

**OPERATOR'S MANUAL**  
**FOR**  
**SCRAPER, TRACTOR**  
**ELEVATING, SELF-PROPELLED, 11 CUBIC YARDS, SECTIONALIZED**  
**MODEL 613CS**  
**(NSN 3805-01-497-0697) (EIC: EE4)**  
  
**COMPONENT OF**  
**AIRBORNE SCRAPER WATER DISTRIBUTOR SYSTEM (ASWDS)**



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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**JULY 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.



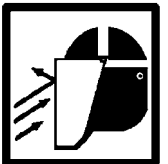
**ELECTRICAL** - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.



**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 OBJECT** - Human figure stooping under heavy object shows physical injury potential from improper lifting techniques.



HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm.



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 engine in enclosed areas.
  2. DO NOT idle engine without adequate ventilation.
  3. DO NOT drive 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!***

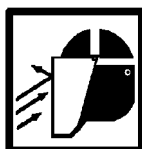


WARNING



**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, 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 death or serious injury to personnel.
- 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**

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.

**WARNING**

**ELECTRONIC MONITORING SYSTEM (EMS)**

When EMS action alarm sounds, immediate shutdown of machine is required to prevent injury to operator and/or severe damage to machine.



WARNING



**ETHER COLD START 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 death or serious injury to personnel.



**WARNING**

***FUEL HANDLING***

- 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.
- 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 to personnel.
- Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. Failure to follow this warning may result in injury to personnel.



**WARNING**

***HAZARDOUS WASTE DISPOSAL***

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.



**WARNING**

***HEARING PROTECTION***

Hearing protection is required when operating machine or when within 23 feet of machine when it is operating. Failure to wear hearing protection may result in hearing loss.



**WARNING**



***HYDRAULIC SYSTEM PRESSURE***

Do NOT disconnect or remove any hydraulic system line or fitting unless engine is shut down and hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin causing serious injury.

**WARNING**

***ISU-60 CONTAINER***

Never transport container with doors open. Transporting container with doors open may cause serious injury or death to personnel.

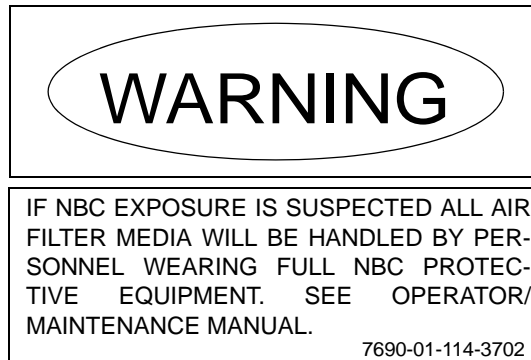


WARNING



***NBC EXPOSURE***

- 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. Failure to follow this warning may result in illness or death to personnel.
- NBC contaminated filters must be handled using adequate precautions (FM 21-40) and must be disposed of by trained personnel. Failure to follow this warning may result in illness or death to 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

### *OPERATION SAFETY*

- Use caution and maintain three-point contact at all times when mounting and dismounting machine, to avoid injury to personnel.
- DO NOT allow riders on machine. Failure to follow this warning may result in serious injury or death to personnel.
- DO NOT operate machine unless seat belt has been fastened. Failure to follow this warning may result in serious injury or death, in the event of an accident.
- BE ALERT for personnel in the area while operating machine. Always check to ensure area is clear of personnel and obstructions before starting engine, moving machine or lowering or raising scraper bowl. Failure to follow this warning may result in serious injury or death to personnel or damage to equipment.
- Never leave the operator's position without applying the parking brake. Failure to follow this warning may result in death to injury to personnel or damage to equipment.
- Never use starting fluid or spray to aid in starting the engine, other than the on-board ether cold start system. Failure to follow this warning may result in death or injury to personnel or damage to equipment.
- Always use a ground guide when driving machine up or down ramps in preparation for highway, marine or air transport, or when driving tractor into position for assembly to scraper. Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
- When loaded and traveling across a hillside, reduce speed significantly BEFORE turning uphill. Failure to do so may cause machine to roll over, resulting in injury or death to personnel.
- Do NOT operate machine if parking brake was applied due to a malfunction of airbrake system or parking brake. Correct any problem before attempting to operate machine. Personal injury or death can result from a brake malfunction.
- For Water Distributor only, DO NOT operate machine at speeds greater than 18 mph (29 kph), in all weather and road conditions and fully loaded. Maximum operating time at 18 mph (29 kph) is 7 hours within a 24 hour period. Failure to follow this warning may cause external or internal injury due to excessive whole-body vibration.



## WARNING

### *PREPARATION FOR TRANSPORT*

- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
- If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.
- Always use a ground guide when moving machine during preparation for transport procedures (driving up and down ramps, onto airdrop platform or onto rail flatcars). Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
- Use extreme caution when driving sectionalized tractor with stability skids and no ROPS/FOPS. Use first gear forward or reverse and low idle ONLY. Ground guide or ground safety officer assistance is required to monitor path in front of front stability skid, to avoid obstacles and direct tractor operation. Failure to follow this warning may result in injury or death to personnel or damage to equipment.
- Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.
- Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel. Use caution when climbing on right side if upper handrail has been removed. Failure to do so may result in injury to personnel
- Removal of upper handrail on right side of tractor leaves right side of tractor without any means to safely climb on machine.



- Do NOT remove exhaust stack until it has cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.



## WARNING



### *PRESSURIZED COOLING SYSTEM*

- 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. 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.
- DO NOT use civilian-type jumper cables.
- DO NOT allow disabled and booster machines to come in contact with each other at any time during slave starting.

Failure to follow this warning may result in injury or death to personnel.



**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. Failure to do so may result in injury or death to personnel.

**WARNING**

***TIRES***

- Operating machine with underinflated or defective tire may lead to tire failure and loss of traction or control. Damage to equipment or injury to personnel may result.
- If tire pressure is 36 psi (248 kPa) or less, do NOT inflate. Notify Unit Maintenance. Failure to do so may result in injury or death to personnel.
- Use a self-inflating chuck and stand at a distance behind tire when inflating tire. Failure to do so could result in injury or death to personnel.

## WARNING

### WORK SAFETY



- Lifting cables, chains, hooks, and slings used for lifting machine must be in good condition and of suitable capacity. Failure to follow this warning may result in injury or death to personnel and damage to equipment.



- Improper use of lifting equipment and improper attachment of cables to machine can result in serious personnel injury and equipment damage. Observe all standard rules of safety.
- Ensure engine compartment access door is securely supported in open position. Failure to do so could cause door to slam shut, causing serious injury to personnel.

- Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.



- Configuration changes to cutting edge and cutting edge-to-elevator clearance adjustments should NEVER be attempted without first securing the bowl by blocking it so that it is firmly supported. Failure to follow this warning may cause injury to personnel.



- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.



**LIST OF EFFECTIVE PAGES/WORK PACKAGES**

Date of issue for original manual is:

Original 15 July 2005

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 34 AND TOTAL NUMBER OF WORK PACKAGES IS 28 CONSISTING OF THE FOLLOWING:**

<b>Page/WP No.</b>	<b>*Change No.</b>
Cover/(Back Blank)	0
a to h	0
A/(B Blank)	0
i to iv	0
WP 0001 00 to 0028 00	0
Index-1 to Index-5/(Index-6 Blank)	0

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

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TECHNICAL MANUAL  
TM 5-3800-205-10-1

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

## OPERATOR'S MANUAL

FOR

### SCRAPER, TRACTOR ELEVATING, SELF-PROPELLED, 11 CUBIC YARDS, SECTIONALIZED MODEL 613CS (NSN 3805-01-497-0697) (EIC: EE4)

#### COMPONENT OF AIRBORNE SCRAPER WATER DISTRIBUTOR SYSTEM (ASWDS)

#### **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://aeeps.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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# HOW TO USE THIS MANUAL

## INTRODUCTION

1. This manual is designed to help you operate the scraper and perform operator troubleshooting and maintenance on the equipment.
2. 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*, *Preparation for Transport*, 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<sup>th</sup> and 6<sup>th</sup> 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.
3. Scan 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 scraper.
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 describes how to perform all operating procedures for the machine: *Operation Under Usual Conditions* and *Operation Under Unusual Conditions*. In addition, *Advanced Operation and Operator Tips* and *Job Site Management* work packages are provided to maximize scraper performance.
5. Chapter 3 covers all *Operator Troubleshooting*. WP 0011 00 contains a *Troubleshooting Symptom Index*. If the machine malfunctions, this index should always be consulted to locate the appropriate troubleshooting procedure.
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, *Preparation for Transport*, provides complete instructions on preparing the machine for all modes of transport.
8. Chapter 6 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 death or serious injury.

### 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.  
If you are told: "If red band is showing, service air cleaner as soon as possible (WP 0015 00)", go to Work Package 0015 00 in this manual for instructions on servicing the air cleaner.
4. Illustrations are placed after, and as close to, the procedural steps to which they apply. Callouts placed on the art may be text or numbers, or both; whichever method is easier for the soldier.
5. Numbers located at lower right corner of art (e.g. 390-001; 390-002, etc.) are art control numbers and are used for tracking purposes. Disregard these numbers.
6. Dashed leader lines used in the Lubrication Chart (WP 0013 00) indicate that lubrication services 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.

### NOTE

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



**CHAPTER 1**  
**INTRODUCTORY INFORMATION WITH**  
**THEORY OF OPERATION**

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**GENERAL INFORMATION**

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**0001 00****SCOPE**

1. **Type of Manual.** This manual is for use in operating and performing operator maintenance on the 613CS Scraper, component of the Airborne Scraper Water Distributor System (ASWDS).
2. **Equipment Name and Model Number.** Scraper, Tractor, Elevating, Self-Propelled, 11 Cubic Yards, Sectionalized, Model 613CS.
3. **Purpose of Equipment.** The 613CS Scraper is used to self-load, haul, dump, and spread soil in worldwide earthmoving and construction projects by U.S. Army forces in engineer troop support.

**MAINTENANCE FORMS, RECORDS, AND REPORTS**

Department of the Army forms and procedures used for the equipment 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 scraper 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. 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. 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.

**THREAT OF NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) CONTAMINATION**

1. The 613C scraper incorporates a CARC painted exterior. Materials used in the machine are metal, rubber, plastic, fabric, and glass.
2. In the event of NBC contamination, decontaminates for these surfaces and materials are listed in FM 3-5. For decontamination procedures, refer to FM 3-7 and to *Operate Decontamination Apparatus* in WP 0008 00.
3. For a list of components susceptible to damage from decontamination, refer to TM 5-3800-205-23-1.

**ELECTROMAGNETIC PULSE (EMP) EXPOSURE**

1. Components listed and designated as EMP susceptible may be damaged by EMP exposure. If the machine is exposed to an EMP incident, verify proper operation and repair as necessary.
2. For a list of EMP susceptible components, refer to TM 5-3800-205-23-1.

**GENERAL INFORMATION - CONTINUED****0001 00****OZONE DEPLETING SUBSTANCES**

Listing to be provided by requiring activity.

**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**

For preparation for storage or shipment procedures, refer to TM 5-3800-205-23-1 and TM 5-3800-205-23-2.

**WARRANTY INFORMATION**

The machines are warranted by Caterpillar Inc. in accordance with WP 0027 00 and by Bridgestone/Firestone and AAR Mobility Systems in accordance with WP 0028 00. Warranty starts on the date found in block 23, DA Form 2408-9 in the log-book. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your Unit Maintenance shop.

**LIST OF ABBREVIATIONS/ACRONYMS****NOTE**

Refer to ASME Y14.38-1999 for standard abbreviations.

**ABBREVIATION/ACRONYMS****DEFINITION**

AAL	Additional Authorization List
AAR	Association of American Railroads
AOAP	Army Oil Analysis Program
ASWDS	Airborne Scraper Water Distributor System
BDC	Bottom Dead Center
BFOR	Bridgestone/Firestone Off Road
BII	Basic Issue Items
C	Centigrade or Celsius
CAGEC	Commercial and Government Entity Code
CARB	California Air Resources Board
CARC	Chemical Agent Resistant Coating
CCA	Cold Cranking Amps
CFR	Code of Federal Regulations
CID	Cubic Inch Displacement
cm	Centimeter
COEI	Components of End Item
CONUS	Continental United States
CPC	Corrosion Prevention and Control
DAP	Decontamination Apparatus
ECM	Electronic Control Module
EIR	Equipment Improvement Recommendations
EMP	ElectroMagnetic Pulse

## GENERAL INFORMATION - CONTINUED

0001 00

**LIST OF ABBREVIATIONS/ACRONYMS - CONTINUED**

<b>ABBREVIATION/ACRONYMS</b>	<b>DEFINITION</b>
EMS.....	Electronic Monitoring System
EPA .....	Environmental Protection Agency
F.....	Fahrenheit
FRC.....	Fuel-air Ration Control
ft .....	Feet
gal .....	Gallons
GCWR.....	Gross Combination Weight Rating
GET.....	Ground Engaging Tools
GIC .....	Gabarit International de Chargement
gpm .....	Gallons per minute
GVWR.....	Gross Vehicle Weight Rating
HAZMAT .....	Hazardous Material
IAW.....	In Accordance With
ISO .....	International Organization for Standardization
ISU .....	Internal Airlift/Helicopter Slingable Container Unit
kg.....	Kilogram
km .....	Kilometer
kPa.....	Kilopascal
kph.....	Kilometers per Hour
kW.....	Kilowatt
in.....	Inches
l .....	Liter
lb .....	Pounds
lb-ft .....	Pound Foot
LC .....	Load Center
lph .....	Liters per Hour
m .....	Meters
mm.....	Millimeter
mph .....	Miles per hour
MSDS .....	Material Safety Data Sheets
MTMC.....	Military Traffic Management Command
MTMCTEA.....	Military Traffic Management Command Transportation Engineering Agency
NATO .....	North Atlantic Treaty Organization
NBC.....	Nuclear, Biological, and Chemical
Nm.....	Newton Meter
NSN.....	National Stock Number
OCONUS .....	Outside Continental United States
OSHA .....	Occupational Safety and Health Administration

**GENERAL INFORMATION - CONTINUED****0001 00****LIST OF ABBREVIATIONS/ACRONYMS - CONTINUED****ABBREVIATION/ACRONYMS****DEFINITION**

PMCS .....	Preventive Maintenance Checks and Services
Qty .....	Quantity
ROD .....	Report of Discrepancy
RPM .....	Revolutions per minute
ROPS/FOPS .....	Rollover Protective Structure/Falling Object Protective Structure
RO/RO .....	Roll-On/Roll-Off
Rqd .....	Required
TAMMS .....	The Army Maintenance Management System
TMPH .....	Ton-mile per-hour
U/M .....	Unit of Measure
V .....	Volts
yd .....	Yards

**END OF WORK PACKAGE**

**EQUIPMENT DESCRIPTION AND DATA****0002 00*****EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES*****1. Characteristics.**

- a. The 613CS Scraper, used in conjunction with the 613CWD Water Distributor, provides the Army with the capability to efficiently build roads, airstrips, and other engineering assets in a wide variety of geographic, environmental, and tactical situations.
- b. The scraper self-loads, hauls, dumps, and spreads earth, thereby providing grading capability from start to finish of a job.
- c. The machine is capable of all critical earthmoving operations in a degraded mode of operation (i.e. without ROPS/FOPS).

**2. 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.

- a. The scraper consists of two sections: front tractor section and rear elevating scraper section. These may be separated (sectionalization) to allow external air transport by CH-47 helicopter.
- b. All parts and tools needed for sectionalization are contained within an ISU-60 container. This container also has stowage space for parts that are removed from the machine for sectionalization.
- c. After sectionalization, the tractor half of this machine is reassembled with the scraper. The tractor may also be assembled and operated with the water distributor half of the 613CWD Water Distributor (interchangeability).
- d. The scraper can be transported by driving onto the following aircraft: C-17 and C-5. After reconfiguration, the scraper can be driven onto a C-130 for transport.
- e. The machine can be rigged on an air delivery platform for airdrop from C-130 aircraft.
- f. Commercial trailers, trains or marine vessels can also transport the scraper.
- g. The scraper can fresh-water ford to a depth of 3.28 ft (1 m) without damage or contamination of lubricants.
- h. The front tractor section has the following capabilities and features:
  - (1) Caterpillar® 3116TA turbocharged diesel engine with six in-line cylinders, generating 175 horsepower @ 2300 RPM;
  - (2) integral ether cold start for engine startup down to -25°F (-32°C);
  - (3) Caterpillar® powershift, manual transmission with six forward speeds and one reverse;
  - (4) operator's cab with adjustable seat and steering column/wheel;
  - (5) removable bolt-on ROPS/FOPS canopy;
  - (6) front full-floating drive axle with outboard planetary final drives;
  - (7) differential lock control to reduce wheel slippage when high traction is required;
  - (8) articulated frame steering with two double-acting steering cylinders;
  - (9) oil sampling valves for engine, transmission, and hydraulic systems;
  - (10) NATO slave receptacle; and
  - (11) mounting provisions for M16 rifle and portable fire extinguisher inside cab and decontamination apparatus at left front of tractor.

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**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

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**0002 00*****EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - CONTINUED***

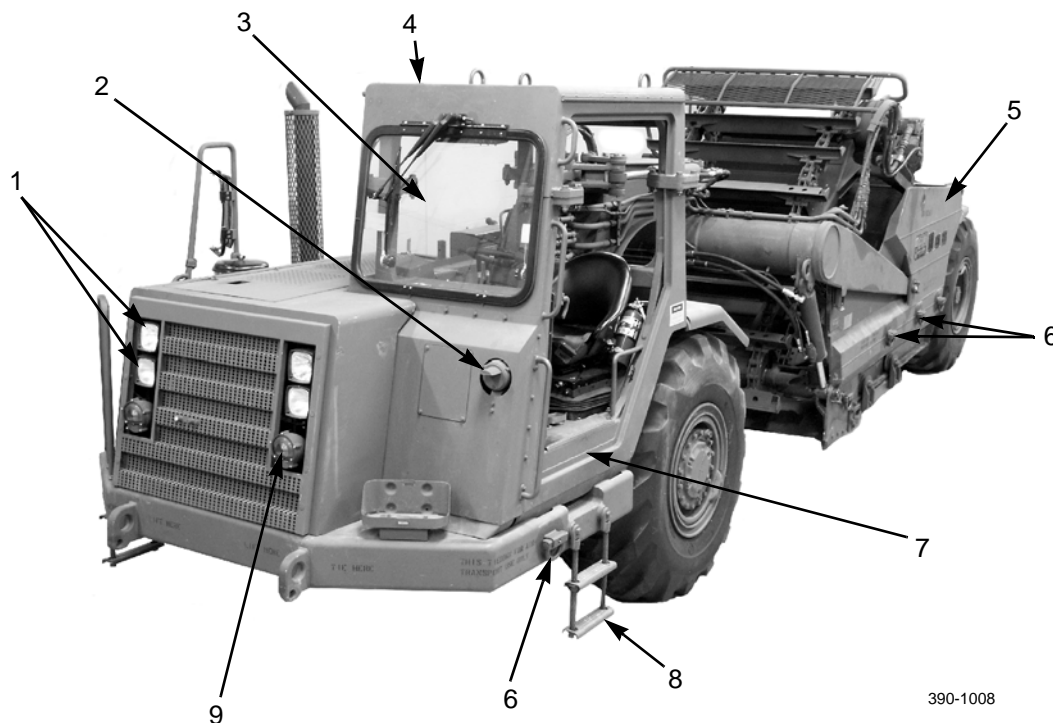
- i. The scraper rear section has the following capabilities and features:
  - (1) non-drive axle;
  - (2) elevating bowl with a load rate of less than one minute, to an 11 yd<sup>3</sup> (8.4 m<sup>3</sup>) capacity;
  - (3) interchangeable and reversible cutting edges, with center section predrilled to allow installation of four cutting teeth;
  - (4) two-speed forward, one reverse speed elevator to lift material into bowl; and
  - (5) retracting floor and dozer-type ejector for rapid unloading.
- j. When sectionalized, tractor can be driven using front and rear skids for stability, and steered using a skid steer system.



## EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



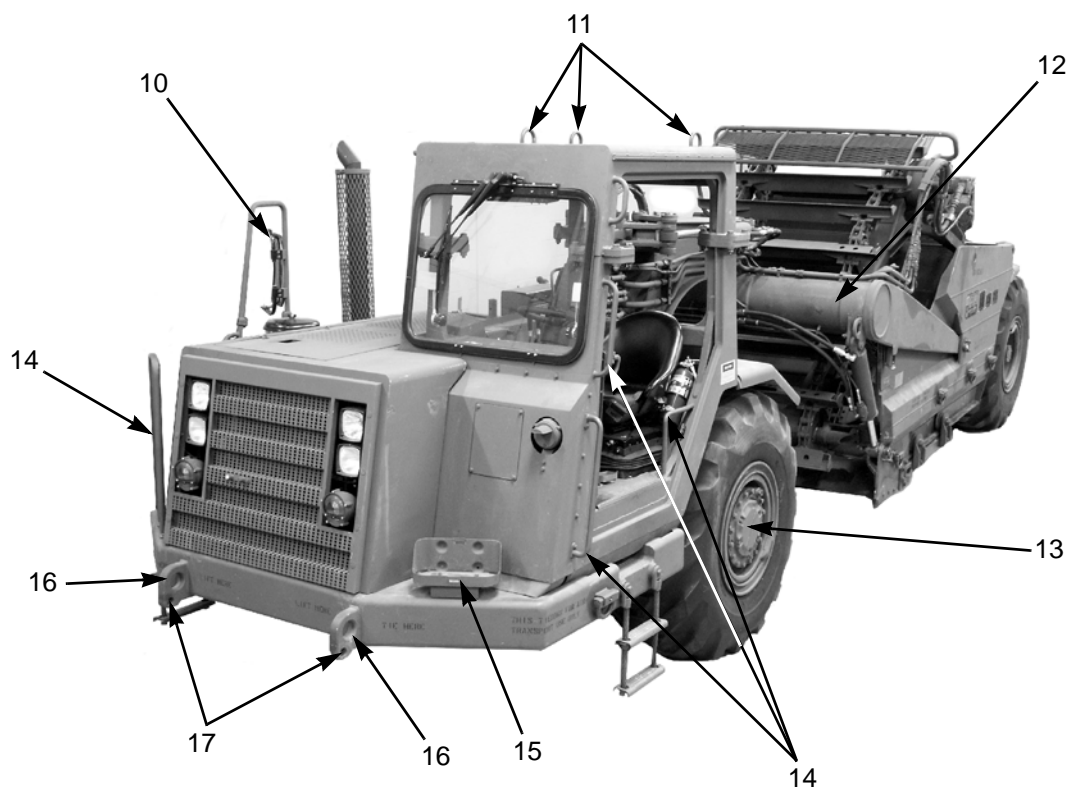
390-1008

KEY	COMPONENT	DESCRIPTION
1	Service Headlights	Top pair of lights are high beam. Bottom are low beam.
2	Blackout Drive Light	Used when operating in blackout mode.
3	Windshield	Protects operator from inclement weather and flying objects. Includes windshield wipers. Can be removed in preparation for transport.
4	ROPS/FOPS	Provides rollover and falling object protection for operator. Can be removed in preparation for transport.
5	Bowl	High-strength steel construction with 11 yd <sup>3</sup> (8.4 m <sup>3</sup> ) capacity. Low profile design with wide cutting edge maximizes speed and efficiency of self-loading.
6	Tiedown D-Rings	Used to tie machine down when being air transported.
7	Cab	Enclosure contains operator's seat and all driving and scraper controls.
8	Steps	Provide access to cab.
9	Parking/Turn Signal and Blackout Marker Lights	Serve as parking lights and flash to indicate direction machine is turning. In blackout mode, bottom of light serves as blackout markers.

## EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



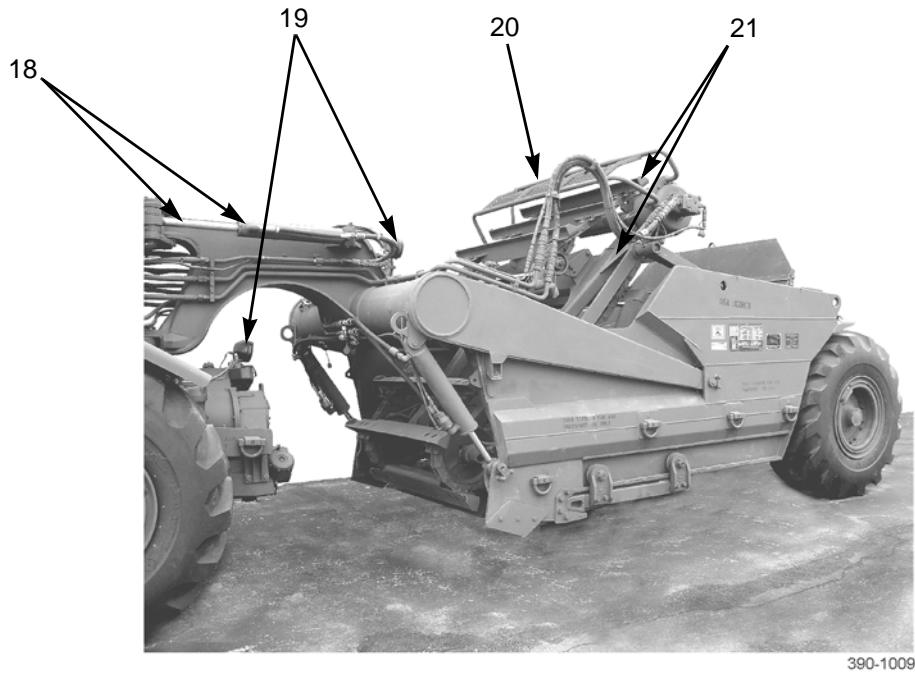
390-1008

KEY	COMPONENT	DESCRIPTION
10	Side Mirror	Provides operator with a view to rear and side of machine.
11	Lift Points	Attachment points for overhead lifting of ROPS/FOPS.
12	Draft Frame	Joins tractor hitch to scraper bowl.
13	Planetary Wheel Ends	Power front driving axle.
14	Grabhandles	Provide a handhold for personnel climbing on machine.
15	Decontamination Apparatus Mounting Bracket	Provides mounting for portable decontamination apparatus (DAP).
16	Lift/Tiedown Points	Provide for slinging or tiedown of machine.
17	Towing Lugs	Provide attachment point for medium-duty towbar.

## EQUIPMENT DESCRIPTION AND DATA - CONTINUED

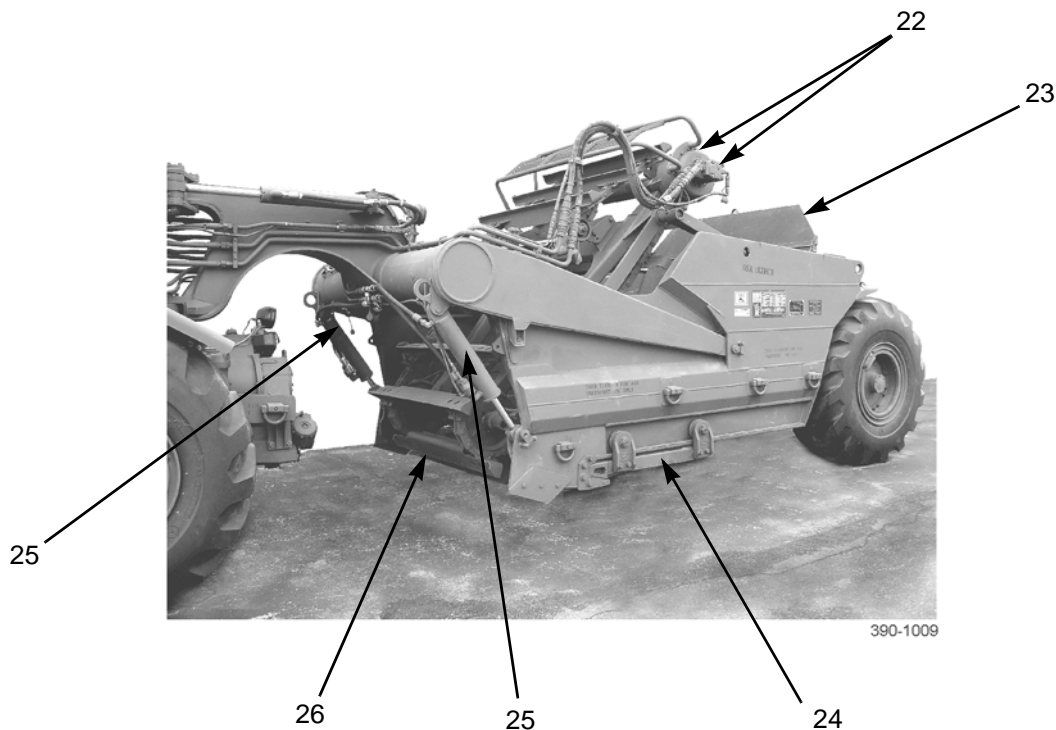
0002 00

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



390-1009

KEY	COMPONENT	DESCRIPTION
18	Steering Cylinder	Two hydraulic cylinders provide for 90-degree right or left turns with articulated frame steering system.
19	Work Lights	Illuminate cutting edge and loading area of scraper bowl.
20	Elevator Guard	Reduces spillage when elevator is lifting earth into bowl during self-load.
21	Elevator	Two-speed, chain-operated elevating mechanism is engaged for all loading/discharging operations. Flights on elevator carry soil from cutting edge up and into bowl. Breaking action of elevator flights during loading results in less chunky material and easier spreading at fill and compaction. Elevator reverses direction to aid ejection.

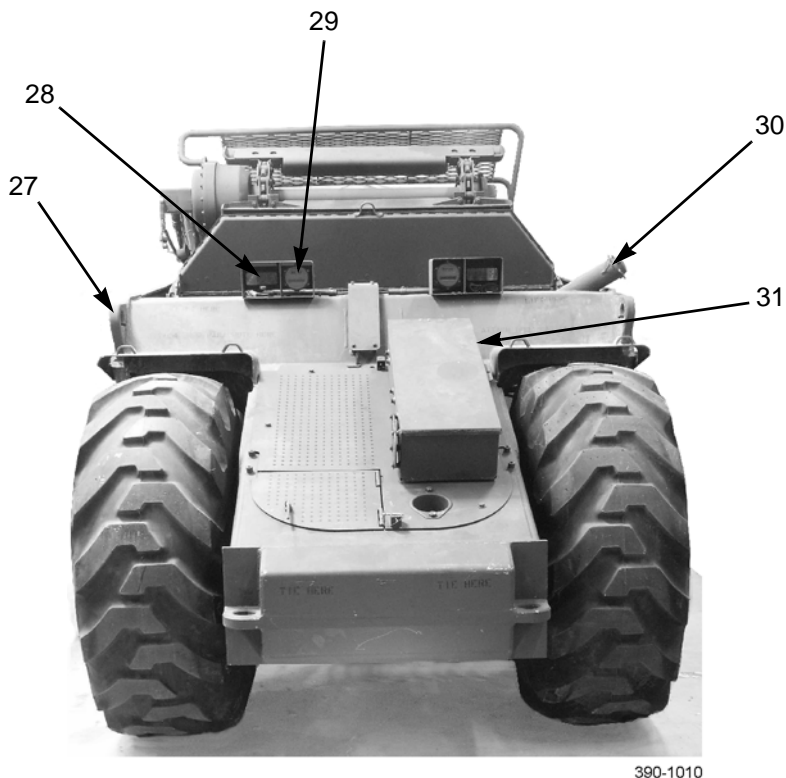
**EQUIPMENT DESCRIPTION AND DATA - CONTINUED****0002 00****LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED**

KEY	COMPONENT	DESCRIPTION
22	Elevator Speed Reducer and Motor	Powers elevator at two forward speeds and one reverse speed. Motor can be removed to lower profile of elevator in preparation for transport.
23	Ejector	Hydraulically-operated back wall of bowl moves forward to push load from bowl during unloading/spreading operations. Can be folded down to reduce height in preparation for transport.
24	Bowl Retracting Floor	Retracts, as ejector moves forward, to facilitate dumping operations.
25	Bowl Lift Cylinders	One on each side lower bowl to desired height for self-loading. Cylinders raise bowl for haul to dump (fill) area.
26	Bowl Cutting Edge	Leading edge at bottom of bowl floor. Three types of cutting edges can be configured, depending on soil type and depth of cut desired: straight edge (low penetration/finishing operations), stinger edge (center cutting edge extended - medium penetration), and teeth edge (high penetration). Distance between cutting edge and elevator flights may be adjusted to accommodate differing soil conditions.

## EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

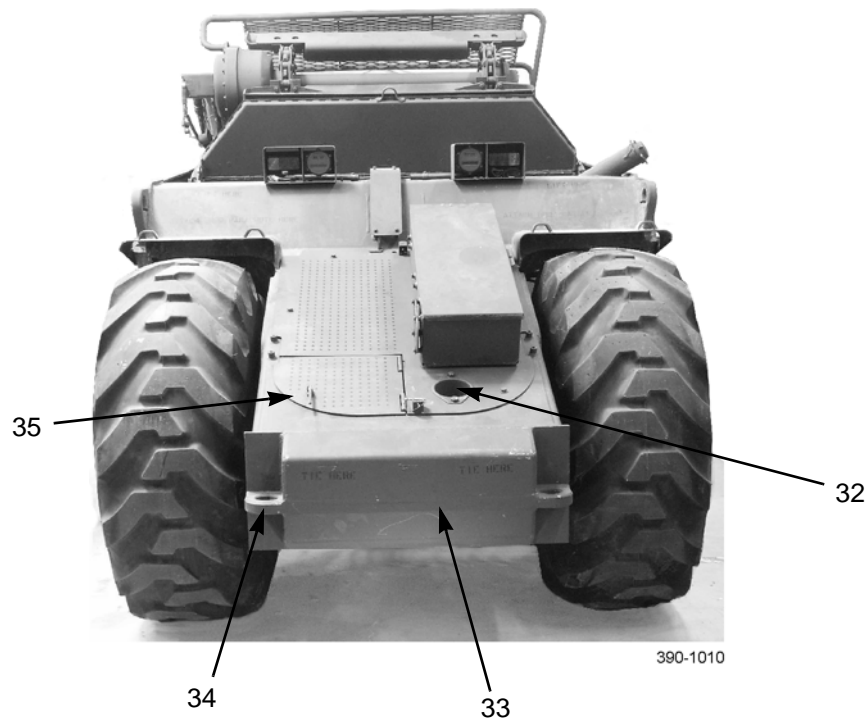
## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



390-1010

KEY	COMPONENT	DESCRIPTION
27	Sling Points	Attachment points for overhead slinging during external air transport by CH-47 helicopter. There are two on front and two on rear of tractor and scraper.
28	Composite Lights	Outside light serves as parking light and turn signal. Middle light is service light. Inside light is brake light. Used when operating in standard mode.
29	Blackout Marker Lights	Used when operating in blackout mode.
30	Fuel Tank Fill Tube	Provides means to fill fuel tank. Tube is removed for C130 airdrop.
31	BII Toolbox	Provides stowage for all BII items or tools required for transport preparations.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

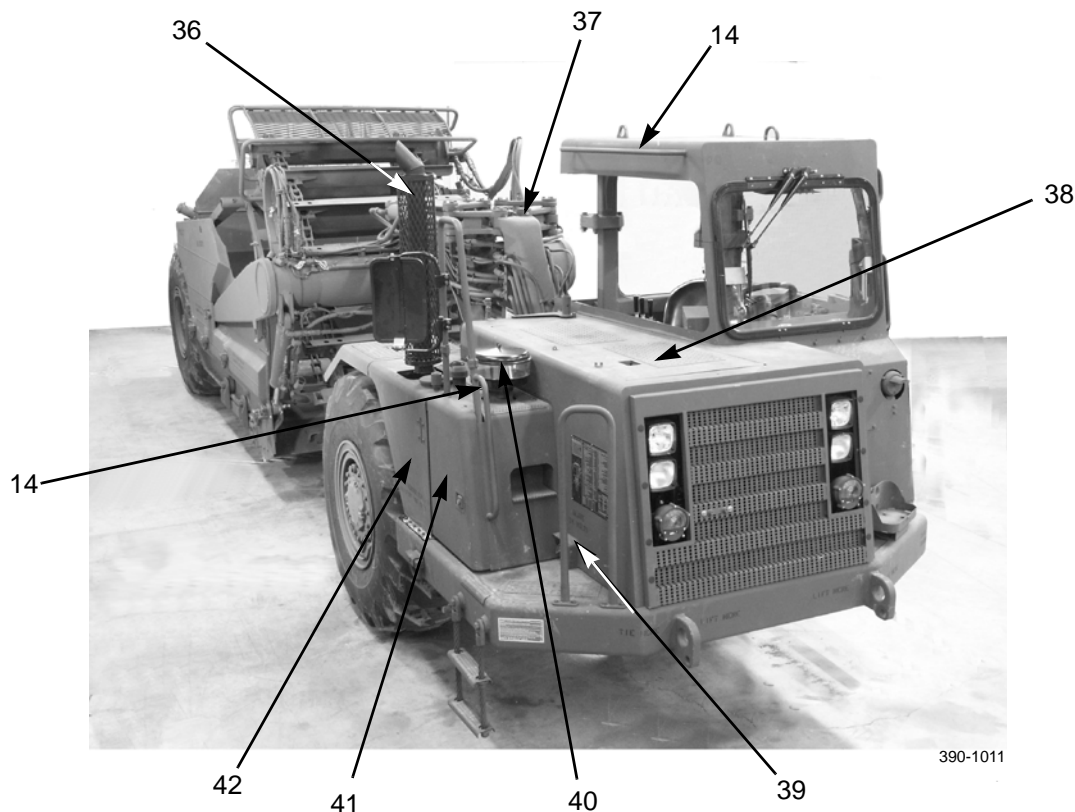


KEY	COMPONENT	DESCRIPTION
32	Hydraulic Motor Stowage Location	Provides stowage for elevator speed reducer hydraulic motor during certain modes of transport.
33	Push Block	Used ONLY during machine recovery operations, by push tractor, if machine is stuck in sand or mud. NEVER use push block to pushload scraper.
34	Tiedown Points	Provide for tiedown of machine.
35	Rear Compartment Access Door	Provides access to fuel and brake system components for service or maintenance.

## EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

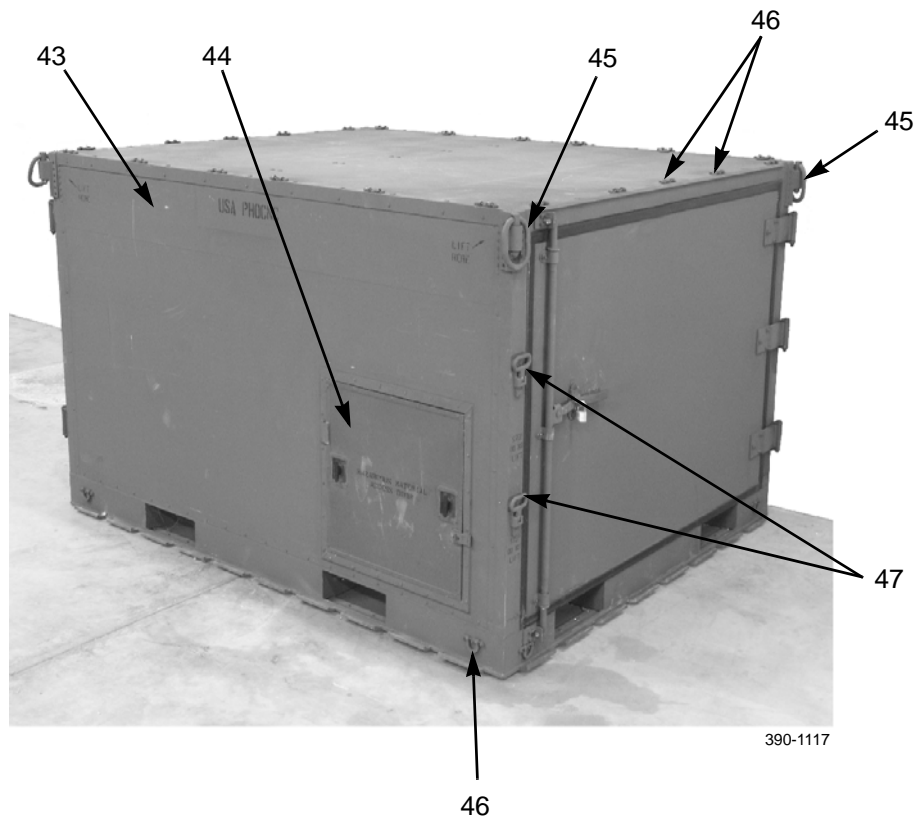


KEY	COMPONENT	DESCRIPTION
14	Grabhandles	Provide a handhold for personnel climbing on machine.
36	Exhaust Stack	Direct exhaust away from machine. Can be removed in preparation for transport.
37	Hitch	Joins tractor to draft frame.
38	Engine Access Door	Provides access to engine compartment.
39	NATO Slave Receptacle	Provides connection point for NATO slave cable to slave start machine.
40	Engine Air Precleaner	Provides convenient means to remove debris filtered from incoming air to engine.
41	Engine Air Filter and Battery Compartment	Enclosure provides access to engine air filter primary and secondary elements and to batteries for servicing.
42	Hydraulic Tank	Stores hydraulic fluid used in machine hydraulic systems. Contains sight gage for fluid level check.

## EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



KEY	COMPONENT	DESCRIPTION
43	ISU-60 Container	Cabinet type enclosure used for storage and shipment of transport supplies and equipment.
44	HAZMAT Access Door	Allows access to auxiliary fuel tank.
45	Lifting Rings	One ring at each top corner of container provides hookup point for sling assembly when lifting container using crane or helicopter.
46	Winching Rings	Bottom rings allow fully loaded container to be pulled into position on roller conveyors. Rings along top edge of container roof are used as tiedowns.
47	Folding Steps	Provide access to roof for sling leg rigging and hookup when lifting container.



**EQUIPMENT DESCRIPTION AND DATA - CONTINUED****0002 00****EQUIPMENT DATA****Overall:**

Length (Tractor and Scraper) . . . . .	33.2 ft (10.13 m)
Width (Tractor and Scraper) . . . . .	8.4 ft (2.56 m)
Wheelbase (Tractor and Scraper). . . . .	20.5 ft (6.25 m)
Height:	
Cab . . . . .	9.4 ft (2.87 m)
Scraper . . . . .	9.7 ft (2.96 m)
Weight (Empty):	
Tractor. . . . .	17184 lb (7793 kg)
Scraper . . . . .	15663 lb (7103 kg)
Tractor and Scraper. . . . .	32847 lb (14897 kg)
Weights (Loaded):	
Tractor and Scraper. . . . .	59247 lb (26869 kg)
Fording Depth . . . . .	3.28 ft (1.00 m)
Maximum Travel Speeds:	
Empty . . . . .	25.5 mph (41 kph)
Loaded . . . . .	21.8 mph (35 kph)
Ground Clearance:	
Tractor. . . . .	17 in. (43.18 cm)
Scraper, Raised . . . . .	11 in. (27.94 cm)
Turning Width, Curb-to-Curb . . . . .	35.7 ft (10.89 m)
Air Mobile:	
Length . . . . .	33.2 ft. (10.13 m)
Width . . . . .	8.4 ft (2.56 m)
Wheelbase. . . . .	20.5 ft (6.25 m)
Height:	
Cab . . . . .	7.8 ft (2.38 m)

**NOTE**

Scraper height indicates height when elevator/ejector is lowered.

Scraper. . . . .	7.5 ft (2.29 m)
Weight (Empty):	
Tractor. . . . .	16670 lb (7560 kg)
Scraper. . . . .	15588 lb (7069 kg)

**EQUIPMENT DESCRIPTION AND DATA - CONTINUED****0002 00****EQUIPMENT DATA - CONTINUED****Overall - Continued**

## Airdrop:

Length .....	33.2 ft (10.13 m)
Width .....	8.6 ft (2.62 m)
Wheelbase .....	20.5 ft (6.25 m)
Height:	
Tractor Cab .....	7.8 ft (2.38 m)

**NOTE**

Scraper height indicates height when elevator/ejector is lowered.

Scraper .....	7.5 ft (2.29 m)
Weight (Empty):	
Tractor .....	16670 lb (7560 kg)
Scraper .....	15588 lb (7069 kg)

## Air Assault:

Length:	
Tractor .....	23.7 ft (7.23 m)
Scraper .....	12.5 ft (3.81 m)
Width:	
Tractor .....	8.4 ft. (2.56 m)
Scraper .....	8.3 ft (2.53 m)
Height:	
Cab .....	7.8 ft (2.38 m)
Scraper .....	9.7 ft (2.96 m)
Weight (Empty):	
Tractor .....	16475 lb (7472 kg)
Scraper .....	15663 lb (7103 kg)

**Tractor:**

## Engine:

Manufacturer .....	Caterpillar Inc.
Model .....	3116TA
Horsepower .....	175 hp (131 kw) @ 2300 RPM
Engine RPM .....	2450 (high idle); 825 (low idle)
Cylinders .....	6
Displacement .....	403 CID (6.6 l)
Weight .....	1874 lb (851 kg)
Fuel System .....	Unit injection
Cooling System, Thermostat Range .....	165°-210° F (74°-99°C)

## Transmission:

Manufacturer .....	Caterpillar Inc.
Type .....	6 speeds forward, 1 reverse
Range Selection .....	powershift, manual

## Final Drive:

Manufacturer .....	Caterpillar Inc.
Type .....	planetary/outboard
Axle .....	full-floating



**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

**0002 00**

***EQUIPMENT DATA - CONTINUED***

**ISU-60 Container:**

Overall Dimensions:

Height .....	60.00 in. (152.40 cm)
Width .....	108.00 in. (274.32 cm)
Depth .....	88.00 in. (223.52 cm)
Weight (Empty) .....	1,260 lb (572 kg)
Maximum Capacity (w/Storage Items) .....	10,000 lb (4,535 kg)
Gross Weight .....	11,260 lb (5,108 kg)
Shelf Capacity .....	750 lb (340 kg)

Transport Requirements:

Military Air Transportability .....	463L Military Aircraft Restraint System
Commercial Air Transportability .....	747 commercial freighter
Forkliftable .....	12,000 lb (4,535 kg) capacity fork truck with 72 in. (182.88 cm) tines
Stackable .....	Maximum two high with optional stacking rack (PN 60210-001)

**END OF WORK PACKAGE**

## THEORY OF OPERATION

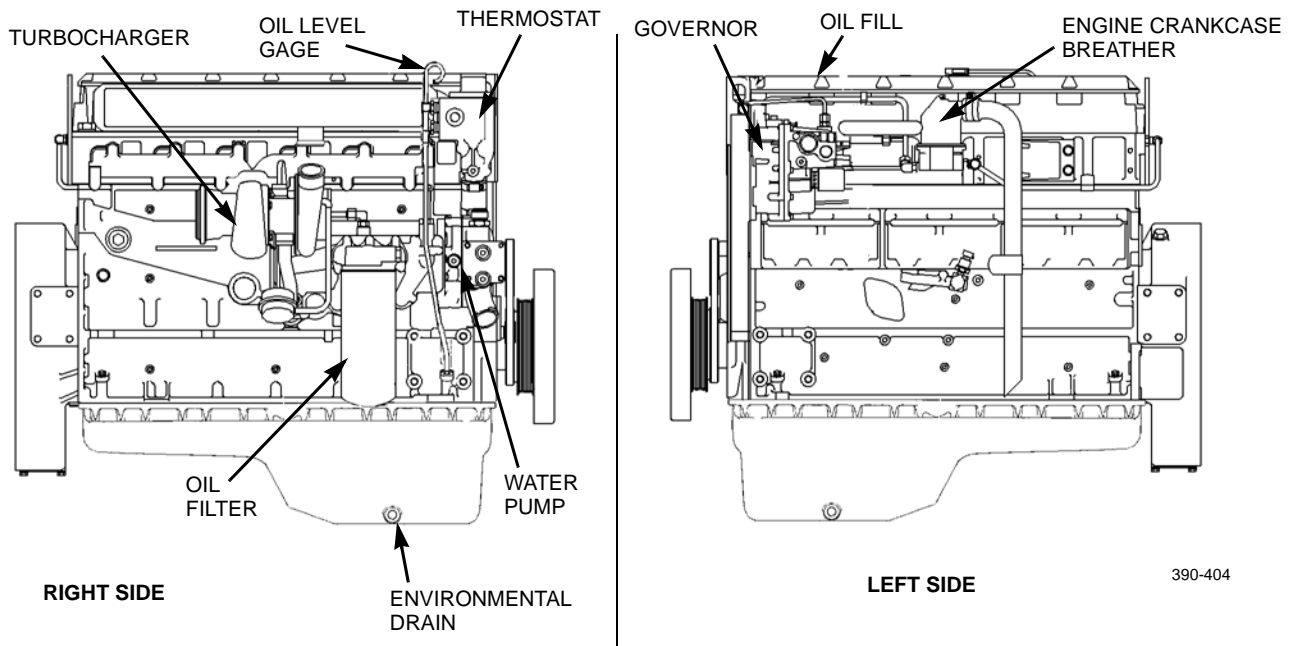
0003 00

**INTRODUCTION**

1. The scraper consists of the following functional systems: engine; power train; air and brake systems; electrical system; and steering and scraper hydraulic systems.
2. This work package explains how the systems and components of the machine work together. A functional description is provided for each major component and system.

**ENGINE**

1. **General.** The tractor is equipped with a Caterpillar® 3116TA turbocharged diesel engine with six in-line cylinders, generating 175 horsepower @ 2300 RPM.



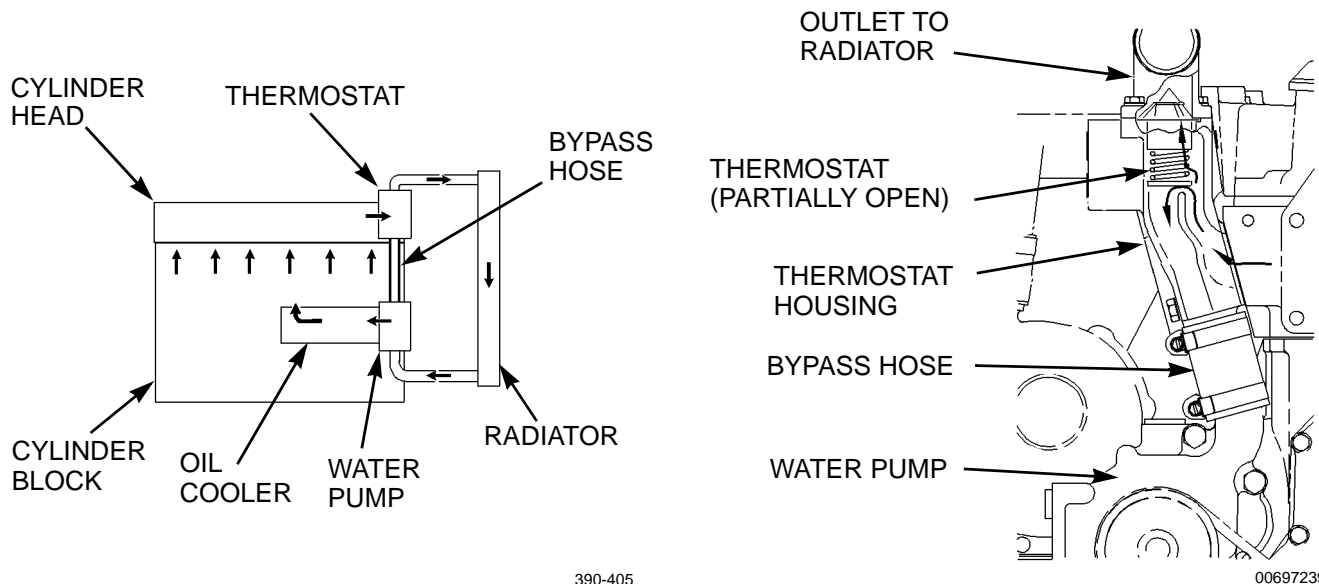
2. **Fuel System.** The engine is powered with a direct fuel injection system. Fuel from the fuel tank is pulled through a fuel/water separator and two secondary fuel filters by an electric fuel pump and the fuel transfer pump that is an integral part of the engine governor. Drilled passages in the cylinder head provide continuous flow of fuel to the injectors. Unused fuel is returned to the fuel tank.

## THEORY OF OPERATION - CONTINUED

0003 00

**ENGINE - CONTINUED**

3. **Cooling System.** The cooling system consists of a belt-driven circulating water pump, 165°F-210°F (74°C-99°C) thermostat for controlling coolant flow, engine-driven fan, oil cooler, and radiator. The cooling system cools the engine by circulating pressurized ethylene glycol based coolant through the engine and radiator.



390-405

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4. **Lubrication System.** The engine lubrication system consists of a gear-driven oil pump, oil filter, oil cooler, and oil pan. The engine is lubricated by cooled and pressurized oil which is circulated through the engine block and head.
5. **Exhaust System.** The exhaust system removes exhaust gases from the engine through the exhaust manifold and turbo-charger. The gases flow into exhaust pipes and a muffler to the atmosphere above the cab.

**POWER TRAIN**

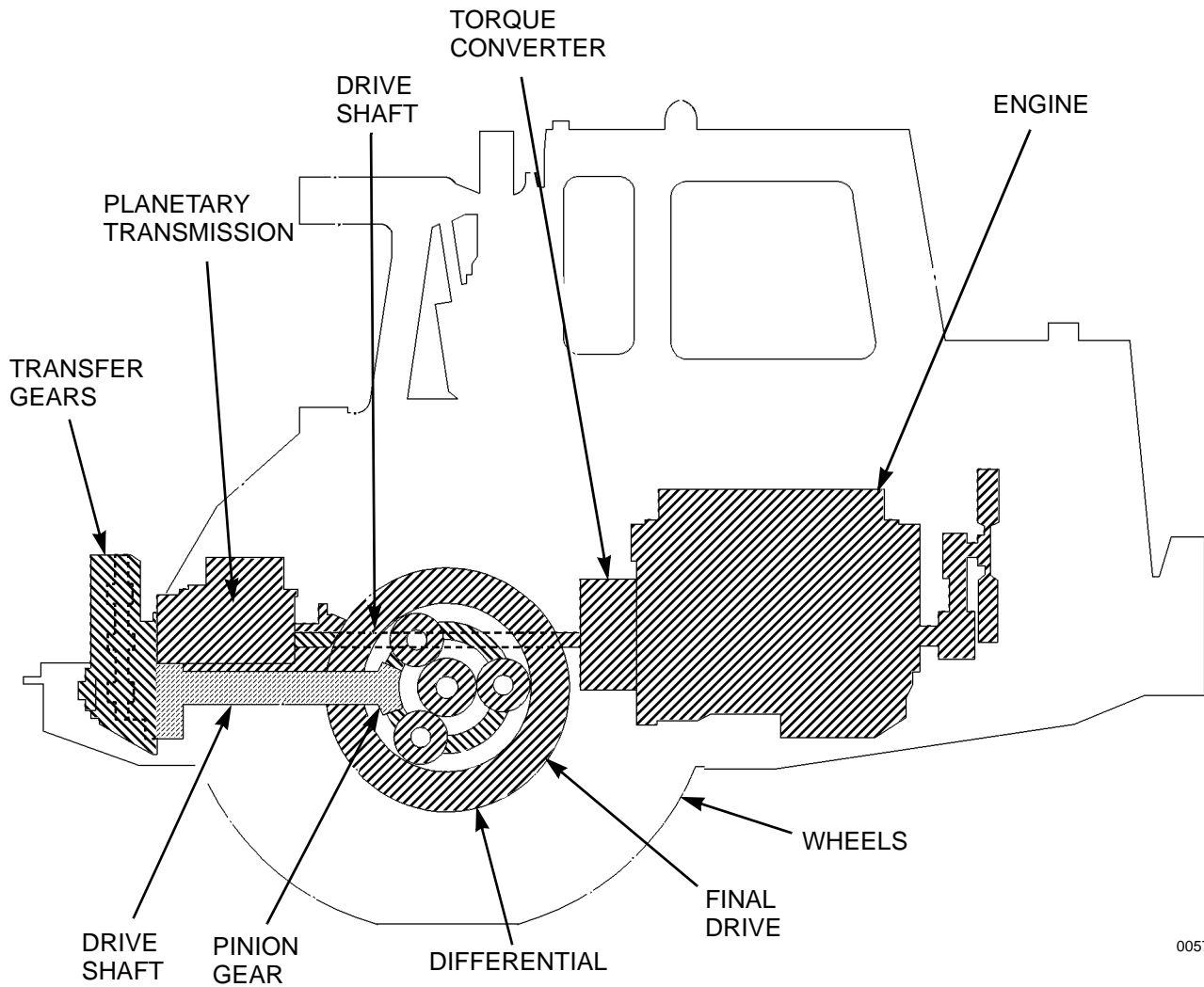
1. **General.** Power from the engine is sent to the torque converter. The converter output is connected to the upper drive shaft that moves the power to the six-speed powershift transmission. The transmission is connected to transfer gears that direct the power via the lower drive shaft to the differential in the drive axle. The differential and drive axles provide the power to the planetary carriers in the left and right final drives.
2. **Transmission.** The transmission has six hydraulically activated clutches that provide six speeds forward and one speed reverse. The speed and direction are manually selected.
3. **Transfer Gears.** The transfer drive gear receives power from the transmission output and transfers the power via a transfer gear and shaft to the drive shaft yoke that is connected to the lower drive shaft. The transfer also mounts the parking brake actuator, drum, and shoes.
4. **Differential.** The differential divides the balance of power that is sent to the final drives and wheels. When the machine is turning, the differential allows the inside wheel to turn at a slower rate than the outside wheel. However, the differential still sends the same torque to each wheel.
5. **Differential Lock.** The differential lock is utilized when maximum traction is needed. The operator engages the differential lock by pressing down and holding the differential lock pedal. This in turn allows air pressure to engage the lock; when the pedal is released, internal springs will disengage the lock. The differential lock should never be engaged when one tractor wheel is spinning or when operator is turning (steering) machine; this action would result in damage to the differential assembly.

## THEORY OF OPERATION - CONTINUED

0003 00

**POWER TRAIN - CONTINUED**

6. **Final Drive.** The planetary final drive causes speed reduction and an increase in torque at the tractor wheels. Power from the differential turns the axle shafts; the shafts turn the sun gear in the center of the planetary gears. The movement of the planetary gears causes the planetary carrier to turn; in turn the wheels are turned.



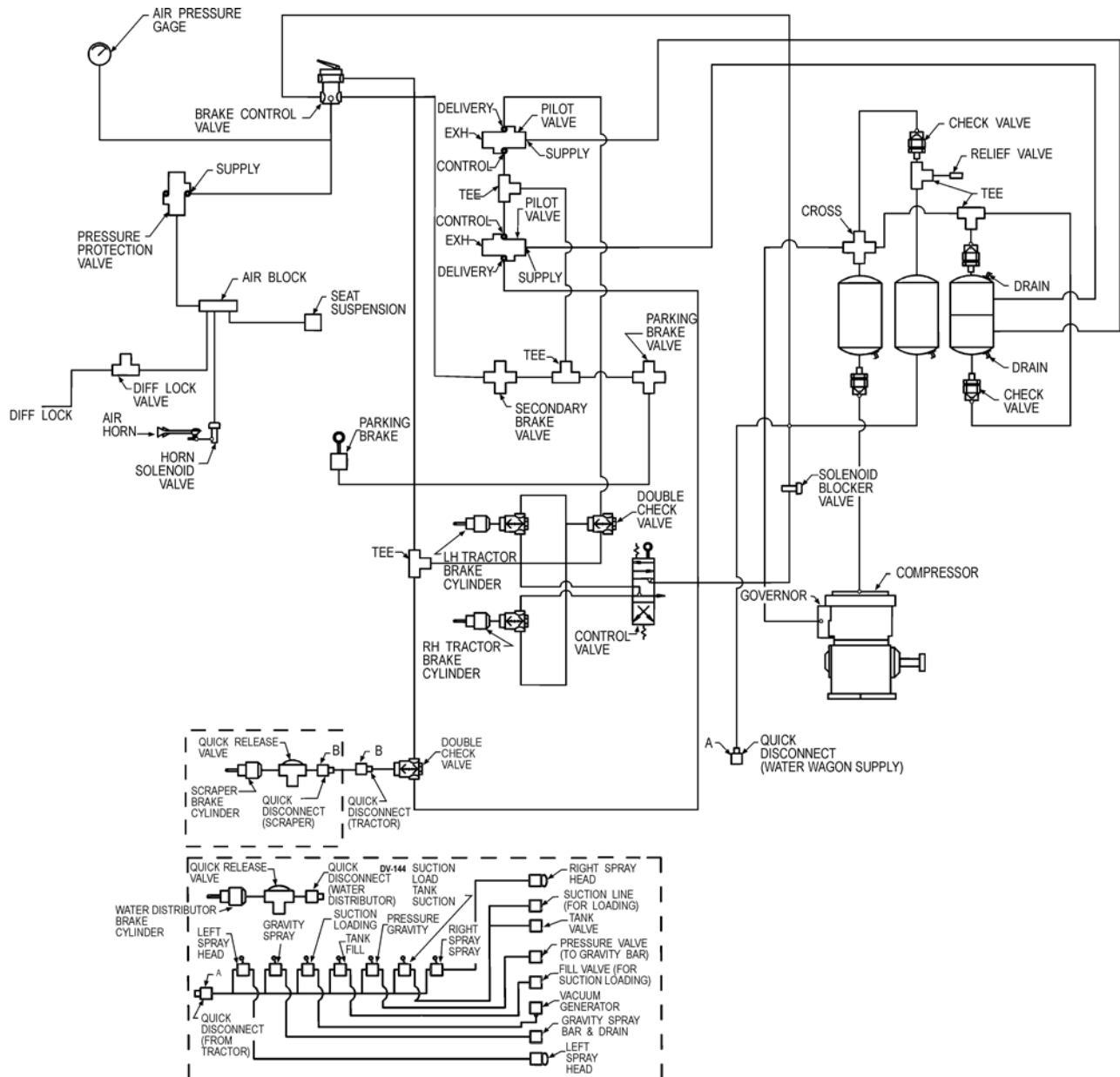
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THEORY OF OPERATION - CONTINUED

0003 00

**AIR AND BRAKE SYSTEMS**

1. **General.** The air system consists of an engine-driven air compressor, three air tanks (wet, dry, and reserve), and related lines, hoses, and valves. The system provides the required air to operate the machine's service and parking brakes, differential lock, operator's seat, and air horn.

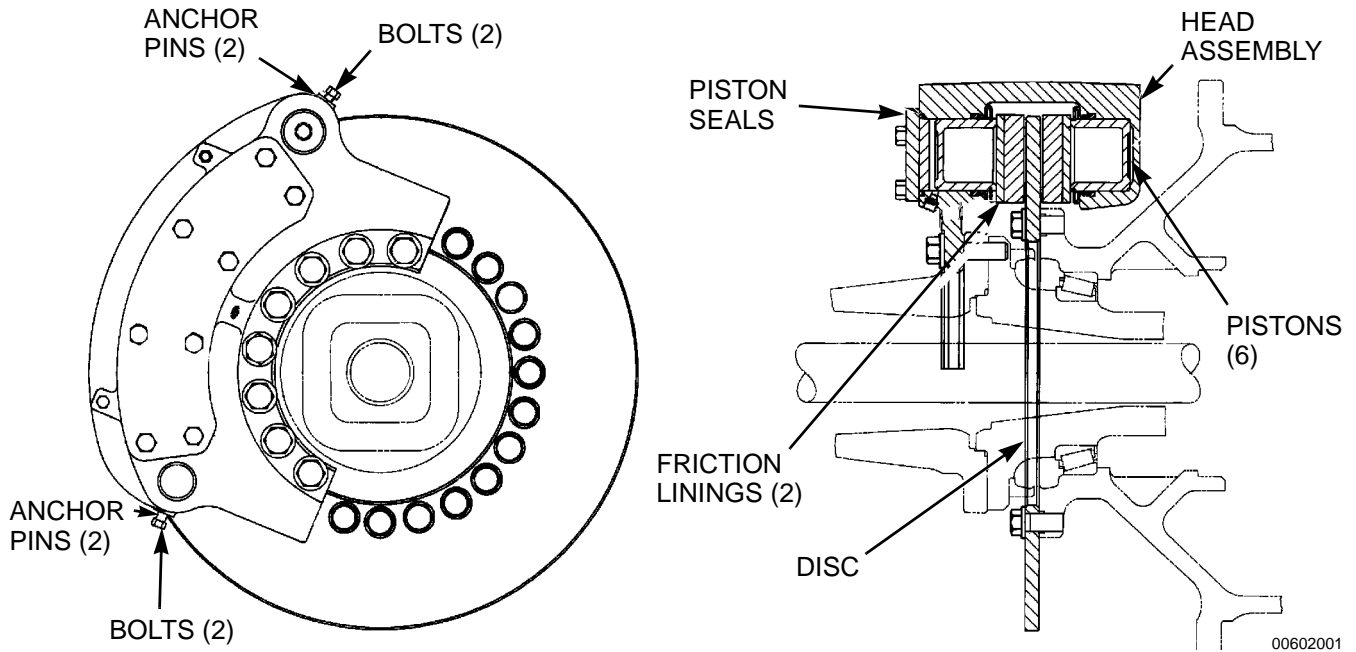


390-1046



**AIR AND BRAKE SYSTEMS - CONTINUED**

2. **Service Brakes.** The service brakes are an air-over-fluid activated caliper disc brake system. Each caliper has six pistons and two friction linings. There are three pistons and one friction lining on each side of the rotating brake disc.

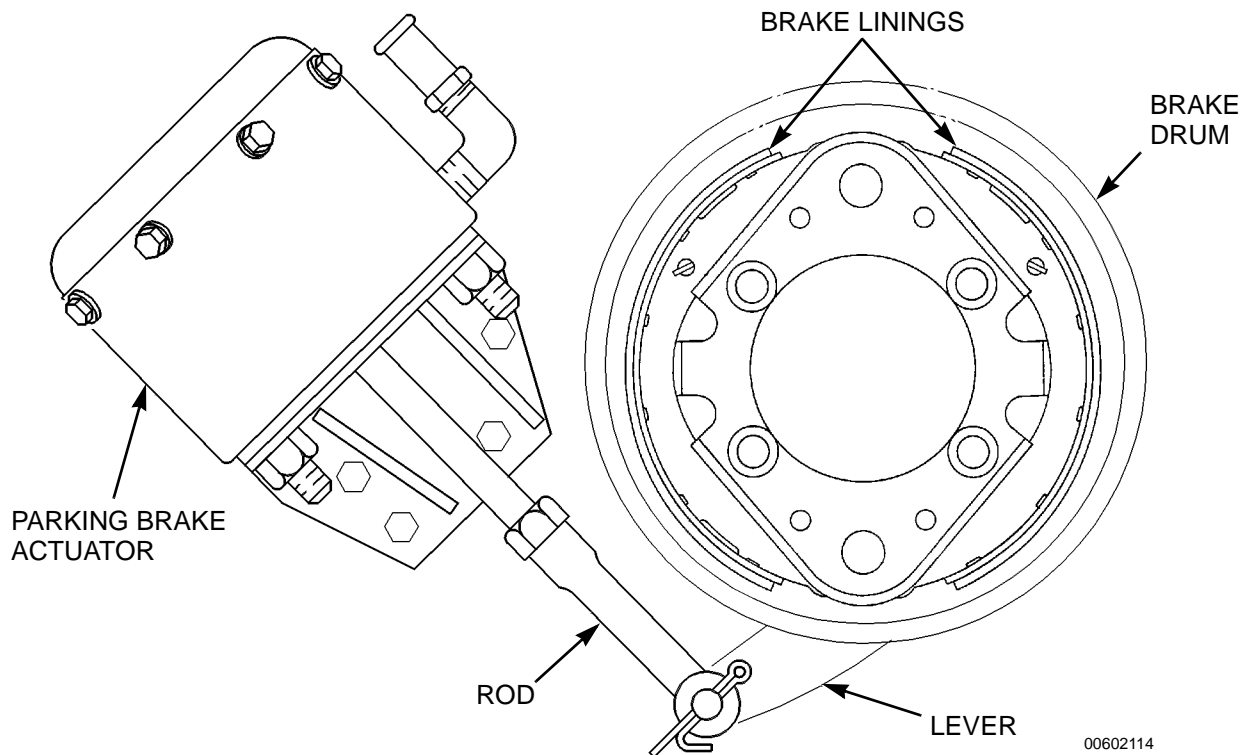


## THEORY OF OPERATION - CONTINUED

0003 00

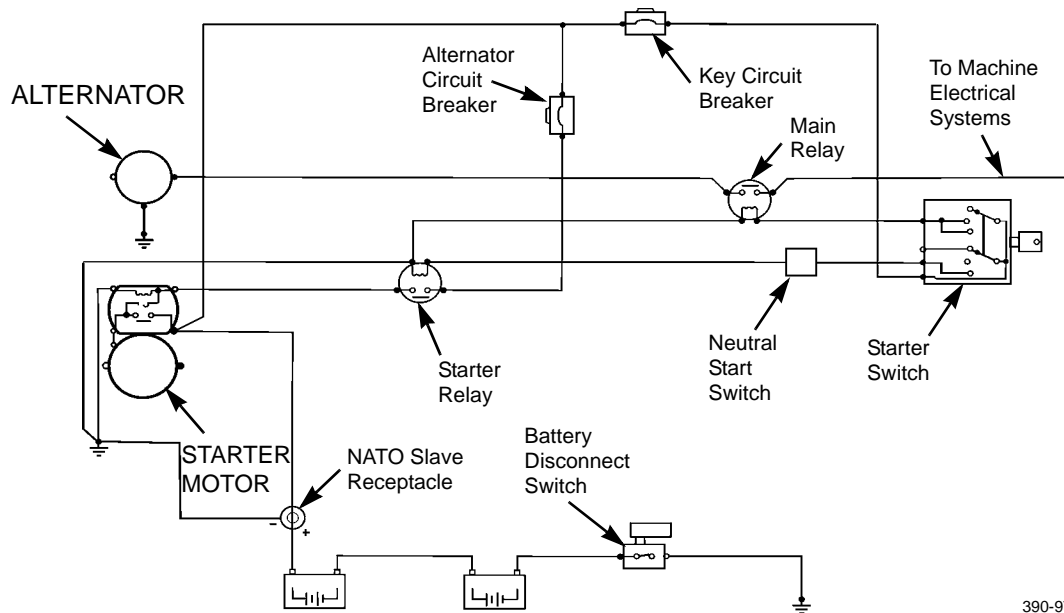
**AIR AND BRAKE SYSTEMS - CONTINUED**

3. **Parking Brake.** The parking brake is an air released/spring applied type of parking brake system. When the parking brake control knob is pulled out, air pressure is exhausted from the brake cylinder and spring pressure is applied. When the control knob is pressed in, air pressure is applied to the cylinder and the parking brake is released.

**ELECTRICAL SYSTEM**

1. The electrical system consists of two 12-volt batteries connected in series, with negative grounding, providing 24 volts to operate the electrical systems and components.
2. The system contains all the necessary switches, circuit breakers, fuses, relays, harnesses, and connectors to operate the machine, including a NATO slave receptacle.
3. The three major systems comprising the electrical system are:
  - a. starting and charging systems;
  - b. service, work, and blackout lights; and
  - c. EMS monitoring and alarm system.

### ***ELECTRICAL SYSTEM - CONTINUED***



390-977

## HYDRAULIC SYSTEM

**1. General.**

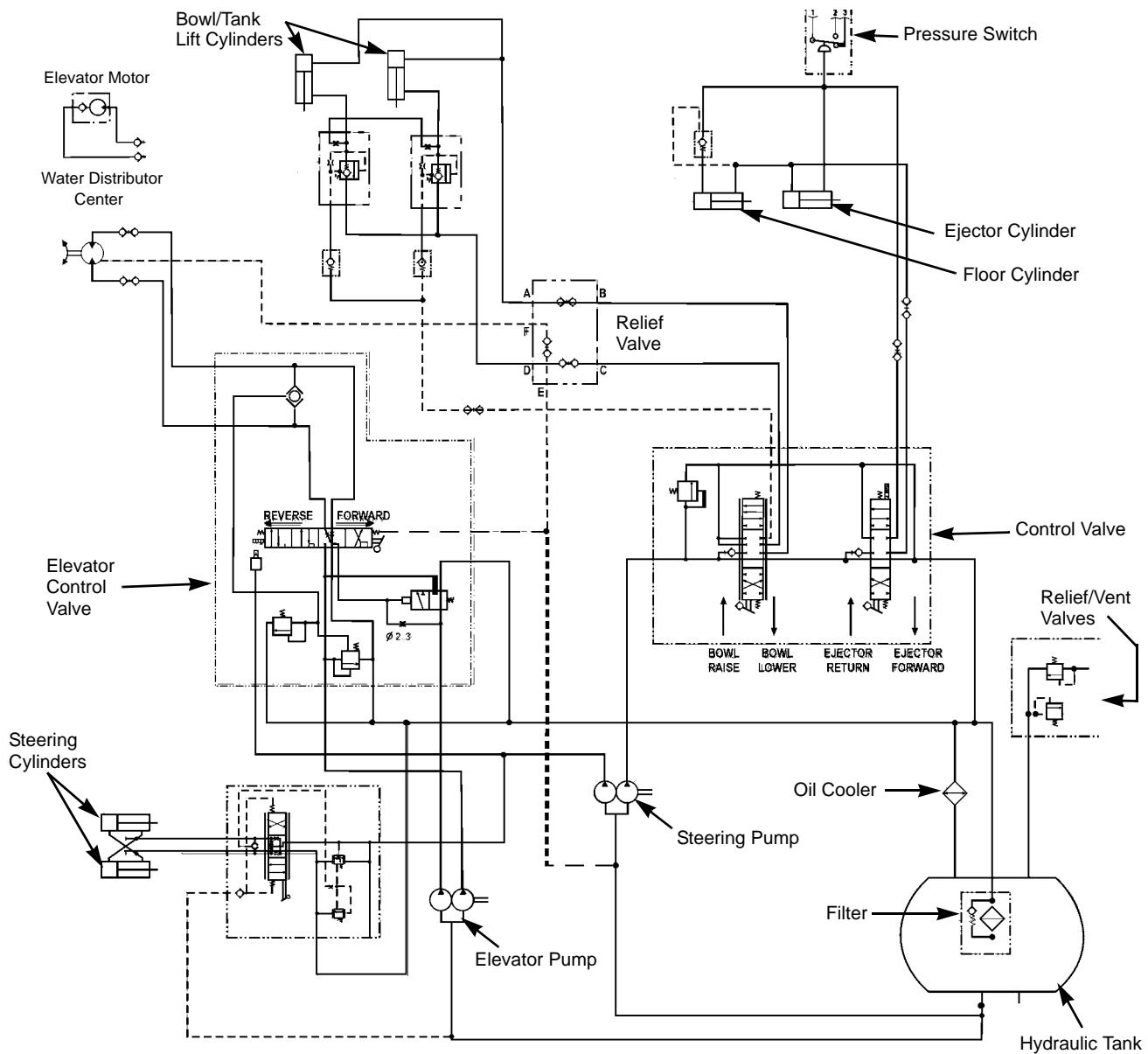
- a. The machine hydraulic system supports both steering and scraper hydraulic systems.
- b. The hydraulic system consists of vane pumps; control, check, and spool type valves; filters; hydraulic motor; lines, hoses, and fittings; oil cooler; and hydraulic tank. Two vane type pumps mounted on the torque converter provide hydraulic system pressure.

## THEORY OF OPERATION - CONTINUED

0003 00

## HYDRAULIC SYSTEM - CONTINUED

2. **Steering System.** The steering system is a variable flow modulated system. This type of system allows the operator good control for minor steering corrections at fast ground speeds as well as good control while operating at slower speeds during tight turns.
3. **Scraper Hydraulic System.** The scraper hydraulic system consists of three primary hydraulic circuits to support scraper operations: bowl circuit for raising and lowering the bowl; ejector/floor circuit for ejecting material from the bowl; and elevator circuit for loading and unloading material.



390-1179

END OF WORK PACKAGE

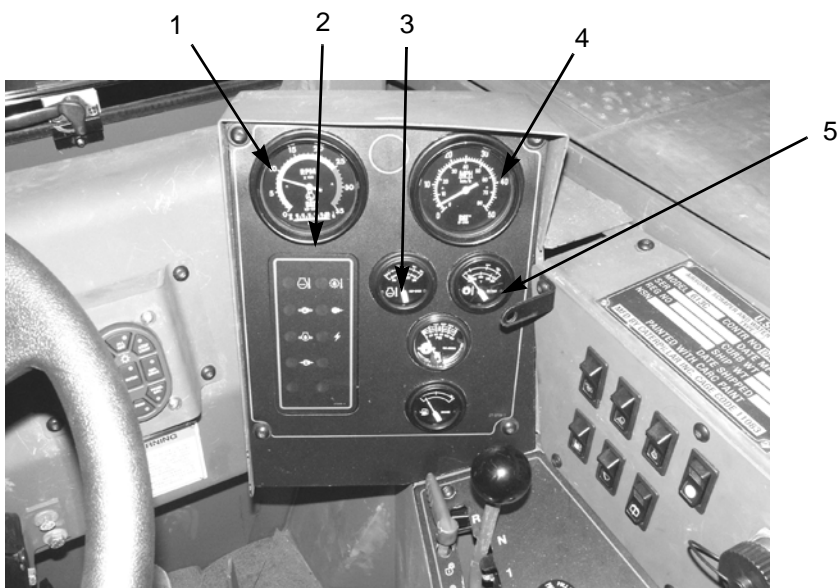
## **CHAPTER 2**

### **OPERATING INSTRUCTIONS**

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

Do not attempt to operate the scraper until becoming familiar with the location and use of all controls and indicators. This work package describes all operator controls and indicators.

**INSTRUMENT PANEL**1. **Gages.**

390-001

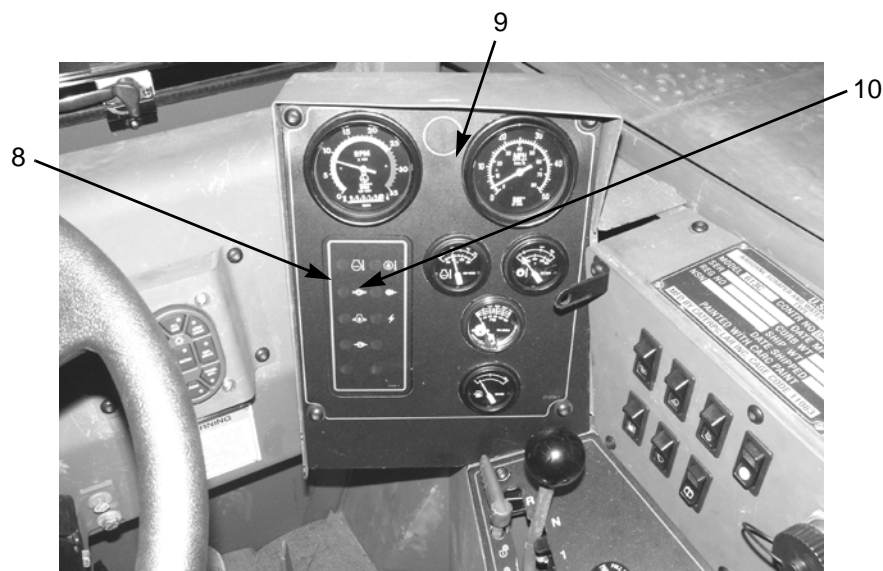
KEY	CONTROL OR INDICATOR	FUNCTION
1	Tachometer	Displays engine speed in RPM.
2	Service Hourmeter	Records total engine operating hours. Used to determine service intervals.
3	Engine Coolant Temperature	Indicates temperature of engine coolant. Normal operating range is 165°F-210°F (74°C-99°C). If coolant temperature exceeds 210°F (99°C), stop engine and troubleshoot.
4	Speedometer	Displays ground speed in mph (km/h).
5	Torque Converter Oil Temperature Gage	Indicates temperature of torque converter oil. Normal operating range is 165°F-265°F (74°C-129°C). If oil temperature exceeds 265°F (129°C), reduce load on machine. If needle stays in elevated zone on gage, stop engine and notify Unit Maintenance.

**INSTRUMENT PANEL - CONTINUED**1. Gages - Continued.

390-001

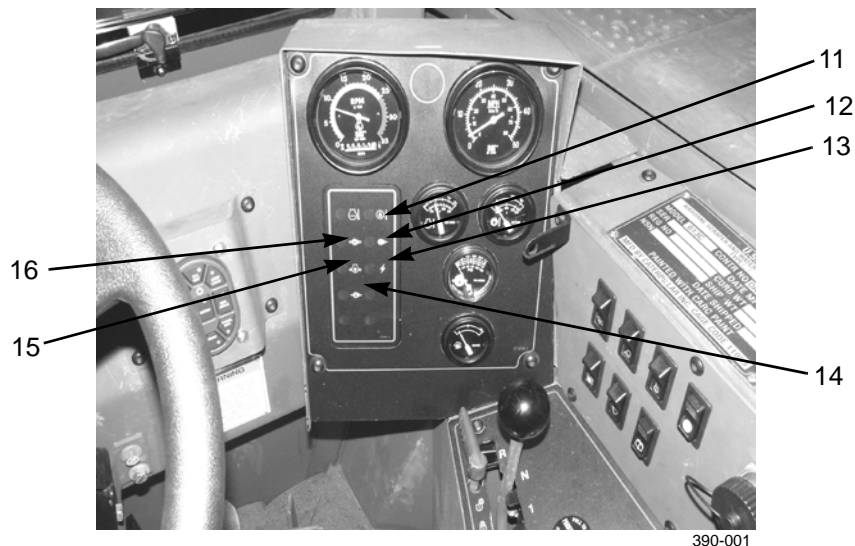
KEY	CONTROL OR INDICATOR	FUNCTION
6	Air Pressure Gage	Indicates air system pressure. System operating pressure is 125 +/-10 psi (862 +/-69 kPa). When air pressure falls below 65 psi (448 kPa), EMS brake air pressure indicator light and EMS action light will illuminate and alarm will sound.
7	Fuel Gage	Indicates amount of fuel remaining in fuel tank.



**INSTRUMENT PANEL - CONTINUED****2. Electronic Monitoring System (EMS).**

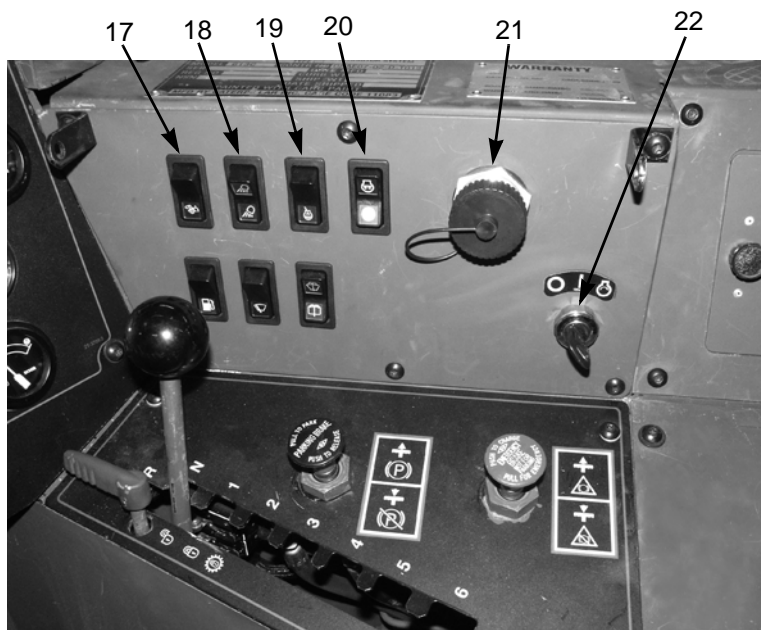
390-001

KEY	CONTROL OR INDICATOR	FUNCTION
8	EMS	Monitors tractor systems and provides three categories of warnings to inform the operator of immediate or impending problems: (a) <i>Category 1 Warning</i> requires only operator awareness. Only EMS alert indicator light illuminates. (b) <i>Category 2 Warning</i> requires operator response. EMS alert indicator light and EMS action light illuminate. (c) <i>Category 3 Warning</i> requires immediate shutdown of machine. EMS alert indicator light, EMS action light, and action alarm come on.
9	EMS Action Light	Illuminates when EMS has detected a problem with any monitored machine system, and operator response is required. An EMS alert indicator also illuminates on EMS display panel.
10	EMS Coolant Temperature Indicator Light	When lit, indicates excessive coolant temperature. If indicator light illuminates, reduce engine speed to idle until engine cools down. Do not operate tractor if indicator light remains on and EMS action light is flashing.

**INSTRUMENT PANEL - CONTINUED****2. Electronic Monitoring System (EMS) - Continued.**

390-001

KEY	CONTROL OR INDICATOR	FUNCTION
11	EMS Torque Converter Oil Temperature Indicator Light	When lit, indicates excessive torque converter oil temperature. If indicator light illuminates, reduce load. Do not operate tractor if indicator light remains on and EMS action light is flashing.
12	EMS Parking Brake Indicator Light	Illuminates when parking brake is set.
13	EMS Alternator Indicator Light	When lit, indicates alternator malfunction. If indicator light illuminates, stop tractor and notify Unit Maintenance.
14	EMS Brake Air Pressure Indicator Light	When lit, indicates low brake air pressure. If indicator light illuminates, stop tractor and notify Unit Maintenance.
15	EMS Engine Oil Pressure Indicator Light	When lit, indicates low engine oil pressure. If indicator light illuminates, stop tractor and notify Unit Maintenance.
16	EMS Brake Oil Pressure Indicator Light	When lit, indicates low brake oil pressure. If indicator light illuminates, stop tractor and notify Unit Maintenance.

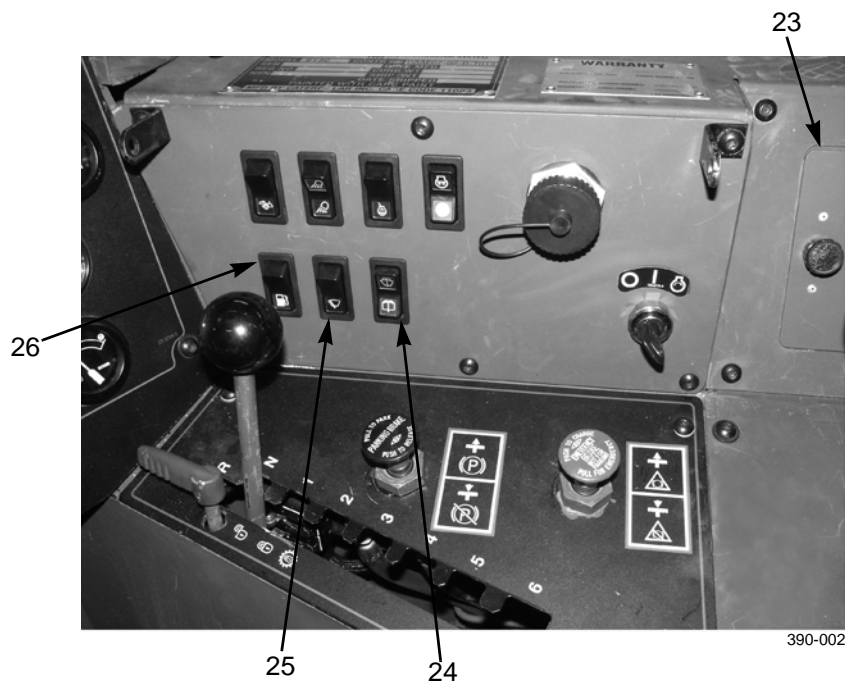
**INSTRUMENT PANEL - CONTINUED****3. Switches and Controls.**

390-002

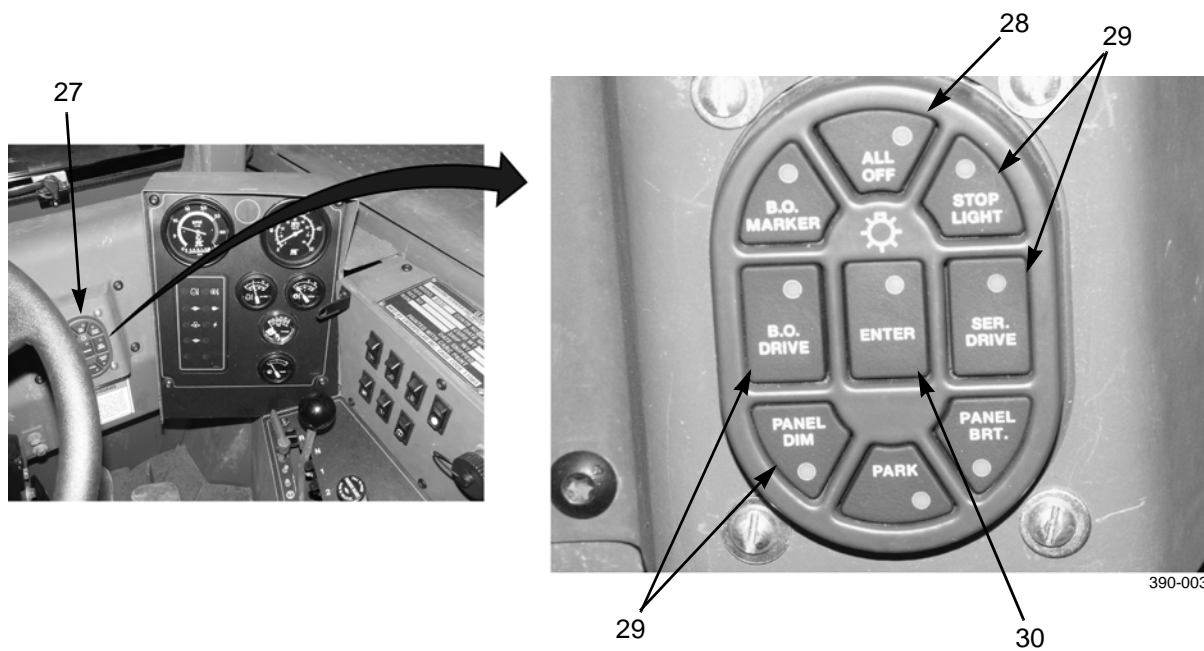
KEY	CONTROL OR INDICATOR	FUNCTION
17	EMS Panel Test Switch	Provides a means to perform EMS self-test by moving switch upward. EMS alert indicator lights, EMS action light, and action alarm should come on until switch is released.
18	Work Lights Switch	Push switch upward to turn bowl and cutting edge work lights ON. Push switch downward to turn lights OFF.
19	Ether Start Aid Switch	When pressed, injects a premeasured amount of ether into engine during cold weather starting. Must ONLY be used during cold weather starting below 32°F (0°C).
20	Air Intake Preheat Switch	Push switch upward to preheat air in intake manifold for cold weather engine starting between 32°-50°F (0°-10°C) or as required. Light on switch turns off when preheating cycle is finished.
21	Diagnostic Connector	Used by Unit Maintenance personnel to perform electrical system troubleshooting.
22	Ignition Switch	Three-position ignition switch: (a) <i>OFF position.</i> When in this position, electrical power is provided only to light systems. (b) <i>ON position.</i> When in this position, electrical system is activated. (c) <i>START position.</i> Provides a means to start engine. After engine has started, release ignition switch to return to ON position.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

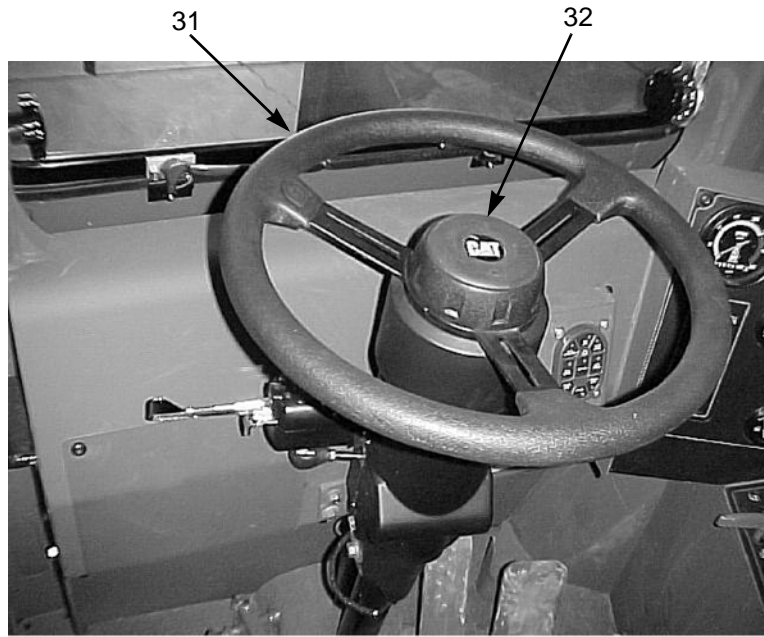
0004 00

**INSTRUMENT PANEL - CONTINUED**
**3. Switches and Controls - Continued.**


KEY	CONTROL OR INDICATOR	FUNCTION
23	Fuse/Circuit Breaker Panel	Contains miscellaneous electrical system fuses and circuit breakers.
24	Windshield Washer Switch	Push top of switch and hold to spray windshield cleaning fluid onto windshield. Release switch to stop flow of windshield cleaning fluid.
25	Windshield Wiper Switch	Three-position wiper switch: (a) <i>Top position</i> turns windshield wiper on HIGH speed. (b) <i>Center position</i> turns windshield wiper on LOW speed. (c) <i>Bottom position</i> turns windshield wiper OFF.
26	Fuel Pump Switch	Push switch upward to turn on electric fuel pump, to prime fuel system. Release switch to turn pump off.

**INSTRUMENT PANEL - CONTINUED**3. **Switches and Controls - Continued.**

KEY	CONTROL OR INDICATOR	FUNCTION
27	Military Light Switch	Controls operation of machine's service, blackout, parking, and instrument panel lights. When operating in blackout mode, work lights, service, and directional lights are disabled. Backup alarm and horn are also disabled in blackout mode.
28	ALL OFF Switch	Press to turn light off, then press ENTER.
29	Mode/Function Keys	Press to select desired function or mode of lighting, then press ENTER. Key will flash when initialized, then blue indicator will come on when selected lights are on.
30	ENTER Key	Press to activate mode/function key selected. If ENTER is not pressed within five seconds, switch will reset to previous mode.

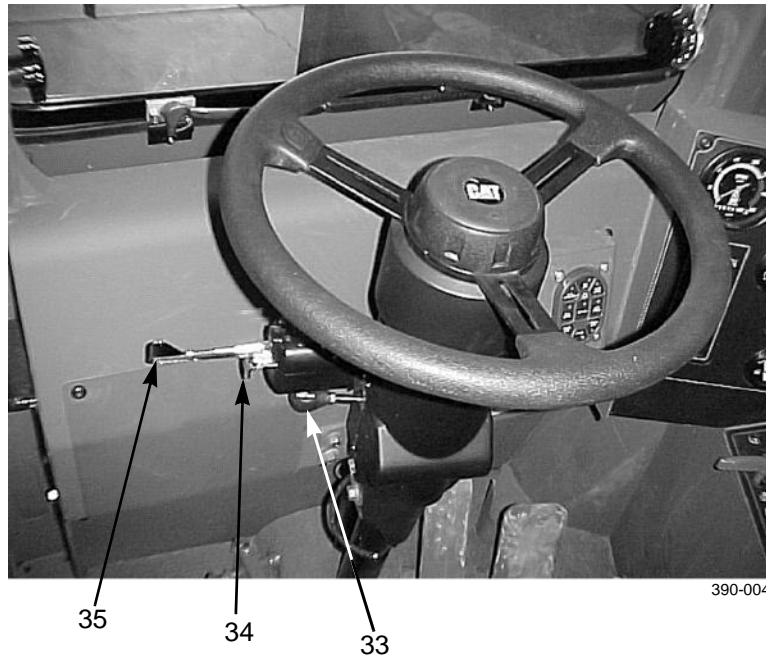
**DRIVING CONTROLS**1. Steering Wheel and Steering Column Controls.

390-004

KEY	CONTROL OR INDICATOR	FUNCTION
31	Steering Wheel	Controls machine direction of travel. Turn steering wheel clockwise to turn right. Turn steering wheel counterclockwise to turn left.
32	Horn	Press center of steering wheel to sound air-operated horn.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

**DRIVING CONTROLS - CONTINUED**1. Steering Wheel and Steering Column Controls - Continued.

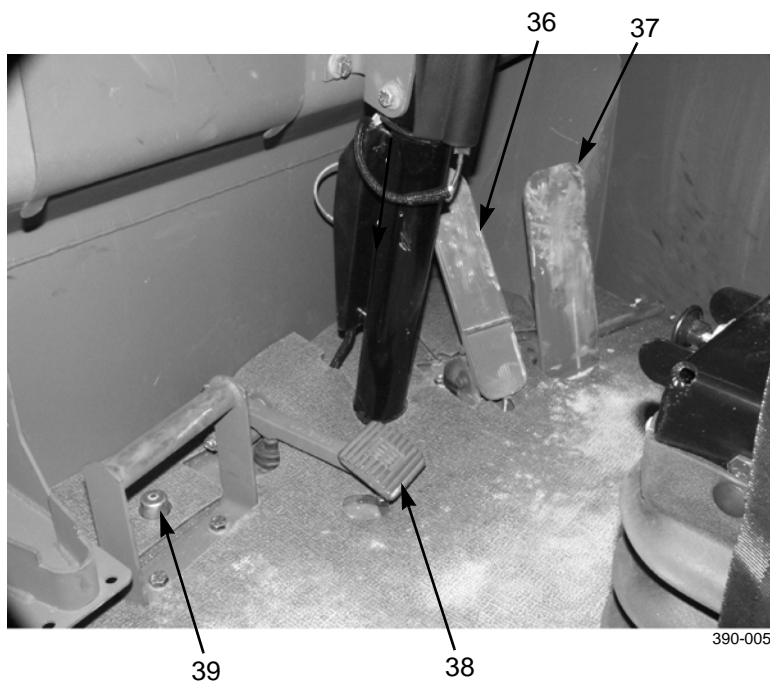
KEY	CONTROL OR INDICATOR	FUNCTION
33	Steering Column Tilt and Telescope Control Lever	Pull up on lever and move steering column to desired tilt position. Push down on lever and move steering column up or down to desired height. Release lever to lock steering column in place.
34	Hazard Flasher Control	Pull out on handle to activate hazard flashers. Move turn signal lever forward or rearward to turn hazard flashers off.
35	Turn Signal Lever	Push lever forward for right turn signal. Pull lever rearward for left turn signal. Place lever in center position to turn signals off.

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**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**


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0004 00

**DRIVING CONTROLS - CONTINUED****2. Floor-Mounted Controls.**

KEY	CONTROL OR INDICATOR	FUNCTION
36	Service Brake Pedal	Press pedal down to apply service brakes and illuminate brake lights.
37	Accelerator Pedal	Press pedal down to increase engine speed and release to decrease engine speed.
38	Differential Lock Control Pedal	Allows operator to lock differential to prevent wheel slippage when operating on soft or wet ground and when loading. Press down and hold pedal to engage differential lock. Release pedal to disengage differential lock. Do NOT turn (steer) machine with differential lock engaged.
39	Headlight Dimmer Switch	Depress dimmer switch to change headlight beams from low to high beam. Press switch again to return headlights to low beam.

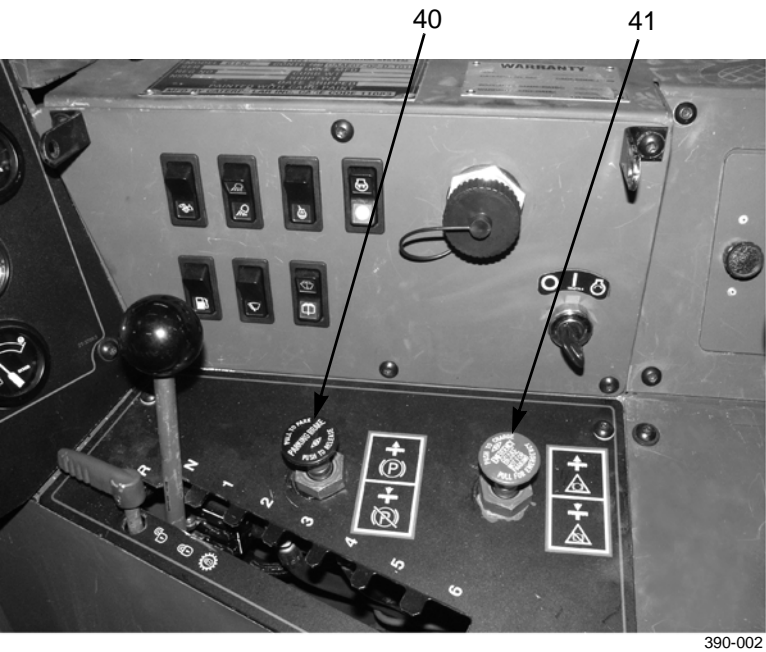


DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED

0004 00

*DRIVING CONTROLS - CONTINUED*

3. Parking and Emergency Brake Controls.



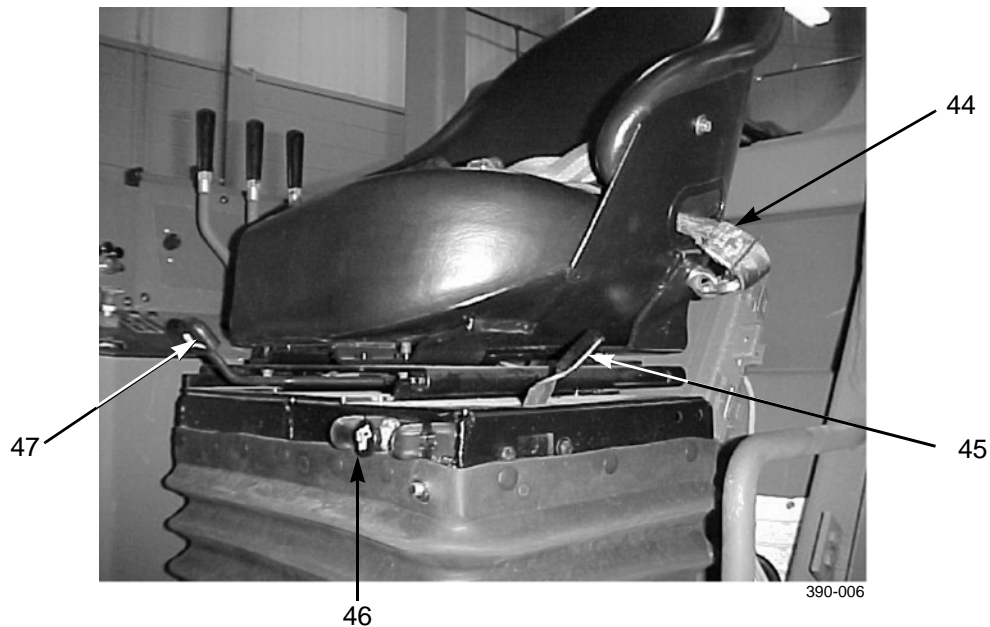
KEY	CONTROL OR INDICATOR	FUNCTION
40	Parking Brake Control Knob	Pull out on knob to apply parking brake. Press knob in to release brake.
41	Emergency Brake Control Knob	Pull out on knob to apply emergency brake if service brakes fail to stop machine. Press knob in to charge air supply and release brakes.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

**DRIVING CONTROLS - CONTINUED**
**4. Transmission Controls.**

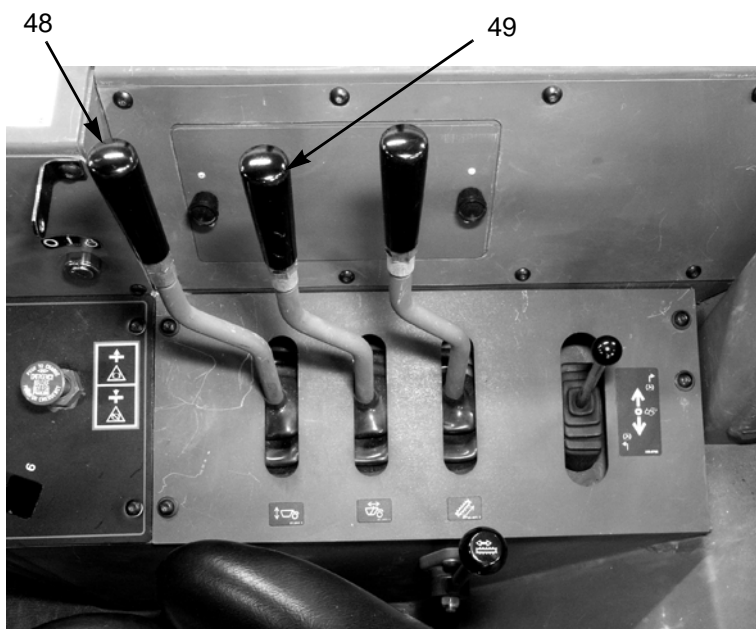

KEY	CONTROL OR INDICATOR	FUNCTION
42	Transmission Shift Lever	Allows operator to select transmission operation.
	(a) N (Neutral)	Position lever in N (Neutral) when starting engine and when parking machine.
	(b) R (Reverse)	Position lever in R (Reverse) to move machine backward.
	(c) 1, 2, 3, 4, 5, 6 (Forward Speeds)	Select desired forward speed by placing lever in position 1 through 6. 1 and 2 are appropriate work speeds. 3-6 are appropriate travel speeds. Manual shifting of transmission is required when shifting positions 1 and 2. Positions 3-6 are powershift selected.
43	Shift Lever Lock	Push down on lever and rotate counterclockwise to lock transmission shift lever in N (Neutral). Push down on lever and rotate clockwise to unlock transmission shift lever and move from N (Neutral).

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED****0004 00****OPERATOR'S SEAT CONTROLS**

KEY	CONTROL OR INDICATOR	FUNCTION
44	Seat Belt	Two-point locking belt adjustable on both sides of seat.
45	Suspension Damping Lever	Place lever in center position for medium seat suspension setting. Pull lever rearward for stiff seat suspension setting. Push lever forward for soft seat suspension setting.
46	Height Air Control Knob	Pull knob out to lower seat. Push knob in to raise seat. When knob is released, seat locks in position.
47	Fore/Aft Lever	Move lever to left and slide seat to desired position. Release lever to lock seat in place.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

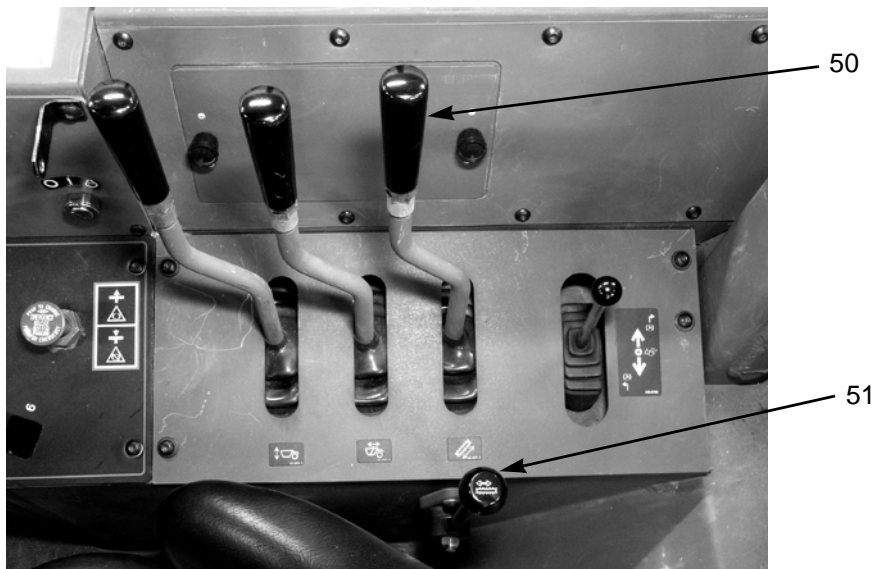
**SCRAPER CONTROLS**


390-1382

KEY	CONTROL OR INDICATOR	FUNCTION
48	Bowl Control Lever	Three-position spring-loaded lever: (a) <i>Bowl Lower.</i> Push lever to RIGHT and hold to lower bowl. Release lever to stop bowl movement. Lever will return to hold position. Bowl may be lowered with engine stopped. (b) <i>Bowl Hold.</i> Lever in center position holds bowl in position. (c) <i>Bowl Raise.</i> Pull lever to LEFT and hold to raise bowl. Release lever to stop bowl movement. Lever will return to hold position.
49	Ejector/Floor Control Lever	Four-position spring-loaded lever: (a) <i>Ejector Return Detent.</i> Push lever fully to RIGHT and hold to move ejector completely rearward and close floor of bowl. Release lever to stop ejector and floor movement. Lever will return to hold position. (b) <i>Ejector Return.</i> Push lever partially to RIGHT and release to move ejector to rear and close floor. Lever will return to hold position when ejector has moved fully to rear and floor has closed. (c) <i>Ejector Hold.</i> Lever in center position holds ejector and floor in place. (d) <i>Ejector Forward.</i> Pull lever to LEFT and hold to move ejector forward and open floor of bowl. Release lever to stop ejector and floor movement. Lever will return to hold position.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

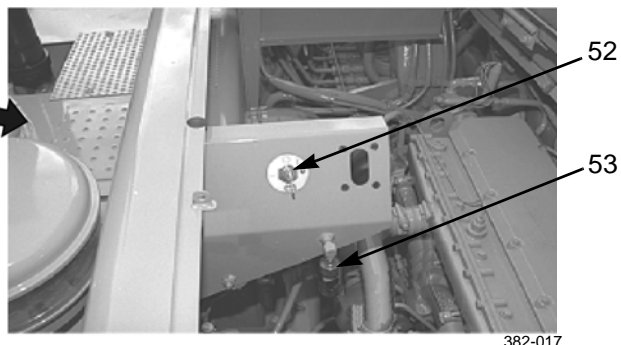
**SCRAPER CONTROLS - CONTINUED**


390-1382

KEY	CONTROL OR INDICATOR	FUNCTION
50	Elevator Speed Control Lever	Four-position lever: (a) <i>Elevator Reverse</i> . Push lever fully to RIGHT and release to operate elevator in reverse. Lever will remain in detent position. (b) <i>Hold</i> . Place lever in center position to hold elevator in place. (c) <i>Low Speed Forward</i> . Pull lever partially to LEFT to first detent position and release lever to operate elevator in forward low speed. Lever will remain in detent position. (d) <i>High Speed Forward</i> . Pull lever fully to LEFT and release to operate elevator in forward high speed. Lever will remain in detent position.
51	Elevator Direction Control Lever	Push lever forward to operate elevator movement in forward direction (loading). Push lever rearward to operate elevator in reverse (unloading).

