

END OF WORK PACKAGE

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AIR CLEANER SERVICE 0014 00

THIS WORK PACKAGE COVERS

Service

INITIAL SETUP

Materials/Parts

Detergent (Item 3, WP 0019 00)

Rag, wiping (Item 12, WP 0019 00)

Equipment Condition

Engine OFF (WP 0004 00, Item 12)

WARNING

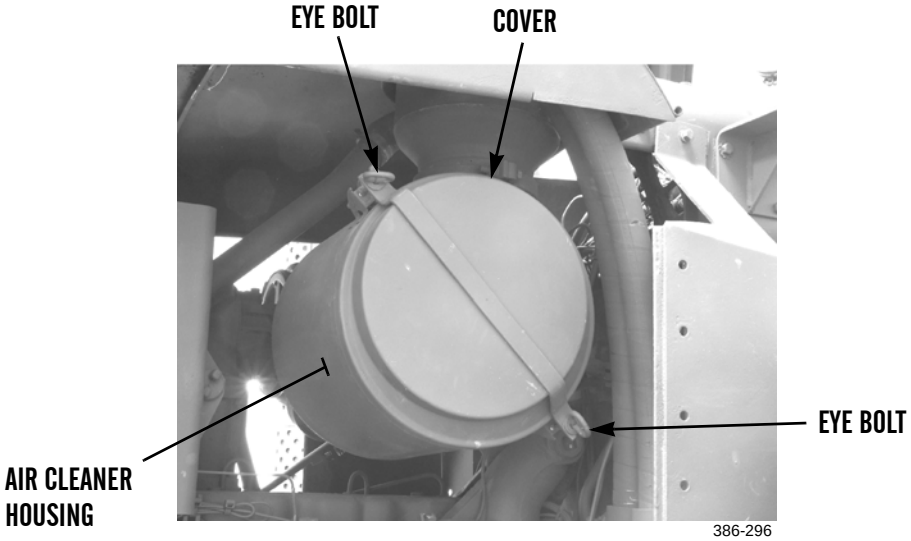
- **If NBC exposure is suspected, personnel wearing protective equipment should handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.**
- **Refer to FM 3-3, *Chemical and Biological Contamination Avoidance,* FM 3-5, *NBC Decontamination,* FM 9-204, *Nuclear Contamination Avoidance.***
- **NBC contaminated filters must be handled using adequate precautions and must be disposed of by trained personnel.**
- **Failure to follow this warning may cause injury or death.**

SERVICE

CAUTION

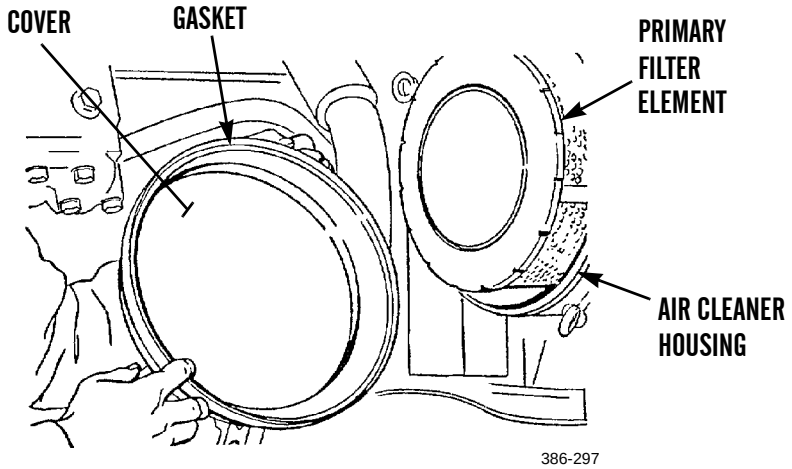
Never service air cleaner with engine running. Engine damage could result if service is performed with engine running.

1. Loosen two eye bolts and remove cover from air cleaner housing.



SERVICE - CONTINUED

2. Inspect gasket on inside of cover. If damaged, notify Unit Maintenance.
3. Remove primary filter element from air cleaner housing.
4. Thoroughly wipe clean inside of air cleaner housing with rag.



5. Check sealing surfaces on primary filter element for dirt on the “clean” side. If this is evident, problem may be a damaged filter element, incorrect element fit or the need for cleaning sealing surfaces.

WARNING

Particles blown by compressed air are hazardous. DO NOT exceed 15 psi (103 kPa) nozzle pressure when drying parts with compressed air. Use a maximum of 30 psi (207 kPa) when cleaning components. DO NOT direct compressed air against human skin. Failure to follow this warning may cause injury or death. Make sure air stream is directed away from user and other personnel in the area. To prevent injury, user must wear protective goggles or face shield.

CAUTION

To prevent damage, do NOT clean primary filter element by bumping or tapping.

NOTE

- **Use a light inside primary filter element to inspect filter for tears, holes or other damage before and after each cleaning process.**
- **Discard primary filter element if any damage is evident.**

SERVICE- CONTINUED

6. Direct compressed air inside primary filter element, along length of filter pleats.
7. Direct compressed air outside, along length of filter pleats.
8. Repeat step 6.