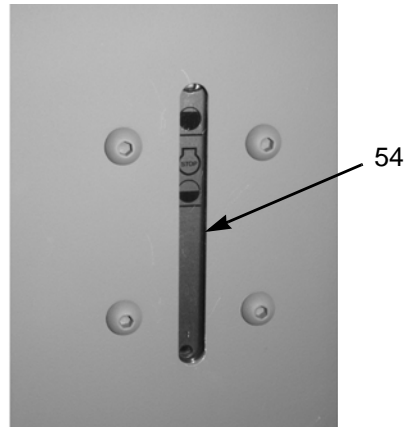
**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

**MISCELLANEOUS CONTROLS AND INDICATORS**


382-017

KEY	CONTROL OR INDICATOR	FUNCTION
52	Battery Disconnect Switch	Turn key and rotate switch clockwise to ON to activate electrical system, counterclockwise to OFF to deactivate electrical system. Remove key for maintenance or if machine is being left for an extended period of time.
53	Engine Air Filter Service Indicator	If indicator is yellow or green, air cleaner air flow is adequate. If indicator is red, service air cleaner. After servicing, press button on bottom to reset.

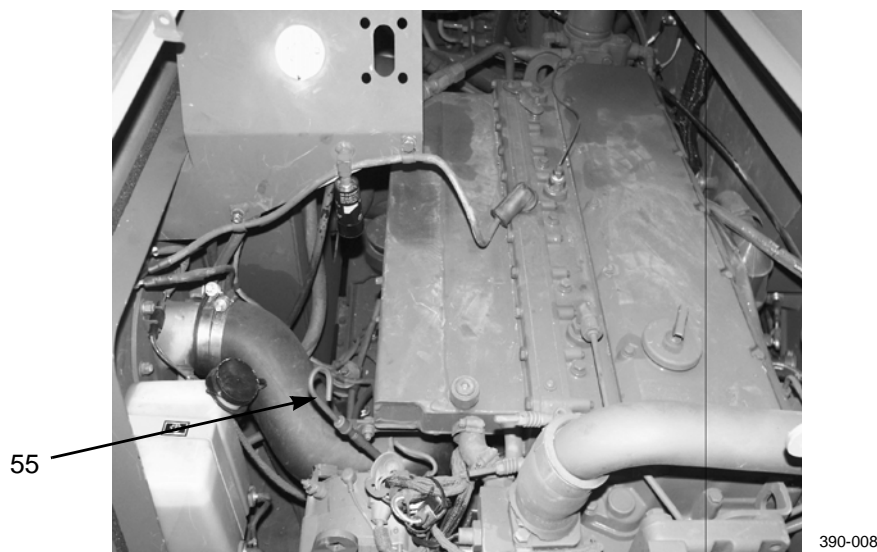


390-009

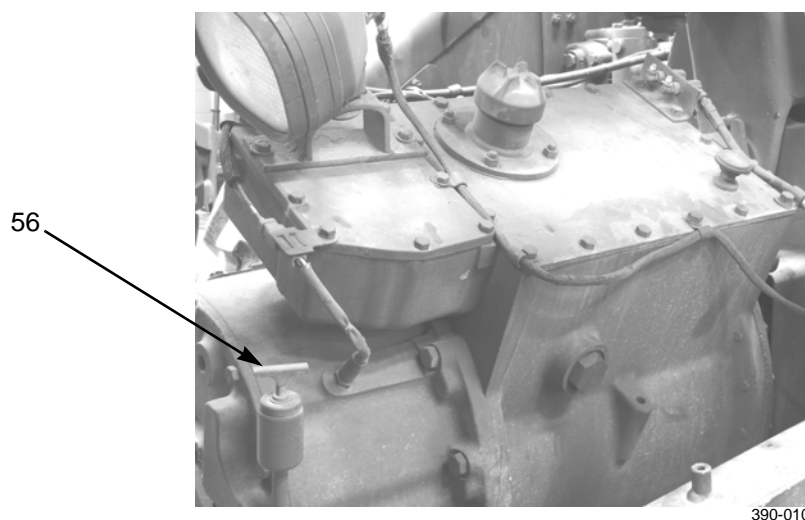
KEY	CONTROL OR INDICATOR	FUNCTION
54	Hydraulic Tank Sight Gage	Provides a visual indication of oil level. Operating range is above bottom line on gage. The machine must meet the following conditions when checking oil level: (a) parked on level ground; (b) parking brake applied; (c) engine idling and hydraulic oil warm; (d) transmission selector in N (Neutral); (e) ejector moved to forward position; and (f) bowl fully lowered to ground with slight downward pressure applied.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

**MISCELLANEOUS CONTROLS AND INDICATORS - CONTINUED**


KEY	CONTROL OR INDICATOR	FUNCTION
55	Engine Dipstick	Indicates level of oil in engine crankcase. Level should be between ADD and FULL ENGINE STOPPED lines on dipstick.

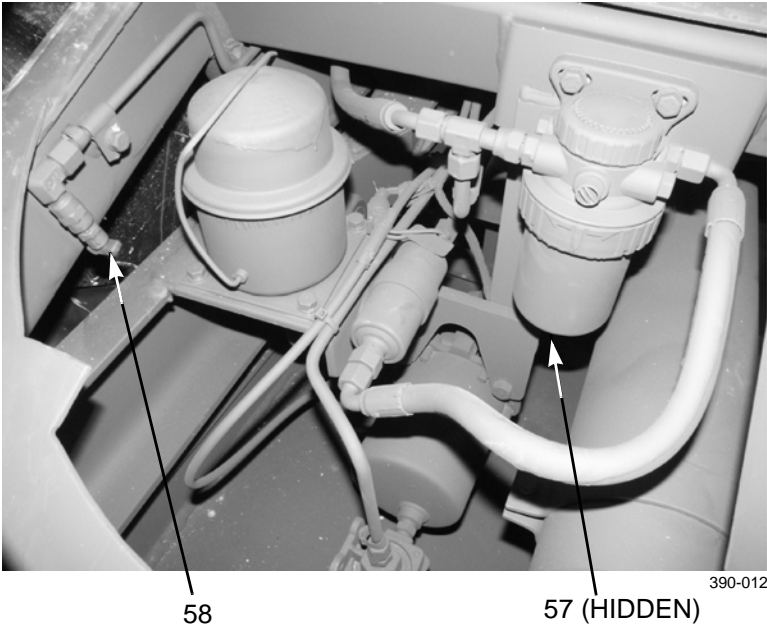


KEY	CONTROL OR INDICATOR	FUNCTION
56	Transmission Dipstick	Indicates level of oil in transmission. If transmission is cold, level should be above COLD MIN SAFE TO START line. If hot, level should be within cross-hatched area on dipstick.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

**0004 00**

**MISCELLANEOUS CONTROLS AND INDICATORS - CONTINUED**

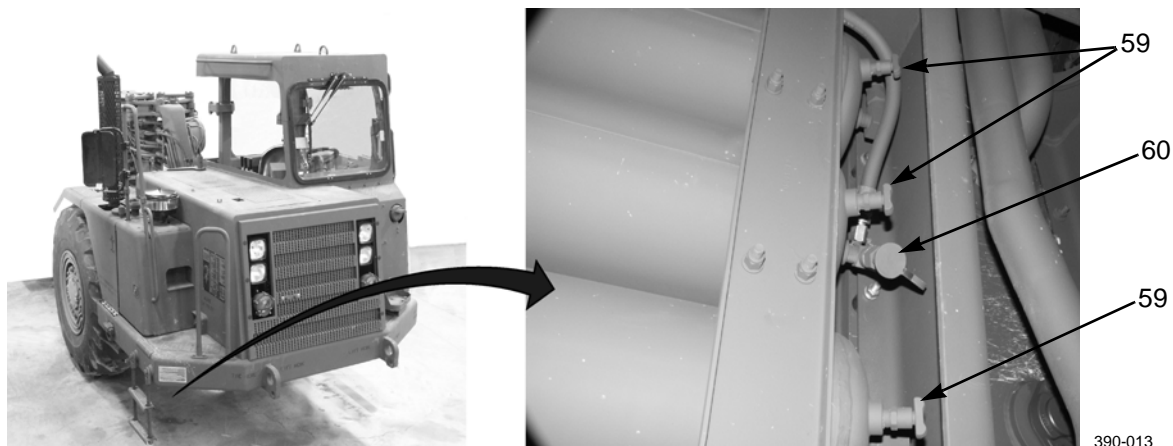


KEY	CONTROL OR INDICATOR	FUNCTION
57	Fuel/Water Separator Drain	Turn knob clockwise to drain all water and fuel from sediment bowl. Turn knob counterclockwise to close.
58	Fuel Tank Drain Valve	Turn counterclockwise to drain water and sediment from fuel tank.

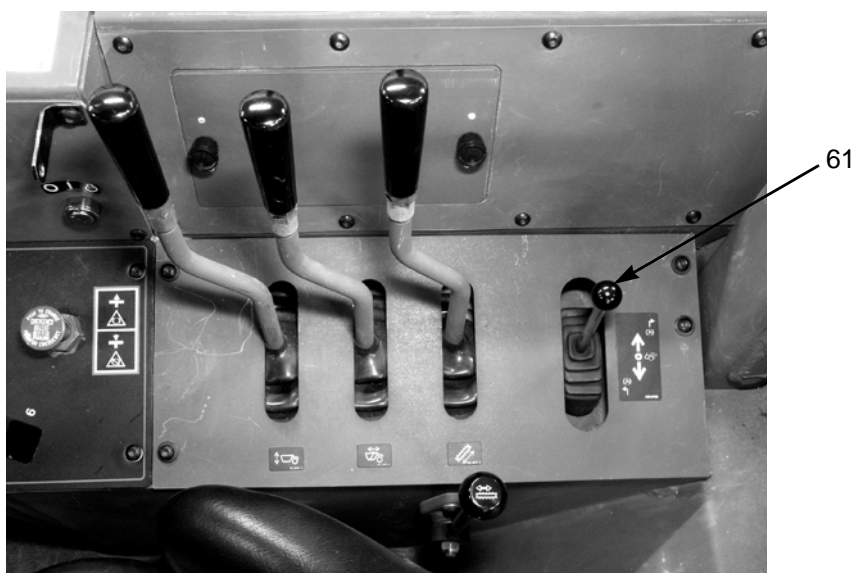


**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

**MISCELLANEOUS CONTROLS AND INDICATORS - CONTINUED**


KEY	CONTROL OR INDICATOR	FUNCTION
59	Air Tank Drains	Used to remove moisture and sediment from air tanks.
60	Air System Quick Disconnect Air Chuck	Means to connect air line to charge air system of machine.

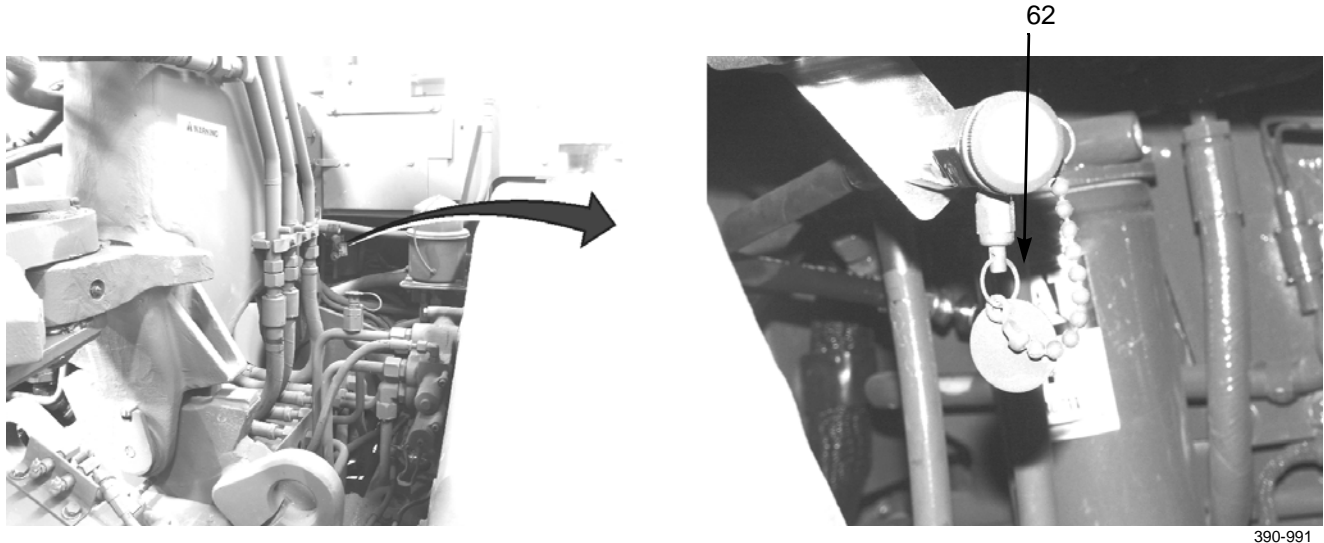


KEY	CONTROL OR INDICATOR	FUNCTION
61	Skid Steer Control	Steers tractor when sectionalized. Push control to right to turn right. Pull control to left to turn left. Control will return to center automatically. Control is disabled when tractor and scraper are joined together. Control is enabled when electrical disconnect is made during sectionalization.

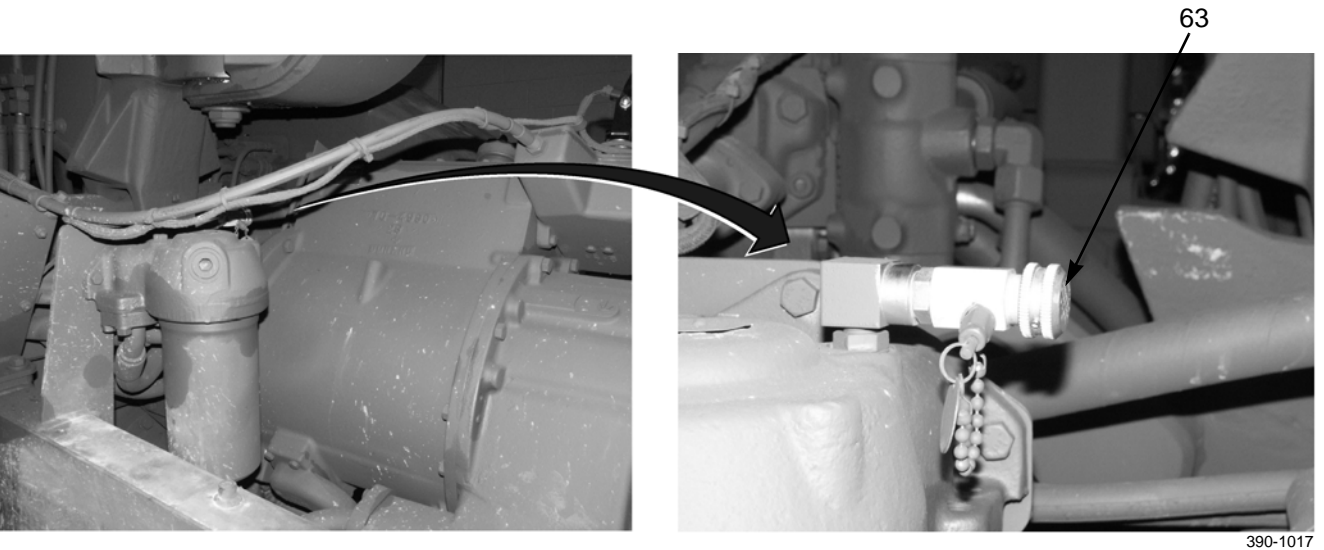
DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED

0004 00

*MISCELLANEOUS CONTROLS AND INDICATORS - CONTINUED*



KEY	CONTROL OR INDICATOR	FUNCTION
62	Engine Oil Sampling Valve	Used to collect engine oil sample.

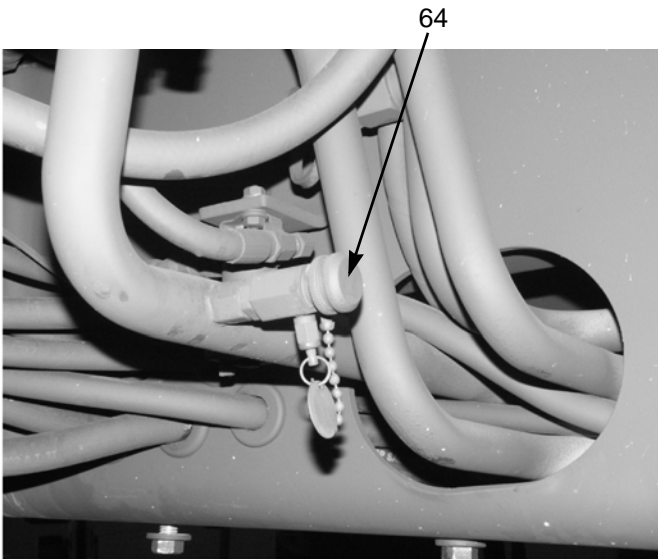


KEY	CONTROL OR INDICATOR	FUNCTION
63	Transmission Oil Sampling Valve	Used to collect transmission oil sample.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

**0004 00**

**MISCELLANEOUS CONTROLS AND INDICATORS - CONTINUED**



390-1018

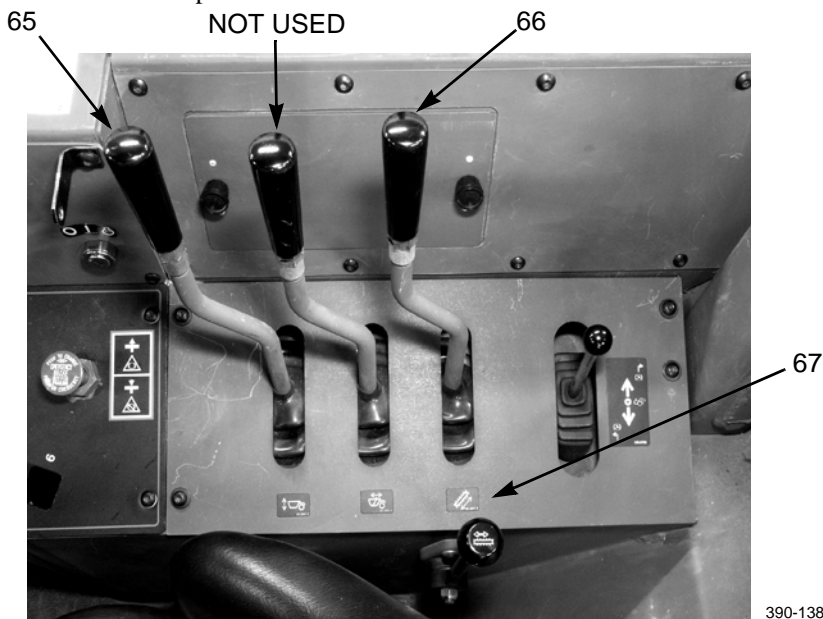
KEY	CONTROL OR INDICATOR	FUNCTION
64	Hydraulic System Oil Sampling Valve	Used to collect hydraulic oil sample.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

**WATER DISTRIBUTOR CONTROLS**
**NOTE**

- The tractor front section of the scraper may be operated, after sectionalization, with the water distributor rear section of the water distributor. The following controls and indicators apply to this mode of operation.
- Refer to TM 5-3800-205-10-2 for operation of water distributor.

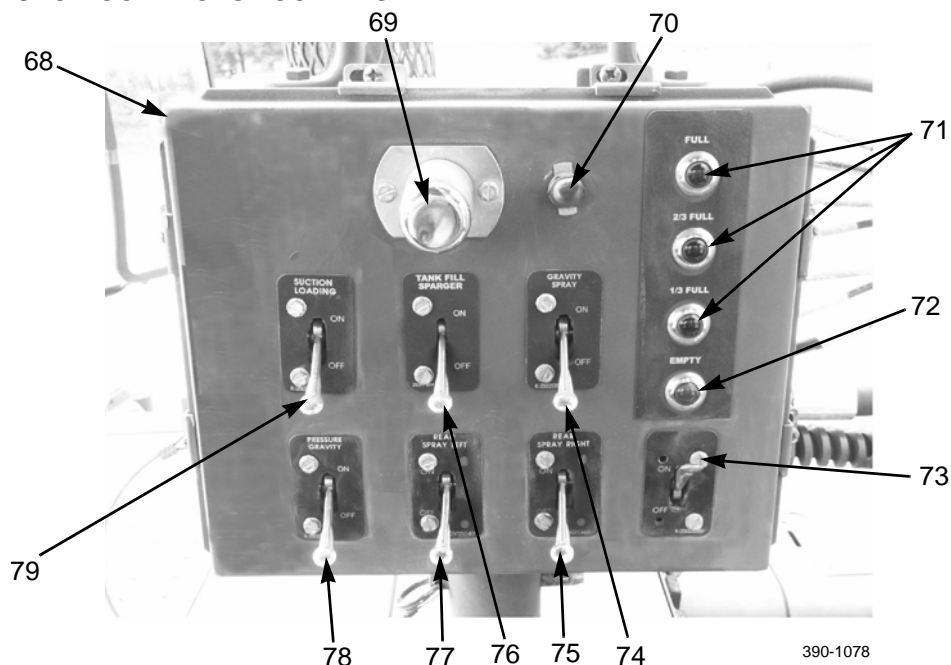


390-1382

KEY	CONTROL OR INDICATOR	FUNCTION
65	Tank Control Lever	Three-position spring-loaded lever: (a) <i>Tank Lower</i> . Push lever to RIGHT to lower tank. Release lever to stop tank movement. Lever will return to hold position. Tank may be lowered with engine stopped. (b) <i>Tank Hold</i> . Lever in center position holds tank in position. (c) <i>Tank Raise</i> . Pull lever LEFT to raise tank. Release lever to stop tank movement. Lever will return to hold position.
66	Pump Control Lever (Elevator Control Lever)	Three-position lever operates in conjunction with locking lever (67) to turn pump on and off. Two pump speeds are available. (a) <i>Pump Off</i> . Pump is off when lever is in center position. (b) <i>Pump On, Slow</i> . Pull lever partially LEFT to turn pump on at slow speed. Lever will remain in detent position. (c) <i>Pump On, Fast</i> . Pull lever fully LEFT to turn pump on at high speed. Lever will remain in detent position.
<b>CAUTION</b>  Leave locking lever (elevator direction control lever) in FORWARD position ONLY. This will prevent running water pump in reverse and causing possible damage.		
67	Locking Lever (Elevator Direction Control Lever)	Push locking lever all the way forward to lock out pump control lever (66) from unused fourth detent position to the right.

**DESCRIPTION AND USE OF OPERATOR'S CONTROLS  
AND INDICATORS - CONTINUED**

0004 00

**WATER DISTRIBUTOR CONTROLS - CONTINUED.**


KEY	CONTROL OR INDICATOR	FUNCTION
68	Water Distributor Control Panel	Control panel monitors water level in tank and controls seven separate water distributor functions and operation of dash and work lights at rear of tank.
69	Panel Light	Illuminates control panel.
70	Work Lights Switch	Raise lever to turn on work lights at rear of water distributor. Lower lever to turn work lights off.
71	Tank Level Lights	Three green indicator lights indicate FULL, 2/3 FULL, AND 1/3 FULL levels of liquid in tank.
72	EMPTY Indicator Light	Red light comes on when tank is empty.
73	PUMP Control Switch	Turn pump control switch ON for pressure. Turn OFF for suction.
74	GRAVITY SPRAY Valve Control	Raise lever to ON to engage gravity discharge from lower spray bar. Lower lever to OFF to close valve.
75	REAR SPRAY RIGHT Valve Control	Raise lever to ON to engage right spray head on upper spray bar. Lower lever to OFF to close valve.
76	TANK FILL SPARGER Valve Control	Raise lever to ON to engage filling and mixing operations. Lower lever to OFF to close valve.
77	REAR SPRAY LEFT Valve Control	Raise lever to ON to engage left spray head on upper spray bar. Lower lever to OFF to close valve.
78	PRESSURE GRAVITY Valve Control	Raise lever to ON to engage pressure discharge from lower spray bar. Lower lever to OFF to close valve.
79	PRIMER (SUCTION LOADING) Control Switch	Used in conjunction with vacuum generator to provide for suction loading (drafting). Positions are ON and OFF.

**END OF WORK PACKAGE**

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**GENERAL****WARNING**

- This machine has been designed to operate safely and efficiently within the limits specified in this TM. Operation beyond these limits is prohibited in accordance with AR 70-1 without written approval from: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-DNA-CS, Warren, MI 48397-5000.
  - Hearing protection is required when operating machine or when within 23 feet of machine when it is operating. Failure to wear hearing protection may result in hearing loss.
1. This work package contains instructions for safely operating the scraper under usual conditions.
  2. WP 0006 00, *Advanced Operation and Operator Tips*, contains additional information and helpful tips on advanced scraper operation to maximize work efficiency and machine potential. WP 0006 00 includes:
    - a. machine services and adjustments;
    - b. operator adjustments;
    - c. straddle cutting;
    - d. construction of berms;
    - e. construction of water control ditches; and
    - f. pond excavations.
  3. WP 0007 00, *Job Site Management*, contains additional information on job site management. WP 0007 00 includes:
    - a. job site management;
    - b. initial site work - cutting high, filling low;
    - c. land planing operations;
    - d. compaction operations; and
    - e. sealing work site from rain.
  4. Read and become familiar with information in this work package and in WP 0006 00 and WP 0007 00 before operating machine.
  5. Operation under unusual conditions is described in WP 0008 00.

**MOUNTING AND DISMOUNTING MACHINE****WARNING**

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

1. Mount and dismount machine only at locations with steps and/or grabhandles. Do NOT use steering wheel as a handhold.
2. Ensure steps and/or grabhandles are clean and secure before using them.
3. Face machine when mounting and dismounting.
4. Maintain minimum three-point contact at all times, i.e., two feet and one hand or two hands and one foot.
5. Never mount or dismount a moving machine.
6. Never jump from machine.
7. Do not mount or dismount machine while carrying tools or supplies. Use a hand line to pull equipment up onto machine.

**INITIAL ADJUSTMENTS, DAILY CHECKS, AND EMS SELF-TEST****NOTE**

Refer to WP 0004 00 for the location and operation of controls and indicators.

1. Perform *Before* operation Preventive Maintenance Checks and Services (PMCS), including EMS self-test before starting engine (WP 0013 00 and WP 0014 00).
2. Ensure battery disconnect switch is in ON position.
3. Occupy and adjust seat.
4. Adjust rearview and exterior mirrors as required.
5. Adjust steering column tilt and steering wheel height.

**WARNING**

DO NOT operate machine unless seat belt has been fastened. Failure to follow this warning may result in serious injury or death, in the event of an accident.

6. Fasten seat belt.

**START ENGINE****WARNING**

- DO NOT operate tractor engine in enclosed areas due to the dangers of carbon monoxide poisoning from exhaust fumes. Always start and operate engine in a well-ventilated area and, if in an enclosed area, vent exhaust to the outside. Failure to follow this warning may result in injury or death to personnel.
- BE ALERT for personnel in the area while operating machine. Always check to ensure area is clear of personnel before starting engine. Failure to follow this warning may result in serious injury or death to personnel.
- Hearing protection is required when operating machine. Failure to wear hearing protection may result in hearing loss.

**NOTE**

Refer to WP 0004 00 for the location and operation of controls and indicators.

1. **Starting Engine Above 32°F (0°C).**

**NOTE**

Between 32°-50°F (0°-10°C), air intake preheat switch may be turned on to assist in cold weather starting: Place switch to ON position. When indicator light goes out, attempt to start engine. Repeat this step one or two times. If engine still fails to start, use ether cold start aid.

- a. Ensure parking brake is applied (parking brake control knob pulled out).
- b. Ensure transmission is in N (Neutral) with shift lever LOCKED.
- c. Ensure all machine hydraulic control levers are in center HOLD position.
- d. Ensure all accessories are off.
- e. Ensure all personnel are clear of machine.



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OPERATION UNDER USUAL CONDITIONS - CONTINUED

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0005 00

**START ENGINE - CONTINUED**

- f. Partially depress accelerator pedal and hold in depressed position during cranking.

**CAUTION**

DO NOT crank 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 premature starter failure.

- g. Insert key in ignition switch. Turn switch all the way clockwise to START position. When engine starts, release ignition switch.

**CAUTION**

Turbocharger damage can result if engine RPM is not kept low until EMS verifies that oil pressure is sufficient and indicator light has gone out.

- h. Release accelerator pedal after engine has started.
  - i. If engine oil pressure does not rise within 10 seconds after engine starts, stop engine and perform troubleshooting.
  - j. After engine has started, proceed to *Machine Warmup*.
2. **Starting Engine Below 32°F (0°C) Using Ether Cold Start Aid.**

- a. Ensure parking brake is applied (parking brake control knob pulled out).
- b. Ensure transmission is in N (Neutral) with shift lever LOCKED.
- c. Ensure all machine hydraulic control levers are in center HOLD position.
- d. Ensure all accessories are off.
- e. Ensure all personnel are clear of machine.
- f. Partially depress accelerator pedal and hold in depressed position during cranking.

**CAUTION**

DO NOT crank 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 premature starter failure.

- g. Insert key in ignition switch to START position.
- h. If operating in arctic conditions, -25°F (-32°C), depress either start aid switch three times, then turn ignition switch all the way clockwise to START position. Release ignition switch when engine has started.

**CAUTION**

Use ether-starting aid sparingly and for cold starting purposes ONLY. Excessive ether without cranking can cause piston and ring damage.

**NOTE**

Inject ether only while cranking engine or after initial start-up, until engine is running smoothly.

- i. If not in arctic conditions, turn ignition switch all the way clockwise to START position and push ether start aid switch down for 2-3 seconds, then release for 2-3 seconds. Operate switch at 2-3 second intervals as engine is cranked. Continue to use switch at 2-3 second intervals until engine starts and is running smoothly. Release ignition switch when engine starts.

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OPERATION UNDER USUAL CONDITIONS - CONTINUED

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0005 00

**START ENGINE - CONTINUED****CAUTION**

Turbocharger damage can result if engine RPM is not kept low until EMS verifies that oil pressure is sufficient.

- j. Release accelerator pedal after engine has started.
- k. If engine oil pressure does not rise within 10 seconds after engine starts, stop engine and perform troubleshooting.
- l. After engine has started, proceed to *Machine Warmup*.

**MACHINE WARMUP****1. Perform EMS Self-Test.**

- a. Move panel test switch upward:
  - (1) Action alarm should sound.
  - (2) ALL indicator lights on EMS display panel should come on.
  - (3) Action light should flash.
- b. Release panel test switch. If the following does not occur, investigate cause:
  - (1) Action alarm should shut off.
  - (2) Selected indicator lights on EMS display panel should remain on, until all systems are operational.
  - (3) Action light should shut off, when all systems are operational.

**2. Warm Up Machine.**

- a. Operate engine at low idle for five minutes to warm up engine. During warmup, monitor EMS alert indicators and instrument panel gages for any signs of abnormal temperatures or pressures. Shut down engine at the first sign of a problem.
- b. Continue to warm up machine as follows:
  - (1) If temperature is greater than 32°F (0°C), warm up machine for a total of approximately 15 minutes.
  - (2) If temperature is less than 32°F (0°C), warm up machine for a total of approximately 30 minutes.
  - (3) If temperature is less than 0°F (-18°C) or if hydraulic functions are sluggish, additional time may be needed.
- c. Cycle steering and machine controls to assist in hydraulic system warmup. Ensure that all are functioning properly.
- d. Before moving out, place transmission in R (Reverse) to ensure backup alarm functions.

**OPERATE TRANSMISSION****NOTE**

Refer to WP 0004 00 for a complete description of transmission controls.

**1. Transmission Ranges.**

- a. N (Neutral) is normal transmission position when machine is not in use. Use N to start engine, when idling engine, and for parking. Always lock transmission in neutral when machine is left unattended in N, parked or stopped.
- b. R (Reverse) is used to back up machine. Machine must be brought to a complete stop before shifting into R. Backup alarm will also sound when in reverse.
- c. To select a specific forward gear range, move transmission shift lever to positions 1 through 6. Upshift one position at a time, as engine accelerates and ground speed increases:
  - (1) Positions 1 and 2 are suitable loading and unloading speeds. They must be manually selected.

**OPERATION UNDER USUAL CONDITIONS - CONTINUED****0005 00****OPERATE TRANSMISSION - CONTINUED**

- (2) Positions 3 through 6 are suitable travel speeds. These positions are powershift selected.
- d. Downshift one position at a time when reducing engine and ground speeds. Downshift when going downhill (to the same gear used to climb the grade) or when operating on side slopes where high speed may compromise safety.
- e. At gross vehicle weight, top speeds for gear positions 1 through 6 are as follows:
  - (1) Position 1: 2.2 mph (3.5 kph)
  - (2) Position 2: 3.6 mph (5.8 kph)
  - (3) Position 3: 5.7 mph (9.2 kph)
  - (4) Position 4: 8.9 mph (14.3 kph)
  - (5) Position 5: 15.1 mph (24.2 kph)
  - (6) Position 6: 21.1 mph (34 kph)

**2. Operate Transmission.**

- a. Depress service brake pedal and hold.
- b. Unlock shift lever lock.
- c. Release parking brake.
- d. Move transmission shift lever to position 1.
- e. Release service brakes and begin to move out.
- f. Upshift one position at a time as engine and ground speeds increase.
- g. Downshift one position at a time while at the same time reducing vehicle speed with service brake applications.

**OPERATE PARKING AND EMERGENCY BRAKES**

- 1. Use parking brake to secure vehicle against movement when parked. NEVER leave operator's cab without applying parking brake.
- 2. Do NOT use parking brake to stop a moving machine. Use service brakes instead.
- 3. If service brakes fail, apply brakes in an emergency using emergency brake control knob.

**OPERATE DIFFERENTIAL LOCK****CAUTION**

- Excessive wheel spin and uncontrolled wheel spin can cause accelerated wear to powertrain components and tires.
  - Improper use of differential lock control may damage components of differential lock.
- 1. Engage differential lock control to prevent wheel slippage when traction is poor. Power will be equally distributed to each wheel and both wheels will turn at the same speed.
  - 2. Anticipate using differential lock before wheel slippage occurs. Do NOT engage differential lock while one wheel is slipping. Decrease engine RPM until wheel stops spinning, and then engage differential lock.
  - 3. Do NOT engage differential lock at high speeds.
  - 4. Do NOT turn (steer) machine while differential lock is engaged.
  - 5. Differential normally unlocks when pedal at floor is released. In areas of high resistance, it may be necessary to turn machine slightly and decrease engine RPM, to assist in unlocking differential lock control.

**OPERATE STEERING (TRACTOR-SCRAPER COMBINATION)**

1. Operator controls machine steering using steering wheel to operate steering system.
2. Avoid over steering. Become familiar with steering characteristics of machine before attempting maneuvers in limited space.

**NOTE**

Tractor-scraper has no secondary steering system.

3. In the event of steering system failure, perform the following:
  - a. Attempt to steer machine to a safe location and stop. Apply parking brake.
  - b. Shut down engine and troubleshoot malfunction.
  - c. Do NOT operate machine until problem has been corrected.

**OPERATE SKID STEERING (TRACTOR SECTIONALIZED)**

1. Skid steering is used to steer tractor after it has been sectionalized, in preparation for external air transport by CH-47 helicopter and is suitable for nominally level terrain. Use 1st gear forward and reverse only when skid steering.
  - a. Skid steering is enabled when electrical disconnect is made between tractor and scraper during sectionalization.
  - b. It is disabled after electrical connection is made between tractor and scraper, during assembly of machine.
2. To operate skid steering, follow the instructions of ground guide and perform the following:
  - a. Push skid steer control lever to right to turn right.
  - b. Pull control to left to turn left.
  - c. Control will return to center position automatically.

**OPERATE MACHINE****WARNING**

- BE ALERT for personnel in the area while operating machine. Always check to ensure area is clear of personnel and obstructions before starting engine, moving machine or lowering or raising scraper bowl. Failure to follow this warning may result in serious injury or death to personnel or damage to equipment.
- DO NOT allow riders on machine. Failure to follow this warning may result in serious injury or death to personnel.
- Transport by C-130 aircraft, CH-47 helicopter, OCONUS rail, and some over-the-road transport requires removal of ROPS/FOPS and temporary operation of machine without ROPS/FOPS. Avoid all operations that may tip machine. Failure to follow this warning may result in serious injury or death to personnel.

1. **General Information.**

- a. Make sure that personnel are clear of machine before starting engine, moving out or before lowering or raising bowl.
- b. Keep machine under control at all times. Do NOT coast or overspeed engine.
- c. Avoid driving close to edge of excavations, overhangs, cliffs, etc.
- d. Avoid operating machine on a severe side slope. When possible, operate up and down slopes. Maximum side slope operation (1st gear forward and reverse) +/- 20% loaded or 35% side slope empty.
- e. Reduce engine speed when maneuvering in tight quarters or when going over a hill. Slow down to negotiate ditches, potholes, bumps or any other unexpected obstructions.

**OPERATION UNDER USUAL CONDITIONS - CONTINUED****0005 00****OPERATE MACHINE - CONTINUED**

- f. Select appropriate travel speed before driving downhill. Select same gear speed as would be used to travel uphill. Do NOT downshift while going downhill; downshift before starting downhill. Do not allow machine to overspeed when going downhill. Apply service brakes.
- g. Do not overload machine.
- h. Never straddle a concertina wire or wire rope cable. Avoid any wire or debris that could become tangled in tires or elevator.
- i. Follow these guidelines when operating in soft soil conditions:
  - (1) Before operating in soft soil conditions, check out site to evaluate its condition. If it appears too soft for even an initial pass with an empty machine, do not enter area. Notify your supervisor.
  - (2) If site appears to be OK, make an initial pass with an empty machine.
  - (3) During operation, observe ground conditions. Look for cracking that may appear adjacent to the wheels.
  - (4) Adjust machine performance for soft soil conditions; make smaller cuts at lower speeds. Do not break traction.
- 2. **Operate Machine - Sequence Checklist.**
  - a. Perform initial adjustments, daily checks, and EMS self-test.
  - b. Start engine.
  - c. Repeat EMS self-test and perform engine warmup.
  - d. Turn on appropriate machine lights.
  - e. Raise bowl high enough to clear any obstacles on ground.
  - f. Depress service brake pedal to prevent machine movement.
  - g. Release parking brake.
  - h. Unlock shift lever lock.
  - i. Move transmission shift lever to desired direction and appropriate gear speed.
  - j. Release service brakes.
  - k. Depress accelerator pedal to achieve desired engine speed.
  - l. Check instrument panel gages and EMS lights frequently during operation.

**STOPPING/PARKING MACHINE****NOTE**

Refer to WP 0004 00 for the location and operation of controls.

- 1. Apply service brakes to stop machine. Select a level surface if possible.
- 2. Move transmission shift lever to N (Neutral).
- 3. Lock shift lever lock.
- 4. Apply parking brake.
- 5. Lower bowl to the ground. Apply slight downward pressure to bowl.
- 6. Block wheels securely.

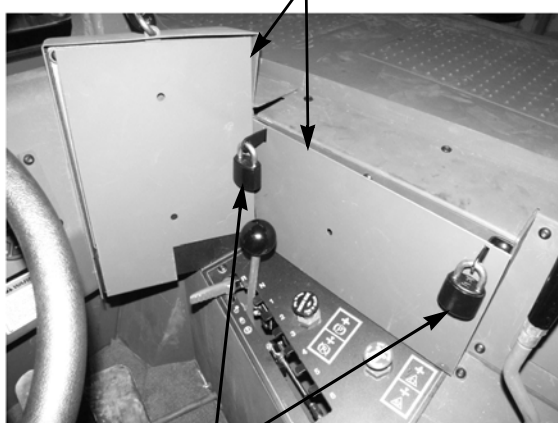
**ENGINE SHUTDOWN****CAUTION**

- Stopping engine immediately after it has been operating under a load can result in overheating and accelerated wear of engine components.
- The following shutdown procedures allow engine to cool. This will prevent excessive temperatures in turbo-charger center housing. Failure to shut down engine properly may cause oil sludge problems.

1. Run engine at low idle for five minutes.
2. Turn off machine lights and accessories.
3. Turn ignition switch counterclockwise to OFF position. Remove key from switch.

**AFTER OPERATION**

1. Perform *After* operation PMCS.
2. Place battery disconnect switch to OFF position. If operation is not anticipated for an extended period of time, remove key from switch.
3. Secure machine against vandalism, as required, using padlocks (Item 11, Table 2, WP 0024 00) on the following:
  - a. fuel tank and hydraulic tank fill caps;
  - b. engine compartment access door;
  - c. BII toolbox; and
  - d. rear compartment access door.
4. Use ignition key to secure engine air filter and battery compartment against vandalism.
5. Secure instrument panel against vandalism as follows:
  - a. Remove two bolts and washers and remove two instrument panel covers from stowage on rear wall of engine compartment enclosure. Reinstall bolts and washers on rear wall of engine compartment enclosure.
  - b. Install covers over instrument panels and secure with three padlocks (Item 11, Table 2, WP 0024 00), as shown.

STOWAGE LOCATION-  
INSTRUMENT PANEL COVERSINSTRUMENT PANEL  
COVERS INSTALLED

PADLOCKS

390-1007

**OPERATION UNDER USUAL CONDITIONS - CONTINUED****0005 00****OPERATE PORTABLE FIRE EXTINGUISHER**

1. Remove fire extinguisher from bracket located behind seat inside cab.
2. Hold fire extinguisher upright. Stand back 8 ft (2.4 m) from base of fire, point nozzle toward fire, 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.

**LOADING SCRAPER****CAUTION**

Maneuver around large obstructions when loading scraper. Driving over large objects may damage transmission case.

**NOTE**

- The following instructions are intended to provide basic procedures on properly loading scraper. Additional information on scraper loading techniques can be found in WP 0006 00, *Advanced Operation and Operator Tips*. Before loading scraper, read the instructions in WP 0006 00, as well as these procedures.
  - Ensure that cutting edge on scraper bowl and clearance between cutting edge and elevator flights have been properly adjusted by Unit Maintenance prior to beginning loading operations. Refer to *Machine Services and Adjustments* in WP 0006 00 for further guidance.
  - To provide maximum efficiency, a supervisor may be used to control loading operation.
  - Refer to WP 0004 00 for the location and operation of controls.
1. Position machine near end of previous loading pass. Provide some overlap for a smooth cut area.

**NOTE**

Loading is most efficient when done on a level grade or a slight uphill grade. If cut area is on a grade, load uphill whenever possible.

2. Load machine in direction of dump (fill) area, if possible. This reduces work cycle time by reducing travel time and eliminating the need for turning loaded machine around.
3. Ensure ejector is moved to rear of bowl before beginning loading pass.
4. When arriving at cut, reduce travel speed by using service brakes and by downshifting to 2nd or 1st gear.

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**OPERATION UNDER USUAL CONDITIONS - CONTINUED**

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**0005 00****LOADING SCRAPER - CONTINUED****NOTE**

Maintain engine RPM high (not to exceed 2450 RPM) for fast hydraulic action. Maintain proper gear to prevent tire slip in rocky or abrasive material.

5. Select proper transmission gear speed for loading material:
  - a. Load in 1st gear under the following conditions:
    - (1) novice operator;
    - (2) tough materials;
    - (3) short distance pickup; and
    - (4) picking up windrows.
  - b. Load in 2<sup>nd</sup> gear for most materials or if an experienced operator.

**CAUTION**

Do NOT place differential lock control in LOCK position while a wheel is spinning. Do NOT turn machine with differential locked. Turning machine with differential locked will cause excessive slip and wear to tires; torque wrap in transmission will also cause tractor to “hop”.

6. As required, move differential lock control to LOCK position.
7. Start elevator. Select appropriate speed for material being loaded:

**NOTE**

Low elevator speed is suitable for most loading operations. Select high-speed elevator operation to reduce amount of bulldozing of material in front of elevator, to load “dead” materials (e.g. heavy sand), or to mix/rototill material to be loaded (so that it may be compacted more readily at fill site).

- a. Use low speed for hard or coarse material.
  - b. Use high speed for soft material.
8. Maintain engine speed at full throttle when cutting.

**CAUTION**

Do NOT push load scraper. Pushloading scraper will cause excessive bulldozing of material in front of elevator, resulting in damage to elevator and hydraulic system.

**NOTE**

- Cut should be shallow enough for machine to move ahead at a constant speed. If cut is too deep, engine will labor or lug down. Excessive tire slippage may occur.
  - Depth of cut can be gauged by observing depth of penetration of side router bits.
9. Lower bowl to cutting depth that is efficient for loading material and start cut. Do NOT force material into bowl. Allow material to be swept into bowl by elevator action.
    - a. Decrease cutting depth if engine begins to labor or if tires slip.
    - b. Use 1<sup>st</sup> gear if more wheel torque is needed.
  10. Drive machine in a straight line during cut.



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**OPERATION UNDER USUAL CONDITIONS - CONTINUED**

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**0005 00****LOADING SCRAPER - CONTINUED****NOTE**

Do NOT overload bowl. When bowl is full, slight spillage of material will be evident. If a cut boss is used, stop cut when directed to do so by spotter.

11. When bowl is full, raise bowl slowly while you continue to drive forward in a straight line (this will result in a smoother transition). Do NOT stop machine to raise bowl. Stop elevator while continuing to drive forward.
12. If locked, move differential lock to UNLOCK position. Accelerate to traveling speed.

**NOTE**

Cutting edge is narrower than scraper bowl. Repeated cuttings within the same slot will result in bowl getting jammed in slot. Minimum slot width should be about 1-1/2 machine width.

13. On successive passes at fill area, use straddle cutting to achieve the best results. Refer to *Straddle Cutting* in WP 0006 00 for further information.

**TRAVELING****CAUTION**

Maneuver around large obstructions when traveling. Driving over large objects may damage transmission case.

**NOTE**

The following instructions are intended to provide basic procedures on traveling with scraper, loaded or unloaded.

1. Travel only on haul roads that have been authorized for your use and have been properly maintained (WP 0007 00 contains information on haul road maintenance). Avoid making deep ruts in road. Travel next to previous track to reduce rutting.
2. Loaded machines always have the right of way, unless otherwise directed by supervisor.

**NOTE**

- Speed is governed by smoothness of haul road, by favorable or adverse grades, and by underfoot conditions. Keeping bowl low enhances stability at high speeds and on uneven roads.
  - “Loping” is a rhythmic up-and-down motion of the machine. Slower speeds are necessary if uneven surfaces create loping.
3. Travel at a safe speed for the road conditions. Use higher speeds on smooth, level surfaces. Use lower speeds for rough, rolling surfaces or when there is traffic congestion at work site.
  4. Use service brakes and downshift as needed and reduce machine speed and engine RPM. Reduce machine speed when turning.
  5. If a ground guide is encountered at blind spots or crossings, obey their signals.
  6. Carry bowl low for best stability—but high enough so that bowl has adequate ground clearance. Under normal circumstances, proper travel height can be gauged by raising bowl until steering cylinders are level with the ground.
  7. Select gear speed for downgrade that is same as gear speed needed for similar upgrade.
  8. If machine starts to slip when traveling across a hillside, turn machine to downhill side. Turn machine to downhill side whenever machine is unstable.

**TRAVELING - CONTINUED****WARNING**

When loaded and traveling across a hillside, reduce speed significantly BEFORE turning uphill. Failure to do so may cause machine to roll over, resulting in injury or death to personnel.

9. When loaded and an uphill turn is required, turn uphill ONLY by making a wide turn at a very slow speed.
10. In the event of a brake failure, drop scraper bowl to aid in stopping machine.
11. If machine becomes stuck when traveling with load, perform the following to break free:
  - a. Raise bowl to maximum height.
  - b. Move machine forward or back, while at the same time steering in quick succession, first sharp left, then sharp right, etc. This technique is called “duck walking”.

**DUMPING/SPREADING OPERATIONS****NOTE**

The following instructions are intended to provide basic procedures on dumping and spreading load. Additional information on dumping/spreading techniques can be found in WP 0006 00, *Advanced Operation and Operator Tips*. Before dumping/spreading load, read the instructions in WP 0006 00, as well as these procedures.

1. Whenever possible, dump downhill.
2. If there is a supervisor at fill area, dump load where directed to do so (with the required lift height).
3. When you arrive at dump (fill) area, release accelerator pedal to reduce engine RPM. Apply service brakes. Down-shift transmission.
4. If entering a fill area with soft underfoot, engage differential lock.
5. Dump material at highest practical travel speed—1<sup>st</sup> or 2<sup>nd</sup> gear operation is average for optimum performance.
6. Lower bowl to required spread (lift) height:
  - a. 2-4 in. (5-10 cm) to provide material lift for subsequent compaction; or
  - b. 4-6 in. (5-15 cm) to dump load as quickly as possible when merely stockpiling material.
7. At start of dump area, engage elevator in reverse.
8. Move ejector forward and open floor of bowl.
9. Finish dumping load. Slowly raise bowl in order to leave dump area as smooth as possible. Raise bowl high enough to clear obstructions.

**CAUTION**

Always return ejector to rear of bowl after dumping load. This reduces the chance of hydraulic cylinder damage due to bouncing when traveling at higher speeds.

10. Return ejector to rear of bowl and close floor of bowl.
11. Return to cut area at highest practical travel speed for job site conditions.
12. On subsequent dumping/spreading passes, consider straddle dumping:
  - a. Leave a gap between 1<sup>st</sup> and 2<sup>nd</sup> dumping passes that is less than distance between tires.
  - b. On the third trip, unload between 1<sup>st</sup> and 2<sup>nd</sup> passes, at a spread depth greater than previous passes; this will leave a new ridge.
  - c. Repeat until desired depth of spread is achieved.

**PICKING UP WINDROWS**1. **Introduction.****CAUTION**

Bucket loading into scraper bowl may damage elevator. It may also result in excessive spillage.

- a. When working with other construction equipment, the scraper should NOT be used as a dump truck.

**NOTE**

A windrow is a row of excess material that must be removed. Typically, a dozer or motor grader creates the windrow, pushes it off to the side, and leaves it, to be loaded into a dump truck by a wheel loader.

- b. Instead of bucket loading with an excavator, wheel loader or dozer, use these machines to create a windrow. Then use scraper to pick up the windrow.

2. **Pick Up Windrows.**

- a. Configure machine for land planing operations—i.e. no teeth or stinger.
- b. Approach windrow in 1<sup>st</sup> or 2<sup>nd</sup> gear.
- c. Operate elevator at appropriate speed for material to be loaded.
- d. Lower bowl until cutting edge just clears the surface.
- e. Load bowl.
- f. Repeat as required until windrow is removed.

**END OF WORK PACKAGE**

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**SCOPE****NOTE**

The information in this work package is provided as a supplement to the basic operating procedures described in WP 0005 00. A thorough reading and understanding of both this work package and WP 0005 00 is essential to safe and efficient machine operation.

1. This work package is designed to provide general information as well as advanced operating tips to maximize machine efficiency and potential.
2. Proper job site management, which is also crucial to work efficiency, is addressed in WP 0007 00.

**MACHINE SERVICES AND ADJUSTMENTS****1. Machine Services.**

- a. To ensure safe and efficient operation, the operator is responsible for performing Preventive Maintenance Checks and Services (PMCS) at the job site. This will ensure the machine is ready to perform its mission and will reduce down time due to machine failures.
- b. To facilitate performance of PMCS, ensure machine is clean. Wash machine to remove dust and dirt that could interfere with inspections and preventive maintenance.
- c. After operation, determine requirements of next mission, so that machine adjustments can be made in advance, if required.

**WARNING**

Configuration changes to cutting edge and cutting edge-to-elevator clearance adjustments should NEVER be attempted without first securing the bowl by blocking it so that it is firmly supported. Failure to follow this warning may cause injury to personnel.

**NOTE**

Unit Maintenance must perform configuration changes to cutting edge and cutting edge-to-elevator clearance adjustments.

**2. Blocking Bowl.**

- a. Park machine on level ground.
- b. Apply parking brake and block wheels.
- c. Raise bowl. Place a block of wood centered under bowl. Ensure wood is of sufficient strength to carry weight of bowl, and large enough so that bowl will be supported at a suitable height.
- d. Lower bowl until weight of bowl is fully resting on block of wood.
- e. Move bowl control lever to middle HOLD position.
- f. Place transmission control lever in N (Neutral) position. Engage transmission neutral lock.
- g. Shut down engine.

**MACHINE SERVICES AND ADJUSTMENTS - CONTINUED****3. Cutting Edge Configuration Changes.**

- a. Determine most efficient configuration of scraper bowl cutting edge for material to be loaded and degree of grading desired.
  - (1) *Straight Edge*. This is most suitable for finishing work or where shallower cuts are required.

**NOTE**

Teeth are available as an AAL item (WP 0025 00).

- (2) *Straight Edge With Teeth*. This is suitable for work where harder materials are encountered.
  - (3) *Stinger Edge*. This configuration will reduce work cycle time by allowing for a more aggressive material bite. Working with a stinger edge is recommended only for the more experienced operator.
  - (4) *Stinger Edge With Teeth*. This configuration allows for the most aggressive material bite. Working with a stinger edge with teeth is recommended only for the more experienced operator.
- b. In general, the higher the penetration capability of cutting edge, the coarser the material that will be lifted into the bowl.
- c. Notify Unit Maintenance to convert cutting edge to suitable configuration, in accordance with procedures in TM 5-3800-205-23-2.

**4. Elevator Mouth Clearance Adjustment.****NOTE**

Notify Unit Maintenance to adjust elevator mouth clearance as required (TM 5-3800-205-23-2).

- a. The elevator serves to cut up and mix materials excavated by the cutting edge. The clearance between the cutting edge and the elevator flights may be adjusted.
- b. The narrower the gap, the more the material being loaded will be reduced and mixed. If material to be loaded is heavy or wet and loads into bowl in large chunks or sheets, narrowing the gap will break the soil into smaller pieces.

**NOTE**

The factory-set clearance is suitable for most operating conditions.

- c. Elevator mouth clearance is factory set to a maximum clearance of 6 in. (15.2 cm). There are four shims used to achieve this setting.
- d. Removing one shim reduces clearance by 0.50 in. (1.3 cm).

**OPERATOR ADJUSTMENTS****1. Introduction.****NOTE**

During construction of a horizontal surface, material removed will be used in an area that must be subsequently compacted to provide a hard, smooth base. Properly adjusted, the material deposited will be readily compacted with a minimum of additional time and effort.

- a. Prior to loading, the operator needs to know the disposition of the material removed during the cut, because this affects how the machine is loaded and the adjustments the operator needs to make:
  - (1) If material removed is to be used to create a base for a horizontal surface, loading must be accomplished to produce an engineered material suitable for subsequent compaction.

**OPERATOR ADJUSTMENTS - CONTINUED**

(2) If material removed is to be stockpiled, the goal will be to load and dump as quickly as possible.

- b. The scraper is most effective when there is a moderate “blade load” maintained ahead of the elevator flights, to be lifted into the bowl. Too little load and the machine is not working to full potential.
- c. When too much load builds forward of the bowl, the elevator linkage pivots upward, increasing the mouth opening. When this happens, the flights are not at the proper angle to excavate the material as effectively.
- d. The operator can make numerous adjustments during loading and unloading to optimize performance. These adjustments control depth of cut, amount of bulldozing in front of elevator during loading, degree of material reduction (or drying) during lift, depth of spread during unloading, etc.

2. **Cutting Depth (Loading) and Lift Height (Unloading) Adjustments.**

- a. During loading operations, the cutting edge is typically 2-4 in. (5-10 cm) below the plane established by the tractor wheels. The operator can lower the cutting edge 6 in. (15 cm) below this plane.
- b. The deeper the cut, the coarser the material that will be lifted by the elevator into the bowl.
- c. During unloading operations, the material’s lift height is established by raising the cutting edge above the plane of the tractor wheels. The higher the lift needed, the higher the cutting edge is raised. Typical lift height is 2-4 in. (5-10 cm).

3. **Elevator Speed Adjustments.**

- a. To reduce amount of material being bulldozed in front of elevator, increase elevator speed from low to high. Also reduce travel speed or depth of cut to reduce bulldozing effect.
- b. High elevator speed also reduces material more than if it were lifted at low speed.
- c. Use high elevator speed to assist in drying material that is wetter than desired.

4. **Travel Speed Adjustments.**

- a. When loading or unloading scraper, limit travel speed to 1<sup>st</sup> or 2<sup>nd</sup> gear. The operator must listen to engine and back off throttle and downshift as required to prevent engine from lugging down.
- b. It is recommended that the novice operator operate in 1<sup>st</sup> gear with shallower cuts.
- c. The more experienced operator may operate in 2<sup>nd</sup> gear, to increase productivity.

5. **Elevator “Banging”.** If operator adjustments are out of sync, elevator “banging” can occur. “Banging” occurs when elevator flights contact undisturbed ground. This will cause damage to elevator. Elevator “banging” can mean any one of the following:

## CAUTION

Elevator “banging” will damage elevator system. If banging occurs, operator must make adjustments in operation to eliminate problem.

- a. cutting depth is excessive for material being loaded;
- b. travel speed is excessive;
- c. elevator should be operating at high speed; or
- d. elevator clearance is not adequate.

**STRADDLE CUTTING****NOTE**

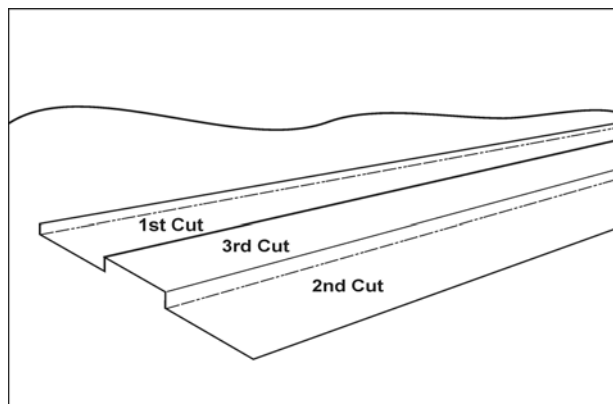
Cutting edge is narrower than scraper bowl. Repeated cuttings within the same slot will result in bowl getting jammed in slot. Minimum slot width should be about 1-1/2 machine width. Repeated cuts in the same slot should not exceed a total depth of 8-10 in. (20-25 cm) inches.

1. Straddle cutting is a method of cutting successive passes of material, where each new cut straddles or overlaps the previous cut. The end result is efficient, progressive, and smooth evacuation of soil. Straddle cutting ensures uniform loading of the bowl.
2. Straddle cut as follows:

**NOTE**

Since first and second cuts are in virgin soil, this operation is best suited for the more advanced operator. The third cut can readily be made by the novice operator.

- a. Cut initial path at prescribed depth.
- b. Cut second path parallel to first cut, at a distance less than distance between tires.
- c. On third cut, load ridge left between cuts 1 and 2, at a depth below previous cuts: This will leave a new ridge.
- d. Repeat until desired depth of cut is achieved.

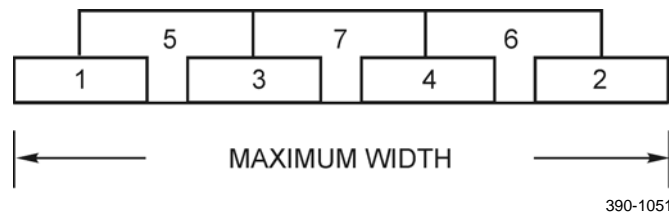


390-1088



**CONSTRUCTION OF BERMS**

1. Excess material (i.e., not required at fill) from a construction site must be stockpiled in the form of a berm or hauled away.
2. Berms are constructed with the scraper. However, due to the steep side slopes of the berm, a track-type tractor does the finish work.
3. Construct berm as follows:
  - a. Start from the outside and work inward.
  - b. Construct berm with lifts of 4-6 in. (10-15 cm).
  - c. Establish length of berm with first layer of material.
  - d. Work from the outside in, to fill base. Intermediate passes should be offset one half machine widths, to be filled in by follow-on machines.
  - e. Deposit 3-4 layers, at which time the width of berm must be reduced by a  $\frac{1}{2}$  machine width.

**CONSTRUCTION OF WATER CONTROL DITCHES**

1. Construction of water control ditches is essential to maintaining horizontal surfaces, roads, runways, landing zones, bases, etc.
2. Using earthmoving equipment other than a scraper to construct a water control ditch creates windrows that reduce/preclude water flow and must be feathered out. Using a scraper eliminates this problem.
3. Scraper-made ditches are usually broader and shallower than ditches made by other types of equipment.
4. Construct a water control ditch with a series of three passes, as follows:
  - a. First series of passes remove material to the required depth to form the bottom of the ditch.
  - b. The second and third series of passes form each side of the ditch. The cutting edge is lowered only to remove material from the intended ditch. The outboard wheel of the machine must remain on undisturbed soil.
  - c. The depth and width of the ditch may be increased, limited only by the side slope capability of the machine. A steeper side slope must be established and maintained by track-type tractors or motor graders.

**POND EXCAVATIONS**

1. Ponds are excavated using similar techniques as water control ditches, except that the length of the excavation is fixed and it is wider and deeper.
2. The scraper functions mainly to remove material from the bottom of the pond.
3. Track-type tractors and motor graders are typically required to provide access into and out of excavation. These machines also dress the edge of the excavation and maintain side slopes in a safe operating condition. They create windrows of excess material at bottom of pond or outside the circumference, to be picked up and moved by the scraper.

**END OF WORK PACKAGE**

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**GENERAL****NOTE**

The information in this work package is provided as a supplement to the basic operating procedures described in WP 0005 00 and the advanced operation and operating tips described in WP 0006 00. A thorough reading and understanding of this work package and WP 0005 00 and WP 0006 00 is essential to safe and efficient machine operation.

1. This work package is designed to provide general job site information to maximize machine efficiency and potential as it pertains to earthmoving operations.
2. Proper job site management is crucial to work efficiency and is also included in this work package.
3. When arriving at a job site the goal is to bring it to the desired grade. This is accomplished by cutting the high spots and filling the low spots. The following general steps are performed:
  - a. make it nominally flat using cut and fill operations to bring the site to the desired grade;
  - b. perform land planing operations; and
  - c. perform compaction operations.
4. A typical work cycle at a job site consists of the following:
  - a. cut;
  - b. haul load;
  - c. fill material; and
  - d. return to fill site.
5. The typical work cycle time is 6-12 minutes with generally 11 yards of material being moved per work cycle.
6. Productivity is measured by the number of work cycles per hour. If the cycle time is less than 6 minutes, use of a dozer may be considered. If the work cycle time is more than 12 minutes, a dump truck may be considered.

**JOB SITE MANAGEMENT**

1. **Work Planning.**
  - a. To ensure efficient completion of mission, work site should be surveyed in advance and a plan implemented so that operators understand the requirements at each stage of the mission.
  - b. During the work planning stage, a decision must be made on whether the machine needs to be adjusted to better perform its mission. Refer to WP 0006 00, *Advanced Operation and Operator Tips*.
  - c. Operators should be kept informed of the work status to ensure the work is progressing according to plan and on schedule.
  - d. The key to a successful mission is good teamwork: planning, coordination, and communication.
2. **Haul Road Construction and Maintenance.**
  - a. Proper construction, operation, and maintenance of haul roads are essential to work efficiency. Building smooth haul roads and keeping them free of ruts, washboards, and debris will enhance operator comfort and safety.
  - b. Haul roads should be the width of three machines, typically 24 ft (7.3 m) minimum.
  - c. Bank curves on haul roads. Avoid building a haul road that runs across a hillside; operation straight up and down hill is recommended.
  - d. Ensure grade on haul roads will provide good drainage.

**JOB SITE MANAGEMENT - CONTINUED****0007 00****JOB SITE MANAGEMENT - CONTINUED**

- e. Expedient haul roads may be built and maintained using conventional construction techniques. The scraper is well suited for this job.
  - (1) Select path of haul road.
  - (2) Configure machine for land planing operations.
  - (3) Once route of road has been determined, use scraper in 1<sup>st</sup> gear to plane haul road surface.
  - (4) Offset subsequent passes by a wheel width until width of road has been established.
- f. Monitor condition of haul roads and use scraper to keep them properly graded and smooth.
- g. Control dust on roads with a 613CWD Water Distributor.
- 3. **Operation on Haul Roads.**
  - a. To reduce ruts in haul roads, operators should travel next to the previous track.
  - b. Report haul road defects to your supervisor.
- 4. **Traffic Control.**
  - a. Stagger machine movements at work site to ensure a smooth workflow with as few interruptions as possible. This will also reduce traffic snarls.
  - b. Keep traffic patterns safe, simple, and, if possible, flowing in the same direction.
    - (1) Direct machines so that they load in the direction of the fill, and uphill, whenever possible.
    - (2) Machines should approach the fill site in a direction that allows for load to be dumped and spread, then scraper returned to the load site without having to turn machine around.
  - c. Position a ground guide at blind spots or crossings.

**INITIAL SITE WORK—CUTTING HIGH, FILLING LOW**

- 1. Typically, a work site will have undulations, high spots and low spots, where water may accumulate and where the uneven terrain will retard construction operations.
- 2. The scraper is most efficient when operating on an approximate level plane. Therefore, the first priority at a new work site should be to use the machine to establish a level plane. However, a slight grade is desired to shed rain and prevent pooling of water.
- 3. Begin by cutting high spots, straddling scraper centerline with centerline of high spot. Several 2-in. (5-cm) cuts are preferable to attempting a single 6-in. (15-cm) bite. Use a ground guide as required.
- 4. Once loaded, ground guide should direct operator to dump load in lowest spot at site. Straddle scraper centerline over centerline of low spot. Lift should be 4-6 in. (10-15 cm).
- 5. If soil is too wet to support machine, deposit material adjacent to low spot, to be bulldozed into hole.

**LAND PLANING OPERATIONS**

- 1. **Introduction.**
  - a. Land planing is a finishing operation. It may be used throughout the construction of a horizontal surface.
  - b. To perform land planing operations, configure scraper cutting edge for finishing operations—use straightedge with no stinger or teeth.
  - c. Prior to land planing operations, inspect construction site to determine the location of high spots to be removed, and low spots to be filled in.
    - (1) The more uneven the terrain, the higher the cutting edge should be above the plane established by the tractor.

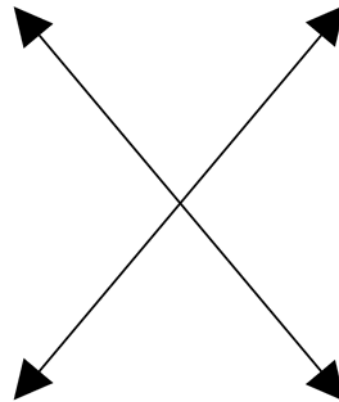
**LAND PLANING OPERATIONS - CONTINUED**

- (2) On a hard, smooth surface, the cutting edge is lowered to the lowest possible setting: cutting edge is on the same plane as the wheels of the tractor and scraper.
- d. When land planing, the operator should only carry enough material to fill in the low spots. To carry additional fill material, move ejector forward to partially retract floor of bowl.
2. **Land Planing Operations.**
- a. The first pass should be in the longitudinal dimension of the work site: this is the direction of travel anticipated/required by the vehicles that will be using the horizontal surface.
- b. Lower cutting edge to level of wheels.
- c. Operate elevator in reverse.
- d. Travel in 1st gear.

**NOTE**

Note that machine tires compact ground with each overlapping pass.

- e. Overlap subsequent passes with a 50% overlap until planing in longitudinal direction is complete.
- f. After longitudinal direction is complete, repeat operation at a 45-degree angle.
- g. After land planing in 45-degree direction is complete, repeat operation at a cross pattern as shown.



390-1709

**COMPACTION OPERATIONS****NOTE**

Ground planing operations may be conducted with a full scraper bowl to combine finishing and compaction.

1. A fully loaded 613CS Scraper weighs almost 60,000 lb (27,240 kg) or 15,000 lb (6810 kg) per tire. Due to its weight, it may be used as an effective tool on any job site for deep compaction of up to 12 in. (30 cm) of the surface.
2. Compaction involves taking advantage of the machine's weight by distributing wheel loads over a large area.
3. Compacted soil has greater bearing strength and drains better. Compaction provides a suitable surface for follow-on vehicles, landing zones, expedient airfields, etc.

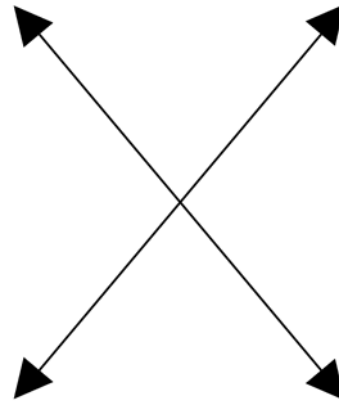
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**JOB SITE MANAGEMENT - CONTINUED**

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**0007 00****COMPACTION OPERATIONS - CONTINUED**

4. Perform the following steps to compact soil:
  - a. Load scraper bowl, turn off elevator, and raise bowl to travel height.
  - b. Drive in 1<sup>st</sup> gear in longitudinal direction of work surface.
  - c. Offset subsequent passes by width of one tire.
  - d. After longitudinal direction has been compacted, repeat operation at 45-degree angle to longitudinal direction.
  - e. After compaction at 45-degree angle, repeat compaction at a cross pattern as shown.



390-1709

**NOTE**

As a result of this operation, each square foot of ground will have been subjected to six tire passes at 15,000 lb (6810 kg)/tire. Even after a single pass, ground will not be suitable to grow grass due to induced compaction.

5. After compaction, tilling is required to break up and aerate soil, as required.

**SEALING WORK SITE FROM RAIN**

1. Sealing a work site in anticipation of rain will minimize slippage in construction schedule caused by rain, pooling of water, and poor underfoot conditions.
2. A properly compacted work site can shed 2-4 in. (5-10 cm) of rain in an 8-hour period.
3. Begin by using a sheepsfoot compactor to compact surface.
4. Follow by land planing surface with scraper.
5. Finish by compacting surface using scraper wheels.

**END OF WORK PACKAGE**

**OPERATION UNDER UNUSUAL CONDITIONS****0008 00****GENERAL****WARNING**

This machine has been designed to operate safely and efficiently within the limits specified in this TM. Operation beyond these limits is prohibited in accordance with AR 70-1 without written approval from: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-DNA-CS, Warren, MI. 48397-5000.

This section contains instructions for safely operating the scraper under unusual conditions. In addition to normal preventive maintenance, special care must be taken to keep the machine operational in extreme temperatures and other environmental conditions.

**SLAVE STARTING****WARNING**

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.
- DO NOT use civilian-type jumper cables.
- DO NOT allow disabled and booster machines to come in contact with each other at any time during slave starting.

Failure to follow this warning may result in injury or death to personnel.

**NOTE**

Ensure that both disabled machine and booster vehicle are equipped with serviceable NATO slave receptacles.

1. Connect NATO slave cable to booster vehicle slave receptacle.
2. Connect other end of slave cable to NATO slave receptacle at right front of disabled machine.
3. Ensure disabled machine's battery disconnect switch is in ON position.
4. Start booster vehicle and run at a speed just above idle.
5. Wait approximately five minutes, then start disabled machine. If engine fails to start, notify Unit Maintenance.
6. After starting disabled machine, return booster vehicle to idle.
7. Remove NATO slave cable from disabled machine, then from booster vehicle.



NATO SLAVE  
RECEPTACLE

390-014

**TOWING****CAUTION**

Do NOT attempt to start tractor engine by towing. Any attempt to start engine by towing will damage transmission.

**1. General Information.**

- a. Towing machine must have sufficient brake capacity, weight, and power to tow disabled machine. It must be able to control both machines for the grade and distance involved.

**CAUTION**

Do NOT tow at speeds over 1.2 mph (2 kph). Damage to equipment may result.

- b. Disabled machine must only be towed a short distance and at slow speed, in order to clear job site. Always transport machine if longer distance moving is required.
- c. Tow disabled machine only from the front, using a medium-duty towbar connected to towing machine's tow pintle.

**WARNING**

Do NOT use a chain for pulling a disabled machine. A chain link may break, causing injury or death to personnel.

- d. If a 613CS Scraper or 613CWD Water Distributor is used as towing machine, a towbar cannot be used between machines. Instead, use a wire tow cable at front and rear of disabled machine with two scrapers (or water distributors). One machine serves as the towing machine, the other serves to provide control and braking. Cable must be equipped with cable loops or rings.
- e. Inspect towbar or wire tow cable before towing to ensure it is in good condition. The strength of the towbar or wire tow cable should be at least 150 percent of the gross weight of the towing machine. This requirement is for a disabled machine that is stuck in the mud or for towing on a grade.

**2. Towing With Engine Stopped.****WARNING**

Do NOT proceed without first securing disabled machine against movement by blocking wheels. Failure to do so could result in injury or death to personnel.

**NOTE**

- Assistance from Unit Maintenance is required.
- Because engine is not running during towing, the following machine systems will not function properly.
  - a. Service brakes will not function.
  - b. Parking brake will not release.
  - c. Transmission lubrication will be insufficient.
  - d. Hydraulic system will not function.

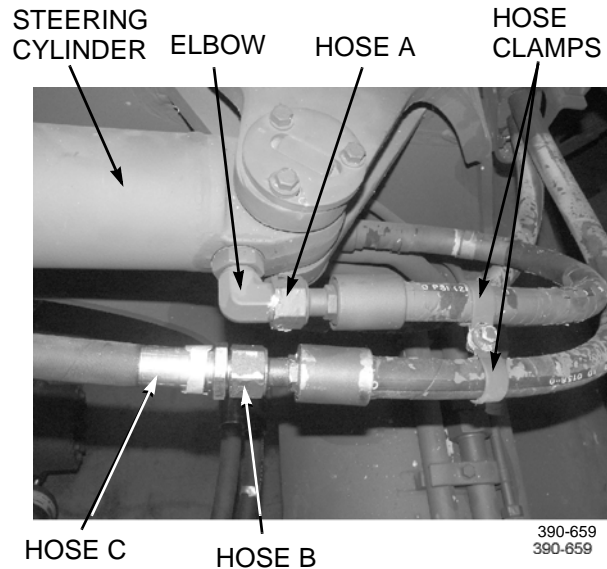


## OPERATION UNDER UNUSUAL CONDITIONS - CONTINUED

0008 00

**TOWING - CONTINUED**

- a. Block wheels of disabled machine.
- b. Place transmission in N (Neutral) and lock (WP 0004 00).
- c. Have Unit Maintenance reverse hydraulic steering cylinder hose connections on one cylinder only. This will allow steering cylinders to move freely.
  - (1) Remove hose clamps from hoses A and B, to free up hoses.
  - (2) Disconnect hose A from elbow.
  - (3) Disconnect hose B from hose C.
  - (4) Connect hose B to elbow.
  - (5) Connect hose A to hose C.



- d. Have Unit Maintenance remove front axle shafts.
- e. If scraper bowl is lowered to ground, perform the following to raise bowl:
  - (1) If bowl is filled, empty bowl.
  - (2) Use a crane to lift bowl while at the same time pulling bowl control lever in cab to LEFT (raise) position (WP 0004 00).
  - (3) When bowl reaches maximum height, return bowl control lever to center HOLD position (WP 0004 00).
  - (4) Remove crane from attachment to bowl.
- f. Release parking brake. Refer to *Manual Release of Parking Brake* in this work package.

**NOTE**

Perform step g if using a towbar and one towing machine.

- g. Connect a medium-duty towbar with standard clevises between towing machine and disabled machine as follows:
  - (1) Connect towbar to tow pintle of towing machine.

**WARNING**

Carefully move towing machine into position. Always use a ground guide and any device necessary to lift towbar into position without standing directly between machines. Failure to follow this warning may result in injury or death to personnel.

- (2) Position towing machine directly in front of disabled machine. Connect towbar to towing lugs at front of disabled machine.

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**OPERATION UNDER UNUSUAL CONDITIONS - CONTINUED**

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**0008 00****TOWING - CONTINUED****WARNING**

Do NOT use a chain for pulling a disabled machine. A chain link may break, causing injury or death to personnel.

**NOTE**

Perform step h if using wire tow cables and two towing machines.

- h. Connect heavy-duty wire tow cables to disabled machine and to towing machines as follows:
  - (1) Connect one cable to front towing lugs of disabled machine. Connect second cable to tiedown points at rear of machine.

**WARNING**

Carefully move towing machines into position. Always use a ground guide and do NOT stand directly between machines. Failure to follow this warning may result in injury or death to personnel.

- (2) Position one towing machine at front and connect to front tow cable. Do NOT exceed a 30-degree angle from straight-ahead position. Keep towline angle to a minimum.
  - (3) Position second machine at rear and connect to rear tow cable.
- i. Remove wheel blocks from disabled machine.
- j. Ensure all personnel and equipment are clear. Position a ground guide in a safe position to monitor towing procedure.

**CAUTION**

Do NOT tow at speeds over 1.2 mph (2 kph). Damage to equipment may result.

- k. Proceed to tow with caution. Gradual, steady machine movement will be the most effective. Stop towing and evaluate progress and security of connections if towing machine moves without moving the disabled machine.

**WARNING**

Do NOT proceed without first securing disabled machine against movement by blocking wheels. Failure to follow this warning could result in injury or death to personnel.

- l. When disabled machine has reached its destination, block wheels of machine before removing towing equipment.

**WARNING**

Be sure to reconnect steering cylinder hose connections properly after towing. Failure to do so will result in nonfunctioning steering system. Injury to personnel could result.

- m. Return steering cylinder hose connections to their operational configuration.
3. **Towing With Engine Running.**
- a. If transmission and steering are operational, machine may be towed with engine running for a short distance only. An example is pulling machine out of the mud or to the side of the road to clear traffic.

**WARNING**

Do NOT allow operator on machine unless both steering and brakes are operational. Failure to follow this warning could cause injury or death to personnel.

- b. Operator of disabled machine must steer machine in the direction of the towline.
- c. Follow instructions and precautions as outlined in *Towing With Engine Stopped*.

**MANUAL RELEASE OF PARKING BRAKE****WARNING**

- Do NOT operate machine if parking brake was applied due to a malfunction of airbrake system or parking brake. Correct any problem before attempting to operate machine. Personal injury or death can result from a brake malfunction.
- Hitch and steering movement can reduce clearances and suddenly cause personnel injury. Always stop engine BEFORE working in area of hitch link.

**NOTE**

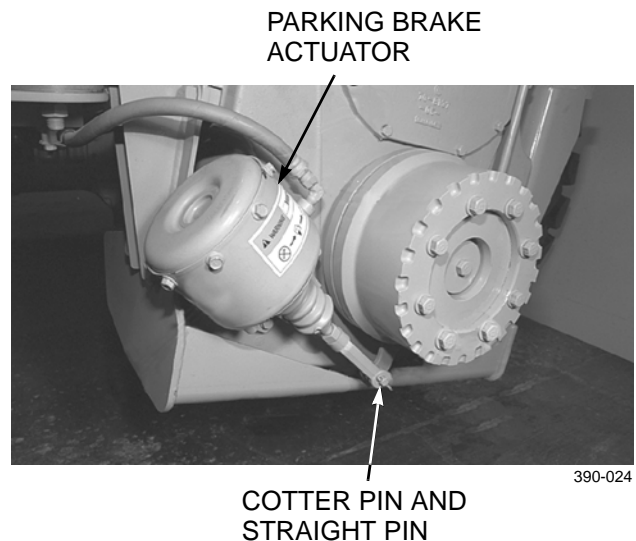
- This procedure describes manual release of parking brake in order to tow machine.
- Assistance from Unit Maintenance is required.

**1. Manual Release of Parking Brake.**

- a. Block all wheels.
- b. Lower bowl.
- c. Charge air system of disabled machine, if required. Use air from recovery vehicle applied to quick disconnect air chuck at rear of air tank of disabled machine (WP 0004 00).
- d. Release parking brake.
- e. Remove cotter pin and straight pin from rod end.
- f. Engage brake and clear rod end from lever.

**2. Reconnect Parking Brake.**

- a. Release parking brake.
- b. Install straight pin and cotter pin in rod end.
- c. Remove blocks from wheels.



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**OPERATION UNDER UNUSUAL CONDITIONS - CONTINUED**

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**0008 00****OPERATE IN EXTREME COLD****General.**

- a. Extreme cold causes many problems:
  - (1) Lubricants thicken or congeal.
  - (2) Batteries may freeze or lose their electrical efficiency.
  - (3) Fuel may not readily atomize for combustion.
  - (4) Various materials will become hard, brittle, and easily damaged.
  - (5) The cooling system requires adequate protection from extreme cold.
  - (6) Fuels, lubricants, and antifreeze compounds require special storage, handling, and use.
- b. Refer to FM 9-207 for additional information.
- c. When starting out in extreme cold, follow these procedures:
  - (1) Be careful when you first start machine. Use appropriate engine starting procedure and allow engine time to reach operating temperature. Be alert that tires may be frozen to ground.
  - (2) Start driving very slowly for about 100 yards (91.4 m). If a problem is noted, notify Unit Maintenance as required.
- d. When parking, follow these procedures:
  - (1) If machine will be parked for a short period, park in a sheltered area out of wind. If shelter is not available, park machine so that radiator does not face into the wind.
  - (2) If machine will be parked for a long shutdown period, try to park on high ground and use planks or brush to make a raised and relatively dry surface. Keep tires out of snow, water, ice, and mud, if possible.
  - (3) Clean snow, ice, and mud from machine as soon as possible after shutdown.
  - (4) If machine will be parked for a long period of time, have Unit Maintenance prepare machine for storage (TM 5-3800-205-23-1 and TM 5-3800-205-23-2).
  - (5) Ensure tires are properly inflated.

**OPERATE IN EXTREME HEAT**

1. **General.** During very hot weather, operating procedures may require altering to prevent machine overheating. Avoid continuous high engine RPM's, and minimize operation of elevator to loading/unloading bowl. Do not leave elevator running during travel.
2. **Driving Machine.**
  - a. Monitor EMS and engine coolant temperature gage. Stop if EMS signals an alert or if temperature is unusually high. Allow machine to cool down.
  - b. Check cooling system, engine air precleaner, air cleaner, air cleaner restriction indicator, engine oil level, and radiator fins frequently. Perform necessary services and notify Unit Maintenance of any unusual readings or problems.
  - c. Notify Unit Maintenance to shorten differential and final drive oil change interval.
3. **Parking Machine.**
  - a. Park machine under cover, if possible. Cover windshield to protect against sand blasting.
  - b. Ensure all tires are inflated to proper pressure.
  - c. Check frequently for rust. Clean and lubricate machine to help prevent deterioration.

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**OPERATION UNDER UNUSUAL CONDITIONS - CONTINUED**

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**0008 00****OPERATE IN MUD OR SOFT SURFACES****NOTE**

It may be advisable to empty bowl to determine mobility in mud or soft surfaces, and to traverse soft areas.

1. Before entering mud or other soft surfaces, check conditions and engage differential lock. Select appropriate transmission gear range. Enter soft area at a medium speed for gear range selected.
2. Maintain steady pressure on accelerator pedal to keep machine rolling until solid ground is reached. Do not accelerate to point where wheels spin, if possible.
3. If machine gets stuck, try to pull out slowly in a low gear. Boards, brush, or similar materials may be placed under tires to provide traction.
4. Notify Unit Maintenance to clean and inspect drive shaft for proper lubrication.

**OPERATE IN SANDY OR DUSTY CONDITIONS**

1. Maintain steady, even movement with transmission in lower gears. Use differential lock as required. Try to keep machine rolling without straining engine and powertrain. If machine gets stuck, notify Unit Maintenance.
2. Whenever operating in sandy or dusty areas, you should:
  - a. Service engine air cleaner more frequently.
  - b. Make sure each tire has a valve cap.
  - c. Check engine and transmission temperature and engine oil pressure frequently.
  - d. If machine overheats, stop and perform troubleshooting procedures.
  - e. Make sure engine oil filler tube and transmission fluid filler tube are cleaned before dipsticks are removed to check fluid levels. Clean accumulations of sand and dirt from around fluid filler locations before checking or adding fluids.
  - f. Clean spouts of fuel containers and areas around filler caps on fuel tanks before adding fuel. Under extremely sandy or dusty conditions, filter fuel when filling tanks.
  - g. Cover windshield to protect against sand blasting.
  - h. Notify Unit Maintenance to clean, inspect, and lubricate drive shaft more frequently.

**OPERATE IN SNOW AND ICE**

1. **Driving.**
  - a. Engage differential lock and accelerate slowly to avoid spinning tires.
  - b. Drive at slower speeds.
  - c. Give signals sooner.
  - d. Apply brakes sooner to give early warning of intention to stop. This will also help to avoid skidding.
  - e. Maintain double the normal distance from the vehicle ahead.
  - f. Keep windshields, mirrors, and lights clean and free of snow and ice.
  - g. If approaching a difficult stretch of road, stop and inspect road carefully before driving on it. Select transmission gear range that best suits road condition. Use differential lock as required.
2. **Stopping.**
  - a. Ease up on accelerator, leaving machine in gear.
  - b. Apply service brakes lightly and evenly. DO NOT pump service brake pedal.
  - c. Always avoid sudden braking.

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**OPERATION UNDER UNUSUAL CONDITIONS - CONTINUED**

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**0008 00****OPERATE IN SNOW AND ICE - CONTINUED**

3. **Parking.** If parking on icy, slushy, wet or muddy surfaces, place boards, brush or other materials that will provide traction underneath tires. This will guard against tires freezing to the ground or becoming pocketed in ice, and will provide some traction when machine is started and moving again.

**FORDING****NOTE**

Fresh-water ford ONLY.

1. Maximum fording depth is 3.28 ft (1 m).
2. Check water depth in several places, thereby allowing for inconsistency of bottom. Ensure that bottom of stream is hard enough to be forded, without exceeding maximum fording depth. Do not attempt to ford even the narrowest stream that is more than 3.28 ft (1 m) deep.
3. Before fording, ensure engine is operating properly and all indicators are indicating normal operating pressures and temperatures.
4. Place transmission in 1<sup>st</sup> gear and enter water slowly.
5. After fording, allow engine to run for awhile to dry out any accumulated water.
6. Drain and dry any area where water has accumulated.
7. Always test service brakes after fording by operating the brake system.

**OPERATE DECONTAMINATION APPARATUS****WARNING**

DS2 is flammable. DS2 also can severely burn the skin, cause blindness, or deteriorate the battledress chemical protective overgarments. Do not use DS2 near an open fire, or allow it to touch skin or clothing. Personnel handling DS2 must wear protective clothing and eye protection.

1. Refer to TM 3-4230-216-10, TM 3-4230-224-10, TM 3-4230-229-10, TM 3-4230-204-12&P, and TM 3-4230-214-12&P for instructions on use of decontamination apparatus.
2. A complete list of susceptible components on the scraper, that may require replacement for machine to be fully operational, is provided in TM 5-3800-250-23-1.

**END OF WORK PACKAGE**

**STOWAGE AND DECAL, DATA PLATE, AND STENCIL GUIDE****0009 00****INTRODUCTION**

- a. This work package shows the location for stowage of equipment and material required to be carried on the scraper.
- b. Also included is a stowage guide for the ISU-60 shipping and storage container, used when machine and container are transported.
- c. In addition, this work package includes illustrations showing the location of all decals, data plates, and stencils.

**STOWAGE GUIDE - BASIC ISSUE ITEMS (BII)****NOTE**

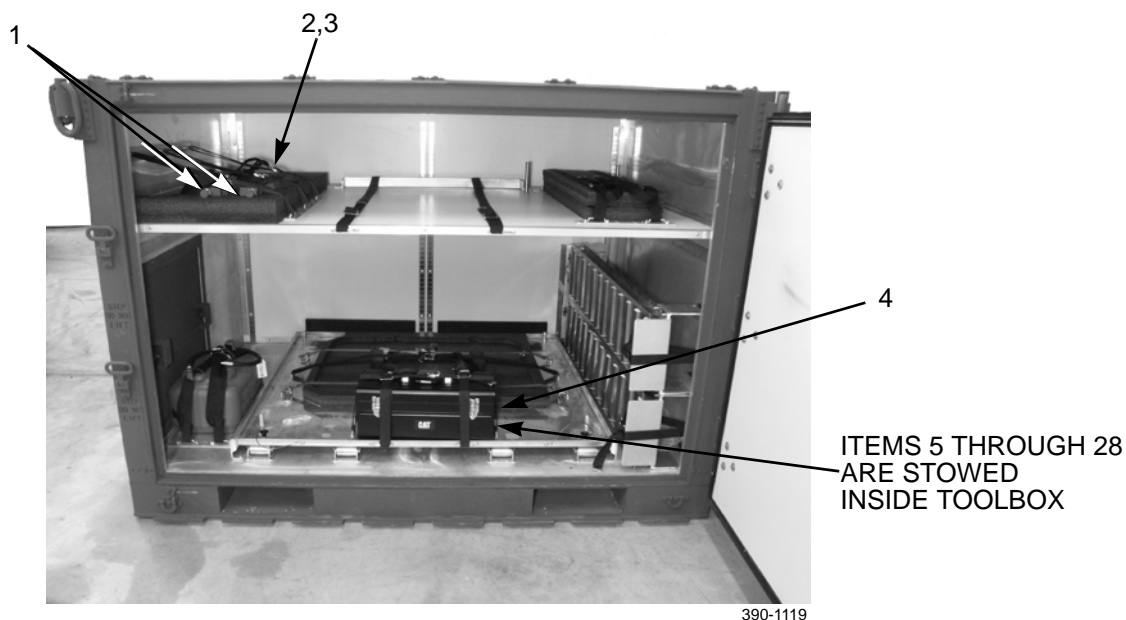
Items listed in Table 1 below are illustrated in Table 2 of WP 0024 00, *Components of End Item (COEI) and Basic Issue Items (BII) Lists*.

**Table 1. Stowage Guide - BII.**

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION
1	Bag, Tool: 10 x 20 Inch	1	In BII toolbox on rear deck of scraper
2	Bag Assembly, Pamphlet	1	In BII toolbox on rear deck of scraper
3	Binder, Loose-Leaf	1	In BII toolbox on rear deck of scraper
4	Binder, Loose-Leaf: U.S. Army Equipment Log Book	1	In BII toolbox on rear deck of scraper
5	Case, Maintenance and Operational Manuals	1	In BII toolbox on rear deck of scraper
6	Coupling, Grease Gun	1	In BII toolbox on rear deck of scraper
7	Extinguisher, Fire	1	In mounting bracket behind seat in cab
8	Gage, Tire Pressure	1	In maintenance case (in BII toolbox on rear deck of scraper)
9	Goggles, Industrial	1	In BII toolbox on rear deck of scraper
10	Hose Assembly, Pneumatic, Tire Inflation	1	In BII toolbox on rear deck of scraper
11	Padlock	12	In maintenance case (in BII toolbox on rear deck of scraper)
12	Pliers, Slip Joint: 10 Inch	1	In maintenance case (in BII toolbox on rear deck of scraper)
13	Screwdriver, Cross Tip	1	In maintenance case (in BII toolbox on rear deck of scraper)
14	Screwdriver, Flat Tip: 5 Inch	1	In maintenance case (in BII toolbox on rear deck of scraper)
15	Warning Device Kit, Highway	1	In BII toolbox on rear deck of scraper
16	Wrench, Adjustable: 12 Inch	1	In maintenance case (in BII toolbox on rear deck of scraper)

**STOWAGE GUIDE - COMPONENTS OF END ITEM (COEI)****NOTE**

- Table 2 lists COEI stowed in single-door end of ISU-60 shipping and storage container.
- Item numbers in Table 2 correspond to callout numbers in illustration below.

**Table 2. Stowage Guide - COEI: Single-Door End of ISU-60 Container.**

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION	STOWAGE INSTRUCTIONS
1	Block Assembly, Hitch Lock (Frame Locks)	2	Left side of shelf	1. Place in two small front cutouts. 2. Secure cushion pad with three straps.
2	Collar Assembly, Steering Cylinder Lock	2 (short) 2 (long)	Left side of shelf	1. Place in two long, narrow cutouts in cushion pad. 2. Secure cushion pad with three straps.
3	Hose, Steering Cylinder Cover	2 (short) 2 (long)	Left side of shelf	1. Assemble with steering cylinder lock collar assemblies, in cushion pad cutouts. 2. Secure cushion pad with three straps.
4	Toolbox, Portable	1	On front edge of tray	1. Place toolbox on front edge of tray. 2. Secure with three straps.
5	Adapter, Socket Wrench: 1 in. x 3/4 in. drive	1	Inside toolbox	
6	Bar, Pry: 12 in. long	1	Inside toolbox	
7	Bolt Machine: rear stability skid mounting	4	Inside toolbox	



## STOWAGE AND DECAL, DATA PLATE, AND STENCIL GUIDE - CONTINUED

0009 00

## STOWAGE GUIDE - COMPONENTS OF END ITEM (COEI) - CONTINUED

Table 2. Stowage Guide - COEI: Single-Door End of ISU-60 Container - Continued.

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION	STOWAGE INSTRUCTIONS
8	Breaker Bar: 1/2 in. drive, 18 in. long	1	Inside toolbox	
9	Cover, Access: Elevator Speed Reducer	1	Inside toolbox	
9.1	Cover Assembly, Fuel Tank	1	Inside toolbox	
10	Cutter, Rivet	1	Inside toolbox	
11	Extension, Socket Wrench: 3/4 in. drive, 8 in. long	1	Inside toolbox	
12	Extension, Socket Wrench: 1/2 in. drive, 5 in. long	1	Inside toolbox	
12.1	Extension Socket Wrench: 1/2 in. drive, 11 in. long	2	Inside toolbox	
13	Hammer, Hand	1	Inside toolbox	
14	Handle, Socket Wrench: 3/4 in. drive, 19.25 in. long	1	Inside toolbox	
15	Wrench, Socket: 3/4 in. drive	1	Inside toolbox	
16	Ratchet Attachment, Socket Wrench: 3/4 in. drive	1	Inside toolbox	
17	Hose Assembly, Fuel Jumper	1	Inside toolbox	
18	Key, Socket Head Screw: 1/4 in. x 3-1/4 in. long	1	Inside toolbox	
19	Puller, Mechanical	1	Inside toolbox	
20	Punch, Drift: brass, 3/4 in.	1	Inside toolbox	
21	Wrench, Ratchet: 1/2 in. drive, 10.31 in. long	1	Inside toolbox	
22	Seal, O-ring, Speed Reducer Cover Assembly	1	Inside toolbox	
23	Wrench, Socket: 3/4 in. drive, 7/8 in.	1	Inside toolbox	
24	Wrench, Socket: 3/4 in. drive, 15/16 in.	1	Inside toolbox	
25	Wrench, Socket: 3/4 in. drive, 1-1/8 in.	1	Inside toolbox	
26	Socket, Socket Wrench: 3/4 in. drive, 1-5/16 in.	1	Inside toolbox	
27	Wrench, Socket: 3/4 in. drive, 1-1/2 in.	1	Inside toolbox	
28	Ratchet Head, Socket Wrench Handle: 1/2 in. drive, 9/16 in.	1	Inside toolbox	

## STOWAGE AND DECAL, DATA PLATE, AND STENCIL GUIDE - CONTINUED

0009 00

## STOWAGE GUIDE - COMPONENTS OF END ITEM (COEI) - CONTINUED



Table 2. Stowage Guide - COEI: Single-Door End of ISU-60 Container - Continued.

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION	STOWAGE INSTRUCTIONS
29	Ratchet Head, Socket Wrench Handle: 1/2 in. drive, 3/4 in.	1	Inside toolbox	
30	Socket, Socket Wrench: 1/2 in. drive, 15/16 in.	1	Inside toolbox	
31	Wrench, Socket: 1 in. dr. 1-15/32 in.	1	Inside toolbox	
32	Strap, Ratchet, General Purpose	4	Inside toolbox	
33	Strap, Webbing	6	Inside toolbox	
34	Tool, Tire	1	Inside toolbox	
35	Washer, Flat: rear stability skid mounting	4	Inside toolbox	
36	Wrench, Adjustable: 12 in., 1-5/16 in. jaw capacity	2	Inside toolbox	
37	Wrench, Box: 1-5/16 in.	1	Inside toolbox	
38	Wrench, Box and Open End, Combination: 7/16 in.	2	Inside toolbox	

## STOWAGE AND DECAL, DATA PLATE, AND STENCIL GUIDE - CONTINUED

0009 00

**STOWAGE GUIDE - COMPONENTS OF END ITEM (COEI) - CONTINUED****Table 2. Stowage Guide - COEI: Single-Door End of ISU-60 Container - Continued.**

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION	STOWAGE INSTRUCTIONS
39	Wrench, Box and Open End, Combination: 1/2 in.	1	Inside toolbox	
40	Wrench, Box and Open End, Combination: 9/16 in.	1	Inside toolbox	
41	Wrench, Box and Open End, Combination: 3/4 in.	1	Inside toolbox	
42	Wrench, Box and Open End, Combination: 15/16 in.	1	Inside toolbox	
43	Wrench, Box and Open End, Combination: 1-1/8 in.	1	Inside toolbox	
44	Wrench, Box and Open End, Combination: 1-1/2 in.	2	Inside toolbox	
45	Hose Assembly, Auxiliary Fuel Tank	1	Installed on auxiliary fuel tank	
46	Tank, Fuel, Engine (Auxiliary)	1	Left side of floor, accessible through HAZMAT access door	Secure with two straps.
47	Tube, Exhaust Extension	1	Left side of shelf	1. Place in left cutout in cushion pad. 2. Secure cushion pad with three straps.

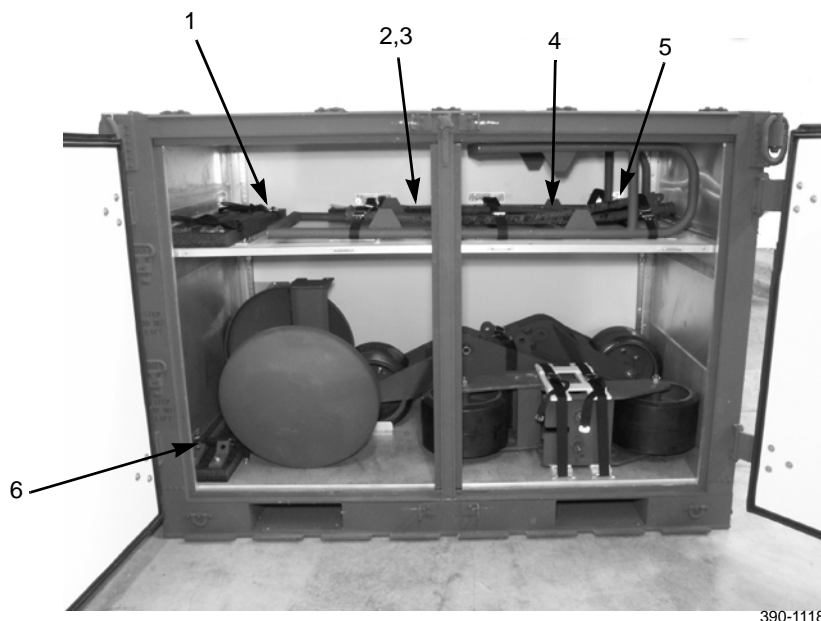
## STOWAGE AND DECAL, DATA PLATE, AND STENCIL GUIDE - CONTINUED

0009 00

## STOWAGE GUIDE - COMPONENTS OF END ITEM (COEI) - CONTINUED

## NOTE

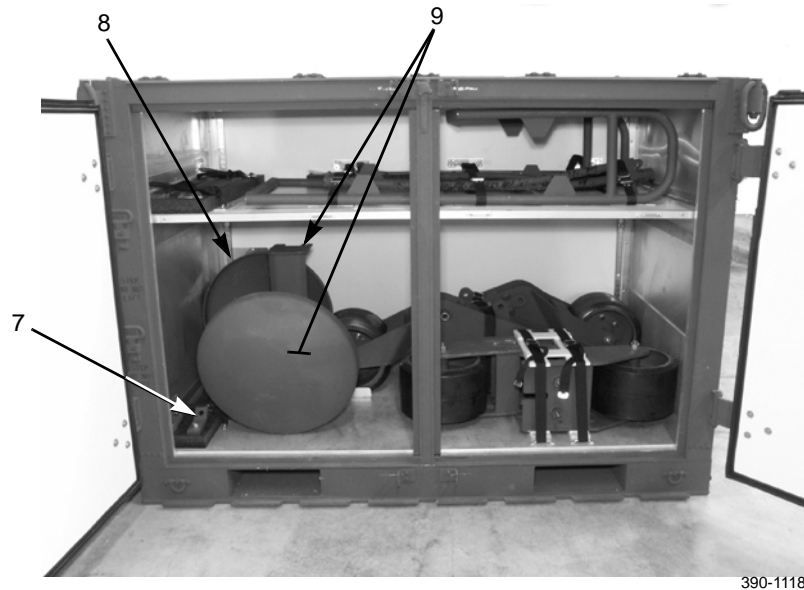
- Table 3 lists COEI stowed in two-door end of ISU-60 shipping and storage container.
- Item numbers in Table 3 correspond to sequence in which components should be stowed, as well as to callout numbers in illustration below.



390-1118

Table 3. Stowage Guide - COEI: Two-Door End of ISU-60 Container.

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION	STOWAGE INSTRUCTIONS
1	Turnbuckle	2	Left side of shelf	1. Place in cushion pad cutouts. 2. Secure cushion pad with two straps.
2	Bar, Pry: 54 in. long	1	Back of shelf	1. Place in cushion pad cutout. 2. Secure cushion pad with three straps.
3	Wrench, Torque: 3/4 in. drive, 200-600 lb-ft capacity	1	Back of shelf	1. Place in cushion pad cutout. 2. Secure cushion pad with three straps.
4	Ladder Assembly	1	On shelf	1. Place on shelf with top of ladder facing right. 2. Secure with three straps.
5	Valve and Hose Assembly, Load Transfer, Relief	1	On shelf	1. Place on top of ladder. 2. Secure with three straps.
6	Bracket, Mounting: long	1	On left side of floor	1. Place in cushion pad cutout. 2. Secure cushion pad with two straps.

**STOWAGE GUIDE - COMPONENTS OF END ITEM (COEI) - CONTINUED****Table 3. Stowage Guide - COEI: Two-Door End of ISU-60 Container - Continued.**

ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION	STOWAGE INSTRUCTIONS
7	Bracket, Mounting: short	1	On left side of floor	<ol style="list-style-type: none"> <li>1. Place in cushion pad cutout.</li> <li>2. Secure cushion pad with two straps.</li> </ol>
8	Skid Assembly, Front	1	In left rear corner of floor	<ol style="list-style-type: none"> <li>1. Place in left rear corner on floor, with "foot" of skid facing back wall. Leg of skid rests in U-shaped channel of support post.</li> <li>2. Secure leg to support post with one strap.</li> <li>3. Secure leg to rear skid assembly leg with one strap.</li> </ol>
9	Skid Assembly, Rear	1	In left front corner of floor	<ol style="list-style-type: none"> <li>1. Place in front of front skid, with "foot" facing out.</li> <li>2. Align mounting leg (with cutout) with base of mounting post.</li> <li>3. Secure leg to base of mounting post with two pins.</li> <li>4. Secure leg to front skid assembly leg with one strap.</li> </ol>

## STOWAGE AND DECAL, DATA PLATE, AND STENCIL GUIDE - CONTINUED

0009 00

## STOWAGE GUIDE - COMPONENTS OF END ITEM (COEI) - CONTINUED

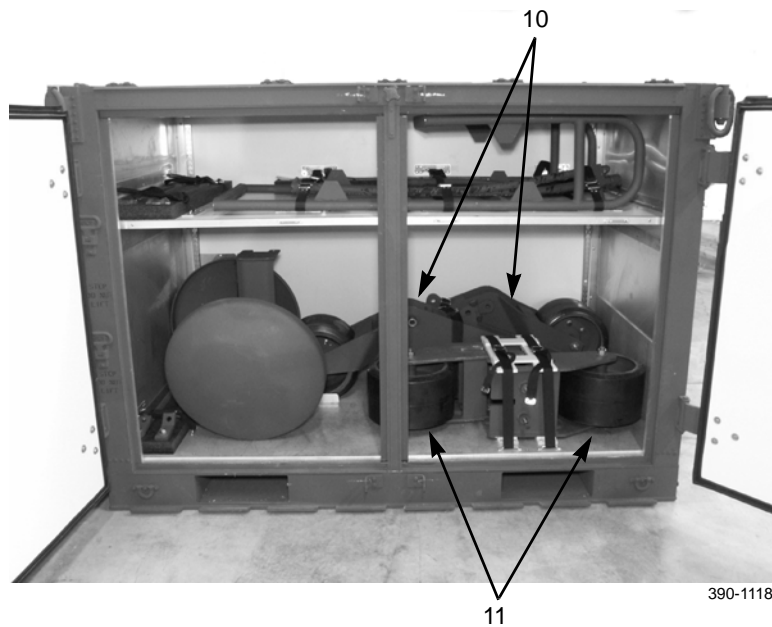
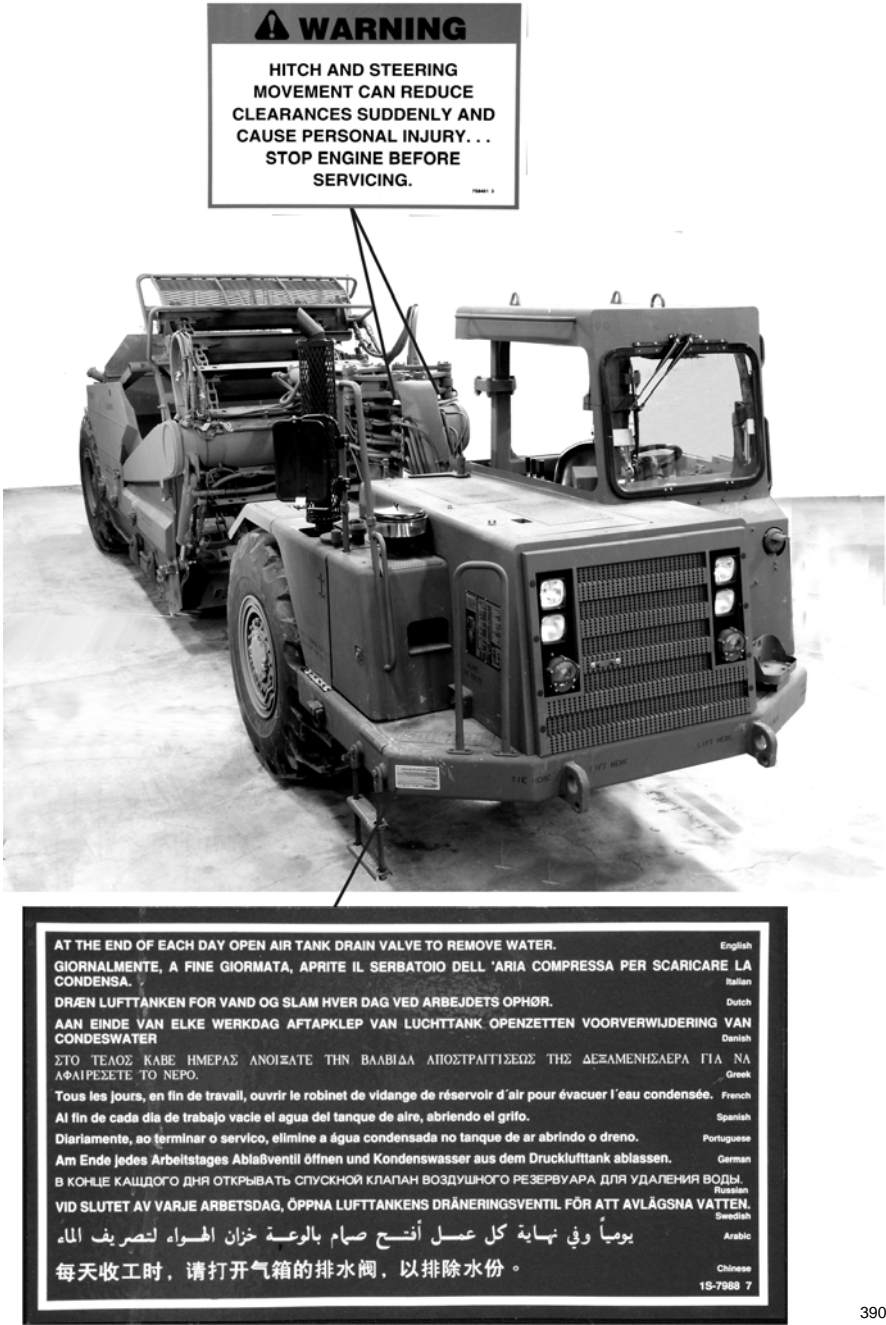


Table 3. Stowage Guide - COEI: Two-Door End of ISU-60 Container - Continued.

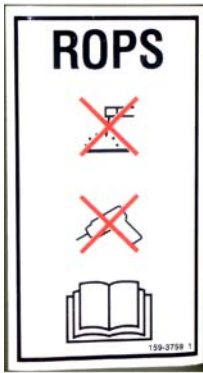
ITEM	NOMENCLATURE	QTY	STOWAGE LOCATION	STOWAGE INSTRUCTIONS
10	Axle Assembly, Load Transfer	2	In right rear corner of floor	<ol style="list-style-type: none"> <li>1. Place one axle along back wall of container, with wheel facing right and other end resting in U-bracket on floor of container.</li> <li>2. Place second axle in front of first but in reverse orientation. End of axle rests in second U-bracket on floor of container.</li> <li>3. Secure each axle with a pin assembly through holes in U-brackets.</li> <li>4. Secure each pin assembly with a lockpin.</li> </ol>
11	Wheel Assembly, Cutting Edge	2	In right front corner of floor	<ol style="list-style-type: none"> <li>1. Place two straps through loops on floor.</li> <li>2. Place one cutting edge wheel on its side with wheel facing left.</li> <li>3. Place other cutting edge wheel in front of first, with wheel facing right.</li> <li>4. Place H-shaped bracket on top and pass two straps through bracket.</li> <li>5. Tighten straps.</li> </ol>

DECALS



390-1161

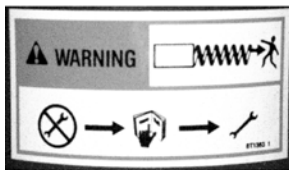
**DECALS - CONTINUED**



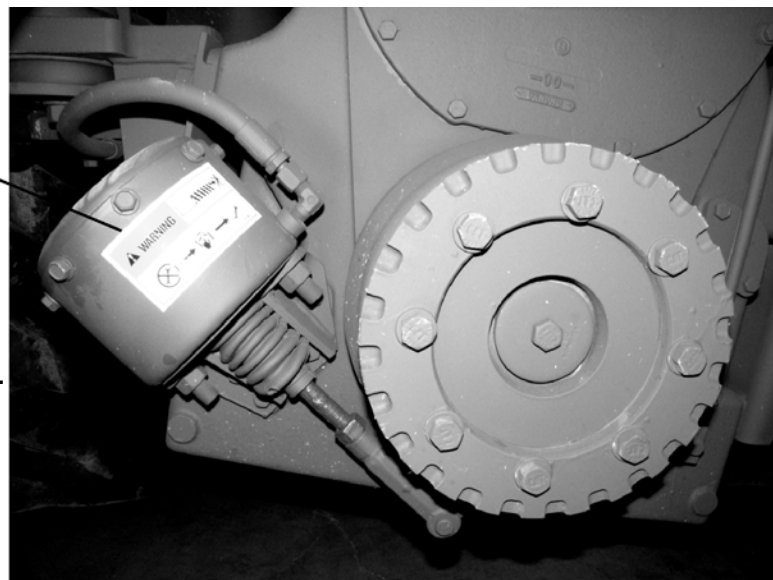
**ROPS: DO NOT WELD,  
DO NOT DRILL.  
CONSULT MANUAL.**



390-1160



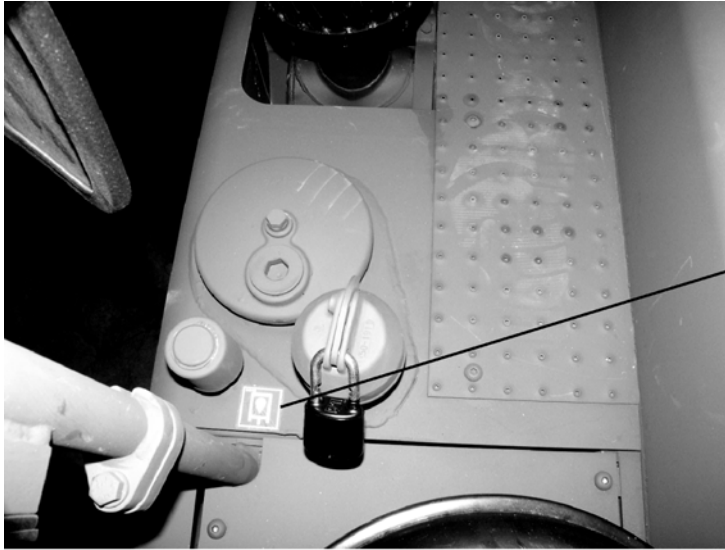
**WARNING: SPRING UNDER  
HIGH PRESSURE. CONSULT  
MANUAL BEFORE SERVICING.**



390-1165

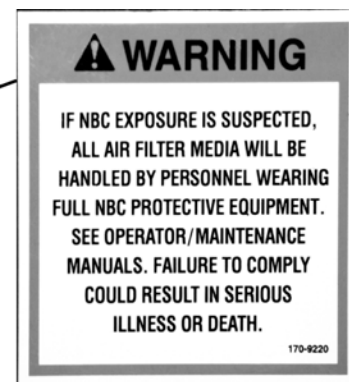


DECALS - CONTINUED



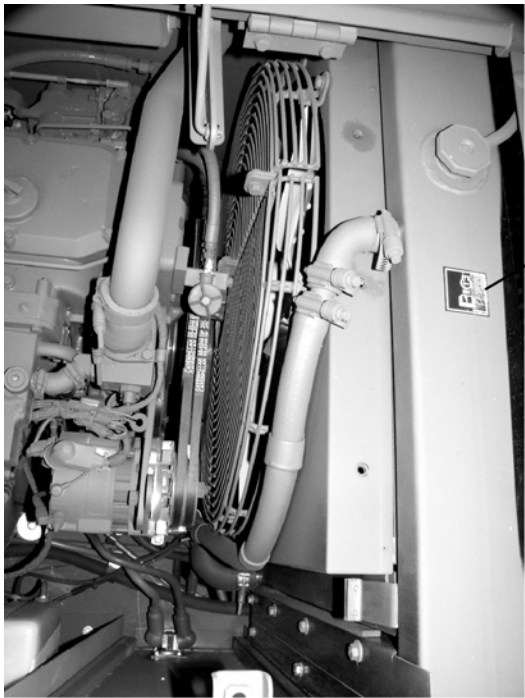
HYDRAULIC OIL

390-1164



390-1163

DECALS - CONTINUED

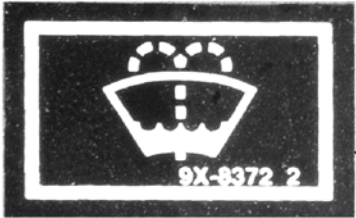


WARNING: ENGINE COOLANT.  
HOT SURFACE. KEEP HANDS  
AWAY. CONSULT MANUAL.

390-1162

CAT		CORE AR.	DATE
SER. NO.			DELIVERED
MODIFICATION NO.			DLR
AR		PERF	CODE
NO.		SPEC	
OEM			MAX
NO.			ALT
FULL LOAD		FULL TORQ.	
STATIC FUEL		STATIC FUEL	
POWER	HP	A/F RATIO	
BARE ENG.		DYNAMIC	
H1 IDLE		FUEL	
RPM		TIMING	
			9L-8531 18

ENGINE INFORMATION

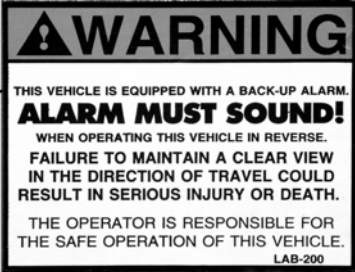


WINDSHIELD WASHER FLUID

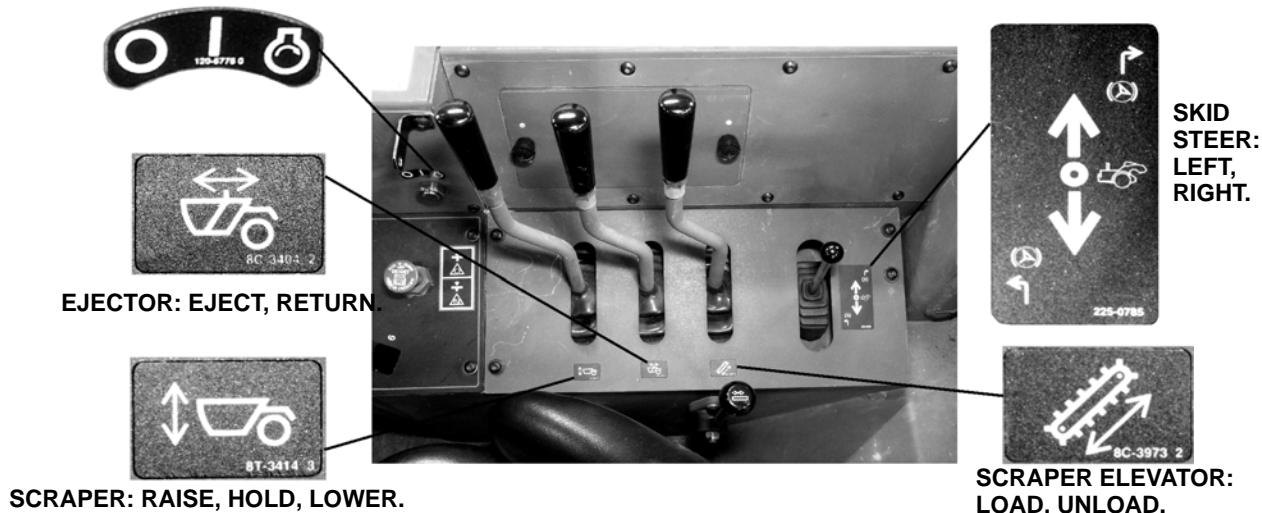


390-1177

DECALS - CONTINUED



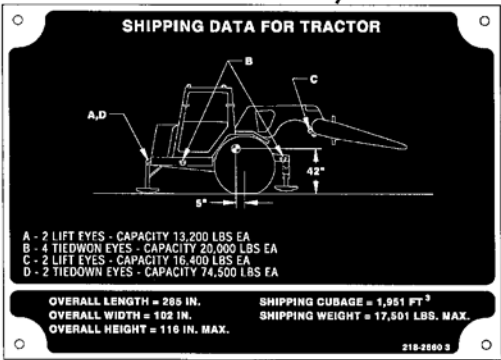
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390-1167

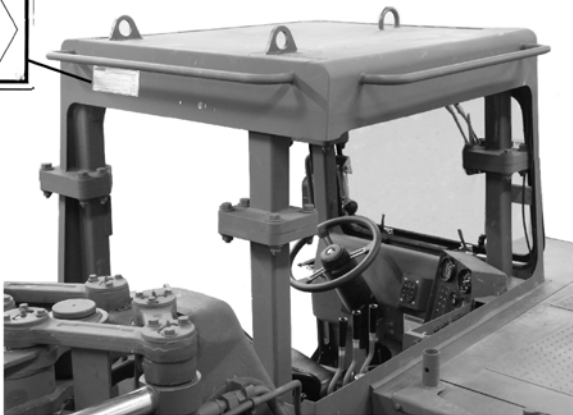


**DATA PLATES - CONTINUED**



390-1168

DATA PLATES - CONTINUED



390-1170

DATA PLATES - CONTINUED




CATERPILLAR INC.  
PEORIA, IL 61629  
USA

CAT<sup>®</sup>

CAT<sup>®</sup>



CATERPILLAR<sup>®</sup>

CATERPILLAR<sup>®</sup>



MODEL NUMBER

PRODUCT IDENTIFICATION NUMBER

	MODEL NUMBER	SERIAL NUMBER	ARRANGEMENT NUMBER
			
			

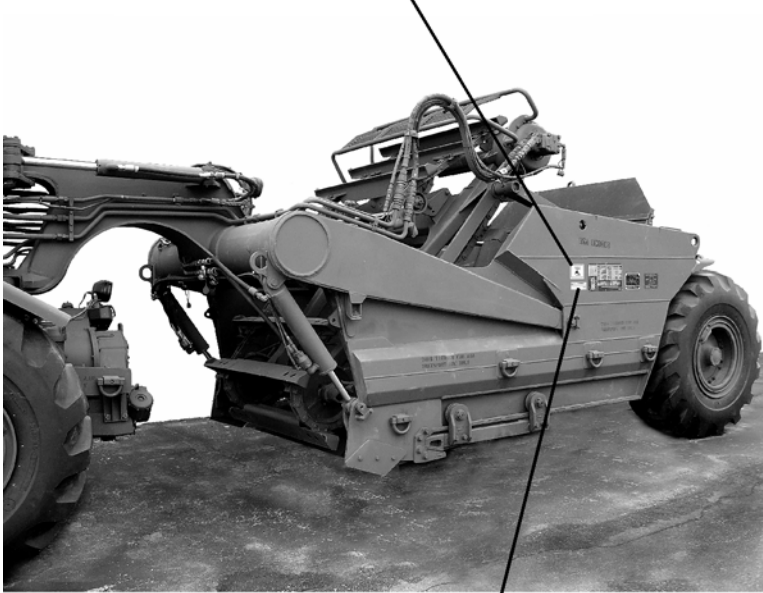
MADE IN


PARTS ORDER

194-0856 4

390-1175

DATA PLATES - CONTINUED



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PRODUCT IDENTIFICATION NUMBER		
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		<b>CATERPILLAR INC.</b> PEORIA, IL 61629 USA MADE IN <div style="border: 1px solid black; width: 30px; height: 15px; display: inline-block;"></div> PARTS ORDER <div style="border: 1px solid black; width: 30px; height: 15px; display: inline-block;"></div> <small>230-0986 1</small>

390-1172



STOWAGE AND DECAL, DATA PLATE, AND STENCIL GUIDE - CONTINUED

0009 00

DATA PLATES - CONTINUED

**NOTICE**  
LUBRICATION, MAINTENANCE, OR REPAIR OF THIS MACHINE CAN BE DANGEROUS UNLESS PERFORMED PROPERLY. EACH PERSON MUST SATISFY HIMSELF THAT HE HAS THE NECESSARY SKILL & INFORMATION, PROPER TOOLS & EQUIPMENT, AND THAT HIS WORK METHODS ARE SAFE & CORRECT. CATERPILLAR DEALERS ARE AVAILABLE TO PROVIDE SERVICE AND INFORMATION.

**613C ELEVATING SCRAPER LUBRICATION AND MAINTENANCE INTERVALS**

ITEM	IDENTIFICATION	SERVICE	ITEM	IDENTIFICATION	SERVICE
<b>WHEN REQUIRED</b>			<b>EVERY 50 SERVICE HOURS OR MONTHLY</b>		
1	ELEVATOR FLIGHT/GETTING EDGE CLEARANCE	CHECK/ADJUST	11	TIRE INFLATION	CHECK
2	DRIFT AND WEAR PLATES	CHECK/REPLACE	<b>EVERY 250 SERVICE HOURS OR MONTHLY *</b>		
3	EJECTOR CARRIER ROLLERS	CHECK/ADJUST	9	EJECTOR SUPPORT ROLLERS	INSPECT/LUBRICATE/REPLACE
4	ELEVATOR CHAIN	INSPECT/ADJUST	12	ELEVATOR SPEED REDUCER	CHECK/LUBRICATE
5	MONITOR RITS	INSPECT/REPLACE	16	FUEL SYSTEM PRIMARY FILTER	CLEAN/INSPECT/REPLACE
<b>EVERY 10 SERVICE HOURS OR DAILY</b>			18	FUEL TANK CAP AND STRAINER	CLEAN
<b>BUILT-UPON INSPECTION</b>			<b>EVERY 2000 SERVICE HOURS OR 1 YEAR</b>		
6	ELEVATOR CHAIN ADJUSTMENT INDEX	LUBRICATE	3	EJECTOR GUIDE ROLLERS	CHECK/ADJUST
7	ELEVATOR CHAIN TENSION	LUBRICATE	9	EJECTOR GUIDE ROLLERS	INSPECT/PACK/REPLACE
8	ELEVATOR LUBRICATION	LUBRICATE	3	EJECTOR SUPPORT ROLLERS	CHECK/ADJUST
9	FLOOR ROLLERS	LUBRICATE	12	ELEVATOR SPEED REDUCER OIL	CHANGE
10	FUEL SYSTEM WATER SEPARATION	DRAIN	9	EJECTOR CARRIER ROLLERS	INSPECT/PACK/REPLACE
			13	WHEEL BEARINGS	REPAIR
			18	FUEL TANK WATER AND SEDIMENT	DRAIN

**REFILL CAPACITIES**

COMPARTMENT	LEVELS	U.S. GALLONS
FUEL TANK	220	86
ELEVATOR SPEED REDUCER	5	1.4

**LUBRICANT GUIDE**

ITEM	LUBRICANT	TEMPERATURE RANGE
C170 LUBRICANT	MIL-PRF-13820	100°F - 250°F
MIL-PRF-13820	MIL-PRF-13820	100°F - 250°F
MIL-PRF-6824	MIL-PRF-6824	100°F - 250°F

FOR DETAILED MAINTENANCE INFORMATION SEE MAINTENANCE MANUAL

222-1602



**SHIPPING DATA FOR SCRAPER VEHICLE**

A - 2 TIEDOWN EYES - CAPACITY 74,500 LBS EA  
B - 12 TIEDOWN EYES - CAPACITY 20,000 LBS EA  
C - 4 SUSPENSION/LIFT EYES - CAPACITY 63,400 LBS EA  
D - 2 TIEDOWN EYES - CAPACITY 74,500 LBS EA

VEHICLE CONFIGURATION	SHIPPING WEIGHT	CG	LENGTH	HEIGHT	WIDTH	CUBAGE
	LBS	X (IN)	Y (IN)	IN	IN	FT <sup>3</sup>
OPERATIONAL	33,750	161	46	460	116	2739
AIR DROP	35,265	154	46	369	91	2143
AIR TRANSPORT	34,169	155	47	400	96	2267
CONCRETE RAIL	33,265	154	48	401	97	2296

218-2052 2

**SHIPPING DATA FOR SCRAPER**

A - 2 LIFT EYES - CAPACITY 10,200 LBS EA  
B - 8 TIEDOWN EYES - CAPACITY 20,000 LBS EA  
C - 2 LIFT EYES - CAPACITY 63,400 LBS EA  
D - 2 TIEDOWN EYES - CAPACITY 74,500 LBS EA

OVERALL LENGTH = 221 IN.  
OVERALL WIDTH = 150 IN.  
OVERALL HEIGHT = 116 IN. MAX.

SHIPPING CUBAGE = 1,464 FT<sup>3</sup>  
SHIPPING WEIGHT = 15,945 LBS. MAX.

218-2051 2

390-1173

**DATA PLATES - CONTINUED**



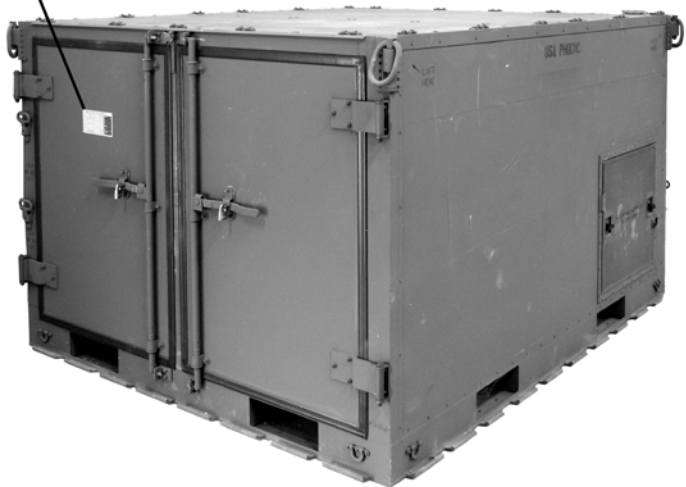
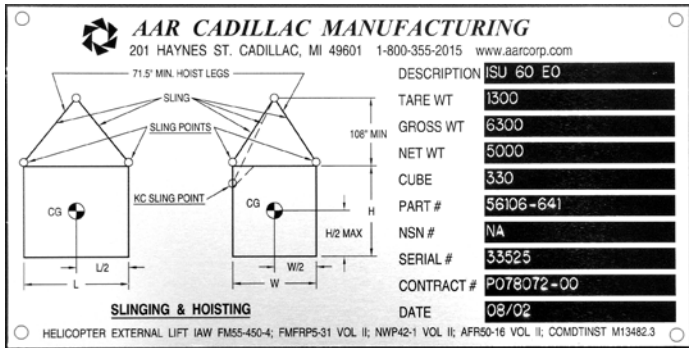
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DATA PLATES - CONTINUED



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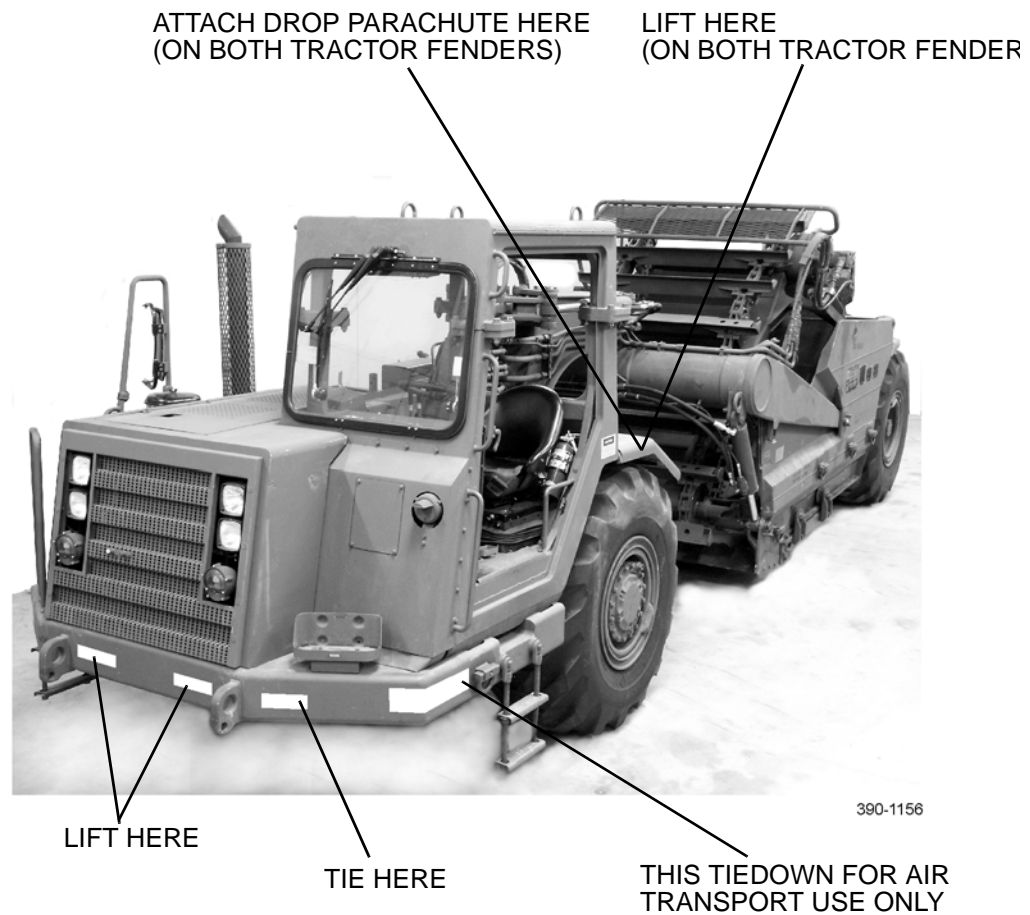
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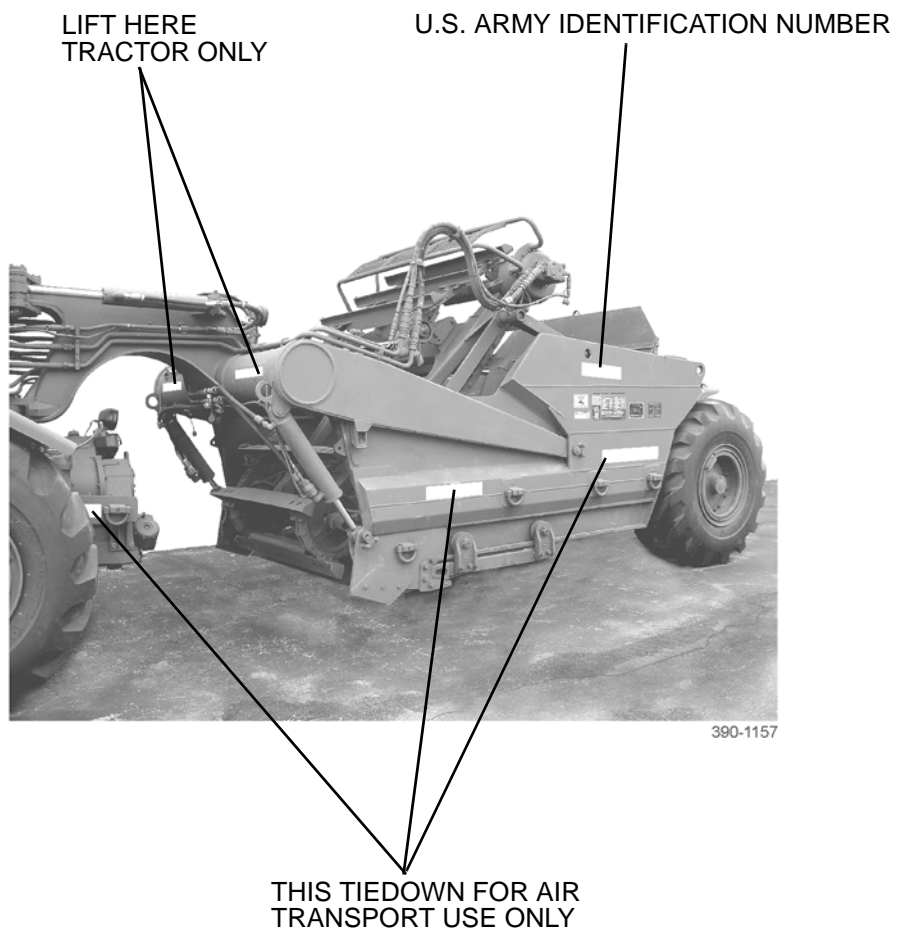
ISU-60 CONTAINER

390-1171

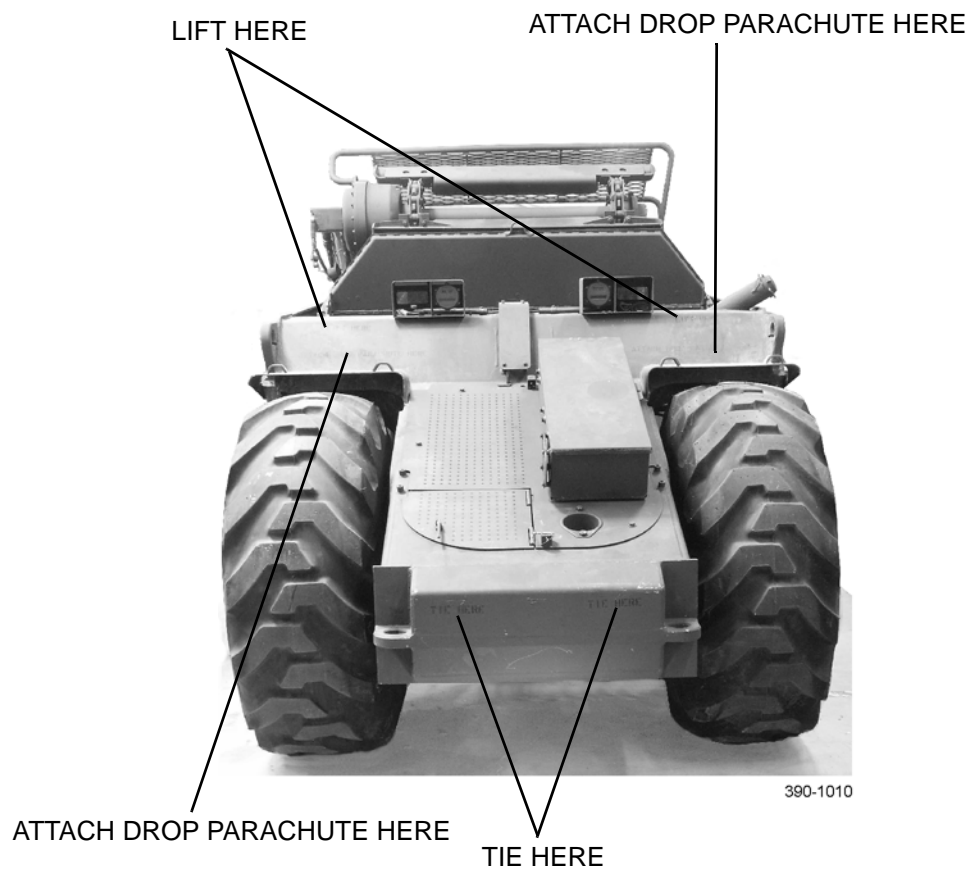
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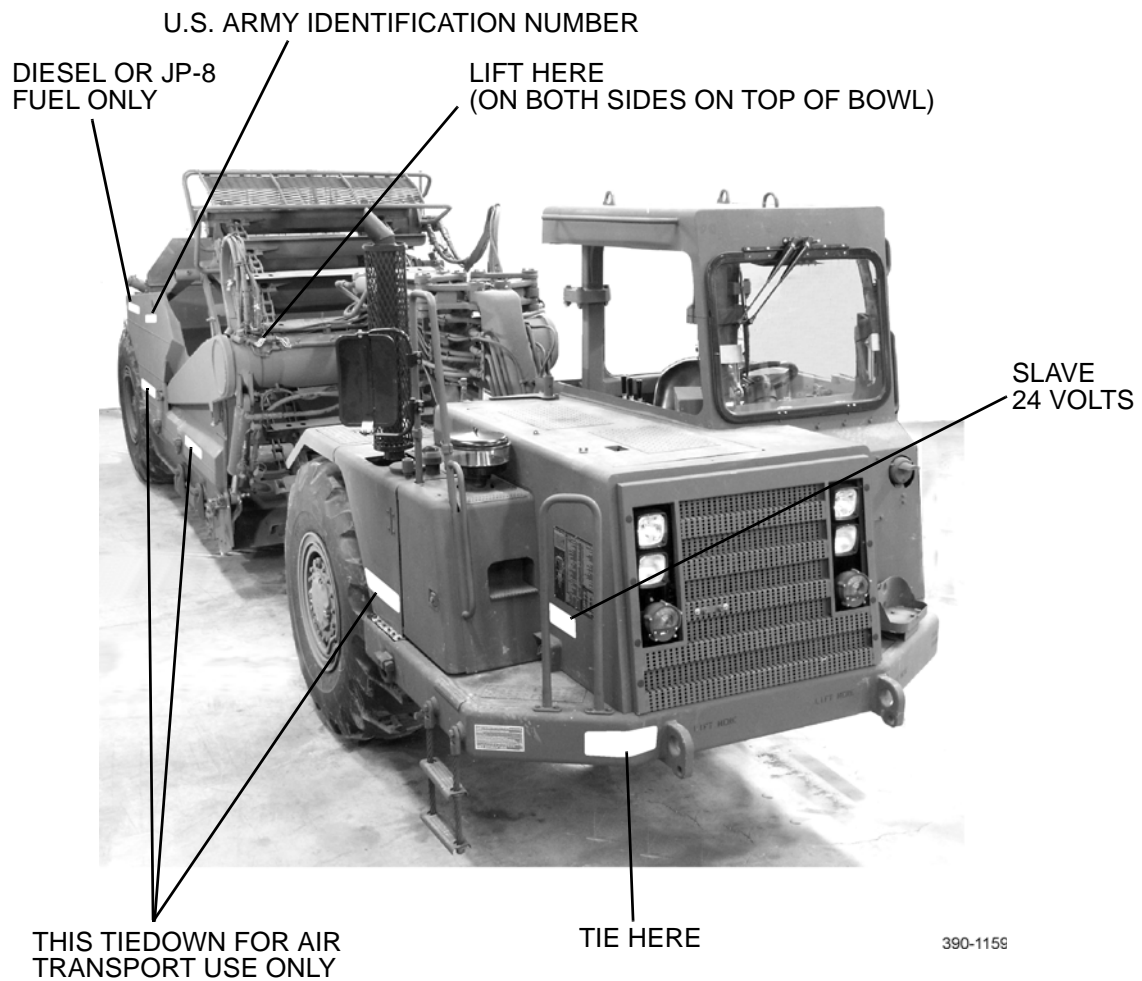
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**STENCILS - CONTINUED**

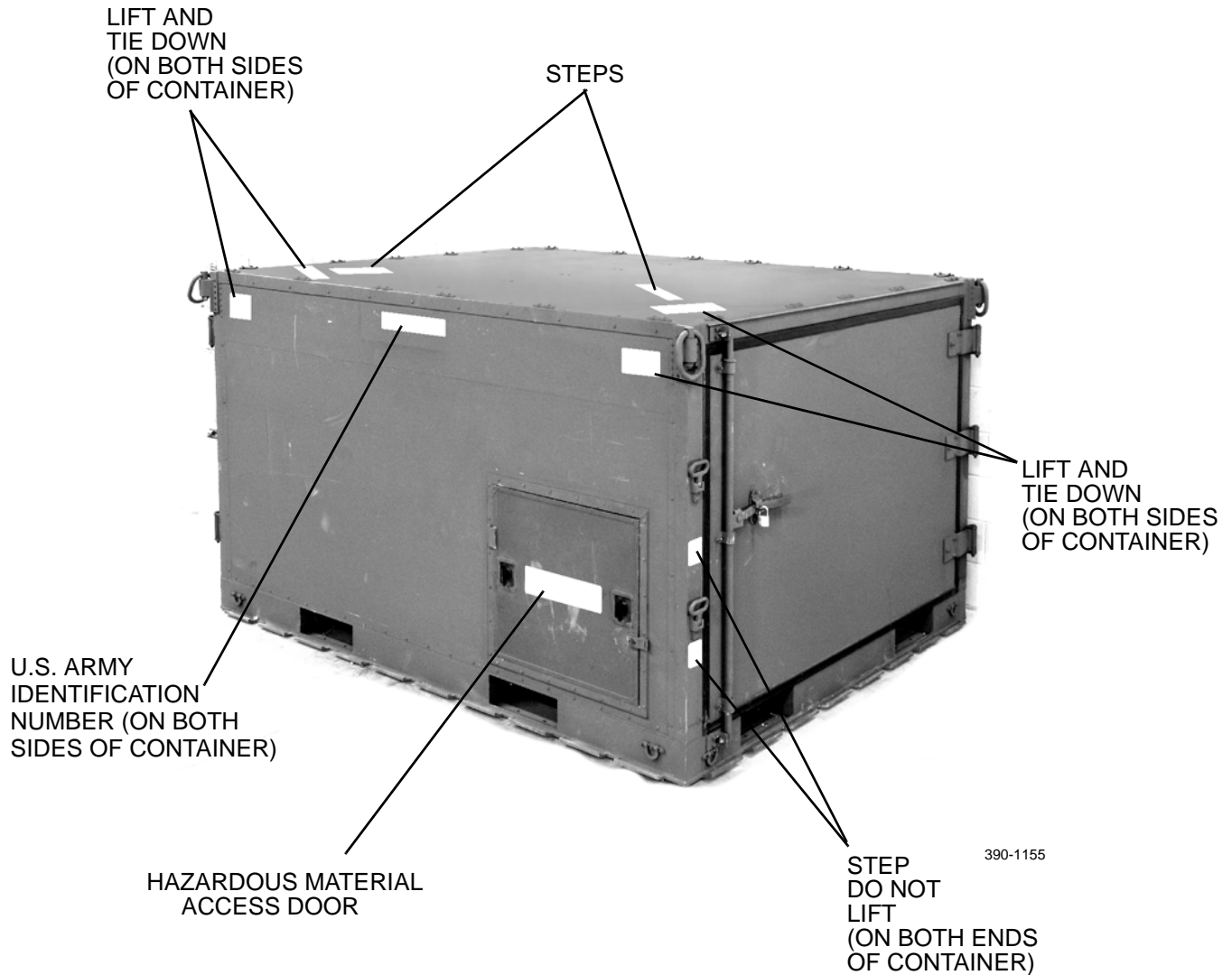


**STENCILS - CONTINUED**





**STENCILS - CONTINUED**



**ISU-60 CONTAINER**

**END OF WORK PACKAGE**

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## **CHAPTER 3**

# **OPERATOR TROUBLESHOOTING**

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**TROUBLESHOOTING INTRODUCTION****0010 00****INTRODUCTION**

1. Troubleshooting procedures are grouped by system, containing information you need to fault locate malfunctions on the 613CS Scraper. A troubleshooting symptom index in WP 0011 00 is provided to aid in locating a malfunction or symptom and directs you to the appropriate troubleshooting table in WP 0012 00.
  - a. Table 1, *Troubleshooting Procedures*, includes all procedures for machine troubleshooting, except for malfunctions which may occur as a result of transport.
  - b. Table 2, *Transport Mode Troubleshooting Procedures*, includes malfunctions that may occur either during or immediately after transporting the machine.
2. The troubleshooting table contains a listing of malfunctions, test and inspection procedures, and corrective actions. The corrective action column further directs you to the required corrective maintenance procedure within this manual by work package number. However, if the required maintenance procedure is beyond Operator level capabilities, the direction is to notify Unit Maintenance.

**PRELIMINARY TROUBLESHOOTING PROCEDURES****NOTE**

Fluid leaks are classified as either Class I, Class II or Class III

- Class I:* Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
- Class II:* Leakage of fluid great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.
- Class III:* Leakage of fluid great enough to form drops that fall from item being checked/inspected.

Before starting any specific troubleshooting procedures, perform the following:

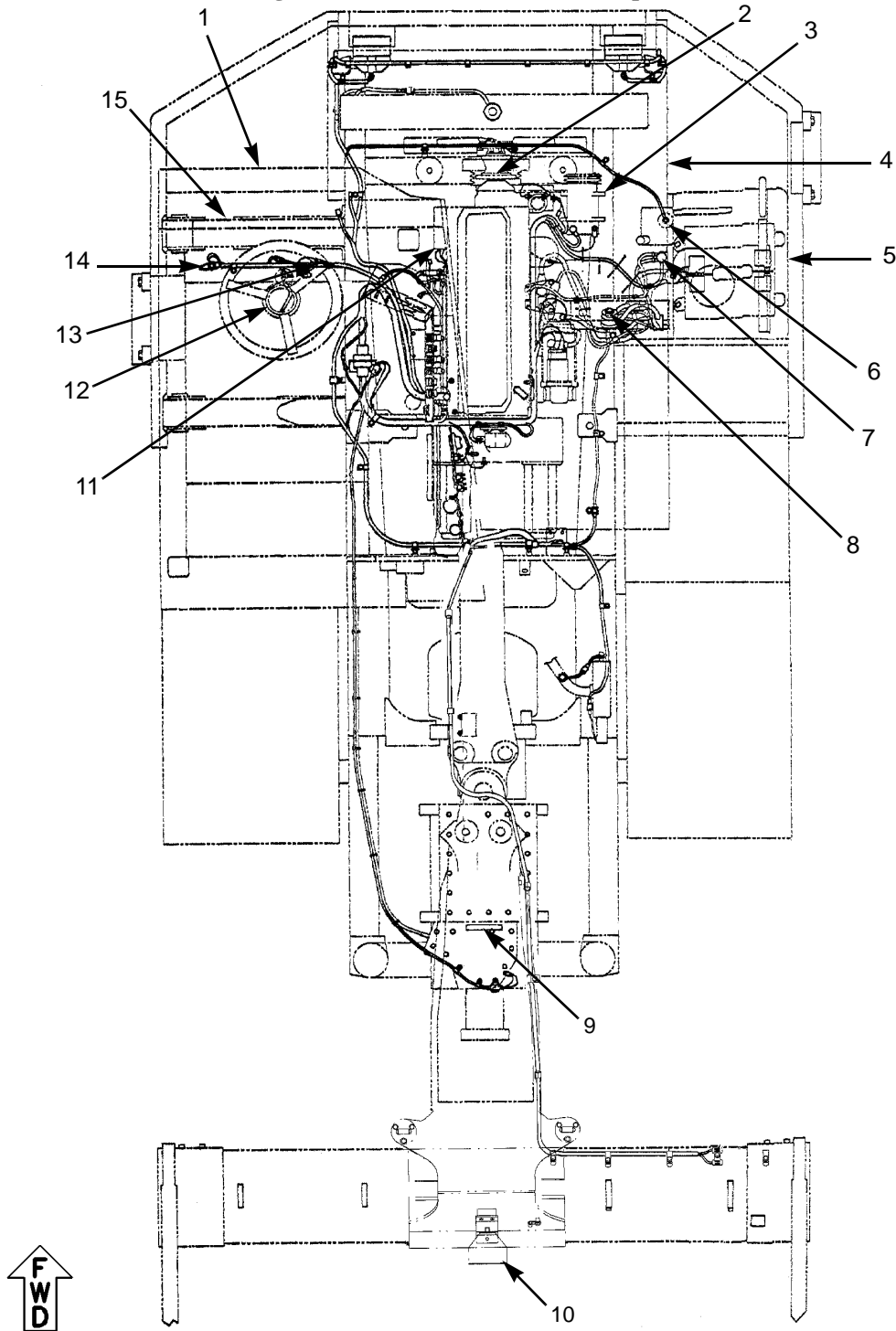
- a. Visually check for ruptured oil hoses or tubes and for Class II or Class III leaks.
- b. Check for mechanical jamming or binding caused by rocks or other foreign matter.
- c. Check fluid levels in subject area and service as required (WP 0013 00 and WP 0014 00).

**ELECTRICAL TROUBLESHOOTING**

1. Analyze the symptoms and conditions and use common sense and logic to determine the most likely cause for the problem, then troubleshoot that circuit first. The more information you have concerning the problem, the easier it will be to troubleshoot.
2. Isolate to the subsystem level (in cases where more than one subsystem is involved); next isolate the problem to a single circuit within the subsystem; then, isolate the problem to the faulty component using the troubleshooting symptom index (WP 0011 00).
3. Frayed, broken, loose or corroded wiring is a common source of problems in any electrical circuit. Always make visual inspection before starting detailed troubleshooting. Observe in particular contacts to ground. Components with case grounds are especially troublesome.

COMPONENT LOCATIONS

Figure 1. Location of Electrical Components.



## TROUBLESHOOTING INTRODUCTION - CONTINUED

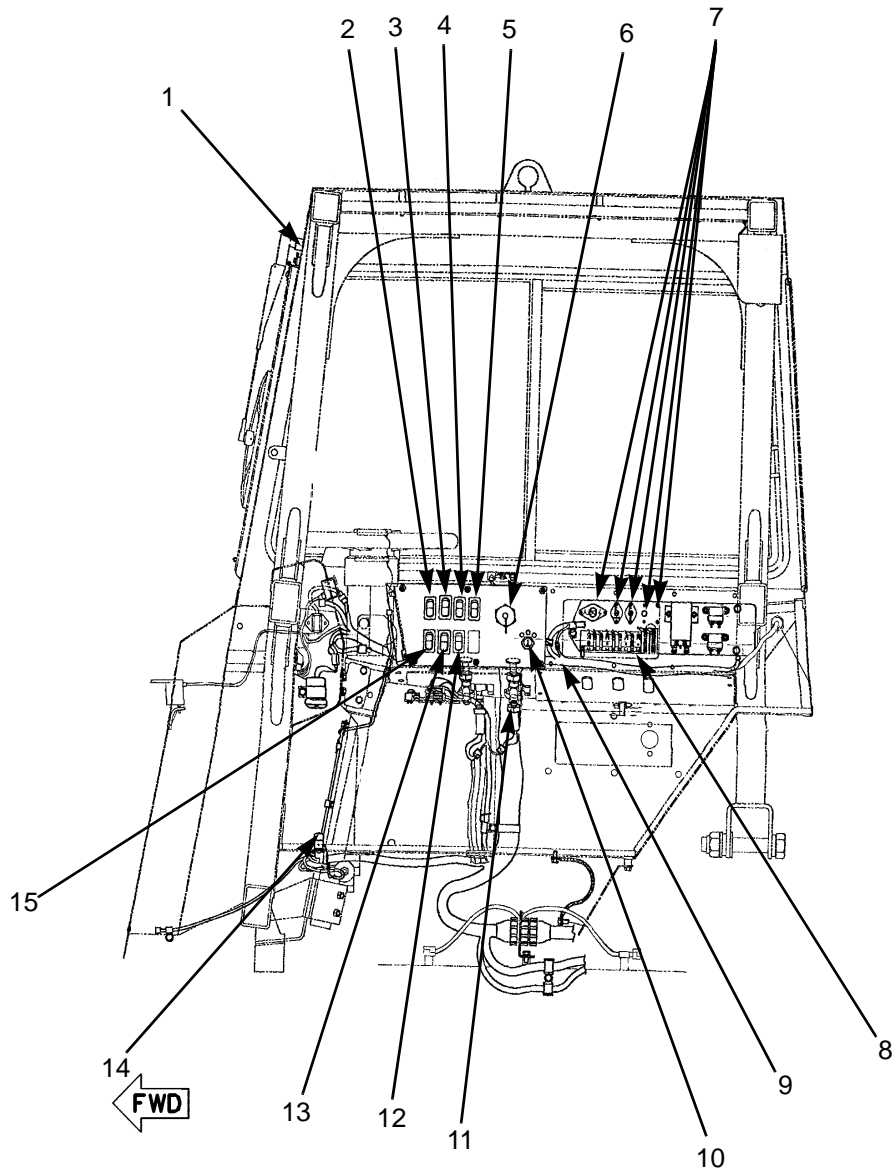
0010 00

**COMPONENT LOCATIONS - CONTINUED**

KEY	COMPONENT	LOCATION
1	Blackout Drive Light	Front left side of cab, below windshield.
2	Drive Belts	Front of engine.
3	Alternator	Front right side of engine.
4	Slave Receptacle	Front right side above wire ladder.
5	Air Tanks	Front right side below engine compartment.
6	Windshield Washer Reservoir	Inside engine compartment right side.
7	Air Filter Service Indicator	Inside engine compartment right side.
8	Battery Disconnect Switch	Inside engine compartment right side.
9	Cutting Edge Flood Work Light	Mounted on top of torque converter.
10	Bowl Flood Work Light	Mounted at rear of hitch.
11	Engine Shutoff Solenoid	Inside engine compartment, left side of engine at fuel governor pump.
12	Horn Button	Center of steering wheel.
13	Light Switch	Lower right side of steering wheel.
14	Directional Control and Hazard Flasher	Mounted on left side of steering column.
15	Horn	Front left under cab, mounted to bumper.

COMPONENT LOCATIONS - CONTINUED

Figure 2. Location of Electrical Components.



390-1146

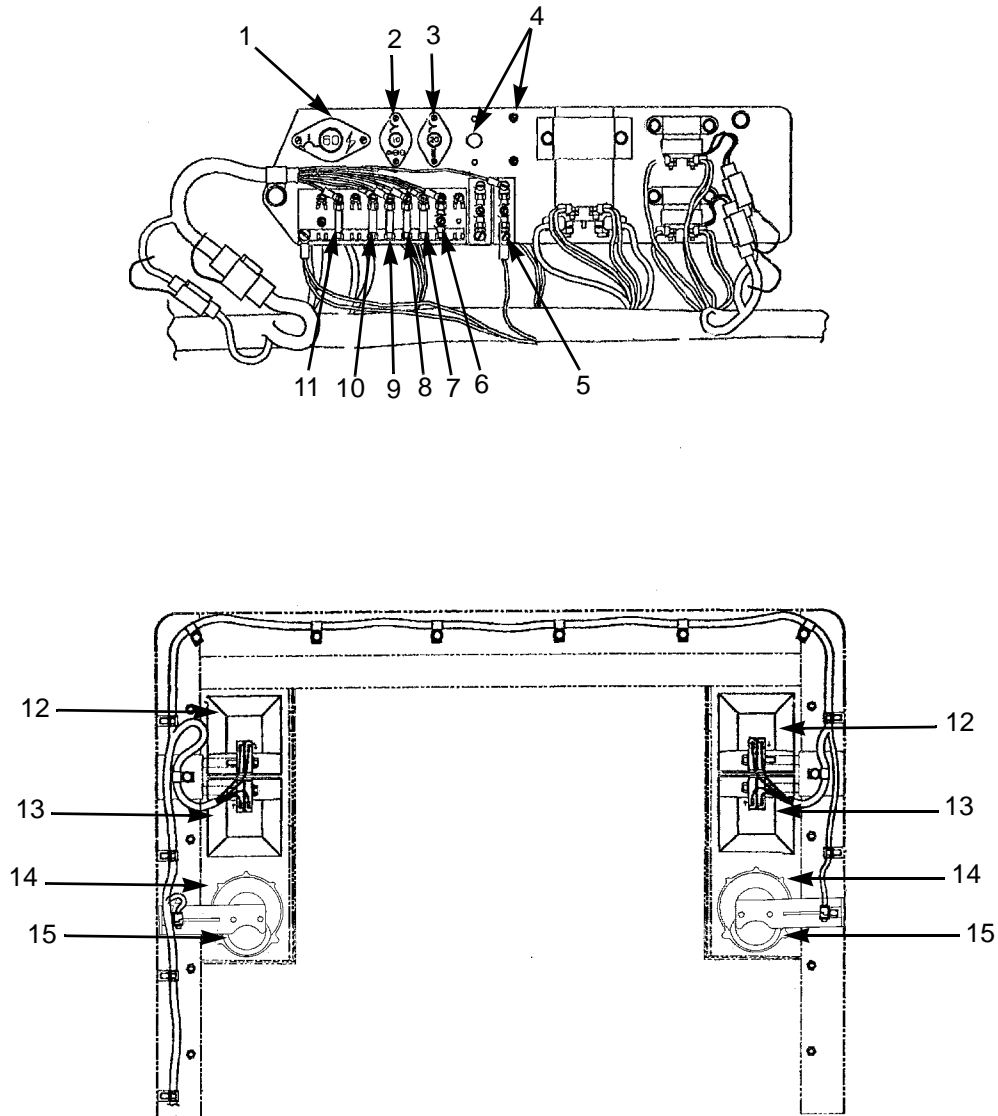


**TROUBLESHOOTING INTRODUCTION - CONTINUED****0010 00****COMPONENT LOCATIONS - CONTINUED**

<b>KEY</b>	<b>COMPONENT</b>	<b>LOCATION</b>
1	Windshield Wiper Motor	Upper right inside cab.
2	Panel Test Switch	Switch panel.
3	Flood Lamp Switch	Switch panel.
4	Ether Start Aid Switch	Switch panel.
5	Air Intake Preheat Switch	Switch panel.
6	Test Connector	Switch panel.
7	Circuit Breakers	Circuit Breakers/Fuse panel.
8	Fuses	Circuit Breakers/Fuse panel.
9	Key Start Switch	Right side of cab on switch panel.
10	Emergency Brake	Right side of cab on shift control panel.
11	Parking Brake	Right side of cab on shift control panel.
12	Windshield Washer Switch	Switch panel.
13	Windshield Wiper Switch	Switch panel.
14	Dimmer Switch	Lower left on cab floor.
15	Fuel Pump Switch	Switch panel.

COMPONENT LOCATIONS - CONTINUED

Figure 3. Location of Electrical Components.



390-1147

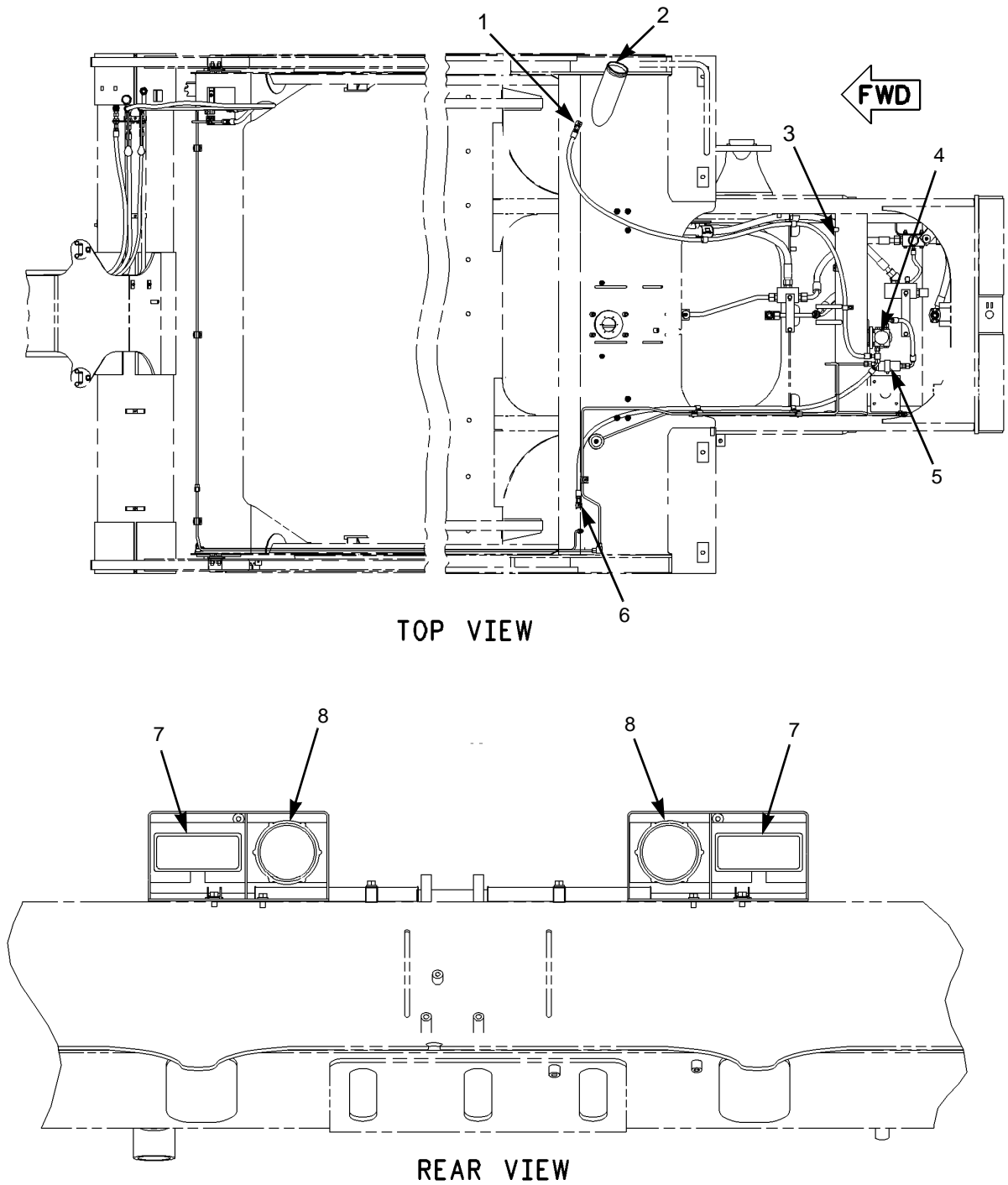
## TROUBLESHOOTING INTRODUCTION - CONTINUED

0010 00

KEY	COMPONENT	LOCATION
1	Alternator Circuit Breaker (60 amp)	Circuit Breaker/Fuse panel.
2	Key Start Switch Circuit Breaker (10 amp)	Circuit Breaker/Fuse panel.
3	Turn Lamp Circuit Breaker (20 amp)	Circuit Breaker/Fuse panel.
4	Blackout and Headlamp Circuit Breakers (15 amp)	Circuit Breaker/Fuse panel.
5	Horn/Backup Alarm Fuse	Circuit Breaker/Fuse panel.
6	Fuel Pump Fuse	Circuit Breaker/Fuse panel.
7	Work Light Fuse	Circuit Breaker/Fuse panel.
8	Windshield Wiper Motor Fuse	Circuit Breaker/Fuse panel.
9	Gages and EMS Fuse	Circuit Breaker/Fuse panel.
10	Water Wagon Fuse	Circuit Breaker/Fuse panel.
11	Ejector Lever Fuse	Circuit Breaker/Fuse panel.
12	High Beam Lamp	Front left and right of machine.
13	Headlamp	Front left and right of machine.
14	Parking Light	Front left and right of machine.
15	Blackout Drive Marker Light	Front left and right of machine.

COMPONENT LOCATIONS - CONTINUED

Figure 4. Location of Electrical Mechanical Components.



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TROUBLESHOOTING INTRODUCTION - CONTINUED

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0010 00

KEY	COMPONENT	LOCATION
1	Fuel Shutoff Valve	Right rear of machine.
2	Fuel Tank Dipstick	Right rear of machine in fuel tank inlet.
3	Backup Alarm	Right rear of machine below BII box.
4	Fuel/Water Separator	Left rear of machine under access door.
5	Fuel Pump	Left rear of machine under access door.
6	Fuel Shutoff Valve	Left rear of machine.
7	Composite Lights	Left and right rear of machine.
8	Blackout Drive/Blackout Markers	Left and right rear of machine.

END OF WORK PACKAGE

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**TROUBLESHOOTING SYMPTOM INDEX****0011 00****Malfunction/Symptom****Troubleshooting Procedure Page****Air System and Brakes**

Brake Air Pressure Low Alert Indicator, Action Light, and Action Alarm Come on During Operation . . . . 0012 00-1

Parking Brake:

Alert Indicator Does Not Come on When Parking Brake is Engaged . . . . . 0012 00-1

Parking/Emergency Brake:

Will Not Engage . . . . . 0012 00-2

Will Not Release . . . . . 0012 00-2

Service Brakes:

Do Not Operate Correctly . . . . . 0012 00-2

Do Not Release Correctly . . . . . 0012 00-3

**Charging System**

Alternator Alert Indicator Comes On . . . . . 0012 00-3

**Cooling System**

Coolant Temperature Alert Indicator is On and Action Light Flashes,

Indicating Engine is Overheating . . . . . 0012 00-4

**Differential Lock Control**

Differential Lock Control:

Will Not Engage When Pedal is Pressed . . . . . 0012 00-5

Will Not Disengage When Pedal is Released . . . . . 0012 00-6

**Electrical System**

Backup Alarm Will Not Sound When Machine is Placed in Reverse . . . . . 0012 00-6

Blackout Drive:

Light Will Not Operate When B.O. DRIVE Function is Selected . . . . . 0012 00-7

Marker Light(s) Do Not Operate When B.O. MARKER Function is Selected . . . . . 0012 00-7

Cutting Edge/Bowl Work Lights Inoperative . . . . . 0012 00-7

Directional Turn Signal or Hazard Flasher Control are Not Working . . . . . 0012 00-7

EMS:

Action Alarm Does Not Sound After Engine Startup . . . . . 0012 00-8

Alert Indicators and Action Light Do Not Come on When Panel Test Switch is Placed to ON . . . . . 0012 00-8

Horn Will Not Sound When Button is Pressed . . . . . 0012 00-8

Headlight(s)/Parking Light(s) Do Not Operate When SER. DRIVE or PARK Functions are Selected . . . . . 0012 00-9

High Beams Do Not Come On . . . . . 0012 00-9

Stoplights Do Not Operate When Brake Pedal is Pressed . . . . . 0012 00-9

Taillights Do Not Come On . . . . . 0012 00-10

Windshield:

Washer Not Working . . . . . 0012 00-10

Wiper Not Working . . . . . 0012 00-10

**Engine**

Engine Cranks But Fails to Start:

Operating Temperature Above 32°F (0°C) . . . . . 0012 00-11

Operating Temperature Below 32°F (0°C) . . . . . 0012 00-11

Engine:

Does Not Develop Full Power . . . . . 0012 00-12

**TROUBLESHOOTING SYMPTOM INDEX - CONTINUED****0011 00****Malfunction/Symptom****Troubleshooting Procedure Page****Engine - Continued**

Does Not Idle Properly . . . . .	0012 00-13
Fails to Crank When Key Start Switch is Turned to Start. . . . .	0012 00-13
Starts But Dies . . . . .	0012 00-13
Starts But Misfires or Runs Rough After Warmup Period . . . . .	0012 00-13
Excessive:	
Engine Oil Consumption . . . . .	0012 00-13
Exhaust Smoke (At Normal Operating Speed) . . . . .	0012 00-13
Exhaust Smoke (White) During Startup . . . . .	0012 00-14
Low or No Engine Oil Pressure Alert Indicator, Action Light and Action Alarm are On . . . . .	0012 00-14

**Scraper System**

Bowl Control Lever Binds . . . . .	0012 00-14
Ejector Control Lever Binds . . . . .	0012 00-14
Elevator Control Lever Binds . . . . .	0012 00-15
Elevator Operating Speeds are Too Slow . . . . .	0012 00-15
Bowl Drifts After Control Lever is Released or Centered . . . . .	0012 00-15
Floor Opens During Operation . . . . .	0012 00-16
Travel Time is Slow:	
Bowl Lift Cylinders . . . . .	0012 00-16
Ejector (Floor) . . . . .	0012 00-16

**Steering****Machine:**

Steering Slow or Intermittent to Respond . . . . .	0012 00-17
Turns Correctly Under Normal Driving Conditions, But Turns Slowly With a Load . . . . .	0012 00-17
Turns Slowly in Both Directions . . . . .	0012 00-17
Turns Slowly in One Direction . . . . .	0012 00-17
Slowly Drifts (Either Direction), Wanders or Pulls to One Side on Level Pavement, Even When Steering Wheel is in Straight Position. . . . .	0012 00-17
Oil Temperature is Too Hot. . . . .	0012 00-17
Steering is Erratic . . . . .	0012 00-18
Turning Steering Wheel is Difficult . . . . .	0012 00-18

**Transmission**

Machine Moves When Shift Lever is in Neutral (N) . . . . .	0012 00-18
Slow or Erratic Transmission Engagement . . . . .	0012 00-18
Torque Converter Oil Temperature Alert Indicator and Action Light Come On (Indicates Overheating During Normal Operation) . . . . .	0012 00-18
Transmission:	
Does Not Operate in Any Speed . . . . .	0012 00-19
Does Not Shift From One Direction to Another . . . . .	0012 00-19
Does Not Shift From One Speed to Another . . . . .	0012 00-19
Engages, but Machine Does Not Move. Engine Stops Running. . . . .	0012 00-19
Shifting is Rough. . . . .	0012 00-19



**TROUBLESHOOTING SYMPTOM INDEX - CONTINUED****0011 00****Malfunction/Symptom****Troubleshooting Procedure Page****C-130 Aircraft Transport**

Bowl Operation is Erratic, After Installation of Load Transfer Relief Valve and Hose Assembly . . . . .	0012 00-20
Bowl Operation is Erratic, After Removal of Load Transfer Relief Valve and Hose Assembly . . . . .	0012 00-20
Poor Steering (After Machine Assembly) . . . . .	0012 00-20
Windshield Wiper Motor Inoperative (After Machine Assembly) . . . . .	0012 00-20
Windshield Washer Inoperative (After Machine Assembly) . . . . .	0012 00-20
Windshield Wiper Motor Operates But Wiper Arm Assembly Will Not Move (After Machine Assembly) . . . . .	0012 00-20

**CH-47 Helicopter Transport**

Backup Alarm Inoperative (After Machine Assembly) . . . . .	0012 00-21
Bowl Operation is Erratic, After Reconnection of Lift Cylinders . . . . .	0012 00-21
Engine Cranks But Fails to Start (After Machine Assembly) . . . . .	0012 00-21
Engine Cranks But Fails to Start, When Connected to Auxiliary Fuel Tank . . . . .	0012 00-21
Engine Starts But Stops Running, When Connected to Auxiliary Fuel Tank . . . . .	0012 00-21
Poor and/or No Braking (After Machine Assembly) . . . . .	0012 00-22
Poor Steering (After Machine Assembly) . . . . .	0012 00-22
Rear Blackout Drive Light Does Not Operate (After Machine Assembly) . . . . .	0012 00-22
Rear Blackout Drive Marker Light Does Not Operate (After Machine Assembly) . . . . .	0012 00-22
Skid Steering Control Inoperative . . . . .	0012 00-22
Stoplights Do Not Operate (After Machine Assembly) . . . . .	0012 00-22
Taillights Do Not Come On (After Machine Assembly) . . . . .	0012 00-22
Windshield Wiper Motor Inoperative (After Machine Assembly) . . . . .	0012 00-22
Windshield Washer Inoperative (After Machine Assembly) . . . . .	0012 00-23
Windshield Wiper Motor Operates But Wiper Arm Will Not Move (After Machine Assembly) . . . . .	0012 00-23

**END OF WORK PACKAGE**

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Table 1. Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>AIR SYSTEM AND BRAKES</b>		
<b>1. Brake Air Pressure Low Alert Indicator, Action Light, and Action Alarm Come On During Operation.</b>		
<b>WARNING</b>		
When action alarm sounds, bring machine to a safe stop to prevent injury to operator and/or severe damage to machine.		
	1. Ensure that air tank drain valve(s) are closed.  2. Check for air/hydraulic oil leaks at air tanks, hoses, fittings, and tractor/scrapper connections at hitch area.	1. Close drain valve(s) if required. If problem still exists, go to test step 2.  2. If any leaks are present, or if no leaks are found and problem still exists, notify Unit Maintenance.
<b>WARNING</b>		
Park machine on level ground, stop engine, and lower bowl to prevent injury to operator and/or severe damage to machine.		
<b>2. Parking Brake Alert Indicator Does Not Come On When Parking Brake is Engaged.</b>	1. Place panel test switch to on (up) and check if alert indicator light comes on. Release switch.  2. Check for debris/obstruction at parking brake actuator.  3. With assistance, engage then release parking brake and observe parking brake arm for movement.  4. Perform parking brake test (WP 0014 00).	1. If problem still exists, go to test step 2.  2. Clean debris/obstruction from parking brake actuator. If problem still exists, go to test step 3.  3. If parking brake arm moves and problem still exists, go to test step 4.  4. If brake is engaged and indicator light is still not on, notify Unit Maintenance.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>AIR SYSTEM AND BRAKES - CONTINUED</b>		
<b>WARNING</b>		
Park machine on level ground, stop engine, and lower bowl to prevent injury to operator and/or severe damage to machine.		
<b>3. Parking/Emergency Brake Will Not Engage.</b>		
<b>NOTE</b>		
Parking/emergency brake will automatically engage if air pressure falls below 40 psi (276 kPa)		
	<ol style="list-style-type: none"> <li>1. Check for debris/obstruction at parking brake actuator.</li> <li>2. Slowly try to move machine forward to test if brake is engaged.</li> <li>3. Perform parking brake test (WP 0014 00).</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean debris/obstruction from parking brake actuator. If problem still exists, go to test step 2.</li> <li>2. If problem still exists, go to test step 3.</li> <li>3. If problem still exists, notify Unit Maintenance.</li> </ol>
<b>4. Parking/Emergency Brake Will Not Release.</b>	<ol style="list-style-type: none"> <li>1. Observe air pressure gage. Air pressure must be above 55 psi (379 kPa) in order to release parking brake.</li> <li>2. Slowly try to move machine forward to test if brake is released.</li> <li>3. Perform parking brake test (WP 0014 00).</li> </ol>	<ol style="list-style-type: none"> <li>1. If air pressure is not above 55 psi (379 kPa), check and close air tank drain valve(s) if required. If problem still exists, go to test step 2.</li> <li>2. If problem still exists, go to test step 3.</li> <li>3. If problem still exists, notify Unit Maintenance.</li> </ol>
<b>WARNING</b>		
Park machine on level ground, stop engine, and lower bowl to prevent injury to operator and/or severe damage to machine.		
<b>5. Service Brakes Do Not Operate Correctly.</b>	<ol style="list-style-type: none"> <li>1. Check for mud or dirt under brake pedal.</li> <li>2. Check air/hydraulic hoses for loose connections.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean mud or dirt from under brake pedal. If problem still exists, go to test step 2.</li> <li>2. Tighten air/hydraulic hoses, if required. If problem still exists, go to test step 3.</li> </ol>

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>AIR SYSTEM AND BRAKES - CONTINUED</b>		
<b>5. Service Brakes Do Not Operate Correctly - Continued.</b>	3. Check for air/hydraulic oil leaks or damage to brake system components.	3. If problem still exists, notify Unit Maintenance.
<p align="center"><b>WARNING</b></p> <p>Park machine on level ground, stop engine, and lower bowl to prevent injury to operator and/or severe damage to machine.</p>		
<b>6. Service Brakes Do Not Release Correctly.</b>	1. Check for mud or dirt under brake pedal  2. Check air/hydraulic hoses for loose connections.  3. Check for air/hydraulic oil leaks or damage to brake system components.	1. Clean mud or dirt from under brake pedal. If problem still exists, go to test step 2.  2. Connect air/hydraulic hoses if required. If problem still exists, go to test step 3.  3. If problem still exists, notify Unit Maintenance.
<b>CHARGING SYSTEM</b>		
<b>1. Alternator Alert Indicator Comes On.</b>		
<p align="center"><b>NOTE</b></p> <p>A thirty (30) minute cool down time may be required before circuit breaker can be reset.</p>		
	1. Check that circuit breaker at fuse/circuit breaker panel in cab is not tripped.  2. Check for loose or broken drive belt.	1. Reset circuit breaker. If problem still exists, go to test step 2.  2. If loose or broken drive belt is found, or if drive belt is okay and problem still exists, notify Unit Maintenance.

Table 1. Troubleshooting Procedures - Continued.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p style="text-align: center;"><b>COOLING SYSTEM</b></p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;"> <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Failure to follow this warning may cause serious burns.</li> <li>• Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.</li> </ul> </div>  </div>		
<p><b>1. Coolant Temperature Alert Indicator is On and Action Light Flashes, Indicating Engine is Overheating.</b></p>	<ol style="list-style-type: none"> <li>1. Check coolant temperature gage for an indication above 225°F (107°C).</li> <li>2. Allow engine to idle at 825 RPM to cool down.</li> <li>3. Check system for leaks.</li> <li>4. Check coolant level.</li> <li>5. Check water pump and fan drive belts for looseness and/or damage.</li> <li>6. Check engine oil level.</li> <li>7. Check transmission oil level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce load and continue to monitor temperature. If indication is still above 225°F (107°C), go to test step 2.</li> <li>2. If problem still exists, go to test step 3.</li> <li>3. If leaks are found, notify Unit Maintenance. If no leaks are found, go to test step 4.</li> <li>4. If low, add coolant (WP 0014 00). If coolant level is okay, go to test step 5.</li> <li>5. If water pump and fan drive belts are loose and/or damaged, notify Unit Maintenance. If belts are okay, go to test step 6.</li> <li>6. If engine oil is low, fill to correct level (WP 0014 00). If problem still exists, go to test step 7.</li> <li>7. If transmission oil level is low, fill to correct level (WP 0014 00) If level is okay and problem still exists, notify Unit Maintenance.</li> </ol>

Table 1. Troubleshooting Procedures - Continued.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>DIFFERENTIAL LOCK CONTROL</b>		
<b>1. Differential Lock Control Will Not Engage When Pedal is Pressed.</b>	1. Observe air pressure gage for an indication of 125 psi (862 kPa).	1. If air pressure indication is okay, go to test step 2. If air pressure indicator is not okay, notify Unit Maintenance to perform Air System troubleshooting.
<p align="center"><b>WARNING</b></p> <p>Park machine on level ground, stop engine, and lower bowl to prevent injury to operator and/or severe damage to machine.</p>		
	2. Check for mud or other debris under pedal.  3. Perform differential lock operation check as follows:	2. Clean mud or debris from pedal area. If problem still exists, go to test step 3.  3. If problem still exists, or if no resistance was observed during test step f, notify Unit Maintenance.
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p><b>WARNING</b></p> <p>If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.</p> </div> </div>		
	a. Start engine and allow air pressure to reach cut-out pressure of 125 psi (860 kPa)  b. Lift empty bowl.  c. Apply parking brake.  d. With engine at low idle speed, use steering wheel to turn machine to left and right while slowly moving forward.  e. With tractor and scraper in a straight position, push and hold differential lock pedal down.	

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b><i>DIFFERENTIAL LOCK CONTROL - CONTINUED</i></b>		
2. <b>Differential Lock Control Will Not Disengage When Pedal is Released.</b>	<p>f. Repeat step d. Machine should resist turning when differential lock is engaged.</p> <p>g. Release differential lock pedal.</p> <p>1. Turn machine slightly while decreasing engine RPM as an aid in unlocking differential lock control.</p> <p>2. Perform differential lock operation check as follows:</p>	<p>1. If problem still exists, go to test step 2.</p> <p>2. If problem still exists, or if resistance was observed during test step e, notify Unit Maintenance.</p>
<div> </div> <div> <h3>WARNING</h3> </div> <div> <p>If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.</p> </div>		
	<p>a. Start engine and allow air pressure to reach cut-out pressure of 125 psi (860 kPa)</p> <p>b. Lift empty bowl.</p> <p>c. Apply parking brake.</p> <p>d. With tractor and scraper in a straight position, slowly move machine while tapping differential lock pedal.</p> <p>e. Machine should not resist turning when differential lock is released.</p> <p>f. Release differential lock pedal.</p>	



Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ELECTRICAL SYSTEM</b>		
1. Backup Alarm Will Not Sound When Machine is Placed in Reverse.	1. Ensure STOP LIGHT or SER. DRIVE function has been selected on military light switch.  2. Check for blown fuse at fuse/circuit breaker panel in cab.  3. Check electrical connection at alarm, located at rear of scraper inside rear compartment.	1. Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.  2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, go to test step 3.  3. Connect electrical connector, if required. If problem still exists, notify Unit Maintenance.
2. Blackout Drive Light Will Not Operate When B.O. DRIVE Function is Selected.		
<b>NOTE</b>  A thirty (30) minute cool down time may be required before circuit breaker automatically resets.		
	Check that circuit breaker is not tripped at fuse/circuit breaker panel in cab.	If circuit breaker does not automatically reset, notify Unit Maintenance.
<b>NOTE</b>  A thirty (30) minute cool down time may be required before circuit breaker automatically resets.		
3. Blackout Drive Marker Light(s) Do Not Operate When B.O. MARKER Function is Selected.	Check that circuit breaker is not tripped at fuse/circuit breaker panel in cab.	If circuit breaker does not automatically reset, notify Unit Maintenance.
4. Cutting Edge/Bowl Work Lights Inoperative.	1. Ensure STOP LIGHT or SER. DRIVE function has been selected on military light switch.  2. Check for blown fuse at fuse/circuit breaker panel in cab.	1. Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.  2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, go to test step 3.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ELECTRICAL SYSTEM - CONTINUED</b>		
5. Directional Turn Signal or Hazard Flasher Control are Not Working.	3. Check lights for separated connections/damage.  1. Ensure STOP LIGHT or SER. DRIVE function has been selected on military light switch.  2. Check lights for separated connections/damage.	3. Reconnect connectors, if required. If any damage to lights is found, notify Unit Maintenance.  1. Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.  2. Reconnect connectors, if required. If any damage to lights is found, notify Unit Maintenance. If connectors and lights are okay, go to test step 3.
5. Directional Turn Signal or Hazard Flasher Control are Not Working - Continued.		
<b>NOTE</b> A thirty (30) minute cool down time may be required before circuit breaker can be reset.		
6. EMS Action Alarm Does Not Sound After Engine Startup.	3. Check that circuit breaker is not tripped at fuse/circuit breaker panel in cab.	3. Reset circuit breaker. If problem still exists, notify Unit Maintenance.
<b>NOTE</b> It is normal for the action alarm and action light to come on and stay on until air pressure of approximately 65 psi (450 kPa) is reached. If the alarm does not come on, shut engine down.		
7. EMS Alert Indicators and Action Light Do Not Come On When Panel Test Switch is Placed to ON.	Check for blown fuses at fuse/circuit breaker panel in cab.  1. Check that battery disconnect and engine start switches are ON.  2. Check for blown fuse at fuse/circuit breaker panel in cab.	If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, notify Unit Maintenance.  1. If switches are ON and problem still exists, go to test step 2.  2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, notify Unit Maintenance.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ELECTRICAL SYSTEM - CONTINUED</b>		
<b>8. Horn Will Not Sound When Button is Pressed.</b>	1. Ensure STOP LIGHT or SER. DRIVE function has been selected on military light switch.  2. Check for blown fuse at fuse/circuit breaker panel in cab.  3. Check air pressure gage for an indication of 125 psi (862 kPa).	1. Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.  2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, and problem still exists, go to test step 3.  3. If air pressure is less than 125 psi (862 kPa), ensure air tank drain valve(s) are closed. If problem still exists, notify Unit Maintenance.
<b>9. Headlight(s)/Parking Light(s) Do Not Operate When SER. DRIVE or PARK Functions are Selected.</b>		
<b>NOTE</b> A thirty (30) minute cool down time may be required before circuit breaker automatically resets.		
<b>10. High Beams Do Not Come On.</b>	Check that circuit breaker is not tripped at fuse/circuit breaker panel in cab.  1. Ensure STOP LIGHT or SER. DRIVE function has been selected on military light switch.	If circuit breaker does not automatically reset, notify Unit Maintenance.  1. Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.
<b>WARNING</b> Park machine on level ground, stop engine, and lower bowl to prevent injury to operator and/or severe damage to machine.		
	2. Check for mud and dirt around high beam switch.	2. Clean mud or dirt from high beam switch. If problem still exists, go to test step 3.
<b>NOTE</b> A thirty (30) minute cool down time may be required before circuit breaker automatically resets.		
	3. Check that circuit breaker is not tripped.	3. If circuit breaker does not automatically reset, notify Unit Maintenance.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ELECTRICAL SYSTEM - CONTINUED</b>		
<b>11. Stoplights Do Not Operate When Brake Pedal is Pressed.</b>	<ol style="list-style-type: none"> <li>1. Ensure STOP LIGHT or SER. DRIVE function has been selected on military light switch.</li> <li>2. Check lights for separated connections/damage.</li> </ol>	<ol style="list-style-type: none"> <li>1. Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.</li> <li>2. Reconnect connectors, if required. If any damage to lights is found, notify Unit Maintenance. If problem still exists, go to test step 3.</li> </ol>
<p style="text-align: center;"><b>NOTE</b></p> <p>A thirty (30) minute cool down time may be required before circuit breaker automatically resets.</p>		
<b>12. Taillights Do Not Come On.</b>	<ol style="list-style-type: none"> <li>3. Check that circuit breaker is not tripped.</li> <li>1. Ensure STOP LIGHT or SER. DRIVE function has been selected on military light switch.</li> <li>2. Check electrical connections at hitch area.</li> </ol>	<ol style="list-style-type: none"> <li>3. If circuit breaker does not automatically reset, notify Unit Maintenance.</li> <li>1. Select STOP LIGHT or SER. DRIVE. If problem still exists, go to test step 2.</li> <li>2. Reconnect connectors, if required. If problem still exists, go to test step 3.</li> </ol>
<p style="text-align: center;"><b>NOTE</b></p> <p>A thirty (30) minute cool down time may be required before circuit breaker automatically resets.</p>		
<b>13. Windshield Washer Not Working.</b>	<ol style="list-style-type: none"> <li>3. Check that circuit breaker is not tripped.</li> <li>1. Check fluid reservoir.</li> <li>2. Check for blown fuse at fuse/circuit breaker panel in cab.</li> </ol>	<ol style="list-style-type: none"> <li>3. If circuit breaker does not automatically reset, notify Unit Maintenance.</li> <li>1. If reservoir is empty, fill reservoir (WP 0014 00). If problem still exists, go to test step 2.</li> <li>2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good and problem still exists, go to test step 3.</li> </ol>



## TROUBLESHOOTING PROCEDURES - CONTINUED

0012 00

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b><i>ELECTRICAL SYSTEM - CONTINUED</i></b>		
<b>14. Windshield Wiper Not Working.</b>	3. Check for loose electrical connectors.	3. Reconnect electrical connectors if required. If problem still exists, notify Unit Maintenance.
	1. Check for blown fuse at fuse/circuit breaker panel in cab.	1. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, and problem still exists, go to test step 2.
	2. Check for loose electrical connectors.	2. Reconnect electrical connectors if required. If problem still exists, notify Unit Maintenance.
<b><i>ENGINE</i></b>		
<b>1. Engine Cranks But Fails to Start (Operating Temperature Above 32°F (0°C)).</b>	1. Check fuel tank gage with key start switch on.	1. If indication is empty, add fuel (WP 0014 00). Notify Unit Maintenance if gage is inoperative. Go to test step 2 if gage is okay.
	2. Check for blown fuel pump fuse at fuse/circuit breaker panel in cab.	2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, go to test step 3.
	3. Check that fuel shutoff valve(s) located on fuel tank are fully OPEN.	3. Open fuel shutoff valve(s) as required. If problem still exists, go to test step 4.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ENGINE - CONTINUED</b>		
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 10px;"> <p><b>WARNING</b></p> <p>If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.</p> </div> </div>		
<b>2. Engine Cranks But Fails to Start (Operating Temperature Below 32°F (0°C)).</b>	4. Place air intake preheat switch ON and start engine (WP 0005 00).	4. If problem still exists after thirty (30) seconds with switch ON, notify Unit Maintenance.
	1. Check fuel tank gage with key start switch on.  2. Check for blown fuel pump fuse at fuse/circuit breaker panel in cab.  3. Check that fuel shutoff valve(s) located on fuel tank are fully OPEN.	1. If indication is empty, add fuel (WP 0014 00). Notify Unit Maintenance if gage is inoperative. If gage is okay, go to test step 2.  2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, and problem still exists, go to test step 3.  3. Open fuel shutoff valve(s) as required. If problem still exists, notify Unit Maintenance.
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 10px;"> <p><b>WARNING</b></p> <p>If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.</p> </div> </div>		
<p style="text-align: center;"><b>NOTE</b></p> <p>For every 30 seconds of engine cranking, allow two (2) minutes for starter motor to cool down.</p>		
<b>3. Engine Does Not Develop Full Power.</b>	4. While cranking engine, press top of ether start aid switch. Wait approximately two (2) seconds between injections.	4. If engine still will not start, notify Unit Maintenance.
	Check air filter service indicator.	If indicator is red, clean air filter (WP 0015 00) and retest. If problem still exists, notify Unit Maintenance.

## TROUBLESHOOTING PROCEDURES - CONTINUED

0012 00

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ENGINE - CONTINUED</b>		
<b>4. Engine Does Not Idle Properly.</b>	Check air filter service indicator.	If indicator is red, clean air filter (WP 0015 00) and retest. If problem still exists, notify Unit Maintenance.
<b>5. Engine Fails to Crank When Key Start Switch is Turned to Start.</b>	1. Check position of battery disconnect switch.	1. Place battery disconnect switch to ON. If problem still exists, go to test step 2.
	2. Check position of transmission shift lever.	2. Place transmission shift lever in N (Neutral). If problem still exists, go to test step 3.
<p style="text-align: center;"><b>NOTE</b></p> <p>A thirty (30) minute cool down time may be required before circuit breaker can be reset.</p>		
<b>6. Engine Starts But Dies.</b>	3. Check that key start switch circuit breaker is not tripped.	3. Reset circuit breaker. If problem still exists, go to test step 4.
	4. Check for dirty, loose or damaged battery cables.	4. Clean dirty cables. Tighten loose connections. If cable is damaged, notify Unit Maintenance.
<b>7. Engine Starts But Misfires or Runs Rough After Warmup Period.</b>	Check for loose electrical connections at engine shutoff solenoid.	If connections are okay, notify Unit Maintenance.
<b>8. Excessive Engine Oil Consumption.</b>	Check fuel/water separator for moisture.	Open fuel/water separator drain valve and drain (WP 0014 00). If problem still exists, notify Unit Maintenance.
<b>9. Excessive Exhaust Smoke (At Normal Operating Speed).</b>	Check for loose oil lines and oil leaks.	If oil lines are loose or leaks are found, notify Unit Maintenance.
	1. Check air filter service indicator.	1. If indicator is red, clean air filter (WP 0015 00) and retest. If problem still exists, go to test step 2.
	2. Check for water in fuel.	2. Drain fuel/water separator (WP 0014 00). If problem still exists, notify Unit Maintenance.

## TROUBLESHOOTING PROCEDURES - CONTINUED

0012 00

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ENGINE - CONTINUED</b>		
<b>10. Excessive Exhaust Smoke (White) During Startup.</b>	1. Check and monitor engine operating temperature.  2. Operate air intake heater (WP 0005 00).	1. Allow engine to warm up to operating temperature. If problem still exists, go to test step 2.  2. If problem still exists, notify Unit Maintenance.
<b>11. Low or No Engine Oil Pressure Alert Indicator, Action Light, and Action Alarm are On.</b>	<p style="text-align: center;"><b>CAUTION</b></p> <p>When action alarm sounds, immediate shutdown of machine is required to prevent damage to machine.</p>	
	Check engine oil level.	If engine oil is low, fill to correct level (WP 0014 00). If problem still exists, notify Unit Maintenance.
<b>SCRAPER SYSTEM</b>		
<b>1. Bowl Control Lever Binds.</b>	1. Check for bent or damaged lever.  2. Check bowl/ejector main control valve, located inboard of right tractor fender, for buildup of debris.  3. Check control lever for damage or debris that would restrict freedom of movement, and/or automatic return to hold position.	1. If lever is bent or damaged, notify Unit Maintenance. If lever is okay, go to test step 2.  2. Clean debris from control valve linkage. If problem still exists, go to test step 3.  3. Clean any debris from lever. If any damage is found, notify Unit Maintenance.
<b>2. Ejector Control Lever Binds.</b>	1. Check for bent or damaged lever.  2. Check bowl/ejector main control valve, located inboard of right tractor fender, for buildup of debris.	1. If lever is bent or damaged, notify Unit Maintenance. If lever is okay, go to test step 2.  2. Clean debris from control valve linkage. If problem still exists, go to test step 3.



Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>SCRAPER SYSTEM - CONTINUED</b>		
<b>3. Elevator Control Lever Binds.</b>	<ol style="list-style-type: none"> <li>3. Check control lever for damage or debris that would restrict freedom of movement, and/or automatic return to hold position.</li> <li>1. Check for bent or damaged lever.</li> <li>2. Check elevator main control valve, located inboard of left tractor fender, for buildup of debris.</li> <li>3. Check control lever for damage or debris that would restrict freedom of movement, and/or automatic return to hold position.</li> </ol>	<ol style="list-style-type: none"> <li>3. Clean any debris from lever. If any damage is found, notify Unit Maintenance.</li> <li>1. If lever is bent or damaged, notify Unit Maintenance. If lever is okay, go to test step 2.</li> <li>2. Clean debris from control valve linkage. If problem still exists, go to test step 3.</li> <li>3. Clean any debris from lever. If any damage is found, notify Unit Maintenance.</li> </ol>
<b>4. Elevator Operating Speeds are Too Slow.</b>	<ol style="list-style-type: none"> <li>1. Check elevator chains for buildup of debris.</li> <li>2. Check hydraulic oil level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean any debris from elevator chains. If problem still exists, go to test step 2.</li> <li>2. If hydraulic oil level is low, fill to correct level (WP 0014 00). If problem still exists, notify Unit Maintenance.</li> </ol>
<b>5. Bowl Drifts After Control Lever is Released or Centered.</b>	<ol style="list-style-type: none"> <li>1. Check bowl hydraulic lift cylinders for damage.</li> <li>2. Check control lever for damage or debris that would restrict freedom of movement and/or automatic return to hold position.</li> </ol>	<ol style="list-style-type: none"> <li>1. If any damage is found, notify Unit Maintenance. If no damage is found, and problem still exists, go to test step 2.</li> <li>2. Clean any debris. If any damage is found, notify Unit Maintenance.</li> </ol>

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>SCRAPER SYSTEM - CONTINUED</b>		
<b>6. Floor Opens During Operation.</b>	<ol style="list-style-type: none"> <li>1. Check floor area for any buildup of debris that would stop floor from closing. If floor is not closing properly, it may cause floor to open prematurely.</li> <li>2. Check that control levers are in hold position.</li> <li>3. Check control lever for damage or debris that would restrict freedom of movement, and/or automatic return to hold position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean any debris from floor area. If problem still exists, go to test step 2.</li> <li>2. Place control levers in hold position if required. If problem still exists, go to test step 3.</li> <li>3. Clean any debris from lever. If any damage is found, notify Unit Maintenance.</li> </ol>
<b>7. Travel Time of Bowl Lift Cylinders is Slow.</b>	<ol style="list-style-type: none"> <li>1. Check bowl hydraulic lift cylinders for any buildup of debris.</li> <li>2. Check hydraulic oil level.</li> <li>3. Check control lever for damage or debris that would restrict freedom of movement, and/or automatic return to hold position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean any debris from cylinder(s). If problem still exists, go to test step 2.</li> <li>2. If hydraulic oil level is low, fill to correct level (WP 0014 00). If problem still exists, go to test step 3.</li> <li>3. Clean any debris from lever. If any damage is found, notify Unit Maintenance.</li> </ol>
<b>8. Travel Time of Ejector (Floor) is Slow.</b>	<ol style="list-style-type: none"> <li>1. Check ejector area for any buildup of debris.</li> <li>2. Check hydraulic oil level.</li> <li>3. Check control lever for damage or debris that would restrict freedom of movement, and/or automatic return to hold position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean any debris from ejector area. If problem still exists, go to test step 2.</li> <li>2. If hydraulic oil level is low, fill to correct level (WP 0014 00). If problem still exists, go to test step 3.</li> <li>3. Clean any debris from lever. If any damage is found, notify Unit Maintenance.</li> </ol>

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>STEERING</b>		
<b>WARNING</b>		
Hitch and steering movement can reduce clearances suddenly and cause injury to personnel. Stop engine before servicing.		
<b>1. Machine Steering Slow or Intermittent to Respond.</b>	Check hydraulic oil level.	If oil level is low, fill to correct level (WP 0014 00). If oil level is okay, notify Unit Maintenance.
<b>2. Machine Turns Correctly During Normal Driving Conditions, But Turns Slowly With a Load.</b>	1. Check steering system for oil leaks.	1. If any oil leaks are found, notify Unit Maintenance. If no leaks are found, go to test step 2.
	2. Check hydraulic oil level.	2. If hydraulic oil level is low, fill to correct level (WP 0014 00). If problem still exists, notify Unit Maintenance.
<b>3. Machine Turns Slowly in Both Directions.</b>	Check hydraulic oil level.	If oil level is low, fill to correct level (WP 0014 00). If oil level is okay, notify Unit Maintenance.
<b>4. Machine Turns Slowly in One Direction.</b>	1. Check oil leaks at steering cylinders.	1. If any oil leaks are found, notify Unit Maintenance.
	2. Check hydraulic oil level.	2. If hydraulic oil level is low, fill to correct level (WP 0014 00). If problem still exists, notify Unit Maintenance.
<b>5. Machine Slowly Drifts (Either Direction), Wanders or Pulls to One Side on Level Pavement, Even When Steering Wheel is in Straight Position.</b>	1. Check tires for proper pressure.	1. Inflate tires to proper pressure (WP 0014 00). If problem still exists, go to test step 2.
	2. Possible linkage or hydraulic component malfunction.	2. Notify Unit Maintenance.
<b>6. Oil Temperature is Too Hot.</b>	Check hydraulic oil level.	If hydraulic oil level is low, fill to correct level (WP 0014 00). If problem still exists, notify Unit Maintenance.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>STEERING - CONTINUED</b>		
7. <b>Steering is Erratic.</b>	1. Check hydraulic oil level.	1. If oil level is low, fill to correct level (WP 0014 00). If oil level is okay, go to test step 2.
	2. Check for air bubbles in hydraulic oil in reservoir.	2. If air bubbles are observed in hydraulic oil, notify Unit Maintenance.
8. <b>Turning Steering Wheel is Difficult.</b>	1. Oil is too cold.	1. If problem still exists after normal operating temperature is reached, go to test step 2.
	2. Check hydraulic oil level.	2. If oil level is low, fill to correct level (WP 0014 00). If oil level is okay, notify Unit Maintenance.
<b>TRANSMISSION</b>		
1. <b>Machine Moves When Shift Lever is in Neutral (N).</b>	Control linkage out of adjustment.	Notify Unit Maintenance.
2. <b>Slow or Erratic Transmission Engagement.</b>	Check transmission oil level.	If transmission oil is low, fill to correct level (WP 0014 00). If problem still exists, notify Unit Maintenance.
3. <b>Torque Converter Oil Temperature Alert Indicator and Action Light Come On (Indicates Overheating During Normal Operation).</b>	1. Observe torque converter oil temperature gage for an indication above 265°F (129°C).	1. If temperature exceeds 265°F (129°C), go to test step 2.
	2. Ensure proper transmission range is selected for machine operation.	2. Select proper transmission range. If proper range was used, go to test step 3.
	3. Reduce load and continue to monitor temperature.	3. If problem still exists, go to test step 4.
<b>NOTE</b>		
Before checking oil level, ensure that machine is parked on level ground, parking brake applied, transmission in N (Neutral) and locked, oil warm, engine at low idle, ejector moved fully forward, and scraper bowl lowered with slight downward pressure applied.		
	4. Check transmission oil level.	4. If transmission oil is low, fill to correct level (WP 0014 00). If level is okay, and problem still exists, notify Unit Maintenance.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>TRANSMISSION - CONTINUED</b>		
<b>4. Transmission Does Not Operate in Any Speed.</b>		
<p style="text-align: center;"><b>NOTE</b></p> <p>Before checking oil level, ensure that machine is parked on level ground, parking brake applied, transmission in N (Neutral) and locked, oil warm, engine at low idle, ejector moved fully forward, and scraper bowl lowered with slight downward pressure applied.</p>		
	Check transmission oil level.	If transmission oil is low, fill to correct level (WP 0014 00). If problem still exists, notify Unit Maintenance.
<b>5. Transmission Does Not Shift From One Direction to Another.</b>	<p>1. Check position of shift lever rack.</p> <p>2. Check transmission oil level.</p> <p>3. Control linkage out of adjustment.</p>	<p>1. Unlock lever if required. If problem still exists, go to test step 2.</p> <p>2. If transmission oil is low, fill to correct level (WP 0014 00). If problem still exists, go to test step 3.</p> <p>3. Notify Unit Maintenance.</p>
<b>6. Transmission Does Not Shift From One Speed to Another.</b>	<p>1. Check transmission oil level.</p> <p>2. Control linkage out of adjustment.</p>	<p>1. If transmission oil is low, fill to correct level (WP 0014 00). If problem still exists, go to test step 2.</p> <p>2. Notify Unit Maintenance.</p>
<b>7. Transmission Engages, But Machine Does Not Move. Engine Stops Running.</b>	There may be mechanical failure.	Notify Unit Maintenance.
<b>8. Transmission Shifting is Rough.</b>	Control linkage may be out of adjustment.	Notify Unit Maintenance.

## TROUBLESHOOTING PROCEDURES - CONTINUED

0012 00

Table 2. Transport Mode Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>C-130 AIRCRAFT TRANSPORT</b>		
<b>1. Bowl Operation is Erratic, After Installation of Load Transfer Relief Valve and Hose Assembly.</b>	Check if load transfer relief valve and hose assembly is properly installed (WP 0018 00).	If load transfer relief valve and hose assembly is properly installed and problem still exists, notify Unit Maintenance.
<b>2. Bowl Operation is Erratic, After Removal of Load Transfer Relief Valve and Hose Assembly.</b>	Check hydraulic hoses at draft frame for proper connections (WP 0018 00).	Reconnect hydraulic hoses if required. If problem still exists, refer to SCRAPER SYSTEM troubleshooting (WP 0011 00).
<b>3. Poor Steering (After Machine Assembly).</b>	Check that locking collars and hose wrappings are removed from steering cylinders.	Remove locking collars and hose wrappings from cylinders, if required. If problem still exists, refer to STEERING troubleshooting (WP 0011 00).
<b>4. Windshield Wiper Motor Inoperative (After Machine Assembly).</b>	<ol style="list-style-type: none"> <li>1. Check wiper motor electrical connectors for loose connections (WP 0018 00).</li> <li>2. Check for blown fuse.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reconnect electrical connectors if required. If problem still exists, go to test step 2.</li> <li>2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).</li> </ol>
<b>5. Windshield Washer Inoperative (After Machine Assembly).</b>	<ol style="list-style-type: none"> <li>1. Check that fluid hose is installed (WP 0018 00).</li> <li>2. Check fluid reservoir inside engine compartment.</li> <li>3. Check for blown fuse.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install fluid hose, if removed. If problem still exists, go to test step 2.</li> <li>2. If reservoir is empty, fill reservoir (WP 0014 00). If problem still exists, go to test step 3.</li> <li>3. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).</li> </ol>
<b>6. Windshield Wiper Motor Operates But Wiper Arm Will Not Move (After Machine Assembly).</b>	Check that pivot and drive shaft nuts are tight (WP 0018 00).	Tighten pivot and drive shaft nuts, if required. If problem still exists, notify Unit Maintenance.

Table 2. Transport Mode Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>CH-47 HELICOPTER TRANSPORT</b>		
<b>1. Backup Alarm Inoperative (After Machine Assembly).</b>	Check electrical connectors at draft arm for loose connection (WP 0017 00).	Reconnect electrical connectors, if required. If problem still exists, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).
<b>2. Bowl Operation is Erratic, After Reconnection of Lift Cylinders.</b>	Check hydraulic hoses at draft frame for loose connections (WP 0017 00).	Reconnect hydraulic hoses, if required. If problem still exists, refer to SCRAPER SYSTEM troubleshooting (WP 0011 00).
<b>3. Engine Cranks But Fails to Start (After Machine Assembly).</b>	<ol style="list-style-type: none"> <li>1. Check fuel level in tank.</li> <li>2. Check fuel hoses on right side of draft frame for secure connection or leaks (WP 0017 00).</li> </ol>	<p>Fill tank to proper level, if required. If problem still exists, go to test step 2.</p> <ol style="list-style-type: none"> <li>(a) Reconnect hoses, if required. If problem still exists, go to step b.</li> <li>(b) Use electrical prime pump to prime fuel system. If problem still exists, go to step c.</li> <li>(c) Refer to ENGINE troubleshooting (WP 0011 00).</li> </ol>
<b>4. Engine Cranks But Fails to Start, When Connected to Auxiliary Fuel Tank.</b>	<ol style="list-style-type: none"> <li>1. Check fuel level in auxiliary fuel tank.</li> <li>2. Check fuel jumper hose assembly for secure connection or leaks (WP 0017 00).</li> <li>3. Check hose assembly between auxiliary fuel tank and bulkhead quick disconnect coupler for secure connection or leaks (WP 0017 00).</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill fuel tank to correct level. If problem still exists, go to test step 2.</li> <li>2. Reconnect jumper hose assembly, if required. If problem still exists, go to test step 3.</li> <li>3. Reconnect hose assembly. If problem still exists, refer to ENGINE troubleshooting (WP 0011 00).</li> </ol>
<b>5. Engine Starts But Stops Running, When Connected to Auxiliary Fuel Tank.</b>	Check that auxiliary fuel tank pressure relief valve is open (WP 0017 00).	Open relief valve if required. If problem still exists, refer to ENGINE troubleshooting (WP 0011 00).

## TROUBLESHOOTING PROCEDURES - CONTINUED

0012 00

Table 2. Transport Mode Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>CH-47 HELICOPTER TRANSPORT - CONTINUED</b>		
<b>6. Poor and/or No Braking (After Machine Assembly).</b>	Check air connection on right side of draft frame for leaks and/or loose connection.	Reconnect air connection, if required. If problem still exists, refer to AIR SYSTEM AND BRAKES troubleshooting (WP 0011 00).
<b>7. Poor Steering (After Machine Assembly).</b>	1. Check that locking collars and hose wrapping are removed from cylinders.	Remove locking collars and hose wrapping from cylinders, if required. If problem still exists, refer to STEERING troubleshooting (WP 0011 00).
	2. Check that hitch locking blocks are removed.	Remove hitch locking blocks, if required. If problem still exists, refer to STEERING troubleshooting (WP 0011 00).
<b>8. Rear Blackout Drive Light Does Not Operate (After Machine Assembly).</b>	Check electrical connectors on right side of draft frame for loose connections.	Reconnect electrical connections, if required. If problem still exists, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).
<b>9. Rear Blackout Drive Marker Light Does Not Operate (After Machine Assembly).</b>	Check electrical connectors on right side of draft frame for loose connections.	Reconnect electrical connections if required. If problem still exists, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).
<b>10. Skid Steer Control Inoperative.</b>	Check for blown fuse at fuse/circuit breaker panel in cab.	If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, and problem still exists, notify Unit Maintenance.
<b>11. Stoplights Do Not Operate (After Machine Assembly).</b>	Check electrical connectors on right side of draft frame for loose connections.	Reconnect electrical connections, if required. If problem still exists, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).
<b>12. Taillights Do Not Come On (After Machine Assembly).</b>	Check electrical connectors on right side of draft frame for loose connections.	Reconnect electrical connections, if required. If problem still exists, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).
<b>13. Windshield Wiper Motor Inoperative (After Machine Assembly).</b>	1. Check wiper motor electrical connectors for loose connections.	1. Reconnect electrical connectors, if required. If problem still exists, go to test step 2.



## TROUBLESHOOTING PROCEDURES - CONTINUED

0012 00

Table 2. Transport Mode Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>CH-47 HELICOPTER TRANSPORT - CONTINUED</b>		
<b>13. Windshield Wiper Motor Inoperative (After Machine Assembly) - Continued).</b>	2. Check for blown fuse.	2. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).
<b>14. Windshield Washer Inoperative (After Machine Assembly).</b>	1. Check that fluid hose is installed (WP 0017 00).  2. Check fluid reservoir inside engine compartment.  3. Check for blown fuse.	1. Install fluid hose, if required. If problem still exists, go to test step 2.  2. If reservoir is empty, fill reservoir (WP 0014 00). If problem still exists, go to test step 3.  3. If fuse is bad, request a replacement fuse from Unit Maintenance. If fuse is good, refer to ELECTRICAL SYSTEM troubleshooting (WP 0011 00).
<b>15. Windshield Wiper Motor Operates But Wiper Arm Will Not Move.</b>	Check that pivot and drive shaft nuts are tight (WP 0017 00).	Tighten pivot and drive shaft nuts, if required. If problem still exists, notify Unit Maintenance.

END OF WORK PACKAGE

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## **CHAPTER 4**

### **OPERATOR MAINTENANCE INSTRUCTIONS**

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## PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

0013 00

**GENERAL**

To ensure that the scraper 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 serious damage, equipment failure, or injury to personnel. Table 1 in WP 0014 00 contains systematic instructions on inspections, lubrications, 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 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 scraper.
  - b. *During* procedures must be done while you are operating the scraper.
  - c. *After* procedures must be done immediately after you have operated the scraper.
  - 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 service.
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 or for operation. 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 the tools you need to make all the checks. You'll always need a rag (Item 20, WP 0026 00) or two.

## PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED

0013 00

### 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. Failure to do so may result in injury or death to personnel.

- 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 3, WP 0026 00) on all metal surfaces. Use detergent (Item 6, WP 0026 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 in accordance with 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 15, WP 0026 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 you think is loose, tighten it.
- 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. Tighten loose connectors and ensure that the wires are in good condition.
- g. **Hoses and Fluid Lines.** Look for wear, damage, and signs of leaks. Ensure that clamps and fittings are tight. 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, tighten it. 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. 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.

## PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION - CONTINUED

0013 00

### GENERAL PMCS PROCEDURES - CONTINUED

#### NOTE

Notify Unit Maintenance of any leaks the operator 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 views of lubrications points are located at the end of this work package. Localized views are located, together with specific lubrication instructions, in PMCS Table 1 (WP 0014 00)
  - This equipment is not covered by AOAP. Follow manufacturers hand-time maintenance intervals as specified in this manual.
  - 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 *KEY* on page 0013 00-4).
  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.



**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. Failure to do so may result in injury or death to personnel.

5. Clean area around lubrication points with dry cleaning solvent (Item 3, WP 0026 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
		+6°F to +122°F (-14°C to +50°C)	-4°F to +50°F (-20°C to +10°C)	-25°F to +32°F (-4°C to 0°C)	
OE/HDO Lubricating Oil, ICE, Tactical					D - Daily W - Weekly M - Monthly OC - On Condition
OEA Lubricating Oil, ICE, Arctic					
Engine Crankcase	7.8 Gal. (30 L)	See Chart A			
Oil Can Points	As Reqd	See Chart A			
Transmission	9.2 Gal. (35 L)	See Chart B			
Hydraulic Tank Reservoir	24.5 Gal. (93 L) System Capacity	See Chart C			
GO Lubricating Oil, Gear, Multipurpose					
Elevator Speed Reducer	As Reqd	See Chart D			
GAA Grease, Automotive and Artillery					
Hitch Steering Linkage Elevator Assembly Floor Rollers Ejector Support Rollers Tiedown D-Rings		All Temperatures			
ANTIFREEZE Ethylene Glycol, Inhib- ited, Heavy Duty					
ANTIFREEZE Ethylene Glycol, Arc- tic Grade					
Engine Radiator	9.9 Gal. (38 L) System Capacity	See Chart E			
* For arctic operation, refer to FM 9-207.					



CHART A—ENGINE AND OIL CAN POINTS

Lubricant	EXPECTED TEMPERATURES																				
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120	
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49	
OE/HDO	Lubricating Oil, ICE, Tactical																				
OEA	Lubricating Oil, ICE, Arctic																				
OE/HDO 15W/40																					
OE/HDO 10W/30																					
OEA																					

CHART B—TRANSMISSION

Lubricant	EXPECTED TEMPERATURES																				
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120	
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49	
OE/HDO	Lubricating Oil, ICE, Tactical																				
OEA	Lubricating Oil, ICE, Arctic																				
OE/HDO 40																					
OE/HDO 30																					
OE/HDO 10*																					
OEA *																					

\*If OEA lubricant is required to meet the low expected-temperature range, OEA lubricant is to be used in lieu of OE/HDO 10 lubricant for all expected temperatures where OE/HDO 10 is specified.