CAUTION

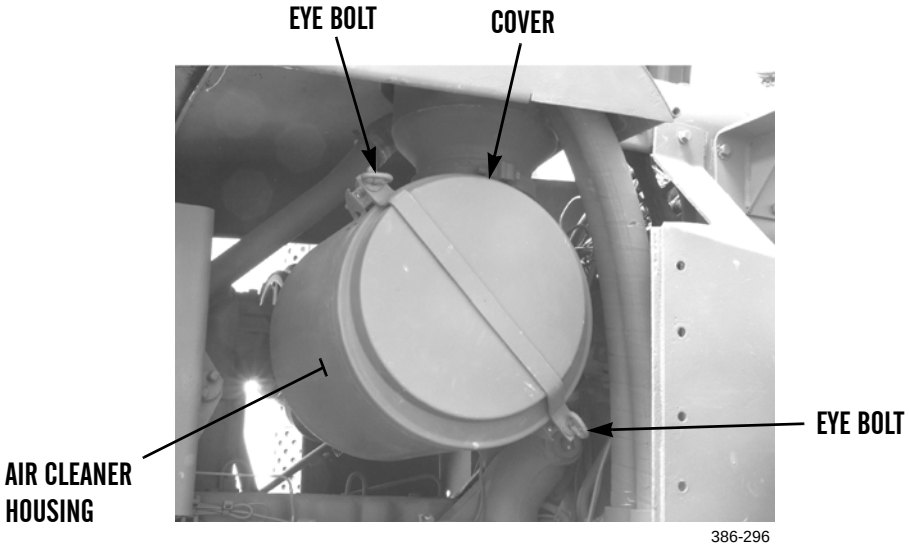
To prevent primary filter element damage, use a maximum of 40 psi (276 kPa) water pressure.

9. Direct water inside primary filter element, along length of filter pleats.
10. Direct water outside along length of pleats. Rinse and air dry primary filter element thoroughly.
11. Wash primary filter element in warm water and detergent.
12. Rinse with clean water and air dry thoroughly.

NOTE

- **Primary filter element should be replaced once each year or after being cleaned a maximum of 6 times.**
- **If indicator shows RED shortly after installation of primary filter element, which has been cleaned approximately 6 times, replace primary filter element.**
- **If indicator still shows RED shortly after installation of clean primary filter element, notify Unit Maintenance to replace secondary filter element.**

13. Install primary filter element in air cleaner housing.
14. Position cover on air cleaner housing and secure with two eye bolts.



15. Reset air filter indicator by pushing button on bottom of indicator (WP 0004 00, Item 17).
16. Run engine and check for proper operation.

END OF WORK PACKAGE

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TRACK ADJUSTMENT 0015 00

THIS WORK PACKAGE COVERS

Adjustment

INITIAL SETUP

Tools

Drawbar pin (Item 5, WP 0017 00)

Lubricating gun, hand (Item 4, WP 0017 00)

Wrench, adjustable (Item 6, WP 0017 00)

Materials/Parts

Grease, GAA (Item 7, WP 0019 00)

Materials/Parts - Continued

Rag, wiping (Item 12, WP 0019 00)

Personnel Required

Two

Equipment Condition

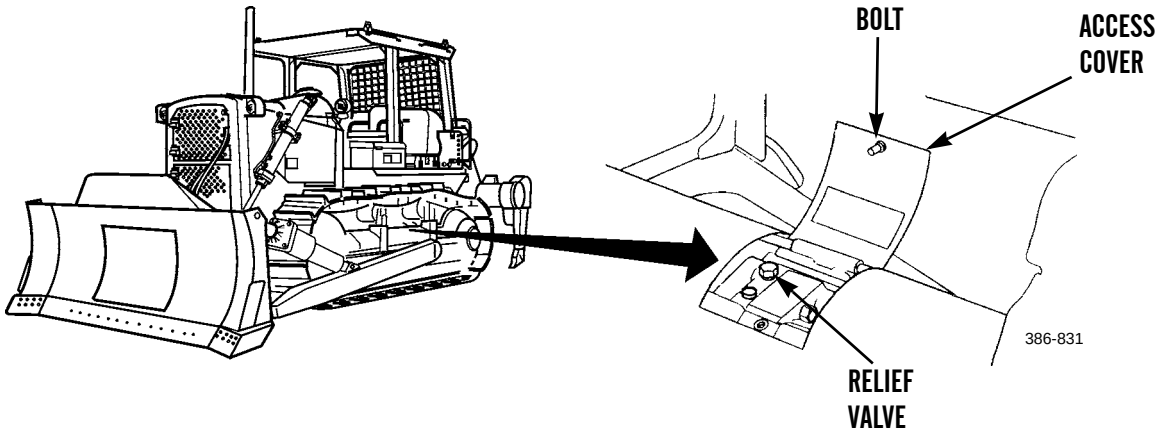
Tractor parked on level ground (WP 0005 00, Page 0005 00-14)

ADJUSTMENT

NOTE

Packed dirt should not be removed from track, if packing conditions exist on the job.