CHART C—HYDRAULIC TANK RESERVOIR

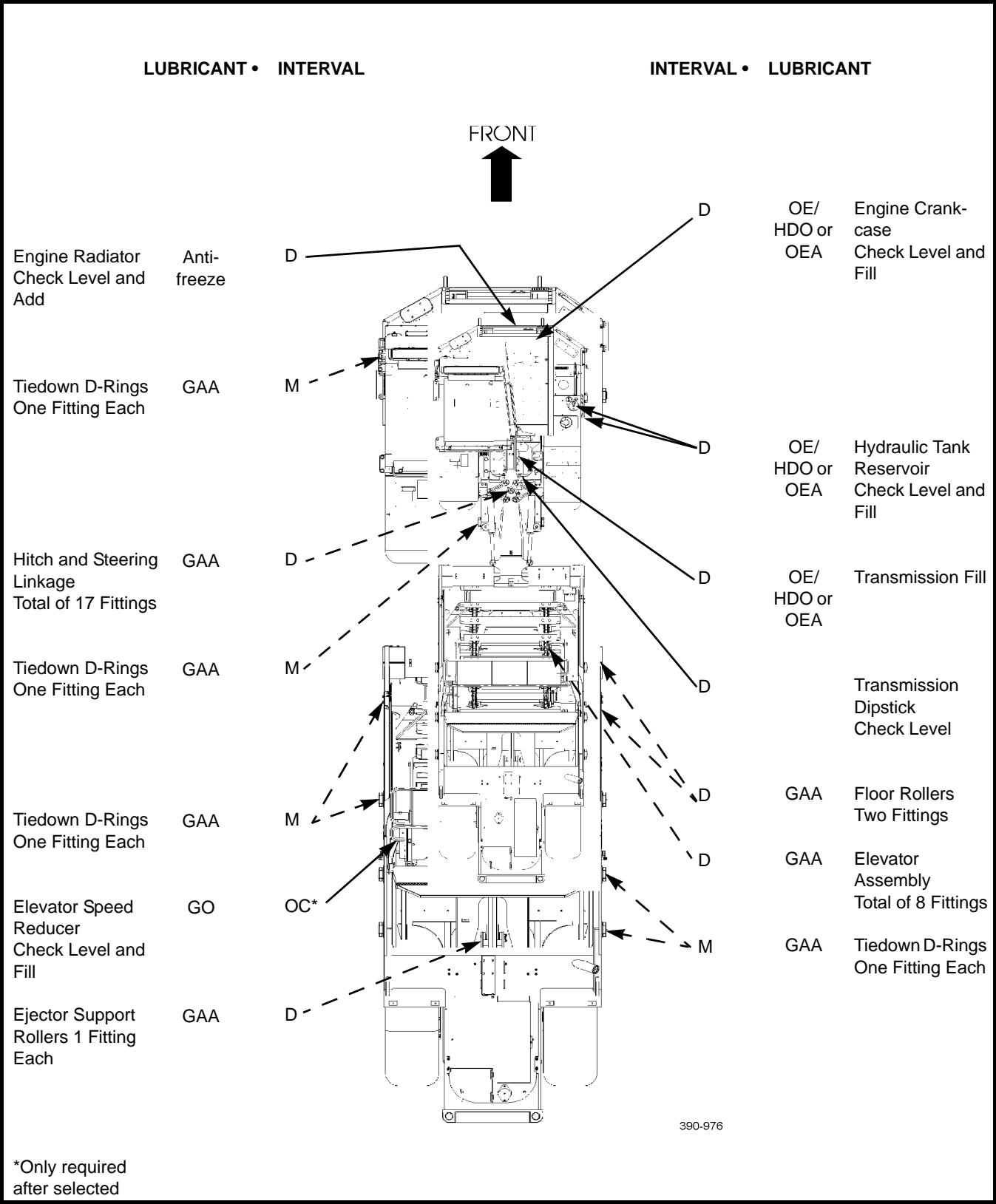
Lubricant	EXPECTED TEMPERATURES																				
	°F	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120	
	°C	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49	
OE/HDO	Lubricating Oil, ICE, Tactical																				
OEA	Lubricating Oil, ICE, Arctic																				
OE/HDO 10*																					
OEA *																					
*If OEA lubricant is required to meet the low expected-temperature range, OEA lubricant is to be used in lieu of OE/HDO 10 lubricant for all expected temperatures where OE/HDO 10 is specified.																					

**CHART D—ELEVATOR SPEED REDUCER**

Lubricant	EXPECTED TEMPERATURES																						
	°F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120	
	°C	-68	-62	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49	
GO	Lubricating Oil, Gear, Multipurpose																						
GO-75																							
GO-80W/90																							
GO-85W/140																							

**CHART E—ANTIFREEZE**

Lubricant	EXPECTED TEMPERATURES																						
	°F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100	+120	
	°C	-68	-62	-57	-51	-46	-40	-34	-29	-23	-18	-12	-7	-1	+4	+10	+16	+21	+27	+32	+38	+49	
ANTIFREEZE	Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty																						
ANTIFREEZE	Antifreeze, Arctic Grade																						
Antifreeze																							
Antifreeze,Arctic Grade																							



END OF WORK PACKAGE

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## PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

0014 00

Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
1	Before			<b>NOTE</b> <ul style="list-style-type: none"><li>Review all WARNINGS, CAUTIONs, and NOTEs before performing PMCS and operating the 613CS Scraper.</li><li>Perform all PMCS checks if:<ul style="list-style-type: none"><li>You are the assigned operator but have not operated the scraper since the last weekly checks.</li><li>You are operating the scraper for the first time.</li></ul></li><li>Unless otherwise indicated, perform PMCS with machine parked on level ground, parking brake applied, transmission in N (Neutral) and locked, bowl lowered to the ground, wheels blocked, and engine shut down.</li><li>If leakage is detected during performance of PMCS, further investigation is required to determine location and cause of leak.</li></ul>	
			<b>FRONT AND LEFT SIDE</b>		
			<b>Overall View</b>	a. Check under tractor for evidence of fluid leakages such as oil, coolant, fuel, brake or hydraulic fluid.  b. Check tractor for obvious damage that would impair operation.	a. Class III oil or hydraulic leaks are evident. Any coolant, brake fluid or fuel leaks are evident.  b. Damage that would impair operation is evident.
			<b>Cab Exterior</b>	Check for damage to lights, windshield, windshield wiper, steps, grab-handles, and fender.	Damage that would interfere with visibility and impair operation is evident, if required for mission.
2	Before				
3	Before		<b>Front Wheel and Tire</b>	a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or underinflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.	a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

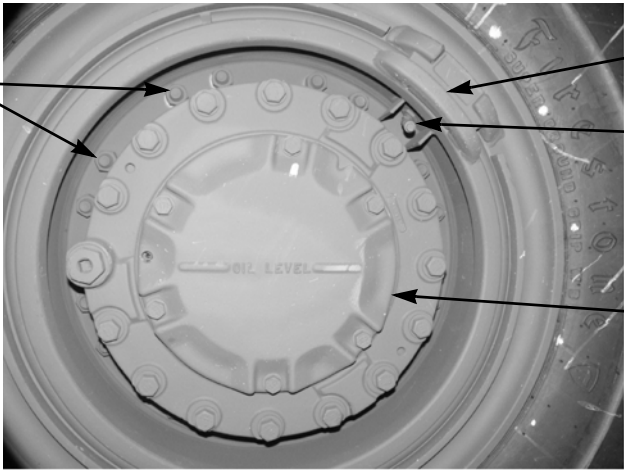
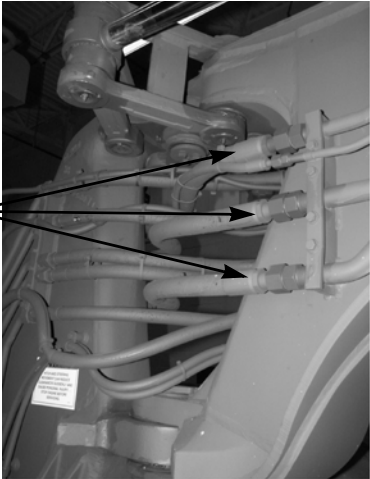
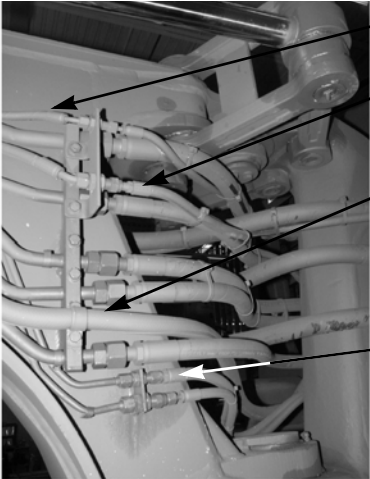
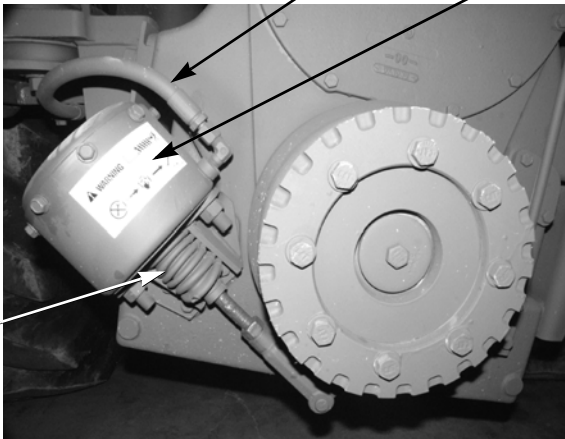
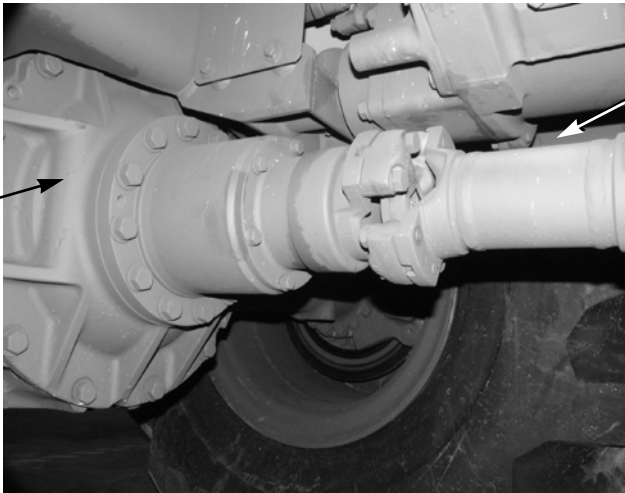
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
3 (Con't)	Before		Front Wheel and Tire	b. Check for loose or missing wheel studs, lug nuts, rim lock, and valve stem with cap.  c. Check for oil leaks from final drive at wheel end.	b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.  c. Class III leaks are evident.
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>RIM LOCK</p> <p>VALVE STEM AND CAP</p> <p>FINAL DRIVE</p> </div> </div>					
4	Before		Hitch Area	<p align="center"><b>WARNING</b></p> <p>Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.</p> a. Check under hitch for evidence of fluid leakage such as fuel or hydraulic fluid.  b. On both sides of hitch, check hydraulic steering cylinders, hydraulic and fuel hoses, lines, and fittings, and air and bare electrical wires for damage or signs of leaking and secure mounting.	a. Class III hydraulic fluid leaks are evident. Any fuel leaks are evident.  b. Class III hydraulic fluid leaks are evident. Any fuel leaks are evident. Any breaks are noted in air and bare electrical wires. Loose or missing mounting hardware is noted.

Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
4 (Con't)	Before		Hitch Area		
<div><div><div>HYDRAULIC LINES</div><div>LEFT SIDE</div></div><div><div><div>AIR LINE</div><div>FUEL LINE</div><div>ELECTRICAL LINES</div><div>FUEL LINE</div></div><div>RIGHT SIDE</div><div>390-1062</div></div></div>					
				<div>c. Check cutting edge work light for damage and secure mounting.</div> <div>d. Visually check for any obstructions between moving components of hitch. Remove obstructions and check for damage.</div> <div>e. Check for damage to parking brake actuator, actuator rod boot, and air hose.</div>	<div>e. Parking brake actuator or hose is damaged.</div>
<div><div><div>AIR HOSE</div><div>PARKING BRAKE ACTUATOR</div><div>BOOT</div><div>390-993</div></div></div>					

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
5	Before		Drive Line	a. Visually check differential assembly for signs of leakage. b. Check lower drive shaft for damaged or missing parts.	a. Class III leaks are evident. b. Damage that would impair operation is evident.
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>DIFFERENTIAL</p> <p>LOWER DRIVE SHAFT</p> </div> </div> <p align="right">390-018</p>					
6	Before		Draft Frame, Scraper Bowl, Elevator, and Ejector	a. Check hydraulic lines and hoses along draft frame for damage or signs of leaking and secure mounting. b. Check for damage to quick disconnect fittings. Check for condition and presence of dust caps.	a. Class III hydraulic fluid leaks are evident. Loose or missing mounting hardware is noted. b. Class III hydraulic fluid leaks, are evident.



**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
6 (Con't)	Before		Draft Frame, Scraper Bowl, Elevator, and Ejector		

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
6 (Con't)	Before		Draft Frame, Scraper Bowl, Elevator, and Ejector	<p>c. Check fuel lines and air line along front of scraper bowl for damage or signs of leaking and secure mounting.</p>	c. Any air or fuel leaks are evident. Loose or missing mounting hardware or damage is evident.

390-021

	<p>d. Check electrical wiring and connectors for damage and secure mounting.</p>	<p>d. Wires or connectors are damaged.</p>
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390-994

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

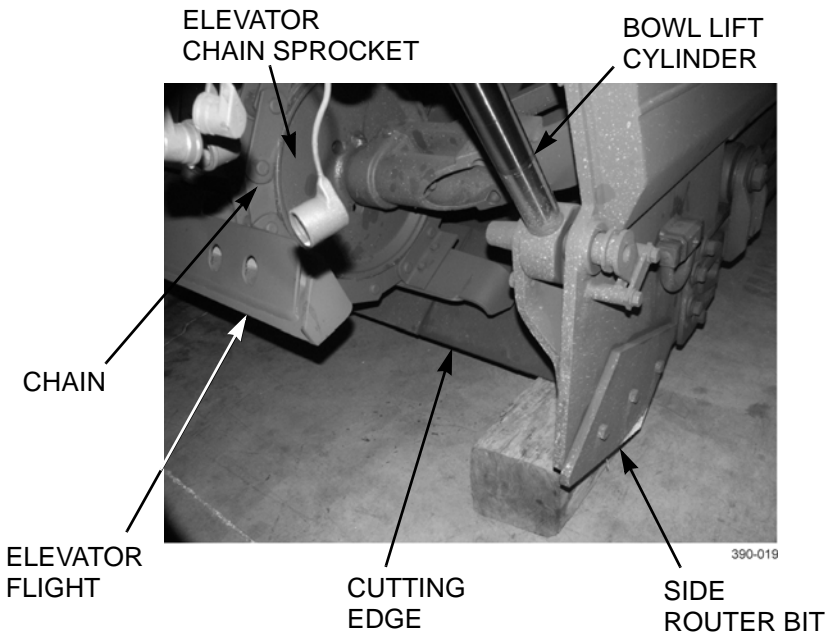
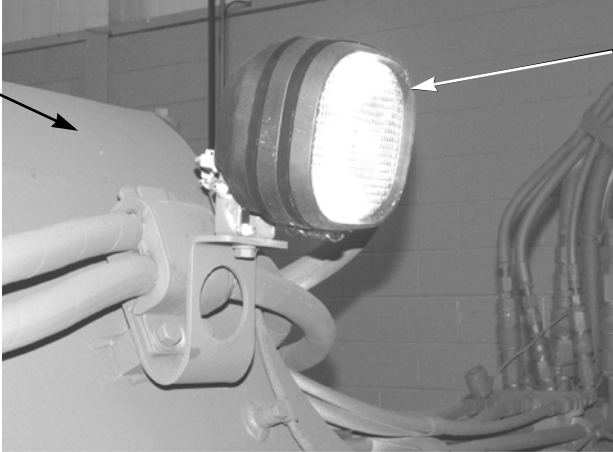

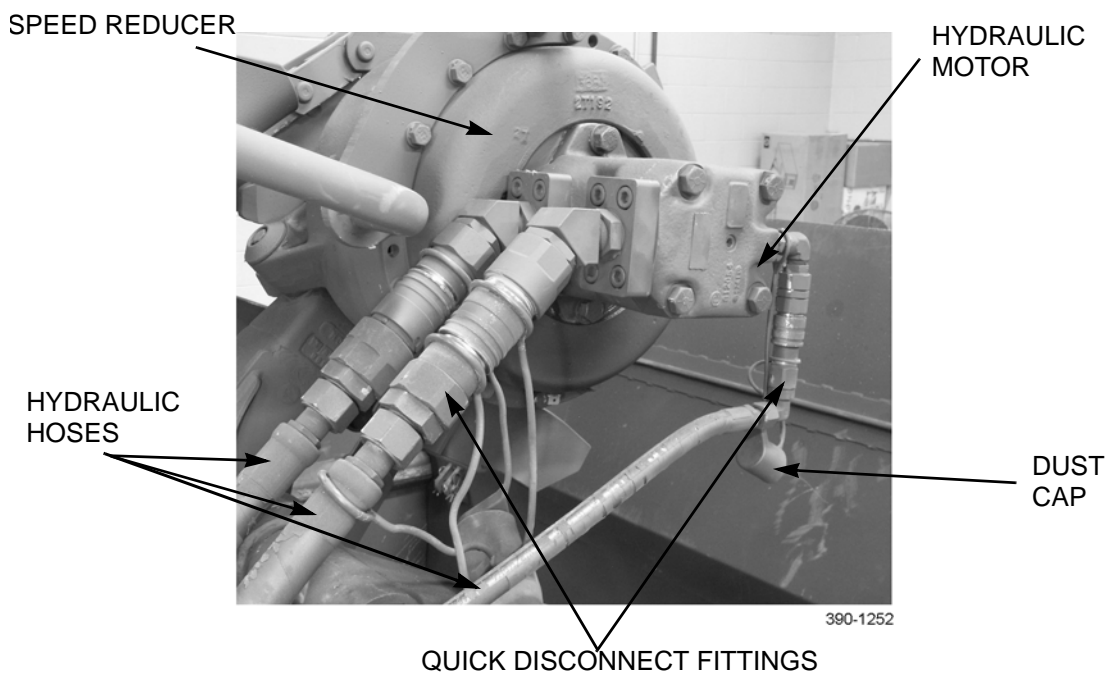
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
6 (Con't)	Before		Draft Frame, Scraper Bowl, Elevator, and Ejector	<p>e. Check left and right bowl lift cylinders, hoses, lines, and fittings for damage or signs of leaking and secure mounting.</p> <p>f. Visually check bowl cutting edge and left and right side router bits for damage and loose or missing mounting hardware.</p> <p>g. Check elevator chains for missing or damaged parts or misalignment.</p> <p>h. Check elevator chain sprockets, idlers, linkage, and elevator flights for missing or damaged parts.</p> <p>i. Check for damage or obstructions inside bowl that would interfere with ejector operation.</p>	<p>e. Class III leaks are evident. Loose or missing mounting hardware is noted.</p> <p>f. Damage that would impair operation is evident. Cutting edge worn sufficiently to allow damage to base edge.</p> <p>g. Damage that would impair operation is evident.</p> <p>h. Damage that would impair operation is evident.</p> <p>i. Damage that would impair operation is evident.</p>
					
7	Before		Bowl Work Light and Elevator Guard	<p>a. Check that bowl work light on draft frame is present and securely mounted.</p>	

Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.


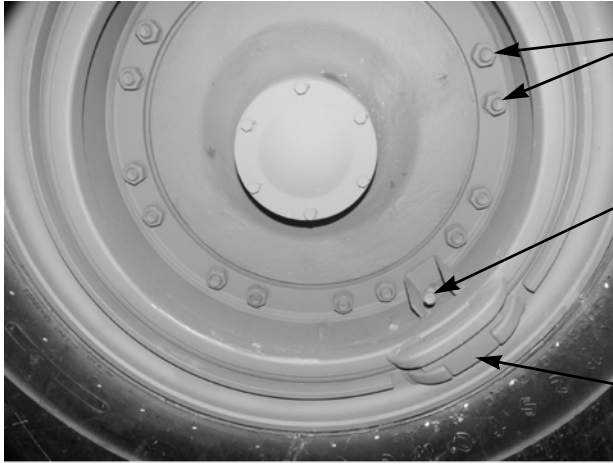
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
7 (Con't)	Before		Bowl Work Light and Elevator Guard		
<div><div><div>DRAFT FRAME</div><div></div><div>BOWL WORK LIGHT</div></div></div>					
8	Before		Floor Rollers	<div><div>b. Check that elevator guard is present and securely mounted.</div><div>Check for damage to left-side bowl floor rollers.</div></div>	<div><div>b. Elevator or guard is missing or damaged or mounting hardware is loose or missing.</div></div>
<div><div><div></div><div>FLOOR ROLLERS</div></div></div>					

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
9	Before		Elevator Speed Reducer and Hydraulic Motor	<p>a. Check elevator speed reducer, hydraulic motor, hydraulic hoses, and fittings (quick disconnect and regular) for signs of leakage and damaged or missing parts. Check hoses for wear</p> <p>b. Check that metal support strip and straps that support hydraulic hoses are not torn, loose or damaged.</p>	<p>a. Damage that would impair operation is evident. Class III oil leaks are evident.</p> <p>b. Damage that would impair operation is evident.</p>



**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

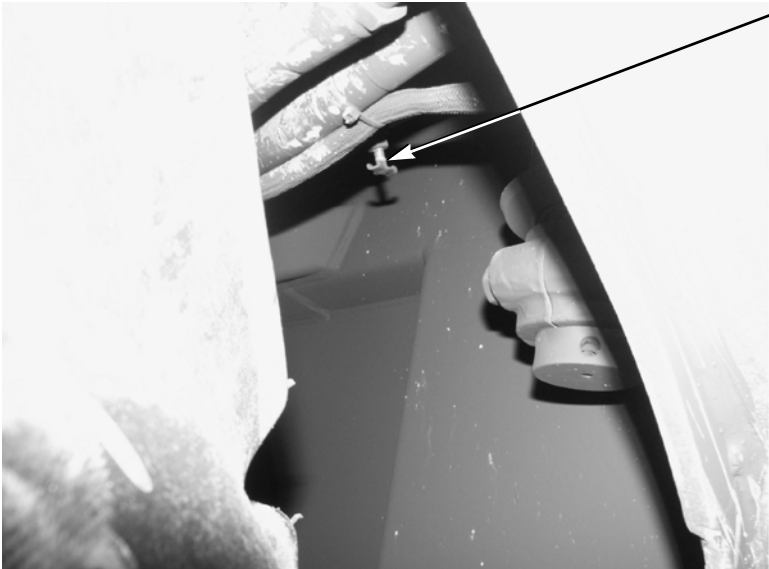
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
10	Before		Fuel Shutoff Valve	Check for damage or fuel leaks from fuel shutoff valve.	Any fuel leaks are evident.
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">FUEL SHUTOFF VALVE - LEFT SIDE</div>  <div style="margin-left: 10px; font-size: small;">390-1056</div> </div>					
11	Before		Rear Wheel and Tire	<p>a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or underinflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.</p> <p>b. Check for loose or missing studs, lug nuts, rim lock, and valve stem with cap.</p>	<p>a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.</p> <p>b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.</p>
<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>LUG NUTS</p> <p>VALVE STEM AND CAP</p> <p>RIM LOCK</p> </div> <div style="margin-left: 10px; font-size: small;">390-020</div> </div>					

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
12	Before		<b>REAR AND RIGHT SIDE</b>		
			<b>Overall View</b>	a. Check under rear of scraper for evidence of fluid leakage such as fuel, brake or hydraulic fluid.  b. Check rear of scraper for obvious damage that would impair operation.  c. Visually check for damaged or missing rear light assemblies.  d. Check that BII toolbox is installed on rear deck, is in good condition, and secure.	a. Class III hydraulic fluid leaks are evident. Any brake fluid or fuel leaks are evident.  b. Damage that would impair operation is evident  c. Damage that would impair safe operation of scraper is noted, if required for mission.
13	Before		<b>Scraper Rear Compartment</b>	Open scraper rear compartment access door and check the following components for signs of leaks and/or damaged or missing parts.  (1) fuel/water separator; (2) fuel lines and fuel tank drain valve; (3) brake fluid reservoir; and (4) air/hydraulic brake cylinder and lines.	Class III hydraulic fluid leaks are evident. Any brake fluid or fuel leaks are evident. Damaged or missing parts are noted.



**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
14	Before		Rear Wheel and Tire	a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or underinflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.  b. Check for loose or missing wheel studs, lug nuts, rim lock, and valve stem with cap.	a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.  b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.
15	Before		Fuel Tank Filler Cap and Fuel Shutoff Valve	a. Ensure fuel tank filler cap is present and secure.  b. Check for damage or fuel leaks from fuel shutoff valve.	b. Any fuel leaks are evident
<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>FUEL SHUTOFF VALVE - RIGHT SIDE</p> </div> </div> <p align="right">390-1054</p>					



**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

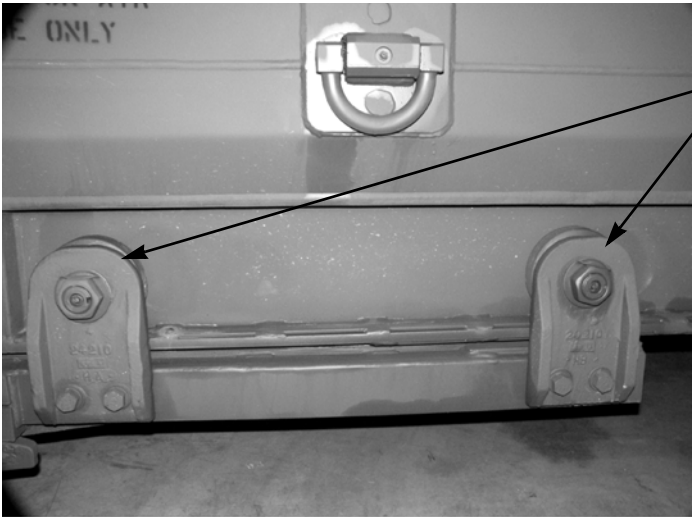
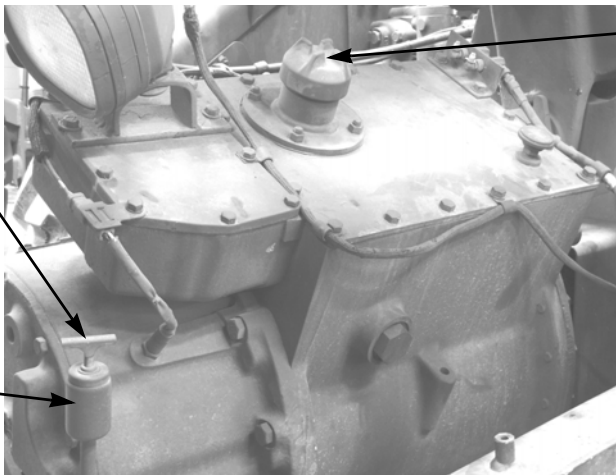
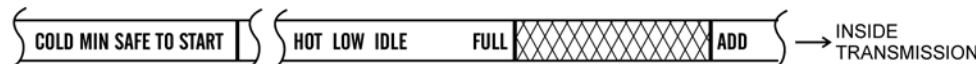

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
16	Before		Floor Rollers	Check for damage to right-side bowl floor rollers.	
 <p>390-981</p>					
17	Before	0.1 Hours	Transmission Oil Level	Perform cold check of transmission oil level: <ol style="list-style-type: none"> <li>(1) Clean area around dipstick tube and fill cap.</li> <li>(2) Remove dipstick, clean, and reinstall.</li> </ol>	
 <p>390-010</p>					

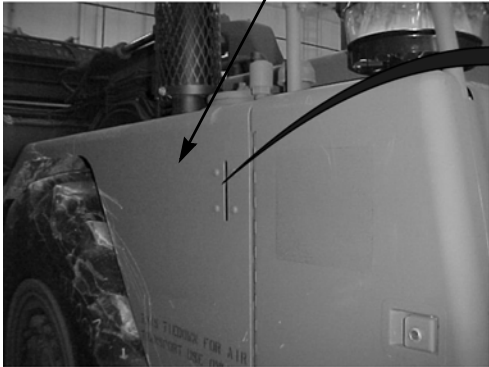

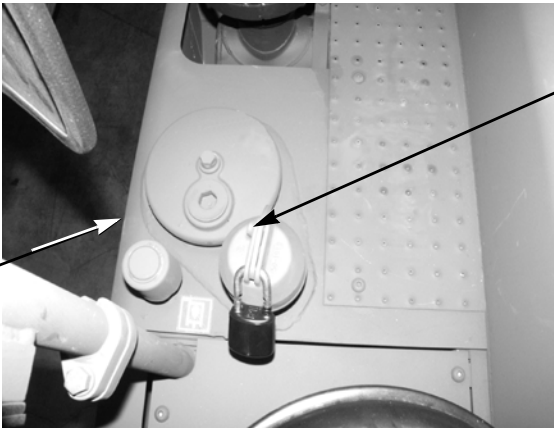
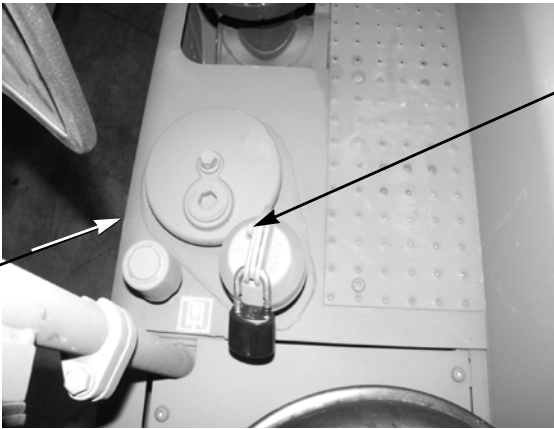
Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
17 (Con't)	Before		Transmission Oil Level	(3) Remove dipstick and check oil level. Level must be at COLD MIN SAFE TO START line on dipstick.	
 <p style="text-align: right;">390-016</p>					
18	Before		Brake Fluid Reservoir	<p>(4) If level is low, add oil (Item 11, 15, 18 or 19, WP 0026 00) through filler opening. Reinstall fill cap. Do NOT overfill.</p> <p>Check that brake fluid reservoir, mounted inboard of tractor's right-side fender, is securely mounted with no evidence of brake fluid leaks.</p>	Any brake fluid leaks are evident.
 <p style="text-align: right;">390-998</p>					


**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
19	Before		Front Wheel and Tire	a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or uninflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.  b. Check for loose or missing studs, lug nuts, rim lock, and valve stem with cap.  c. Check for oil leaks from final drive at wheel end.	a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.  b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.  c. Class III leaks are evident.
20	Before	0.1 Hours	Hydraulic Tank and Sight Gage	a. Visually check for damage or leaks.  b. Perform cold check of hydraulic oil level. Oil must be visible in sight gage.  <div> </div> <p><b>WARNING</b></p> <p>If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide.</p> c. If oil is not visible in sight gage, start engine and move ejector forward (WP 0005 00). Ensure bowl is lowered. Shut down engine. Add lubricating oil (Item 11 or 15, WP 0026 00) through filler opening, until oil is visible in sight gage.	a. Class III leaks are evident.

Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
20 (Con't)	Before		Hydraulic Tank and Sight Gage		
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>HYDRAULIC TANK</p> </div> <div style="text-align: center;">  <p>SIGHT GAGE</p> <p>390-009</p> </div> </div> <div style="margin-top: 20px; text-align: center;"> <p>d. Ensure that hydraulic tank fill cap is present and secure.</p> <div style="display: flex; justify-content: center; align-items: center;"> <div style="text-align: center;">  <p>HYDRAULIC TANK</p> </div> <div style="text-align: center;">  <p>FILL CAP</p> <p>390-999</p> </div> </div> </div>					
21	Before		Cab Exterior	a. Check for damage to side mirror, handrails, steps, grabhandles, and fender.	a. Damage that would interfere with visibility and impair operation is evident.

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
21 (Con't)	Before		Cab Exterior	b. Ensure that cover is installed on NATO slave receptacle.	
<div> <p>COVER ON NATO SLAVE RECEPTACLE</p> </div>  <p>390-014 390-014</p>					
22	Before		Engine Air Cleaner and Battery Compartment	<p>Open compartment access door and check the following items:</p> <ul style="list-style-type: none"> <li>(1) Check air cleaner assembly for damaged or missing parts.</li> <li>(2) Check batteries, battery filler caps (if batteries are equipped with filler caps), and battery hold-down for damaged or missing parts.</li> <li>(3) Check for loose battery cables.</li> </ul>	<ul style="list-style-type: none"> <li>(1) Damaged or missing parts are noted.</li> <li>(2) Batteries, filler caps or hold-down missing or damaged.</li> <li>(3) Cables are loose, missing or damaged.</li> </ul>

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

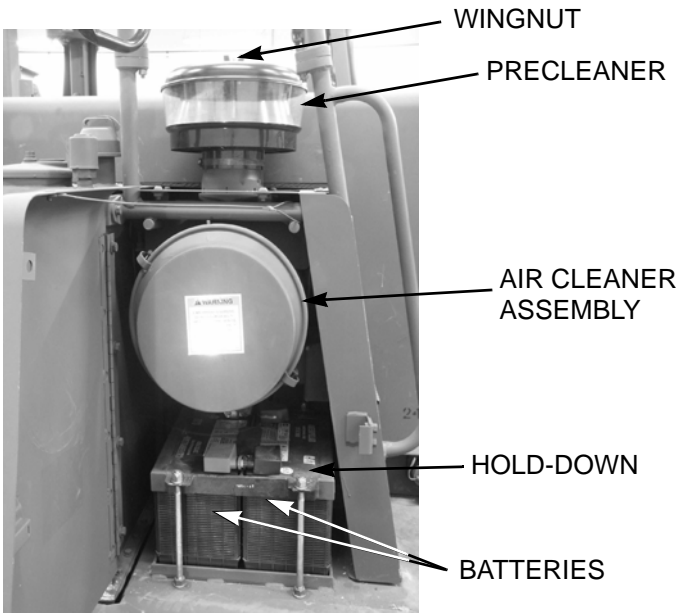

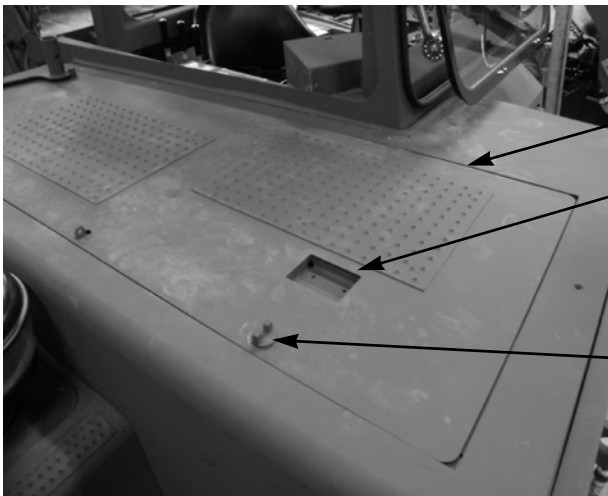
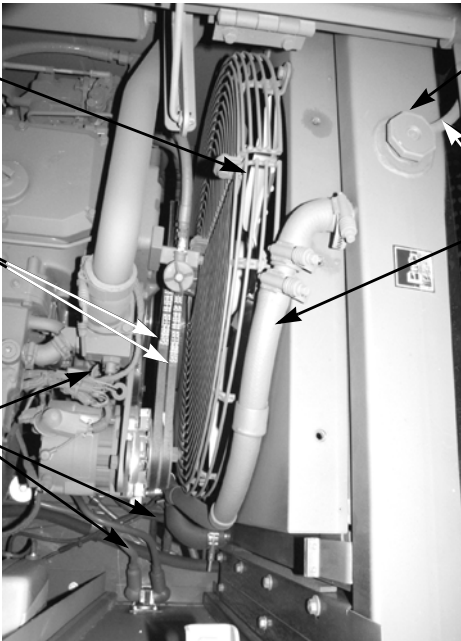

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
22 (Con't)	Before		Engine Air Cleaner and Battery Compartment		
 <p align="center">390-996</p>					
23	Before		Engine Air Precleaner	Check precleaner for damage. Ensure housing is free of debris and cover is installed and secured with wingnut.	Precleaner is damaged or clogged.

Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

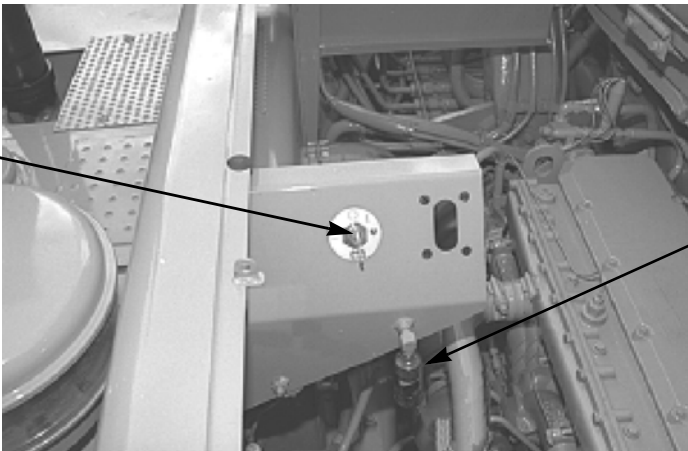
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
24	Before	0.2 Hours	Engine Compartment and Engine Radiator Coolant Level Check	 <p><b>WARNING</b></p> <p>Ensure access door is securely supported in open position. Failure to do so could cause door to slam shut, causing serious injury to personnel.</p> <p>a. Loosen retainer, open engine compartment access door, and secure door open with latch rod.</p>	
				 <p>390-1005</p> <p>b. Check engine compartment for evidence of fluid leakage such as oil, coolant, and fuel.</p> <p>c. Check engine compartment for any of the following conditions:</p> <ul style="list-style-type: none"> <li>(1) loose, damaged or missing drive belts;</li> <li>(2) loose or damaged coolant hoses;</li> <li>(3) damaged electrical harnesses; and</li> </ul>	<p>b. Class III oil leaks are evident. Any coolant or fuel leaks are evident.</p> <p>c. Damage that would impair operation is evident.</p>

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

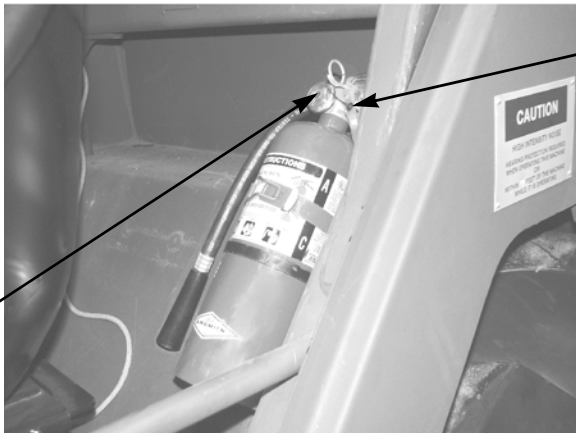
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
24 (Con't)	Before	0.2 Hours	Engine Compartment and Engine Radiator Coolant Level Check	(4) damaged cooling fan or clogged radiator.	
<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;"> <p>COOLING FAN</p> <p>DRIVE BELTS</p> <p>ELECTRICAL HARNESSES</p> </div>  <div style="margin-left: 20px;"> <p>RADIATOR PRESSURE CAP</p> <p>COOLANT HOSES</p> </div> </div> <p style="text-align: right; margin-right: 50px;">390-1000</p>					
				 <p><b>WARNING</b></p> <p>Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.</p>	
				<p>d. Remove cooling system pressure cap. Wipe clean with a rag. Inspect for a damaged cap or a missing cap gasket.</p> <p>e. Maintain coolant level 1/2 in. (13 mm) from bottom of filler neck. As required, add a 50/50 mixture of antifreeze (Item 1 or 2, WP 0026 00) and water.</p>	<p>d. Cap gasket is missing or damaged.</p>



**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
24 (Con't)	Before		Engine Compartment and Engine Radiator Coolant Level Check	<p>d. Place battery disconnect switch in ON position.</p> <p>e. Ensure engine air filter service indicator shows green or yellow and is not damaged. Service air cleaner if red band is showing (WP 0015 00).</p>	g. Red band is showing.
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>BATTERY DISCONNECT SWITCH</p>  </div> <div style="text-align: center;"> <p>ENGINE AIR FILTER SERVICE INDICATOR</p> </div> </div> <p align="right">390-1001</p>					
25	Before		<div style="border-bottom: 1px solid black; padding-bottom: 5px;">CAB INTERIOR</div> <div style="border-bottom: 1px solid black; padding-bottom: 5px;">Fire Extinguisher</div>	<p>f. Close engine compartment access door and tighten retainer to secure door closed.</p> <p>a. Visually check for missing or damaged fire extinguisher. Ensure it is securely mounted in bracket directly behind seat.</p> <p>b. Check gage for reading in green area on gage.</p> <p>c. Check for damaged or missing seal.</p> <p>d. Inspect fire extinguisher inspection tag.</p>	<p>a. Fire extinguisher is missing or damaged.</p> <p>b. Pressure gage needle is in red area.</p> <p>c. Seal is broken or missing.</p> <p>d. Inspection date is not current and/or tag is missing.</p>

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**


ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
25 (Con't)	Before		Fire Extinguisher		
 <p style="text-align: right;">390-1302</p>					
26	Before		Instrument Panel	Check for damaged gages, warning indicators, and switches.	Any warning indicator is broken or unreadable.
27	Before		Seat and Seat Belt	Check seat and seat belt for damage and proper operation. Ensure seat adjustments can be made and seat locks in place.	Seat belt is damaged. Date on belt is more than three years old. Seat will not adjust/lock in place.
28	Before		Steering Wheel and Column	Check steering wheel and column for damage and proper operation and adjustments.	Damage that would impair operation is evident.

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
29	Before		EMS Self-Test	<p>Perform EMS self-test as follows:</p> <p>a. Turn ignition to ON, without starting engine.</p> <p>(1) Selected indicator lights on EMS display panel should come on.</p> <p>(2) Action light should flash.</p> <p>b. Move panel test switch upward:</p> <p>ALL indicator lights on EMS display panel should come on.</p> <p>c. Release panel test switch:</p> <p>Only selected indicator lights on EMS display panel should remain on.</p>	EMS does not function.

390-001

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
30	Before		Engine Start-up	 <p><b>WARNING</b></p> <p>If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide.</p> <p>a. Start engine and repeat EMS self-test (WP 0005 00). Verify that all indicators, warning lights, and alarm operate properly on EMS display. If EMS indicates no engine oil pressure, shut down engine and notify Unit Maintenance.</p> <p>b. Check operation of lights (service and blackout lights, brake lights, turn signals, work lights, etc.).</p> <p>c. Adjust rearview mirror as required: Loosen two knobs on either side of mirror, adjust mirror, and tighten knobs.</p>	<p>a. Engine will not start. Warning lights and alarm stay on.</p> <p>b. Any lights do not function, if required for mission.</p>
31	Before		Hydraulic Controls	<p>Perform a functional check of all hydraulic systems: steering, bowl lift, ejector, floor, and elevator circuits. Ensure elevator operates properly in reverse and in low and high forward speeds.</p>	<p>Any hydraulic system or function does not operate properly.</p>
32	Before		Backup Alarm and Horn	<p>a. Verify that backup alarm functions when transmission is placed in R (Reverse).</p> <p>b. Check operation of air-operated horn on steering wheel.</p>	<p>a. Backup alarm does not function, if required for mission.</p> <p>b. Horn does not operate, if required for mission.</p>

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
33	During		Brakes	a. Check service brakes for pulling, grabbing or reduced braking capacity.  b. Check parking brake operation with engine idling and transmission in high range.	a. Brakes pull, grab or exhibit unsafe operation.  b. Parking brake will not hold machine.
34	During		Steering	Check for smooth, controlled steering without pulling or drifting.	Steering is erratic. Any play is evident at hitch linkage.
35	During		Drive Train	Monitor tractor operation for unusual noise or vibrations from engine, transmission, drive shafts, axles, and wheels.	
36	During		Scraper	Monitor bowl operations for unusual noise or vibrations from elevator, ejector, retracting floor of bowl, and bowl lift cylinders.	
37	During		Overall Leakage	Be alert for evidence of fluid leakage.	Class III oil or hydraulic fluid leaks are evident. Any coolant, brake fluid or fuel leaks are evident.
38	During		Instrument Panel	With machine fully warmed up, monitor EMS indicators, warning lights, and readings on gages.  (1) Engine coolant temperature range should be 165°F-210°F (74°C- 99°C).  (2) Torque converter oil temperature range should be 165°F-265°F (74°C-129°C).  <b>NOTE</b>  Air pressure gage must register above 65 psi (240 kPa).  (3) Air system operating pressure range is 125 +/- 10 psi (862 +/- 69 kPa).	EMS panel or gages indicate an abnormal reading.

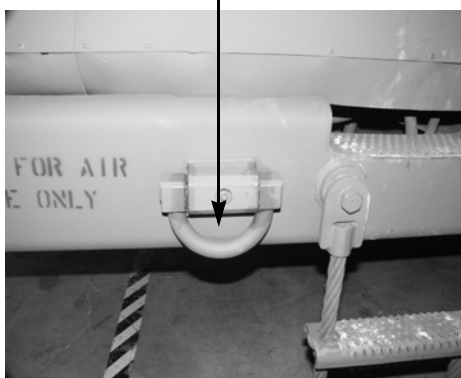
Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/ SERVICE		
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**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

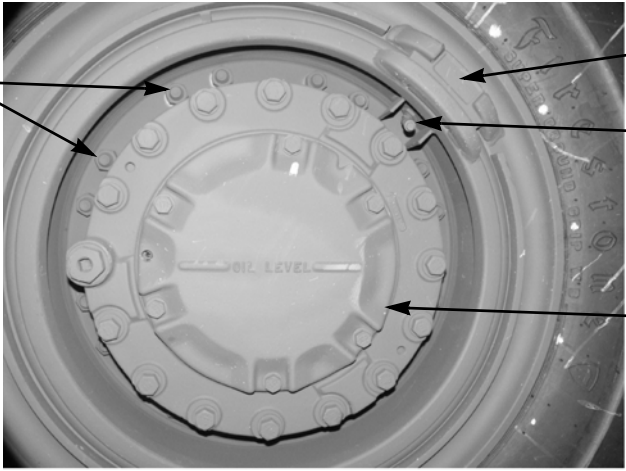
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
39	After		<b>FRONT AND LEFT SIDE</b>	<p align="center"><b>NOTE</b></p> <p>Ensure machine is clean in order to facilitate performance of PMCS inspections.</p> <p>a. Check under tractor for evidence of fluid leakages such as oil, coolant, fuel, brake or hydraulic fluid.</p> <p>b. Check tractor for obvious damage that would impair operation.</p> <p>c. Check tractor tiedown D-rings for signs of damage and free movement.</p>	<p>a. Class III oil or hydraulic fluid leaks are evident. Any coolant, brake fluid or fuel leaks are evident.</p> <p>b. Damage that would impair operation is evident.</p> <p>c. D-rings are damaged, if required for mission.</p>
			<b>Overall View</b>		
40	After		<b>Cab Exterior</b>	<p>a. Check for damage to lights, windshield, windshield wiper, steps, grabhandles, and fender.</p> <p>b. Clean windshield as required. Use windshield cleaning compound (Item 4, WP 0026 00).</p>	<p>a. Damage that would interfere with visibility and impair operation is evident, if required for mission.</p>

**TIEDOWN D-RING**



390-1002

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

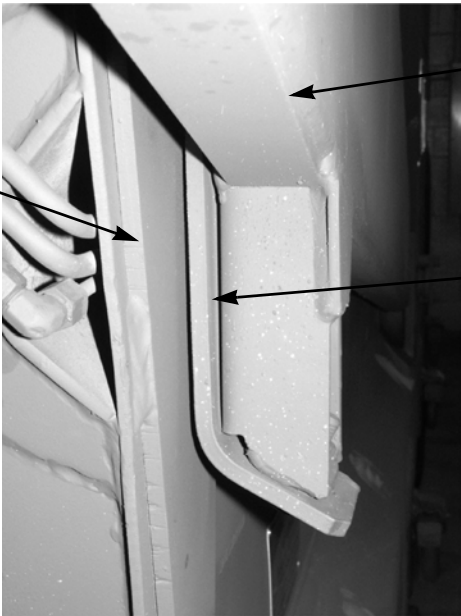
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
41	After		Front Wheel and Tire	<p>a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or underinflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.</p> <p>b. Check for loose or missing wheel studs, lug nuts, rim lock, and valve stem with cap.</p> <p>c. Check for oil leaks from final drive at wheel end.</p>	<p>a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.</p> <p>b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.</p> <p>c. Class III oil leaks are evident.</p>
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>RIM LOCK</p> <p>VALVE STEM AND CAP</p> <p>FINAL DRIVE</p> </div> </div>					
42	After		Hitch Area	<p>d. Check fender for damage.</p> <p align="center"><b>WARNING</b></p> <p align="center">Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.</p> <p>a. Check under hitch for evidence of fluid leakage such as fuel or hydraulic fluid.</p>	<p>a. Class III hydraulic fluid leaks are evident. Any fuel leaks are evident.</p>



**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
42 (Con't)	After		Hitch Area	<p>b. On both sides of hitch, check hydraulic steering cylinders, hydraulic and fuel hoses, lines, and fittings, and air and bare electrical wires for damage or signs of leaking and secure mounting.</p> <p>c. Visually check area for any obstructions between moving components of hitch. Remove obstructions and check for damage.</p> <p>d. Check for damage to parking brake actuator, actuator rod boot, and air hose.</p>	<p>b. Class III hydraulic fluid leaks are evident. Any fuel leaks are evident. Any breaks are noted in air and bare electrical wires. Loose or missing mounting hardware is noted.</p> <p>d. Parking brake actuator or hose is damaged.</p>
43	After		Drive Line	<p>a. Visually check differential assembly for signs of oil leakage.</p> <p>b. Check lower drive shaft for damaged or missing parts.</p>	<p>a. Class III oil leaks are evident.</p> <p>b. Damage that would impair operation is evident.</p>
44	After		Draft Frame, Scraper Bowl, Elevator, and Ejector	<p>a. Check draft frame for cracks, damage or distortion.</p> <p>b. Check hydraulic lines and hoses along draft frame for damage or signs of leaking and secure mounting.</p> <p>c. Check for damage to quick disconnect fittings. Check for condition and presence of dust caps.</p> <p>d. Check fuel lines and air line along front of scraper bowl for damage or signs of leaking and secure mounting.</p> <p>e. Check bare electrical wires and connectors for damage and secure mounting.</p>	<p>a. Cracks, damage or distortion are noted.</p> <p>b. Class III hydraulic fluid leaks are evident. Loose or missing mounting hardware is noted.</p> <p>c. Class III hydraulic fluid leaks are evident</p> <p>d. Any air or fuel leaks are evident. Loose or missing mounting hardware or damage is evident.</p> <p>e. Bare electrical wires or connectors are damaged.</p>

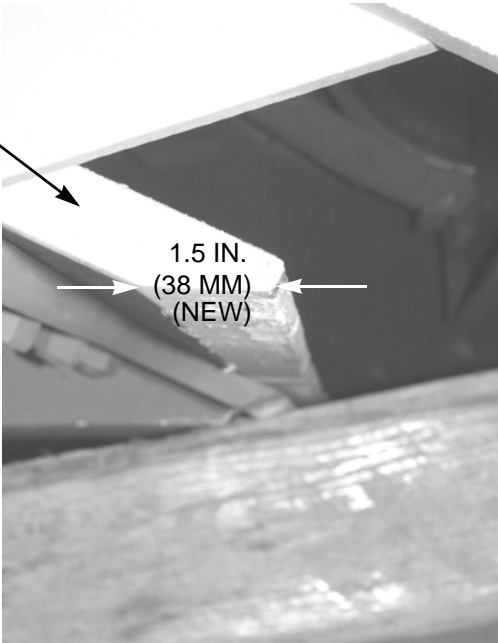
**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
44 (Con't)	After		Draft Frame, Scraper Bowl, Elevator, and Ejector	f. On each side of bowl, inspect draft arm wear plate and mounting hardware for presence and general condition. Ensure there is clearance between wear plate and scraper bowl.	
<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;"> <p>SCRAPER BOWL</p>  </div> <div style="margin-left: 20px;"> <p>DRAFT ARM</p> <p>WEAR PLATE</p> </div> </div> <p style="text-align: center; font-size: small;">390-1003</p>					
				<p>g. Check left and right bowl lift cylinders, hoses, lines, and fittings for damage or signs of leaking and secure mounting.</p> <p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• If scraper bowl cutting edge or side router bits are worn or damaged, or if cutting edge configuration needs to be changed in order to accomplish the next scheduled mission, notify Unit Maintenance.</li> <li>• Obtain appropriate measuring device from Unit Maintenance, to measure cutting edge wear in step g and router bit wear in step h.</li> </ul>	<p>g. Class III leaks are evident. Loose or missing mounting hardware is noted.</p>

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
44 (Con't)	After		Draft Frame, Scraper Bowl, Elevator, and Ejector	<div>NOTE</div> <div>When new cutting edge dimension, as indicated ON illustration, is approximately 1.5 in. (38 mm).</div>	
				<div>h. Inspect cutting edge for excessive wear, cracks, breaks, and loose or missing mounting hardware. If worn to 3/4 in. (19 mm) or less, or if damage or loose mounting hardware is noted, notify Unit Maintenance to rotate or replace cutting edge or tighten mounting hardware.</div> <div>h. Worn to 3/4 in. (19 mm) or less, damage or looseness is evident.</div>	

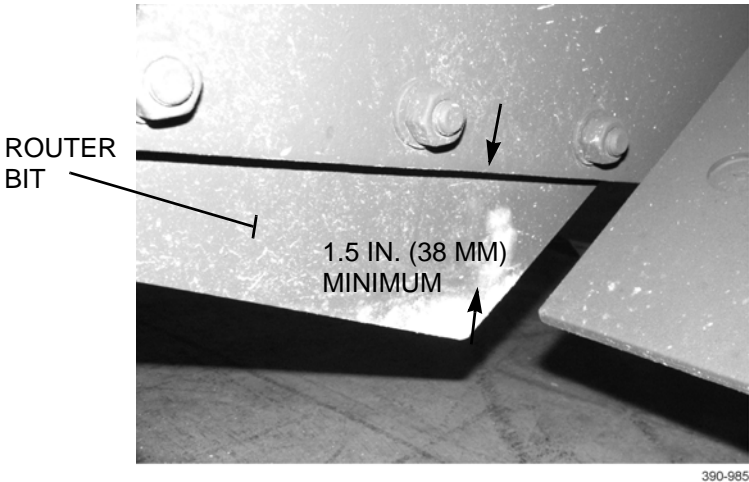
CUTTING EDGE



1.5 IN.  
(38 MM)  
(NEW)

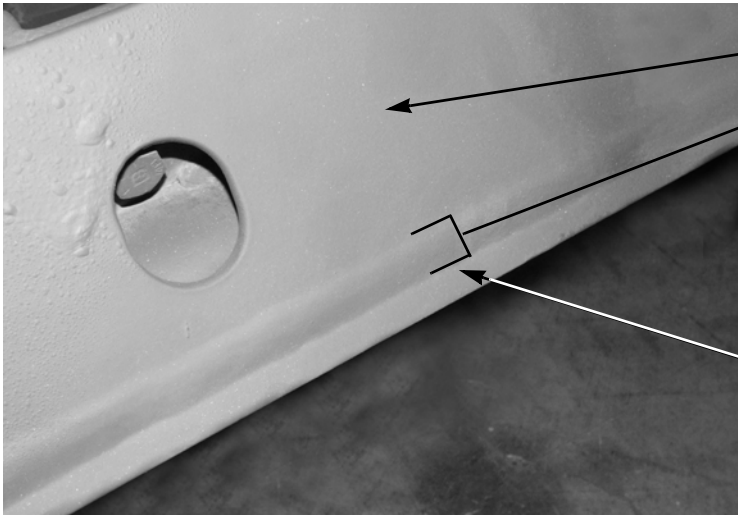
390-1725

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
44 (Con't)	After		Draft Frame, Scraper Bowl, Elevator, and Ejector	i. Inspect router bit on each side of scraper bowl for cracks, breaks, loose or missing mounting hardware, and excessive wear. Measurement between bottom of bowl and tip of router bit must be at least 1.5 in. (38 mm). If damage or loose mounting hardware is noted, or if worn beyond limit, notify Unit Maintenance to rotate or replace component or tighten mounting hardware.	i. Measurement is less than 1.5 in. (38 mm). Damage or looseness is evident.
					
				j. Check elevator chains for missing or damaged parts or misalignment. k. Check elevator chain sprockets, idlers, linkage, and elevator flights for missing or damaged parts. l. Check for wear to elevator flights. Flight is worn beyond limits when plate is worn to start of weld. Notify Unit Maintenance if flight needs to be replaced.	j. Damage that would impair operation is evident. k. Damage that would impair operation is evident. l. Plate is worn to start of weld.

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/ SERVICE		
44 (Con't)	After		Draft Frame, Scraper Bowl, Elevator, and Ejector		



ELEVATOR FLIGHT

WELD


MAXIMUM WEAR TO START OF WELD

390-1724

45	After		Bowl Work Light and Elevator Guard	<p>m. Check for damage or obstructions inside bowl that would interfere with ejector operation.</p> <p>a. Check that bowl work light on draft frame is present and securely mounted.</p> <p>b. Check that elevator guard is present and securely mounted.</p>	<p>m. Damage that would impair operation is evident.</p> <p>b. Elevator guard is missing or damaged or mounting hardware is loose or missing.</p>
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Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
46	After		Floor Rollers	Check for damage to left-side bowl floor rollers.	Damage that would impair operation is evident.
47	After		Scraper Bowl	a. Check all left-side scraper tiedown D-rings for signs of damage and free movement.  b. Check that draft arm pin and retainer bar are secure at mounting to bowl. Tighten if loose.	a. D-rings are damaged, if required for mission.

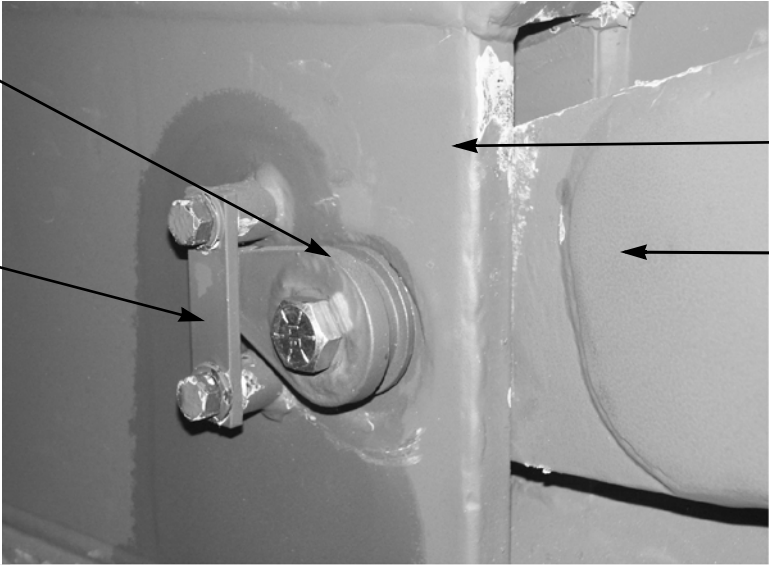


ONLY

SCRAPER TIEDOWN D-RING

FLOOR ROLLERS

390-981



PIN

RETAINER BAR

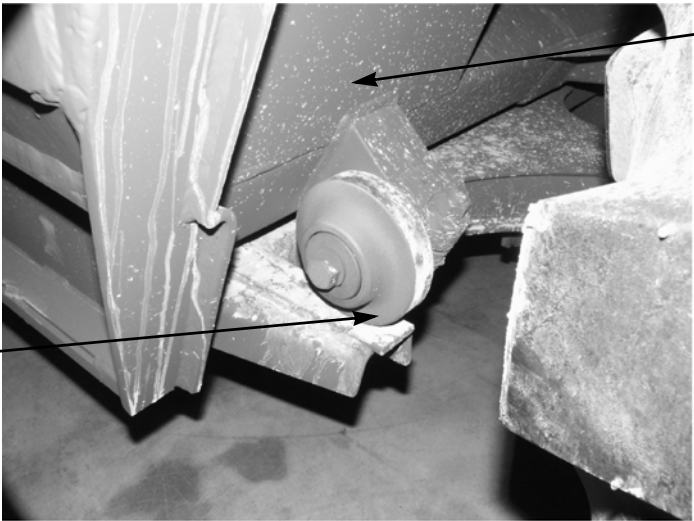
SCRAPER BOWL

DRAFT ARM


RIGHT SIDE SHOWN  
LEFT SIDE THE SAME

390-1073

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**


ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
48	After		Elevator Speed Reducer and Hydraulic Motor	a. Check elevator speed reducer, hydraulic motor, hydraulic hoses, and fittings (quick disconnect and regular) for signs of leakage and damaged or missing parts. Check hoses for wear.  b. Check that metal support strip and straps that support hydraulic hoses are not torn, loose or damaged.	a. Damage that would impair operation is evident. Class III oil leaks are evident.  b. Damage that would impair operation is evident.
49	After		Ejector Carrier (Lower) Roller	Check for damage or obstructions to ejector carrier (Lower) roller. Remove obstructions as needed.	Ejector carrier (lower) roller is missing or damaged.
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>EJECTOR CARRIER ROLLER</p> </div>  <div style="margin-left: 20px;"> <p>EJECTOR</p> </div> </div> <p align="right">390-995</p>					
50	After		Fuel Shutoff Valve	Check for damage or fuel leaks from fuel shutoff valve.	Any fuel leaks are evident.
51	After		Rear Wheel and Tire	a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or underinflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.  b. Check for loose or missing wheel studs, lug nuts, rim lock, and valve stem with cap.	a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.  b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**



ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
52	After		<b>REAR AND RIGHT SIDE</b>		
			<b>Overall View</b>		
53	After		<b>Scraper Rear Compartment</b>	<p>a. Check under rear of scraper for evidence of fluid leakage such as fuel, brake or hydraulic fluid.</p> <p>b. Check rear of scraper for obvious damage that would impair operation.</p> <p>c. Check for damaged or missing rear service light assemblies.</p> <p>d. Check that BII toolbox is installed on rear deck, is in good condition, and secure.</p>	<p>a. Class III hydraulic fluid leaks are evident. Any brake fluid or fuel leaks are evident.</p> <p>b. Damage that would impair operation is evident.</p> <p>c. Damage that would impair safe operation of scraper is noted, if required for mission.</p>
				<p>a. Open scraper rear compartment access door and check the following components for signs of leaks and/or damaged or missing parts:</p> <ul style="list-style-type: none"> <li>(1) fuel/water separator;</li> <li>(2) fuel lines and fuel tank drain valve;</li> <li>(3) brake fluid reservoir; and</li> <li>(4) air/hydraulic brake cylinder and lines.</li> </ul> <div style="text-align: center;">  <p><b>WARNING</b></p> </div> <ul style="list-style-type: none"> <li>• DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.</li> <li>• Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. Failure to do so may result in injury to personnel.</li> </ul>	<p>a. Class III hydraulic fluid leaks are evident. Any brake fluid or fuel leaks are evident. Damaged or missing parts are noted.</p>



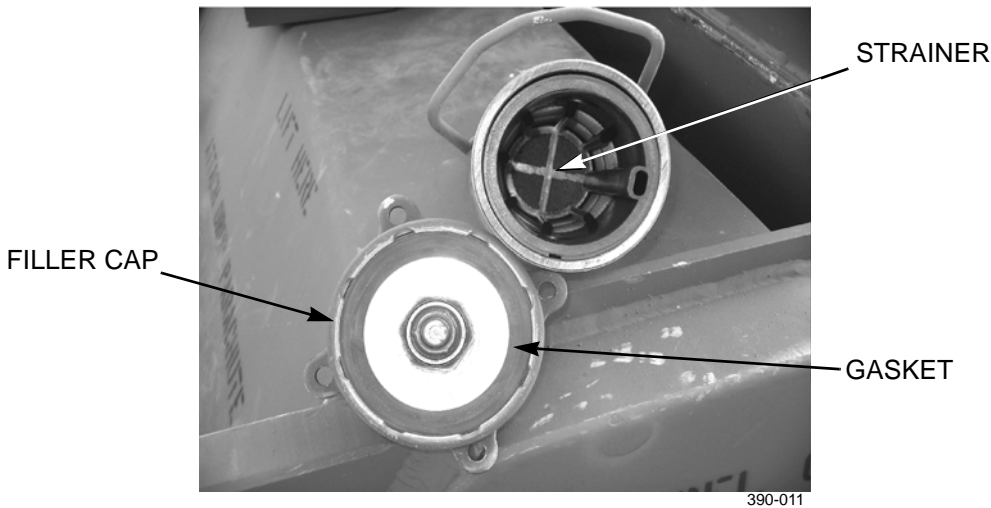
**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
53 (Con't)	After		Scraper Rear Compartment	b. Open drain valve on fuel/water separator and drain water and fuel into a suitable container. Close valve.	
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>FUEL LINE</p> <p>FUEL TANK DRAIN VALVE</p> </div> <div style="text-align: center;"> <p>BRAKE FLUID RESERVOIR</p>  <p>390-012</p> </div> <div style="text-align: center;"> <p>FUEL/WATER SEPARATOR</p> <p>AIR/HYDRAULIC BRAKE CYLINDER</p> </div> </div>					
54	After		Rear Wheel and Tire	<p>a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or underinflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.</p> <p>b. Check for loose or missing wheel studs, lug nuts, rim lock, and valve stem with cap.</p>	<p>a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.</p> <p>b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.</p>

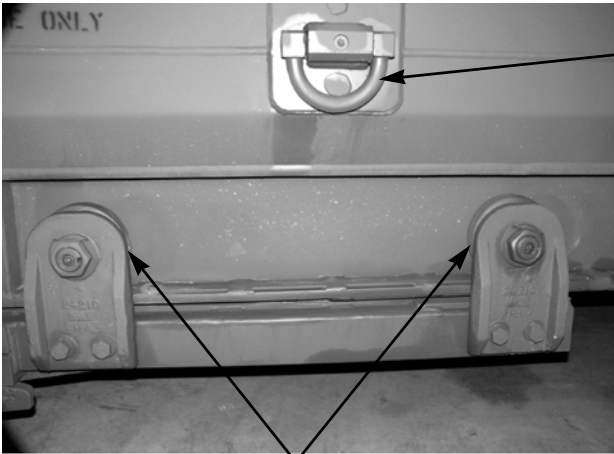

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
55	After		Ejector Carrier (Lower) Roller	Check for damage or obstructions to ejector carrier (lower) roller. Remove obstructions as needed.	Ejector carrier (lower) roller is missing or damaged.
<div style="text-align: center;">  <p style="text-align: right;">390-1054</p> </div>					
56	After		Fuel Shutoff Valve and Fuel Tank	<div style="text-align: center;">  <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• DO NOT smoke or permit any open flame in area of machine while you are servicing diesel 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.</li> <li>• Operating personnel must wear fuel-resistant gloves when handling fuels. If exposed to fuel, promptly wash exposed skin and change fuel-soaked clothing. Failure to do so may result in injury to personnel.</li> </ul> </div>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
56 (Con't)	After		Fuel Shutoff Valve and Fuel Tank	<p>a. Check for damage or fuel leaks from fuel shutoff valve.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Place portable fire extinguisher within reach prior to refueling.</li> <li>DO NOT overfill fuel tank. If fuel starts foaming from fuel tank, stop IMMEDIATELY to avoid fuel spillage.</li> </ul> <p>b. Check fuel tank filler tube and cap for damage or leaks.</p> <p>c. Clean area around fuel tank filler cap. Remove cap and inspect cap gasket for damage.</p> <p>d. Check strainer to ensure it is clean. Remove strainer and clean as required.</p> <p>e. Add fuel (Item 7, 8 or 9, WP 0026 00) to tank. Do NOT overfill. Reinstall fuel cap and secure.</p>	<p>a. Any fuel leaks are evident.</p> <p>b. Any fuel leaks or damage are noted.</p> <p>c. Fuel cap gasket is missing or damaged.</p>
					
57	After		Scraper Bowl	a. Check all right-side scraper tiedown D-rings for signs of damage and free movement.	a. D-rings are damaged, if required for mission.

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
57 (Con't)	After		Scraper Bowl	b. Check for damage to right-side bowl floor rollers.	b. Damage that would impair operation is evident.
<div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>SCRAPER TIEDOWN D-RING</p> <p>FLOOR ROLLERS</p> </div> </div>					
				c. Check that draft arm pin and retainer bar are secure. Tighten if loose.	
				 <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.</li> <li>• Hitch and steering movement can reduce clearances suddenly and cause personnel injury.</li> </ul>	
				<p align="center"><b>NOTE</b></p> <p>To ensure an accurate reading, tractor must be parked on level ground, with transmission at operating temperature and engine running at idle speed.</p>	
58	After	0.1 Hours	Transmission Oil Level Check	<p>a. Start engine (WP 0005 00).</p> <p>b. Ensure transmission is in N (Neutral) and locked and parking brake is applied. Ensure bowl is lowered to the ground. Move ejector all the way forward.</p>	

## TRANSMISSION OIL FILL



**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**


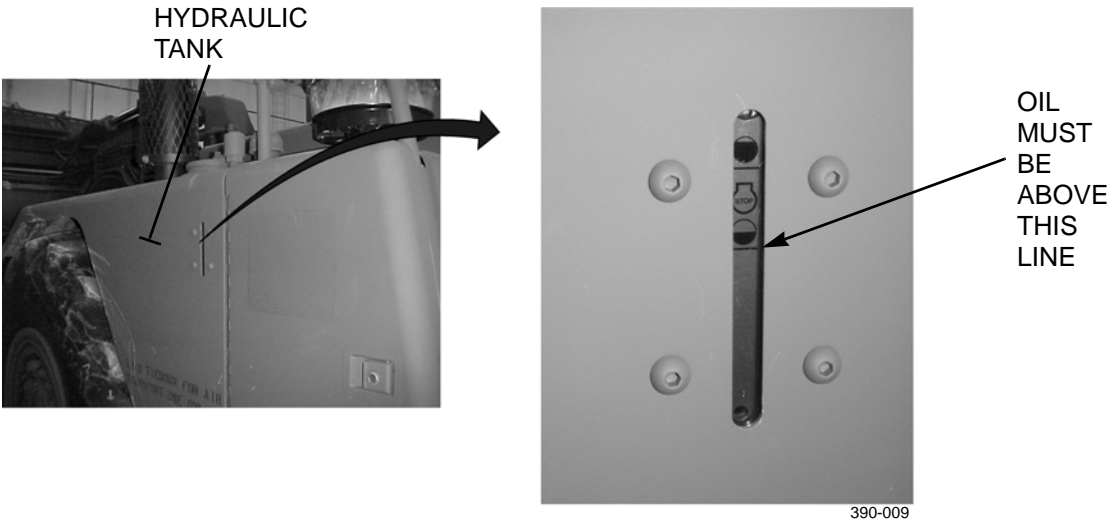
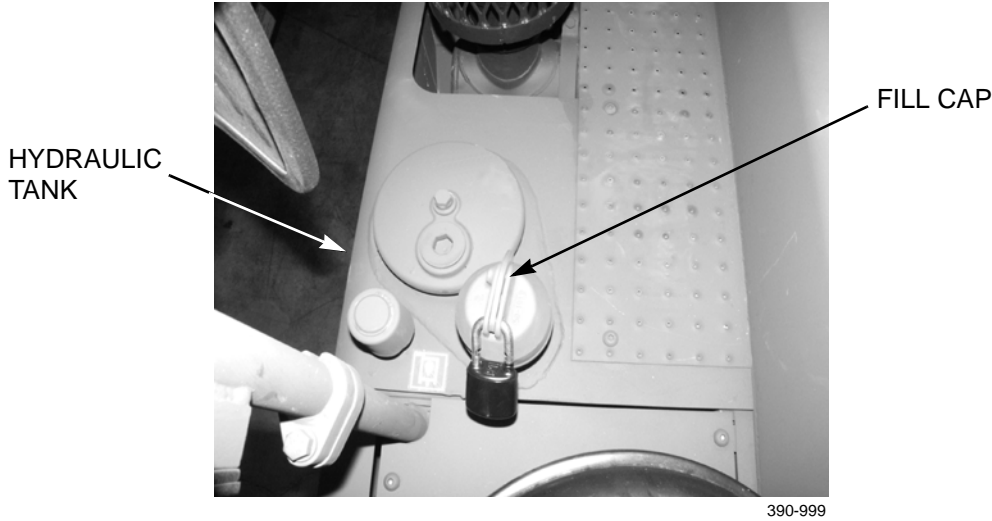
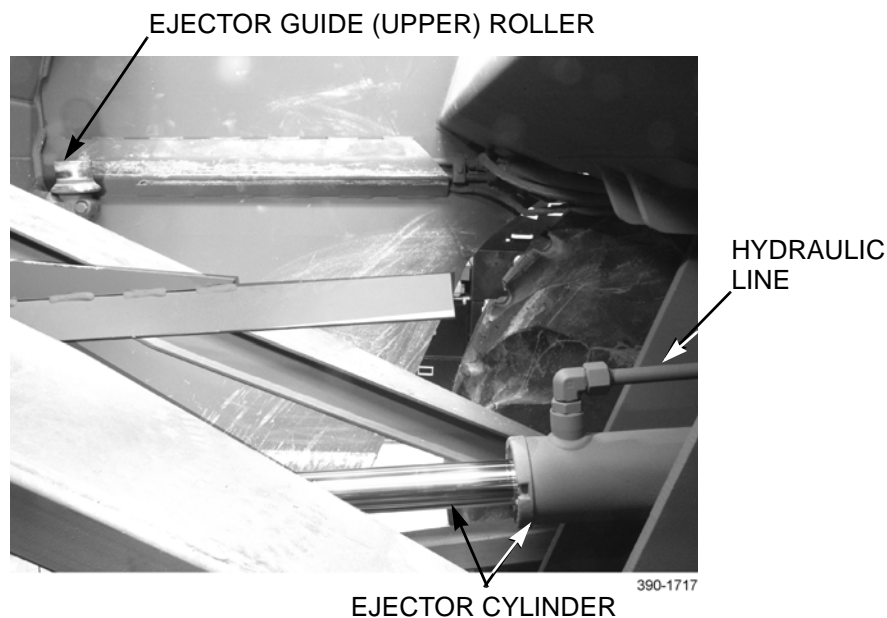
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
58 (Con't)	After	0.1 Hours	Transmis- sion Oil Level Check	(3) Remove dipstick and check oil level. Level should be within cross-hatched area, between ADD and FULL marks, on dipstick.	
					
59	After		Brake Fluid Reservoir	(4) Add oil (Item 11, 15, 18 or 19, WP 0026 00) as required through filler opening. Do NOT overfill. Reinstall fill cap.  Check that brake fluid reservoir, mounted inboard of tractor's right-side fender, is securely mounted with no evidence of brake fluid leaks.	Any brake fluid leaks are evident.
60	After		Front Wheel and Tire	a. Visually check tire for cuts or bulges in tread or sidewall area. Check for uneven wear or underinflation. Look for stones or other foreign material embedded in tread or sidewall area. Remove stones or other foreign material if found.  b. Check for loose or missing wheel studs, lug nuts, rim lock, and valve stem with cap.  c. Check for oil leaks from final drive at wheel end.  d. Check fender for damage.	a. Tire has cuts or bulges in tread or sidewall area or other damage that would impair operation.  b. Missing wheel studs, lug nuts, rim lock or damaged valve stem are noted.  c. Class III oil leaks are evident.
61	After	0.1 Hours	Hydraulic Tank Oil Level Check	a. Visually check for damage or leaks.  b. Perform hot check of hydraulic oil level with ejector all the way forward, bowl lowered to the ground, engine idling, and hydraulic oil at operating temperature. Oil level must be above bottom line on sight gage.	a. Class III leaks are evident.

Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
61 (Con't)	After	0.1 Hours	Hydraulic Tank Oil Level Check	 <p>HYDRAULIC TANK</p> <p>OIL MUST BE ABOVE THIS LINE</p> <p>390-009</p>	
				<p>c. If oil is required, clean area around fill cap and tube. Lift cap tab and remove cap. Add oil (Item 11 or 15, WP 0026 00) and replace cap and secure.</p>  <p>HYDRAULIC TANK</p> <p>FILL CAP</p> <p>390-999</p>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
62	After		Cab Exterior	a. Check for damage to side mirror, handrails, steps, and grabhandles.  b. Check both tiedown D-rings on right side of tractor for signs of damage and free movement.	a. Damage that would interfere with visibility and impair operation is evident.  b. D-rings are damaged, if required for mission.
63	After		Ejector Hydraulic Cylinder and Ejector Guide Rollers	<p align="center"><b>NOTE</b></p> <p align="center">Assistance is required to perform PMCS item number 63.</p> a. With ejector all the way forward, check for damage or evidence of leaks from ejector hydraulic cylinder and line.  b. Check for damage or obstructions to ejector guide (upper) roller on each side of bowl. Remove obstructions as needed.	a. Damage or Class III leaks are evident.  b. Ejector guide (upper) roller is missing or damaged.





**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
64	After		Service Brake Test	WARNING	
				BE ALERT for personnel in the area while operating machine. Always check to ensure area is clear of personnel and obstructions before starting engine, moving machine or lowering or raising scraper bowl. Failure to follow this warning may result in serious injury or death to personnel or damage to equipment.	
				NOTE	
				If the tractor begins to move during service brake test, reduce engine speed immediately and engage parking brake.	
				Perform the following service brake test:	Machine moves with engine RPM less than 1200 RPM.
				(1) Ensure area around machine is clear of all personnel and obstacles.	
				(2) Test brakes on dry level surface.	
				(3) Fasten seat belt before testing brakes.	
				(4) Ensure air system is at operating pressure of 125 +/- 10 psi (862 +/- 69 kPa).	
				(5) Raise bowl.	
				(6) Apply service brakes and release parking brake.	
				(7) With engine at idle with service brakes applied, move transmission control lever to forward speed position 2.	
				(8) Gradually increase engine RPM. Service brakes should prevent machine movement with engine running at 1200 +/- 100 RPM.	

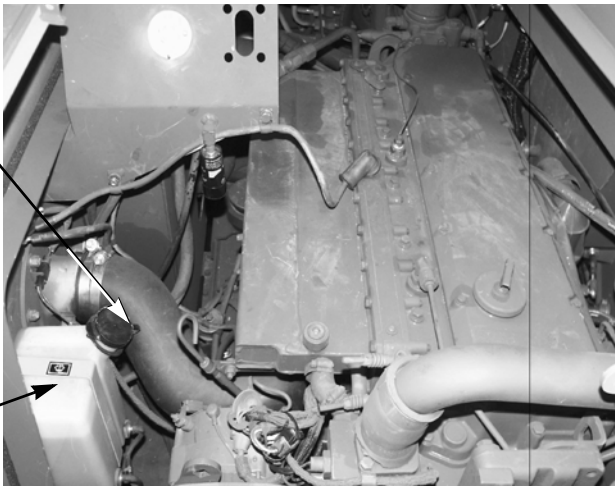
**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
65	After		Parking Brake Test	<p align="center"><b>NOTE</b></p> <p>If machine begins to move during parking brake test, reduce engine speed immediately and engage service brakes.</p> <ol style="list-style-type: none"> <li>(1) Ensure area around machine is clear of all personnel and obstacles.</li> <li>(2) Test brakes on dry level surface.</li> <li>(3) Fasten seat belt before testing brakes.</li> <li>(4) Ensure air system is at operating pressure of 125 +/- 10 psi (862 +/- 69 kPa).</li> <li>(5) Raise bowl.</li> <li>(6) With engine at idle and parking brake applied, move transmission control lever to forward speed position 2.</li> <li>(7) Gradually increase engine RPM. Parking brake should prevent machine movement with engine running at 1000 +/- 100 RPM.</li> </ol>	Machine moves with engine RPM less than 1000 RPM.




**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
<b>65</b> (Con't)	<b>After</b>		<b>Parking Brake Test</b>	<p>(8) Move ejector to the rear and shut down engine (WP 0005 00).</p> <div> </div> <p><b>WARNING</b></p> <p>Ensure access door is securely supported in open position. Failure to do so could cause door to slam shut, causing injury to personnel.</p>	
<b>66</b>	<b>After</b>		<b>Engine Compartment</b>	<p>a. Loosen retainer, open engine access door, and secure door open with latch rod.</p> <p>b. Place battery disconnect switch in OFF position.</p> <p>c. Check engine compartment for evidence of fluid leakage such as oil, coolant, and fuel.</p> <p>d. Check engine compartment for any of the following conditions. Notify Unit Maintenance as needed:</p> <ul style="list-style-type: none"> <li>(1) loose or damaged coolant hoses;</li> <li>(2) damaged electrical harnesses; and</li> <li>(3) damaged cooling fan or clogged radiator.</li> </ul> <p>e. Ensure engine air filter service indicator shows green or yellow and is not damaged. Service air cleaner if red band is showing (WP 0015 00).</p>	<p>c. Class III oil leaks are evident. Any coolant or fuel leaks are evident.</p> <p>d. Damage that would impair operation is evident.</p>


**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

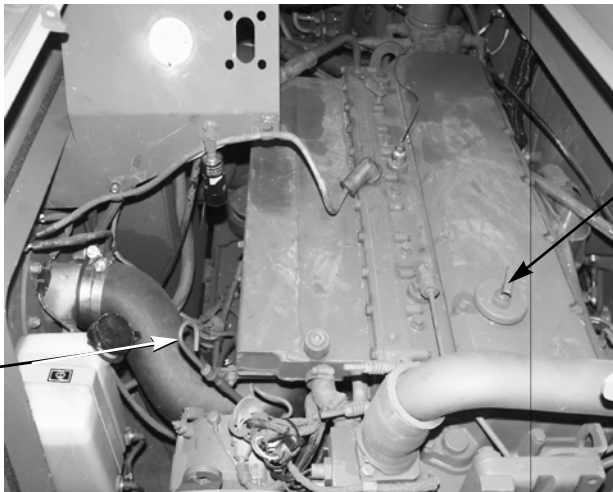
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
67	After		Windshield Washer Fluid Reservoir	If fluid level is low, remove cap and add windshield cleaning compound (Item 4, WP 0026 00) through filler opening of reservoir. Reinstall cap.	
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>RESERVOIR CAP</p> <p>WINDSHIELD WASHER FLUID RESERVOIR</p> </div>  </div> <p style="text-align: right; margin-right: 50px;">390-008</p>					
68	After		Drive Belts	<p>a. Check for loose, missing, frayed or cracked drive belts.</p> <p>b. Check for loose or damaged drive pulleys.</p> <p>c. Locate battery cables that are routed into engine compartment from engine air cleaner and battery compartment. Check for missing, broken, split or frayed battery cables.</p>	<p>a. Drive belt is loose, missing or damaged.</p> <p>b. Pulley is damaged.</p> <p>c. Cable is missing or damaged.</p>

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
69	After		Batteries	<div style="display: flex; align-items: center; justify-content: center;">   <div style="margin: 0 10px;">WARNING</div>  </div> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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 death or serious injury to personnel.</li> <li>• DO NOT use compressed air to clean batteries. Use a clean, dry rag. Failure to do so may cause injury to personnel.</li> </ul> <p align="center"><b>CAUTION</b></p> <p>To reduce battery damage, check battery compartment for corrosion (greenish/white powder) and do NOT jerk or pull on battery cables during visual inspection.</p> <div style="display: flex;"> <div style="flex: 1;"> <p>a. Access batteries inside engine air cleaner and battery compartment.</p> <p>b. Check hold-down for looseness or damage.</p> <p>c. Inspect batteries for a cracked case and evidence of leaking.</p> </div> <div style="flex: 1;"> <p>b. Hold-down is loose or damaged.</p> <p>c. Battery case is cracked or leaks are evident.</p> </div> </div> <p align="center"><b>NOTE</b></p> <p>If machine is equipped with original equipment maintenance-free batteries, batteries will have no filler caps.</p> <div style="display: flex;"> <div style="flex: 1;"> <p>d. Check for damaged or missing battery filler caps.</p> <p>e. Check for missing, broken, split or frayed battery cables.</p> <p>f. Check for damaged battery posts.</p> <p>g. Check for rust, corrosion, and cleanliness.</p> <p>h. Report any problems to Unit Maintenance.</p> </div> <div style="flex: 1;"> <p>d. Damaged or missing filler caps are noted.</p> <p>e. Damage is noted.</p> <p>f. Damage is noted.</p> </div> </div>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

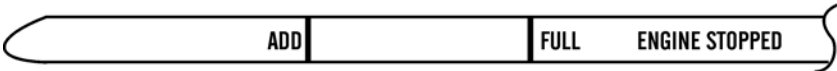

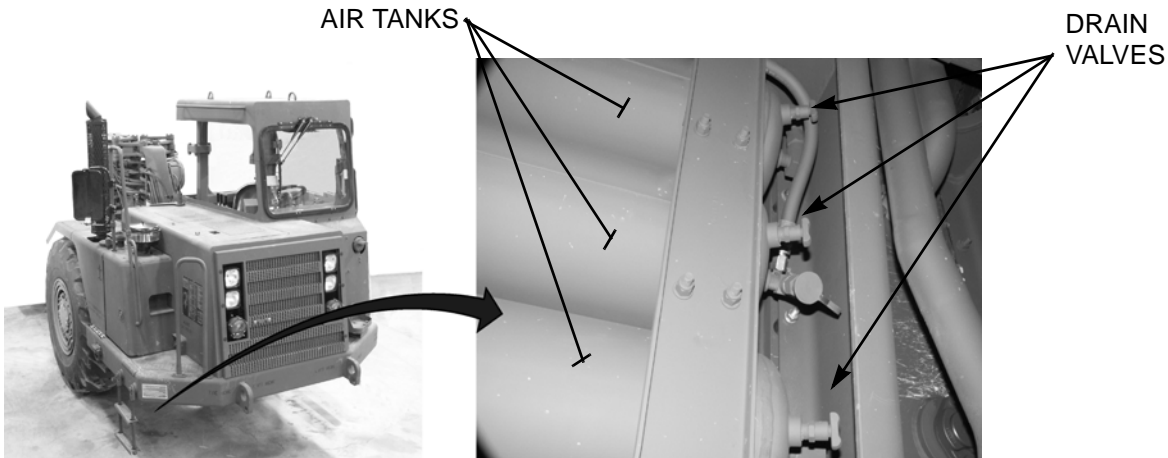
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
70	After		Engine Air Precleaner	<div></div> <div>WARNING</div> <ul style="list-style-type: none"><li>• If NBC exposure is suspected, personnel wearing protective equipment should handle all air cleaner media. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.</li><li>• NBC contaminated filters must be handled using adequate precautions (FM 21-40) and must be disposed of by trained personnel.</li></ul> <div>Clean engine air precleaner if debris is visible in precleaner (WP 0015 00).</div>	
71	After	0.1 Hours	Engine Oil Level Check	<div>NOTE</div> <div>To ensure an accurate reading, machine must be parked on level ground. Wait 10 minutes after shutting down engine to allow oil to drain into crankcase.</div> <div>a. Clean area around engine dipstick and fill cap.</div>	



390-008

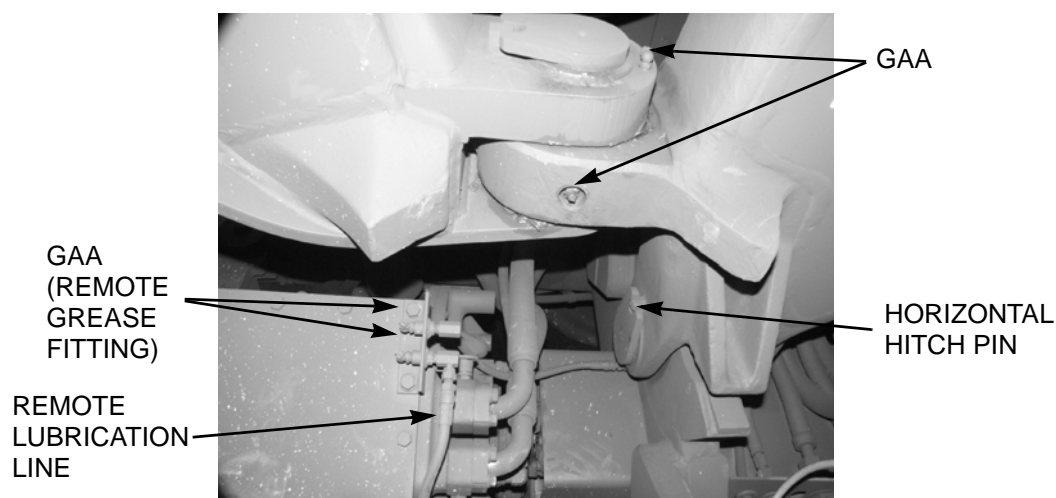
				<div>b. Remove dipstick, clean, and reinstall. Remove dipstick and check level of oil on dipstick. Level should be between ADD and FULL.</div>	
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Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
71 (Con't)	After	0.1 Hours	Engine Oil Level Check		
					
72	After		Air System Tanks	<p>c. Add oil (Item 11, 16 or 17, WP 0026 00) as required through filler opening. Reinstall fill cap.</p> <p>d. Close engine compartment access door and tighten retainer to secure door closed.</p> <p>a. Check air tanks, lines, and valves under right side of tractor for damaged or missing parts.</p> <div>  </div> <p><b>WARNING</b></p> <p>Wear suitable eye protection and keep face and eyes away from exhausting air tank drain valves. Failure to do so may cause personnel injury.</p> <p>b. Open drain valve on each air tank to drain all moisture and sediment. Check for oil in draining air. If oil is noted, notify Unit Maintenance. Close drain valves.</p>	<p>a. Damage that would impair operation is evident.</p>
<div>  </div>					


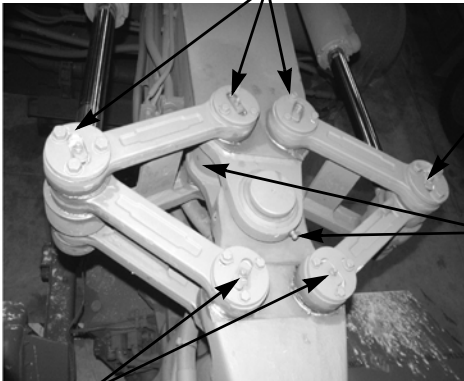
**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/ SERVICE		
73	After		Hydraulic Oil Cooler and Radiator	<p align="center"><b>NOTE</b></p> <p>If there is an accumulation of debris at hydraulic oil cooler and radiator, engine grille must be removed to allow a thorough cleaning. Notify Unit Maintenance.</p> <p>Visually check oil cooler and radiator for signs of leakage or damage.</p>	Damage that would impair operation is evident.
74	After	0.5 Hours	Hitch and Steering Linkage	<p align="center"><b>WARNING</b></p> <p>Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.</p> <p align="center"><b>NOTE</b></p> <ul style="list-style-type: none"><li>• Park machine on level ground, with parking brake applied, transmission in N (Neutral) and locked, bowl lowered to the ground, wheels blocked, and engine off.</li><li>• If any remote lubrication lines are damaged, notify Unit Maintenance. These lines must be filled with grease.</li></ul> <p>a. Apply GAA grease (Item 10, WP 0026 00) to two remote horizontal hitch pin grease fittings, mounted on top of transmission.</p> <p>b. Apply GAA grease (Item 10, WP 0026 00) to two lower hitch bearing grease fittings.</p>	









**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
74 (Con't)	After	0.5 Hours	Hitch and Steering Linkage	<p>c. Apply GAA grease (Item 10, WP 0026 00) to three upper hitch bearing grease fittings.</p> <p>d. Apply GAA grease (Item 10, WP 0026 00) to ten steering link grease fittings.</p>	
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>GAA (HITCH)</p>  </div> <div style="text-align: center;"> <p>GAA (STEERING)</p>  </div> </div>					
75	After	0.5 Hours	Elevator Assembly	<p style="text-align: center;"><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Park machine on level ground, with parking brake applied and bowl lowered to the ground.</li> <li>• Obtain appropriate measuring device from Unit Maintenance, to measure elevator chain slack in step a.</li> </ul>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
75 (Con't)	After	0.5 Hours	Elevator Assembly	a. Inspect elevator chain for correct slack. Take measurement approximately half way between upper sprocket and lower idler, at widest space between edge of elevator frame and upper side of chain. Chain slack must be 5-9 in. (127-229 mm). Notify Unit Maintenance if adjustment is required.	
				 <p>5-9 IN. (127-229 MM)</p> <p>390-992</p>	
				b. Apply GAA grease (Item 10, WP 0026 00) to grease fitting at elevator chain adjustment idler, on each side of elevator frame.	
				 <p>GAA</p> <p>390-987</p>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
75 (Con't)	After	0.5 Hours	Elevator Assembly	c. Apply GAA grease (Item 10, WP 0026 00) to grease fitting at elevator chain idler, on each side of lower end of elevator frame.	
				 <p>390-986</p>	
				d. Apply GAA grease (Item 10, WP 0026 00) to grease fitting on bracket, on each side of elevator linkage at bottom.	
				 <p>390-988</p>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**


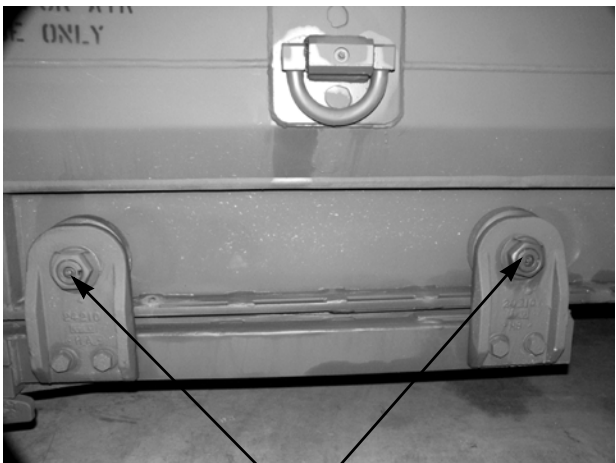




ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
75 (Con't)	After	0.5 Hours	Elevator Assembly	e. Apply GAA grease (Item 10, WP 0026 00) to grease fitting on hanger, on each side of elevator linkage at top.	
 <p>390-989</p>					
76	After	0.5 Hours	Floor Rollers	Apply GAA grease (Item 10, WP 0026 00) to grease fitting of each floor roller, two on each side of scraper.	
 <p>390-981</p> <p>GAA</p>					

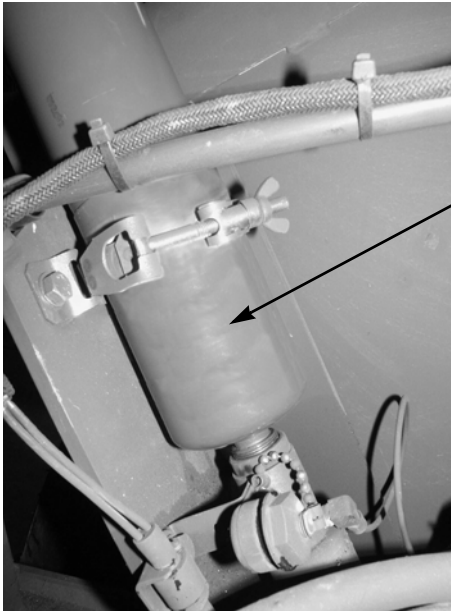
Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
77	After	0.4 Hours	Ejector Support Rollers	<p>a. Clean debris from each ejector support roller and inspect roller for damage or misalignment in track. Clean roller grease fitting.</p> <p>b. Apply GAA grease Item 17, WP 0026 00) to each ejector support roller grease fitting. Wipe fitting clean after lubrication.</p>	



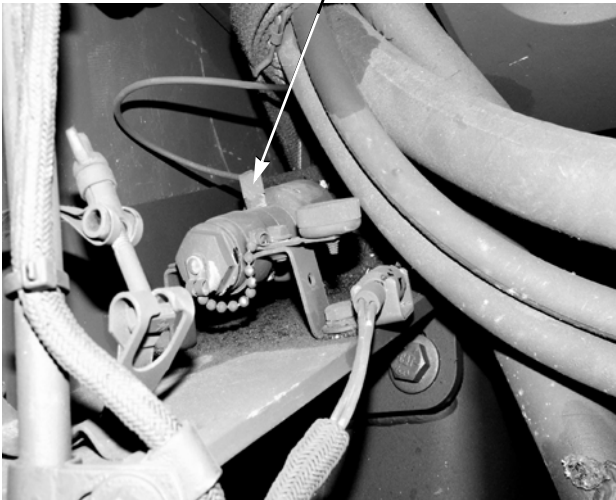
Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
78	Weekly		Ether Cold Start System	<div><b>WARNING</b></div> <p>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 death or serious injury to personnel.</p> <div><div>a. Check for loose connections and damage to lines, fittings, and ether canister. Ensure canister is securely mounted. Be alert for odor of leaking ether.</div><div>b. Check and install protective cap on fitting when ether canister is not installed.</div><div>a. Damage or evidence of leaks are noted. Ether canister is missing, if required for mission.</div></div>	



390-1274

PROTECTIVE CAP  
(ETHER CANISTER NOT INSTALLED)



390-1716

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
79	Weekly		Exhaust System	Check exhaust system pipes, clamps, and muffler for looseness, leakage, and damage.	Damage or leaks are noted.
80	Weekly		ROPS/FOPS	<p>a. Check ROPS/FOPS for loose, damaged or missing mounting hardware. Notify Unit Maintenance to re-torque/ replace mounting hardware.</p> <p>b. Check ROPS/FOPS for any signs of cracking in base metal or welded areas.</p>	<p>a. Loose, damaged or missing mounting hardware is noted.</p> <p>b. Any signs of damage or cracked welds are noted.</p>
81	Weekly		Brake Air System Pressure Test	<p>Perform the following test of brake air system:</p> <ol style="list-style-type: none"> <li>(1) Start engine and allow air pressure to reach 125 +/- 10 psi (862 +/- 69 kPa).</li> <li>(2) Apply and hold service brake pedal. Shut down engine.</li> <li>(3) Reading on air pressure gage should not drop more than 5 psi (34 kPa) after the engine is stopped for 10 minutes.</li> </ol>	Drop of air pressure is greater than 5 psi (35 kPa) in ten minutes.
82	Weekly		Brake Air System EMS Action Alarm Test	<p>Perform the following test of brake air system EMS action alarm:</p> <ol style="list-style-type: none"> <li>(1) Start engine and allow air pressure to reach 125 +/- 10 psi (862 +/- 69 kPa).</li> <li>(2) Shut down engine but leave ignition switch on. Ensure transmission is in N (Neutral) and parking brake is engaged.</li> </ol>	EMS action alarm does not sound at 65 psi (450 kPa).



### WARNING


If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

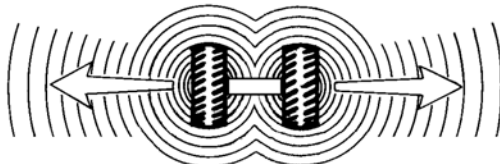
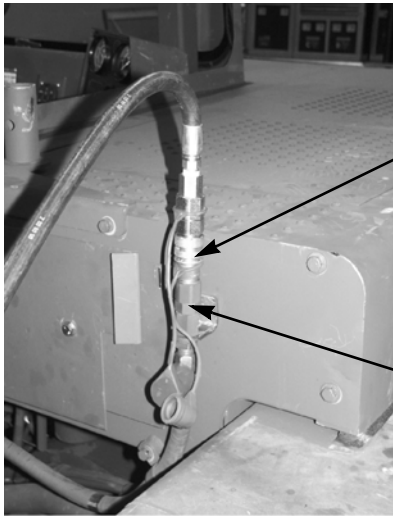
ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
82 (Con't)	Weekly		Brake Air System EMS Action Alarm Test	<p>(3) Apply and release service brake pedal until air pressure drops to 65 psi (448 kPa). EMS brake air pressure indicator light and EMS action light should illuminate. EMS action alarm should sound.</p> <p>(4) Notify Unit Maintenance of any malfunction.</p>	




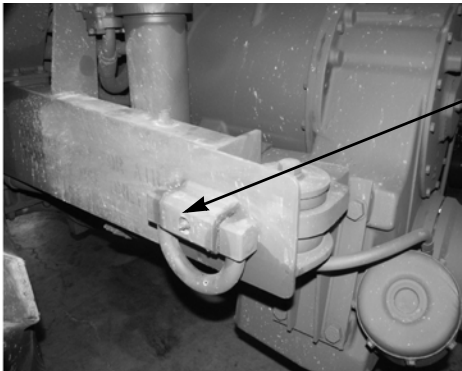

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
83	Monthly		Wheels and Tires	<p>a. Check if lug nuts are loose. Notify Unit Maintenance to re-torque lug nuts.</p> <p align="center"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>Operating machine with underinflated or defective tire may lead to tire failure and loss of traction or control. Damage to equipment or injury to personnel may result.</li> <li>If tire pressure is 36 psi (248 kPa) or less, do NOT inflate. Notify Unit Maintenance. Failure to do so could result in injury or death to personnel.</li> </ul> <p>b. Park machine so that valve stem is between 10 and 2 o'clock.</p> <p>c. Clean area around valve stem, then remove valve stem cap.</p>	a. Lug nuts are loose.
				 <p>390-1006</p>	
				d. Gage air pressure in each tire with tire pressure gage (Item 8, Table 2., WP 0024 00). Tire inflation should be 45 psi (310 kPa).	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
83 (Con't)	Monthly		Wheels and Tires	<div><div>WARNING</div><p>Use a self-inflating chuck and stand at a distance behind tire when inflating tire. Failure to do so could result in injury or death to personnel.</p><p>e. Adjust air pressure in tire as required to 45 psi (310 kPa), using pneumatic tire inflation hose assembly (Item 10, Table 2., WP 0024 00). Connection point to machine's air supply is quick disconnect fitting at rear of hood on right side of tractor.</p><p>f. Install valve stem cap.</p></div>	
<div><div><p>390-1712</p></div><div><p>TIRE INFLATION HOSE ASSEMBLY</p><p>AIR CHUCK QUICK DISCONNECT</p><p>390-1388</p></div></div>					
84	Monthly	0.5 Hours	Tiedown D-Rings	Lubricate all tiedown D-rings on each side of tractor and scraper bowl (total of 12 grease fittings: 4 on tractor; 8 on scraper) with GAA grease (Item 10, WP 0026 00).	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
84 (Con't)	Monthly	0.5 Hours	Tiedown D-Rings		
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>GAA</p> </div> <div style="text-align: center;">  <p>GAA</p> </div> </div> <p style="text-align: center;"><b>TRACTOR D-RINGS - LEFT SIDE</b></p> <p style="text-align: right;">390-1002</p>					
85	Monthly		Cab Windshield Latches	Unlatch and open windshield to ensure it operates freely. Close and latch.	
86	Monthly		All Systems-Machine Exercise	<div style="text-align: center;">  <p><b>WARNING</b></p> <p>If machine is parked indoors, DO NOT run engine unless exhaust fumes are vented to the outside. Failure to follow this warning may cause injury or death due to carbon monoxide poisoning.</p> <p><b>CAUTION</b></p> <p>Do NOT perform this PMCS exercise when temperature is below 0°F (-18°C). Damage to equipment may result.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Do NOT exercise machine if it has been operated within the past month.</li> <li>Ensure Before (B) operation PMCS has been performed.</li> </ul> <div style="display: flex;"> <div style="flex: 1;"> <p>a. Start engine and run at idle for five minutes.</p> <p>b. While machine is warming up, perform a walkaround inspection, checking for evidence of leaks.</p> </div> <div style="flex: 1;"> <p>b. Class III oil or hydraulic leaks are evident. Any brake fluid, fuel or coolant leaks are evident.</p> </div> </div> </div>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
86 (Con't)	Monthly		All Systems-- Machine Exercise	<p align="center"><b>NOTE</b></p> <p>If temperature is below 32°F (0°C), operate controls prior to moving machine.</p> <p>c. After machine has idled for five minutes, begin to operate <u>all</u> controls slowly:</p> <p>(1) transmission in all ranges including reverse;</p> <p>(2) differential lock engaged and disengaged;</p> <p>(3) parking and service brakes applied and released;</p> <p>(4) steering from full left to full right; and</p> <p>(5) all scraper hydraulic controls (bowl, ejector, floor, and elevator circuits).</p> <p>d. Operate controls for another five minutes.</p> <p>e. Move machine and operate all controls through full motion, to bring all systems to operating temperature.</p> <p>f. Move machine and continue to operate all controls through full motion for 30 minutes <u>after</u> machine systems have reached operating temperature.</p> <p>g. Stop machine and allow to idle for five minutes.</p> <p>h. Shut down engine.</p> <p>i. Perform <i>After</i> operation PMCS.</p>	

**Table 1. Preventive Maintenance Checks and Services (PMCS) for 613CS Scraper - Continued.**

ITEM NO.	INTERVAL	MAN-HOURS	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			ITEM TO CHECK/SERVICE		
87	Monthly		Shipping and Storage Container	<p>a. Inspect container face/skin for breaks, holes, cracks, and dents.</p> <p>b. Inspect doors, including HAZMAT access door, for loose, damaged or missing latching/locking mechanisms. Ensure that hinges on single-door and two-door ends of container open and close freely, without binding.</p> <p>c. Inspect lifting and winching rings for security of mounting.</p> <p>d. Ensure folding steps are present, securely mounted, and move freely into folded and unfolded positions.</p>	<p>a. Face/skin has damage that weakens integrity of container, if required for mission.</p> <p>b. Door has damage that impairs operation; door cannot be closed and secured, if required for mission.</p> <p>c. Rings are loose, damaged or missing, if required for mission.</p> <p>d. Steps are loose or missing, if required for mission.</p>
88	Monthly		Data Plates, Decals, and Stencils	Inspect date pages, decals, and stencil for presence and legibility (WP 0009 00).	Any warning plate, decal or stencil is missing or NOT legible.

**END OF WORK PACKAGE**

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**ENGINE AIR PRECLEANER AND AIR CLEANER ASSEMBLY SERVICING**

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**0015 00****THIS WORK PACKAGE COVERS**

Engine Air Precleaner Cleaning  
Engine Air Cleaner Assembly Servicing

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**INITIAL SETUP****Materials/Parts**

Detergent (Item 6, WP 0026 00)  
Rag, wiping (Item 20, WP 0026 00)

**Equipment Condition**

Engine off

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**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. Failure to follow this warning may result in illness or death to personnel.
- NBC contaminated filters must be handled using adequate precautions (FM 21-40) and must be disposed of by trained personnel. Failure to follow this warning may result in illness or death to personnel.

**CAUTION**

Service engine air precleaner and air cleaner assembly with engine stopped. Engine damage could result if service is performed with engine running.

**ENGINE AIR PRECLEANER CLEANING**

1. If precleaner is full of debris, remove wingnut and cover from housing of precleaner.

**NOTE**

DO NOT clean precleaner with air pressure.

2. Remove housing of precleaner. Empty debris, wipe clean, and reinstall housing.
3. Install cover and secure with wingnut.



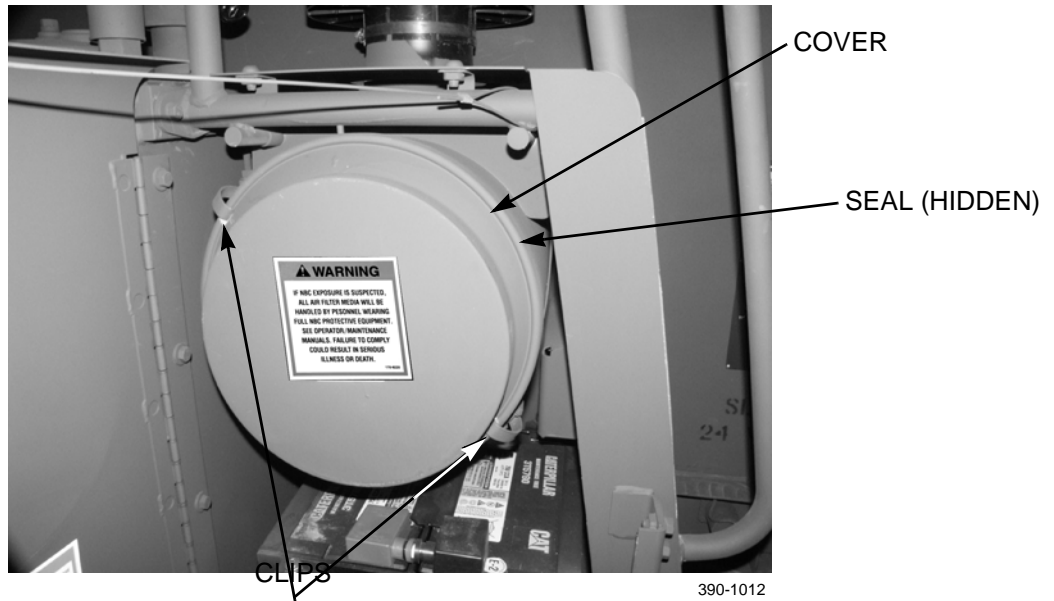
390-982

**ENGINE AIR CLEANER ASSEMBLY SERVICING**

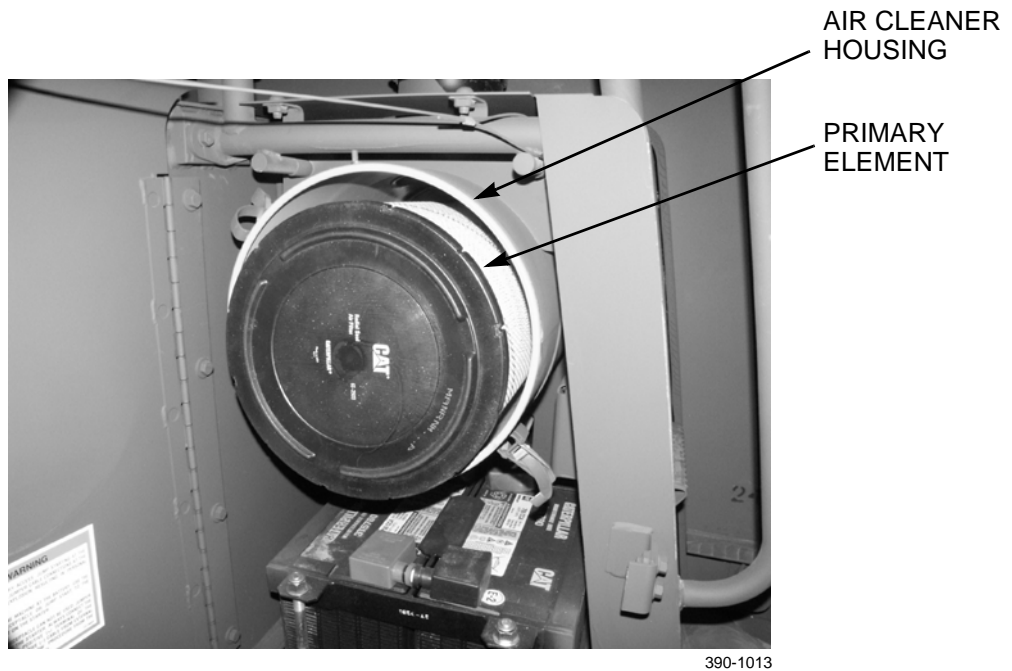
1. Access air cleaner inside compartment on right side of tractor.
2. Release two clips on cover. Remove cover.
3. Inspect cover seal for damage. If damaged, notify Unit Maintenance to obtain replacement cover and/or seal.