1. Move machine forward a distance of at least twice its length. Allow machine to coast to a stop. Do NOT apply brakes. Shut down engine.
2. Loosen bolt and open recoil mechanism access cover.
3. Wipe clean relief valve.



ADJUSTMENT - CONTINUED

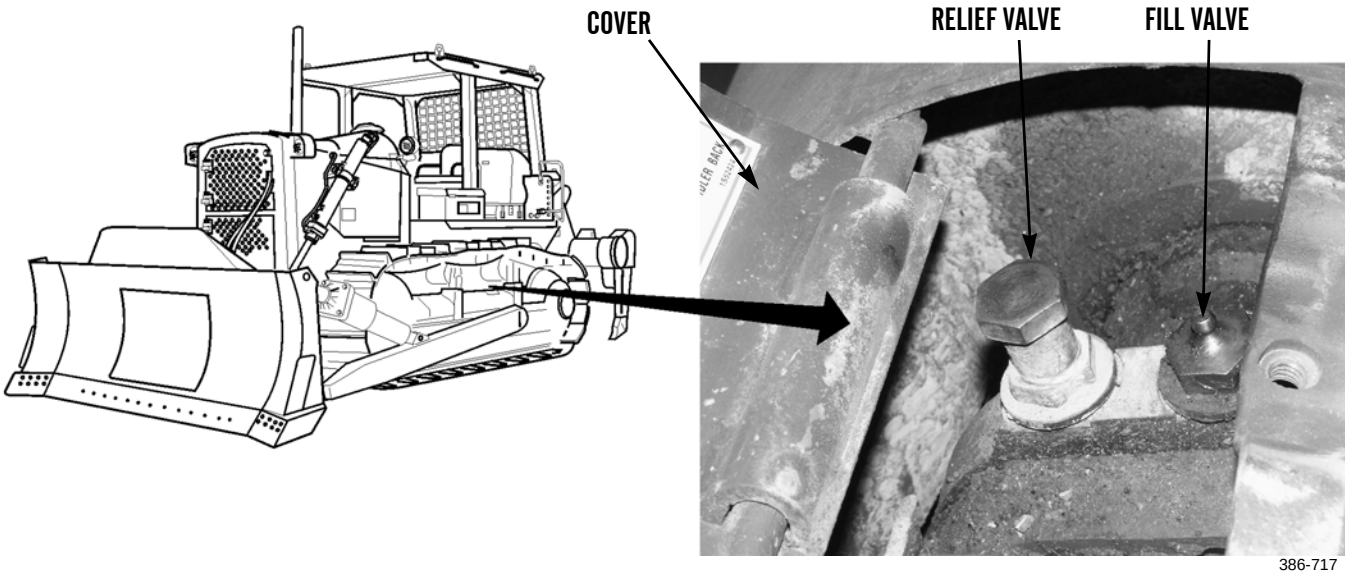
WARNING

Wear eye protection and keep face clear when venting grease from relief valve during track adjustment. NEVER visually inspect relief valve to see if grease is escaping. Always observe track to verify it has loosened. Failure to follow this warning could cause eye injury or blindness.

NOTE

If track tension does not release, notify Unit Maintenance.

4. Open relief valve and allow grease to escape and track tension to release.
5. Close relief valve. Clean area around fill and relief valves.



386-717

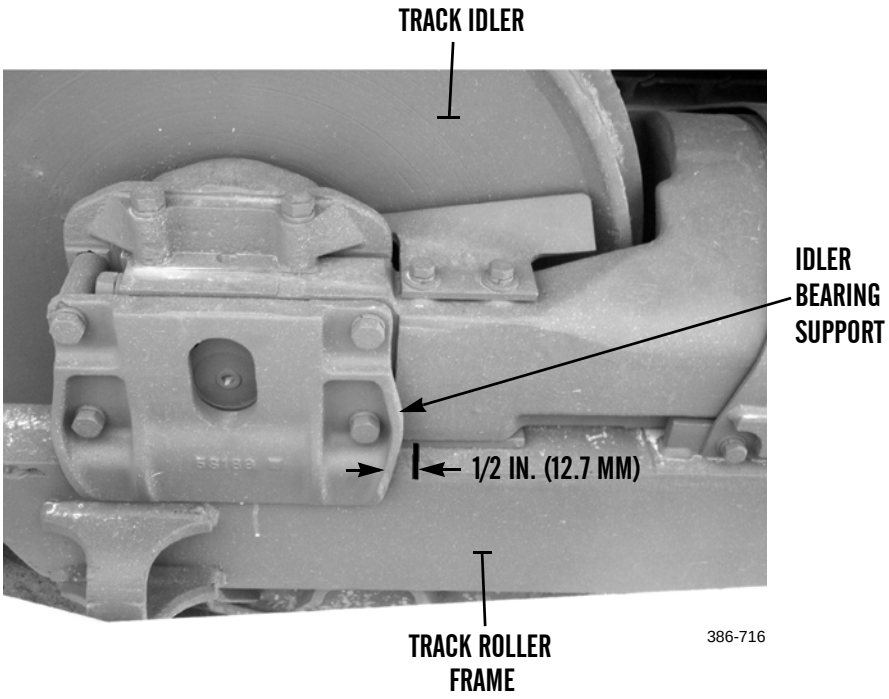
6. Fill grease gun and connect to fill valve.
7. Pump grease into fill valve until track idler moves forward toward front of tractor. STOP pumping when track idler stops moving.
8. Mark a line on track roller frame 1/2 in. (13 mm) from rear face of idler bearing support.