**ENGINE AIR CLEANER ASSEMBLY SERVICING - CONTINUED**



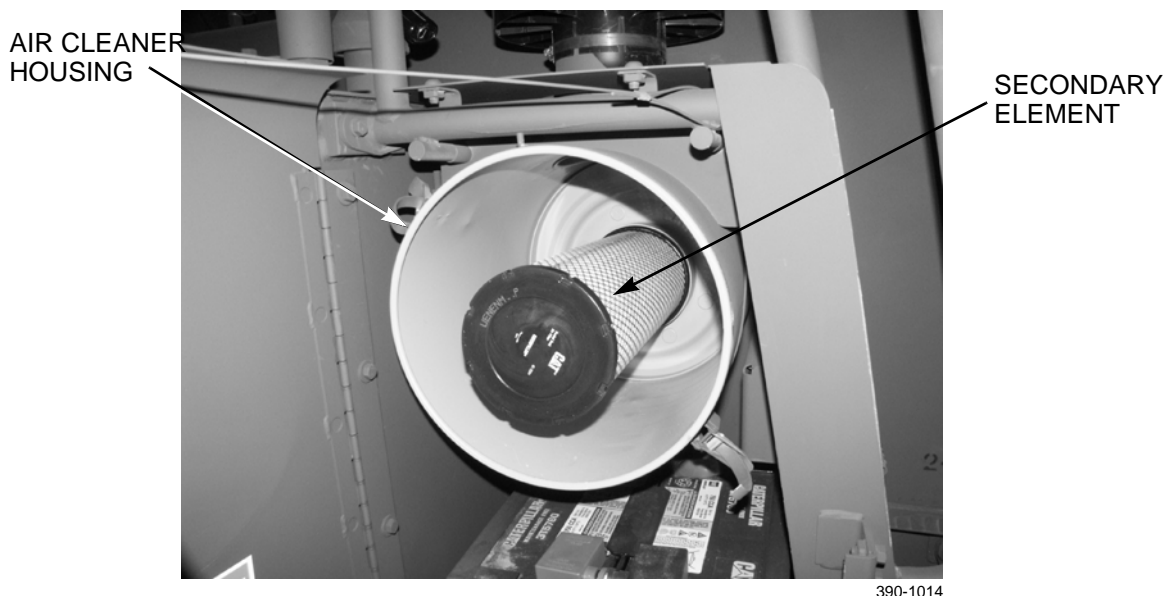
4. Remove primary element from air cleaner housing.



**ENGINE AIR CLEANER ASSEMBLY SERVICING - CONTINUED****NOTE**

Replace secondary element every third primary element replacement.

5. Remove secondary element from air cleaner housing. Obtain a replacement if damaged or if primary element is being replaced for the 3rd time.
6. Wipe inside of air cleaner housing clean with a rag.

**CAUTION**

DO NOT use a damaged primary element. Engine damage can result.

7. Inspect primary element. If pleats or seals are damaged, discard primary element.

**NOTE**

A primary element may be cleaned a maximum of six times. Also replace primary element if it has been in service for one year.

8. If primary element is OK, clean as follows:

**ENGINE AIR CLEANER ASSEMBLY SERVICING - CONTINUED****WARNING**

Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Pressurized water used for cleaning purposes should not exceed 40 psi (276 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.

**NOTE**

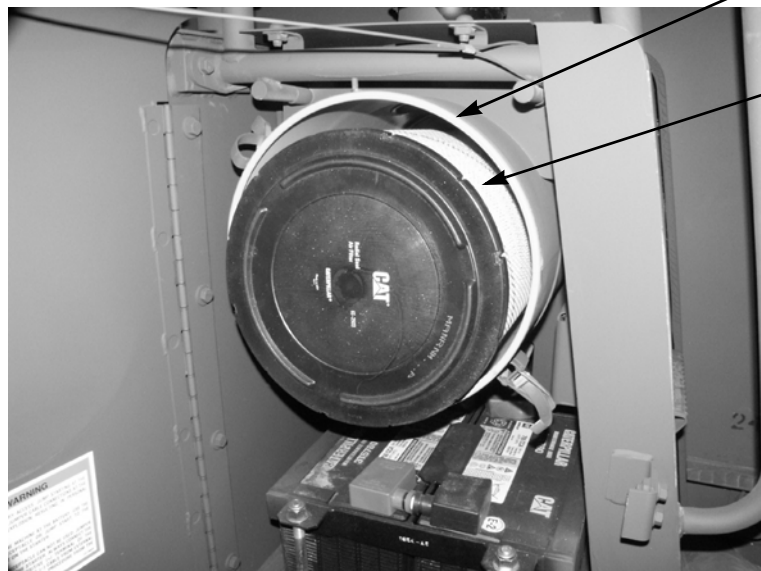
DO NOT clean primary element by tapping or bumping element.

- a. Use compressed air or pressurized water. Clean inside and outside pleats by directing stream along pleats.
  - b. A solution of detergent and water may be used as required. Fully rinse pleats.
  - c. Allow primary element to air dry completely.
9. Inspect primary element again. If pleats or seals are damaged, discard primary element and obtain a replacement.
  10. Install secondary element inside air cleaner housing.

**NOTE**

Primary element must be completely dry before installation.

11. Install primary element inside air cleaner housing.



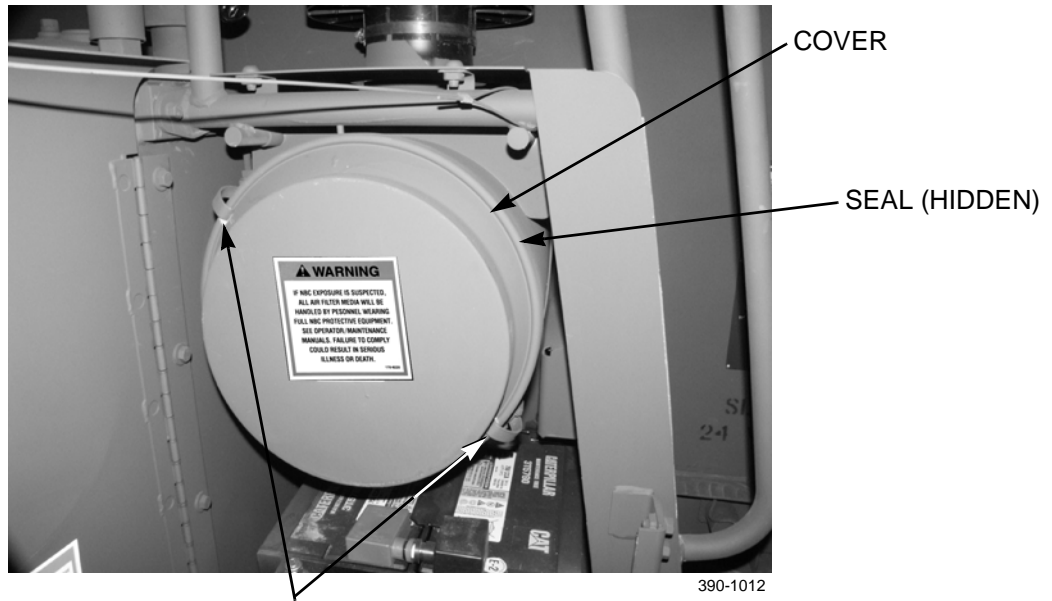
AIR CLEANER  
HOUSING

PRIMARY  
ELEMENT

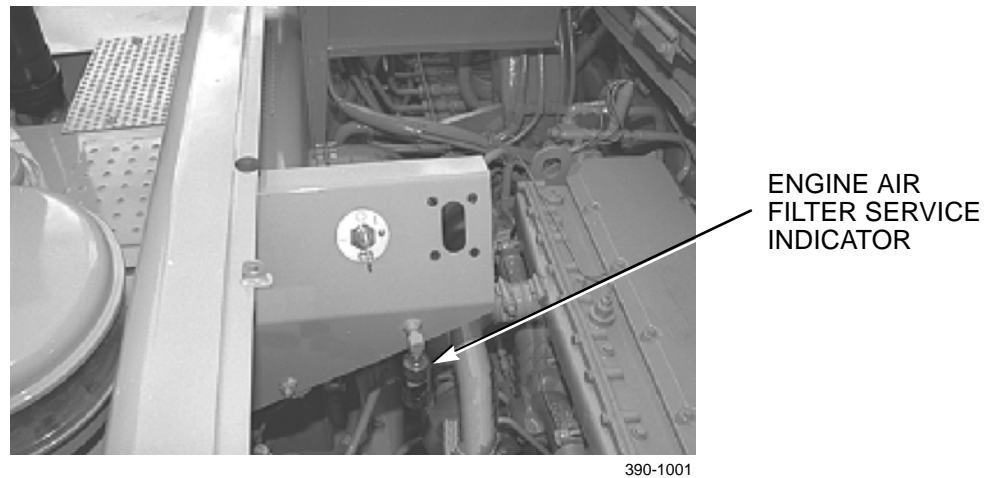
390-1013

**ENGINE AIR CLEANER ASSEMBLY SERVICING - CONTINUED**

12. Clean cover and install. Index arrow and notch on cover with tab on air cleaner housing. Secure cover with two clips.



13. Reset air filter service indicator by pushing in on bottom of indicator.



14. Start engine.
15. If air filter service indicator shows green or yellow, service is complete.
16. If indicator shows red or if engine exhaust smoke is black, repeat steps and replace secondary element.

**END OF WORK PACKAGE**

## **CHAPTER 5**

### **PREPARATION FOR TRANSPORT**

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**PREPARATION FOR TRANSPORT INTRODUCTION**

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**0016 00****INTRODUCTION**

1. This chapter describes how to prepare the scraper for the following modes of transport:
  - a. external air transport by CH-47 helicopter - machine sectionalized (WP 0017 00);
  - b. air transport by C-130 aircraft - machine reconfiguration and drive-on and drive-off procedures (WP 0018 00);
  - c. airdrop by C-130 aircraft - machine reconfigured and rigged on an air delivery platform (WP 0019 00);
  - d. marine transport - roll-on/roll-off (RO/RO) procedures (WP 0020 00);
  - e. rail transport - procedures for CONUS and OCONUS countries (WP 0021 00); and
  - f. highway transport - using commercial trailers only (WP 0022 00).
2. C-17 and C-5 aircraft can transport the scraper without any reconfiguration required. Machine is driven on and off aircraft in accordance with loadmaster instructions.
3. Assistance from two Unit Maintenance mechanics is required to prepare the scraper for transport.

**TOOLS AND EQUIPMENT****CAUTION**

Do NOT deliver container by airdrop. Failure to follow this caution will damage container and its contents.

1. Tools and equipment required to prepare the machine for transport are contained in an ISU-60 container. For a complete listing of these tools and equipment, refer to Table 1 in WP 0024 00.
2. Some tools from the BII are also used (Table 2, WP 0024 00).
3. Components of the machine that must be removed in preparation for transport are stowed on the machine, in the ISU-60 container, in the BII toolbox or, in the case of airdrop by C-130, they may be stowed on the air delivery platform.

**END OF WORK PACKAGE**

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**INTRODUCTION**

1. This work package describes how to prepare the scraper for external air transport by CH-47 helicopter, and how to return machine to operational configuration after external air transport.
2. Due to weight restrictions, the tractor and scraper must be sectionalized (separated) to accomplish external air transport. Selected components are also removed from the tractor to further reduce weight of the tractor. Once separated, tractor and scraper are each separately rigged with sling legs and lifted by CH-47 helicopter.
3. The level of disassembly required will depend on the CH-47 mission flight profile. Prior to sectionalization, this mission flight profile must be determined. This will ensure machine is disassembled only to the degree required to meet weight requirements.
4. Amount of fuel left in machine's fuel tank must comply with guidance from Military Traffic Management Command (MTMC).
5. Assistance from two Unit Maintenance mechanics is required to prepare the machine for external air transport.

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

6. As part of this procedure, the ROPS/FOPS is removed from the tractor. Operation of the machine after assembly at the work site may be required without the ROPS/FOPS, until the ROPS/FOPS is transported to the work site and reinstalled.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

7. Many components that must be removed and installed during this procedure are very heavy. Use assistance, caution, and follow safe work practices when handling them.

**WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

8. Throughout procedure, be aware of potential hazards when working around hitch. Do NOT work in area of hitch link unless engine is shut down.

**TOOLS AND EQUIPMENT**

1. Tools and equipment required for sectionalization are stored in an ISU-60 shipping and storage container (Item 1, Table 1, WP 0024 00). BII tools (Table 2, WP 0024 00) must also be used.
2. Tools required to assemble machine after external air transport must be carried in the scraper's on-board BII toolbox. This is because there may be a delay in the delivery of the container to the assembly site. After transport and assembly of machine, stow tools and equipment in container.

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**EXTERNAL AIR TRANSPORT BY CH-47 HELICOPTER - CONTINUED**

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**0017 00*****TOOLS AND EQUIPMENT - CONTINUED***

3. Components of the machine that must be removed in preparation for external air transport are stowed in the container, for subsequent transport to the assembly site.
4. Reinstall mounting hardware for all removed components on machine, to secure against loss during transport.

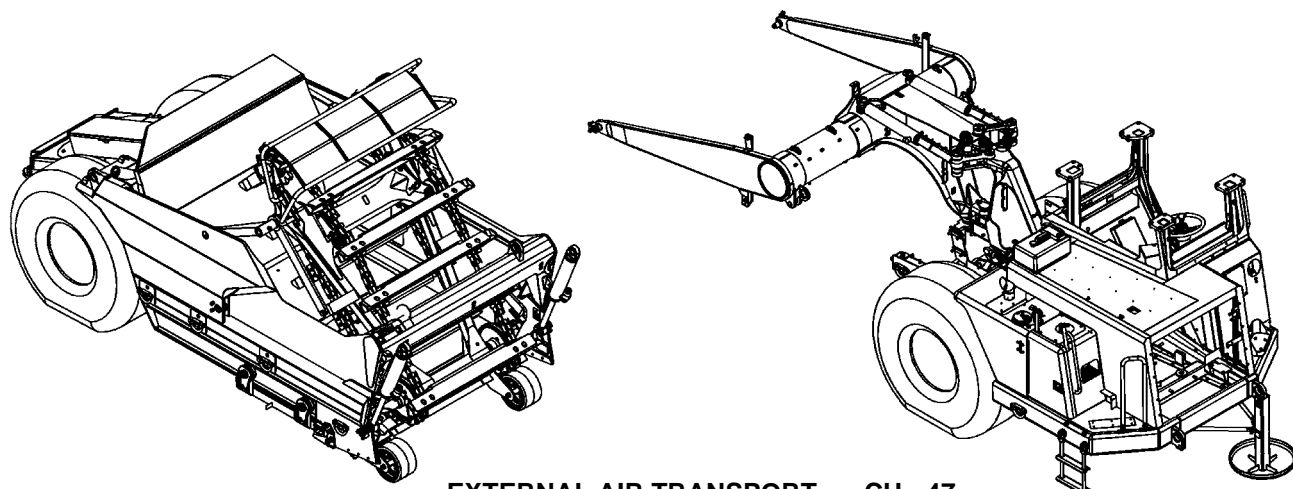
***SUMMARY OF PROCEDURES*****NOTE**

The following summary of procedures is provided to assist personnel preparing the machine for external air transport by CH-47 helicopter.

1. Disassemble and sectionalize machine:
  - a. Determine disassembly required per CH-47 mission flight profile.
  - b. Remove windshield wiper arm and windshield.
  - c. Remove ROPS/FOPS.
  - d. Remove guard plates.
  - e. Remove engine grille.
  - f. Install scraper bowl cutting edge wheels.
  - g. Install front and rear stability skids.
  - h. Disconnect bowl lift cylinders from draft frame and lower to ground.
  - i. Install hitch locking blocks.
  - j. Install all steering locks.
  - k. Install auxiliary fuel tank and connect fuel lines.
  - l. Disconnect electrical, hydraulic, air, and fuel lines between tractor and scraper.
  - m. Disconnect draft arms from scraper bowl.
  - n. Remove exhaust stack and install exhaust extension.
  - o. Remove tractor fenders.
  - p. Remove upper handrail with side mirror.
  - q. Drive tractor away from scraper bowl.
  - r. Raise bowl lift cylinders and secure.
  - s. Stow tools in scraper BII toolbox and secure.
  - t. Pack ISU-60 container.

**SUMMARY OF PROCEDURES - CONTINUED**

2. The following illustration shows the scraper sectionalized for external air transport by CH-47 helicopter.



390-1457

**MACHINE DISASSEMBLY AND SECTIONALIZATION**

1. Request CH-47 mission flight profile to determine level of sectionalization required to fulfill mission requirements. Refer to Table 1, *CH-47 External Load Capabilities for 30 Nautical Mile Radius Mission*, below.

**Table 1. CH-47 External Load Capabilities for 30 Nautical Mile Radius Mission.\***

ELEVATION/AMBIENT TEMPERATURE	LIFT CAPACITY	
Sea Level/59°F (Sea Level/15°C)	23,324 lb**	10,580 kg**
2000 ft/70°F (610 m/21°C)	23,396 lb**	10,610 kg**
4000 ft/95°F (1220 m/35°C)	16,644 lb	7550 kg
*Reference: MIL-STD-1366D, Table 32.		
** No Disassembly required, except to gain sling leg clearance.		

**NOTE**

After sectionalization, weight of scraper is sufficient so that no further disassembly of scraper is required. Weight of tractor must, however, be reduced; disassembly to remove selected components from tractor is required.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****0017 00****MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

2. Consult Table 2, *External Air Transport by CH-47—Tractor Component Removal Table*, to determine disassembly required, in order to meet the weight requirements as determined in Table 1. Do not disassemble tractor more than required.

**Table 2. External Air Transport by CH-47—Tractor Component Removal Table.**

<b>COMPONENT</b>	<b>COMPONENT WEIGHT</b>	<b>TOTAL WEIGHT</b>
<b>Tractor</b>		17, 292 lb
<b>Components Added to Tractor</b>		
Front and Rear Stability Skids	79 lb	17,371 lb
Auxiliary Fuel Tank and Lines	49 lb	17,420 lb
Hitch Locking Blocks	11 lb	17,431 lb
Steering Locks	32 lb	17,463 lb
Exhaust Extension	2 lb	17,465 lb
<b>Components Removed from Tractor</b>		
ROPS/FOPS	447 lb	17,018 lb
Wiper Arm Assembly	3 lb	17,015 lb
Windshield Assembly	31 lb	16,984 lb
Exhaust Stack	26 lb	16,958 lb
Guard Plates (3)	169 lb	16,784 lb
Engine Grille	37 lb	16,752 lb
Handrail and Mirror	18 lb	16,734 lb
Fenders	107 lb	16,627 lb

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****NOTE**

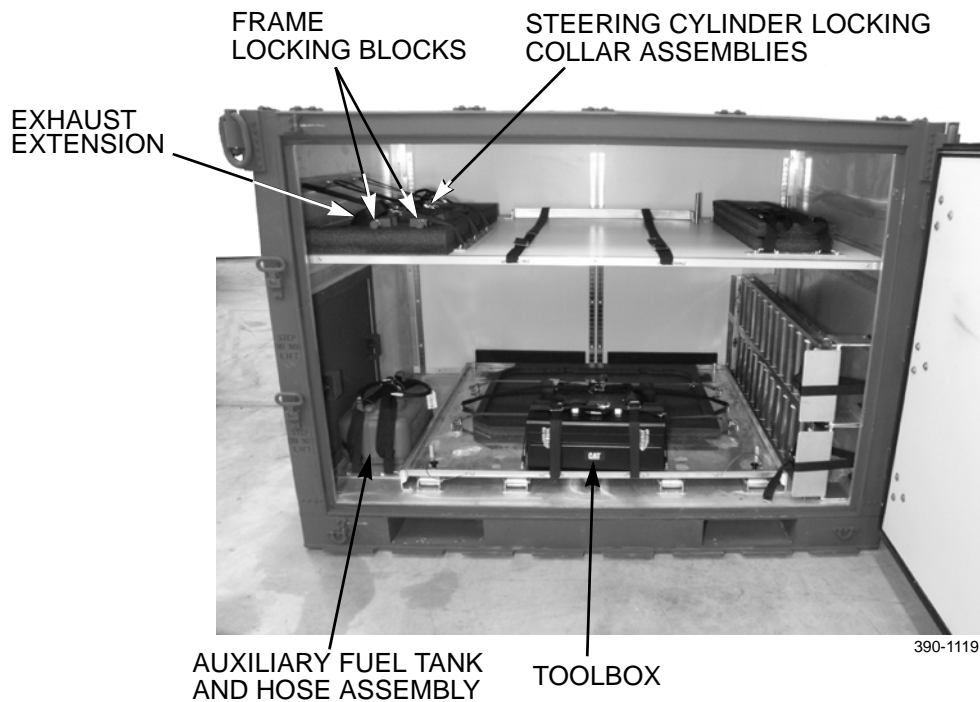
- To facilitate machine disassembly and sectionalization, it is crucial that machine be positioned on level ground, with tractor and scraper aligned and steering centered.
  - If possible, position machine in direction of helicopter's takeoff, so that pilot does not have to pick up load, then turn aircraft into takeoff direction.
  - Whenever hydraulic hose quick disconnects need to be disconnected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate disconnection of hoses.
3. Position machine on level ground, with tractor and scraper aligned and steering wheel centered. Move ejector fully to the rear and close floor of bowl. Place transmission in N (Neutral) and lock, apply parking brake, and lower bowl to the ground. Shut down engine. Block tractor and scraper wheels.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

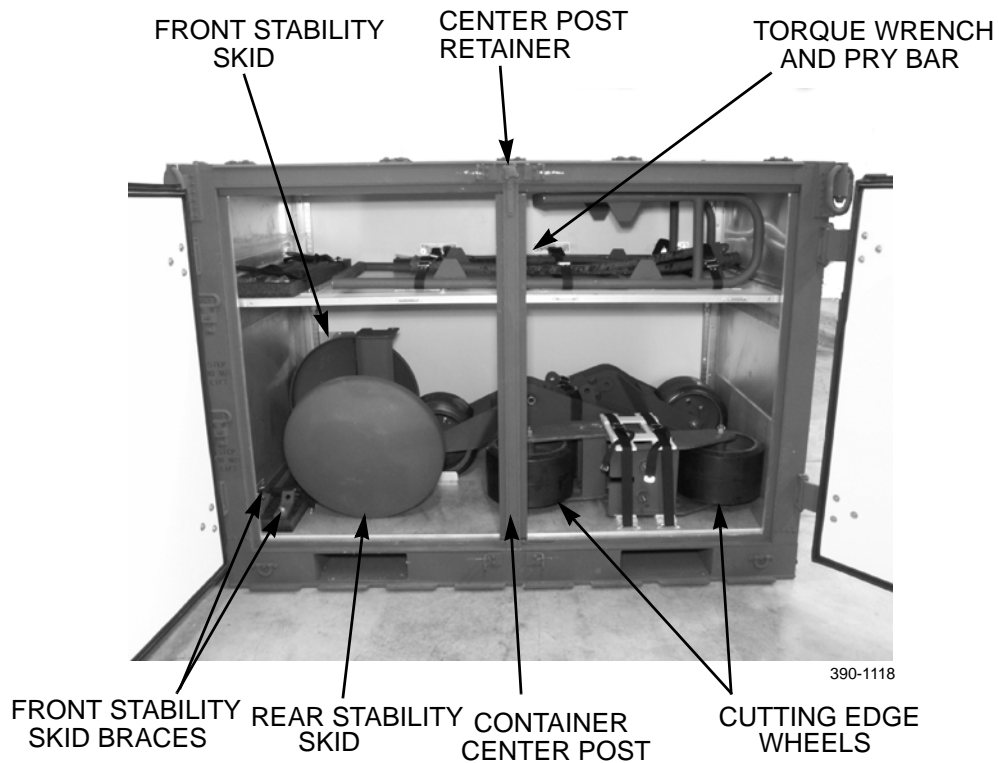
4. Place ISU-60 container near work area and remove the following items from container:
  - a. toolbox;
  - b. fuel jumper hose assembly (remove from toolbox);
  - c. auxiliary fuel tank, four ratchet straps, and fuel hose assembly;
  - d. exhaust extension;
  - e. two hitch locking blocks;
  - f. four steering cylinder locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);



**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****NOTE**

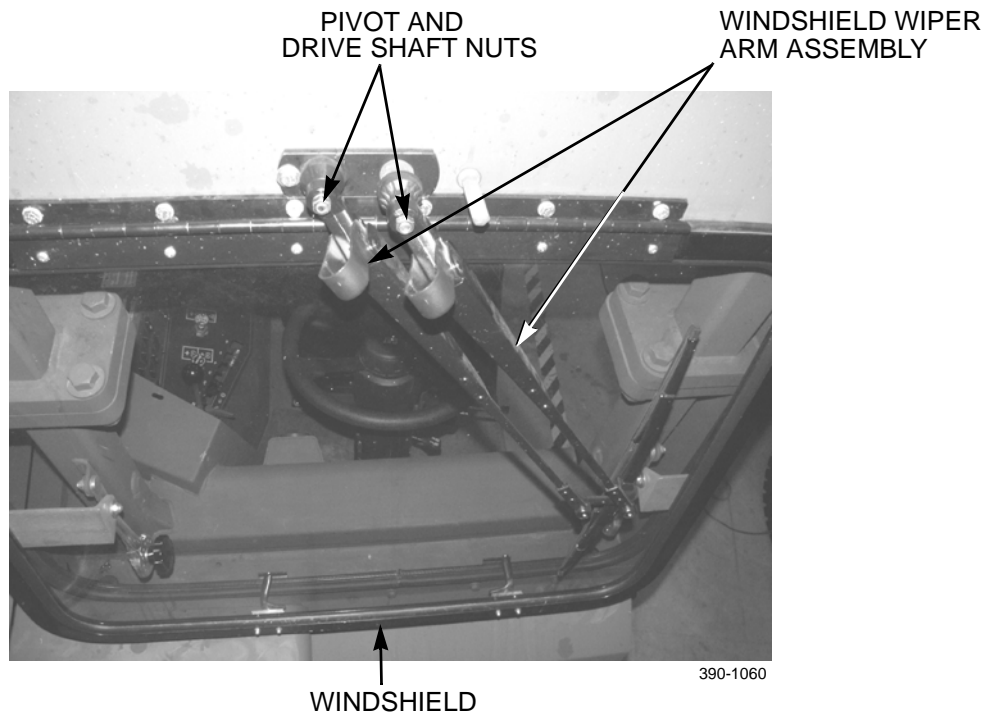
To remove container center post, unscrew retainer and remove post.

- g. two cutting edge wheels;
- h. rear stability skid (remove mounting bolts and washers from toolbox);
- i. front stability skid, and two braces; and
- j. torque wrench and pry bar.

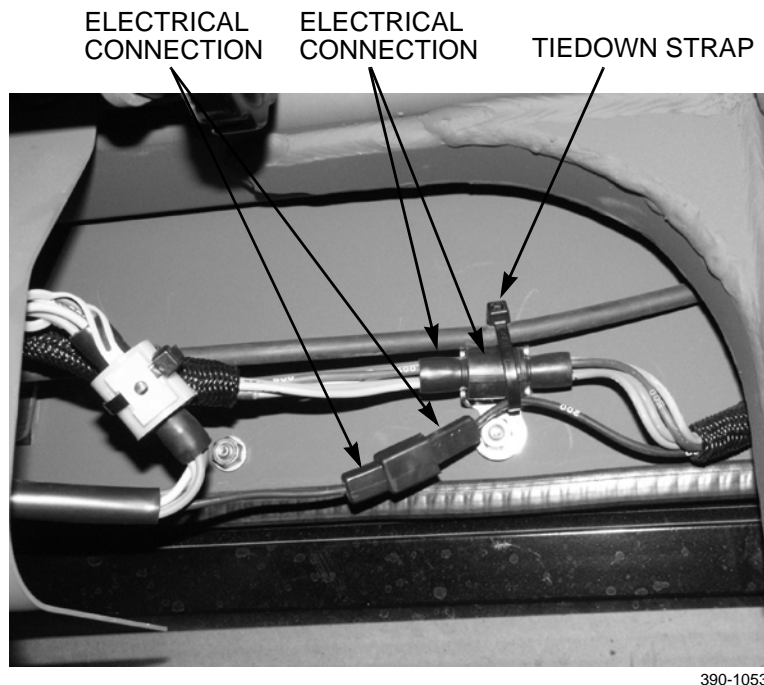


**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

5. Remove two nuts and windshield wiper arm assembly from windshield. Set wiper arm assembly aside for stowage in ISU-60 container. Reinstall nuts on drive and pivot shafts.



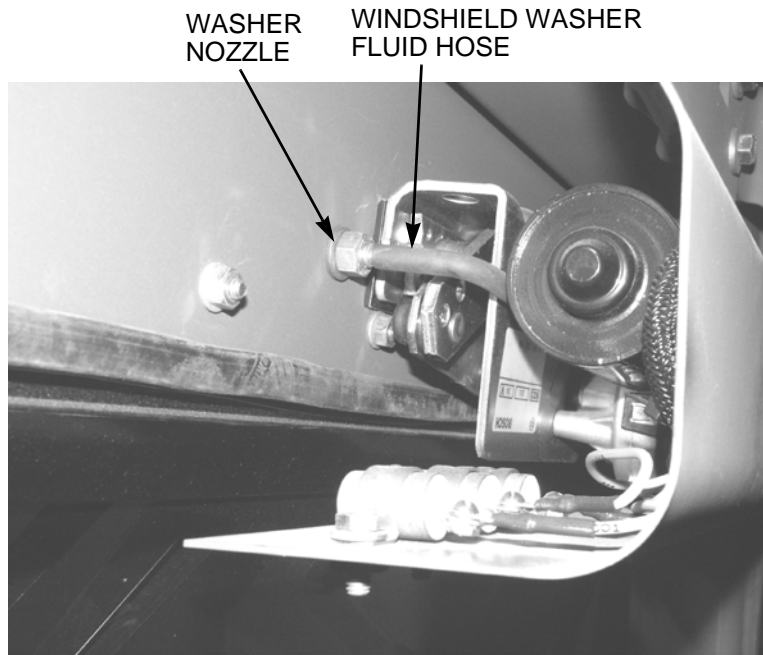
6. Cut tiedown strap and disconnect two electrical connectors at wiper motor inside cab. Discard tiedown strap.





**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

7. Remove windshield washer fluid hose from water nozzle.

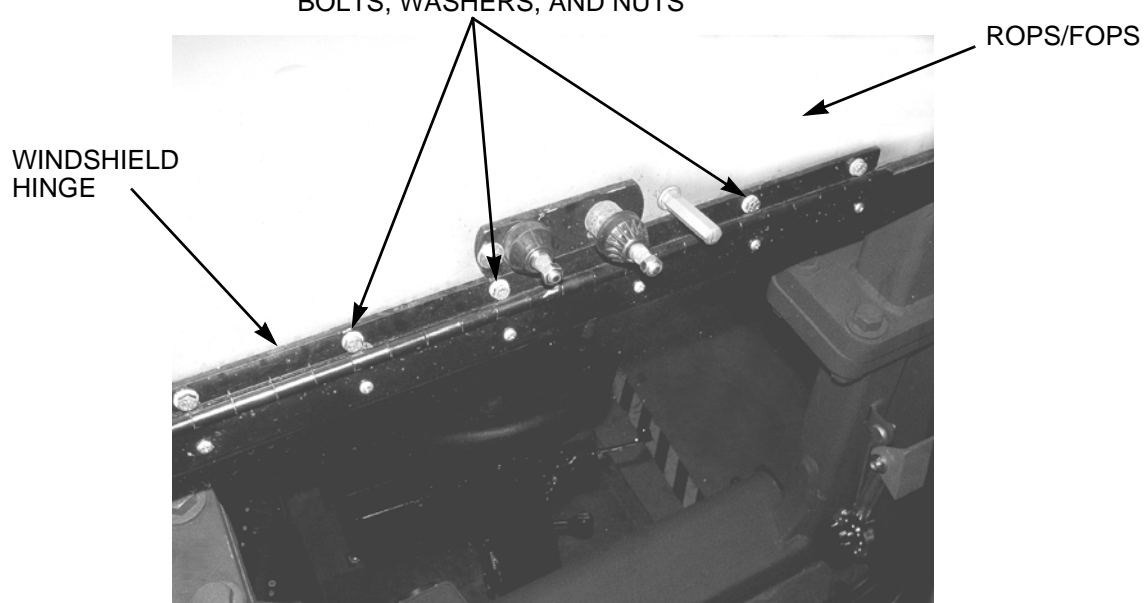


390-1052

**WARNING**

Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.

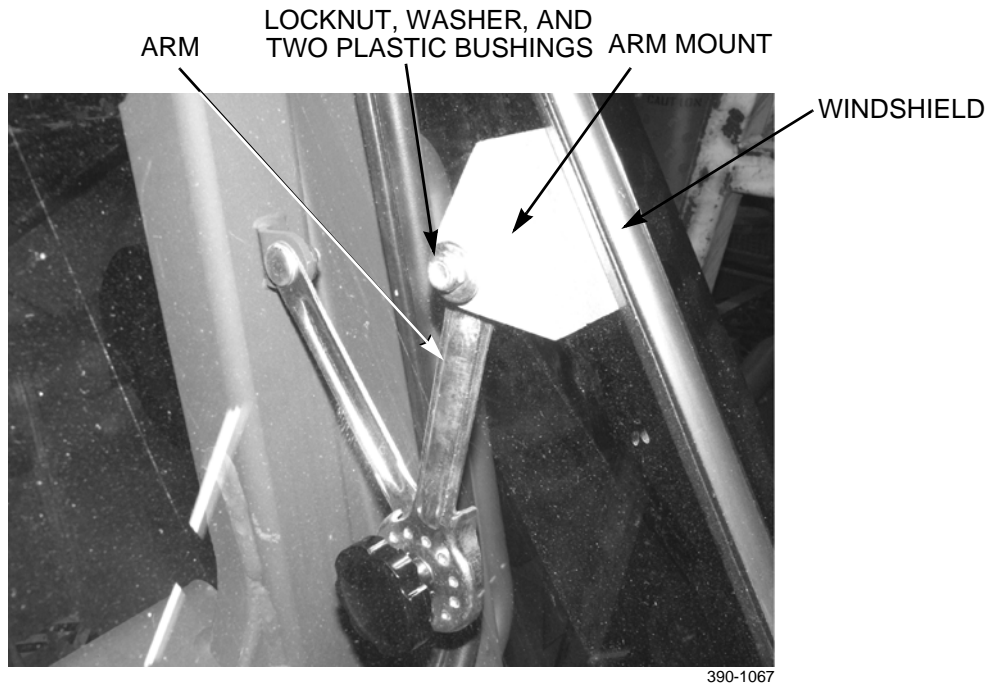
8. Remove windshield from ROPS/FOPS:
- Unlatch and open window.
  - Remove six nuts, 12 washers, and six bolts from windshield hinge and ROPS/FOPS.



390-1072

**EXTERNAL AIR TRANSPORT BY CH-47 HELICOPTER - CONTINUED****0017 00****MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

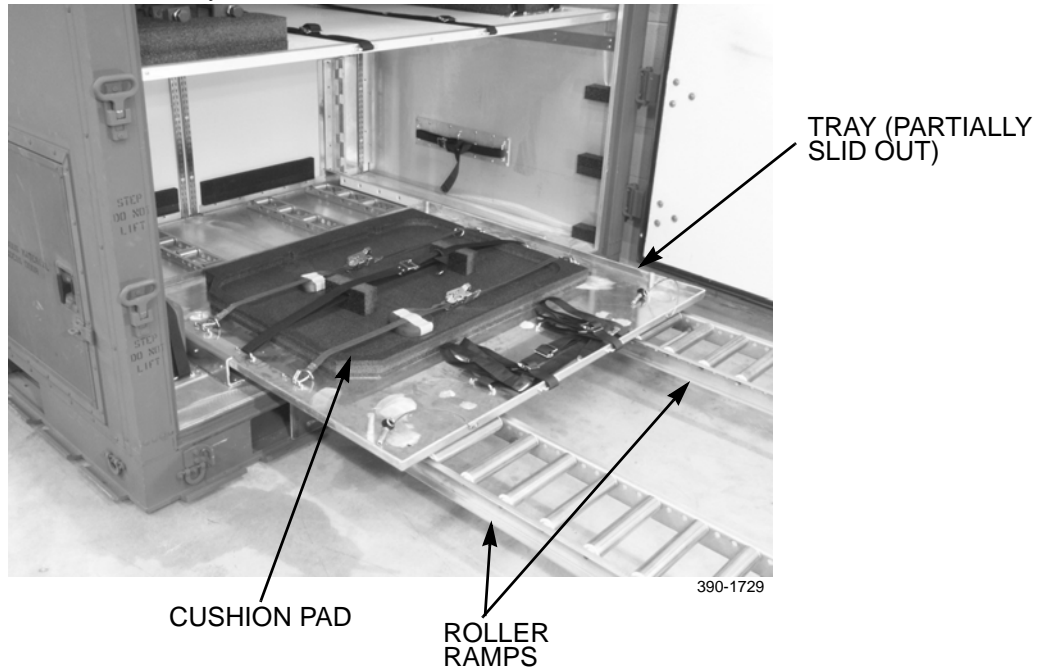
- c. Remove locknut, washer, and two plastic bushings. Separate arm from arm mount on each side of windshield and remove windshield.



- d. Reinstall bolts, washers, and nuts to windshield hinge. Reinstall two plastic bushings, washer, and locknut on each arm.
9. Stow windshield in ISU-60 container:
    - a. Open single-door end of container.
    - b. Remove two roller ramps from right-side wall of container.
    - c. Install each ramp at door opening, with two pins through each ramp into holes in edge of container floor.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

- d. Remove two pins and slide out tray.

**CAUTION**

Use caution not to damage windshield during handling.

- e. Place windshield in cushion pad on tray, with hinge facing out.  
f. Place cushion pad on top of windshield to protect glass.  
g. Secure windshield with one strap.



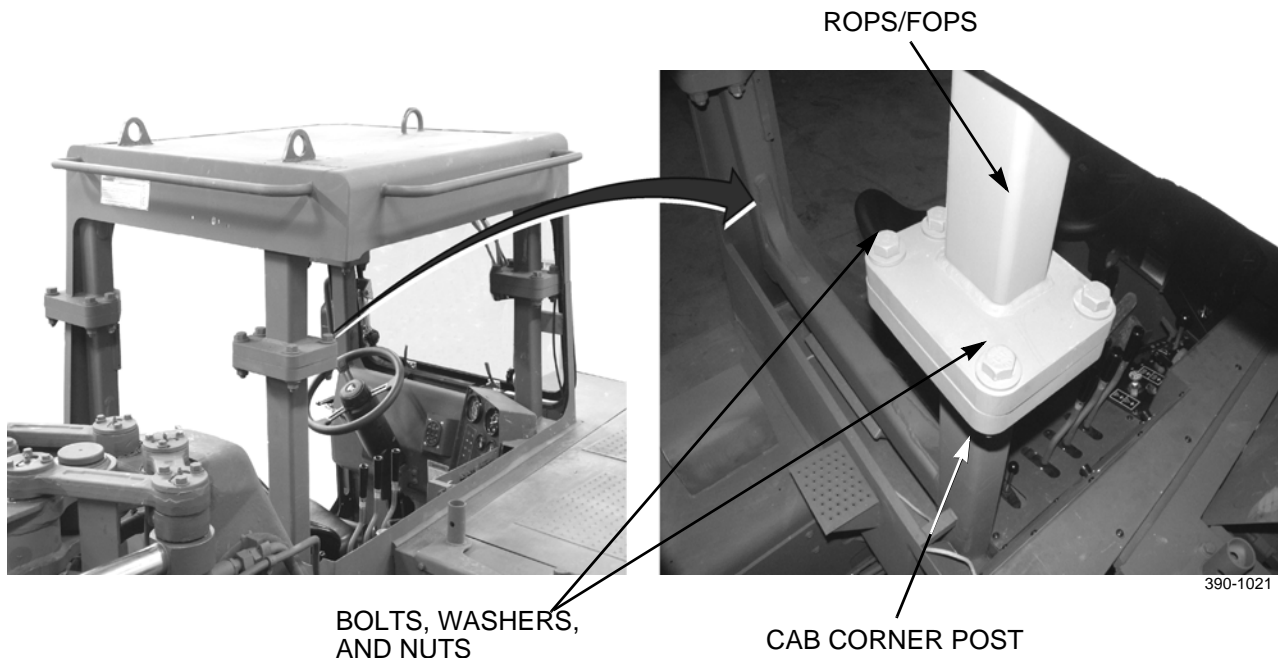
**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

ROPS/FOPS weighs 447 lb (203 kg).

10. Remove ROPS/FOPS and set aside for stowage in ISU-60 container:
  - a. Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.
  - b. Remove 16 nuts, 32 washers, and 16 bolts from four corner posts of ROPS/FOPS.
  - c. Lift ROPS/FOPS free of cab corner posts and lower to the ground.
  - d. Stow mounting hardware in BII toolbox on rear deck of scraper.



**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

11. Remove three guard plates from underside of tractor and set aside for stowage in ISU-60 container:

**NOTE**

To assist in installation of plates, mark plates as “front”, “middle”, and “rear”.

- a. With assistance, loosen but do NOT remove six bolts securing each guard plate to tractor frame.
- b. Remove three bolts and washers from side of guard plate that is NOT slotted, while supporting remainder of weight of plate.
- c. Lower guard plate slightly and pull plate free of bolts and washers at opposite side of plate. Remove plate from under tractor.
- d. Repeat steps for two remaining guard plates.
- e. Reinstall mounting hardware securely on frame of tractor.

BOLTS ON  
SLOTTED SIDE



FRONT GUARD PLATE

MIDDLE GUARD PLATE

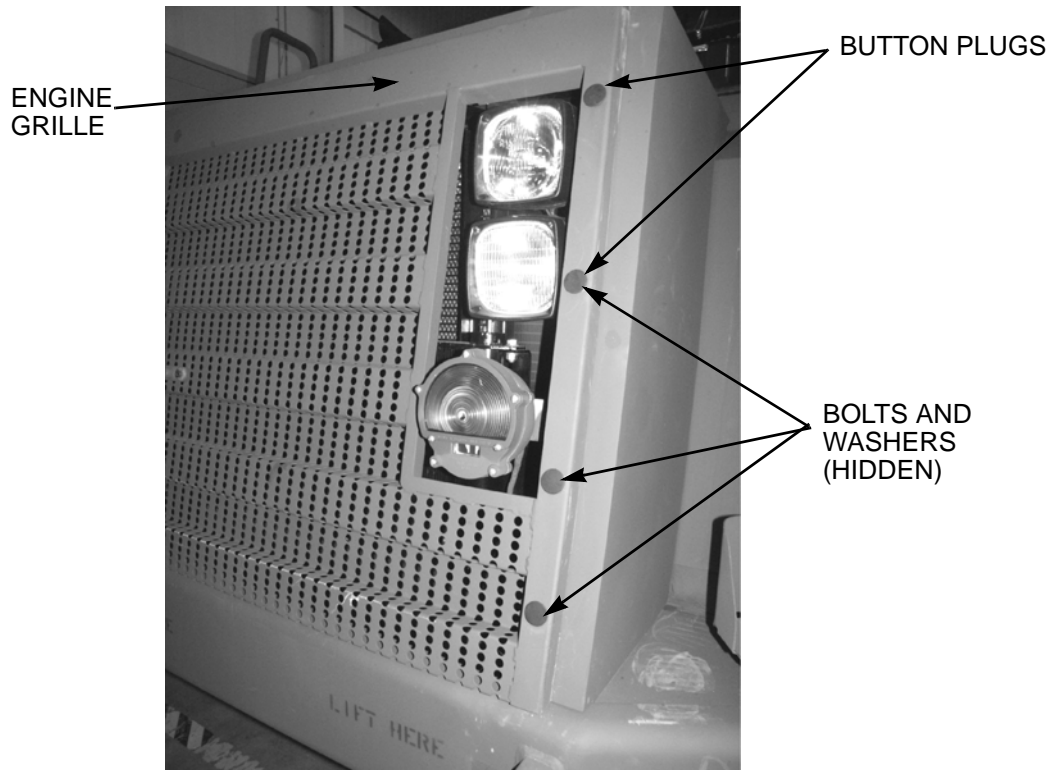
REAR GUARD PLATE

390-1024

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****CAUTION**

Use caution not to damage lights when removing engine grille.

12. With assistance, remove eight button plugs, bolts, washers, and engine grille from front of hood. Set grille aside for stowage in ISU-60 container. Reinstall mounting hardware to hood to secure against loss.



390-1061

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

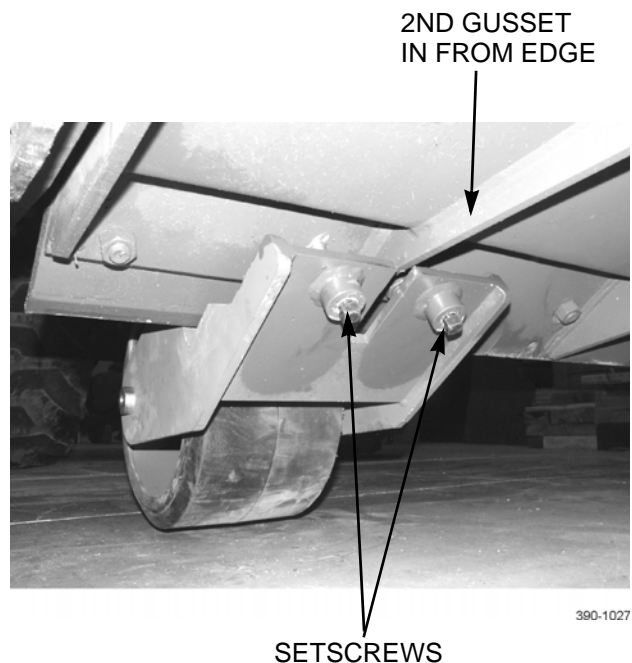
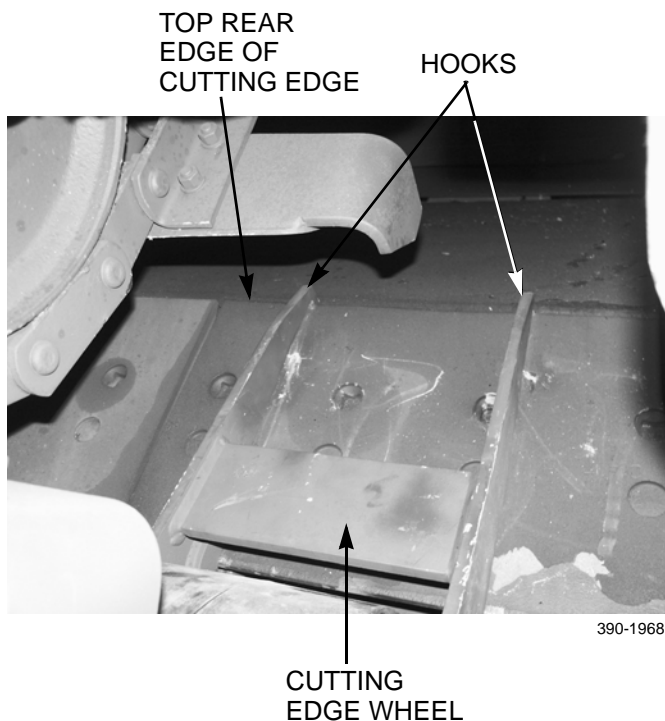
Configuration change at cutting edge should NEVER be attempted without first securing the bowl by blocking it so that it is firmly supported. Failure to follow this warning may cause injury to personnel.

13. Attach two scraper bowl cutting edge wheels:

**WARNING**

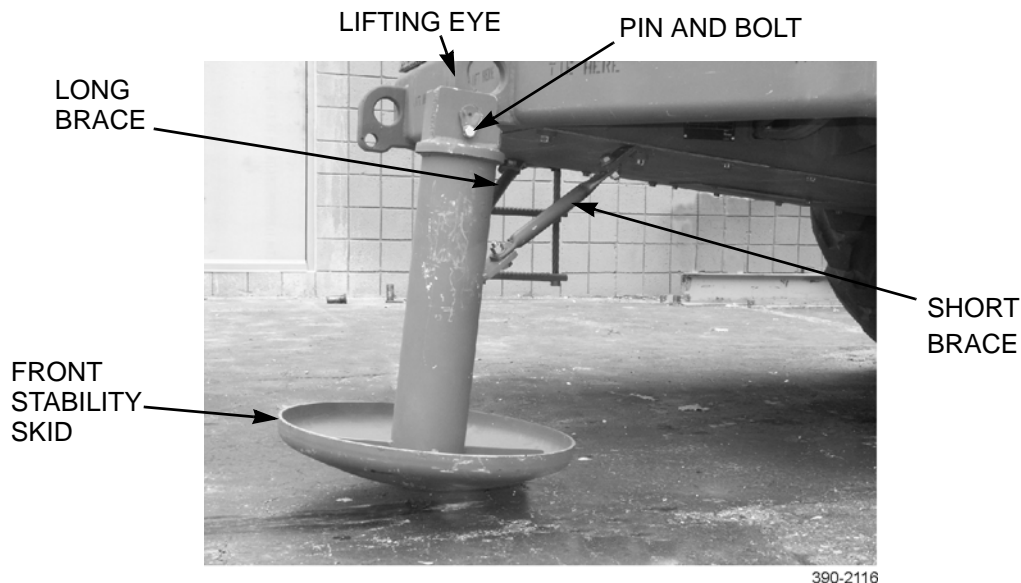
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

- a. Start engine and raise bowl approximately 10 in. (25.4 cm) from the ground. Block bowl securely. Shut down engine.
- b. With assistance and using a pry bar, position each cutting edge wheel centered on gusset underneath cutting edge, with hooks engaged over top rear of cutting edge.
- c. Fully and evenly tighten two setscrews to secure each cutting edge wheel.



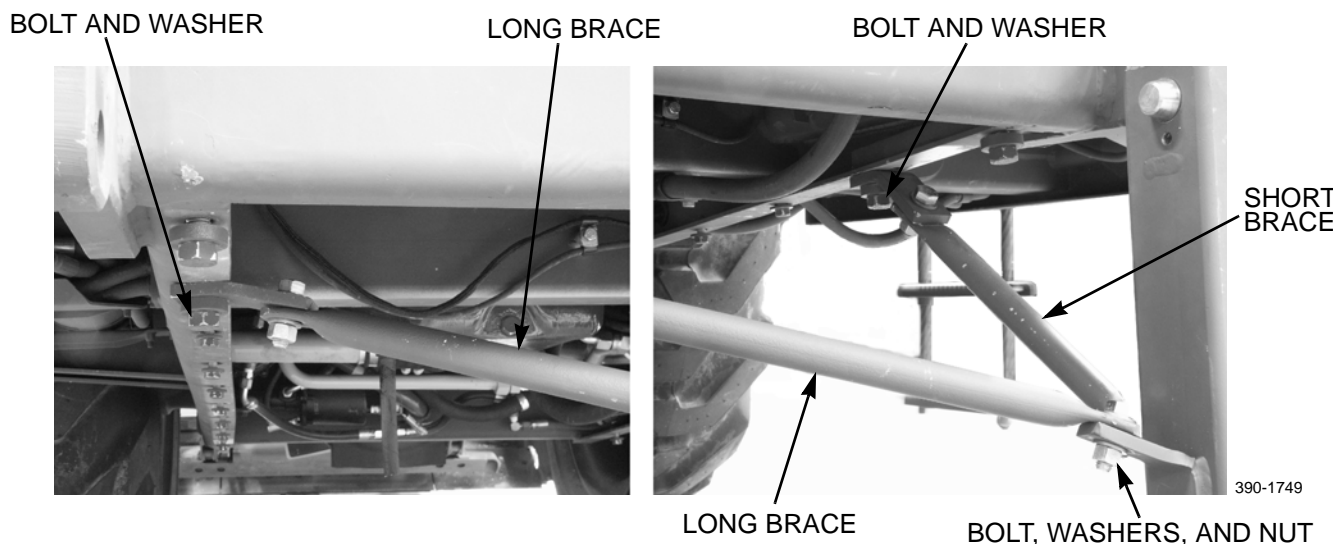
**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

14. Install front stability skid to lifting eye at left-front corner of tractor bumper:
- Remove bolt, washer, and pin assembly from front stability skid.
  - Position front stability skid at lifting eye. Install pin assembly through bottommost towbar hole in lifting eye. Install washer and bolt to pin assembly.

**NOTE**

Do NOT tighten front (long) brace mounting hardware until all items have been assembled. Ensure braces are correctly aligned and are flush against mounting surfaces.

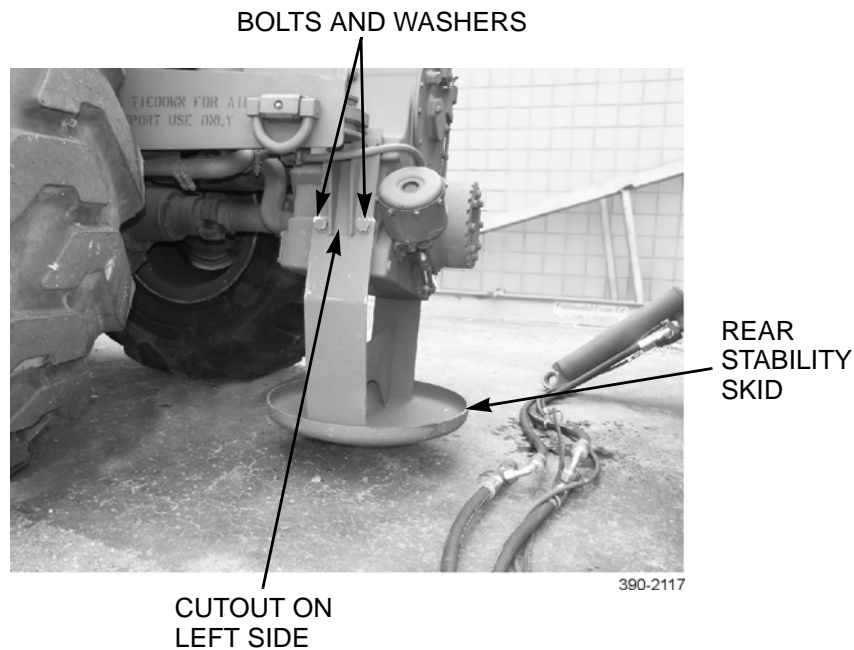
- Position two braces between front stability skid and underside of tractor frame. Secure each brace to frame with washer and bolt used to install front guard plate. Secure each brace to front stability skid with bolt, two washers, and nut. Tighten bolts and nuts to 272 lb-ft (370 Nm).





**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

15. Install rear stability skid to transmission mount:
- Remove two bottommost bolts and washers from each side of transmission mount. Set bolts and washers aside for stowage in BII toolbox.
  - Position rear stability skid in front of transmission housing with cutout on skid on left side of machine.
  - Slide rear stability skid rearward until bolt holes in skid are aligned with bolt holes in transmission mount.
  - Loosely install rear stability skid with four washers and bolts removed from toolbox.
  - Tighten bolts. Retighten bolts to 272 lb-ft (370 Nm) after separation of tractor from scraper bowl.



**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****CAUTION**

Do NOT power down scraper bowl. If powered down, cylinder force could overload cutting edge wheels, causing them to become damaged.

16. Start engine and raise cutting edge off blocks, remove blocks, then shut down engine. With engine off, lower scraper bowl until weight rests on cutting edge wheels.

**CAUTION**

Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

**NOTE**

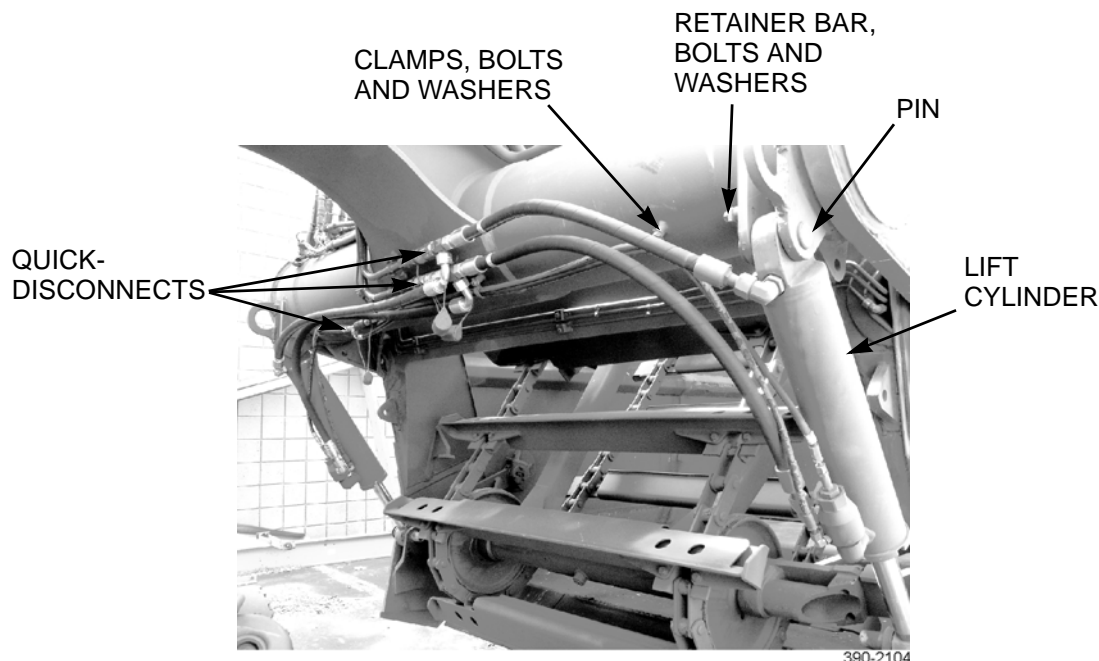
To facilitate disconnection of hydraulic hose quick disconnect fitting, relieve any trapped hydraulic pressure in hoses by operating control levers through all positions (WP 0004 00).

17. Disconnect bowl lift cylinders from draft frame and lower to ground:
  - a. Remove four bolts, washers and clamps securing two crossover hydraulic hoses. Reinstall clamps, washers and bolts.
  - b. Disconnect three hydraulic quick disconnects at center of draft arm crossbeam. Install dust caps.

**NOTE**

The following steps three personnel.

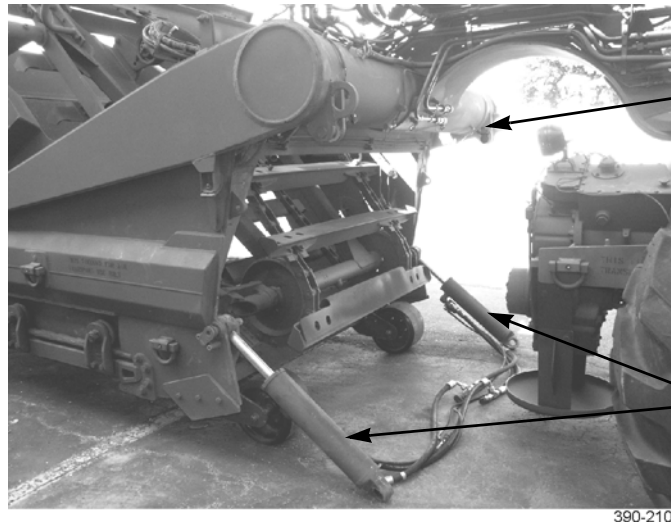
- c. While holding left hydraulic lift cylinder in place, remove two bolts, washers, retainer bar and upper cylinder pin. Continue to hold lift cylinder in place.
- d. While holding right lift cylinder in place, remove two bolts, washers, retainer bar and upper cylinder pin. Continue to hold lift cylinder in place.



390-2104

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

- e. Simultaneously lower both lift cylinders to ground with hydraulic hoses attached.
- f. Reinstall pins, retainer bars, washers and bolts on both sides.



PIN, RETAINER BAR,  
BOLTS AND WASHERS

LIFT CYLINDER

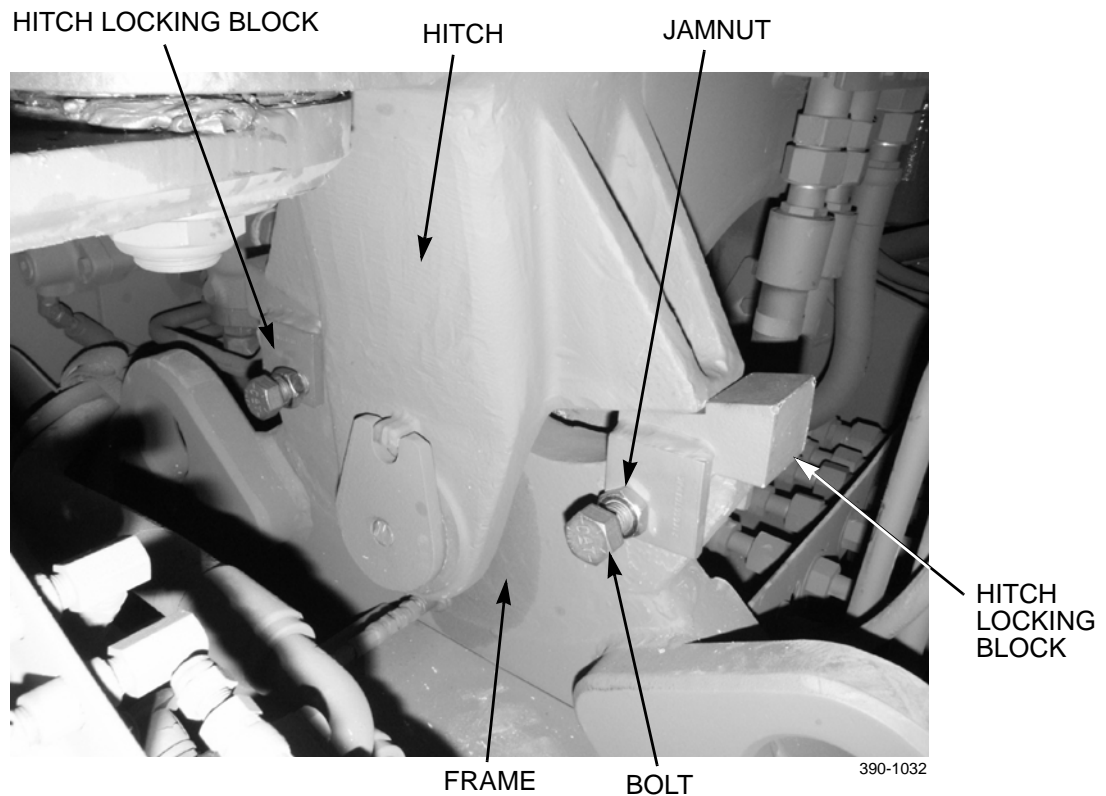
**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

**NOTE**

If machine is not on level ground with tractor and scraper aligned, machine may have to be repositioned to facilitate installation of hitch locking blocks.

18. Install hitch locking blocks:
  - a. Position each locking block between hitch and tractor frame.
  - b. Fully tighten two bolts and jamnuts on each locking block.



19. Install all steering cylinder locking collars:
  - a. Disassemble each of four locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.): Remove two bolts and washers and open each short locking collar and remove hose wrapping. Remove three bolts and washers and open each long locking collar and remove hose wrapping.

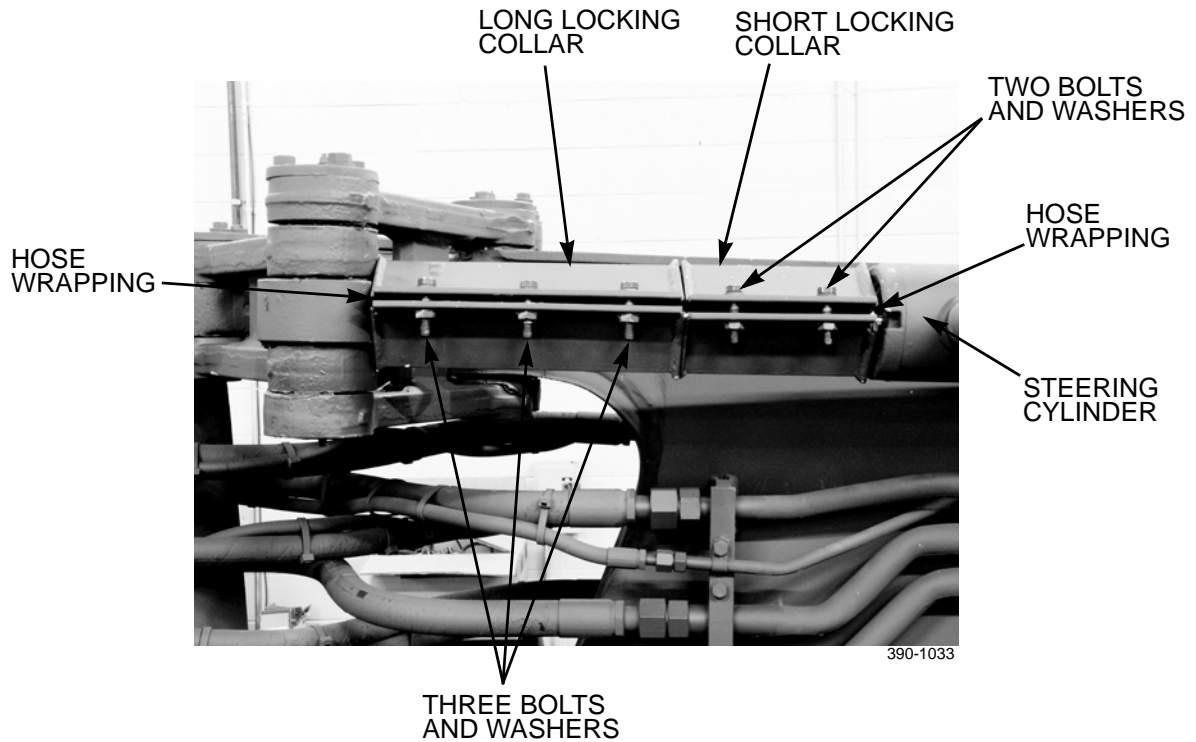
**CAUTION**

To prevent damage to cylinder rod, ensure rod surface is free of dirt or other debris before locking collars are installed.

- b. Position hose wrappings and one short and one long locking collar around rod end of each steering cylinder.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

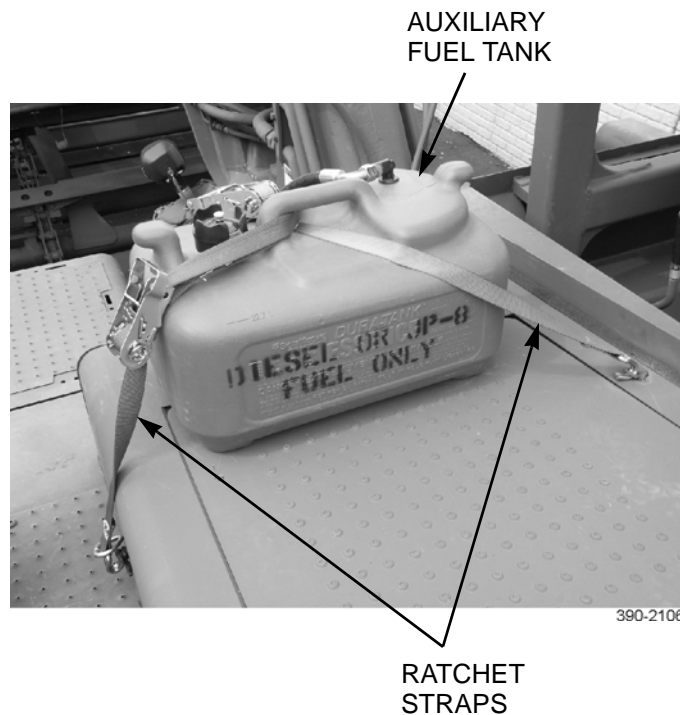
- c. Install three washers and bolts to each long locking collar. Install two washers and bolts to each short locking collar. Tighten bolts evenly and securely.



**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

DO NOT perform fuel system maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.

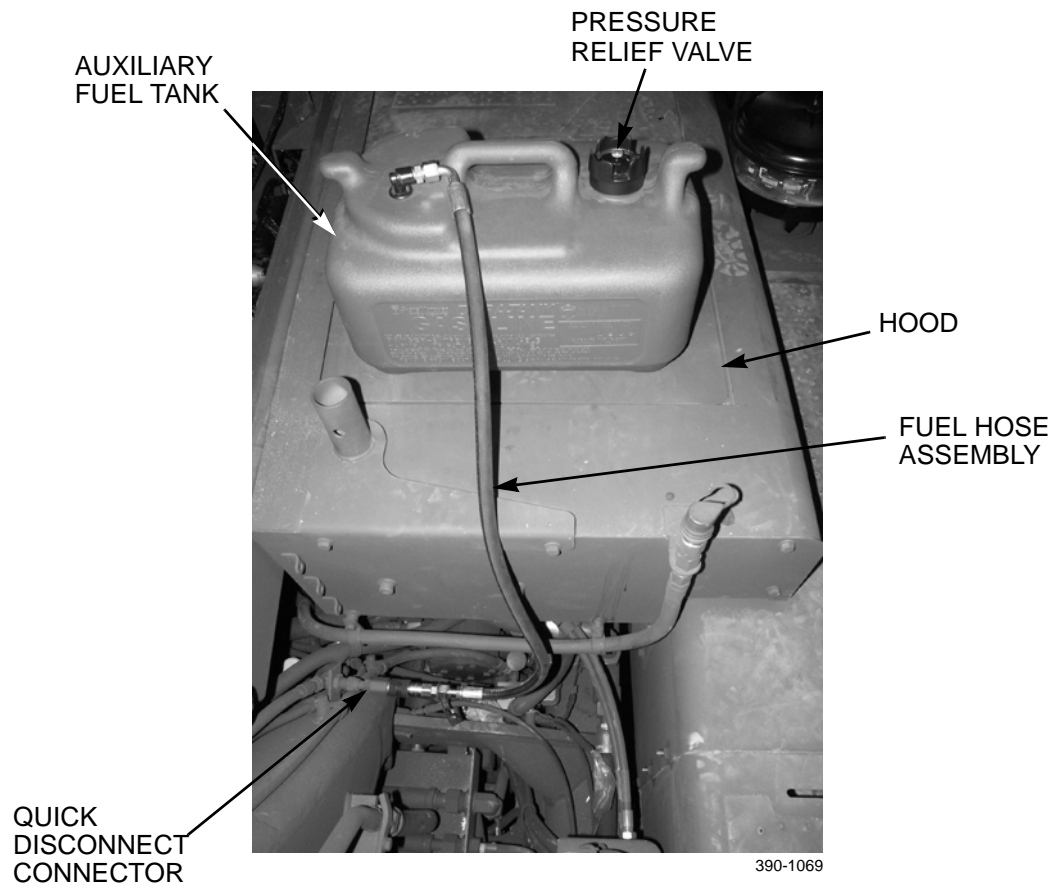
20. Install auxiliary fuel tank and connect fuel line:
- Add fuel (Item 7, 8 or 9, WP 0026 00) to auxiliary fuel tank.
  - Secure auxiliary fuel tank to hood with two ratchet straps as shown. Fully tighten straps. Open pressure relief valve on auxiliary fuel tank.

**NOTE**

All quick disconnect connections (fuel, air, and hydraulic) are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

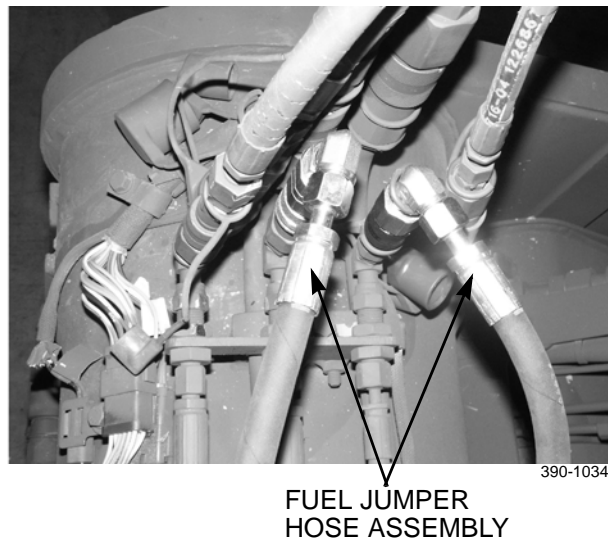
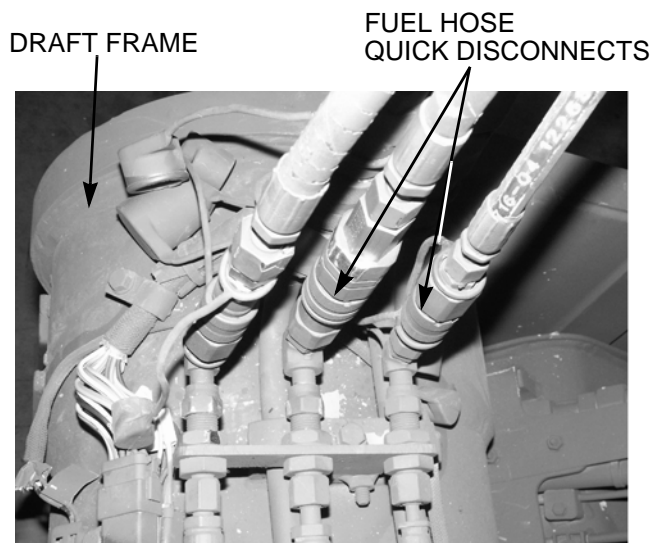
- Remove dust cap and connect fuel hose assembly between auxiliary fuel tank and bulkhead quick disconnect connector. Turn quick disconnect collar a half turn after connecting to lock connection.

*MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED*



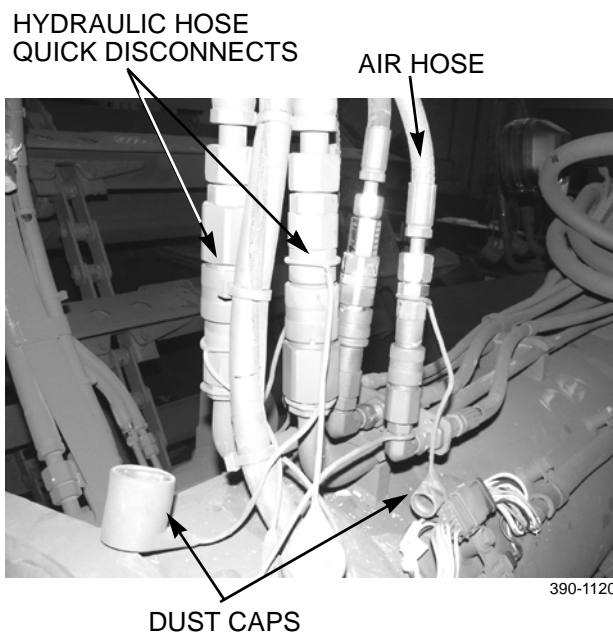
**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

- d. At right side of draft frame, disconnect two fuel hose quick disconnect fittings.
- e. Connect fuel jumper hose assembly, in accordance with illustration, to recycle return fuel.

**CAUTION**

Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

- 21. Disconnect two hydraulic hoses and air hose at quick disconnect fittings on right side of draft frame. Install dust caps. Place hoses out of the way inside bowl.





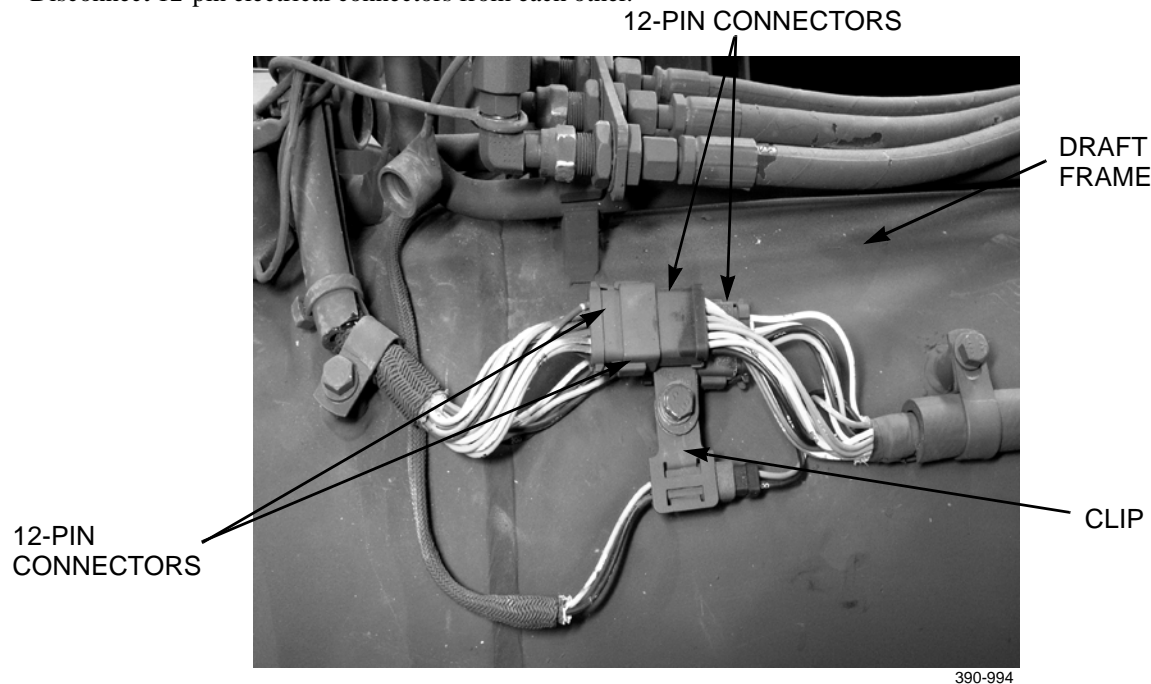
**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

22. Release four 12-pin electrical connectors from clip on right side of draft frame.

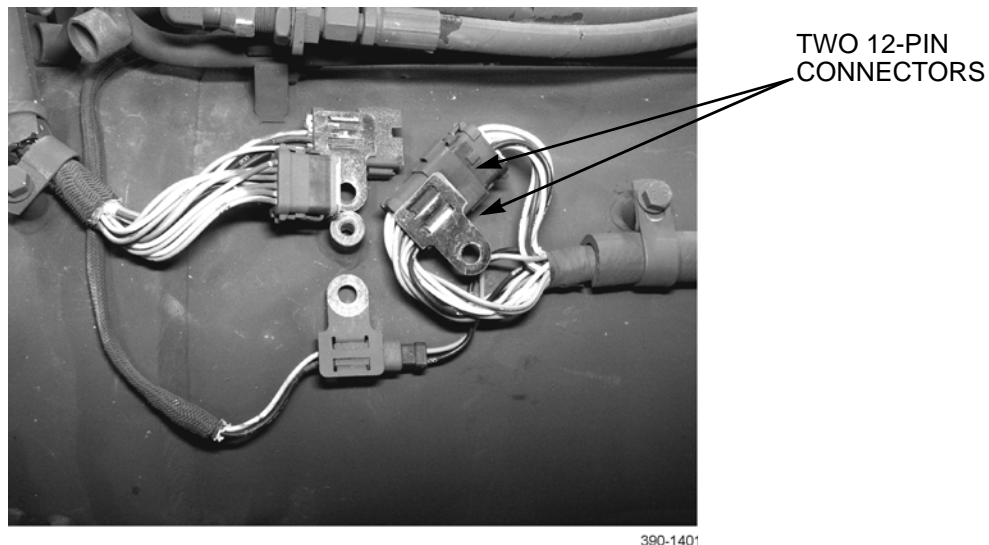
**NOTE**

As soon as electrical disconnects are made, conventional steering (with steering wheel) is disabled and skid steering is enabled.

23. Disconnect 12-pin electrical connectors from each other.

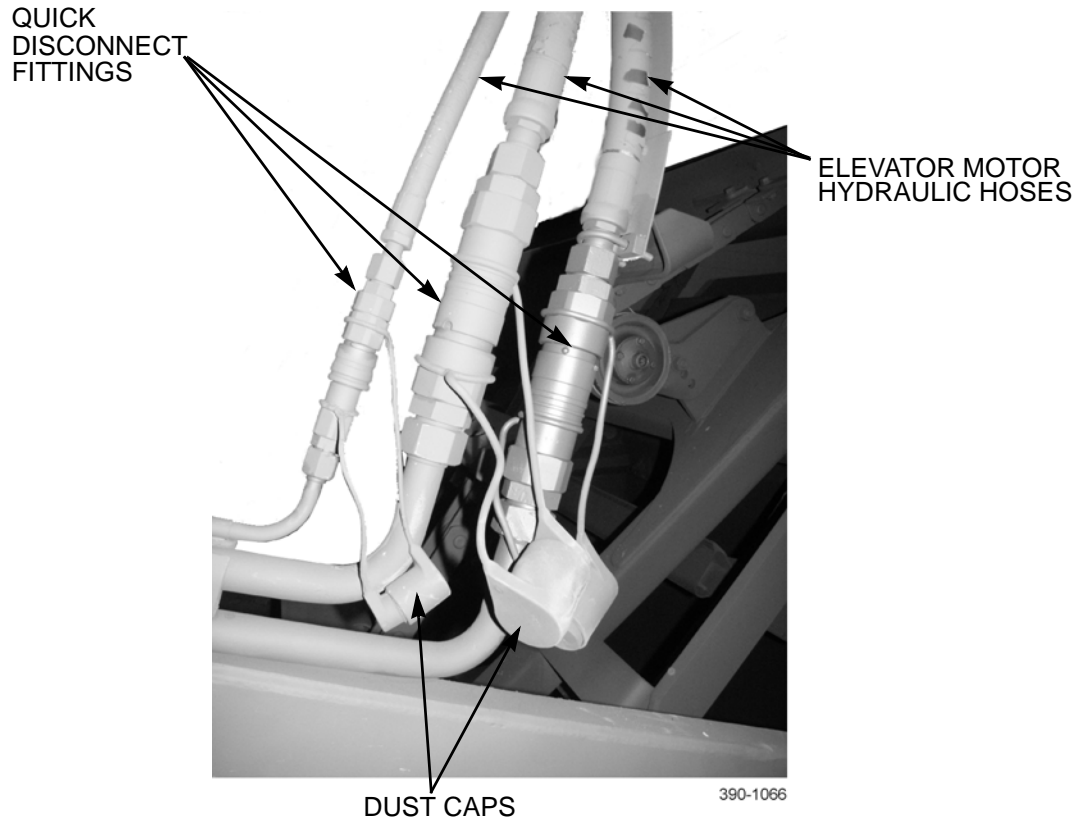


24. Align keyways and connect two 12-pin electrical connectors to other two connectors, as shown.
25. Remove bolt, clamp, and release wiring harness from draft frame. Reinstall bolt and clamp and place wiring harness out of the way inside bowl.

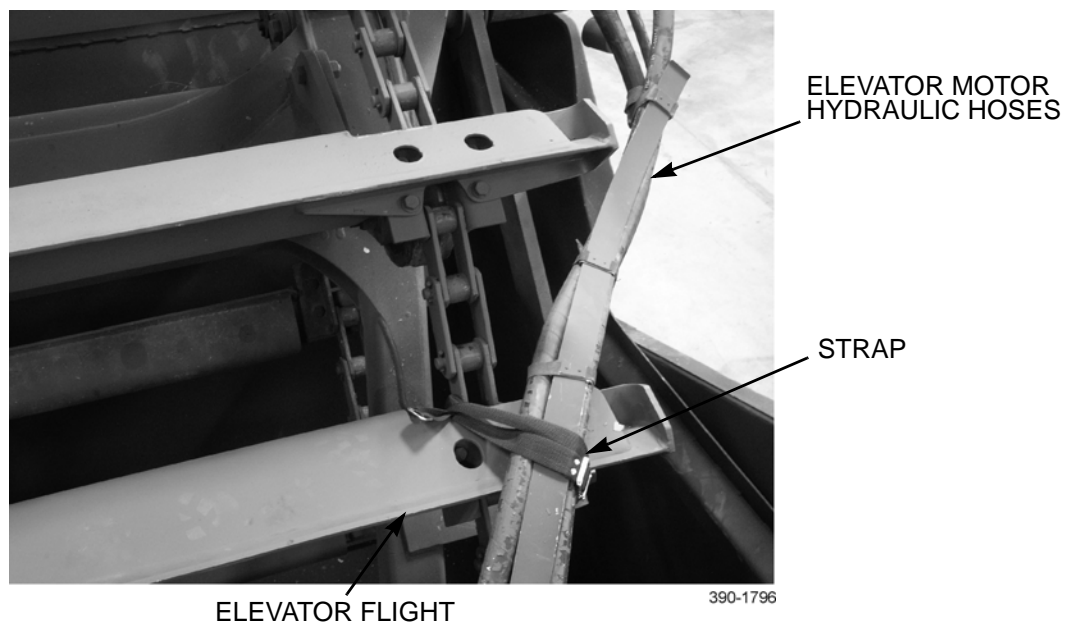


**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

26. On left side of draft frame, disconnect three elevator motor hydraulic hoses at quick disconnect fittings. Install dust caps.



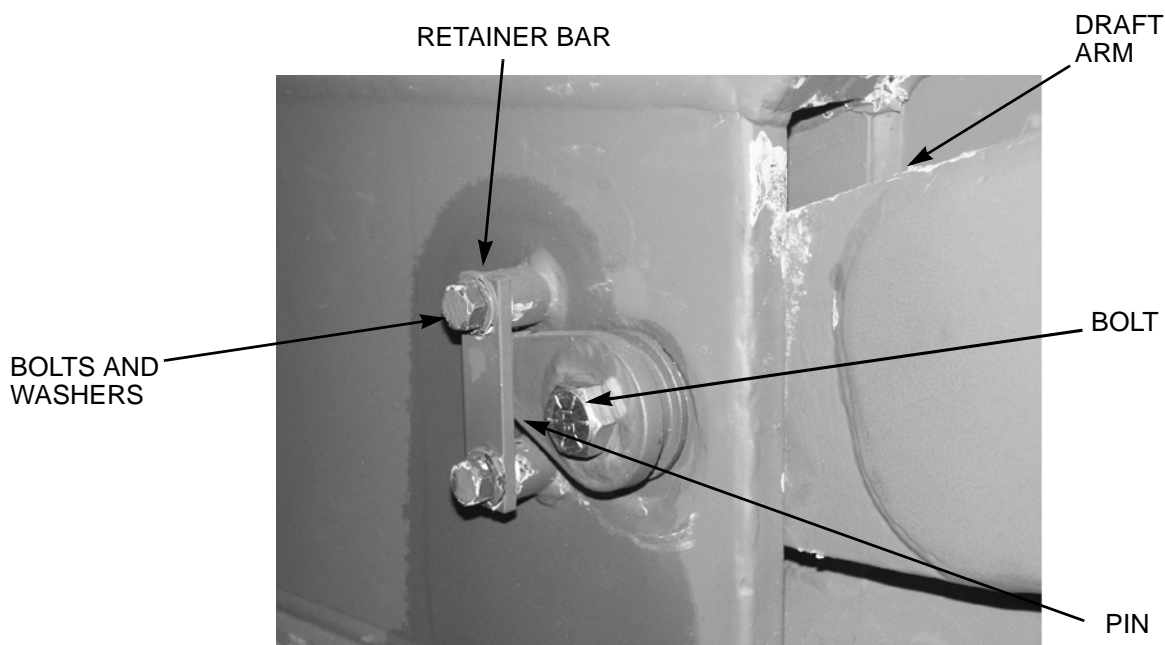
27. Strap loose ends of elevator motor hydraulic hoses to an elevator flight inside bowl.



**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

To prevent scraper from rolling, ensure scraper wheels are securely blocked prior to sectionalization. Failure to secure scraper against movement may cause injury or death to personnel or damage to machine.

28. Remove draft arms from attachment to scraper bowl:
  - a. Remove bolt, two bolts, washers, and retainer bar from pin.

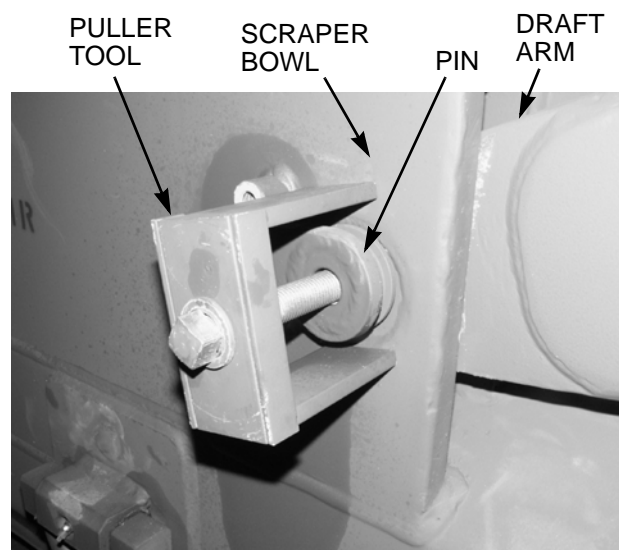


390-1073

**WARNING**

Do NOT stand in front of puller tool when removing pin. Pin may be under tension and could fly free when removed. Injury to personnel could result.

- b. Use pin puller tool to remove pin at end of each draft arm, to separate draft arm from scraper bowl.



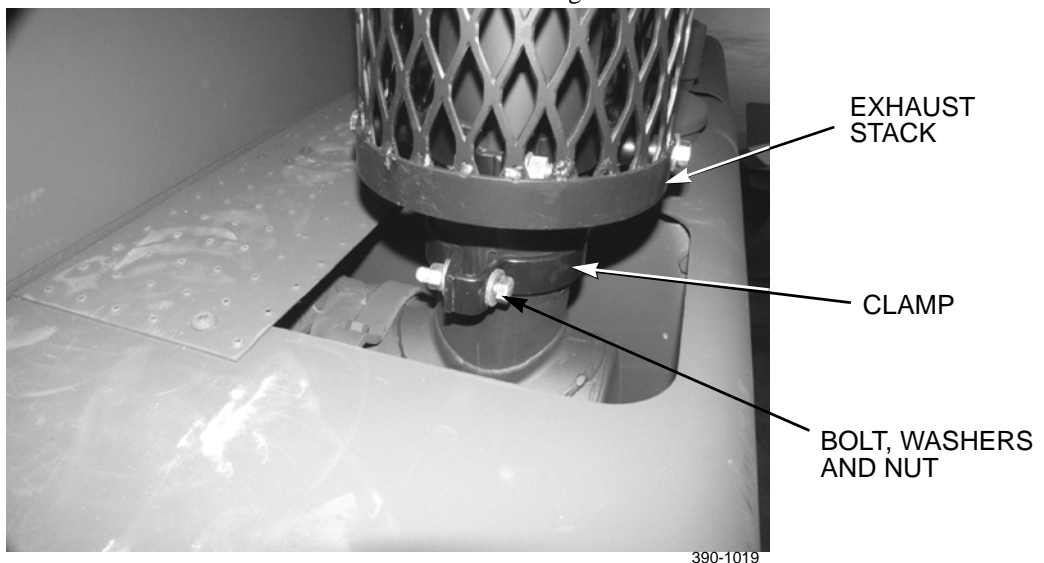
390-1074

## MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED

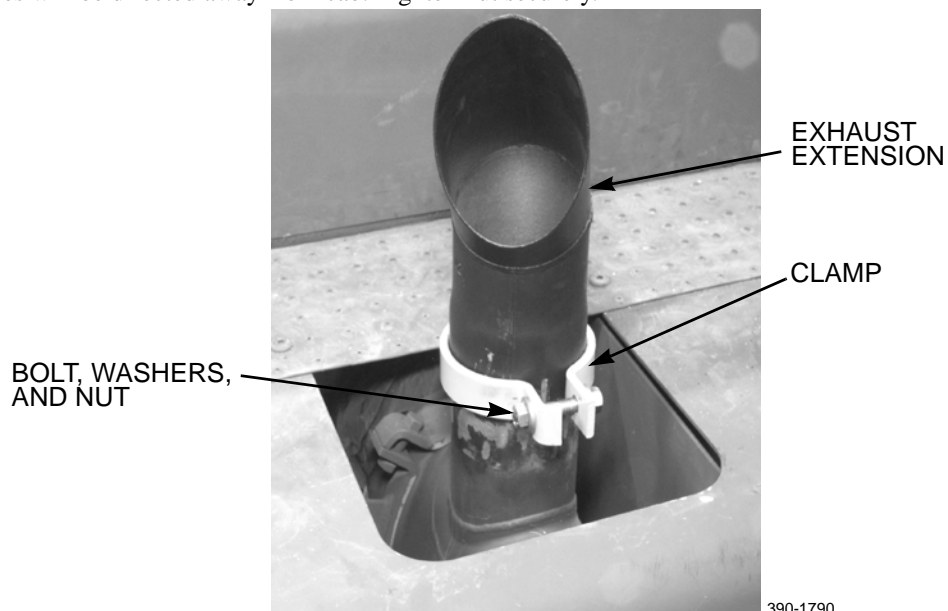
**WARNING**

Do NOT remove exhaust stack until it has cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

29. Remove exhaust stack from muffler on right side of tractor and install exhaust extension in its place:
- Loosen nut, bolt, two washers, and clamp, and remove exhaust stack from right side of tractor. Retain mounting hardware on exhaust stack and set aside exhaust stack for stowage in ISU-60 container.



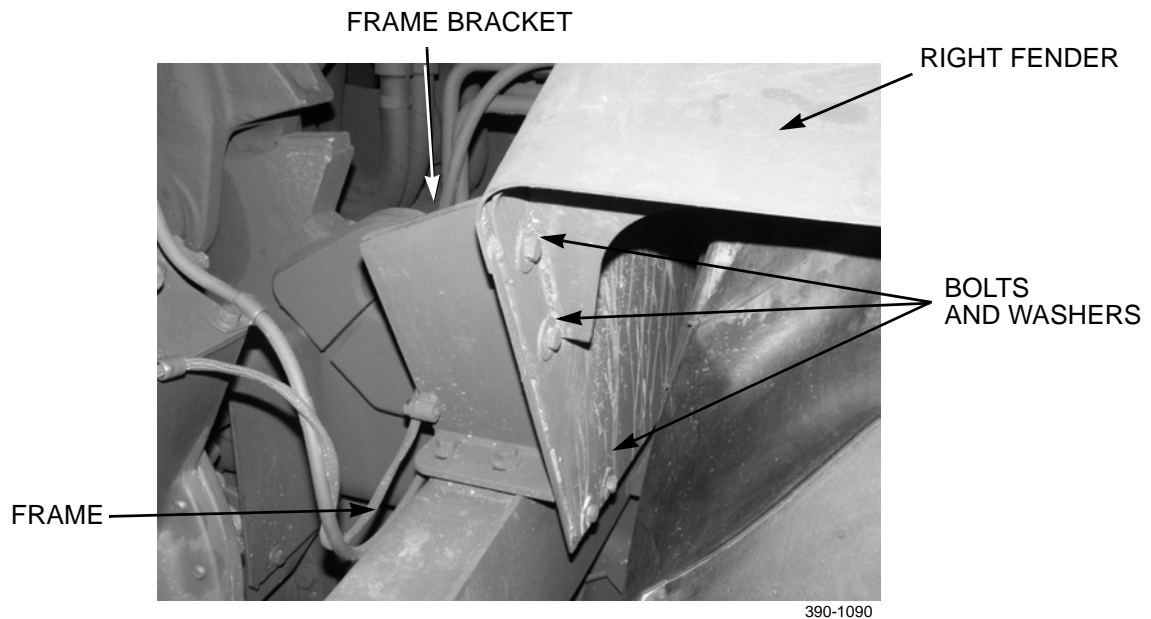
- Install exhaust extension on muffler with clamp, bolt, two washers, and nut. Position extension so that exhaust fumes will be directed away from cab. Tighten nut securely.



**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

30. Remove right fender from tractor and set aside for stowage in ISU-60 container:
- Remove six bolts and washers from fender and frame bracket.
  - Remove an additional 11 bolts and washers and remove fender.
  - Reinstall mounting hardware on machine.



31. Remove left fender from tractor and set aside for stowage in ISU-60 container:
- Remove six bolts and washers holding fender to frame bracket.
  - Attach lifting sling through slotted opening in welded bracket of fender and attach sling to overhead lifting device. Take up slack in sling.

**NOTE**

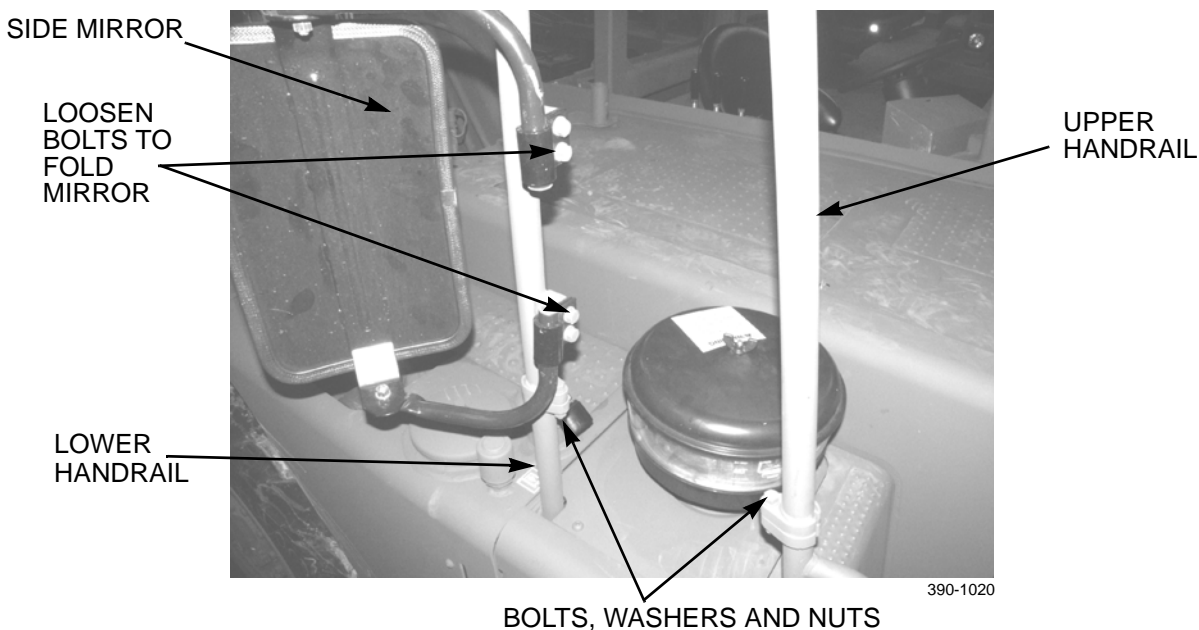
Weatherseal at front of fender will remain with fender.

- Remove 12 bolts, washers, and fender from tractor.
- Reinstall mounting hardware on machine.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

Removal of upper handrail on right side of tractor leaves right side of tractor without any means to safely climb on machine. Use caution when climbing on right side of upper handrail has been removed. Failure to do so may result in injury to personnel.

32. Remove two nuts, washers, bolts, and upper handrail with side mirror from lower handrail on right side of tractor. Reinstall mounting hardware on lower handrail.
33. Loosen bolts and fold side mirror flat against upper handrail. Set handrail with side mirror aside for stowage in ISU-60 container.



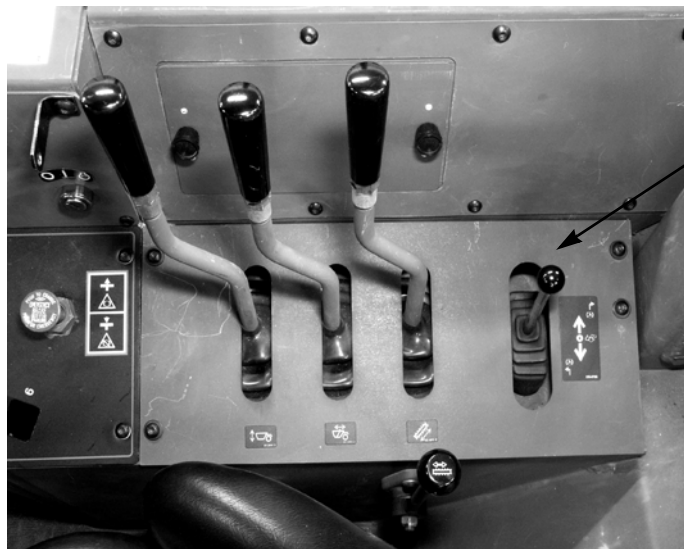
**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

- Use extreme caution when driving sectionalized tractor with stability skids and no ROPS/FOPS. Use first gear forward and low idle ONLY.
- Ground guide or ground safety officer assistance is required to monitor path in front of front stability skid, to avoid obstacles and direct tractor operation.

**NOTE**

- Do NOT use differential lock in skid steer mode.
- Once sectionalized, conventional steering will not function.

34. Using low idle and first gear ONLY, drive tractor forward and separate from scraper:
- a. Steer using skid steer control: push control to right to turn right. Pull control to left to turn left.
  - b. Drive tractor forward a minimum of 50 ft (15.3 m), to separate tractor from scraper and to allow sufficient clearance for CH-47 lift.



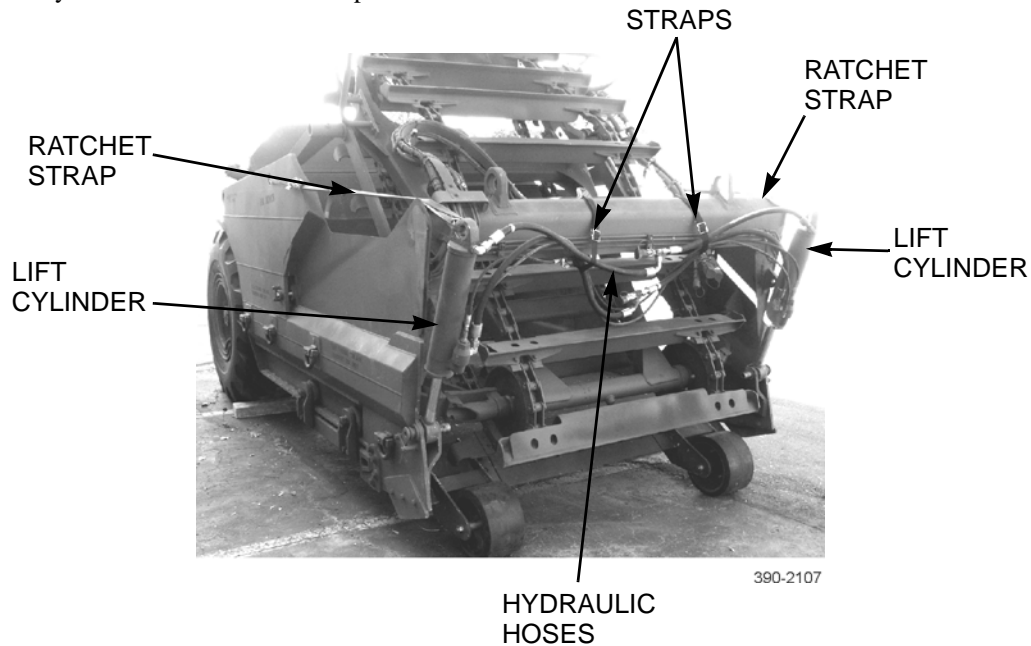
390-1382

35. Reinstall draft arm pins and hardware in scraper bowl.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****NOTE.**

The following step requires three personnel.

36. Raise bowl lift cylinders and secure:
  - a. Simultaneously lift both cylinders and secure using one ratchet strap for each cylinder as shown in the illustration.
  - b. Secure hydraulic hoses with two straps.

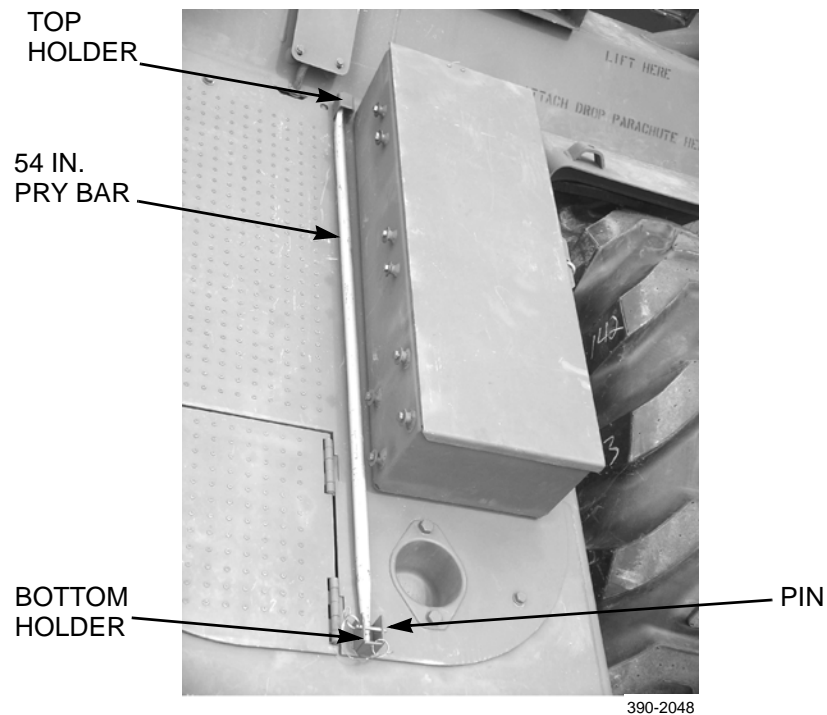


37. Retighten rear stability skid mounting bolts to 375 lb-ft (508 Nm).
38. Stow the following tools, required for machine assembly after transport, in BII toolbox on rear deck of scraper:
  - a. bar, breaker, 1/2 in. drive;
  - b. extension, socket, 1/2 in. drive, 5 in. long;
  - c. hammer;
  - d. handle, 3/4 in. drive;
  - e. head, breaker bar, 3/4 in. drive;
  - f. punch, drift, brass, 3/4 in.;
  - g. socket, 3/4 in. drive, 1-1/8 in.;
  - h. socket, 1/2 in. drive, 9/16 in.;
  - i. socket, 1/2 in. drive, 15/16 in.;
  - j. socket, 1/2 in. drive, 3/4 in.;
  - k. wrench, adjustable, 12 in.;
  - l. wrench, combination, 7/16 in. (2);
  - m. wrench, combination, 1/2 in.; and
  - n. wrench, combination, 9/16 in.



**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

39. Stow four transmission mount bolts and washers in BII toolbox.
40. Stow 54 in. pry bar in on rear deck of scraper as follows:
  - a. Place pry bar in top holder, then place in bottom holder.
  - b. Secure pry bar with pin through bottom holder.



41. Secure loose ends of fuel, electrical, air, and hydraulic lines with general purpose straps.
42. Cover all lights with adhesive tape (Item 23, WP 0026 00).

**CAUTION**

Exhaust pipe must be taped closed to prevent wind from entering exhaust system and causing turbo-charger to spin, without the benefit of lubrication. Failure to cover exhaust pipe may damage turbo-charger.

43. Use duct tape (Item 22, WP 0026 00) to cover exhaust system.
44. Ensure all compartment doors and BII toolbox on rear deck of scraper are closed, latched, and secured with padlocks. Install instrument panel covers and secure with padlocks (WP 0005 00).
45. Rig sling legs to tractor and scraper (FM 10-450-5) in accordance with illustration and shipping data plates on tractor and scraper. Tractor and scraper are now ready for hookup to CH-47 helicopter.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****WARNING**

- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
- Mud and dirt that are left on components when stowed will result in extra weight in excess of allowable payload. Ensure components stowed are cleaned prior to stowage to ensure ISU-60 container is not overweight.

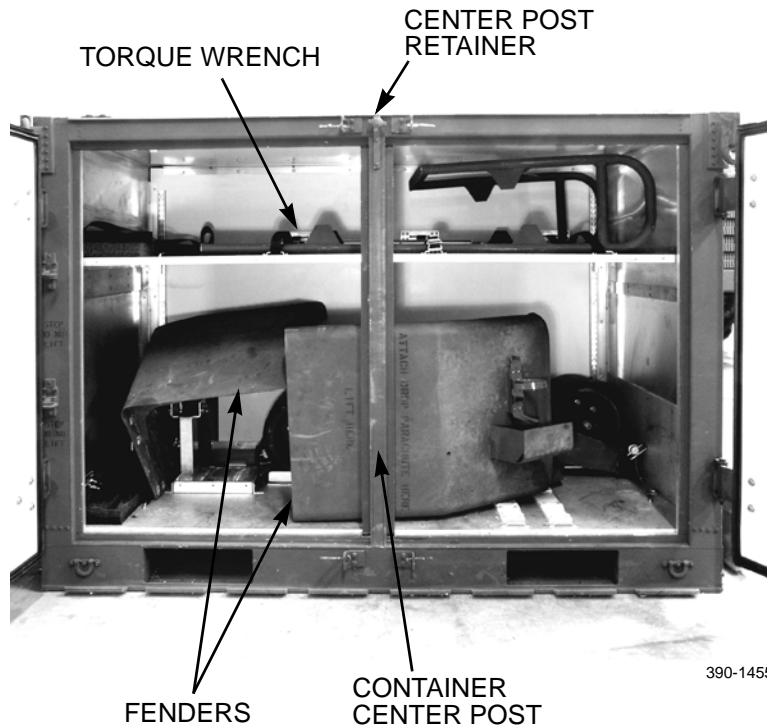
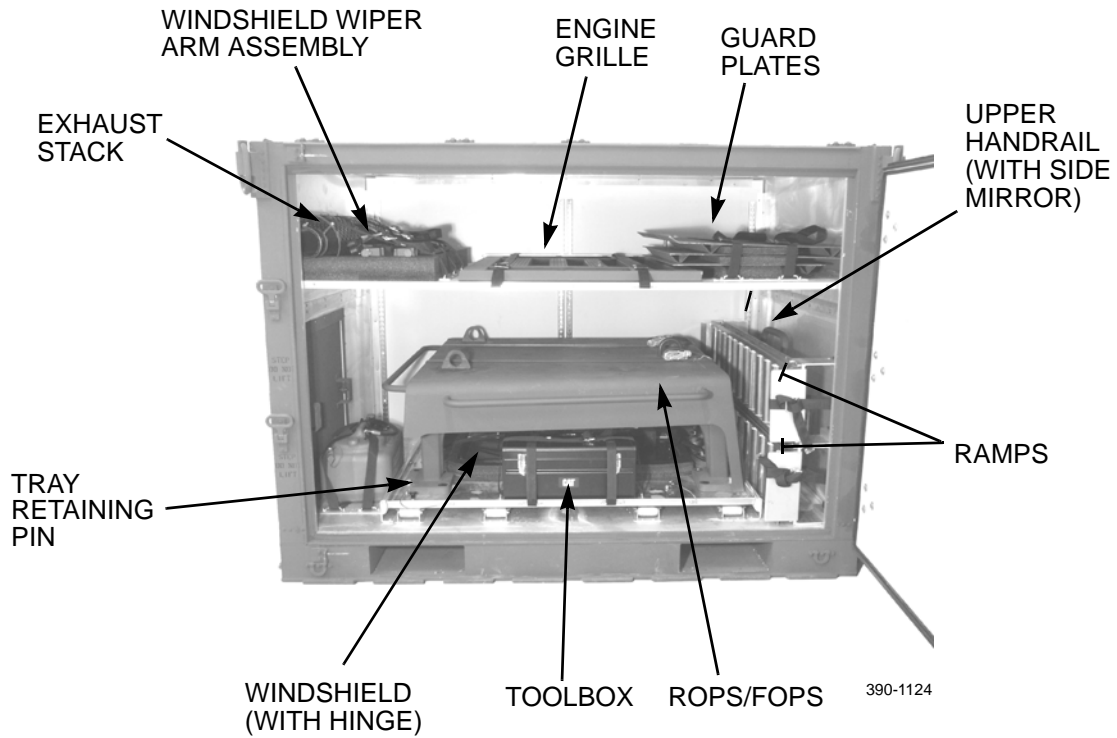
46. Remove mud and dirt from components prior to stowage.

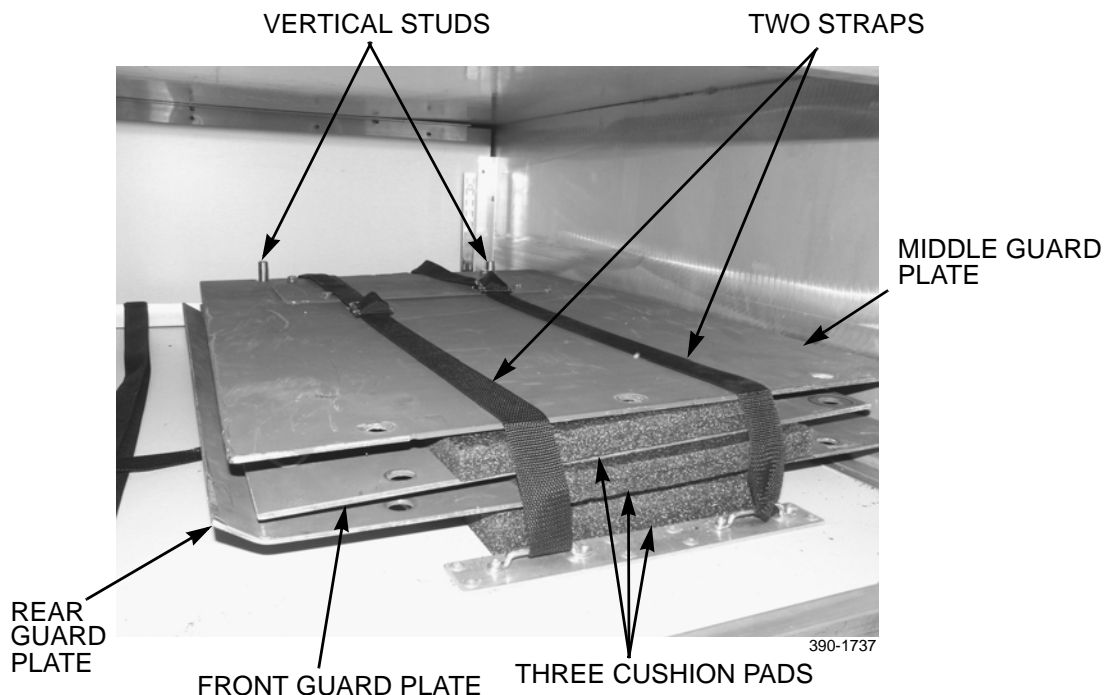
**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

47. Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 3 and 4:
- a. exhaust stack;
  - b. windshield wiper arm assembly;
  - c. engine grille;
  - d. three guard plates;
  - e. upper handrail (with side mirror);
  - f. ROPS/FOPS;
  - g. toolbox (minus tools and equipment placed in BII toolbox on scraper);
  - h. fenders; and
  - i. torque wrench.

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**



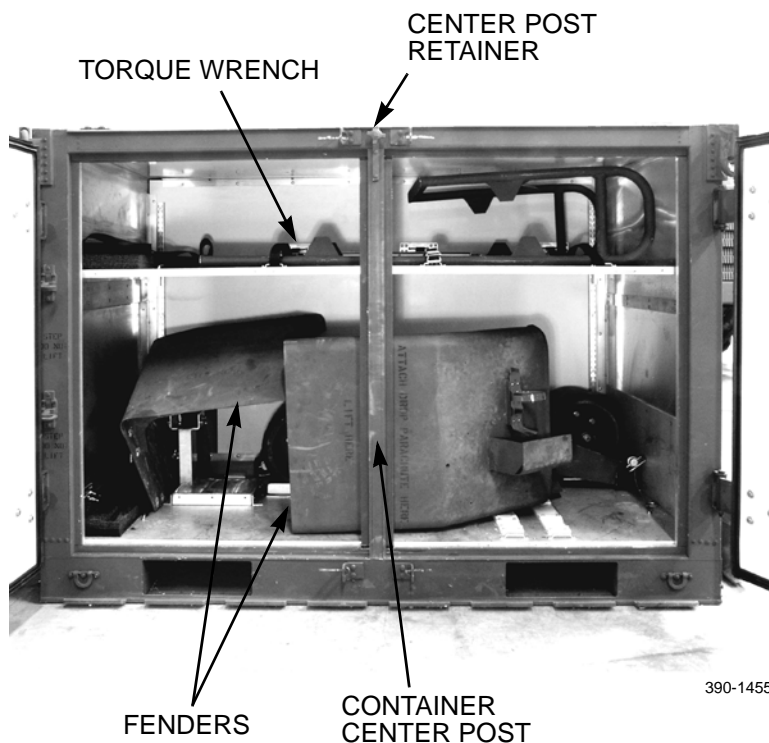
**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****Table 3. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Exhaust Stack and Windshield Wiper Arm Assembly	<ol style="list-style-type: none"> <li>1. Place exhaust stack in left cutout of cushion pad, on left side of shelf. Lower end of stack should be facing out.</li> <li>2. Place windshield wiper arm assembly next to exhaust stack.</li> <li>3. Secure components with three straps.</li> </ol>
Engine Grille	<ol style="list-style-type: none"> <li>1. Place engine grille in middle of shelf.</li> <li>2. Secure engine grille with two straps.</li> </ol>
Guard Plates	<ol style="list-style-type: none"> <li>1. Position two straps lengthwise on top of bottom cushion pad.</li> <li>2. Place rear guard plate on pad, with slotted holes in plate notched into vertical studs at back of shelf.</li> <li>3. Position second cushion pad.</li> <li>4. Place front guard plate on second pad, in same manner as rear guard plate.</li> <li>5. Position third cushion pad.</li> <li>6. Place middle guard plate on third pad.</li> <li>7. Secure guard plates with two straps.</li> </ol>
Upper Handrail (with Side Mirror)	<ol style="list-style-type: none"> <li>1. Place against right-side wall of container.</li> <li>2. Secure with one strap.</li> </ol>

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED**

Table 3. Stowage Instructions for ISU-60 Container - Single-Door End - Continued.

COMPONENT	STOWAGE INSTRUCTIONS
ROPS/FOPS	<div> </div> <p><b>WARNING</b></p> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do NOT allow to swing free.</p> <p><b>CAUTION</b></p> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> <ol style="list-style-type: none"> <li>1. Using a suitable three-point lifting device, lift ROPS/FOPS into position over tray, with front of ROPS/FOPS to the right.</li> <li>2. Lower ROPS/FOPS onto four studs, one at each corner of tray.</li> <li>3. Secure ROPS/FOPS with two straps.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Place toolbox on front edge of tray.</li> <li>2. Secure with three straps.</li> <li>3. Slide tray all the way in.</li> <li>4. Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>1. Position each ramp against right wall of container.</li> <li>2. Secure each ramp with strap.</li> </ol>
	<p><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door.</p>

**MACHINE DISASSEMBLY AND SECTIONALIZATION - CONTINUED****Table 4. Stowage Instructions for ISU-60 Container - Two-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
	<p style="text-align: center;"><b>NOTE</b></p> <p>Container center post must be removed to allow stowage of fenders. Remove retainer and post.</p>
Torque Wrench	<ol style="list-style-type: none"> <li>1. Place in cushion pad at back of shelf.</li> <li>2. Secure with three straps.</li> </ol>
Fenders	<ol style="list-style-type: none"> <li>1. Place right fender in left-rear corner on floor of container.</li> <li>2. Place left fender as shown.</li> <li>3. Secure fenders with straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>1. Position center post, installing bottom end first.</li> <li>2. Raise shelf slightly to lock center post in position.</li> <li>3. Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing doors.</p>

48. Rig sling legs to ISU-60 container (FM 10-450-5). Container is now ready for hookup to CH-47 helicopter.

**MACHINE ASSEMBLY****NOTE**

Whenever hydraulic hose quick disconnects need to be connected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate connection of hoses.

1. Block tractor and scraper wheels.

**WARNING**

Use extreme caution when removing helicopter sling legs. Handrail on right side of tractor was removed for sectionalization. Until it is installed, personnel must use great care when climbing on tractor. Failure to follow this warning may result in personnel injury.

2. Remove sling legs from tractor and scraper. Remove sling legs from container.
3. Remove tape from all lights. Remove tape from exhaust extension.
4. Remove all general purpose straps from load, to release loose ends of fuel, electrical, air, and hydraulic lines.
5. Remove 54 in. pry bar from stowage on rear deck of scraper.
6. Remove padlocks and instrument panel covers (WP 0005 00).

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

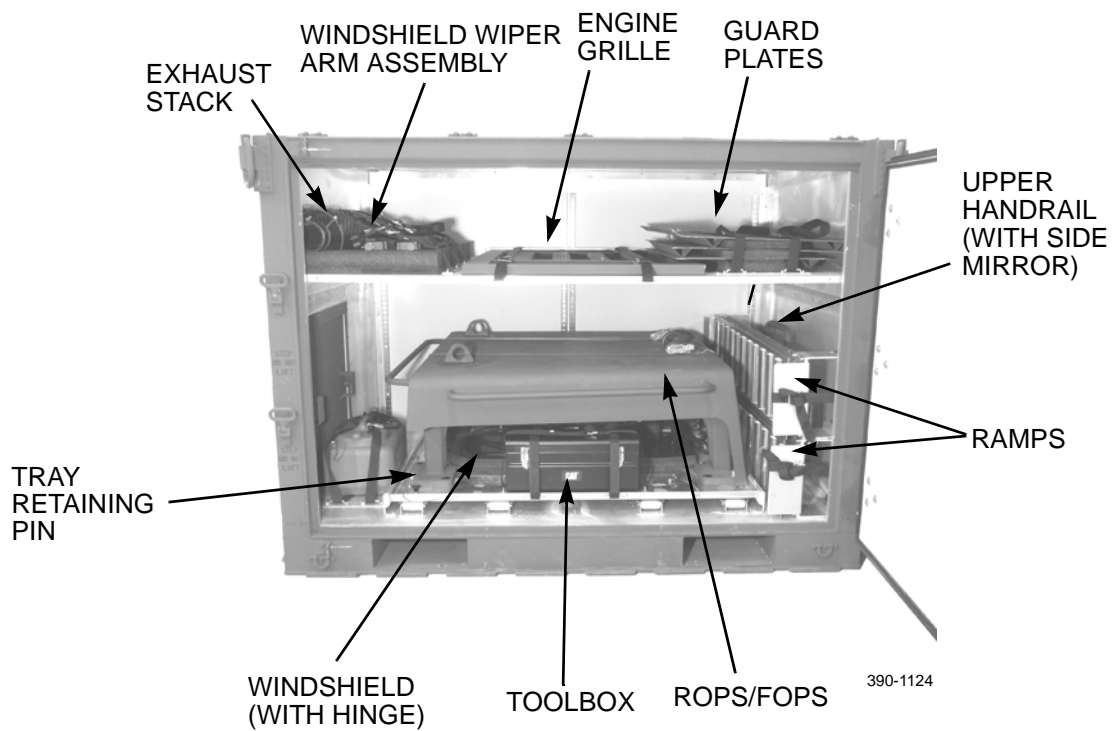
- Tools and equipment required for machine assembly are located in BII toolbox on rear deck of scraper.
- If ISU-60 container has not been delivered to site of machine assembly, performance of selected steps will need to be delayed until container arrives. Proceed with assembly of machine, returning to these steps as soon as container is available.

## EXTERNAL AIR TRANSPORT BY CH-47 HELICOPTER - CONTINUED

0017 00

**MACHINE ASSEMBLY - CONTINUED**

7. Place ISU-60 container near machine assembly area and remove the following items from container, in accordance with illustrations and information in Tables 5 and 6:
- fenders;
  - torque wrench;
  - toolbox (minus tools and equipment placed in BII toolbox on scraper);
  - ROPS/FOPS;
  - windshield (with hinge);
  - upper handrail (with side mirror);
  - exhaust stack;
  - windshield wiper arm assembly;
  - engine grille; and
  - three guard plates.






**MACHINE ASSEMBLY - CONTINUED****Table 5. Unpacking ISU-60 Container - Two-Door End.**

COMPONENT	UNPACKING INSTRUCTIONS
	<p style="text-align: center;"><b>NOTE</b></p> <p>Container center post must be removed to allow unpacking of fenders. Remove retainer and post.</p>
Fenders	<ol style="list-style-type: none"> <li>1. Release straps from both fenders.</li> <li>2. Remove fenders from container.</li> </ol>
Torque Wrench	<ol style="list-style-type: none"> <li>1. Release three straps.</li> <li>2. Remove torque wrench from cushion pad at back of shelf.</li> </ol>

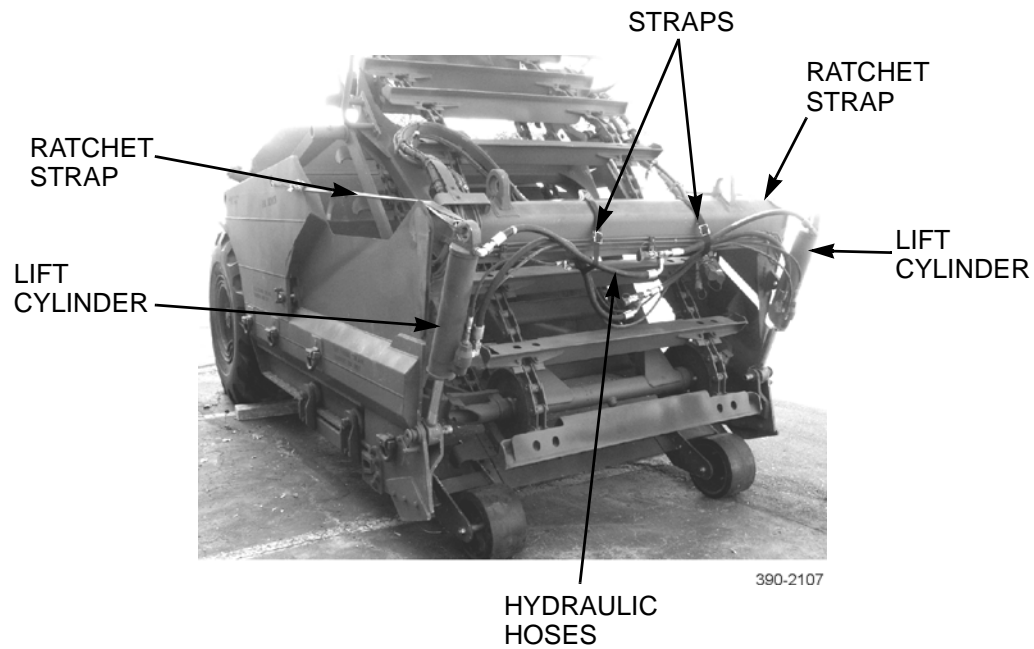
**Table 6. Unpacking ISU-60 Container - Single-Door End.**

COMPONENT	UNPACKING INSTRUCTIONS
Ramps	<ol style="list-style-type: none"> <li>1. Remove two roller ramps from right-side wall of container.</li> <li>2. Install each ramp at door opening, with two pins through each ramp into holes in edge of floor.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Remove two pins and slide out tray.</li> <li>2. Release three straps and remove toolbox from tray.</li> </ol>
ROPS/FOPS	<ol style="list-style-type: none"> <li>1. Release two straps from ROPS/FOPS.</li> </ol> <div style="text-align: center;">  <p><b>WARNING</b></p> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do NOT allow to swing free. Failure to do so may result in injury or death to personnel.</p> <p><b>CAUTION</b></p> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> </div> <ol style="list-style-type: none"> <li>2. Use a suitable three-point lifting device to lift ROPS/FOPS clear of tray.</li> </ol>
Windshield (with Hinge)	<p style="text-align: center;"><b>CAUTION</b></p> <p>Use caution not to damage windshield during handling. Do not remove from container until ready to install.</p> <ol style="list-style-type: none"> <li>1. Release one strap from windshield.</li> <li>2. Carefully remove windshield (with hinge) from cushion pad.</li> </ol>
	<p style="text-align: center;"><b>NOTE</b></p> <p>To remove all remaining components, remove straps as required and lift out component.</p>

**MACHINE ASSEMBLY - CONTINUED****NOTE**

The following step requires three personnel.

8. Lower bowl lift cylinders to ground.
  - a. Remove two straps securing hydraulic hoses.
  - b. While holding lift cylinders in place, remove two ratchet straps securing lift cylinders.



**MACHINE ASSEMBLY - CONTINUED**

- c. Simultaneously lower both cylinders to ground.



LIFT  
CYLINDERS

9. Start tractor engine.

**WARNING**

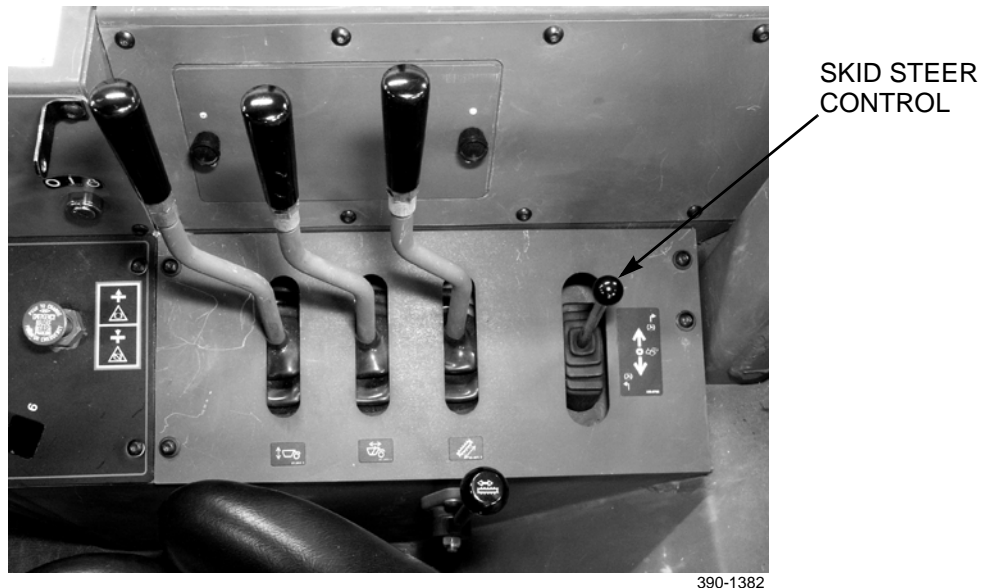
- Use extreme caution when driving sectionalized tractor with stability skids and no ROPS/FOPS. Use first gear forward or reverse and low idle ONLY. Failure to do so may result in injury or death to personnel.
- Ground guide or ground safety officer assistance is required to monitor path in front of front stability skid, to avoid obstacles and direct tractor operation. Failure to do so may result in injury or death to personnel.

**NOTE**

- Do NOT use differential lock in skid steer mode.
- Conventional steering is not functional.

**MACHINE ASSEMBLY - CONTINUED**

10. Using low idle **ONLY** and first gear or reverse, position tractor directly in front of and in line with scraper bowl. Steer using skid steer control: push control right to turn right, pull control left to turn left.



11. Remove two bolts, washers, retainer bar, and draft arm pin from each side of scraper bowl.
12. With ground guide assistance, slowly back tractor up into position in front of scraper:
  - a. Maintain draft arms of tractor an equal distance from attachment point on each side of scraper bowl. Keep tractor centered on scraper.

**NOTE**

Center of gravity of tractor is over tractor wheels. Draft arms can be manually lifted, as required, to facilitate positioning at scraper bowl.

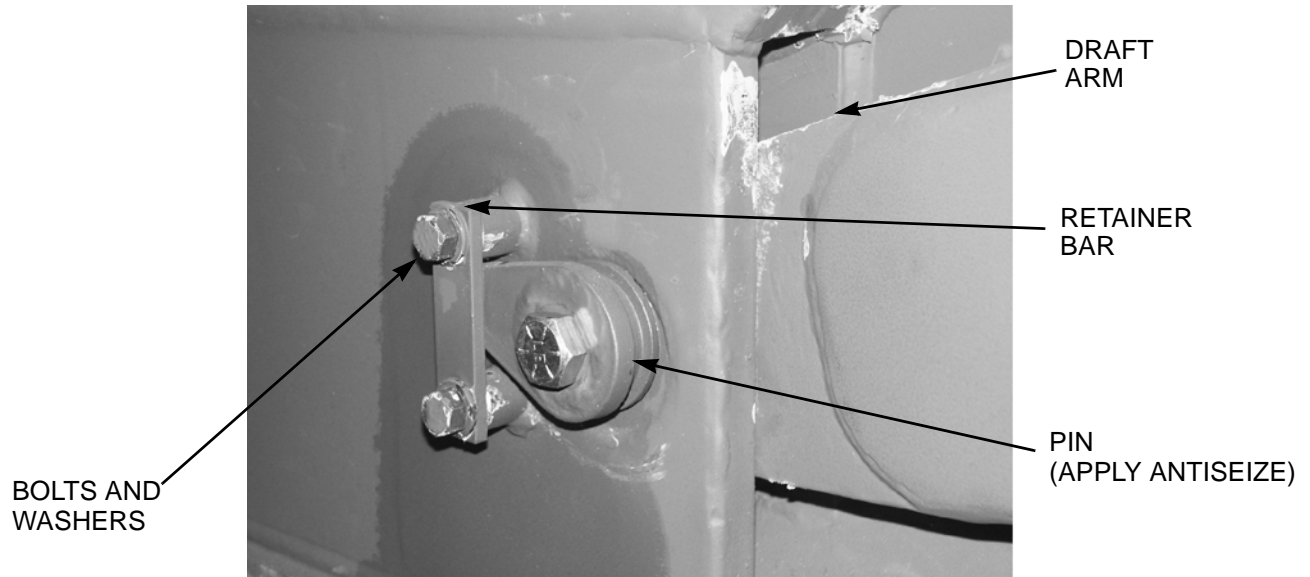
- b. Have an assistant maneuver each draft arm into its respective slot on scraper bowl, as tractor backs up.

**NOTE**

Clean and lubricate pins with antiseize compound (Item 5, WP 0026 00) before they are installed.

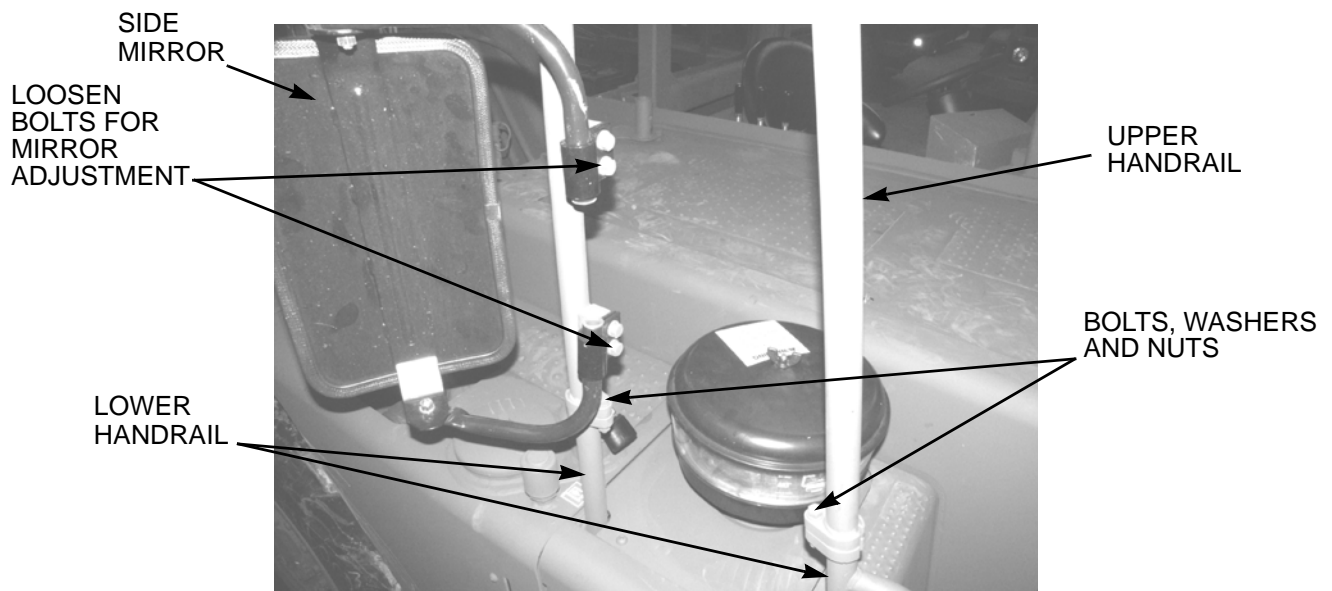
- c. When alignment for pin installation is OK, have each assistant install pin through scraper bowl and draft arm.
- d. Install retainer bar, two washers, bolts and bolt. Tighten bolts securely.

**MACHINE ASSEMBLY - CONTINUED**



390-1073

13. Shut down engine.
14. Install upper handrail with side mirror on lower handrail on tractor with two bolts, washers, and nuts. Tighten nuts securely.
15. Loosen bolts and unfold side mirror. Adjust to provide visibility to side and rear of machine. Tighten bolts.



390-1020

**MACHINE ASSEMBLY - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

16. Install left fender to tractor:
  - a. Attach lifting sling through slotted opening in welded bracket of fender and attach sling to overhead lifting device.
  - b. Install fender (with weatherseal) to tractor with 12 bolts and washers.
  - c. Install fender to frame bracket with six bolts and washers.



390-1089

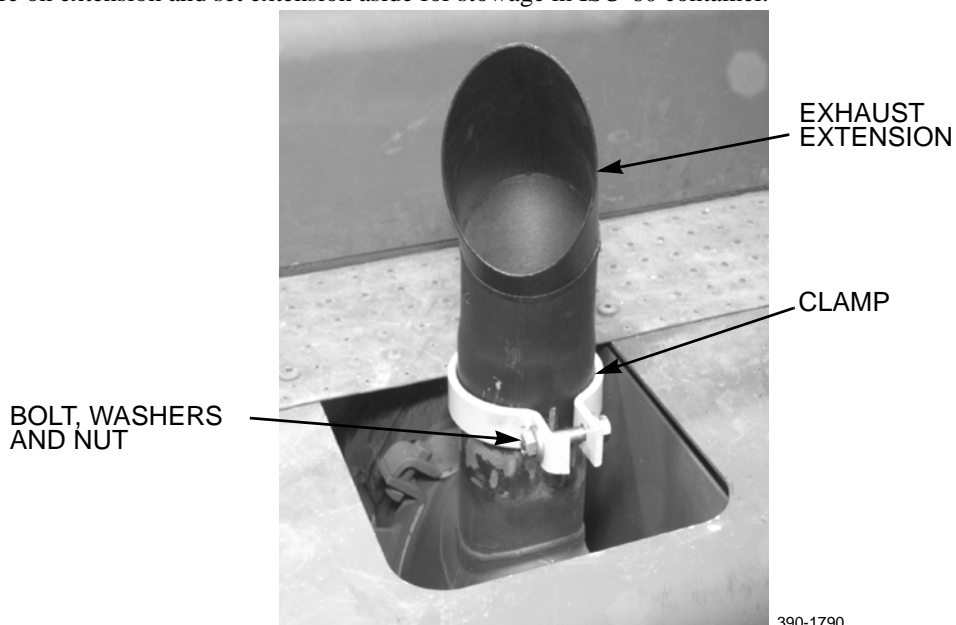
**MACHINE ASSEMBLY - CONTINUED**

17. Install right fender to frame and fender bracket with 17 bolts and washers.

**WARNING**

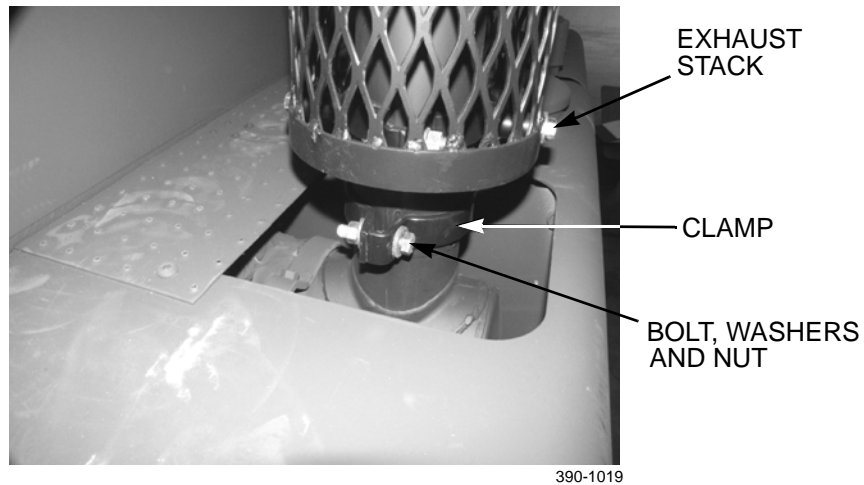
Do NOT install exhaust stack until engine exhaust components have cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

18. Remove exhaust extension from muffler on right side of tractor and install exhaust stack in its place:
- Loosen nut, bolt, two washers, and clamp, and remove exhaust extension from muffler. Retain mounting hardware on extension and set extension aside for stowage in ISU-60 container.



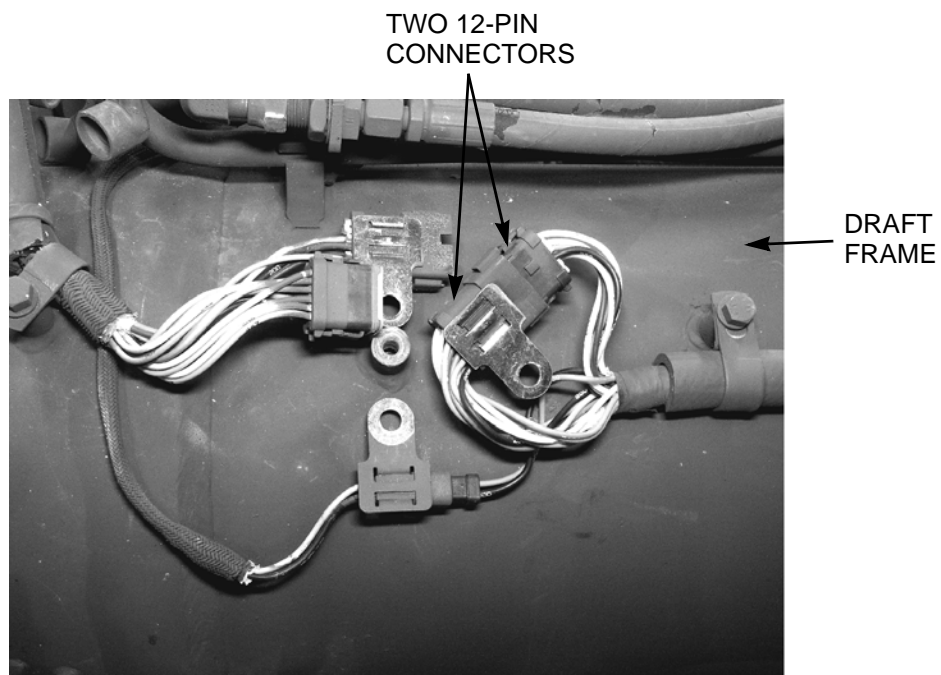
**MACHINE ASSEMBLY - CONTINUED**

- b. Install exhaust stack with clamp, bolt, two washers, and nut. Tighten nut securely.

**NOTE**

As soon as electrical connections are made, skid steering is disabled and conventional steering is enabled.

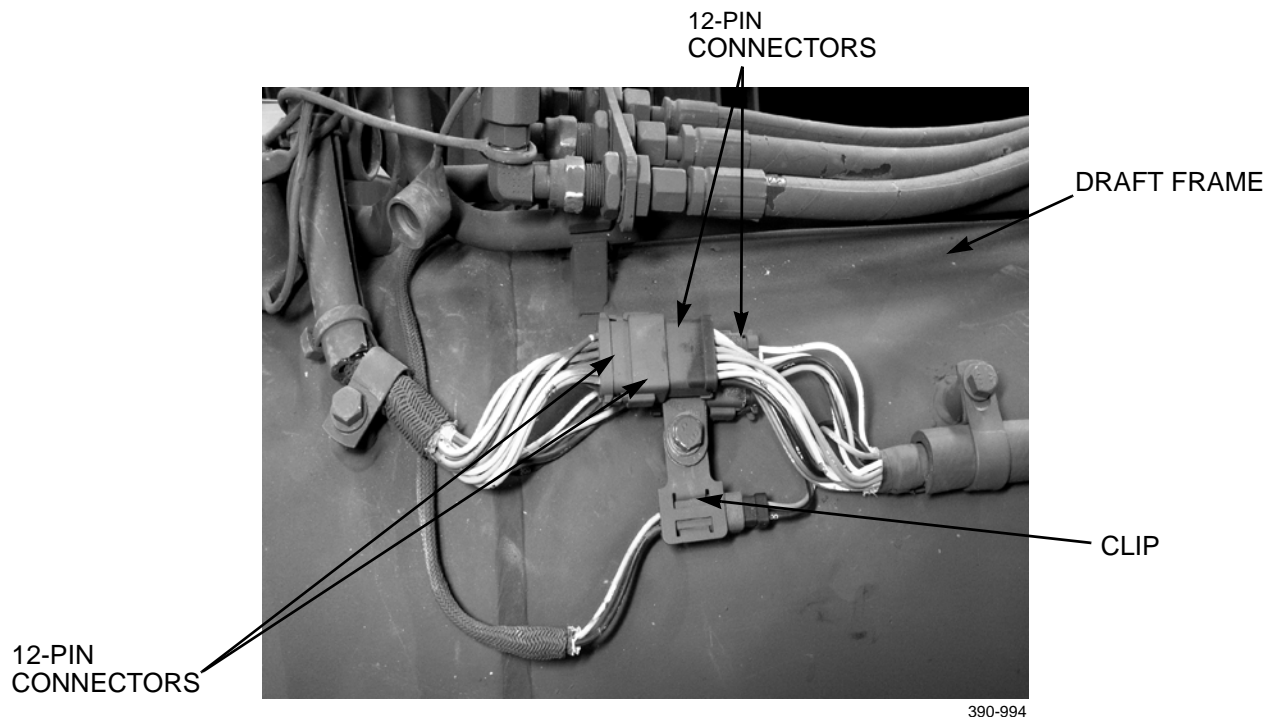
19. Reposition wiring harness at right side of draft frame and secure with clamp and bolt.
20. Disconnect two 12-pin electrical connectors from each other.





**MACHINE ASSEMBLY - CONTINUED**

21. Connect two 12-pin electrical connectors to other two connectors, as shown. Secure connectors in clip to draft frame.

**WARNING**

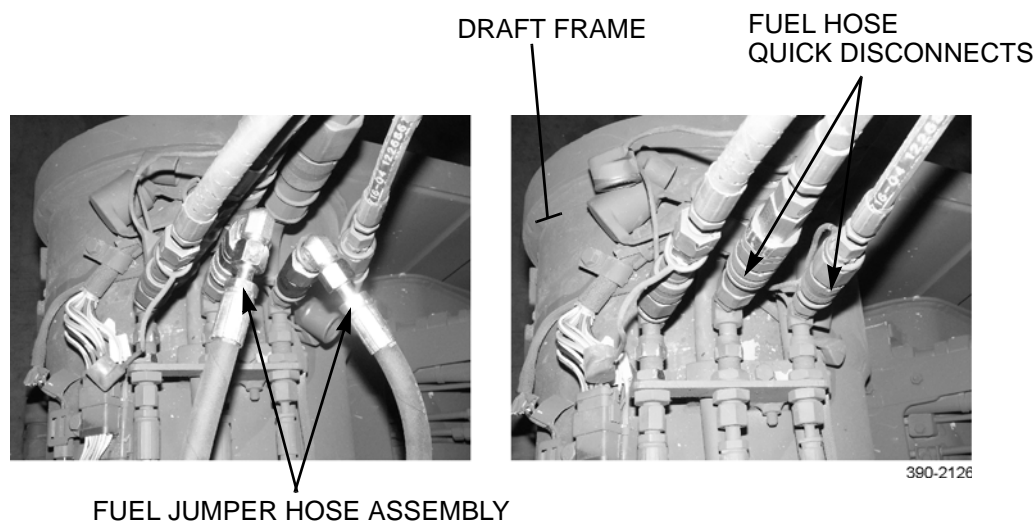
DO NOT perform fuel system maintenance while smoking or near fire, flames or sparks. Auxiliary fuel tank should be stored EMPTY. Fuel may ignite, causing damage to machine and injury or death to personnel.

**NOTE**

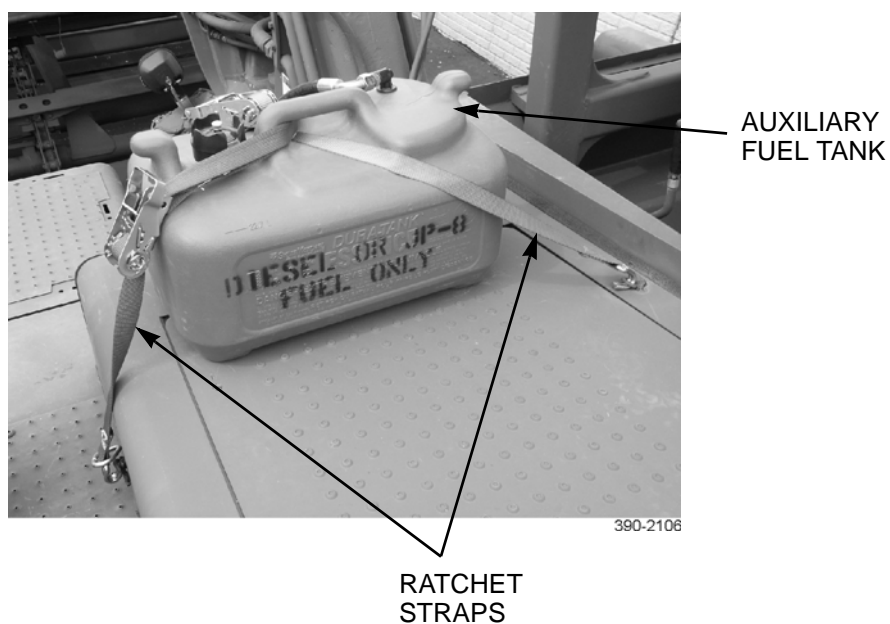
All quick disconnect connections (fuel, air, and hydraulic) are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

**MACHINE ASSEMBLY - CONTINUED**

22. Remove auxiliary fuel tank, ratchet straps, and fuel lines and set aside for stowage in ISU-60 container:
- Disconnect fuel jumper hose assembly from fuel hose quick disconnects on right side of draft frame. Connect fuel hoses at quick disconnect fittings. Turn quick disconnect collars a half turn after connecting to ensure connection is locked. Install all dust caps.
  - Stow fuel jumper hose assembly in ISU-60 container toolbox.

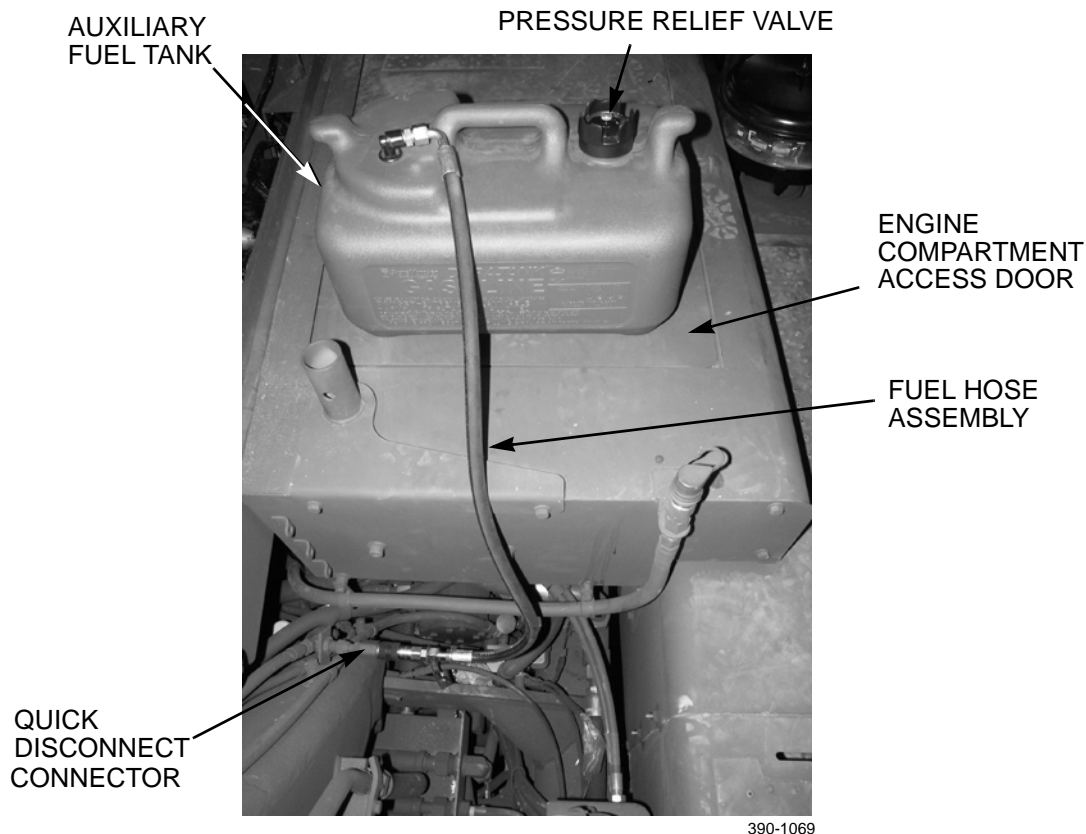


- Disconnect auxiliary fuel tank hose assembly from quick disconnect connector.
- Remove two ratchet straps and auxiliary fuel tank from hood. Place straps in ISU-60 container toolbox.



**MACHINE ASSEMBLY - CONTINUED**

- e. Empty auxiliary tank of fuel. Close pressure relief valve on auxiliary fuel tank.



390-1069

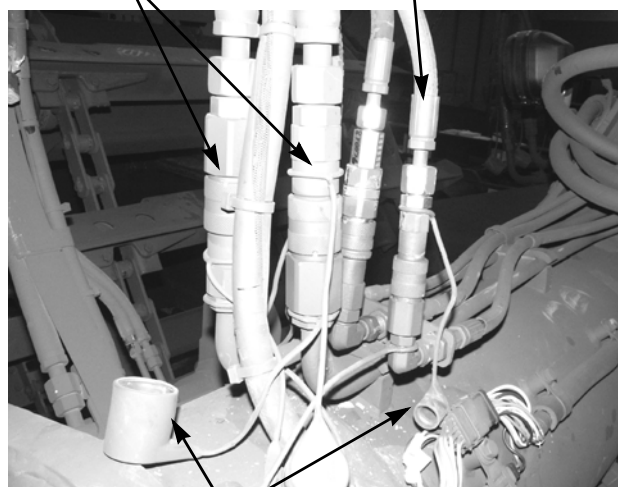
- f. Start tractor engine to ensure fuel system is OK. Use electric prime pump switch on instrument panel to prime fuel system, if required. Shut down engine.

**CAUTION**

Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

23. Wipe clean, then remove dust caps and connect two hydraulic hoses and air hose at quick disconnect fittings at top of right side of draft frame crossbeam.

HYDRAULIC HOSE QUICK DISCONNECTS AIR HOSE



390-1120

DUST CAPS

**MACHINE ASSEMBLY - CONTINUED**

24. Raise bowl lift cylinders and connect to draft frame:
- Remove two bolts, washers, retainer bar and pin from both sides of draft frame.

**NOTE**

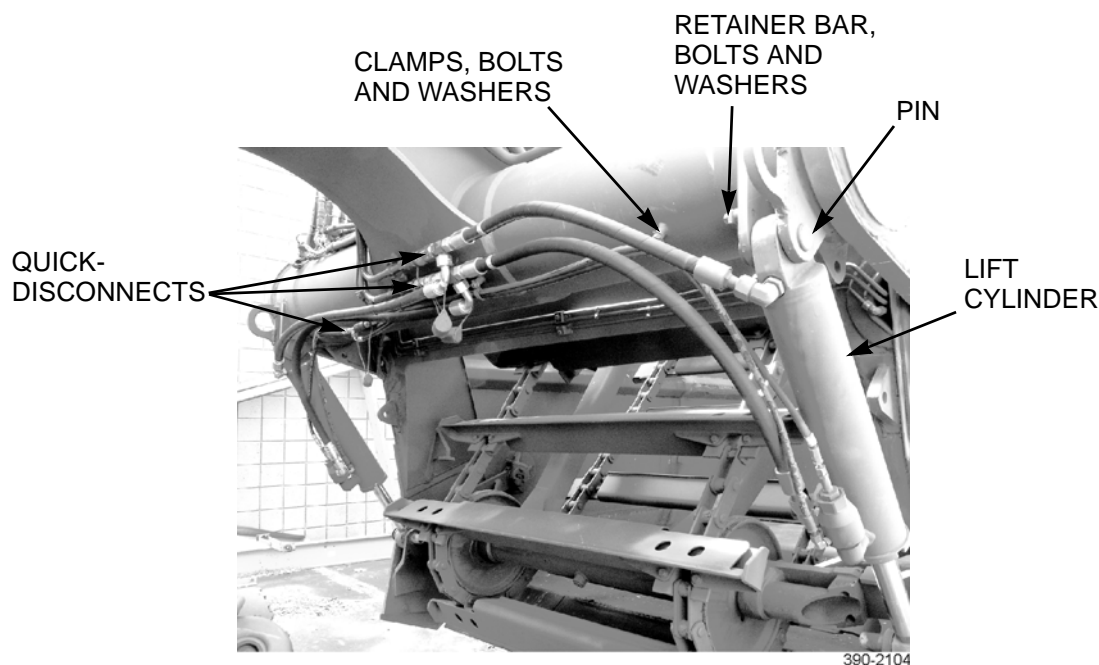
The following steps require three personnel.

- Simultaneously raise both cylinders into position and hold there.
- Wipe clean, then remove dust caps and connect three hydraulic quick disconnects at center of draft arm crossbeam.

**NOTE**

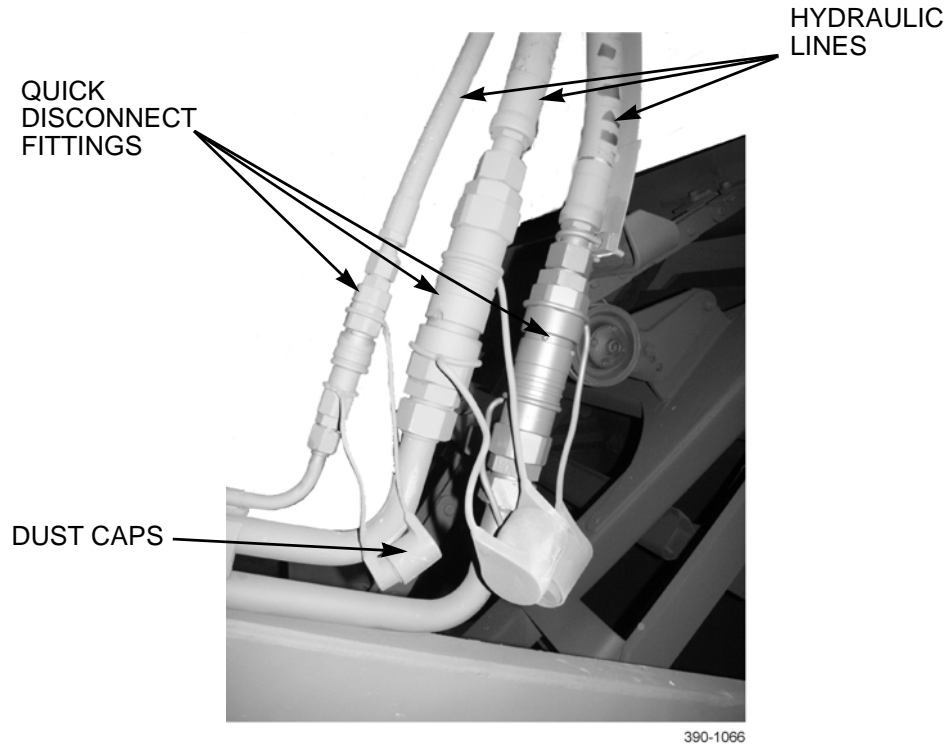
Clean and lubricate pins with antiseize compound (Item 5, WP 0026 00) before installing.

- Operate bowl lift control lever to extend or retract one cylinder until aligned with mounting location and install pin, retainer bar, two washers and bolts.
- Install four clamps, washers and bolts securing two crossover hydraulic hoses.



**MACHINE ASSEMBLY - CONTINUED**

25. Wipe clean, then remove dust caps and connect three hydraulic lines at quick disconnect fittings on left side of draft frame.

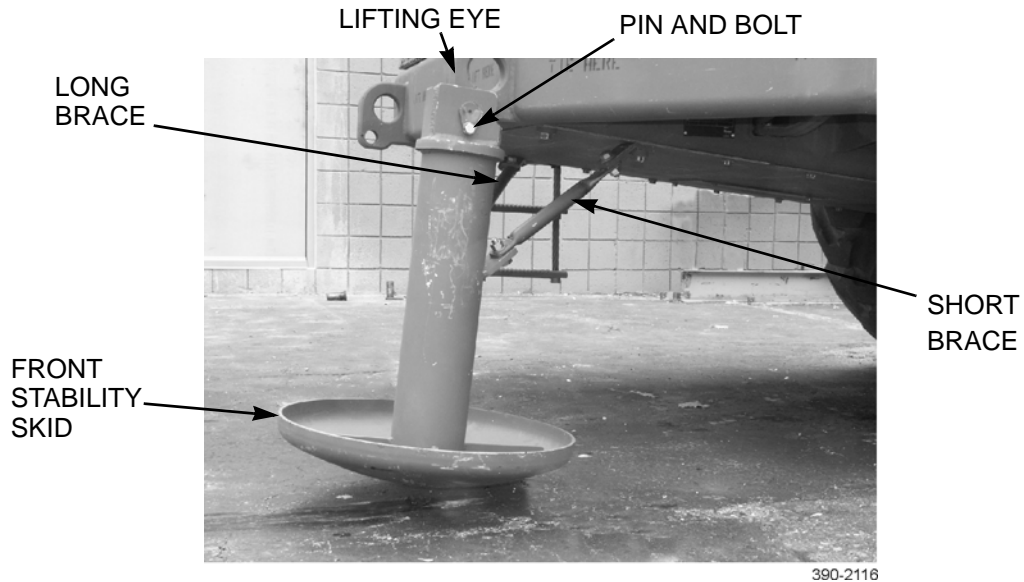


26. Remove four bolts, washers, and rear stability skid from transmission mount. Set rear stability skid and mounting hardware aside for stowage in ISU-60 container. Reinstall transmission mount washers and bolts, stowed in container toolbox, on each side of transmission mount. Tighten bolts to 375 lb-ft (508 Nm).



**MACHINE ASSEMBLY - CONTINUED**

27. Remove front stability skid and set aside for stowage in ISU-60 container:
- Remove bolt and washer and each brace from frame. Remove nut, two washers, bolt, and each brace from front stability skid. Reinstall mounting hardware in frame and on each brace to secure against loss.
  - Remove bolt, washer, pin assembly, and front stability skid from lifting eye.
  - Reinstall pin assembly to front stability skid with washer and bolt.



**MACHINE ASSEMBLY - CONTINUED****WARNING**

Configuration change at cutting edge should NEVER be attempted without first securing the bowl by blocking it so that it is firmly supported. Failure to follow this warning may cause injury or death to personnel.

28. Remove cutting edge wheels and set aside for stowage in ISU-60 container:
  - a. Raise scraper bowl until approximately 10 in. (25.4 cm) from ground. Block cutting edge securely.
  - b. Loosen two setscrews. With assistance and using a pry bar, remove each cutting edge wheel.
  - c. Remove blocks, lower bowl, and shut down engine.



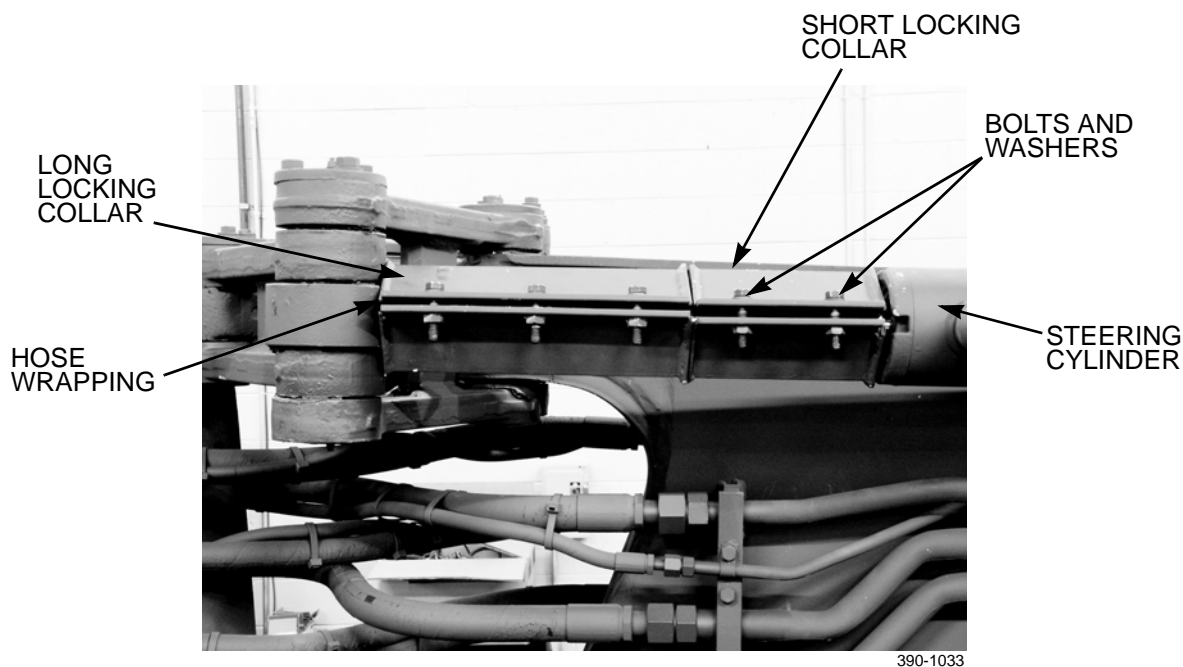
390-1027

**WARNING**

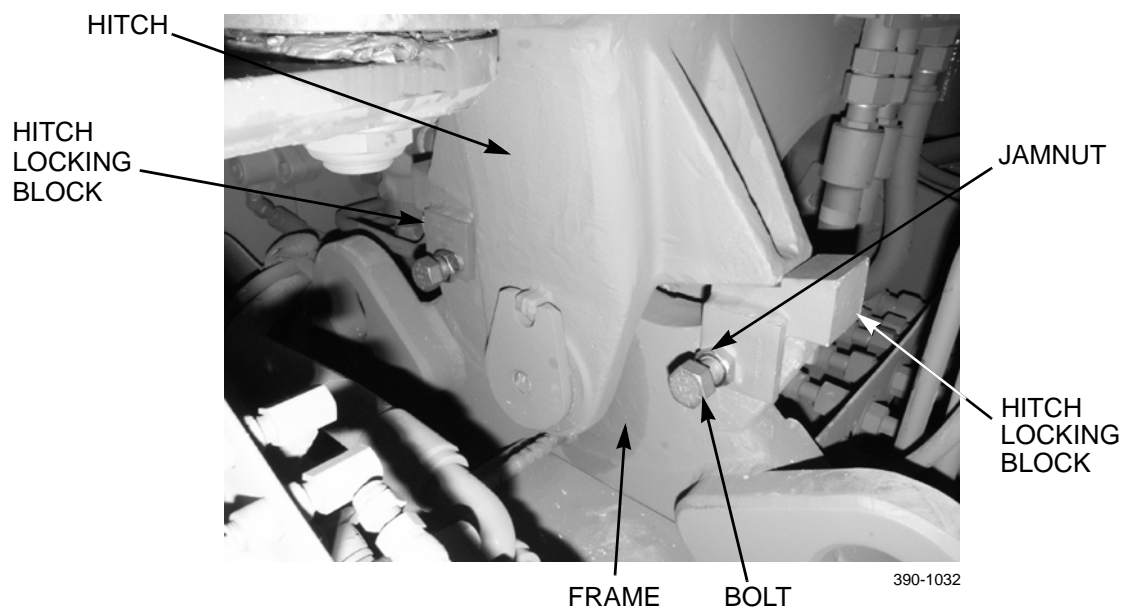
Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

**MACHINE ASSEMBLY - CONTINUED**

29. Remove steering cylinder locking collars and set aside for stowage in ISU-60 container:
- Remove five bolts and washers and remove two locking collars (one short and one long) and hose wrappings from each steering cylinder.
  - Reassemble each locking collar assembly with its mounting hardware.



30. Loosen two jamnuts, bolts, and remove two hitch locking blocks from between hitch and frame. Reinstall mounting hardware in blocks to secure against loss. Set aside for stowage in ISU-60 container.





**MACHINE ASSEMBLY - CONTINUED****WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

31. NOTE: Machine is now drivable. However, until ROPS/FOPS is installed, it should be operated only with extreme caution, at low idle, and in first gear or reverse ONLY.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

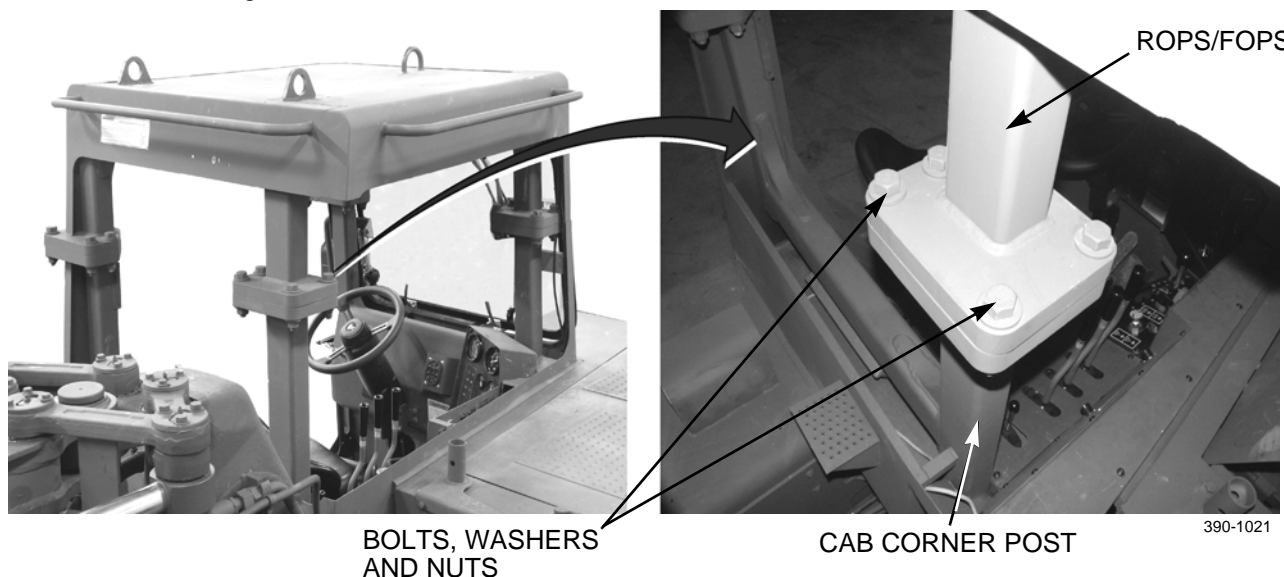
ROPS/FOPS weighs 447 lb (203 kg).

32. Install ROPS/FOPS on cab corner posts:
- Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.

**NOTE**

Tighten all mounting nuts using a crisscross tightening pattern. This will ensure even tightening and correct installation alignment on all four cab corner posts.

- Lift ROPS/FOPS into position at four corner posts. While positioning ROPS/FOPS, loosely install all 16 bolts, 32 washers, and 16 nuts. Final tighten nuts in a crisscross tightening pattern to 317 lb-ft (430 Nm).
- Remove lifting device from ROPS/FOPS.

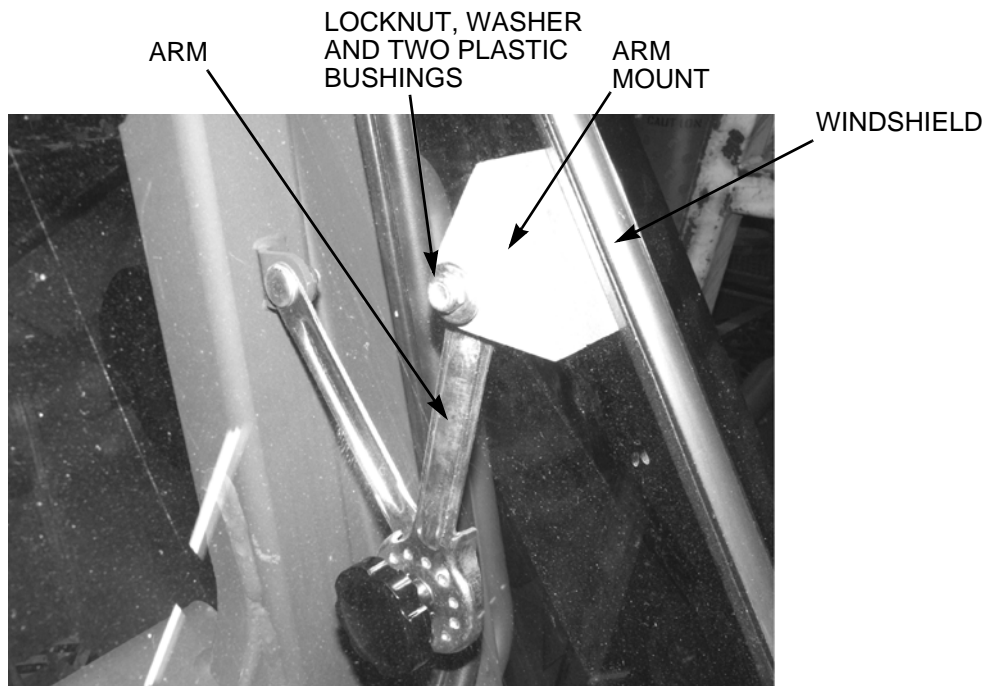


**MACHINE ASSEMBLY - CONTINUED****WARNING**

Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.

## 33. Install windshield:

- a. Position windshield and install arms to arm mounts with two plastic bushings, washer, and locknut on each side.

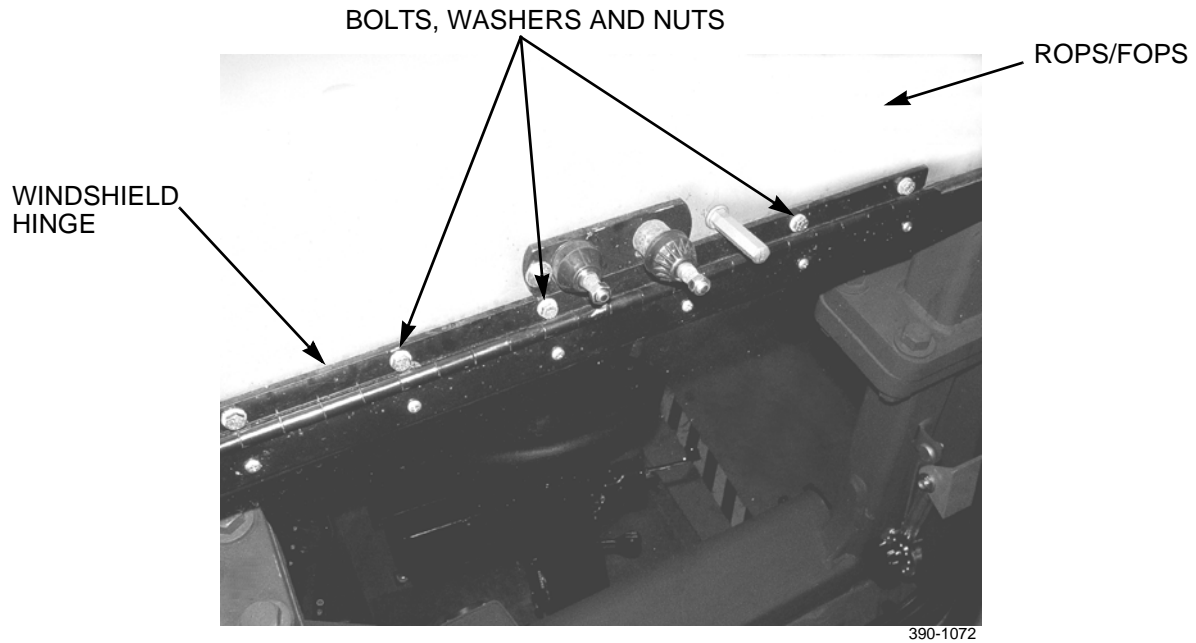


390-1067

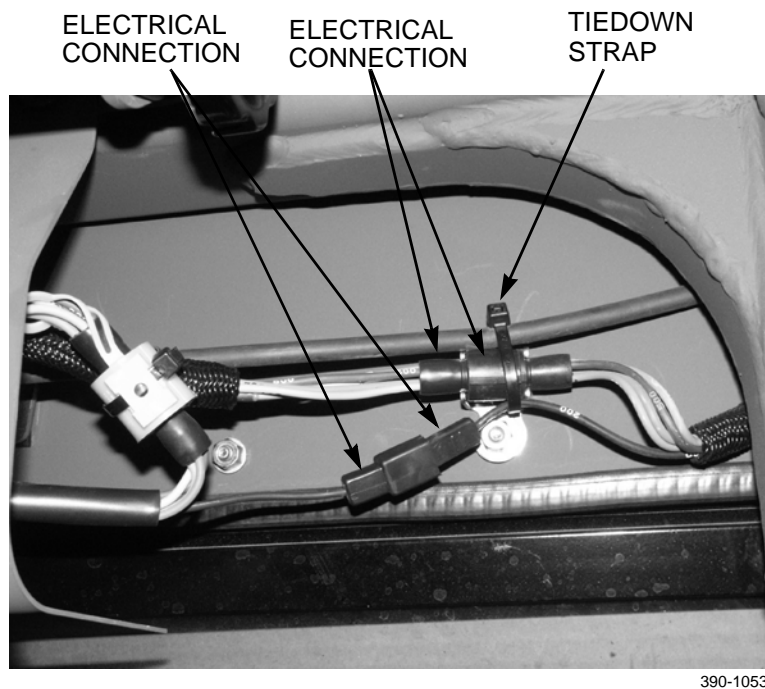
- b. Loosely install windshield hinge to ROPS/FOPS with six bolts, 12 washers, and six nuts.
- c. Close windshield and latch.

**MACHINE ASSEMBLY - CONTINUED**

- d. Fully tighten six nuts.

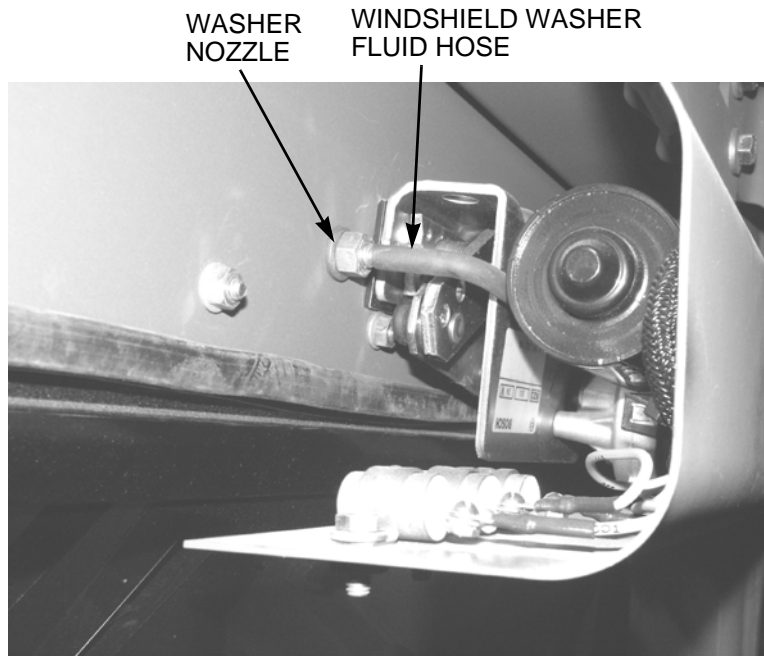


34. Connect two windshield wiper motor connectors. Secure wires with new tiedown strap (Item 21, WP 0026 00).



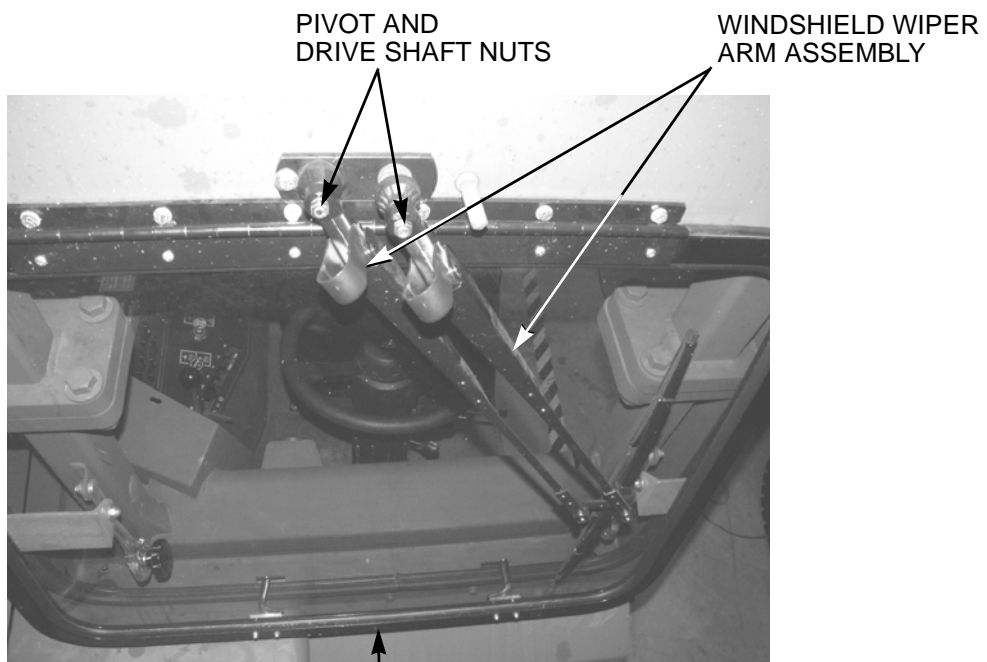
**MACHINE ASSEMBLY - CONTINUED**

35. Install windshield washer hose on washer nozzle.



390-1052

36. Install windshield wiper arm assembly to drive and pivot shafts with two nuts.



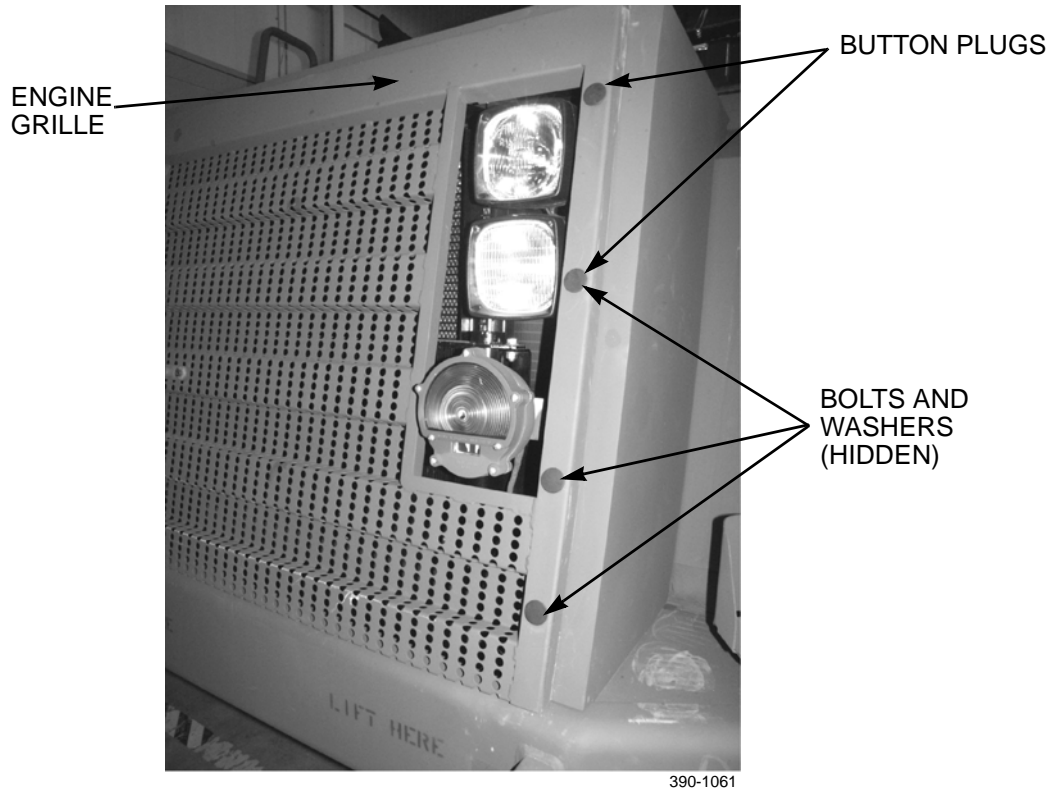
390-1060

WINDSHIELD

**MACHINE ASSEMBLY - CONTINUED****CAUTION**

Use caution not to damage lights when installing engine grille.

37. With assistance, install engine grille to front of hood with eight washers and bolts. Tighten bolts securely. Install eight button plugs.



**MACHINE ASSEMBLY - CONTINUED**

38. Install three guard plates:

- a. Remove guard plate mounting bolts and washers from left side of tractor frame. Loosen bolts and washers on right side of frame.

**NOTE**

Slotted side of plates mount to right side of tractor frame.

- b. With assistance, raise guard plate into position. Push guard plate so that slots in plate engage under washers and bolts. Install three washers and bolts on left side and fully tighten all six washers and bolts.
- c. Repeat step b to install two remaining guard plates.



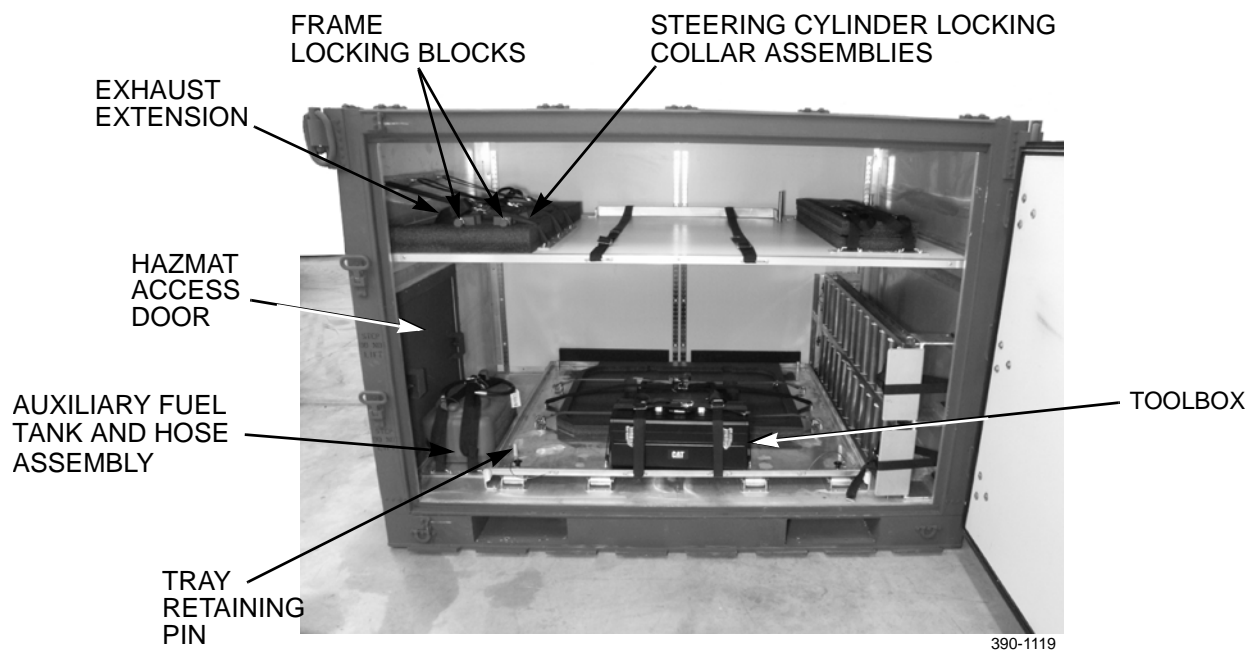
39. Machine is now fully assembled and operational.

**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

40. Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 7 and 8.

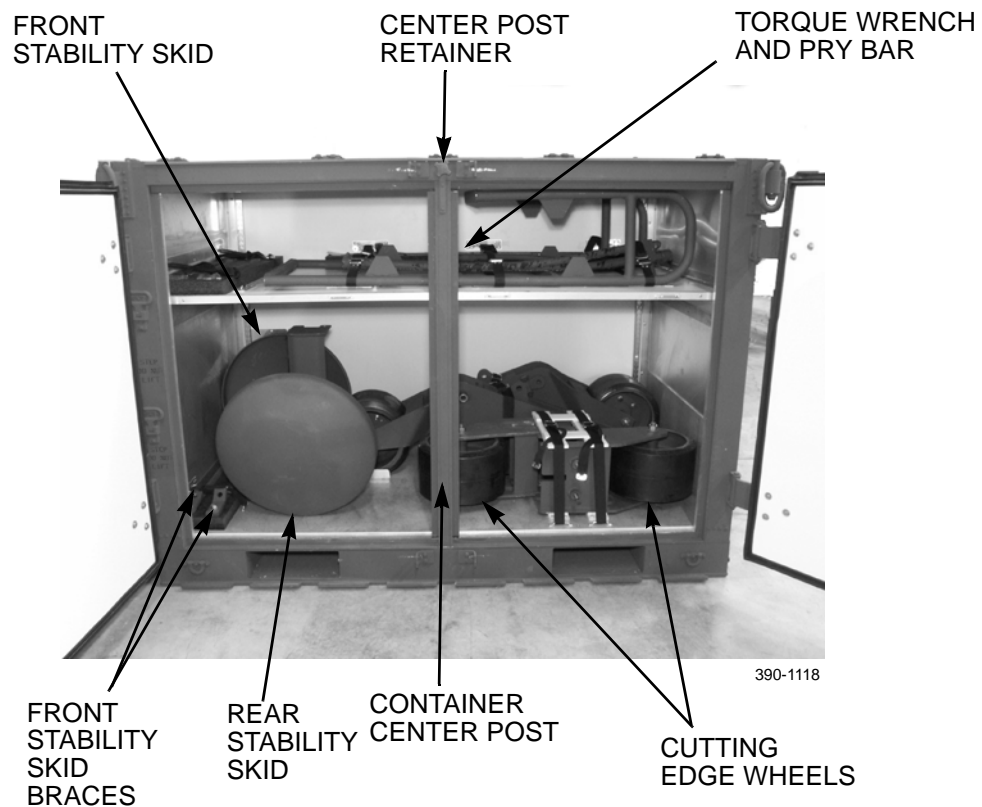
- a. four steering cylinder locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);
- b. two hitch locking blocks;
- c. exhaust extension;
- d. auxiliary fuel tank, four ratchet straps, and fuel hose assembly;
- e. fuel jumper hose assembly (stow in toolbox);
- f. toolbox;

**MACHINE ASSEMBLY - CONTINUED****Table 7. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Hitch Locking Blocks, Steering Cylinder Locking Collar Assemblies, and Exhaust Extension	<ol style="list-style-type: none"> <li>1. Place hitch locking blocks in front cutouts of cushion pad, on left side of shelf.</li> <li>2. Place steering cylinder locking collar assemblies in two right cutouts in cushion pad, on left side of shelf.</li> <li>3. Place exhaust extension in left cutout in cushion pad, on left side of shelf.</li> <li>4. Secure with three straps.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Place toolbox on front edge of tray.</li> <li>2. Secure with three straps.</li> <li>3. Slide tray all the way in.</li> <li>4. Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>1. Position each ramp against right wall of container.</li> <li>2. Secure each ramp with strap.</li> </ol>
Auxiliary Fuel Tank	<ol style="list-style-type: none"> <li>1. Place auxiliary fuel tank just inside HAZMAT access door.</li> <li>2. Secure with two straps.</li> <li>3. Stow four ratchet straps.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**MACHINE ASSEMBLY - CONTINUED**

- g. pry bar and torque wrench;
- h. front stability skid;
- i. two front stability skid braces;
- j. rear stability skid; and
- k. two cutting edge wheels.





**MACHINE ASSEMBLY - CONTINUED****Table 8. Stowage Instructions for ISU-60 Container - Two-Door End.**

<b>COMPONENT</b>	<b>STOWAGE INSTRUCTIONS</b>
Pry Bar and Torque Wrench	<ol style="list-style-type: none"> <li>1. Place each component in cushion pad on shelf, against back wall of container.</li> <li>2. Secure components with three straps.</li> </ol>
Front Stability Skid	<ol style="list-style-type: none"> <li>1. Place front stability skid in left rear corner on floor, with "foot" of skid facing back wall. Leg of skid rests in U-shaped channel of support post.</li> <li>2. Secure leg of skid to support post with one strap.</li> </ol>
Front Stability Skid Braces	<ol style="list-style-type: none"> <li>1. Place braces in cushion pad on left side of floor.</li> <li>2. Secure with two straps.</li> </ol>
Rear Stability Skid	<ol style="list-style-type: none"> <li>1. Place in front of front stability skid, with "foot" facing out.</li> <li>2. Orient rear stability skid so that mounting leg with cutout is aligned with base of mounting post.</li> <li>3. Secure leg to base of mounting post with two pins.</li> <li>4. Secure legs of front and rear stability skids together with one strap.</li> </ol>
Cutting Edge Wheels	<ol style="list-style-type: none"> <li>1. Place two straps through loops on floor, on right side of container.</li> <li>2. Place one cutting edge wheel on its side with wheel facing left.</li> <li>3. Place other cutting edge wheel in front of first, with wheel facing right.</li> <li>4. Place H-shaped bracket on top and pass two straps through bracket.</li> <li>5. Tighten straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>1. Position center post, installing bottom end first.</li> <li>2. Raise shelf slightly to lock center post in position.</li> <li>3. Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**END OF WORK PACKAGE**

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**INTRODUCTION**

1. This work package describes how to prepare the scraper for air transport by C-130 aircraft, how to load and unload machine into aircraft, and how to return machine to operational configuration after air transport.
2. The machine must be configured to meet air transport weight and height requirements. Machine components that exceed these requirements are either removed or folded down. Machine is loaded/unloaded using drive on/drive off procedures.
3. Amount of fuel left in machine's fuel tank must comply with guidance from Military Traffic Management Command (MTMC).
4. Assistance from two Unit Maintenance mechanics is required to prepare the machine for air transport.

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

5. As part of this procedure, the ROPS/FOPS is removed from the tractor. Operation of the machine without ROPS/FOPS, to drive on and off the aircraft, is required.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

6. Many components, that must be removed and installed during this procedure, are very heavy. Use assistance, caution, and follow safe work practices when handling them.

**WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

7. Throughout procedure, be aware of potential hazards when working around hitch. Do NOT work in area of hitch link unless engine is shut down.

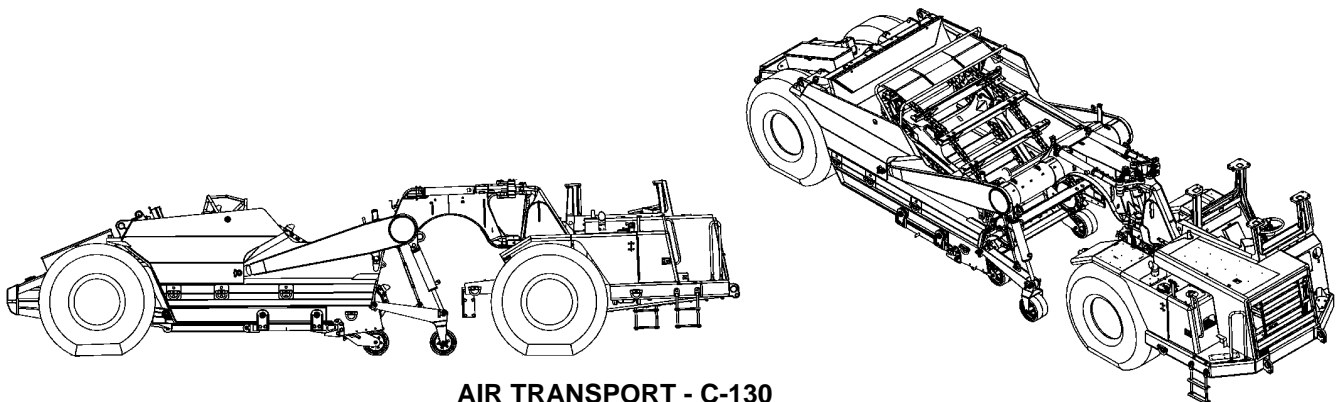
**TOOLS AND EQUIPMENT**

1. Tools and equipment required to prepare the machine for air transport are stored in an ISU-60 shipping and storage container (Item 1, Table 1, WP 0024 00). BII tools (Table 2, WP 0024 00) must also be used.
2. Components of the machine that must be removed in preparation for air transport are stowed in the container for subsequent transport to the assembly site, inside and on BII toolbox, and on rear deck of scraper.
3. Reinstall mounting hardware for all removed components on machine, to secure against loss during transport.
4. Once the machine has been loaded inside the aircraft, the ISU-60 container is loaded onto the same aircraft, for subsequent transport to the assembly site.

**SUMMARY OF PROCEDURES****NOTE**

The following summary of procedures is provided to assist personnel preparing the machine for air transport by C-130 aircraft.

1. Configure machine for air transport:
  - a. Remove windshield wiper arm and windshield.
  - b. Remove ROPS/FOPS.
  - c. Configure elevator for air transport.
  - d. Install scraper bowl cutting edge wheels.
  - e. Install load transfer axles.
  - f. Install load transfer relief valve and hose assembly.
  - g. Remove exhaust stack and install exhaust extension.
  - h. Remove upper handrail with side mirror.
  - i. Install two long (10 3/4 in.) steering locks, one each steering cylinder.
  - j. Install turnbuckles and raise cutting edge wheels and load transfer axles off ground.
  - k. Drive machine to aircraft ramp.
  - l. Remove turnbuckles.
  - m. Install two remaining short (6 5/8 in.) steering locks.
  - n. Drive machine into aircraft.
  - o. Install turnbuckles.
  - p. Block and tie down machine.
  - q. Load ISU-60 container into aircraft and tie down.
2. The following illustration shows the scraper configured for air transport by C-130 aircraft.

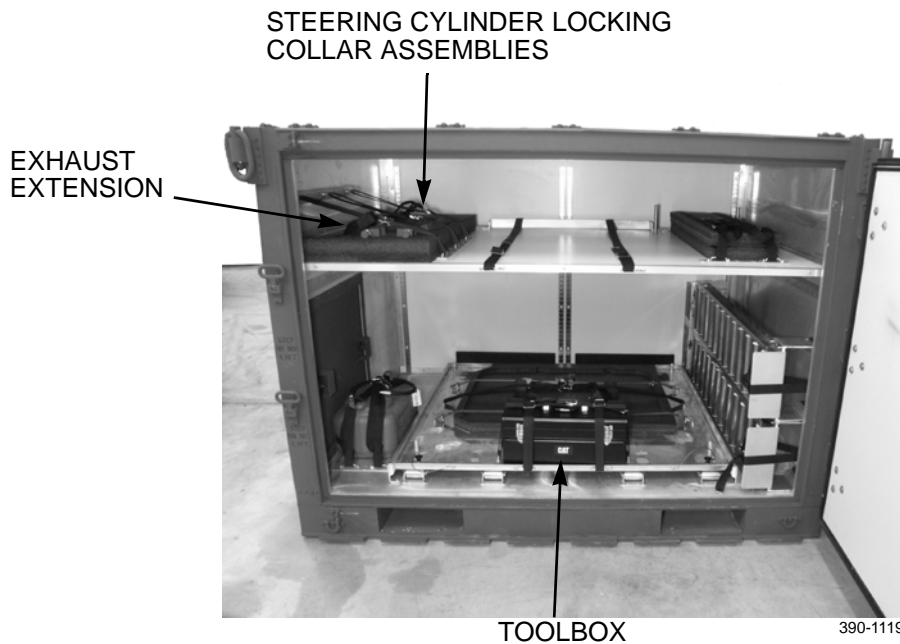
**AIR TRANSPORT - C-130**

390-1471

**CONFIGURE MACHINE FOR AIR TRANSPORT****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

1. Place ISU-60 container near staging area off tarmac where machine will be configured for air transport. Remove the following items from container:
  - a. toolbox;
  - b. exhaust extension;
  - c. four steering cylinder locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);

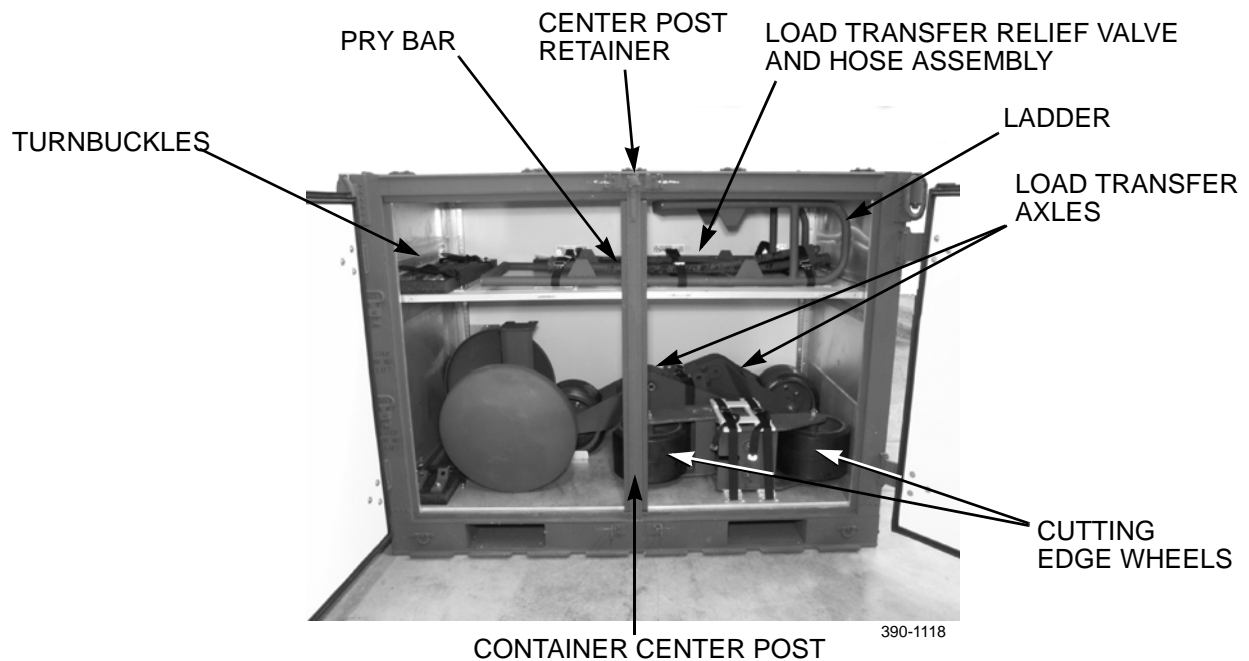


- d. two turnbuckles;

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****NOTE**

Before the remaining components can be removed, unscrew retainer and remove post.

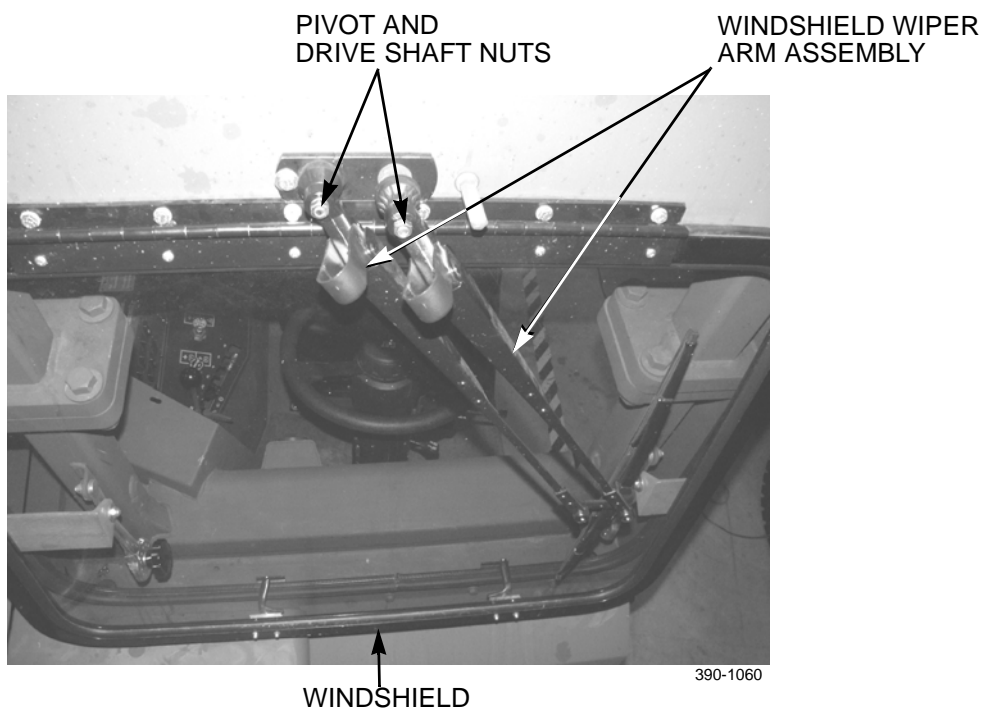
- e. load transfer relief valve and hose assembly;
- f. ladder;
- g. pry bar;
- h. two cutting edge wheels; and
- i. two load transfer axles.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****NOTE**

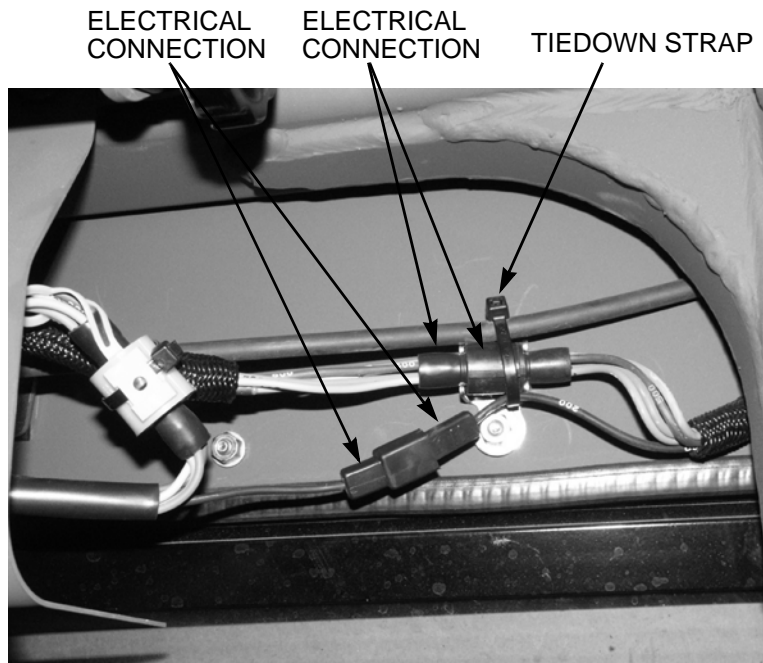
Whenever hydraulic hose quick disconnects need to be disconnected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate disconnection of hoses.

2. Position machine on level ground, in staging area off tarmac. Ensure tractor and scraper are aligned and steering wheel is centered.
3. Move ejector fully to the rear and close floor of bowl. Place transmission in N (Neutral) and lock, apply parking brake, and lower bowl to the ground. Shut down engine. Block tractor and scraper wheels.
4. Remove two nuts and windshield wiper arm assembly from windshield. Set wiper arm assembly aside for stowage in ISU-60 container. Reinstall nuts on drive and pivot shafts.



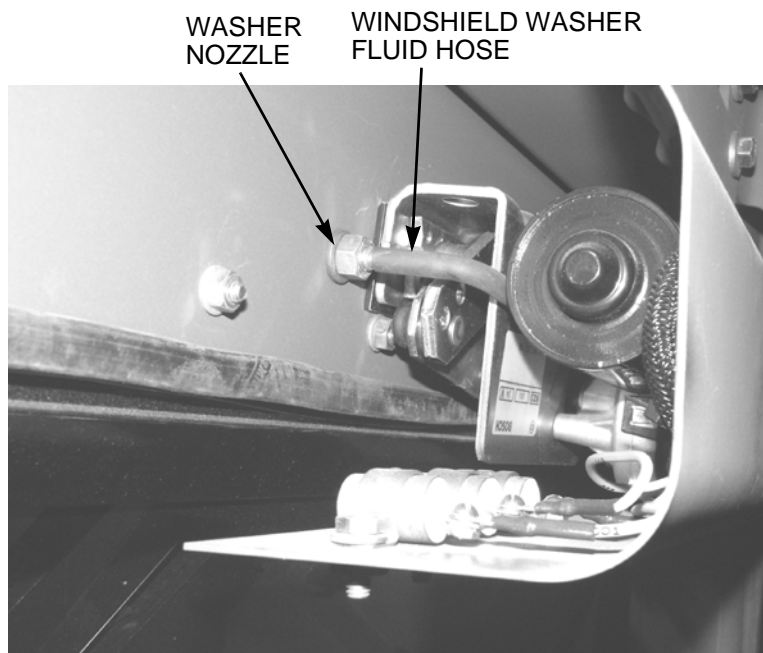
**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

5. Cut tiedown strap and disconnect two electrical connectors at wiper motor inside cab. Discard tiedown strap.



390-1053

6. Remove windshield washer fluid hose from washer nozzle.



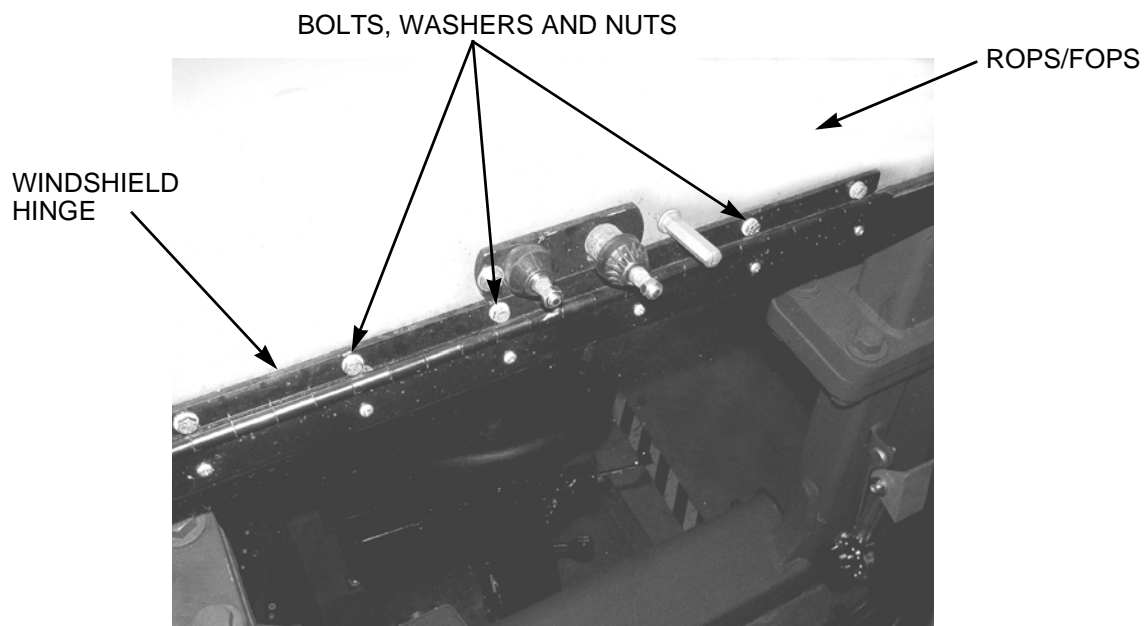
390-1052



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.

7. Remove windshield from ROPS/FOPS:
  - a. Unlatch and open window.
  - b. Remove six nuts, 12 washers, and six bolts from windshield hinge and ROPS/FOPS.



390-1072

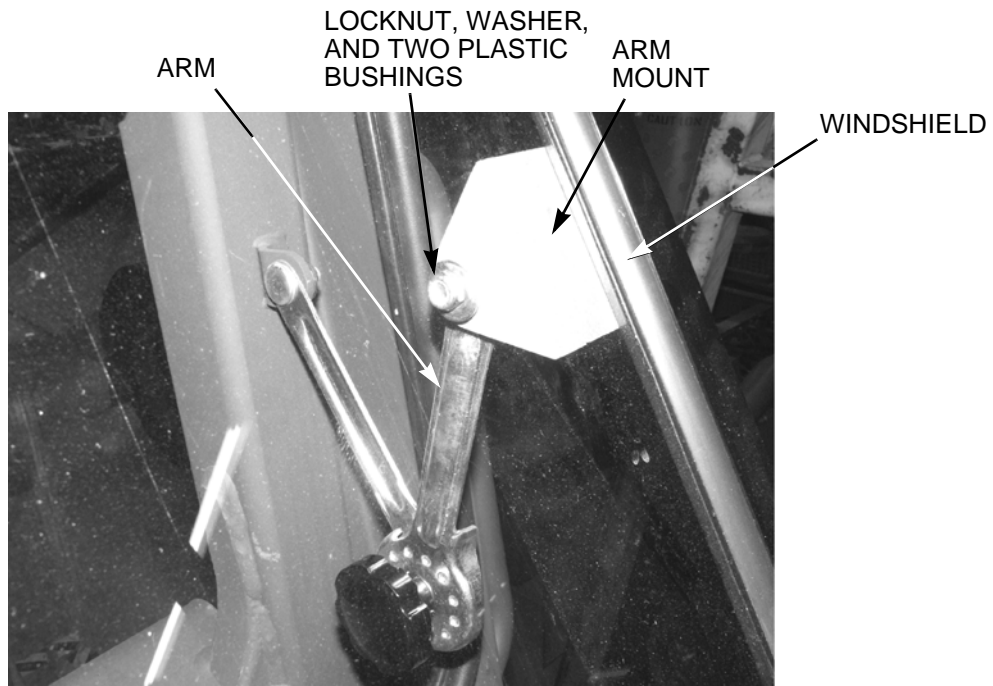
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**AIR TRANSPORT BY C-130 AIRCRAFT - CONTINUED**

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**0018 00****CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- c. Remove locknut, washer, and two plastic bushings. Separate arm from arm mount on each side of windshield and remove windshield.

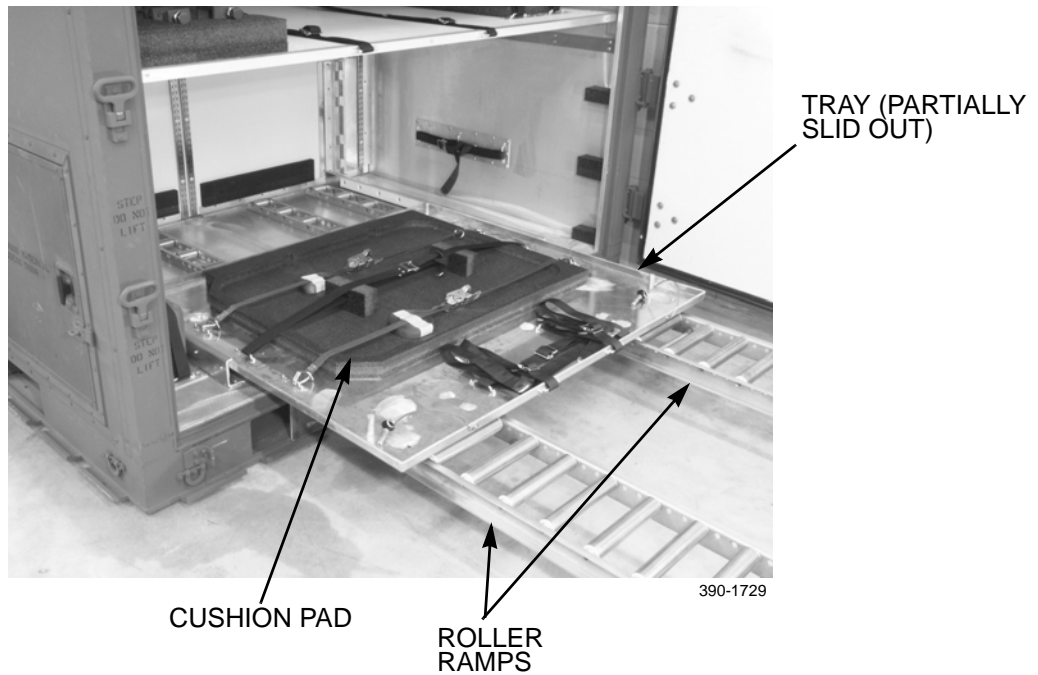


390-1067

- d. Reinstall bolts, washers, and nuts to windshield hinge. Reinstall two plastic bushings, washer, and locknut on each arm.