WARNING

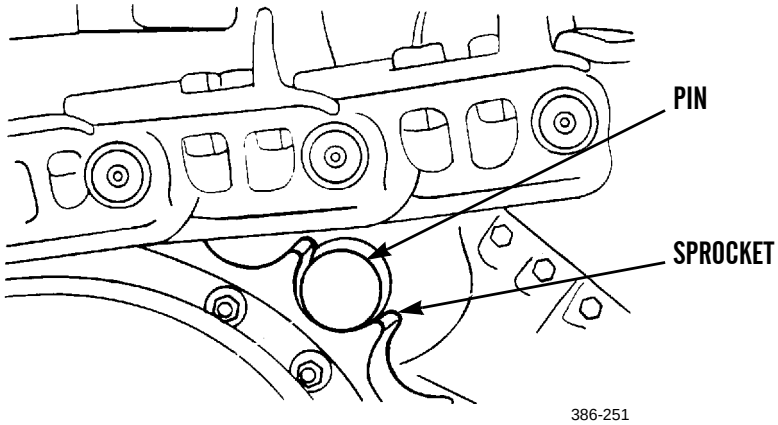
Wear eye protection and keep face clear when venting grease from relief valve during track adjustment. NEVER visually inspect relief valve to see if grease is escaping. Always observe track to verify it has loosened. Failure to follow this warning could cause eye injury or blindness.

9. Open relief valve no more than one turn and allow grease to escape and idler to move back.

ADJUSTMENT - CONTINUED



10. Put a drawbar pin (or a length of steel pipe) between top of track sprocket teeth near track link.



11. Start engine and move machine in reverse until rear face of idler bearing support moves past mark made on track roller frame (WP 0005 00).
12. Move machine forward until pin is free of sprocket. Shut down engine and remove pin (WP 0005 00).
13. Connect grease gun to fill valve. Close relief valve.
14. Pump grease into fill valve until rear face of idler bearing support lines up with mark made on track roller frame.
15. Close recoil mechanism access cover and tighten bolt.
16. Operate machine and check track for proper operation (WP 0005 00).

END OF WORK PACKAGE

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CHAPTER 5
SUPPORTING INFORMATION

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REFERENCES 0016 00

SCOPE

This work package lists all publication indexes, forms, field manuals, technical manuals and other publications referenced in this manual and which apply to operation and operator maintenance of the D7F Tractor.

PUBLICATION INDEXES

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

Consolidated Army Publications and Forms Index. . . . . .DA Pam 25-30

Functional User's Manual for the Army Maintenance Management System. . . . . .DA Pam 738-750

FORMS

NOTE

Refer to DA Pam 738-750*, The Army Maintenance Management System (TAMMS),* for instructions on the use of maintenance forms.

Equipment Inspection and Maintenance Worksheet. . . . . DA Form 2404, DA Form 5988-E

Product Quality Deficiency Report. . . . . SF Form 368

Recommended Changes to Publications and Blank Forms. . . . . DA Form 2028

FIELD MANUALS

Basic Cold Weather Manual . . . . . .FM 31-70

Chemical and Biological Contamination Avoidance . . . . . .FM 3-3

Desert Operations . . . . . .FM 90-3

First Aid. . . . . FM 4-25.11

NBC Decontamination . . . . . .FM 3-5

Northern Operations . . . . . .FM 31-71

Nuclear Contamination Avoidance . . . . . FM 3-3-1

Operations and Maintenance of Ordnance Materiel in Cold Weather . . . . . .FM 9-207

Recovery and Battlefield Damage Assessment and Repair . . . . . FM 9-43-2

Rigging Techniques, Procedures, and Applications . . . . . .FM 5-125

TECHNICAL MANUALS

Operator's, Unit, Direct Support, and General Support Maintenance Manual for Lead-Acid Storage Batteries . . . . . TM 9-6140-200-14

Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command) . . . . . .TM 750-244-3

OTHER PUBLICATIONS

Abbreviations and Acronyms . . . . . ASME Y14.38-1999

Army Medical Department Expendable/Durable Items . . . . . .CTA 8-100

Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items) . . . . . .CTA 50-970

END OF WORK PACKAGE

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COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS 0017 00

SCOPE

This work package lists COEI and BII for the D7F Tractor, to help you inventory items required for safe and efficient operation.

GENERAL

The COEI and BII information is divided into the following lists:

1. **Table 1, Components of End Item List.** This listing is for informational purposes only and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

2. **Table 2, Basic Issue Items List.** These are the minimum essential items required to place the tractor in operation, to operate it and to perform emergency repairs. Although shipped separately packaged, BII must be with the tractor during operation and whenever it is transferred between property accounts. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of end item. Illustrations are furnished to assist you in identifying the items.

EXPLANATION OF COLUMNS

Below is an explanation of columns found in the tabular listings:

1. **Column (1) - Illustration Number (Illus Number).** This column indicates the number of the illustration that shows the item.

2. **Column (2) - National Stock Number.** Indicates the National Stock Number (NSN) assigned to the item and will be used for requisitioning purposes.

3. **Column (3) - Description, CAGEC, and Part Number.** Indicates the Federal item name (in all capital letters) and, if required, a minimum description in parentheses to identify and locate the item. The entry for each item ends with the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.

4. **Column (4) - Usable on Code.** Indicates a code if the item needed is not the same for different models of equipment. Usable on Codes for the D7F Tractor are:

Usable On Code	Used On
BSX	D7F With Ripper
BSW	D7F With Winch

5. **Column (5) - Unit of Measure (U/M).** Indicates how the item is issued for the National Stock Number shown in Column (2).

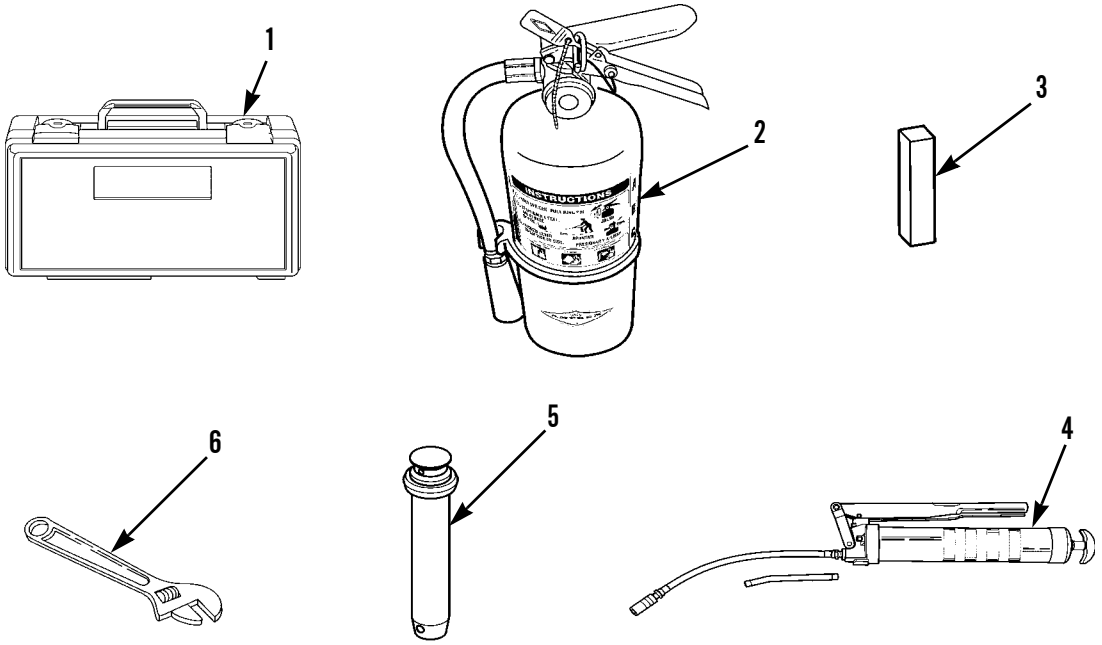
6. **Column (6) - Quantity Required (Qty Rqd).** Indicates the quantity of the item required.

Table 1. Components of End Item List.

NOTE

There are no COEI items assigned to the D7F Tractor.

Table 2-1. Basic Issue Items List.



(1) Illus Number	(2) National Stock Number	(3) Description, CAGEC, and Part Number	(4) Usable on Code	(5) U/M	(6) Qty Rqd
1	7520-00-559-9618	CASE, MAINTENANCE AND OPERATIONAL MANUALS (83421) 7520-00-559-9618		EA	1
2	4210-00-889-2221	EXTINGUISHER, FIRE (58536) A-A-393		EA	1
3	5120-01-275-2128	KEY, SOCKET HEAD SCREW (Drain Plug Tool) (11083) 5R6278		EA	1
4	4930-00-223-3391	LUBRICATING GUN, HAND (19207) 5644803		EA	1
5	5315-00-426-5074	PIN, DRAWBAR: (11083) 7F9541		EA	1
6	5120-01-473-9274	WRENCH, ADJUSTABLE: 12 Inches Long (96508) AT112BK		EA	1

END OF WORK PACKAGE

ADDITIONAL AUTHORIZATION LIST (AAL) 0018 00

NOTE

There are no AAL items assigned to the D7F Tractor.