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

8. Stow windshield in ISU-60 container:
  - a. Open single-door end of container.
  - b. Remove two roller ramps from right-side wall of container.
  - c. Install each ramp at door opening, with two pins through each ramp into holes in edge of container floor.
  - d. Remove two pins and slide out tray.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****CAUTION**

Use caution not to damage windshield during handling.

- e. Place windshield in cushion pad on tray, with hinge facing out.
- f. Place cushion pad on top of windshield.
- g. Secure windshield with one strap.



## CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED

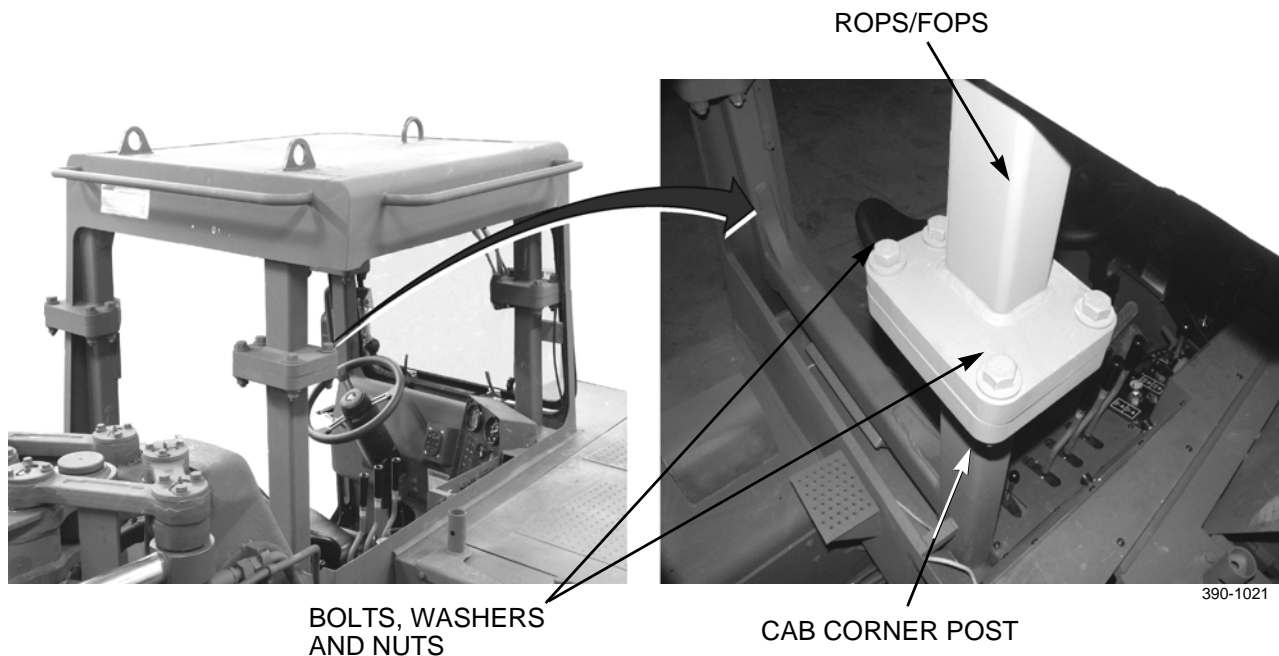
**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

ROPS/FOPS weighs 447 lb (203 kg).

9. Remove ROPS/FOPS and set aside for stowage in ISU-60 container:
  - a. Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.
  - b. Remove 16 nuts, 32 washers, and 16 bolts from four corners of ROPS/FOPS.
  - c. Lift ROPS/FOPS free of cab corner posts and lower to the ground.
  - d. Stow mounting hardware in BII toolbox on rear deck of scraper.



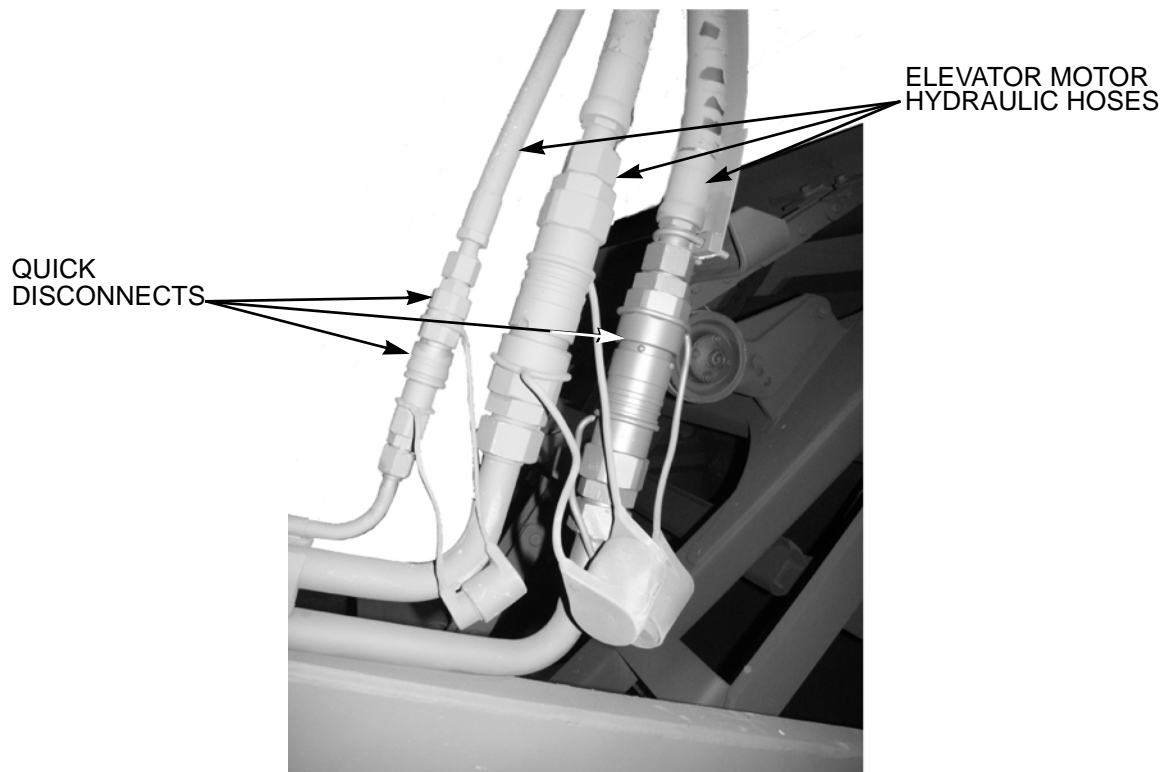
**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

10. Configure elevator for air transport:

**CAUTION**

Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

- a. Disconnect three elevator motor hydraulic hoses at quick disconnects on left side of scraper bowl. Install dust caps.



390-1066

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel.

- b. Position ladder for access to elevator motor on left side of scraper bowl.
- c. Disconnect three hydraulic hose quick disconnects at elevator motor and remove hoses. Install dust caps. Set hoses aside until they are stowed, after elevator has been configured for air transport.
- d. Remove speed reducer cover with O-ring from stowage in ISU-60 container toolbox.

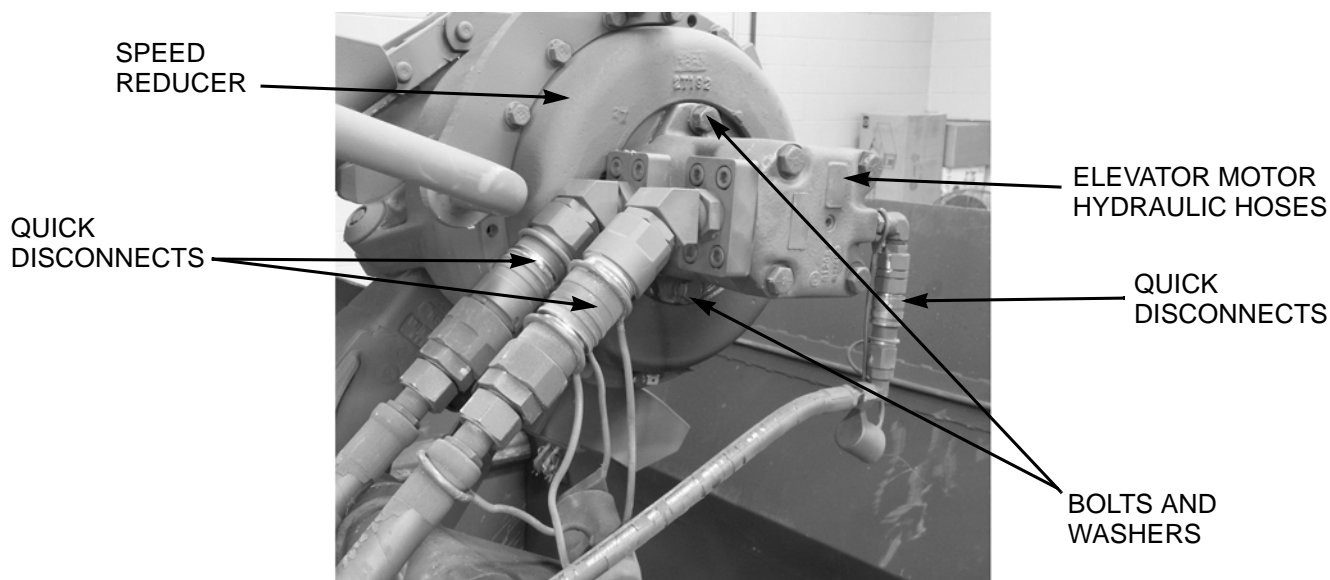
**WARNING**

- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
- Some oil will spill as hydraulic motor is removed. Oil is very slippery. Ensure all spills are cleaned up. Failure to do so may cause injury to personnel.

**NOTE**

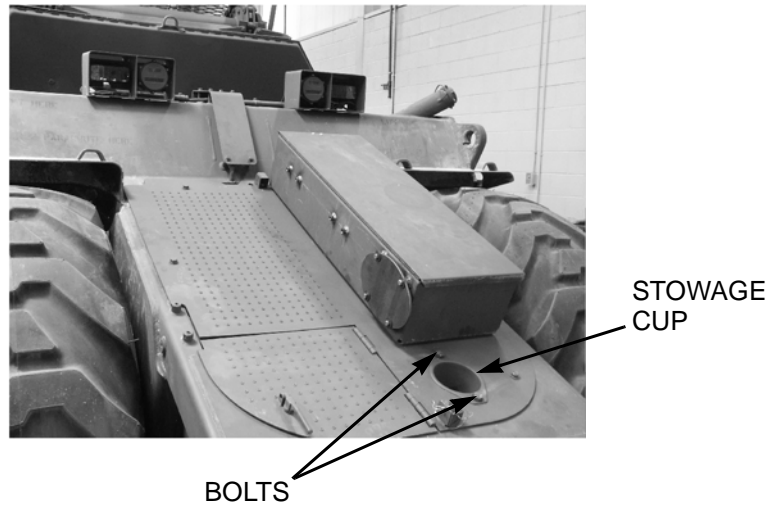
Hydraulic motor weighs approximately 85 lb (39 kg).

- e. Attach a suitable overhead lifting device to elevator motor. Take up slack in sling.
- f. Remove two bolts, washers, and elevator motor from speed reducer.

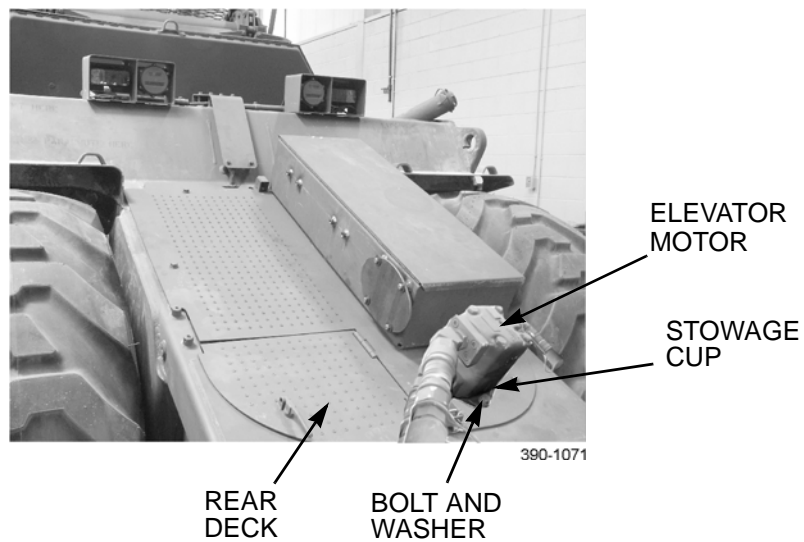


**AIR TRANSPORT BY C-130 AIRCRAFT - CONTINUED****0018 00****CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- g. Remove two bolts from elevator motor stowage cup and rear desk of scraper. Install cover with O-ring on speed reducer with two bolts removed from stowage cup.



- h. Remove any dirt or accumulated debris from stowage cup. Install elevator motor on cup on rear deck with two washers and bolts that were removed in step F.

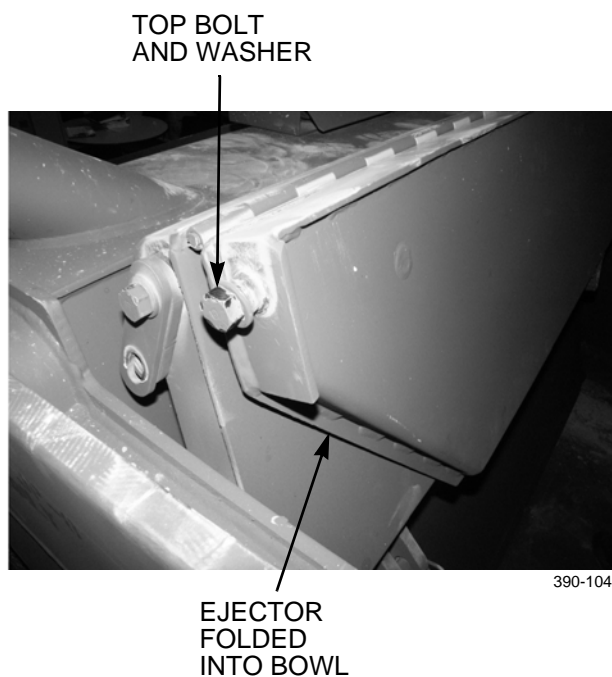
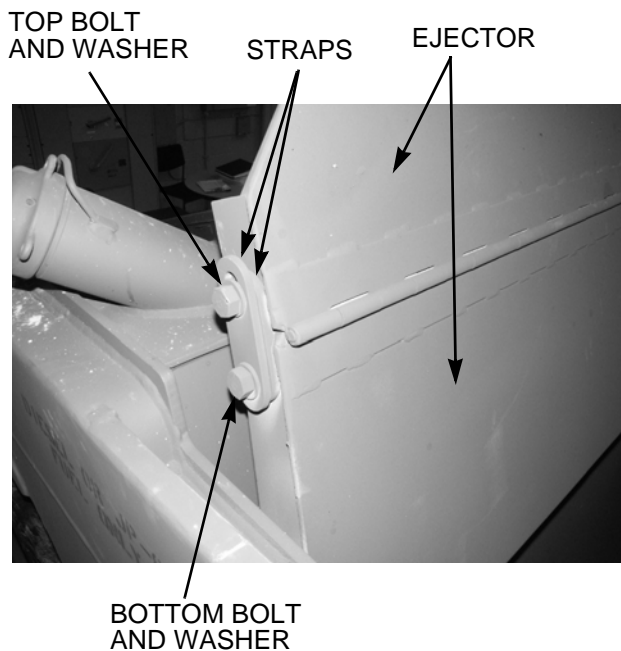




**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

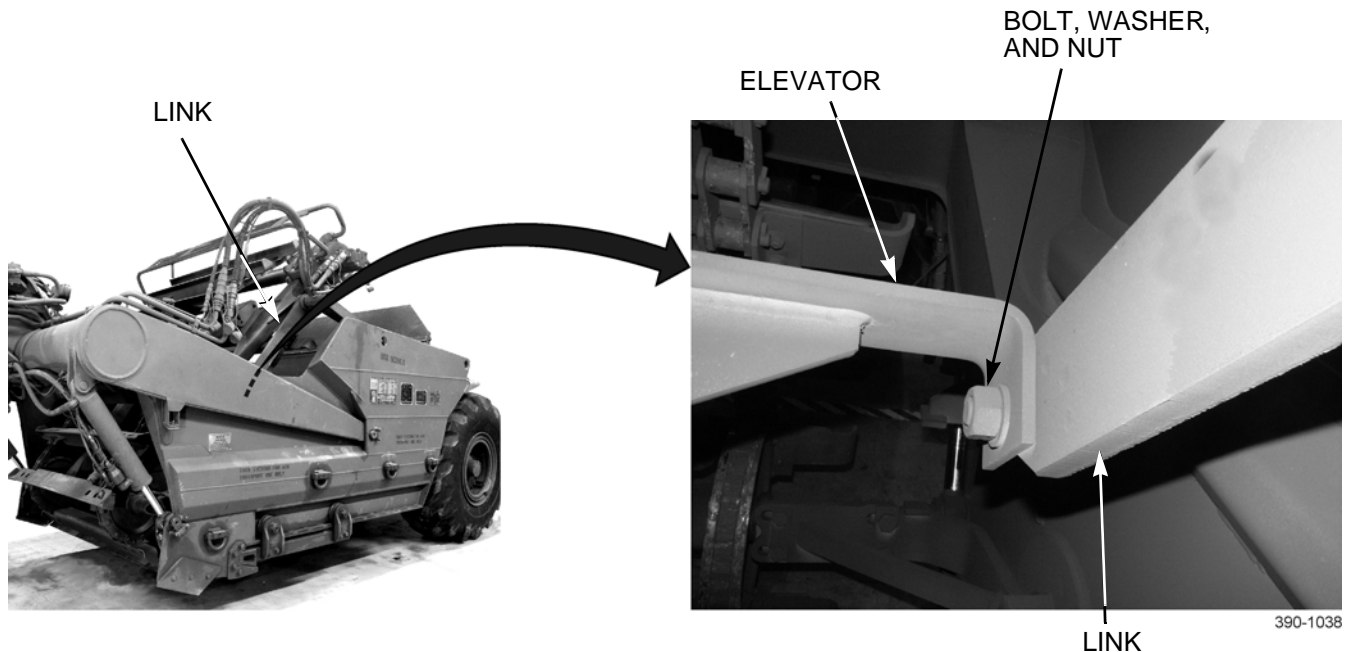
- i. Fold ejector down:
  - (1) Attach a lifting sling through lifting eye of top flap of ejector. Take up slack in sling.
  - (2) Remove top bolt and washer from two straps and ejector.
  - (3) Loosen bottom bolt and washer. Reinstall top bolt and washer in top flap of ejector.
  - (4) With assistance, fold ejector down into bowl.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Do NOT enter or stand in bowl or on elevator flights. Flights may move if stepped on. Failure to follow this warning may result in injury to personnel.

- j. Move ejector forward and pin elevator links to rear wall of ejector:
  - (1) Remove nut, bolt, and washer and remove link from attachment to each side of elevator. Reinstall mounting hardware on elevator.



- (2) From rearmost ejector position, measure 31 3/4 in. (80.6 cm) forward and mark location on wall of bowl.
    - (3) Remove ladder out of the way, clear of scraper bowl.

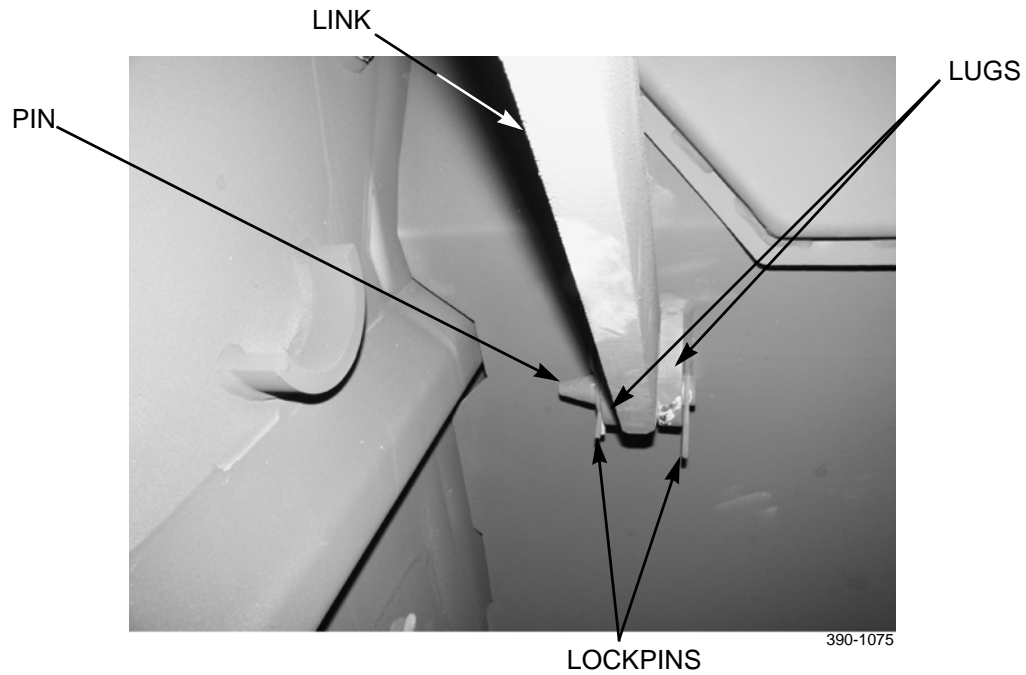
**WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- (4) Start engine and operate ejector forward until ejector is even with mark and links can be pinned through lugs on ejector rear wall.

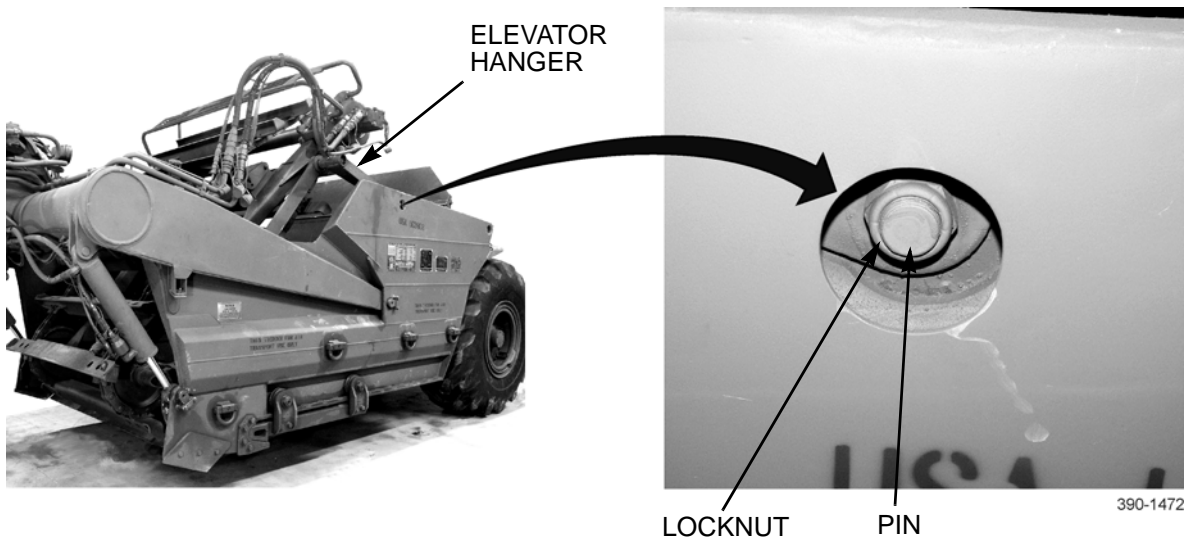
**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- (5) Pin each link to lugs on ejector. Secure with two lockpins.



- k. Remove elevator hangers:

- (1) Remove locknut from pin on each side of bowl.

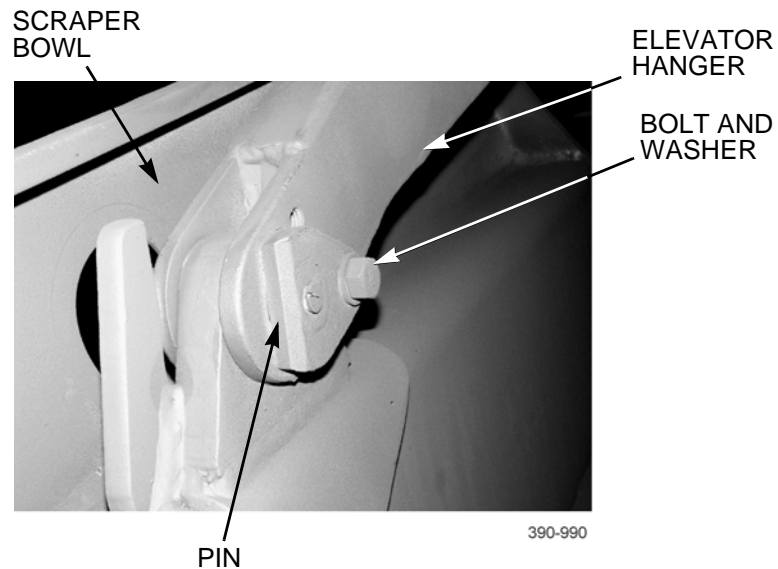


**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- (2) Remove bolt and washer from pin.

**NOTE**

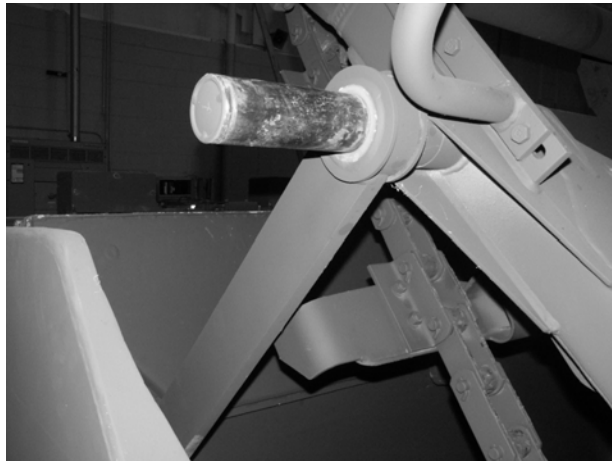
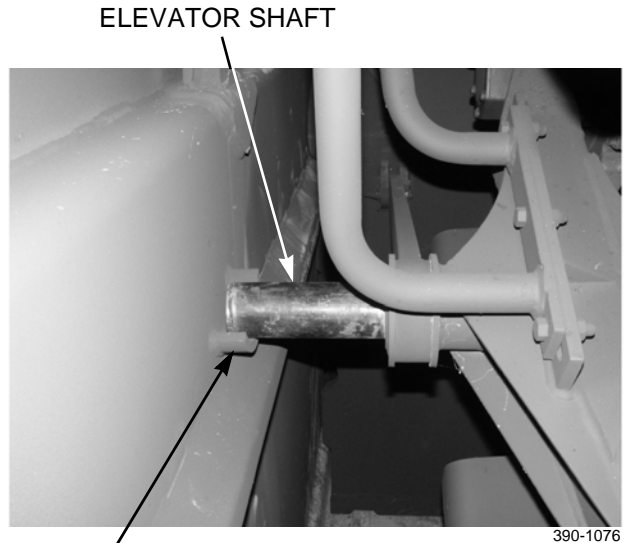
- To relieve tension on hangers, ejector can be moved slightly forward.
  - Another means to relieve tension on hangers is to attach a come-along (load binder) between one scraper bowl lifting eye and elevator drive cross shaft.
  - To assist in removing pins, work on both sides of scraper bowl at the same time.
- (3) Remove pin from each side of bowl, by driving pin out.
- (4) Lift each hanger free of bowl and remove from elevator shaft. Reinstall mounting hardware on hangers.
- (5) Stow hangers in BII toolbox on rear deck of scraper.



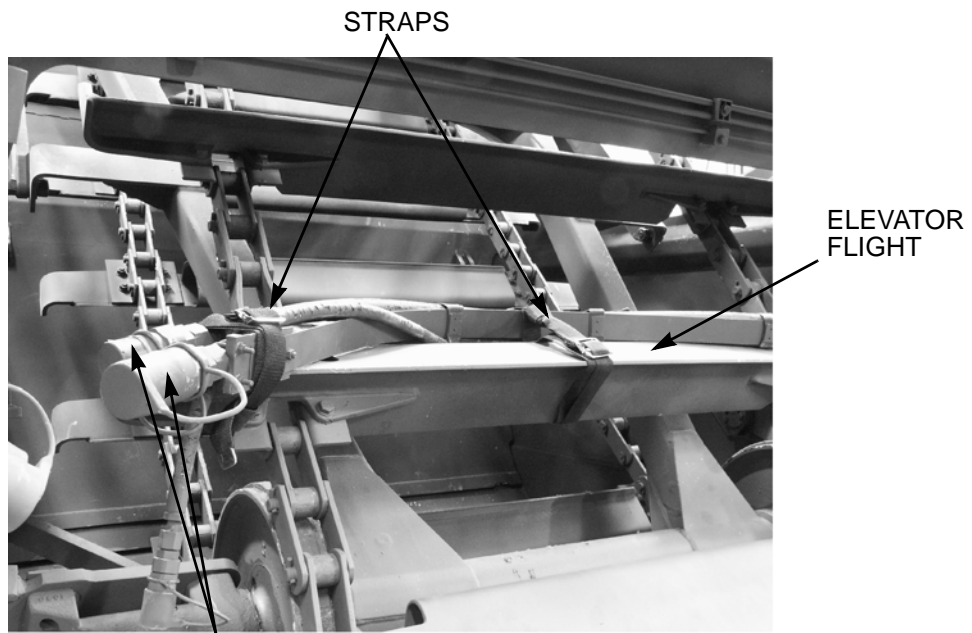
**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

1. Operate ejector rearward until elevator shafts rest on hangers.

**ELEVATOR RAISED****ELEVATOR LOWERED**

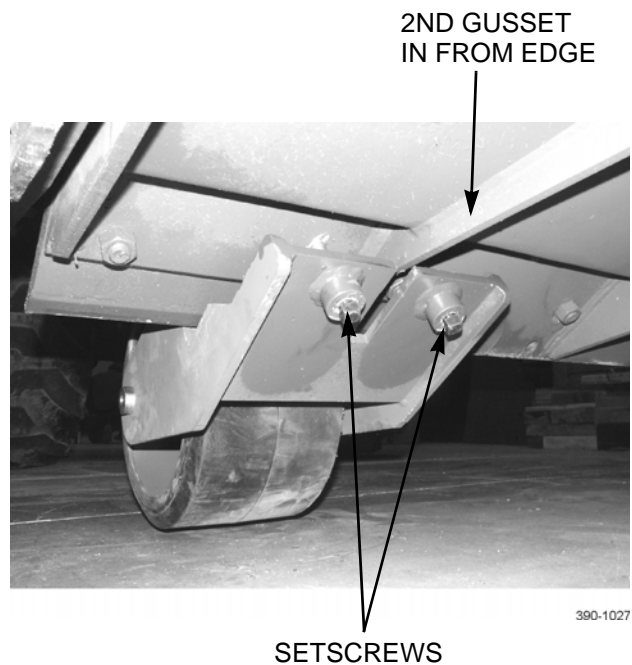
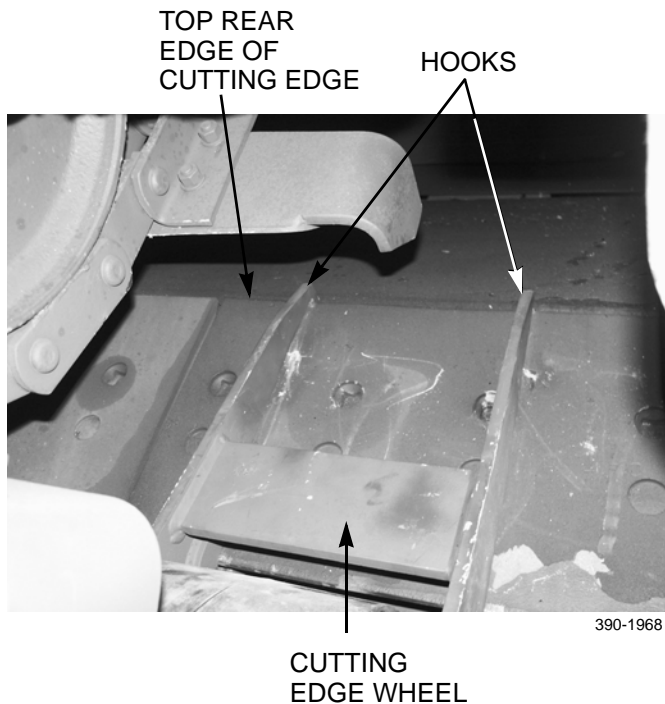
- m. Place three elevator motor hydraulic hoses on an elevator flight and secure with three straps.

**ELEVATOR MOTOR  
HYDRAULIC HOSES**

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Configuration change at cutting edge should NEVER be attempted without first securing the bowl by blocking it so that it is firmly supported. Failure to follow this warning may cause injury to personnel.

11. Attach two scraper bowl cutting edge wheels:
  - a. Raise bowl approximately 10 in. (25.4 cm) from the ground. Block bowl securely.
  - b. With assistance and using a pry bar, position each cutting edge wheel centered on gusset underneath cutting edge, with locks engaged over top rear edge of cutting edge.
  - c. Fully and evenly tighten two setscrews to secure each cutting edge wheel.

**CAUTION**

Do NOT power down scraper bowl. If powered down, cylinder force could overload cutting edge wheels, causing them to become damaged.

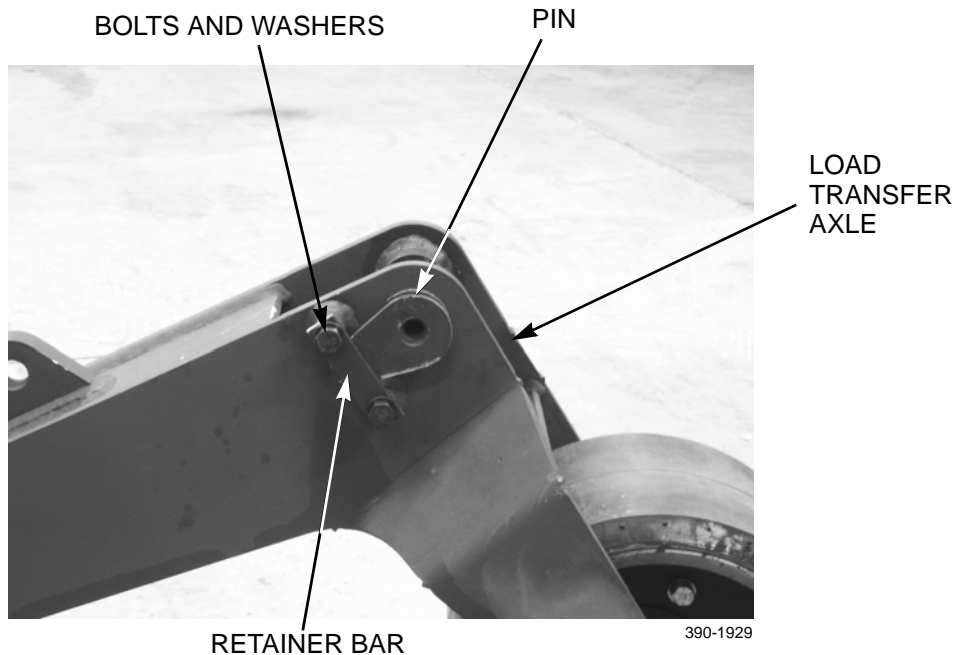
12. Raise cutting edge off blocks, remove blocks, then shut down engine. With engine off, lower scraper bowl until weight rests on cutting edge wheels.

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****CAUTION**

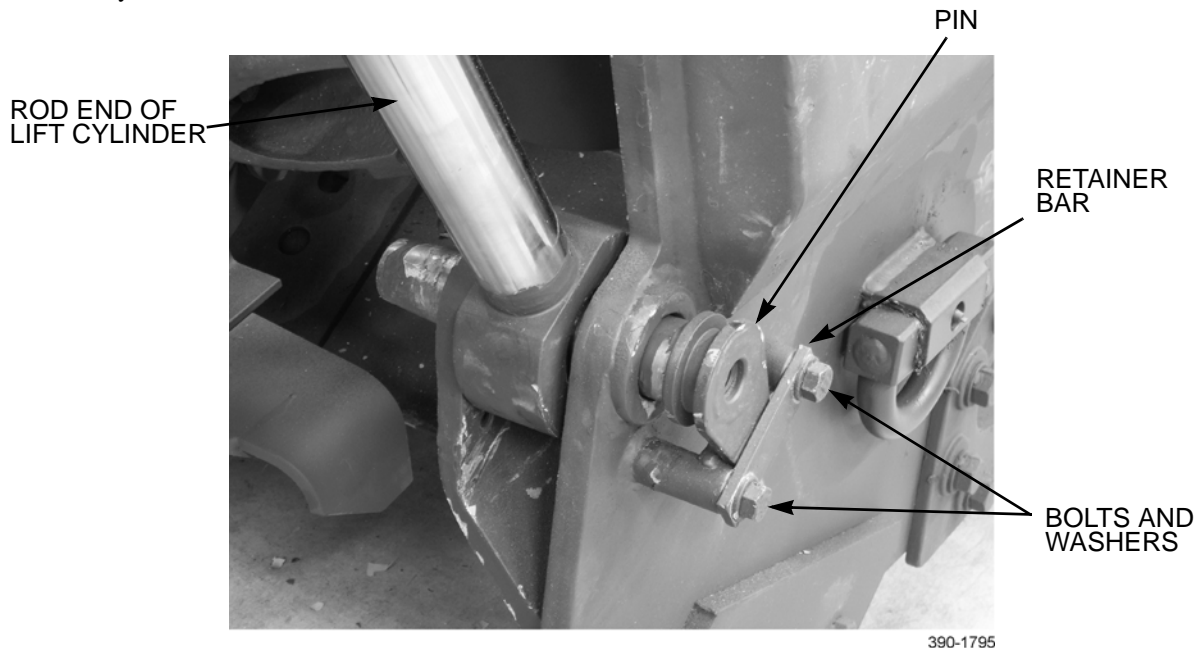
Do NOT move machine until configuration is complete. Failure to follow this caution will damage load transfer axles and wheels.

13. Install load transfer axles to front of scraper bowl:

- a. Remove two bolts, washers, and retainer bar. Remove pin from each load transfer axle.

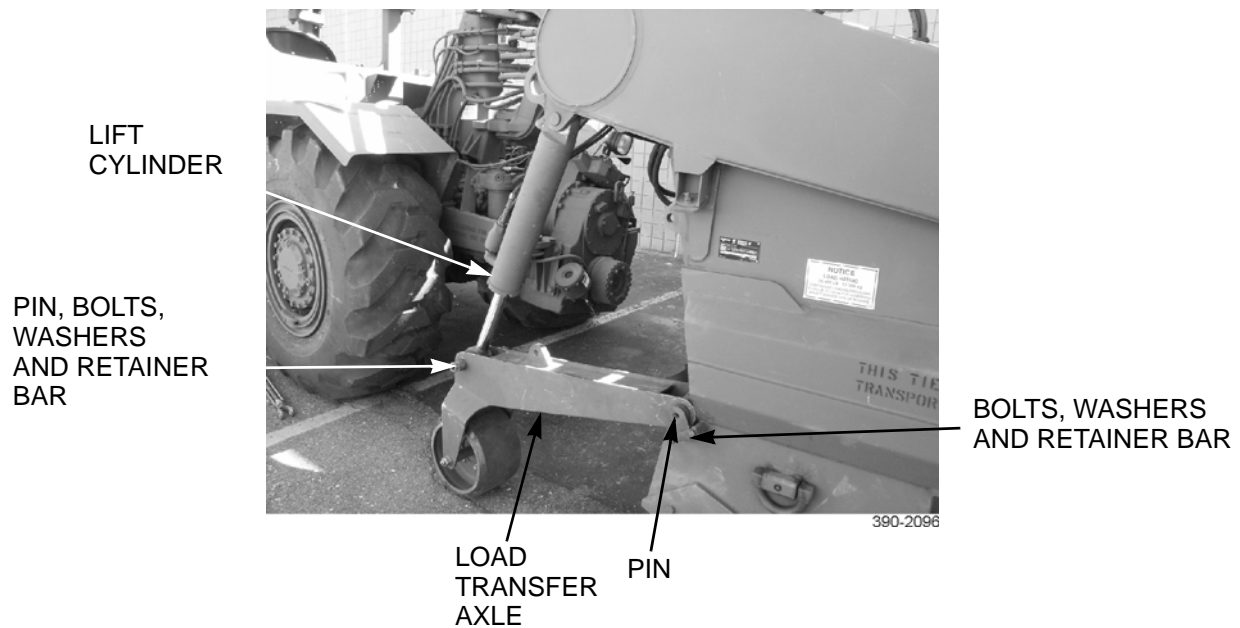


- b. Remove two bolts, washers, and retainer bar. Remove pin from rod end of each lift cylinder. Use puller tool if necessary.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****NOTE**

- Work simultaneously on both load transfer axles and operate hydraulics to extend or retract cylinders as needed to align mounting holes.
  - Clean and lubricate pins with antiseize compound (Item 5, WP 0026 00) before they are installed.
- c. Position each load transfer axle at front corner of bowl, pivot rod end of cylinder forward, align mounting holes, and install to axle with mounting hardware (pin, retainer bar, two washers, and bolts) removed from axle in step a. Tighten bolts securely.
- d. Install each axle to front of bowl with mounting hardware removed in step b (pin, retainer bar, two washers, and bolts). Tighten bolts securely.





**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****CAUTION**

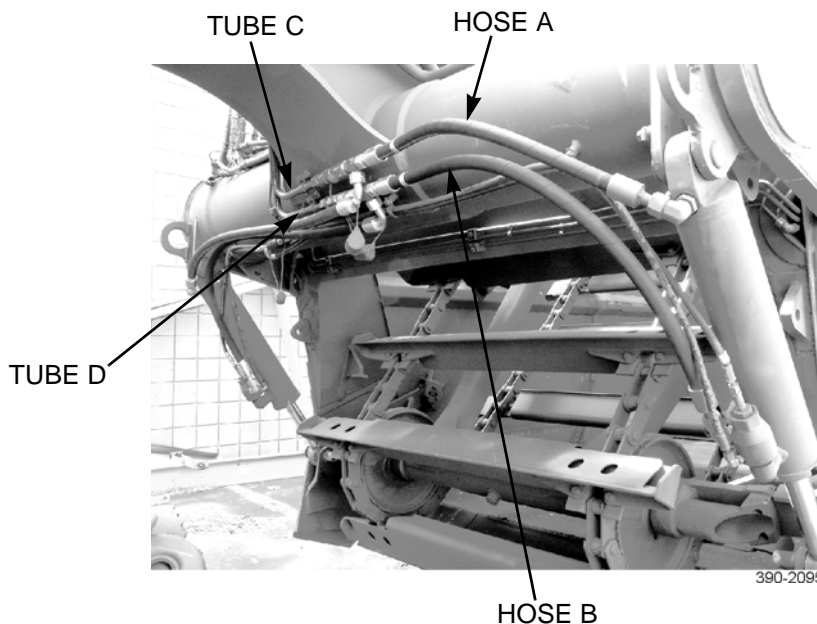
Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

**NOTE**

- To facilitate disconnection of hydraulic hose quick disconnect fittings, relieve any trapped hydraulic pressure in hoses by operating control levers through all positions (WP 0004 00).
- Review all load transfer valve and hose assembly installation steps before proceeding, to aid in understanding installation steps.

14. Install load transfer relief valve and hose assembly to bowl lift cylinder plumbing and to elevator motor drain line at left side of machine:

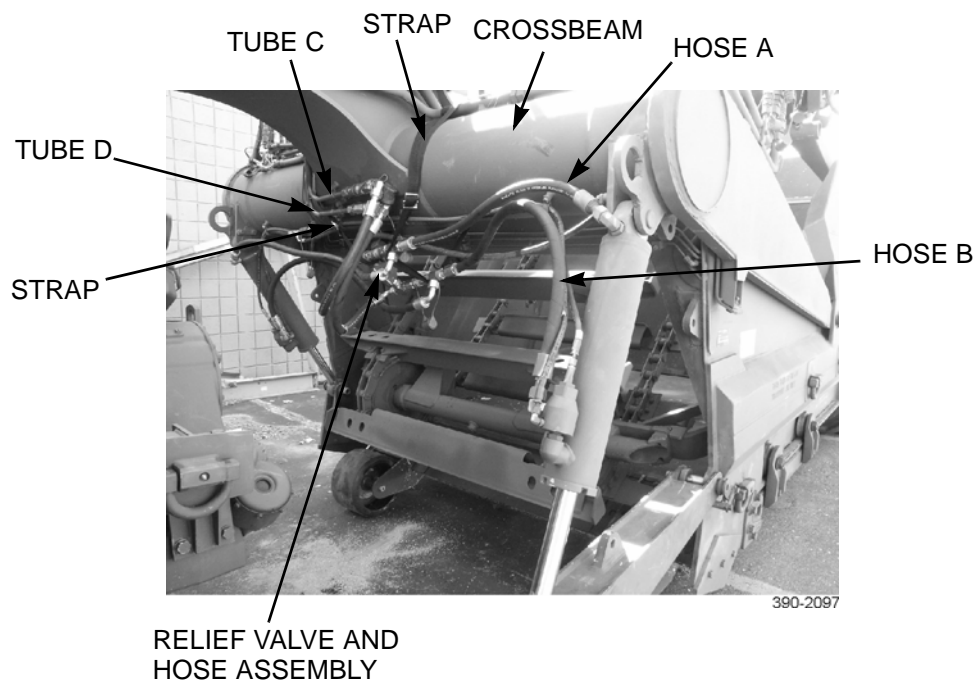
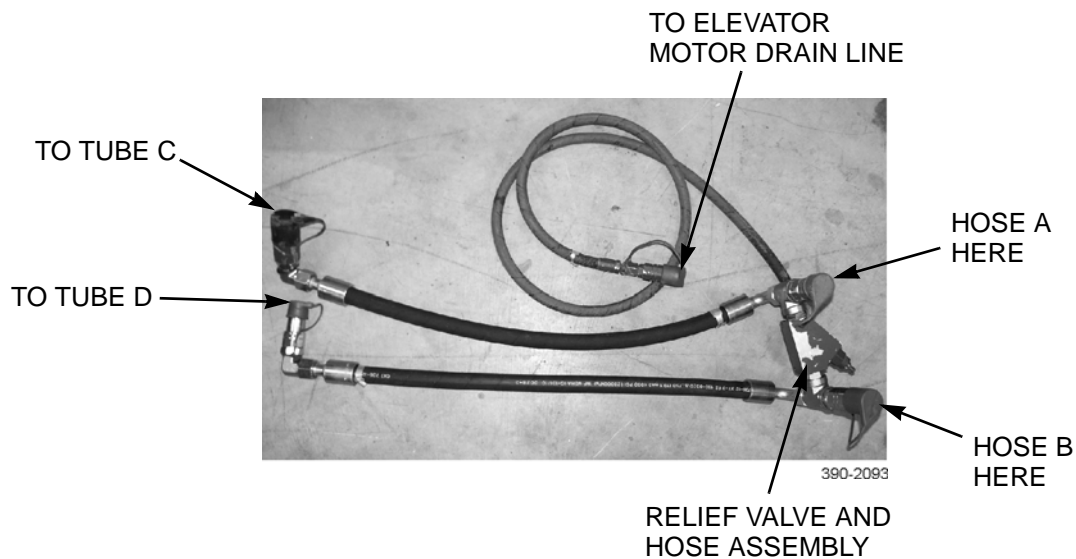
- a. Disconnect hose A quick disconnect from tube C. Disconnect hose B quick disconnect from tube D.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****NOTE**

All quick disconnect connections are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

- b. Position relief valve and hose assembly at lift cylinder and make connections in accordance with illustrations provided. Secure relief valve and hose assembly to crossbeam with two straps.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- (6) Connect elevator drain line hose from load transfer relief valve and hose assembly to drain line.

ELEVATOR DRAIN  
LINE HOSE

ELEVATOR MOTOR  
DRAIN LINE

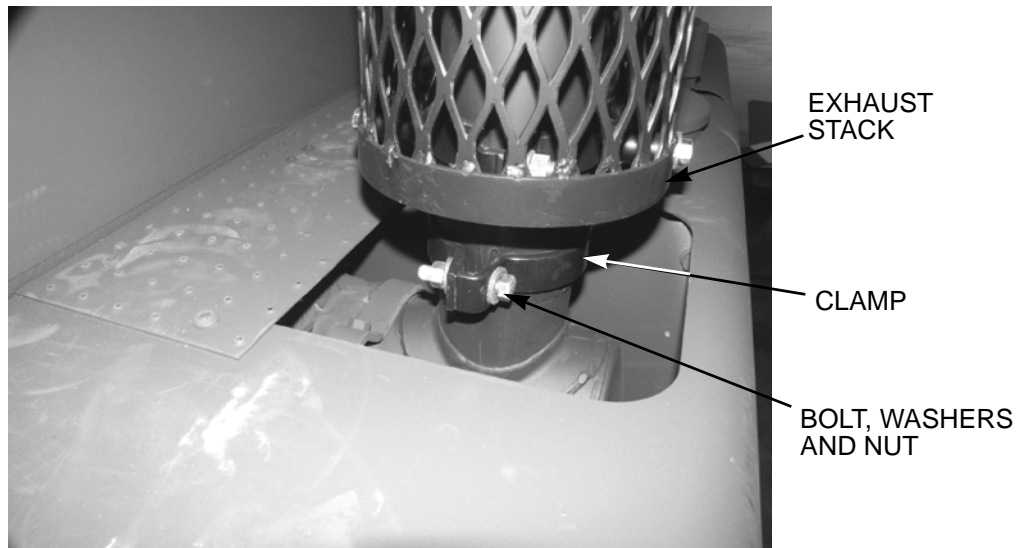


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**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Do NOT remove exhaust stack until it has cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

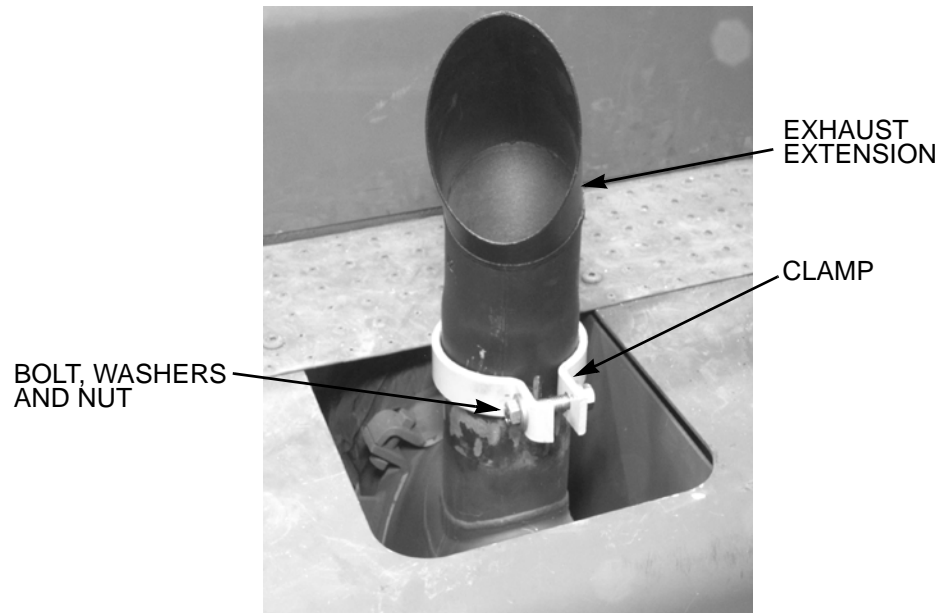
15. Remove exhaust stack from muffler on right side of tractor and install exhaust extension in its place:
  - a. Loosen nut, bolt, two washers, and clamp, and remove exhaust stack from right side of tractor. Retain mounting hardware on exhaust stack and set exhaust stack aside for stowage in ISU-60 container.



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**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- b. Install exhaust extension on muffler with clamp, bolt, two washers, and nut. Position extension so that exhaust fumes will be directed away from cab. Tighten nut securely.

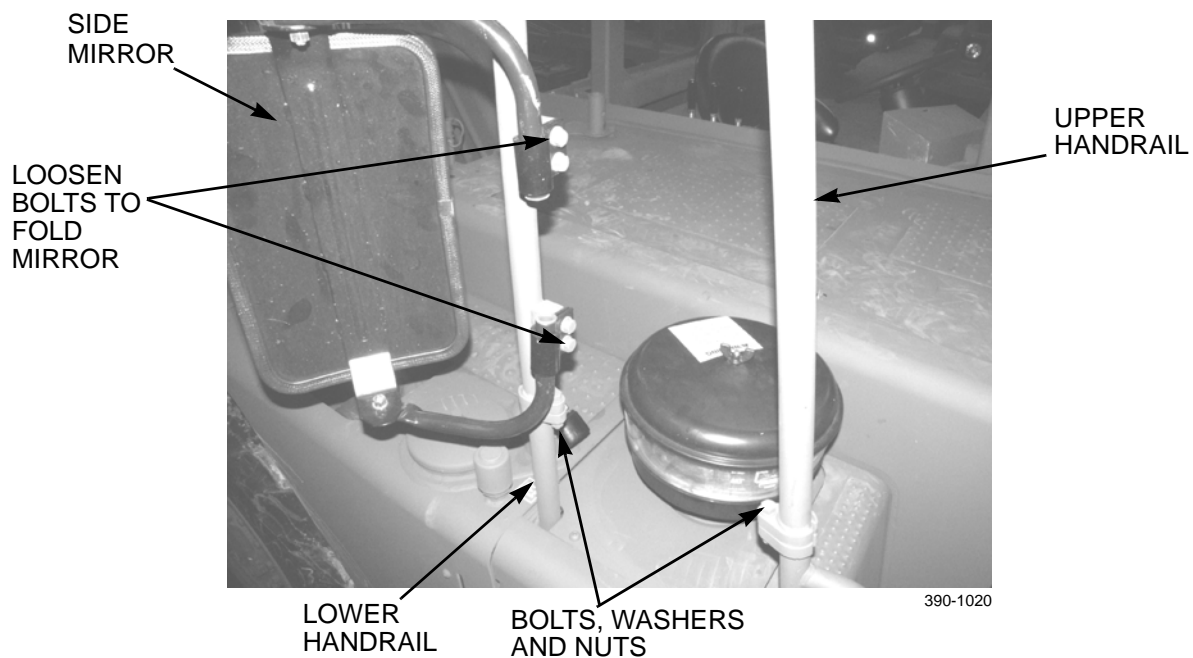


390-1790

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Removal of upper handrail on right side of tractor leaves right side of tractor without any means to safely climb on machine.

16. Remove two nuts, washers, bolts, and upper handrail with side mirror from lower handrail on right side of tractor. Reinstall mounting hardware on lower handrail.
17. Loosen bolts and fold side mirror flat against upper handrail. Set handrail with side mirror aside for stowage in ISU-60 container.

**WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

18. Install one each long (10 3/4 in.) steering cylinder locking collar to rod end of each steering cylinder:
  - a. Disassemble each locking collar assembly: remove three bolts and washers, open locking collar, and remove hose wrapping.

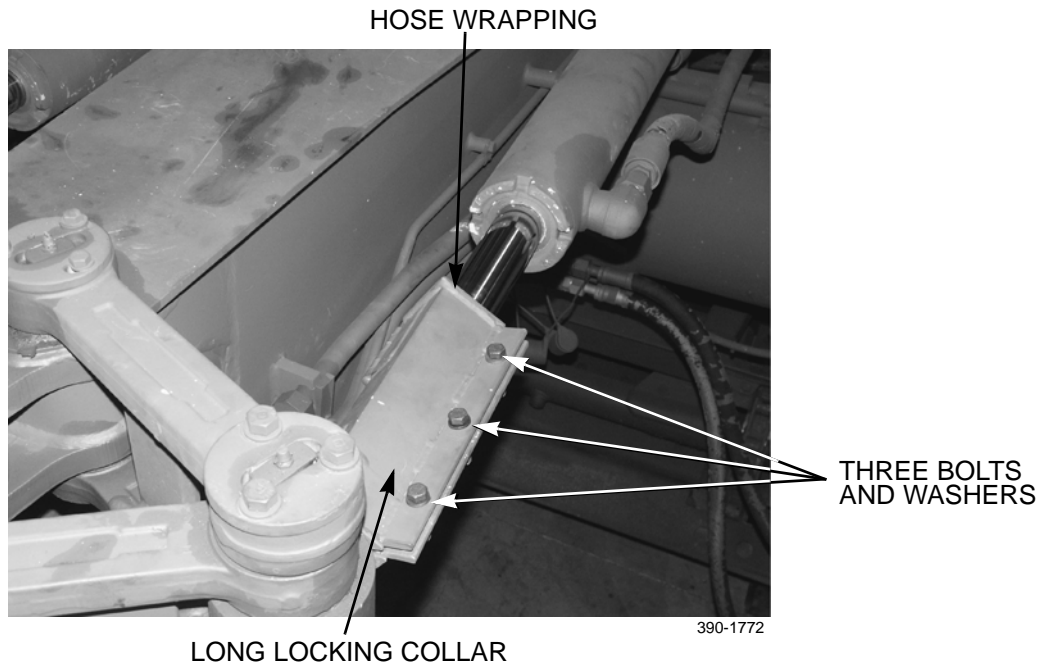
**CAUTION**

To prevent damage to cylinder rod, ensure rod surface is free of dirt or other debris before locking collars are installed.

- b. Position hose wrapping and long (10 3/4 in.) locking collar around rod end of each steering cylinder.
- c. Install three washers and bolts to each long locking collar. Tighten bolts evenly and securely.

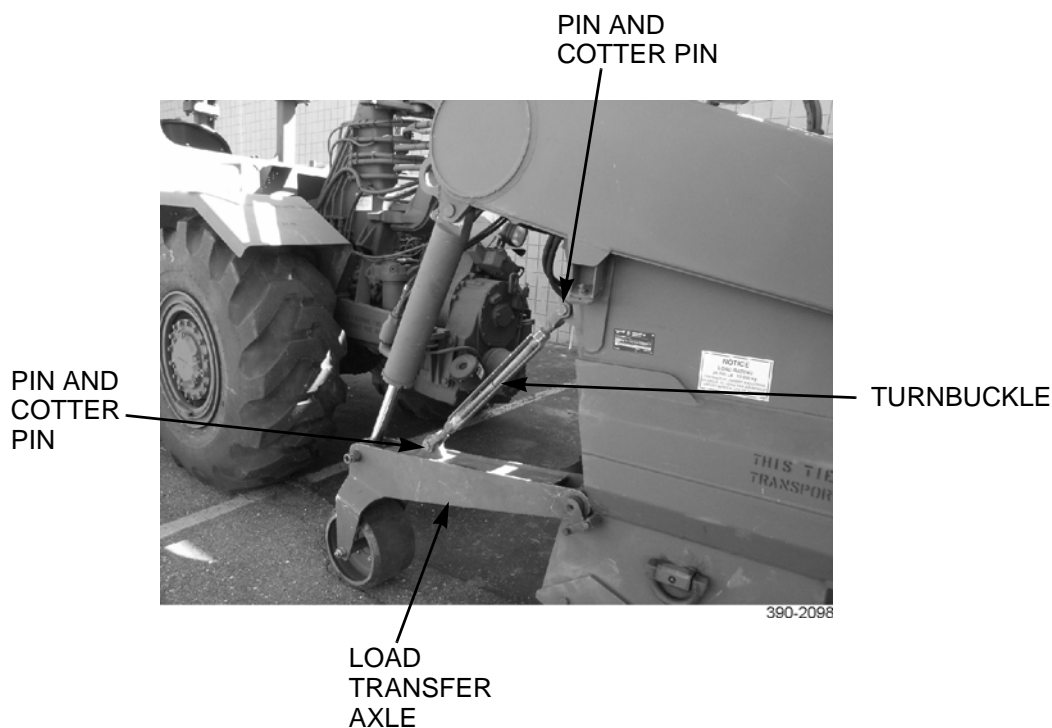
**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- d. Place two remaining short (6 5/8 in.) locking collars in cab. They will be installed just prior to driving into aircraft.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

19. Install turnbuckles and raise cutting edge wheels and load transfer axle wheels off ground:
- Install one end of each turnbuckle to lug on scraper bowl. Secure with pin and cotter pin.
  - Start engine and operate hydraulics to retract lift cylinders and raise cutting edge wheels and load transfer axle wheels off ground.
  - Adjust length of each turnbuckle as required. Install to lug on load transfer axle, hand tighten turnbuckle, and secure with pin and cotter pin.

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

**CAUTION**

- Turning radius and overall steering capacity are reduced due to installation of long (10 3/4 in.) steering locks. Steering too sharply may damage machine. Tractor tires may also contact load transfer axles.
  - Positioning of machine at loading ramp of aircraft is crucial. Machine must be backed STRAIGHT into aircraft; after air transport, machine must be driven STRAIGHT off aircraft. Failure to drive straight on/off will damage either or both load transfer axles and bowl lift cylinders. The more the turn, the more severe the damage.
20. Drive machine from staging area to aircraft flight line. Position machine directly in line with loading ramp, with rear of machine facing ramp. Ensure tractor and scraper are aligned and steering wheel is centered. Block tractor and scraper wheels.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

21. Remove turnbuckles:
- Place transmission in N (Neutral) and lock. Apply parking brake.
  - Shut down engine.
  - Remove cotter pin and pin from each load transfer axle and turnbuckle.
  - Remove cotter pin and pin from other end and remove each turnbuckle from scraper bowl.
  - Operate hydraulics to lower load transfer axle wheels and cutting edge wheels to the ground.

**WARNING**

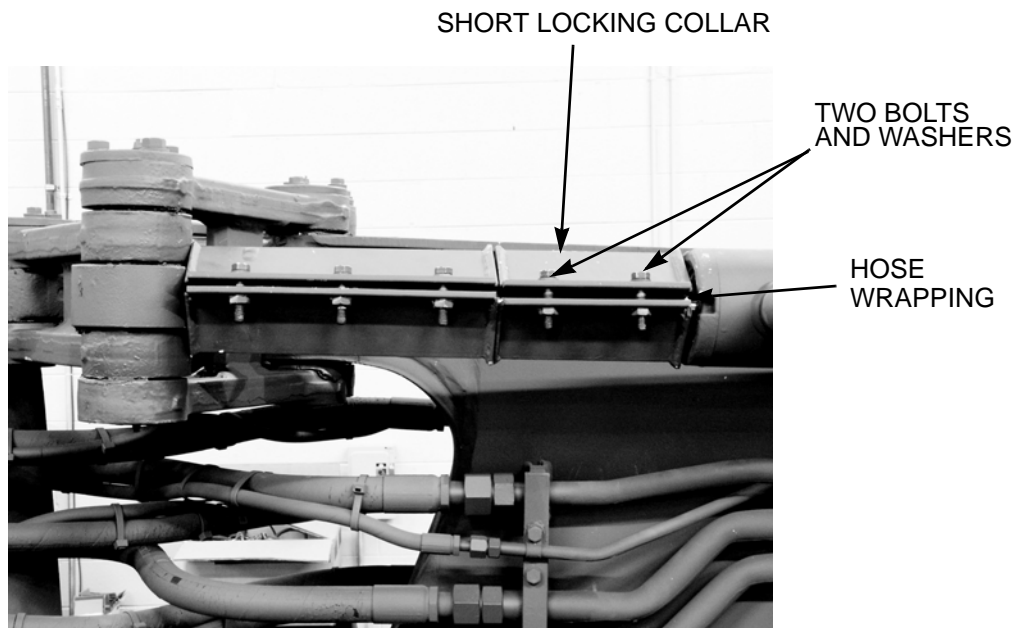
Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine **BEFORE** working in area of hitch link.

22. Install two remaining short (6 5/8 in.) steering cylinder locking collars, one to each steering cylinder:
- Disassemble each locking collar assembly: remove two bolts and washers, open locking collar, and remove hose wrapping.

**CAUTION**

To prevent damage to cylinder rod, ensure rod surface is free of dirt or other debris before locking collars are installed.

- Position hose wrapping and short (6 5/8 in.) locking collar around rod end of each steering cylinder.
- Install two washers and bolts to secure each locking collar. Tighten bolts evenly and securely.



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**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

- Always use a ground guide when backing machine up ramp to load into aircraft. Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
- When operating machine without ROPS/FOPS up aircraft ramp, drive with extreme caution and at a DEAD SLOW speed. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

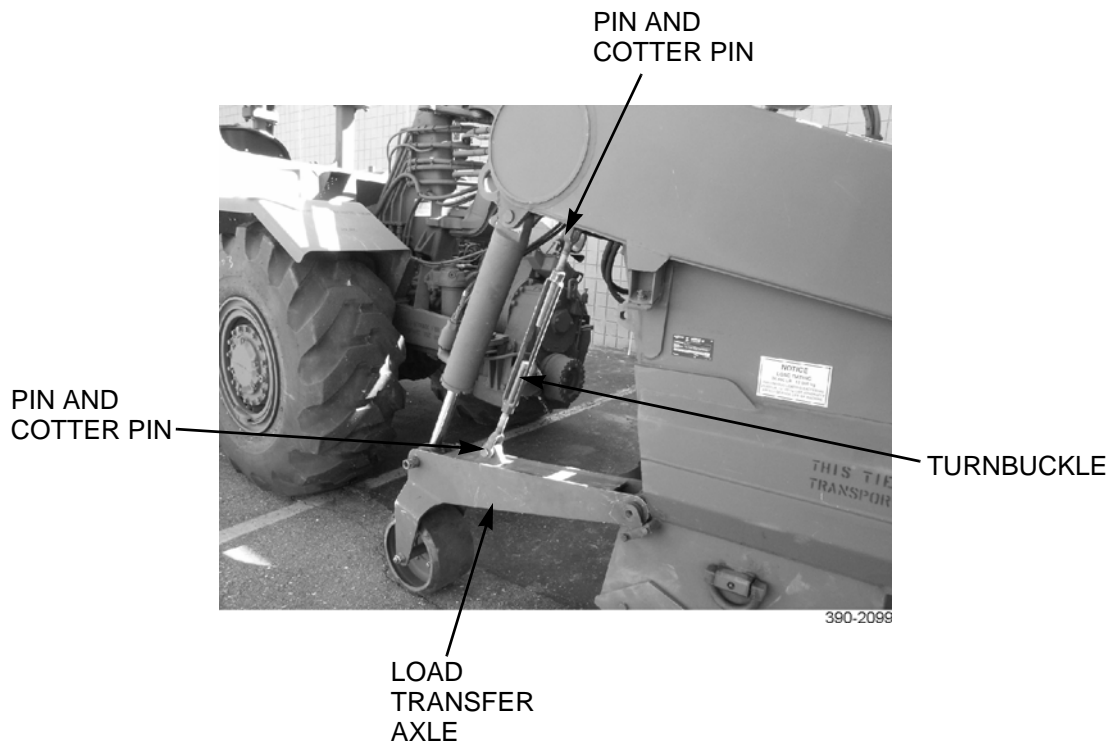
**CAUTION**

- Machine must be backed STRAIGHT into aircraft. Failure to back straight in will damage either or both load transfer axles and bowl lift cylinders.
  - Make sure shoring is properly in place as specified in TO 1C-130A-9 or TO 1C-130J-9, as applicable.
23. Remove wheel blocks. Following instructions from load master, SLOWLY back machine straight into aircraft. Negotiate ramp at a DEAD SLOW speed. Use bowl control lever in LOWER position to maintain load on load transfer axles.
  24. Once inside aircraft, stop machine and apply parking brake when directed to do so. Place transmission in N (Neutral) and lock.
  25. Install turnbuckles:
    - a. Install each turnbuckle to lug on draft frame, behind each bowl lift cylinder. Secure with pin and cotter pin.
    - b. Extend turnbuckles so they are aligned for installation on load transfer axles.

**NOTE**

Continue to use bowl control lever in LOWER position to maintain load on load transfer axles while turnbuckles are installed.

- c. With load maintained on load transfer axles, install turnbuckle to each load transfer axle with pin and cotter pin.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

26. Shut down engine.
27. Block and shore machine securely and tie down in accordance with shipping data plate on machine.
28. Ensure all compartment doors and BII toolbox on rear deck of scraper are closed, latched, and secured with padlocks.

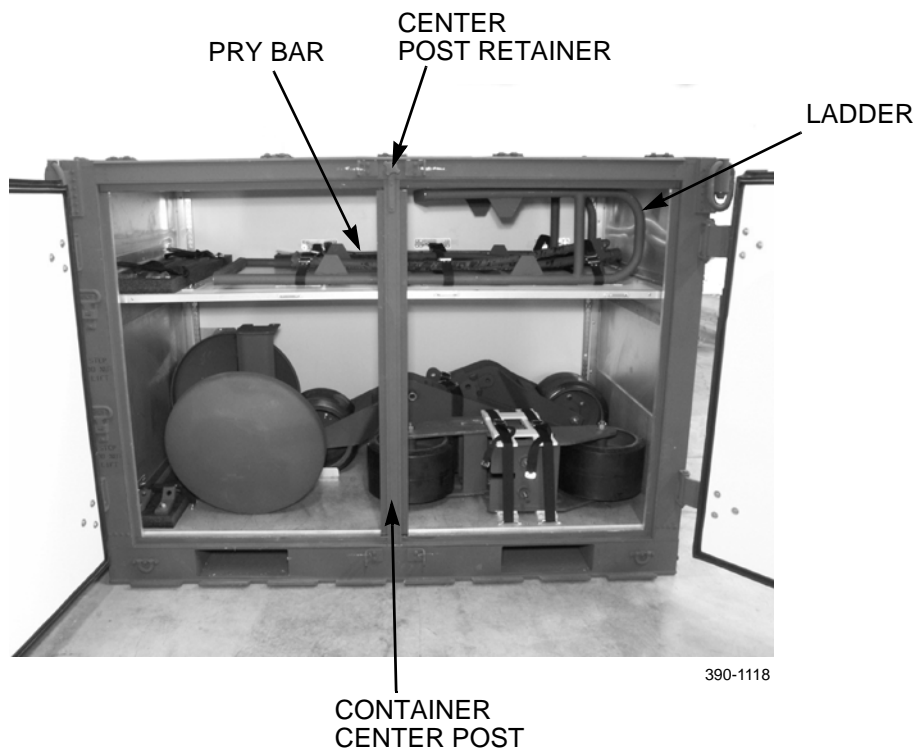
**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

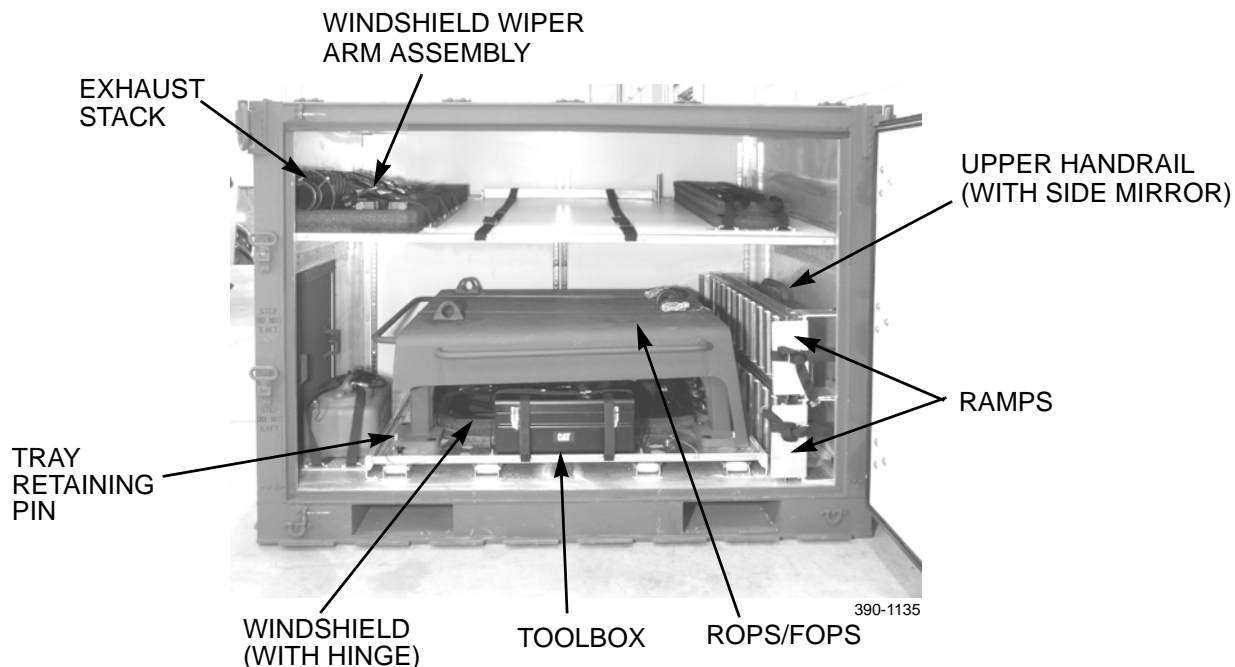
29. Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 1 and 2.
  - a. pry bar;
  - b. ladder;



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**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- c. exhaust stack;
- d. windshield wiper arm assembly;
- e. upper handrail (with side mirror);
- f. ROPS/FOPS; and
- g. toolbox.

**Table 1. Stowage Instructions for ISU-60 Container - Two-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Pry Bar	<ol style="list-style-type: none"> <li>1. Place component in cushion pad on shelf, against back wall of container.</li> <li>2. Secure component with three straps.</li> </ol>
Ladder	<ol style="list-style-type: none"> <li>1. Place on shelf, with top of ladder facing right.</li> <li>2. Secure with three straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>1. Position center post, installing bottom end first.</li> <li>2. Raise shelf slightly to lock center post into position.</li> <li>3. Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****Table 2. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Exhaust Stack and Windshield Wiper Arm Assembly	<ol style="list-style-type: none"> <li>1. Place exhaust stack in left cutout of cushion pad, on left side of shelf. Lower end of stack should be facing out.</li> <li>2. Place windshield wiper arm assembly next to exhaust stack.</li> <li>3. Secure components with three straps.</li> </ol>
Upper Handrail (with Side Mirror)	<ol style="list-style-type: none"> <li>1. Place against right-side wall of container.</li> <li>2. Secure with one strap.</li> </ol>
ROPS/FOPS	<div style="text-align: center;">  <p><b>WARNING</b></p> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do NOT allow to swing free.</p> <p><b>CAUTION</b></p> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> <ol style="list-style-type: none"> <li>1. Using a suitable three-point lifting device, lift ROPS/FOPS into position over tray, with front of ROPS/FOPS to the right.</li> <li>2. Lower ROPS/FOPS onto four studs, one at each corner of tray.</li> <li>3. Secure ROPS/FOPS with two straps.</li> </ol> </div>
Toolbox	<ol style="list-style-type: none"> <li>1. Place toolbox on front edge of tray.</li> <li>2. Secure with three straps.</li> <li>3. Slide tray all the way in.</li> <li>4. Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>1. Position each ramp against right wall of container.</li> <li>2. Secure each ramp with strap.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

30. Load ISU-60 container onto ramp of aircraft. Secure container with tiedowns in accordance with shipping data plate on container.

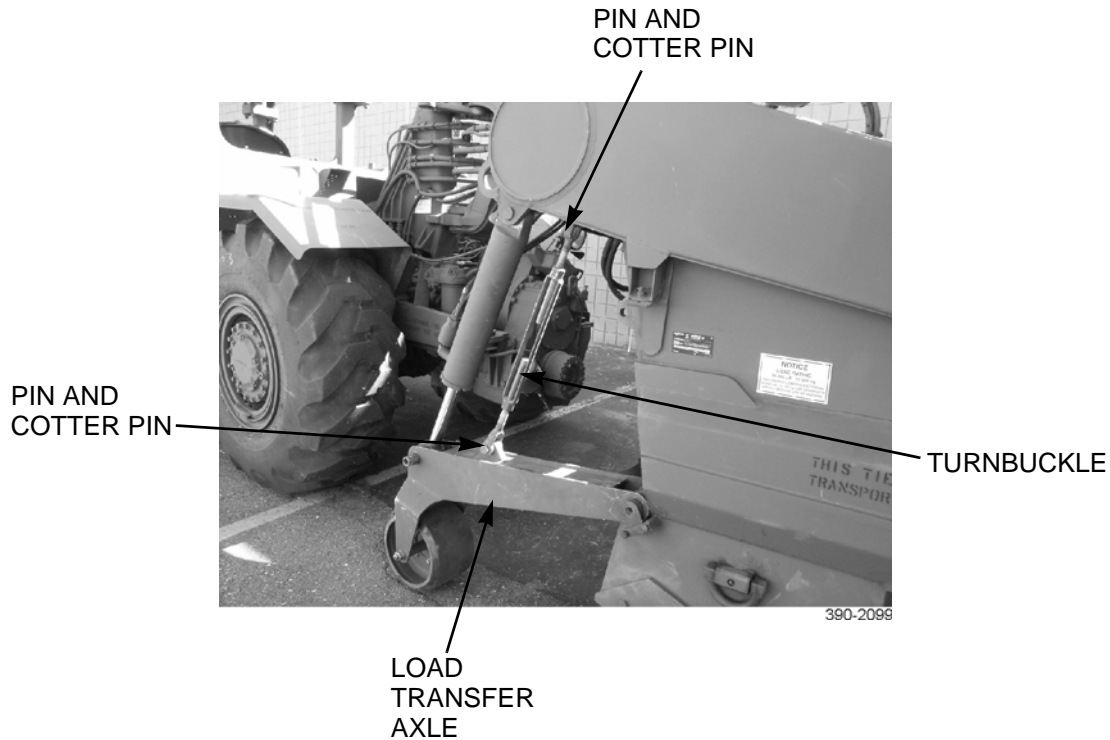
**RETURN MACHINE TO OPERATIONAL CONFIGURATION****NOTE**

Whenever hydraulic hose quick disconnects needs to be connected, operate control levers through all positions (WP 0004 00) to relieve any dropped hydraulic pressure in hoses. This will facilitate connection of hoses.

1. Remove tiedowns and unload ISU-60 container from aircraft. Place container in staging area where machine will be assembled.
2. Remove blocking, shoring, and tiedowns from machine.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

3. Remove cotter pin and pin from each end and remove turnbuckles.

**WARNING**

- Always use a ground guide when driving machine down ramp to unload from aircraft. Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
- When operating machine without ROPS/FOPS down aircraft ramp, drive with extreme caution and at a DEAD SLOW speed and in 1st gear ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

**CAUTION**

Machine must be driven STRAIGHT off aircraft. Failure to drive straight off will damage either or both load transfer axles and bowl lift cylinders.

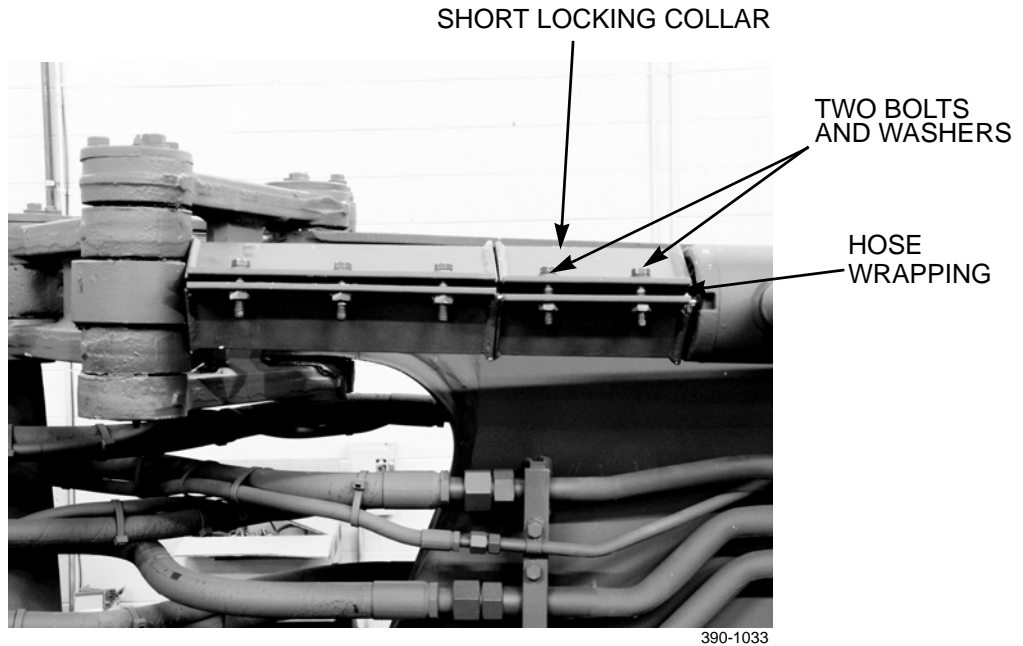
4. Start tractor engine and allow to warm up. Using 1<sup>st</sup> gear ONLY, SLOWLY drive straight off aircraft until clear of ramp. Negotiate ramp at a DEAD SLOW speed. Stop machine when positioned just clear of ramp. Place transmission in N (Neutral) and lock, apply parking brake, and shut down engine. Block tractor and scraper wheels.

**WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

**AIR TRANSPORT BY C-130 AIRCRAFT - CONTINUED****0018 00****RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

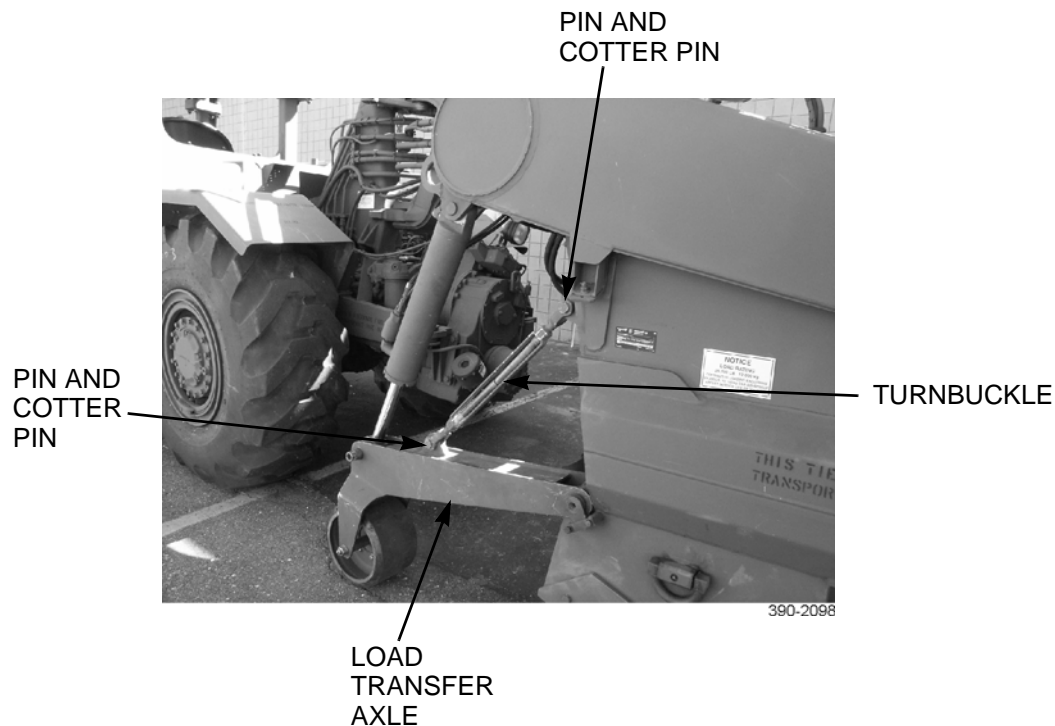
5. Remove one short (6 5/8 in.) steering cylinder locking collar from each steering cylinder and set aside for stowage in ISU-60 container:
  - a. Remove two bolts and washers, and remove one short (6 5/8 in.) locking collar and hose wrapping from each steering cylinder.
  - b. Reassemble each locking collar assembly with its mounting hardware.



6. Install turnbuckles and raise cutting edge wheels and load transfer axle wheels off ground:
  - a. Install one end of each turnbuckle to lug on scraper bowl. Secure with pin and cotter pin.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- b. Adjust length of each turnbuckle as required. Install to lug on load transfer axle, hand tighten turnbuckle, and secure with pin and cotter pin.
- c. Start engine and operate hydraulics to retract lift cylinders and raise cutting edge wheels and load transfer axles off ground.

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has not rollover protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

**CAUTION**

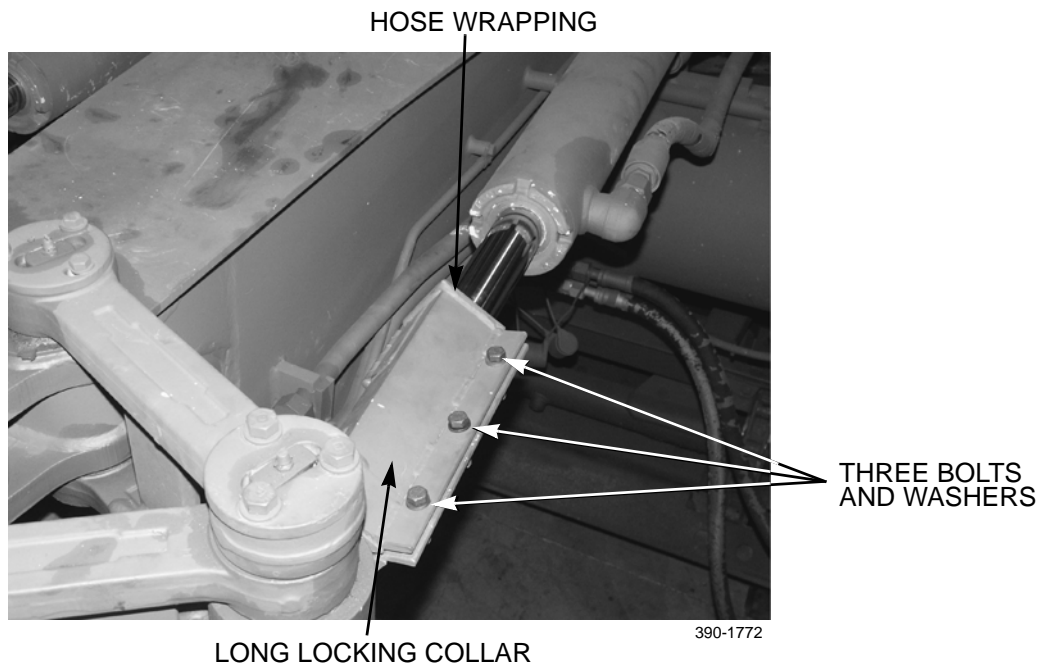
Turning radius and overall steering capacity are reduced due to installation of steering locks. Steering too sharply may damage machine. Tractor tires may also contact load transfer axles.

7. Drive machine to staging area off tarmac, where machine is to be returned to operational configuration.
8. Remove turnbuckles and set aside for stowage in ISU-60 container:
  - a. Place transmission in N (Neutral) and lock. Apply parking brake.
  - b. Shut down engine.
  - c. Operate hydraulics to lower load transfer axles and cutting edge wheels to the ground.
  - d. Remove cotter pin and pin from each load transfer axle and turnbuckle.
  - e. Remove cotter pin and pin from other end and remove each turnbuckle from scraper bowl.
  - f. Block tractor and scraper wheels.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

9. Remove remaining long (10 3/4 in.) steering locking collar from rod end of each steering cylinder and set aside for stowage in ISU-60 container:
  - a. Remove three bolts and washers and remove locking collar and hose wrapping from each steering cylinder.
  - b. Reassemble each locking collar assembly with its mounting hardware.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

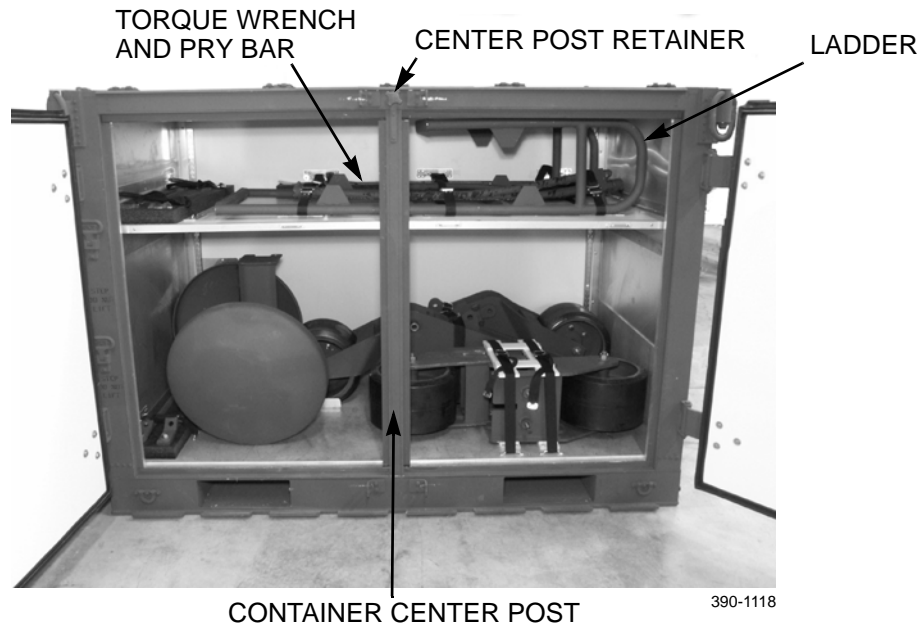
10. Remove the following items from ISU-60 container, in accordance with illustrations and information in Table 3:

**NOTE**

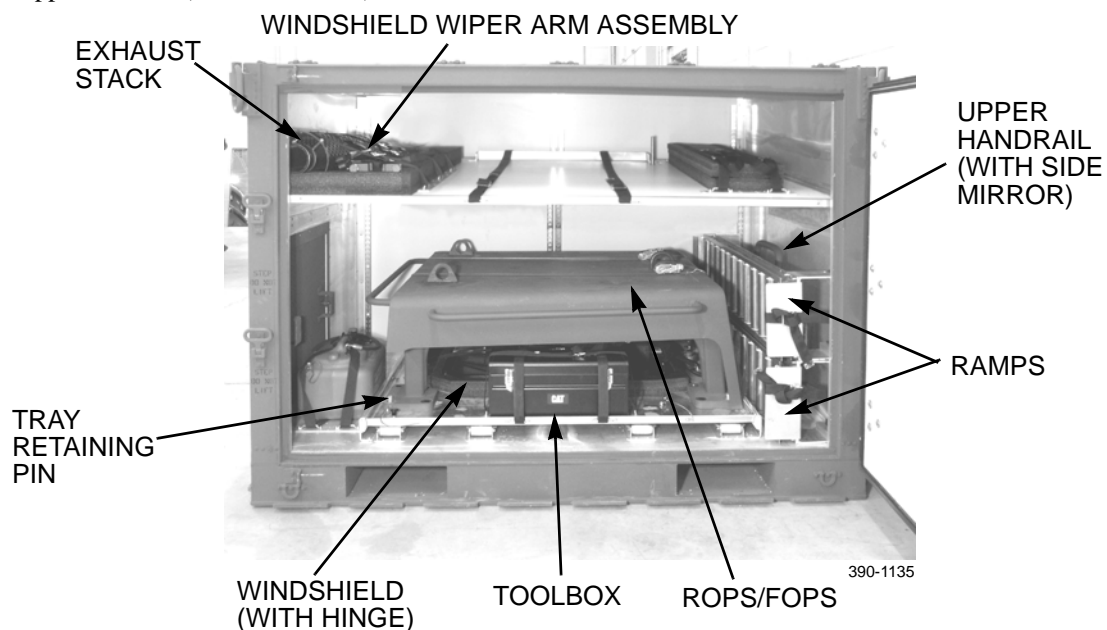
Container center post must be removed to remove ladder. Remove retainer and post.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- a. ladder;
- b. torque wrench and pry bar;



- c. toolbox;
- d. ROPS/FOPS;
- e. windshield (with hinge);
- f. exhaust stack;
- g. windshield wiper arm assembly; and
- h. upper handrail (with side mirror).

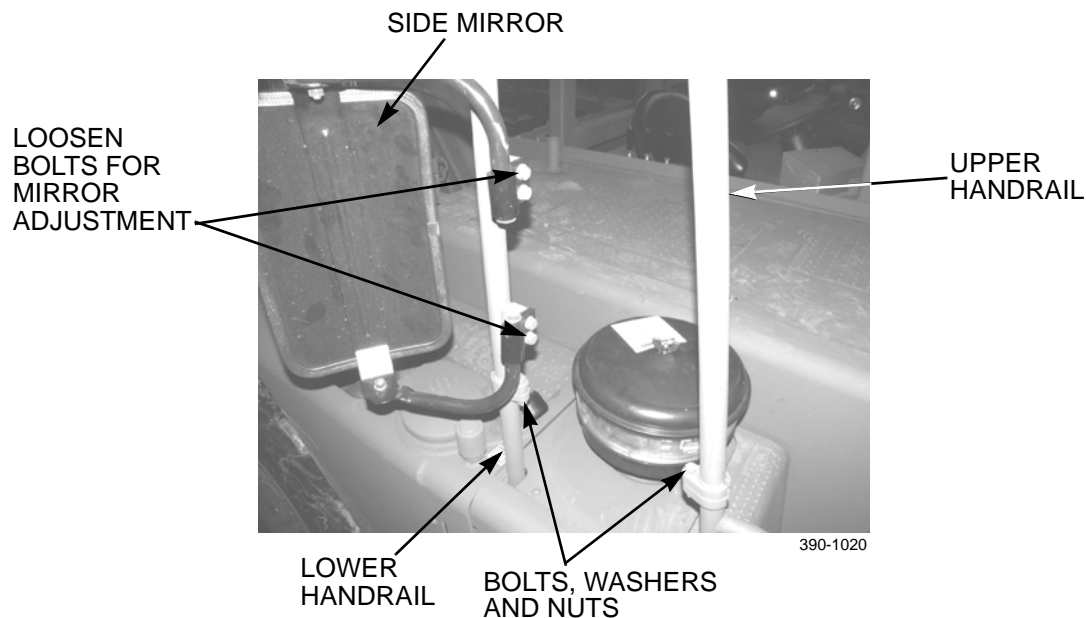


**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****Table 3. Unpacking ISU-60 Container - Single-Door End.**

COMPONENT	UNPACKING INSTRUCTIONS
Ramps	<ol style="list-style-type: none"> <li>1. Remove two roller ramps from right-side wall of container.</li> <li>2. Install each ramp at door opening, with two pins through each ramp into holes in edge of floor.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Remove two pins and slide out tray.</li> <li>2. Release three straps and remove toolbox from tray.</li> </ol>
ROPS/FOPS	<ol style="list-style-type: none"> <li>1. Release two straps from ROPS/FOPS.</li> </ol> <div> </div> <p><b>WARNING</b></p> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do NOT allow to swing free. Failure to do so may result in injury or death to personnel.</p> <p><b>CAUTION</b></p> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> <ol style="list-style-type: none"> <li>2. Use a suitable three-point lifting device to lift ROPS/FOPS clear of tray.</li> </ol>
Windshield (with Hinge)	<p><b>CAUTION</b></p> <p>Use caution not to damage windshield during handling. Do not remove from container until ready to install.</p> <ol style="list-style-type: none"> <li>1. Release one strap from windshield.</li> <li>2. Carefully remove windshield (with hinge) from cushion pad.</li> </ol>
	<p><b>NOTE</b></p> <p>To remove all remaining components, remove straps as required and lift out component.</p>

**AIR TRANSPORT BY C-130 AIRCRAFT - CONTINUED****0018 00****RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

11. Install upper handrail with side mirror on lower handrail of tractor with two bolts, washers, and nuts. Tighten nuts securely.
12. Loosen bolts and unfold side mirror. Adjust to provide visibility to side and rear of machine. Tighten bolts.

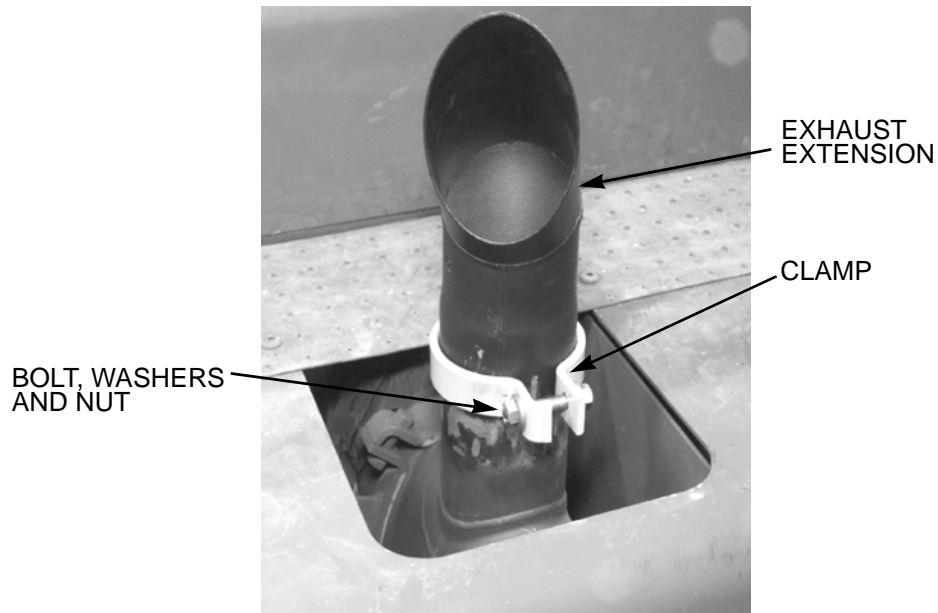
**WARNING**

Do NOT install exhaust stack until engine exhaust components have cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

13. Remove exhaust extension from muffler on right side of tractor and install exhaust stack in its place:

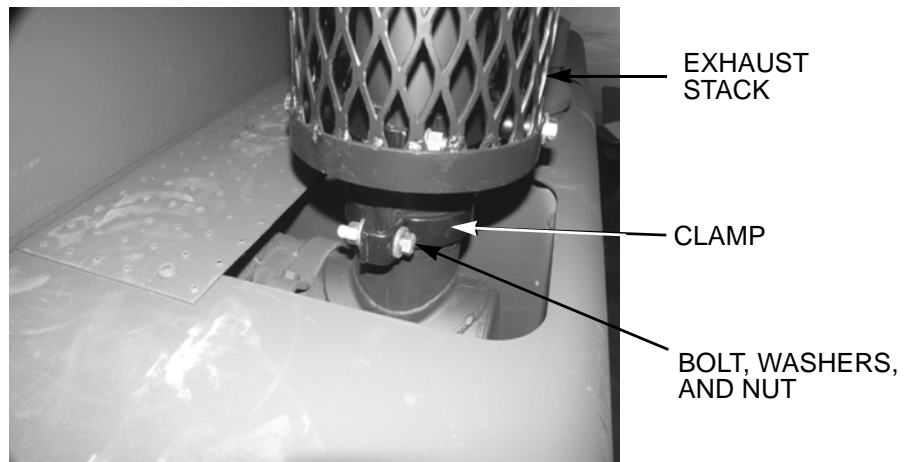
**AIR TRANSPORT BY C-130 AIRCRAFT - CONTINUED****0018 00****RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- a. Loosen nut, bolt, two washers, and clamp, and remove exhaust extension from muffler. Retain mounting hardware on extension and set extension aside for stowage in ISU-60 container.



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- b. Install exhaust stack with clamp, bolt, two washers, and nut. Tighten nut securely.



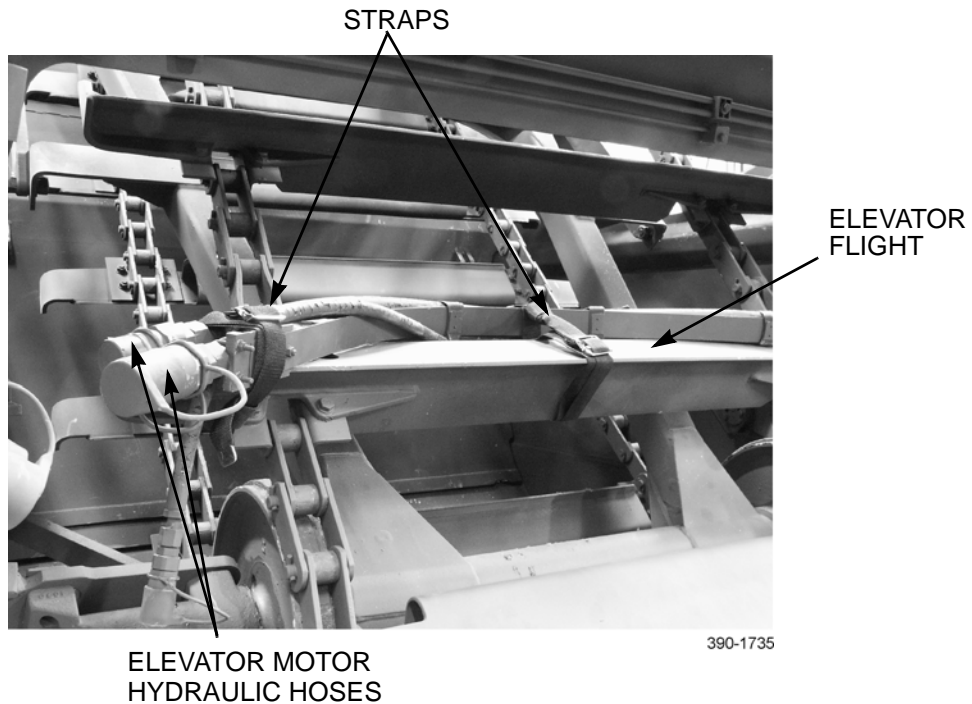
390-1019

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

14. Remove three straps and three elevator motor hydraulic hoses from stowage on elevator flight.

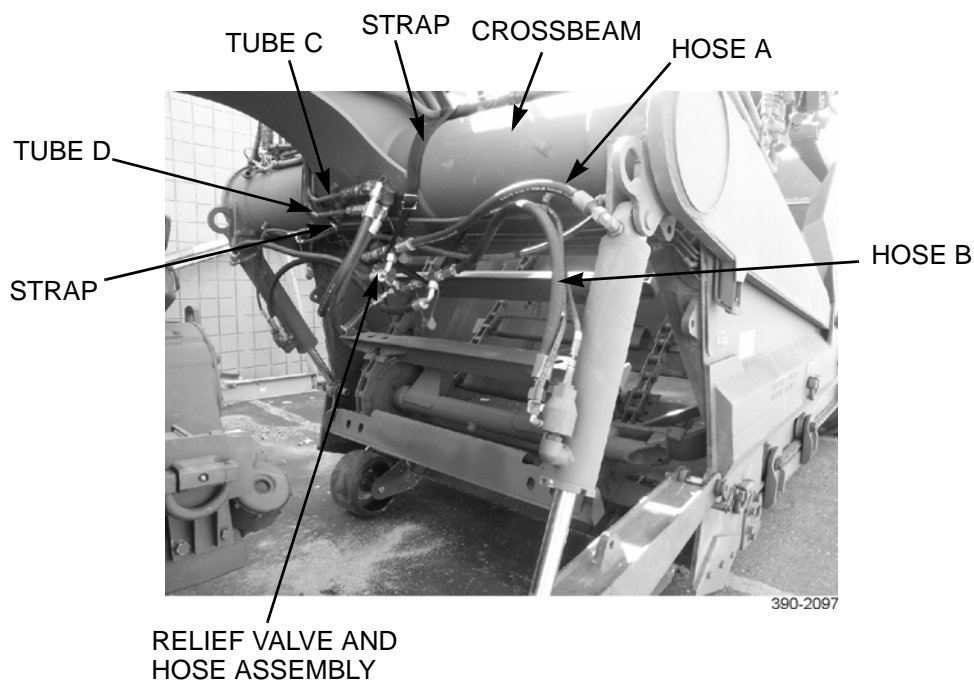
**NOTE**

To facilitate disconnection of hydraulic hose quick disconnect fitting, relieve any trapped hydraulic pressure in hoses by operating control levers through all positions (WP 0004 00).

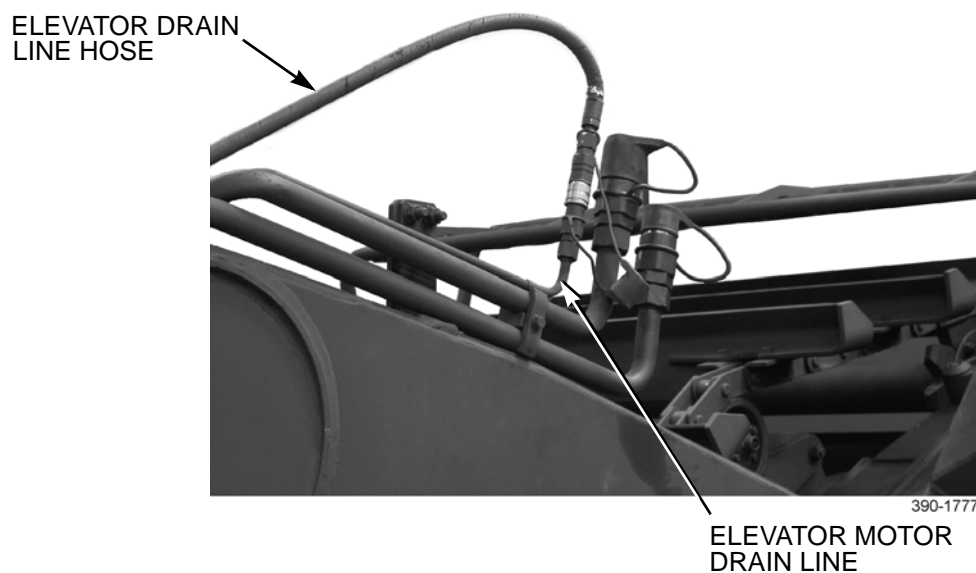


**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

15. Remove load transfer relief valve and hose assembly from bowl lift cylinder plumbing and from elevator motor drain line at left side of machine. Set aside for stowage in ISU-60 container:
- Remove two straps. Disconnect and remove relief valve and hose assembly from hose A, hose B, tube C and tube D as shown. Install dust caps.



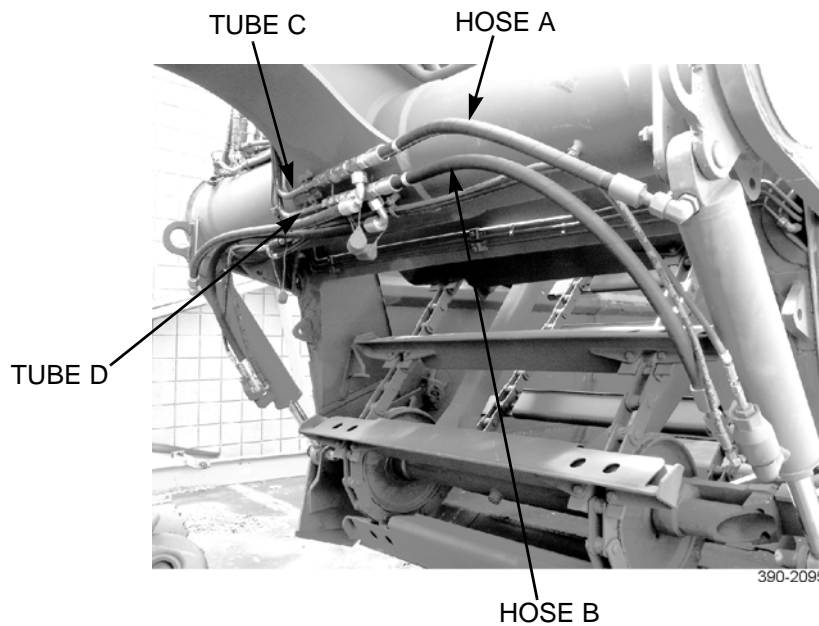
- Disconnect elevator drain line hose (from load transfer relief valve and hose assembly) from elevator motor drain line.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

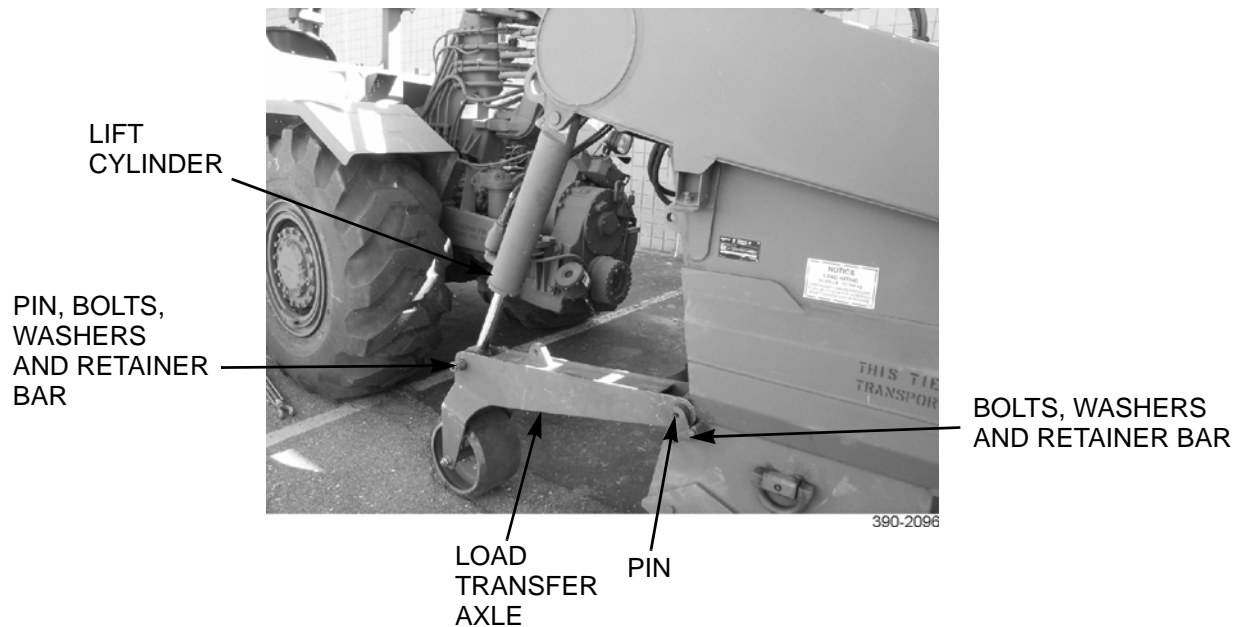
All quick disconnect connections are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

- c. Connect hose A to tube C. Turn quick disconnect collar a half turn after connecting to lock connection.
- d. Connect hose B to tube D.