END OF WORK PACKAGE

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EXPENDABLE AND DURABLE ITEMS LIST 0019 00

SCOPE

This work package lists expendable supplies and materials you will need to maintain the D7F Tractor. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, *Expendable/Durable Items* (*Except Medical, and Class V Repair Parts, Heraldic Items*), or CTA 8-100, *Army Medical Department Expendable/Durable Items*.

EXPLANATION OF COLUMNS

1. **Column (1) - Item Number.** This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item [e.g., Use antifreeze (Item 1, WP 0019 00)].
2. **Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

3. **Column (3) - National Stock Number.** This is the NSN assigned to the item which you can use to requisition it.
4. **Column (4) - Description, CAGEC, and Part Number.** This provides the other information you need to identify the item.
5. **Column (5) - Unit of Measure (U/M).** This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable Items List.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
1	C		ANTIFREEZE: Permanent, Ethylene Glycol, Inhibited (58536) AA52624-1-A	
		6850-01-441-3218	1 Gallon Bottle	GAL
		6850-01-441-3223	55 Gallon Drum	GAL
2	C		CLEANING COMPOUND: Solvent, Type III (81349) MIL-PRF-680	
		6850-01-474-2318	1 Gallon Can	GAL
		6850-01-474-2320	5 Gallon Can	GAL
		6850-01-474-2321	55 Gallon Drum	GAL
3	C		DETERGENT: General Purpose, Liquid (83421) 7930-00-282-9699	
		7930-00-282-9699	1 Gallon Can	GAL
4	C		FUEL: Diesel, DF-1 Grade, Winter (81346) ASTM D 975	
		9140-00-286-5286	Bulk	GAL
		9140-00-286-5287	5 Gallon Can	GAL
		9140-00-286-5288	55 Gallon Drum	GAL
5	C		FUEL: Diesel, DF-2 Grade (81346) ASTM D 975	
		9140-00-286-5294	Bulk	GAL
		9140-00-286-5295	5 Gallon Can	GAL
		9140-00-286-5296	55 Gallon Drum	GAL
6	C	9130-01-031-5816	FUEL, TURBINE: Aviation (81349) MILT83133 GR JP8	GAL
7	C		GREASE: Automotive and Artillery, GAA	
		9150-01-197-7688	(81349) M-10924-A 2-1/4 Ounce Tube	OZ
		9150-01-197-7693	(81349) M-10924-B 14 Ounce Cartridge	OZ
		9150-01-197-7690	(81349) M-10924-C 1-3/4 Pound Can	LB
		9150-01-197-7692	(81349) M-10924-E 35 Pound Can	LB

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
8	C		OIL: Lubricating, OEA-30, Arctic	
		9150-00-402-4478	(81349) MIL-L-46167 1 Quart Can	QT
		9150-00-402-2372	(81349) MIL-PRF-46167 5 Gallon Can	GAL
		9150-00-491-7197	(81349) MIL-PRF-46167 55 Gallon Drum	GAL
9	C		OIL: Lubricating, OE/HDO-10 (81349) M2104-1-10W	
		9150-00-189-6727	1 Quart Can	QT
		9150-00-186-6668	5 Gallon Can	GAL
		9150-00-191-2772	55 Gallon Drum	GAL
10	C		OIL: Lubricating, OE/HDO-15/40 (81349) M2104-4-15W40	
		9150-01-152-4117	1 Quart Can	QT
		9150-01-152-4118	5 Gallon Can	GAL
		9150-01-152-4119	55 Gallon Drum	GAL
11	C		OIL: Lubricating, OE/HDO-30 (81349) M2104-1-30W	
		9150-00-186-6681	1 Quart Can	QT
		9150-00-188-9858	5 Gallon Can	GAL
12	C		RAG: Wiping (64067) M2104-1-3W 7920-00-205-1711	
		7290-00-205-1711	50 Pound Bale	LB

END OF WORK PACKAGE

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Effective with sales to the first user on or after July 1, 2000

CATERPILLAR BATTERY LIMITED WARRANTY

USA and Canada

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants new batteries sold by it and used within the geographic area serviced by authorized USA and Canadian Caterpillar dealers, to be free from defects in material and workmanship.

In other areas, different warranties may apply. Copies of applicable warranties may be obtained by writing to Caterpillar, Inc., 100 N.E. Adams St., Peoria, IL USA 61629.

This warranty is subject to the following:

1. The warranty period is as follows, starting from the date of battery sale or product delivery to the first user.

Application	Battery Type & Warranty Period	
	Premium, High Output	General Service Line
On-Highway vehicles up to 680 kilograms (3/4 ton) capacity with charging systems in a personal, family or household use application.	72 Months	72 Months
On-Highway vehicles up to 680 kilograms (3/4 ton) capacity with charging systems in other than a personal, family or household use application.	36 Months	36 Months
All on-highway vehicles over 680 kilograms (3/4 ton) capacity with charging systems.	36 Months	30 Months
Earthmoving, construction, materials handling, paving and off-highway equipment, agricultural, industrial engine, electric power generation and marine products with charging systems.	36 Months	24 Months
For deep cycle applications or applications without constant battery charging systems (i.e. auxiliary batteries for marine pleasure craft or recreational vehicles; electric trolling motor or golf cart applications which use batteries as their motive power; lawn garden applications, etc.).	3 Months	(See Note)

Note: For "General Service Line" batteries in deep cycle applications or applications without constant battery charging systems, the warranty period is as follows:

BCI group sizes U-1R, U-1, 8V, and GC-2: 18 Months
BCI group sizes 24 M and 27M: 30 Months
The warranty period for all other batteries is 3 Months.

2. Within the periods stated in Item 1, Caterpillar will replace a battery which it finds to be defective in material or workmanship with a new battery at the following cost to the user:

For the first 18 months from date of sale or delivery for PHO group 31 batteries used in on-highway applications, 12 months for Cat PHO batteries not used in the aforementioned on-highway applications and 3 months for "General Service Line" category batteries, or batteries in deep cycle applications or applications without constant battery charging systems, there is no charge to the user. After this time period, user cost is determined by the following formula:

$$\frac{\text{Current Consumer's Battery Price} \times \text{Months of Service}}{\text{Months in Warranty Period}} = \text{User Cost}$$

3. This warranty will be honored upon return of the battery, during normal working hours, to a Caterpillar dealer or other source approved by Caterpillar.

4. Taxes, installation, or transportation costs, which may result from replacement, are not included in this warranty.

(continued on reverse side...)

NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN. CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION (CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS) IS EXCLUDED IN ITS ENTIRETY.

For personal or family use batteries used in the USA, its territories and possessions, some states do not allow limitations on how long an implied warranty may last nor allow the exclusion or limitation of incidental or consequential damages. Therefore, the previously expressed exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary by jurisdiction. To find the location of the nearest Caterpillar dealer or authorized repair facility, call (877) 228-9900. If you have questions concerning this warranty or its application, call or write: NACD Business Operations, Caterpillar Inc., 100 N. E. Adams St., Peoria, IL 61629-1250 Telephone:(309)675-4037.

Effective with sales to the first user on or after September 1, 1999

CATERPILLAR WARRANTY

Ground Engaging Tools
Worldwide
(excluding the commonwealth of Independent States)

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants the following Ground Engaging Tools (and every major component thereof) sold by it, and used outside the Commonwealth of Independent States (formerly USSR), against breakage. This warranty is applicable after the expiration of any standard machine or parts warranty to:

- Tips and adapters used on buckets, rippers and scrapers
- End bits and router bits
- Side cutters and sidebar protectors
- Uni-tooth components
- Modulok and HD Mining System components
- MEGS (Mining Edge Guard System) components
- Mechanically-attached adapter systems and wear plates
- Lip Protection System components
- Base edge assemblies, bolt-on flat plate or half arrow segments and cutting edges (except high carbon motor grader cutting edges)
- Ripper shank protectors and multi-piece ripper protectors
- Scarifier tips
- Compactor feet
- Landfill compactor tips and chopper blades (an additional warranty applies to Long Life Plus Tips)
- Bolt-on wear plates and sole plates
- Loader bucket cutting edge corner components
- Grader Bit and Mining Bit adapters
- Grader Bit, Mining Bit assemblies and tungsten carbide motor grader cutting edges (except for carbide element)
- Percussive drill products

This warranty also covers the parent material of the Ground Engaging Tools covered if Caterpillar-sourced Abrasion-Resistant Material (ARM) has been applied by a Caterpillar dealer.

This warranty is subject to the following:

Warranty Period
The warranty period is not limited by time and is applicable throughout the *useful life* of the Ground Engaging Tools covered.

Caterpillar Responsibilities
If a breakage occurs during normal operation, Caterpillar will, during normal working hours and at a place of business of a Caterpillar dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new or Caterpillar-approved repaired parts or assembled components needed to correct the defect.

Note: Items replaced under this warranty become the property of Caterpillar.

User Responsibilities
The user is responsible for:

- Labor (including welding) and hardware costs associated with removal and installation.
- Parts shipping charges in excess of those which are usual and customary.
- Local taxes, if applicable.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.

Limitations
Caterpillar is not responsible for failures resulting from:

- Any use or installation which Caterpillar judges improper.
- Breakage of Ground Engaging Tools due to worn mating components or those that have been hardfaced or improperly welded.
- Attachments of competitive parts to Caterpillar components.
- Cracks in the ARM weld and chipping of hard particles out of the weld. This is not considered "breakage" under the terms of this warranty.
- Abuse, neglect and/or improper repair.

A different warranty statement applies to Ground Engaging Tools used in the Commonwealth of Independent States. Copies of this warranty may be obtained by writing Caterpillar Inc., 100 N.E. Adams St., Peoria, IL USA 61629.

For products operating outside of Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:

NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN. CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION (CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS) IS EXCLUDED IN ITS ENTIRETY.

For products operating in Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:

THIS WARRANTY IS IN ADDITION TO WARRANTIES AND CONDITIONS IMPLIED BY STATUTE AND OTHER STATUTORY RIGHTS AND OBLIGATIONS THAT BY ANY APPLICABLE LAW CANNOT BE EXCLUDED, RESTRICTED OR MODIFIED ("MANDATORY RIGHTS"). ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED (BY STATUTE OR OTHERWISE), ARE EXCLUDED.

NEITHER THIS WARRANTY NOR ANY OTHER CONDITION OR WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED (SUBJECT ONLY TO THE MANDATORY RIGHTS), IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

TO THE EXTENT PERMITTED UNDER THE MANDATORY RIGHTS, IF CATERPILLAR IS THE SUPPLIER TO THE USER, CATERPILLAR'S LIABILITY SHALL BE LIMITED AT ITS OPTION TO (a) IN THE CASE OF SERVICES, THE SUPPLY OF THE SERVICES AGAIN OR THE PAYMENT OF THE COST OF HAVING THE SERVICES SUPPLIED AGAIN, AND (b) IN THE CASE OF GOODS, THE REPAIR OR REPLACEMENT OF THE GOODS, THE SUPPLY OF EQUIVALENT GOODS, THE PAYMENT OF THE COST OF SUCH REPAIR OR REPLACEMENT OR THE ACQUISITION OF EQUIVALENT GOODS.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

CATERPILLAR IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES UNLESS IMPOSED UNDER MANDATORY RIGHTS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION (CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS) IS EXCLUDED IN ITS ENTIRETY.

Claims under this warranty should be submitted to a place of business of a Caterpillar dealer or other source approved by Caterpillar. For further information concerning either the location to submit claims or Caterpillar as the issuer of this warranty, write Caterpillar Inc., 100 N. E. Adams St., Peoria, IL USA 61629.

SELF5281-02

Effective with sales to the first user on or after June 1, 2001

CATERPILLAR WARRANTY

Earthmoving, Construction, and Material Handling Machines Rebuilt As Part Of The Service Life Extension Program

Caterpillar warrants products rebuilt to be free from defects in material and workmanship.

This warranty is subject to the following:

Warranty Period

For rebuilt machines and attachments, the warranty period is 18 months or 500 operating hours, whichever occurs first, starting from date of delivery to the user.

An additional warranty against breakage is applicable to certain Caterpillar brand Ground Engaging Tools. Refer to the applicable warranty statement for coverage detail.

An additional prorated warranty applies to Caterpillar brand batteries after the 18-month or 500 hours. Refer to applicable warranty statement for coverage detail.

Caterpillar Responsibilities
If a defect in material or workmanship is found during the warranty period, Caterpillar will, during normal working hours and at a place of business of a Caterpillar dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new, remanufactured, or Caterpillar-approved repaired parts or assembled components needed to correct the defect.
- Provide reasonable and customary labor needed to correct the defect.
- The costs associated with transporting the product, or reasonable travel by dealer mechanic.

User Responsibilities

The user is responsible for:

- Providing proof of the delivery date to the user.
- Labor costs, except as stated under "Caterpillar Responsibilities".
- Local taxes, if applicable.
- Parts shipping charges in excess of those which are usual and customary.
- Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.
- Performance of the required maintenance (including use of proper fuel, oil, lubricants and coolant) and replacement of items due to normal wear and tear.
- Allowing Caterpillar access to all electronically stored data.

Limitations

Caterpillar is not responsible for failures resulting from:

- Any use or installation which Caterpillar judges improper.
- Attachments, accessory items and parts not sold or approved by Caterpillar.
- Abuse, neglect and/or improper repair.
- User's delay in making the product available after being notified of a potential product problem.
- Unauthorized repair or adjustments, and unauthorized fuel setting changes.

NEITHER THE FOREGOING EXPRESS WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS WHICH IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXCEPT CATERPILLAR EMISSION-RELATED COMPONENTS WARRANTIES FOR NEW ENGINES, WHERE APPLICABLE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN. CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

As used in this warranty, the term "Caterpillar" means Caterpillar, Inc., or one of its subsidiaries, except Caterpillar Oversea s S.A., Caterpillar France S.A., Caterpillar (U.K.) Limited, or Caterpillar Belgium S.A., whichever last sold the product involved.

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W

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army
0435101

DISTRIBUTION: To be distributed in accordance with the initial distribution requirements for IDN: 251930, requirements for TM 5-2410-233-10.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE **1 July 2005**
TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 5-2410-233-10	15 March 2005	Operator's Manual for Tractor, Full Tracked Low Speed: DED, Medium Drawbar Pull, D7F

ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
	0017 00-2					Part number supplied for item 2 is incorrect.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

TO: *(Forward direct to addressee listed in publication)*	FROM: *(Activity and location) (Include ZIP Code)*	DATE

PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARK *(Use this part for any explanatory remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

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THE METRIC SYSTEM AND EQUIVALENTS

Linear Measure

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

Weights

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Pounds
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

Liquid Measure

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

Square Measure

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.0386 Sq Miles

Cubic Measure

1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

Temperature

5/9 (°F - 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 C° +32 = F°

APPROXIMATE CONVERSION FACTORS

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

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

PIN: 005387-000