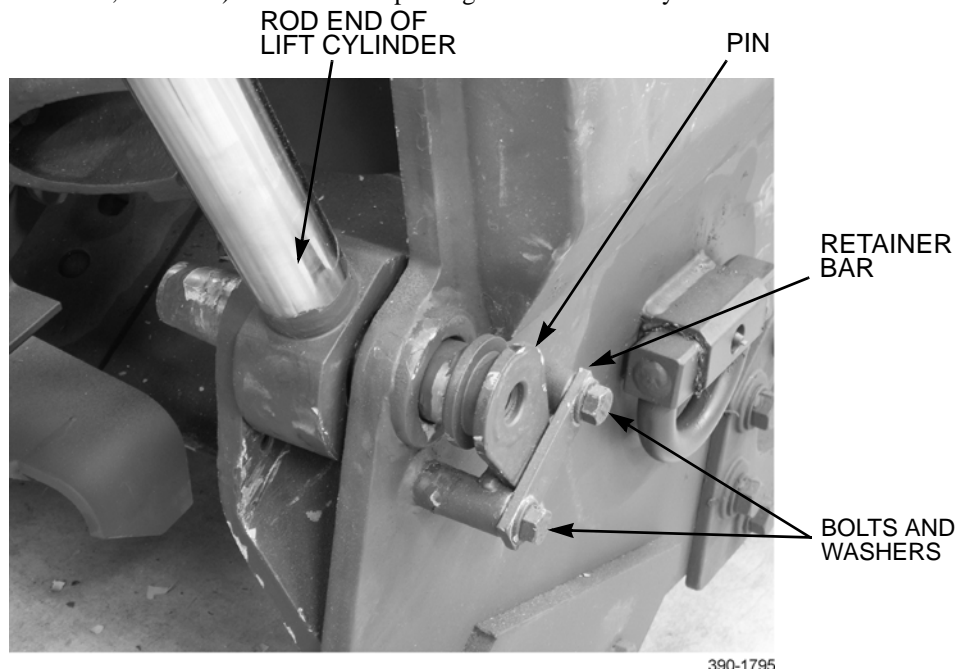


- 16. Remove load transfer axles and set aside for stowage in ISU-60 container:
  - a. Remove two bolts, washers, retainer bar, and pin and remove each load transfer axle from front corner of scraper bowl.
  - b. Remove two bolts, washers, retainer bar, pin, and disconnect rod end of each lift cylinder from load transfer axle. Reinstall mounting hardware on axle.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

- Work simultaneously on both sides and operate hydraulics to extend or retract cylinders as needed to align mounting holes.
  - Clean and lubricate pins with antiseize compound (Item 5, WP 0026 00) before they are installed.
- c. Pivot each cylinder rearward, align mounting holes, and install cylinder to bowl with mounting hardware (pin, retainer bar, two washers, and bolts) removed in step a. Tighten bolts securely.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Configuration change at cutting edge should NEVER be attempted without first securing the bowl by blocking it so that it is firmly supported. Failure to follow this warning may cause injury to personnel.

17. Remove cutting edge wheels and set aside for stowage in ISU-60 container:
  - a. Start engine and raise scraper bowl until approximately 10 in. (25.4 cm) from the ground. Block cutting edge securely.
  - b. Loosen two setscrews. With assistance and using a pry bar, remove each cutting edge wheel.
  - c. Remove blocks, lower bowl, and shut down engine.



390-1027

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

18. NOTE: Machine is now drivable. However, until ROPS/FOPS is installed, it should be operated only with extreme caution, at low idle and in 1<sup>st</sup> gear or reverse ONLY. As required, move machine to a new location to complete machine assembly.
19. Return elevator to work configuration:

**WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- a. Start engine and raise elevator by moving ejector forward until elevator shafts are free of hangers.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

ELEVATOR SHAFT



HANGER

**ELEVATOR LOWERED****ELEVATOR RAISED**

390-1077

## b. Install elevator hangers:

- (1) Remove hangers from BII toolbox on rear deck of scraper.

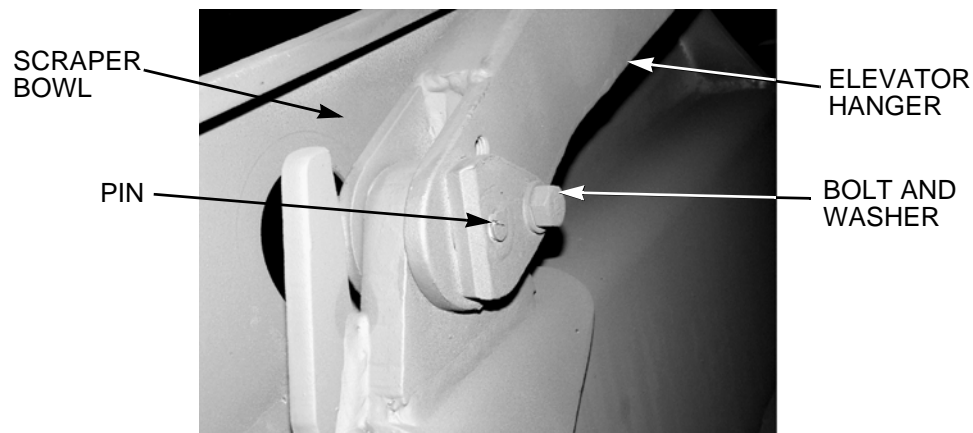
**NOTE**

GAA grease (Item 10, WP 0026 00) coated on elevator shafts will make hangers easier to install.

- (2) Position large end of each hanger on elevator shaft.

**NOTE**

- To assist in installing pins, work on both sides of scraper bowl at the same time.
  - Ejector can be moved slightly forward or rearward to allow installation of pins.
- (3) Install pin on each side of scraper bowl, by driving pin in.
  - (4) Install washer and bolt on pin. Tighten bolt securely.

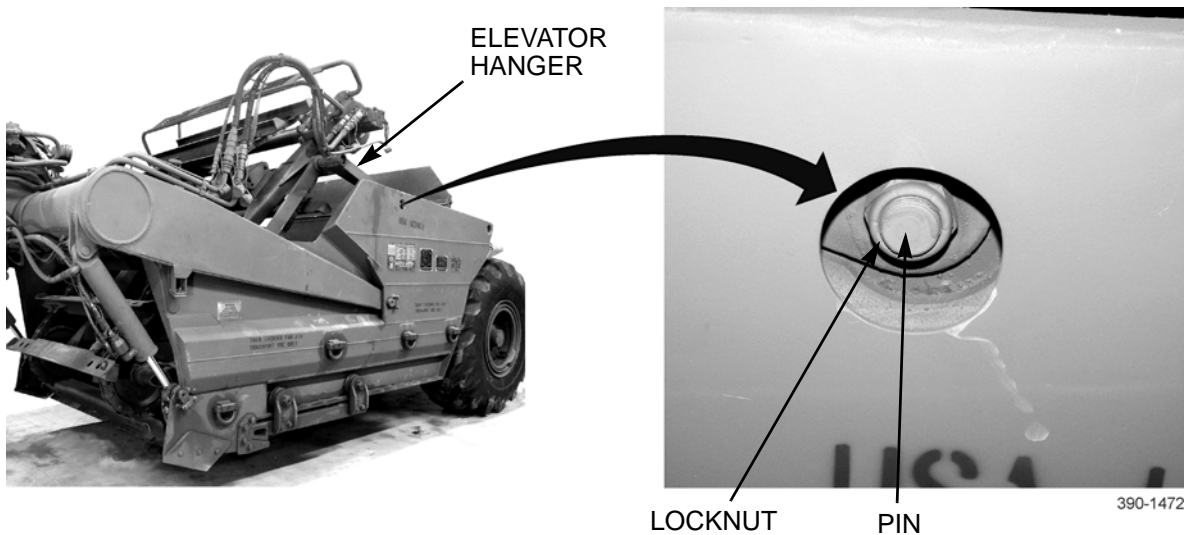


390-990

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

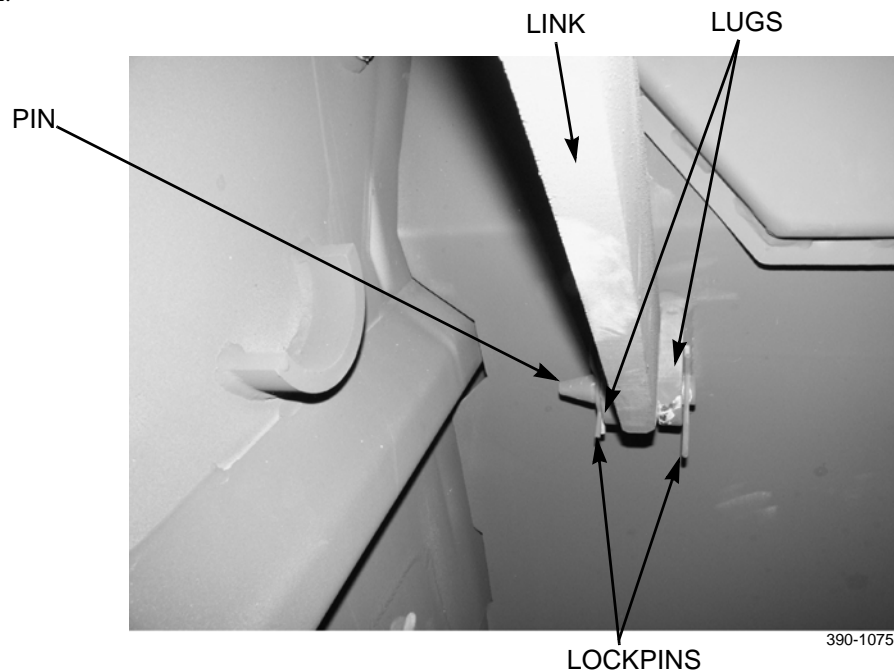
Notify Unit Maintenance to obtain and install new locknuts on pins as soon as possible.

- (5) Install locknut on pin and tighten securely.

**NOTE**

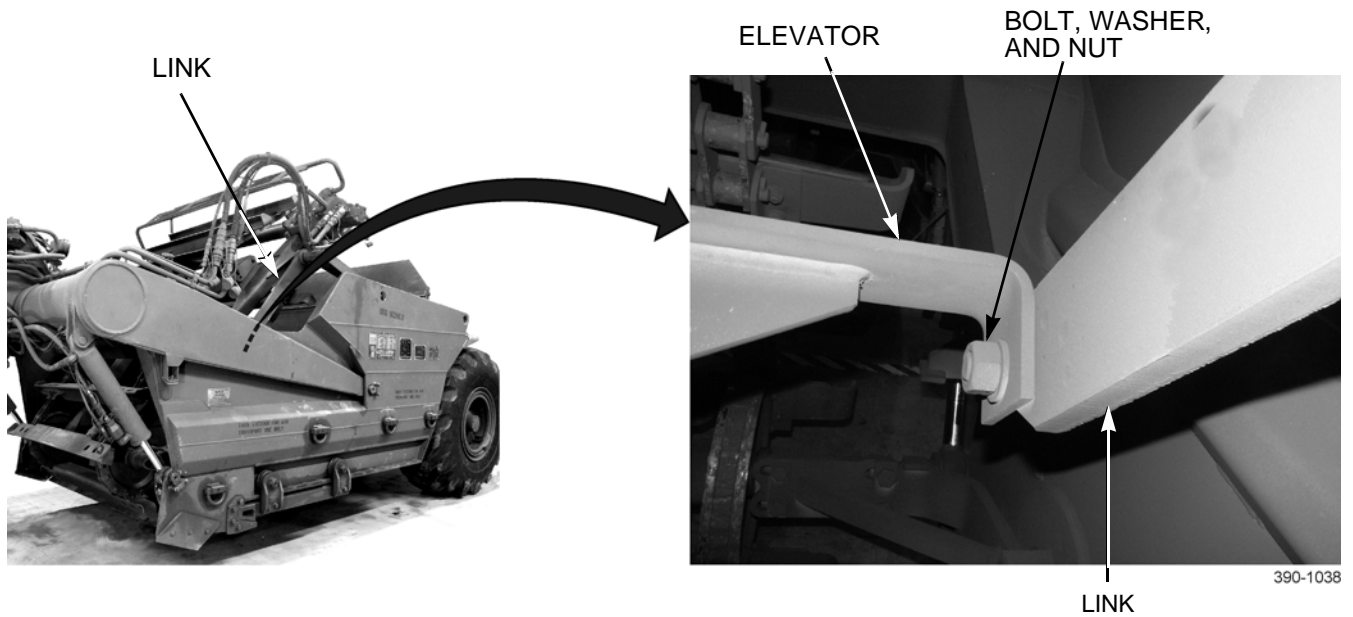
Ejector can be moved slightly forward or rearward to allow removal of pins.

- c. Remove lockpins and unpin two elevator links from lugs on ejector rear wall. Stow pins and lockpins in BII tool-box.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- d. Position each link toward front of scraper bowl and install to side of elevator with bolt, washer, and nut.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

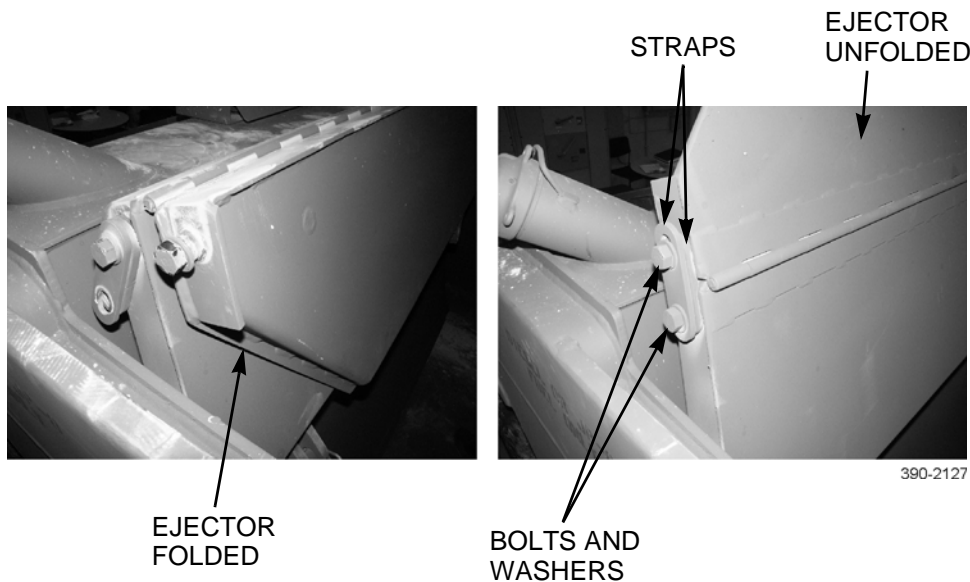
Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- e. Move ejector fully to the rear. Shut down engine.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

- f. Use a suitable lifting device to unfold ejector. Secure two straps on each side with two washers and bolts.

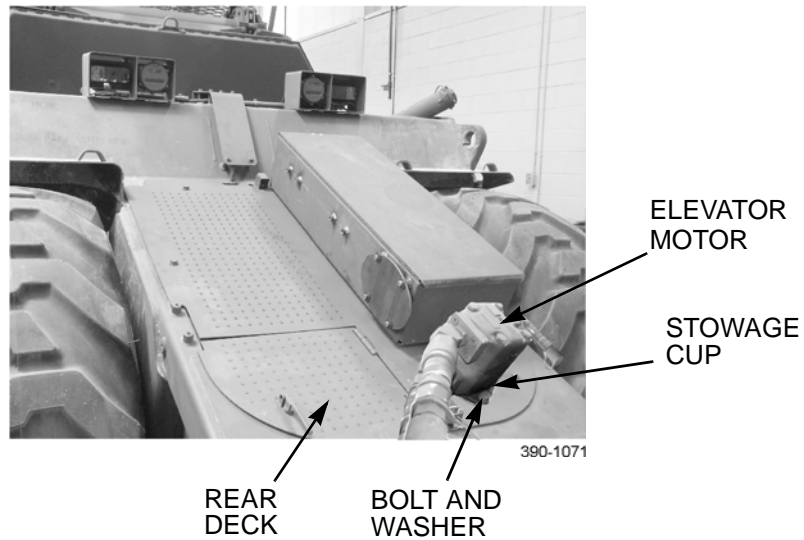
**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

Hydraulic motor weighs approximately 85 lb (39 kg).

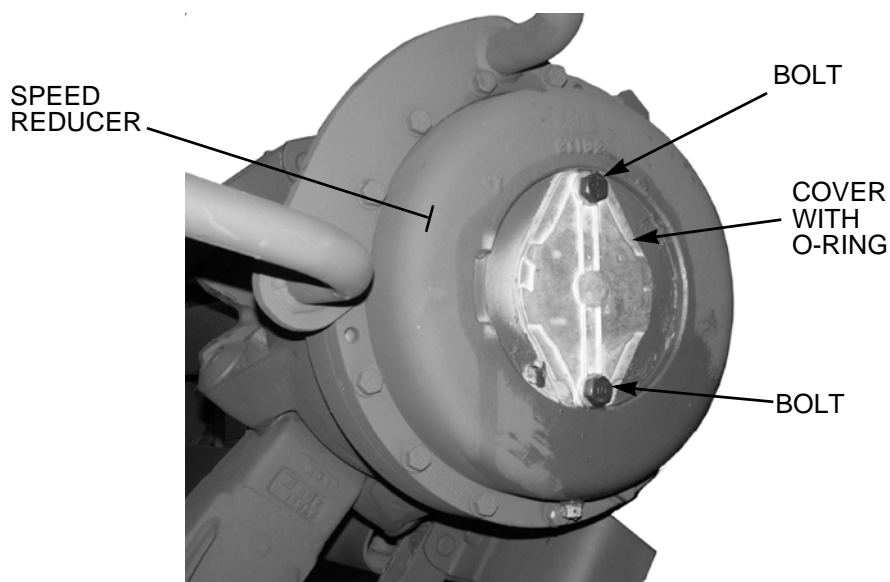
- g. Attach a suitable overhead lifting device to elevator motor. Take up slack in sling. Remove two bolts, washers, and elevator motor from mounting on stowage cup on rear deck of scraper.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel.

- h. Place ladder against left side of scraper to access elevator motor mounting.
- i. Remove two bolts and cover with O-ring from speed reducer. Reinstall two bolts removed from cover to stowage cup on rear deck of scraper. Return cover with O-ring to ISU-60 container toolbox.



390-1070

- j. Install elevator motor to speed reducer with two washers and bolts that were moved in step g. Tighten bolts to 158 lb-ft (214 Nm). Remove lifting device from elevator motor.

**CAUTION**

Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

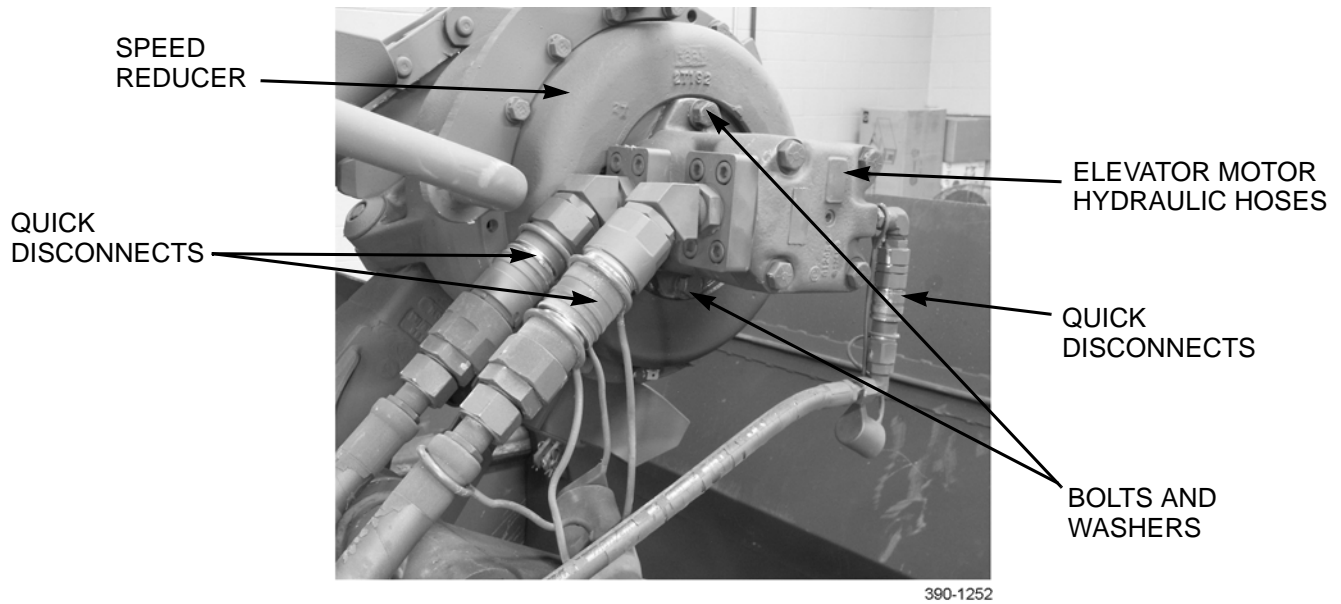
**NOTE**

All quick disconnect connections are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

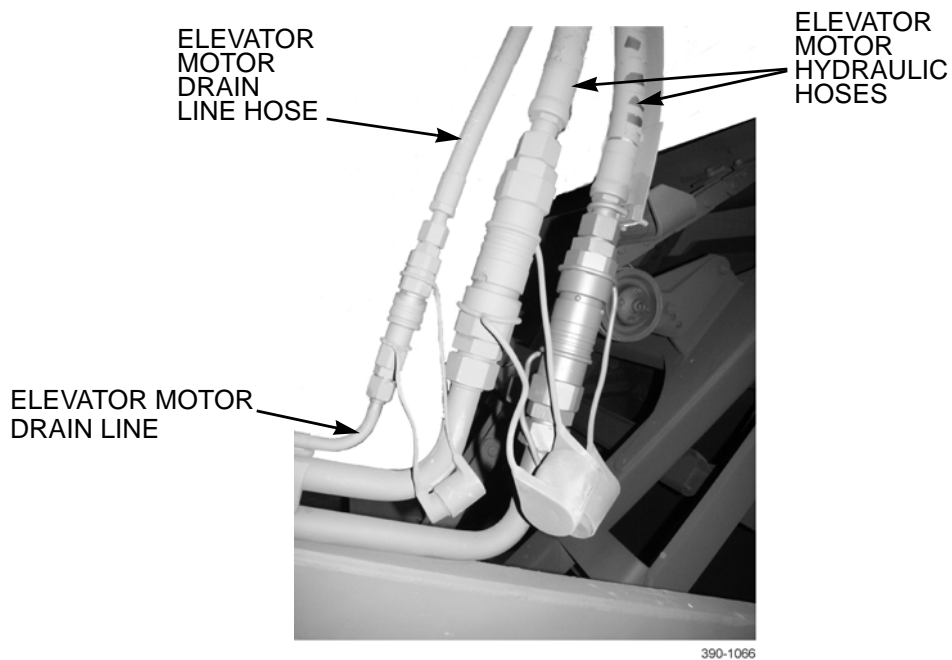
- k. Remove dust caps and connect three hydraulic hose quick disconnects at elevator motor. Turn each quick disconnect collar a half turn after connecting to lock connection.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

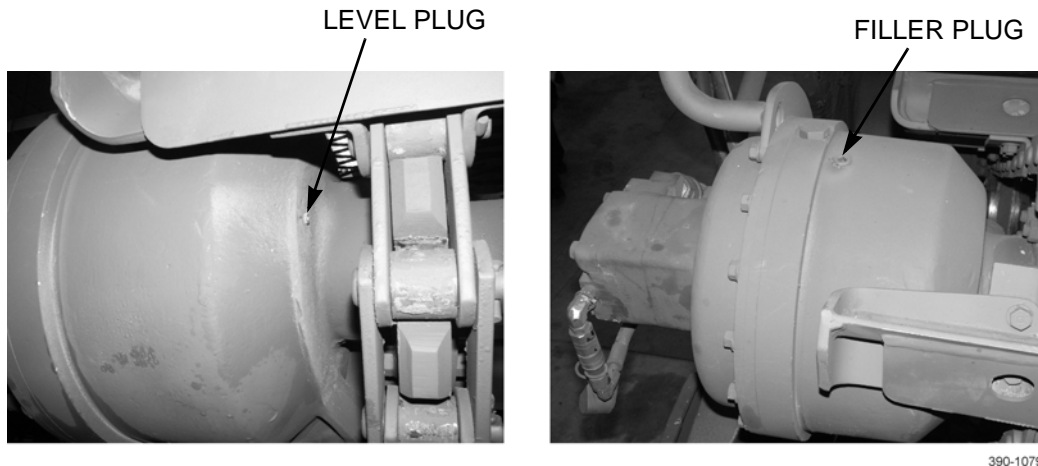


- l. Remove dust caps and connect two large elevator motor hydraulic hoses at quick disconnect fittings on left side of scraper bowl.
- m. Connect third elevator motor drain line hydraulic hose to elevator motor drain line.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- n. Check level of oil in gearbox:
  - (1) Clean area around level plug.
  - (2) Remove level plug. Oil should drip out opening.
  - (3) If oil level is low, remove filler plug and add gear lubricating oil (Item 12, 13 or 14, WP 0026 00) until oil drips out level plug opening.
  - (4) Clean level and filler plugs and instal.



- o. Remove ladder and set aside for stowage in ISU-60 container.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

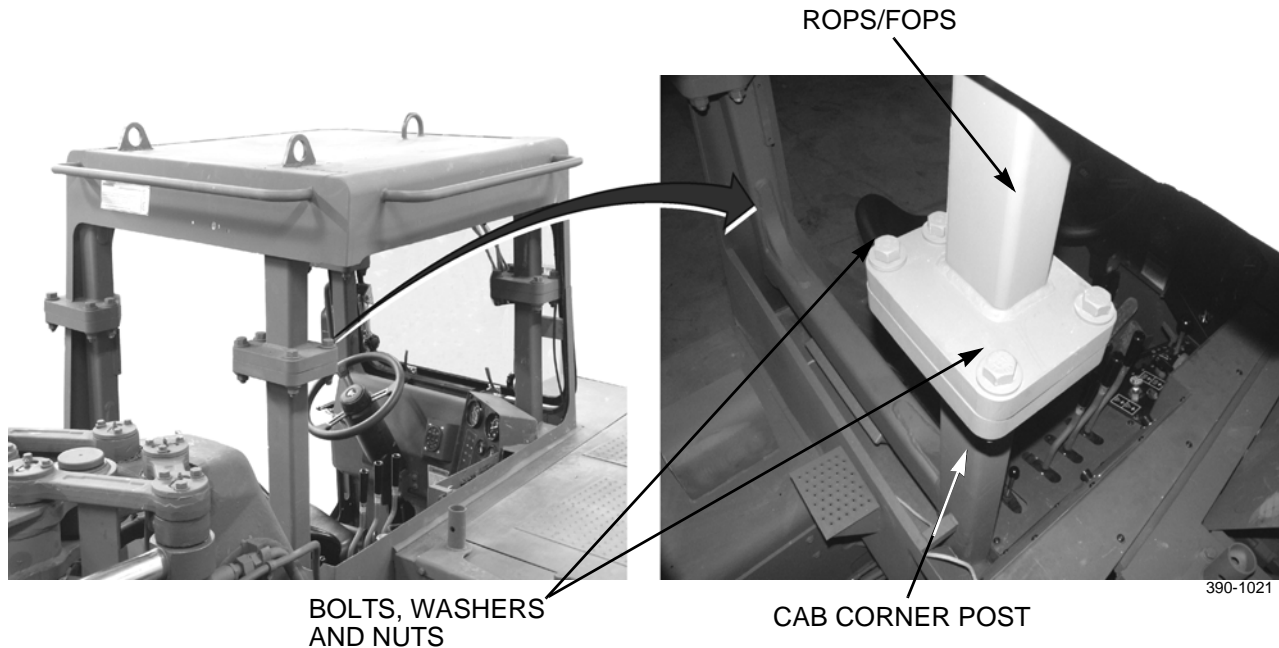
ROPS/FOPS weighs 447 lb (203 kg).

- 20. Install ROPS/FOPS on cab corner posts:
  - a. Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.

**NOTE**

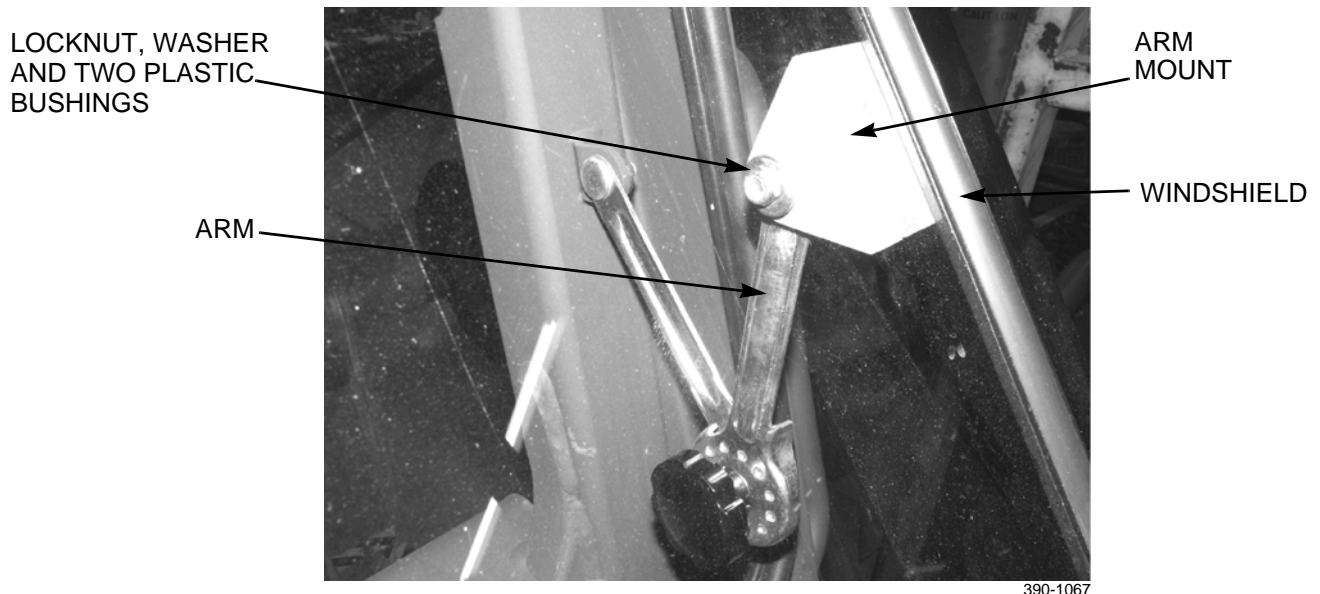
Tighten all mounting nuts using a crisscross tightening pattern. This will ensure even tightening and correct installation alignment on all four cab corner posts.

- b. Lift ROPS/FOPS into position at four corner posts. While positioning ROPS/FOPS, loosely install all 16 bolts, 32 washers, and 16 nuts. Final tighten nuts in a crisscross tightening pattern to 317 lb-ft (430 Nm).
- c. Remove lifting device from ROPS/FOPS.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

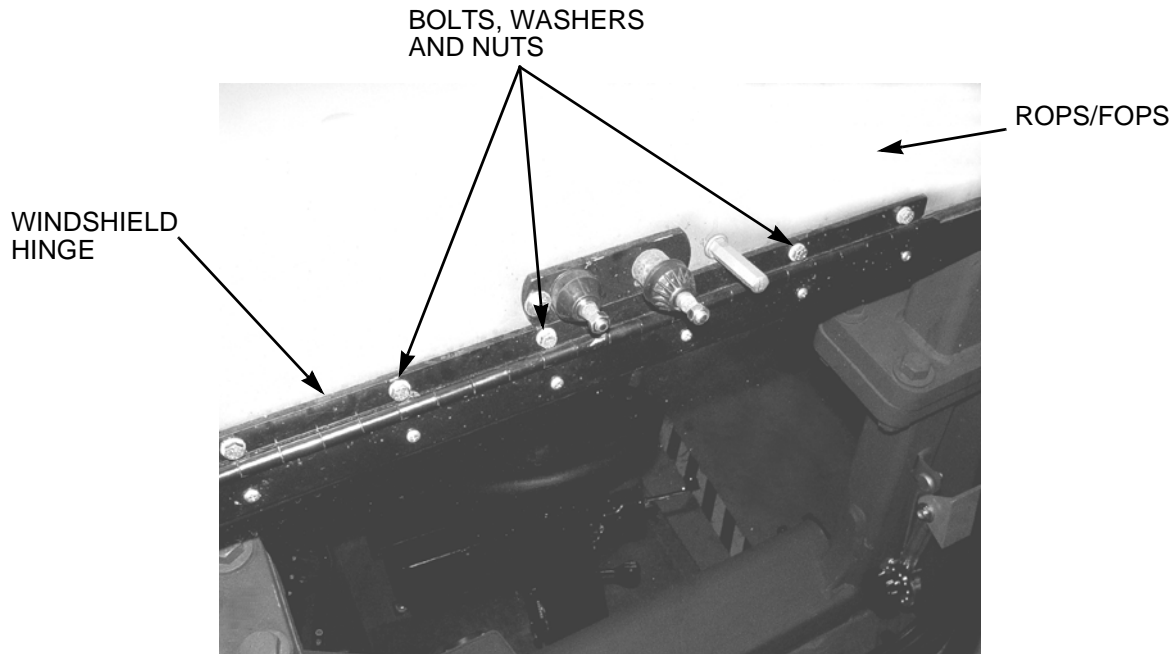
Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.

21. Install windshield:
  - a. Position windshield and install arms to arm mounts with two plastic bushings, washer, and locknut on each side.



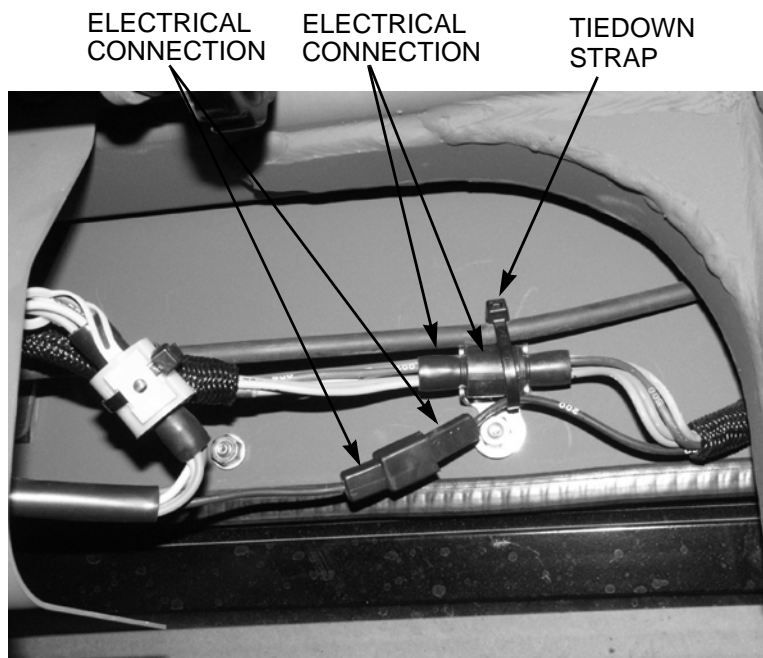
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- b. Loosely install windshield hinge to ROPS/FOPS with six bolts, 12 washers, and six nuts.
- c. Close windshield and latch.
- d. Fully tighten six nuts.



390-1072

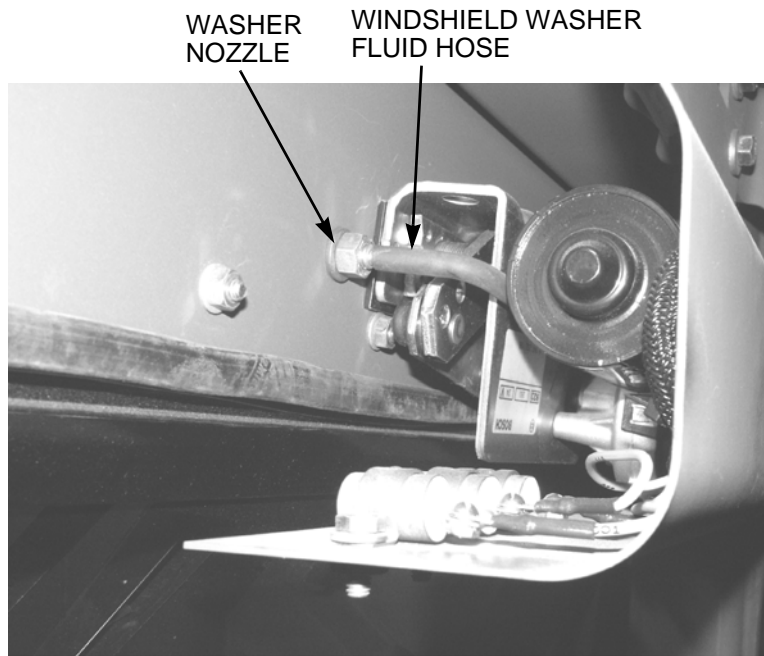
22. Connect two windshield wiper motor connectors. Secure wires with new tiedown strap (Item 21, WP 0026 00).



390-1053

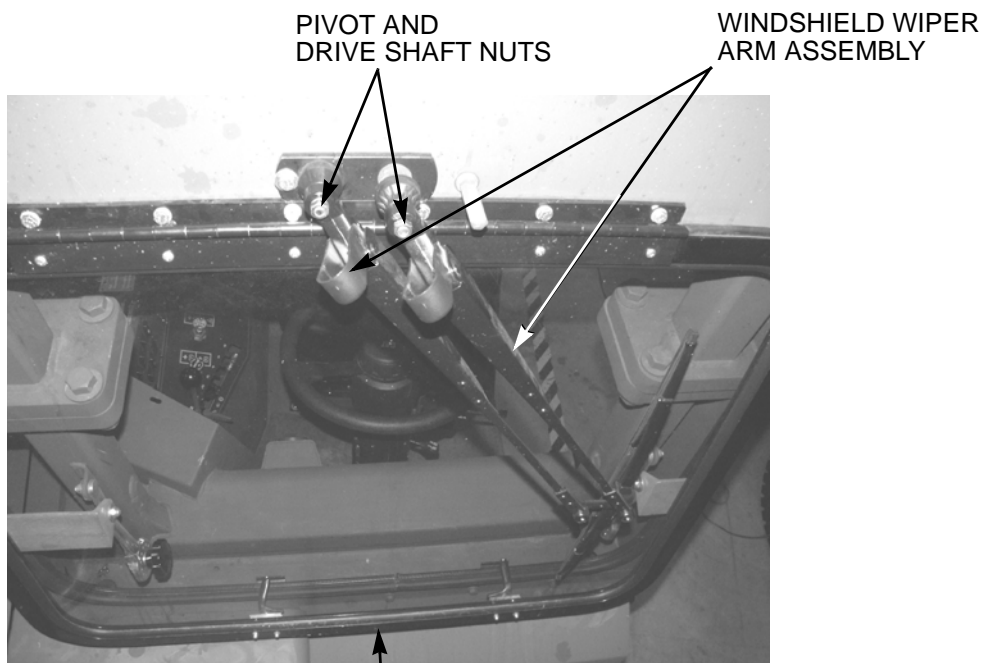
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

23. Install windshield washer hose on washer nozzle.



390-1052

24. Install windshield wiper arm assembly to drive and pivot shafts with two nuts.



390-1060

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

25. Machine is now fully assembled and operational.

**WARNING**

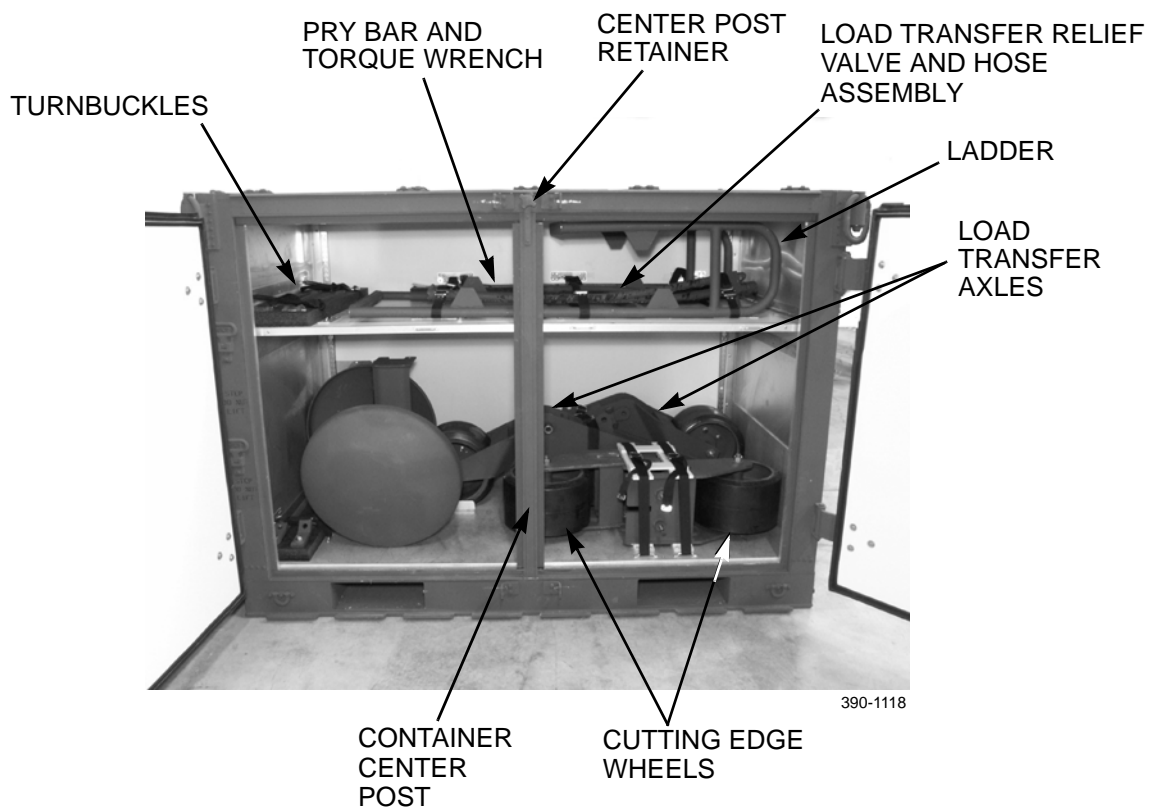
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

26. Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 4 and 5:

- a. pry bar and torque wrench;
- b. two turnbuckles;
- c. ladder;
- d. load transfer relief valve and hose assembly;
- e. two load transfer axles;
- f. two cutting edge wheels;

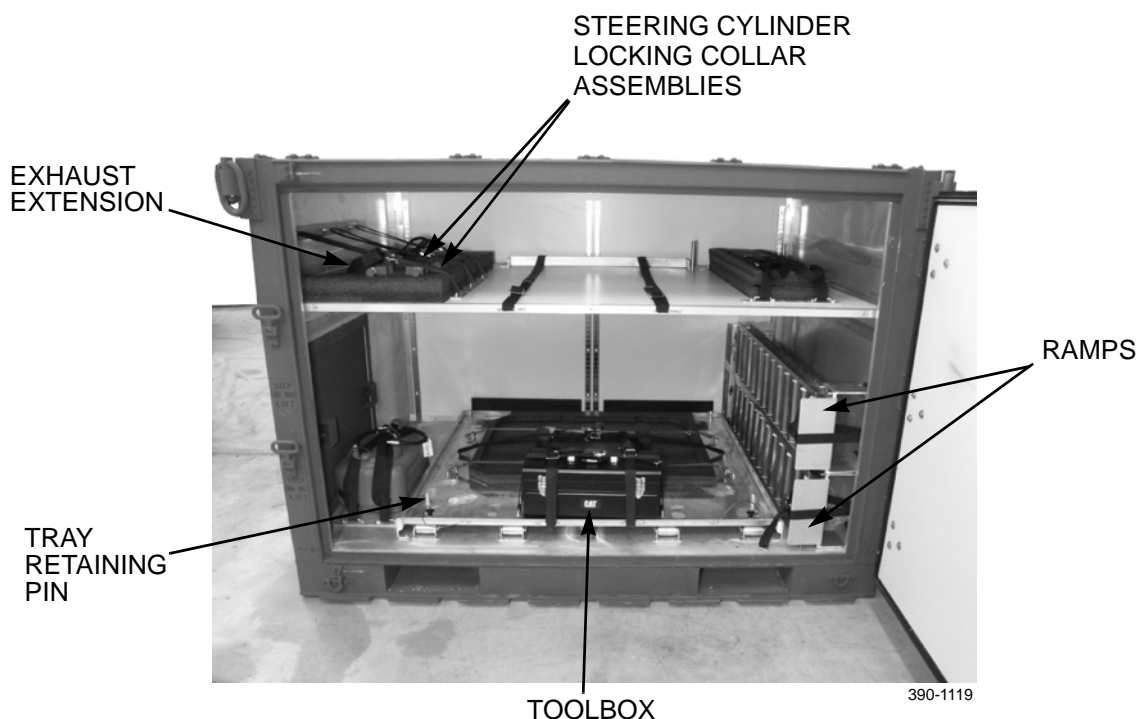


**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****Table 4. Stowage Instructions for ISU-60 Container - Two-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Pry Bar and Torque Wrench	<ol style="list-style-type: none"> <li>1. Place each component in cushion pad on shelf, against back wall of container.</li> <li>2. Secure components with three straps.</li> </ol>
Turnbuckles	<ol style="list-style-type: none"> <li>1. Place in cushion pad on left side of shelf.</li> <li>2. Secure with two straps.</li> </ol>
Ladder and Load Transfer Relief Valve and Hose Assembly	<ol style="list-style-type: none"> <li>1. Place ladder on shelf with top of ladder facing right.</li> <li>2. Place relief valve and hose assembly on top of ladder.</li> <li>3. Secure components with three straps.</li> </ol>
Load Transfer Axles	<ol style="list-style-type: none"> <li>1. Place one axle along back wall of container, with wheel facing right and other end of axle resting in U-bracket on floor of container.</li> <li>2. Place second axle alongside first, but in reverse orientation. End of second axle rests in second U-bracket on floor of container.</li> <li>3. Secure each axle to floor of container with a pin assembly through holes in U-brackets. Secure each pin assembly with a lockpin.</li> </ol>
Cutting Edge Wheels	<ol style="list-style-type: none"> <li>1. Place two straps through loops on floor, on right side of container.</li> <li>2. Place one cutting edge wheel on its side with wheel facing left.</li> <li>3. Place other cutting edge wheel in front of first, with wheel facing right.</li> <li>4. Place H-shaped bracket on top and pass two straps through bracket.</li> <li>5. Tighten straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>1. Position center post, installing bottom end first.</li> <li>2. Raise shelf slightly to lock center post in position.</li> <li>3. Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- g. four steering cylinder locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);
- h. exhaust extension; and
- i. toolbox.

**Table 5. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Steering Cylinder Locking Collar Assemblies and Exhaust Extension	<ol style="list-style-type: none"> <li>Place steering cylinder locking collar assemblies in two right cutouts in cushion pad, on left side of shelf.</li> <li>Place exhaust extension in left cutout in cushion pad, on left side of shelf.</li> <li>Secure with three straps.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>Place toolbox on front edge of tray.</li> <li>Secure with three straps.</li> <li>Slide tray all the way in.</li> <li>Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>Position each ramp against right wall of container.</li> <li>Secure each ramp with strap.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**END OF WORK PACKAGE**



**INTRODUCTION****NOTE**

Refer to FM 10-576, *Airdrop of Supplies and Equipment*, for further information on airdrop procedures.

1. This work package describes how to prepare the scraper for airdrop by C-130 aircraft, and how to return machine to operational configuration after airdrop.
2. The machine is positioned on an airdrop platform, which contains structures for critical support of the machine. The machine is then configured to meet airdrop height requirements (tip-off curve). Machine components that exceed these requirements are either removed or folded down.
3. The machine is secured to the platform with tie downs, blocking, shoring, and rigged with parachutes. The platform is then loaded into the C-130 aircraft and secured.
4. Amount of fuel left in machine's fuel tank must comply with guidance from Military Traffic Management Command (MTMC).
5. Assistance from two Unit Maintenance mechanics is required to prepare the machine for airdrop.

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

6. As part of this procedure, the ROPS/FOPS is removed from the tractor. Operation of the machine without ROPS/FOPS is required.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

7. Many components, that must be removed and installed during this procedure, are very heavy. Use assistance, caution, and follow safe work practices when handling them.

**WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

8. Throughout procedure, be aware of potential hazards when working around hitch. Do NOT work in area of hitch link unless engine is shut down.

**TOOLS AND EQUIPMENT**

1. Tools and equipment required to prepare the machine for airdrop are stored in an ISU-60 shipping and storage container (Item 1, Table 1, WP 0024 00). BII tools (Table 2, WP 0024 00) must also be used.
2. Tools required for machine assembly after airdrop must be stowed on or in BII toolbox and on rear deck of scraper. This is because the container cannot be airdropped. There may be a delay in the container's arrival at the assembly site.

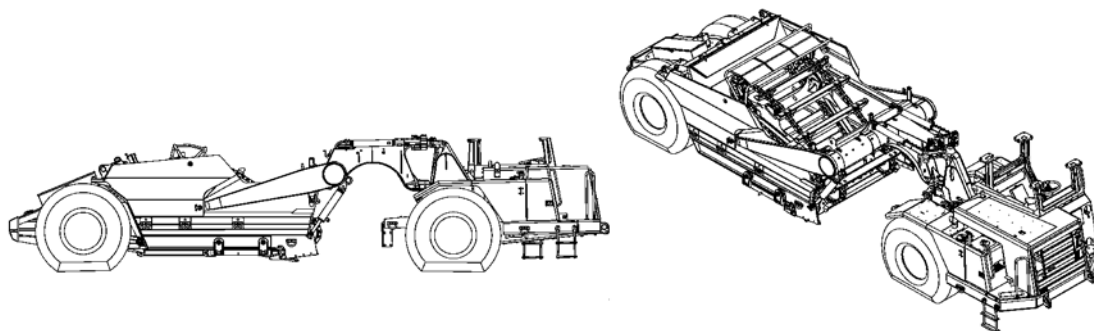
**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****TOOLS AND EQUIPMENT - CONTINUED**

3. Components of the machine that must be removed in preparation for airdrop are stowed in the container for subsequent transport to the assembly site, inside BII toolbox on rear deck of scraper, or mounted on the side of the BII toolbox.
4. Reinstall mounting hardware for all removed components on machine, to secure against loss during transport.
5. The ISU-60 container is transported separately from the scraper to the assembly site.

**SUMMARY OF PROCEDURES****NOTE**

The following summary of procedures is provided to assist personnel preparing the machine for airdrop by C-130 aircraft.

1. Configure machine for airdrop:
  - a. Remove windshield wiper arm and windshield.
  - b. Remove ROPS/FOPS.
  - c. Configure elevator for airdrop.
  - d. Install all steering locks.
  - e. Disconnect electrical, air, fuel, and hydraulic lines on right side of scraper bowl and place inside bowl.
  - f. Remove exhaust stack and install exhaust extension.
  - g. Remove upper handrail with side mirror.
  - h. Remove taillights and stow on side of BII toolbox.
  - i. Remove fuel neck and stow on side of BII toolbox.
  - j. Reduce tire inflation.
  - k. Position machine on prepared airdrop platform.
  - l. Provide blocking and shoring. Tie machine down on platform.
  - m. Rig machine for airdrop.
  - n. Load airdrop platform into aircraft.
  - o. Load ISU-60 container for delivery (NOT by airdrop).
2. The following illustration shows the scraper configured for airdrop by C-130 aircraft.

**AIRDROP - C-130**

390-2049

**CONFIGURE MACHINE FOR AIRDROP****NOTE**

Whenever hydraulic hose quick disconnects need to be disconnected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate disconnection of hoses.

1. Position machine on level ground. Ensure tractor and scraper are aligned and steering wheel is centered. Move ejector fully to the rear and close floor of bowl. Place transmission in N (Neutral) and lock, apply parking brake, and lower bowl to the ground. Shut down engine. Block tractor and scraper wheels.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

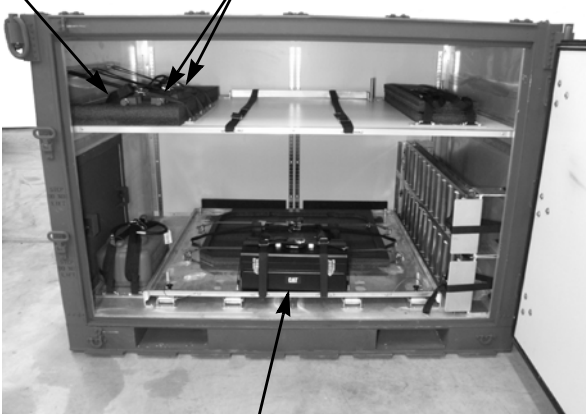
2. Place ISU-60 container near work area and remove the following items from container:
  - a. toolbox;
  - b. exhaust extension;
  - c. four steering locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);

**NOTE**

Before removing ladder, unscrew retainer and remove post.

- d. ladder; and
- e. pry bar.

EXHAUST  
EXTENSION      STEERING CYLINDER  
LOCKING COLLAR ASSEMBLIES



TOOLBOX

390-1119

PRY BAR      CENTER POST  
RETAINER      LADDER

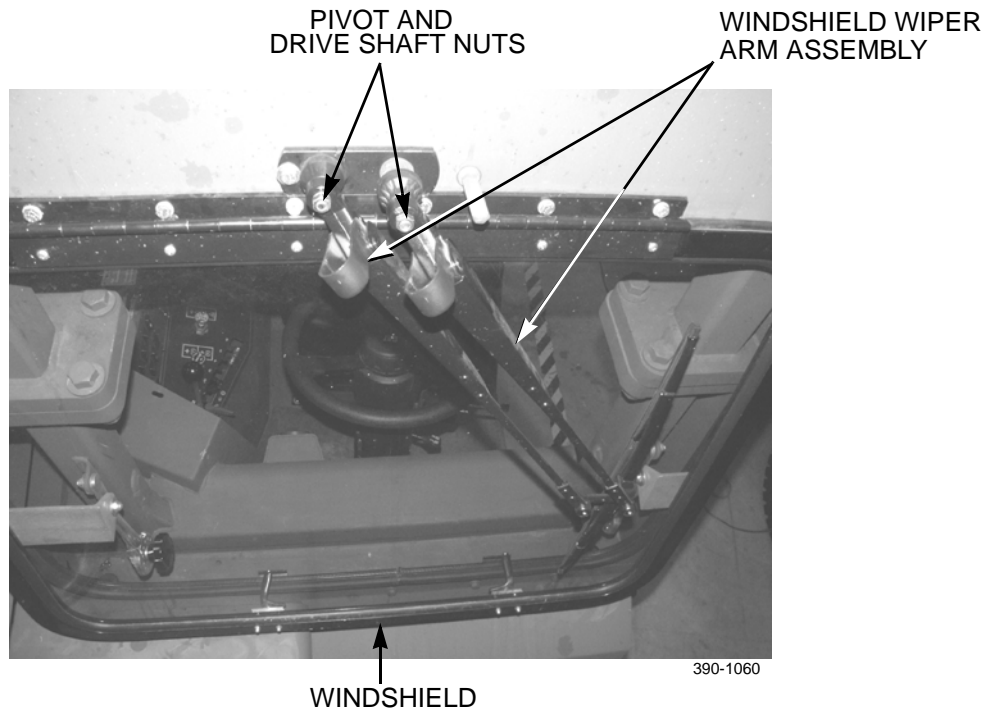


CONTAINER CENTER POST

390-1118

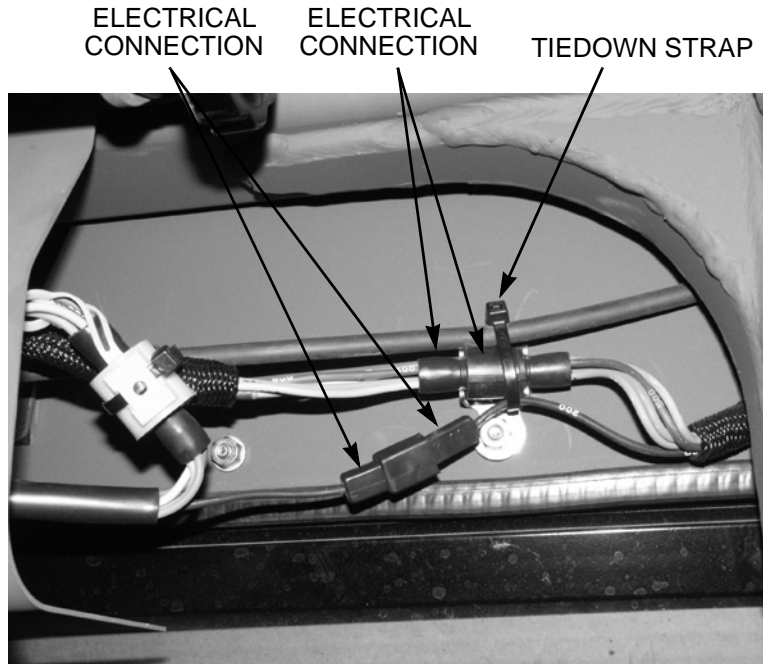
**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

3. Remove two nuts and windshield wiper arm assembly from windshield. Set wiper arm assembly aside for stowage in ISU-60 container. Reinstall nuts on drive and pivot shafts.



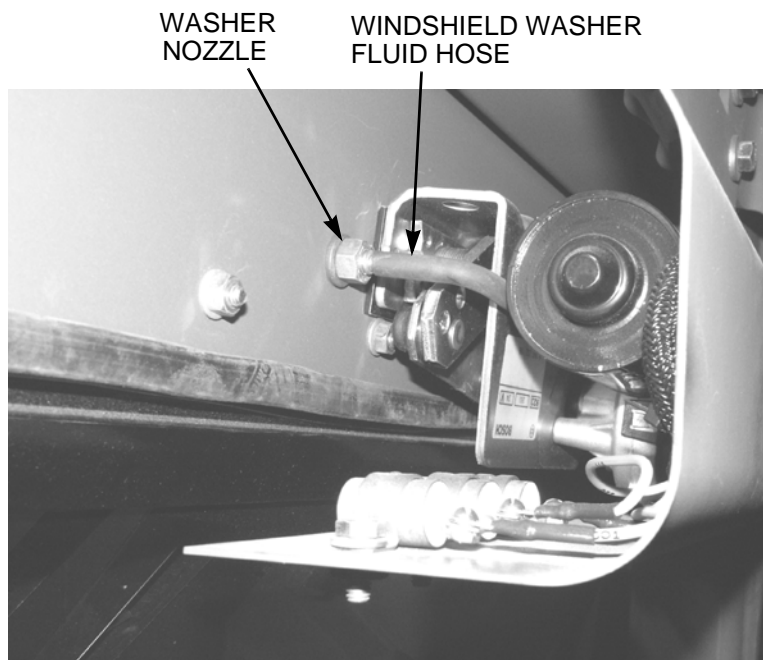
**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

4. Cut tiedown strap and disconnect two electrical connectors at wiper motor inside cab. Discard tiedown strap.



390-1053

5. Remove windshield washer fluid hose from washer nozzle.

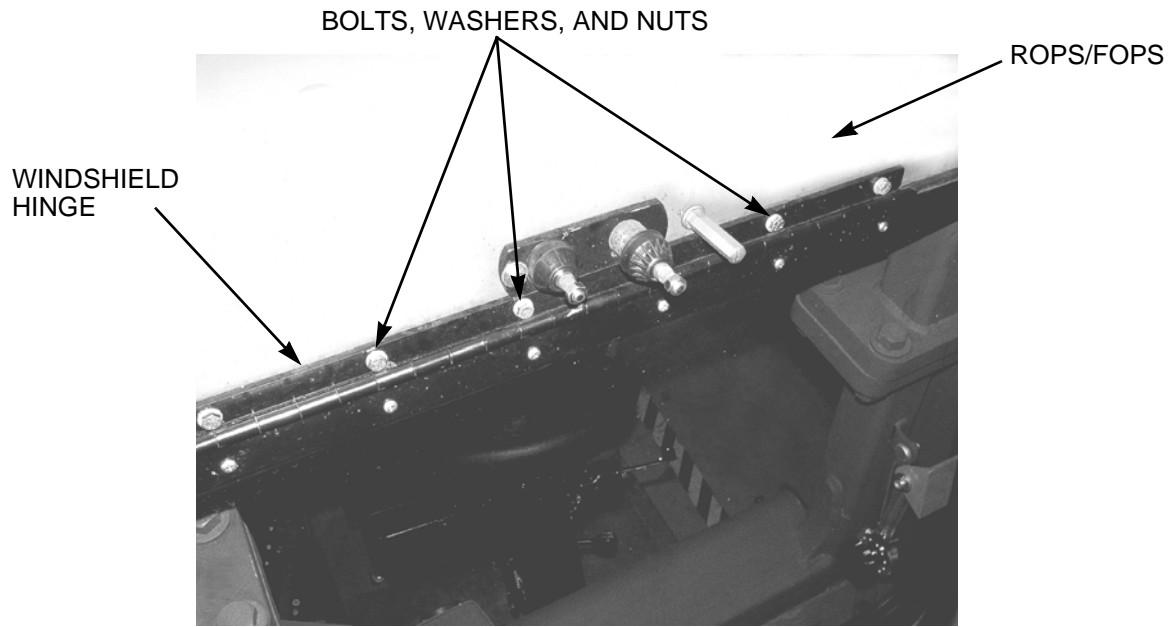


390-1052

**CONFIGURE MACHINE FOR AIRDROP - CONTINUED****WARNING**

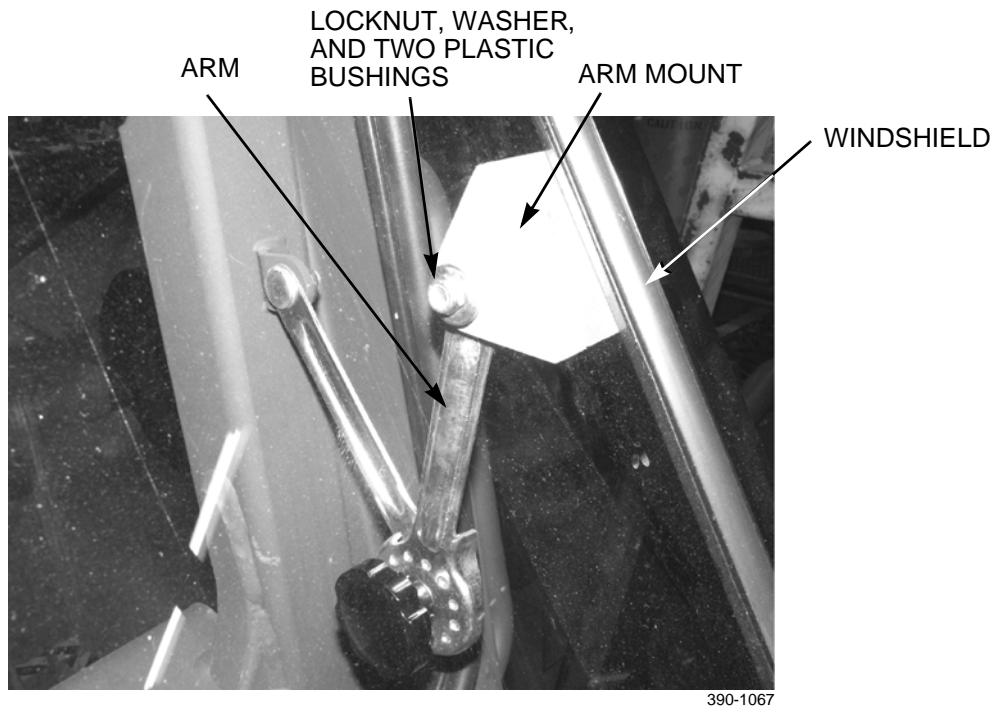
Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.

6. Remove windshield from ROPS/FOPS:
  - a. Unlatch and open window.
  - b. Remove six nuts, 12 washers, and six bolts from windshield hinge and ROPS/FOPS.



**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

- c. Remove locknut, washer, and two plastic bushings. Separate arm from arm mount on each side of windshield and remove windshield.

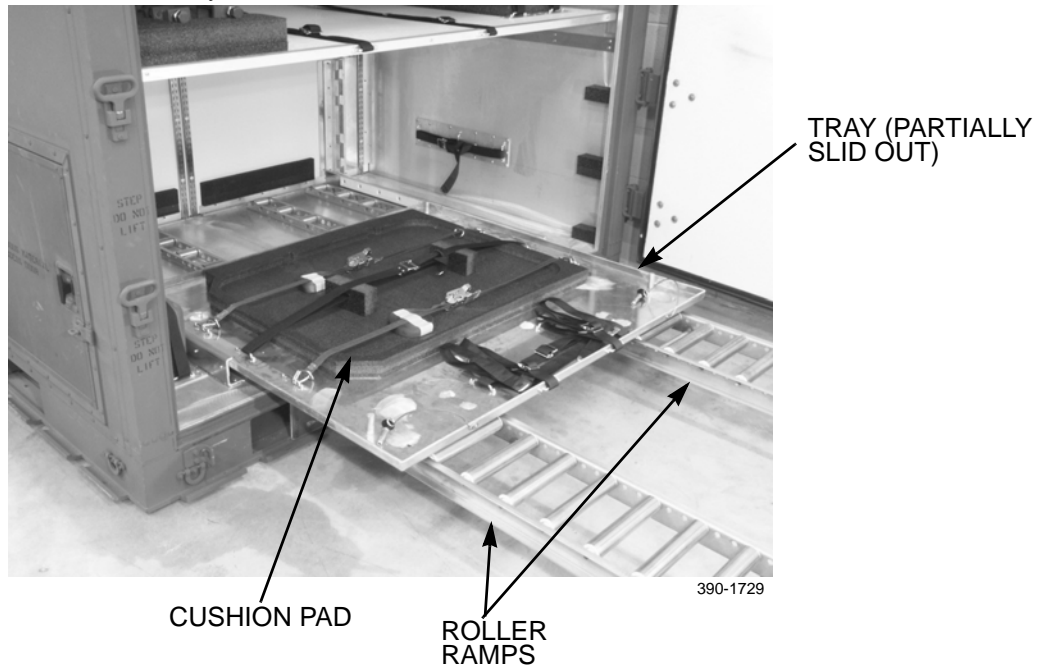


390-1067

- d. Reinstall bolts, washers, and nuts to windshield hinge. Reinstall two plastic bushings, washer, and locknut on each arm.
7. Stow windshield in ISU-60 container:
    - a. Open single-door end of container.
    - b. Remove two roller ramps from right-side wall of container.
    - c. Install each ramp at door opening, with two pins through each ramp into holes in edge of container floor.

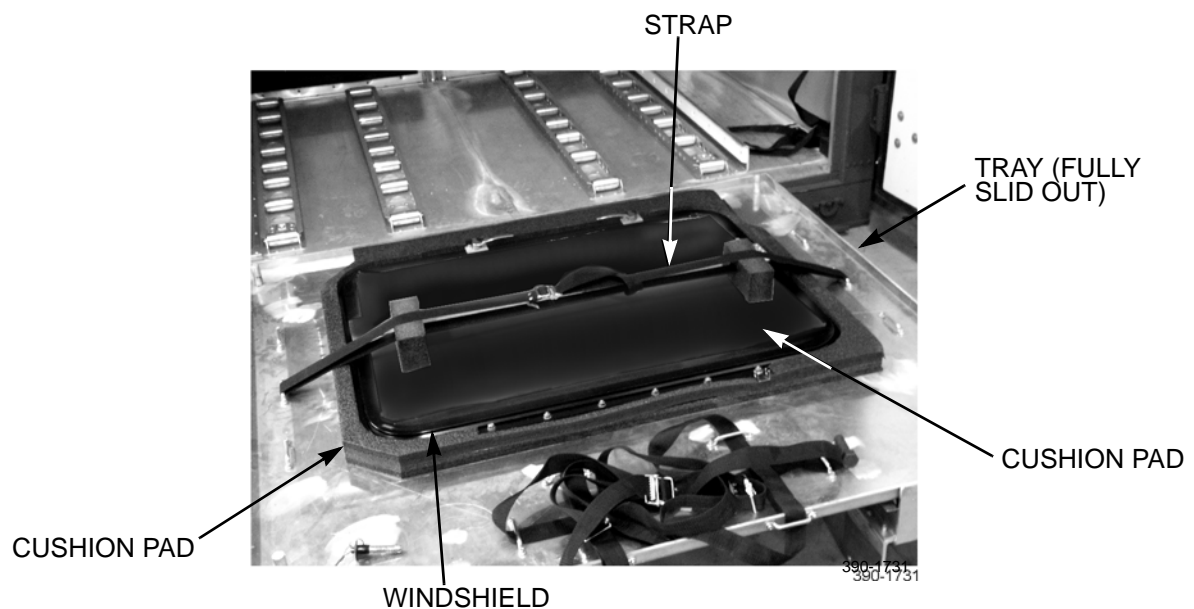
**CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

- d. Remove two pins and slide out tray.

**CAUTION**

Use caution not to damage windshield during handling.

- e. Place windshield in cushion pad on tray, with hinge facing out.  
f. Place cushion pad on top of windshield.  
g. Secure windshield with one strap.





## CONFIGURE MACHINE FOR AIRDROP - CONTINUED

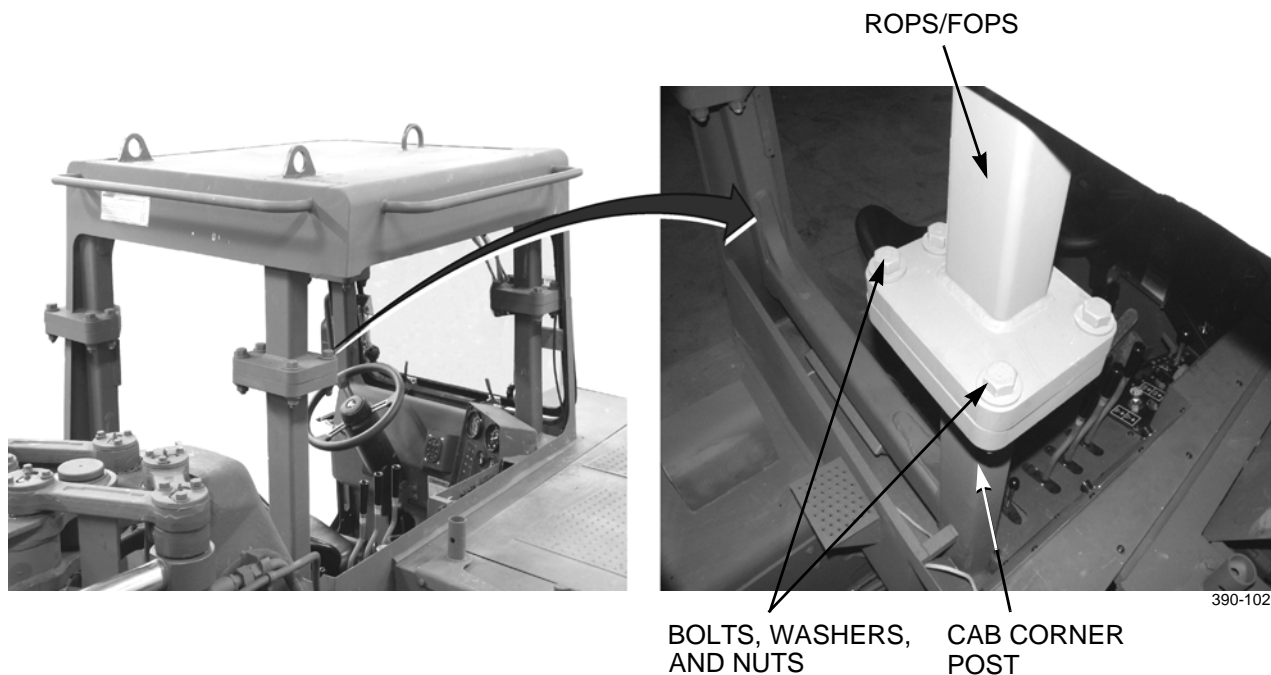
**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

ROPS/FOPS weighs 447 lb (203 kg).

8. Remove ROPS/FOPS and set aside for stowage in ISU-60 container:
  - a. Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.
  - b. Remove 16 nuts, 32 washers, and 16 bolts from four corners of ROPS/FOPS.
  - c. Lift ROPS/FOPS free of cab corner posts and lower to the ground.
  - d. Stow mounting hardware in BII toolbox on rear deck of scraper.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

9. Configure elevator for air transport:

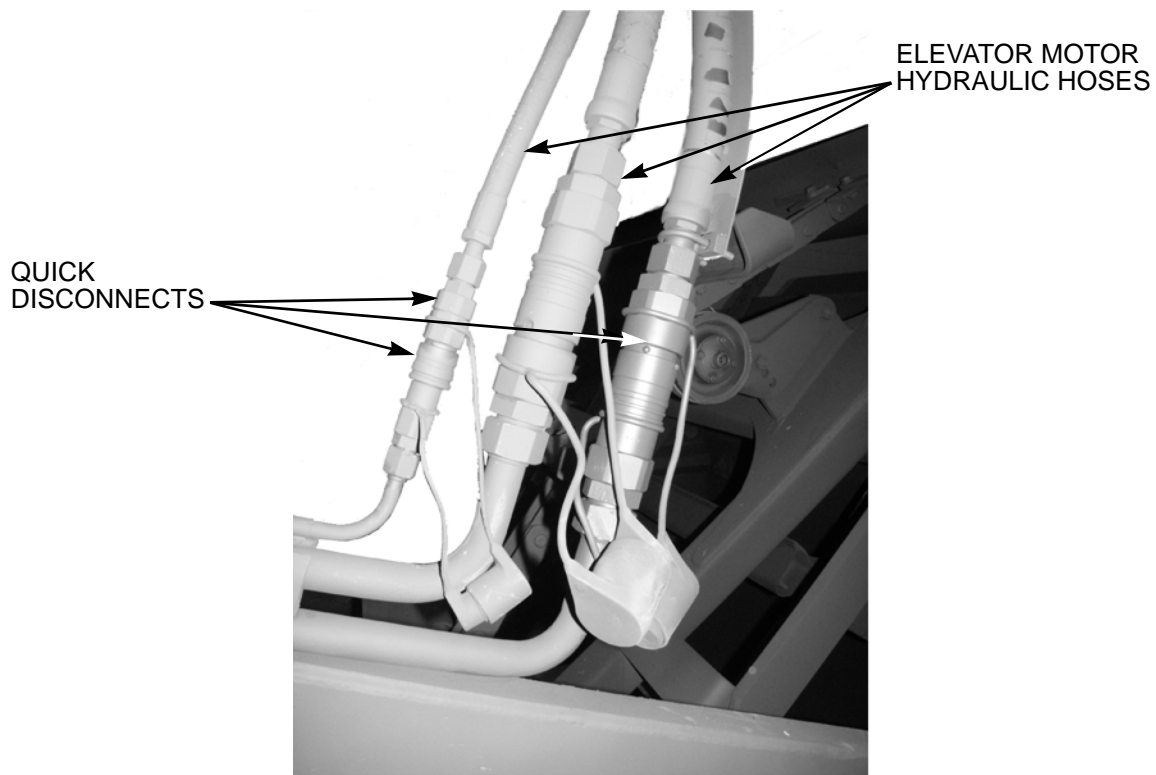
**CAUTION**

Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

**NOTE**

Whenever hydraulic hose quick disconnects need to be disconnected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate disconnection of hoses.

- a. Disconnect three elevator motor hydraulic hoses at quick disconnects on left side of scraper bowl. Install dust caps.



390-1066

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

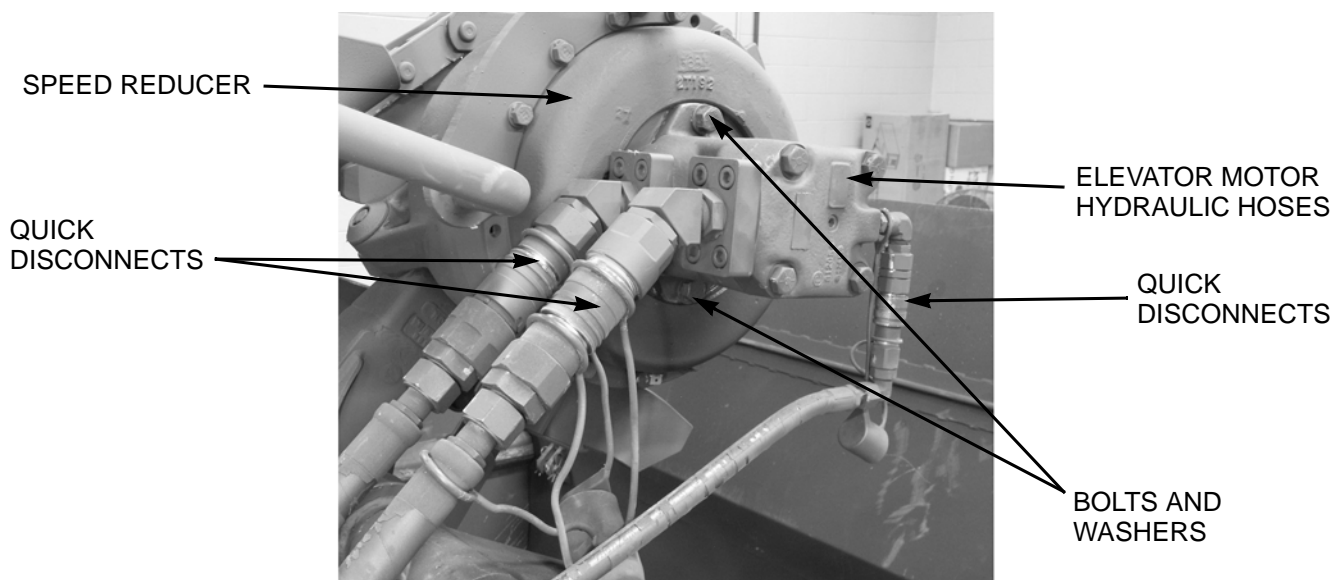
Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel.

- b. Position ladder for access to elevator motor on left side of scraper bowl.
- c. Disconnect three hydraulic hose quick disconnects at elevator motor and remove hoses. Install dust caps. Set hoses aside until they are stowed, after elevator has been configured for air transport.
- d. Remove speed reducer cover with O-ring from stowage in ISU-60 container toolbox.
  - Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
  - Some oil will spill as hydraulic motor is removed. Oil is very slippery. Ensure all spills are cleaned up. Failure to do so may cause injury to personnel.

**NOTE**

Hydraulic motor weighs approximately 85 lb (39 kg).

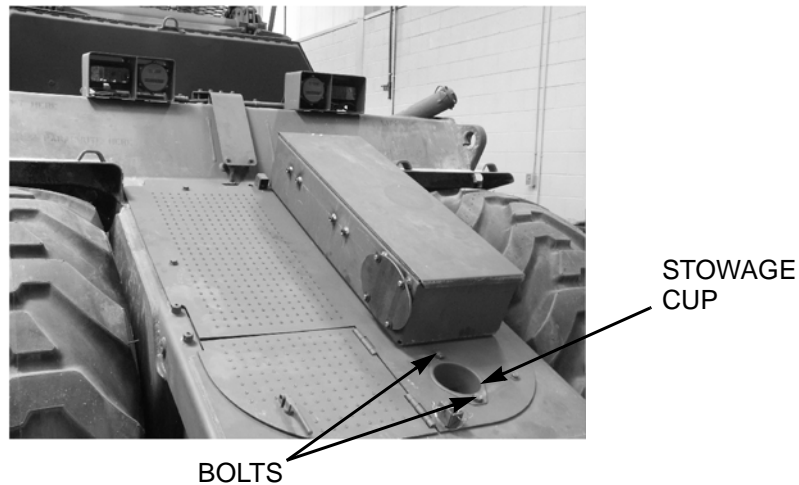
- e. Attach a suitable overhead lifting device to elevator motor. Take up slack in sling.
- f. Remove two bolts, washers, and elevator motor from speed reducer.



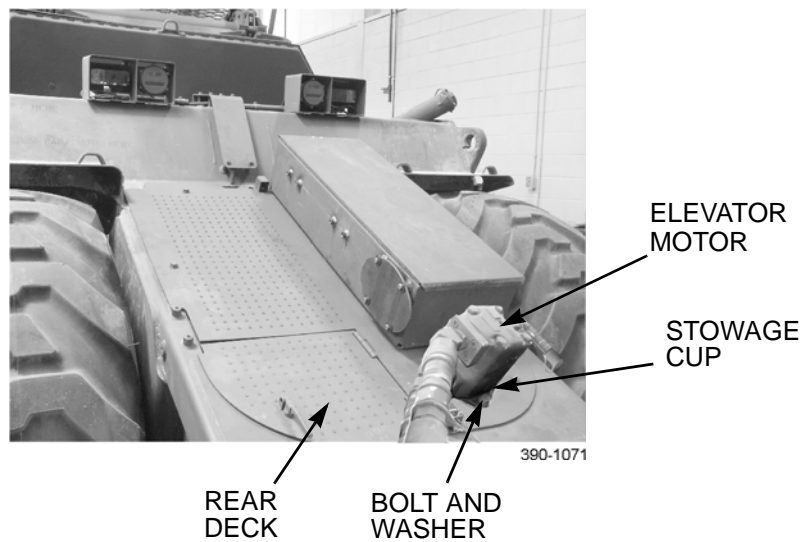
390-1252

**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- g. Remove two bolts from elevator motor stowage cup and rear desk of scraper. Install cover with O-ring on speed reducer with two bolts removed from stowage cup.



- h. Remove any dirt or accumulated debris from stowage cup. Install elevator motor on cup on rear deck with two washers and bolts that were removed in step F.

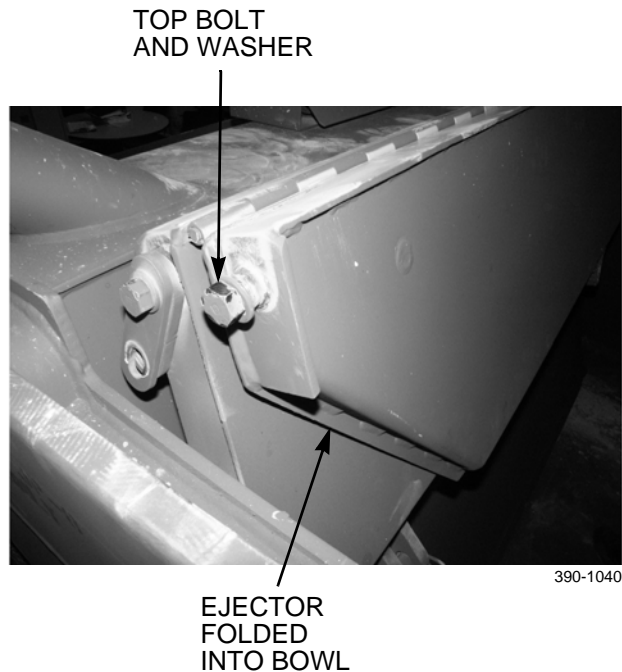
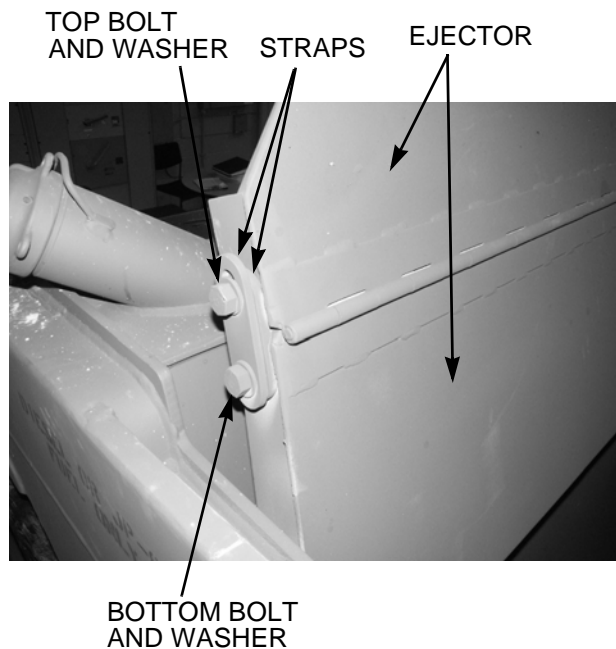


## CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

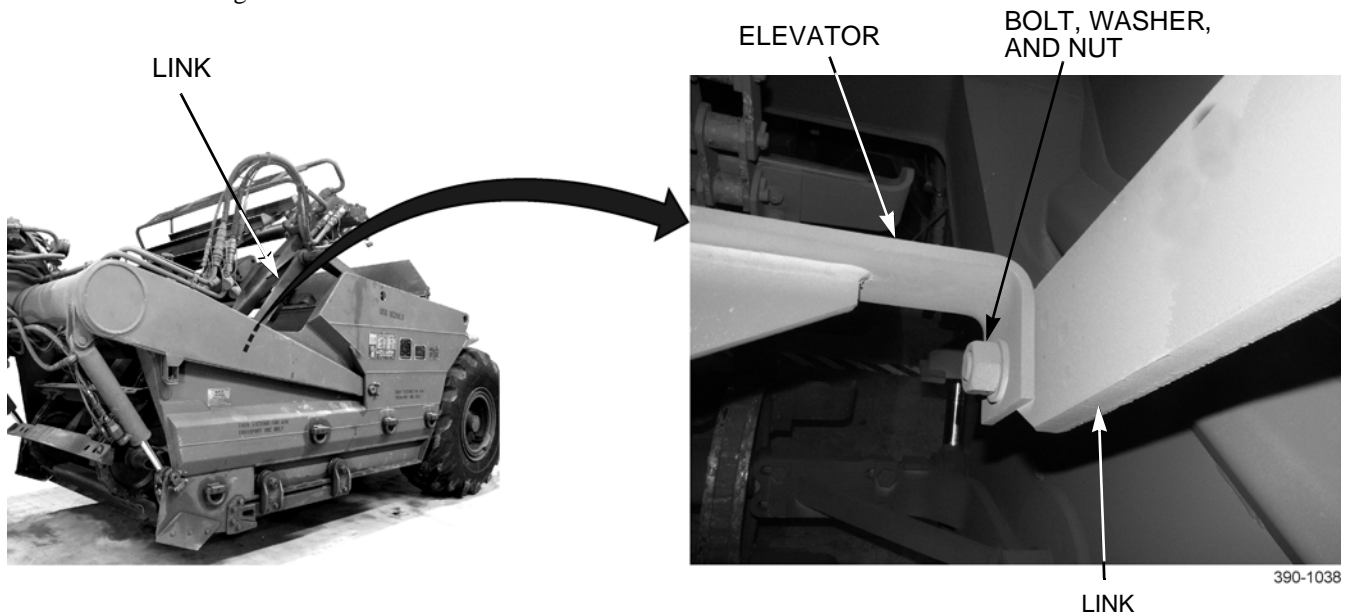
- i. Fold ejector down:
  - (1) Attach a lifting sling through lifting eye of top flap of ejector. Take up slack in sling.
  - (2) Remove top bolt and washer from two straps and ejector.
  - (3) Loosen bottom bolt and washer. Reinstall top bolt and washer in top flap of ejector.
  - (4) With assistance, fold ejector down into bowl.



**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Do NOT enter or stand in bowl or on elevator flights. Flights may move if stepped on. Failure to follow this warning may result in injury to personnel.

- j. Move ejector forward and pin elevator links to rear wall of ejector:
- (1) Remove nut, bolt, and washer and remove link from attachment to each side of elevator. Reinstall mounting hardware on elevator.



- (2) From rearmost ejector position, measure 31 3/4 in. (80.6 cm) forward and mark location on wall of bowl.
- (3) Remove ladder out of the way, clear of scraper bowl.

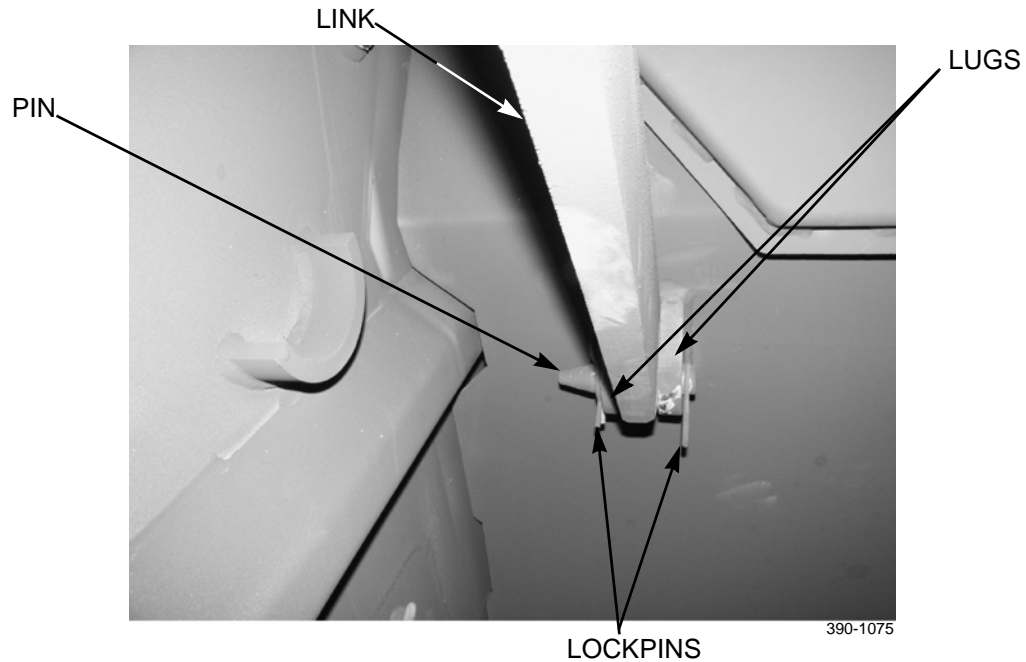
**WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- (4) Start engine and operate ejector forward until ejector is even with mark and links can be pinned through lugs on ejector rear wall.

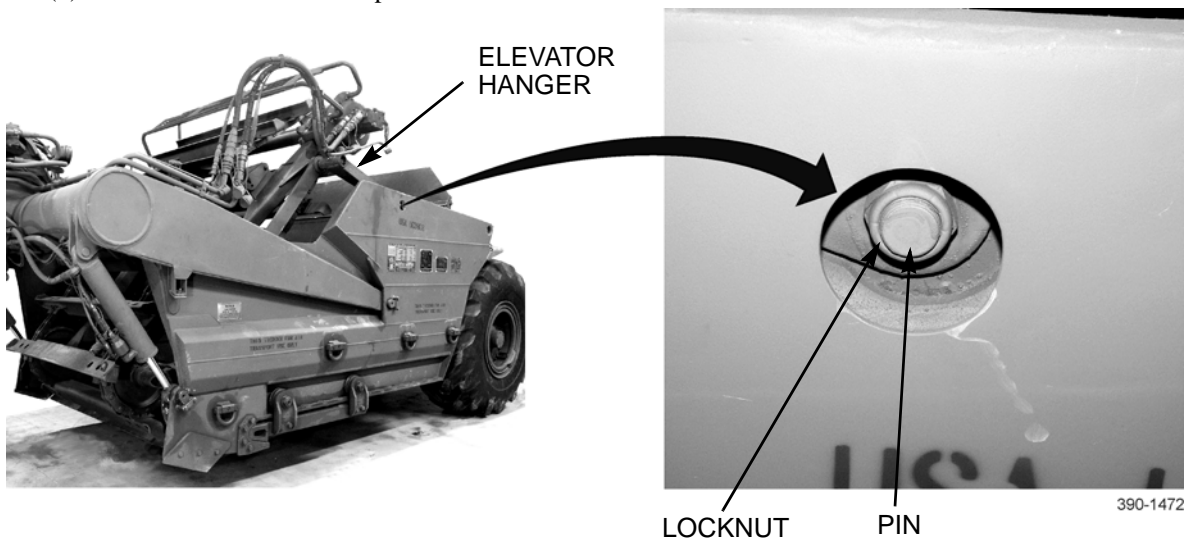
**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- (5) Pin each link to lugs on ejector. Secure with two lockpins.



- k. Remove elevator hangers:

- (1) Remove locknut from pin on each side of bowl.

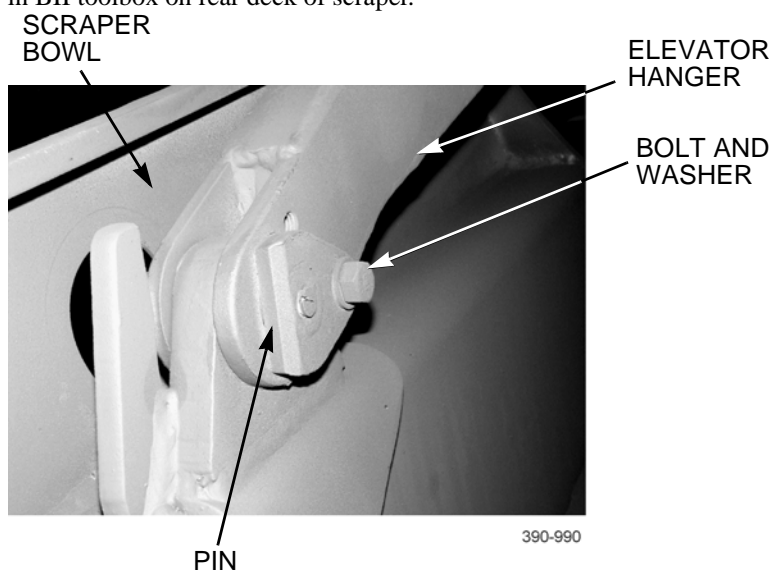


**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED**

- (2) Remove bolt and washer from pin.

**NOTE**

- To relieve tension on hangers, ejector can be moved slightly forward.
  - Another means to relieve tension on hangers is to attach a come-along (load binder) between one scraper bowl lifting eye and elevator drive cross shaft.
  - To assist in removing pins, work on both sides of scraper bowl at the same time.
- (3) Remove pin from each side of bowl, by driving pin out.
- (4) Lift each hanger free of bowl and remove from elevator shaft. Reinstall mounting hardware on hangers.
- (5) Stow hangers in BII toolbox on rear deck of scraper.

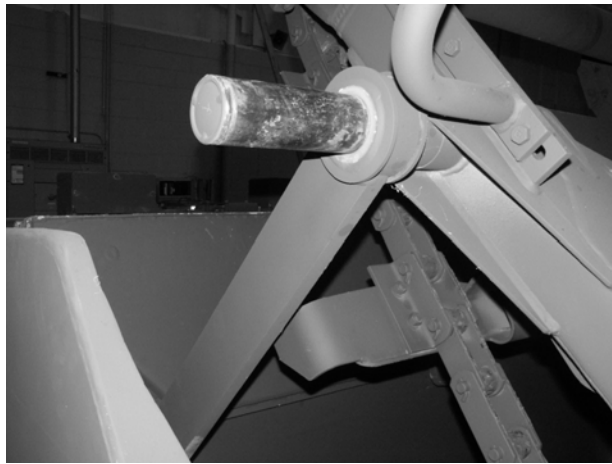




**CONFIGURE MACHINE FOR AIR TRANSPORT - CONTINUED****WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

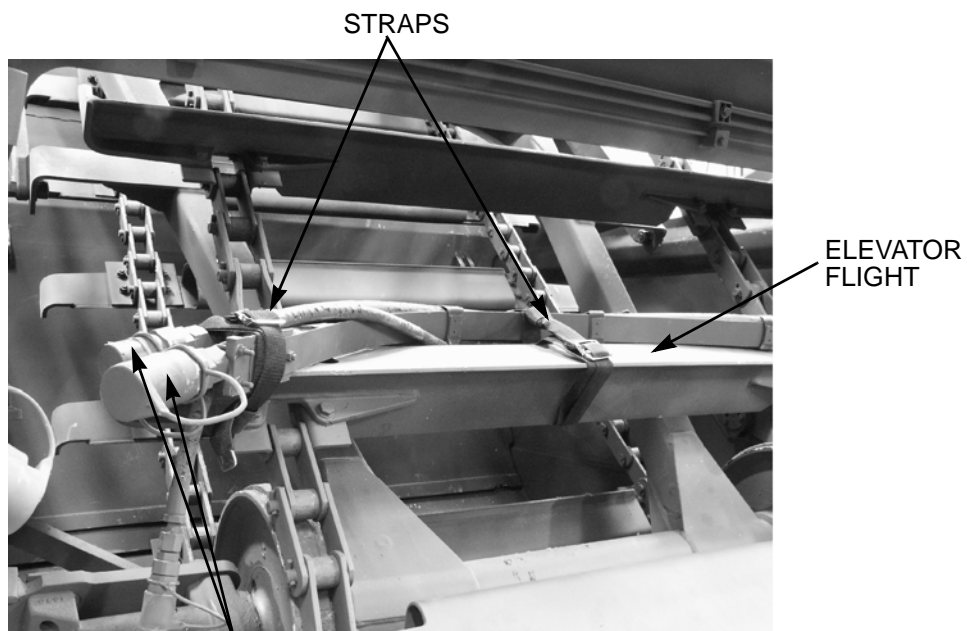
1. Operate ejector rearward until elevator shafts rest on hangers.

**ELEVATOR RAISED**

390-1076

**ELEVATOR LOWERED**

- m. Place three elevator motor hydraulic hoses on an elevator flight and secure with three straps.

**STRAPS****ELEVATOR FLIGHT****ELEVATOR MOTOR  
HYDRAULIC HOSES**

390-1735

**CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

10. Shut down engine.

**WARNING**

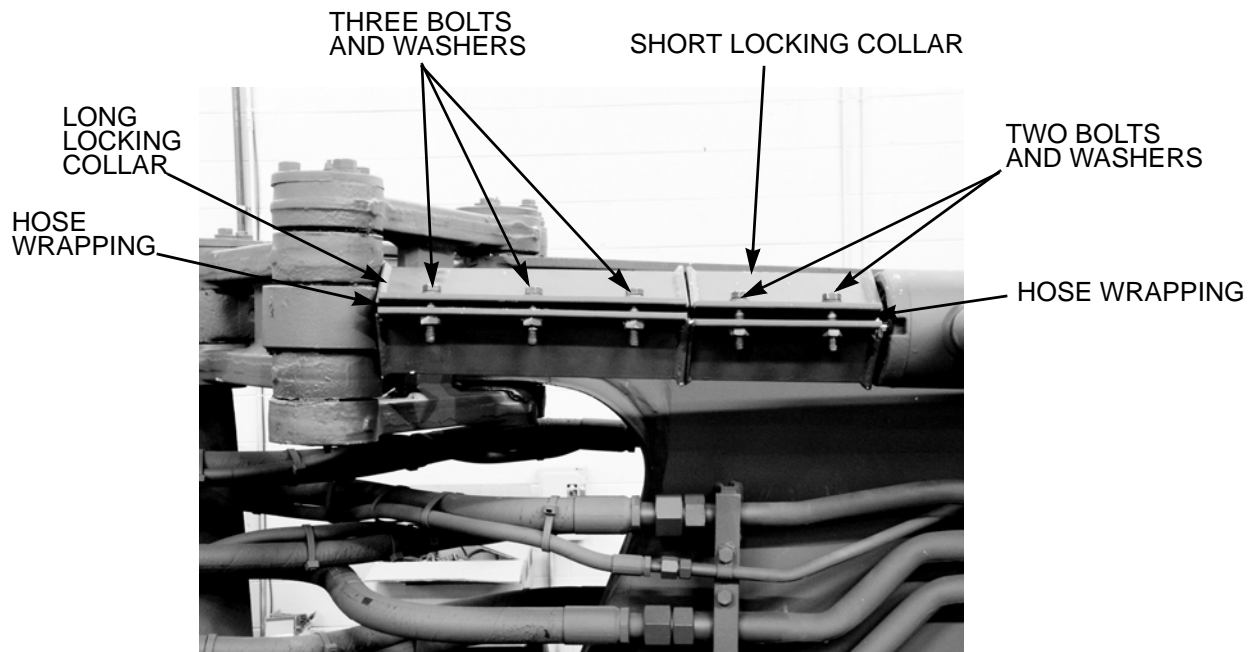
Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

11. Install all steering cylinder locking collars:
- Disassemble each of four locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.): remove two bolts and washers and open each short locking collar and remove hose wrapping. Remove three bolts and washers and open each long locking collar and remove hose wrapping.

**CAUTION**

To prevent damage to cylinder rod, ensure rod surface is free of dirt or other debris before locking collars are installed.

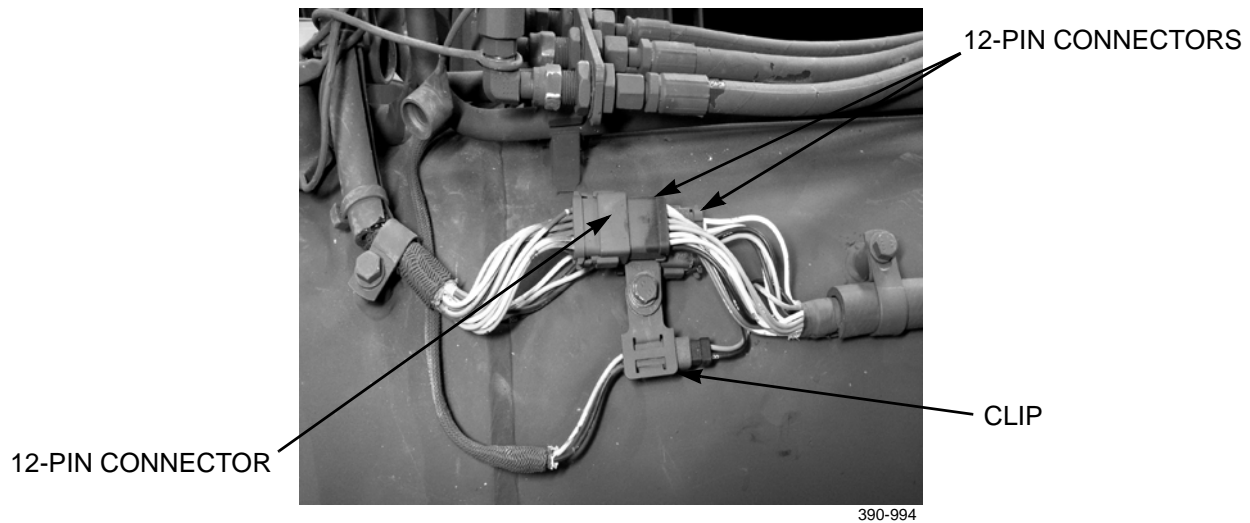
- Position hose wrappings and one short and one long locking collar around rod end of each steering cylinder.
- Install three washers and bolts to each long locking collar. Install two washers and bolts to each short locking collar. Tighten bolts evenly and securely.



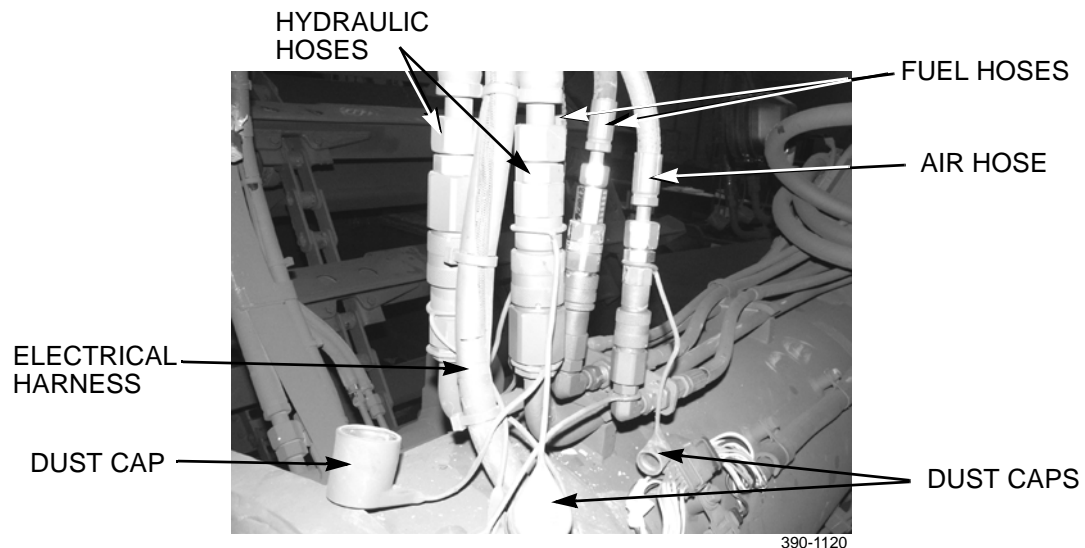
390-1033

**CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

12. On right side of draft frame, perform the following steps:
- Remove bolt, washer, clamp, and release electrical harness.
  - Remove bolt, washer, and clip.
  - Disconnect 12-pin electrical connectors from each other.



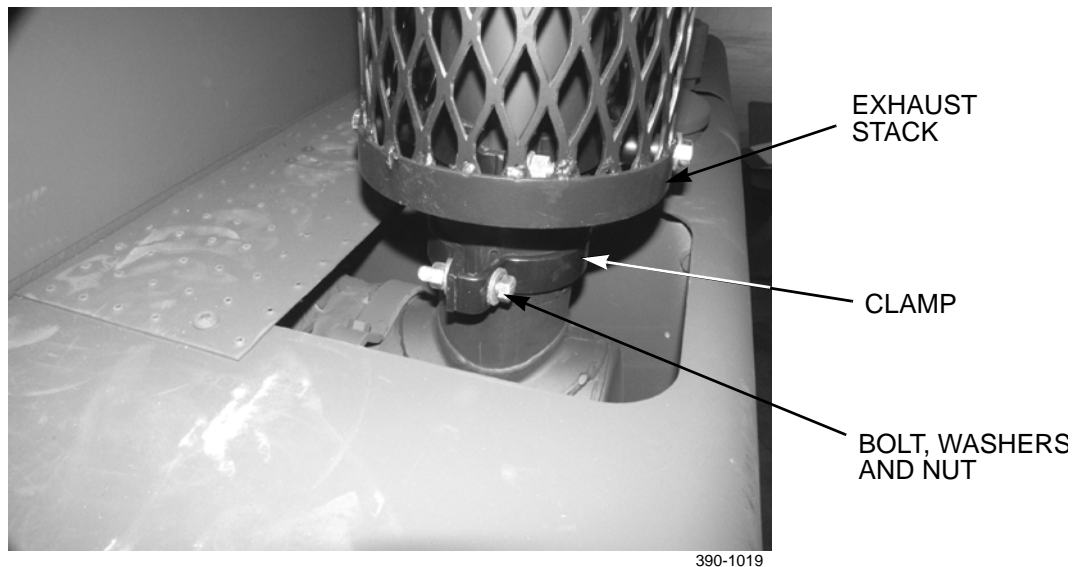
- Disconnect air hose at quick disconnect fitting.
- Disconnect two fuel hoses at quick disconnect fittings.
- Disconnect two hydraulic hoses at quick disconnect fittings.
- Place disconnected electrical harness, air hose, fuel hoses, and hydraulic hoses down inside bowl. Ensure all dust caps are installed.



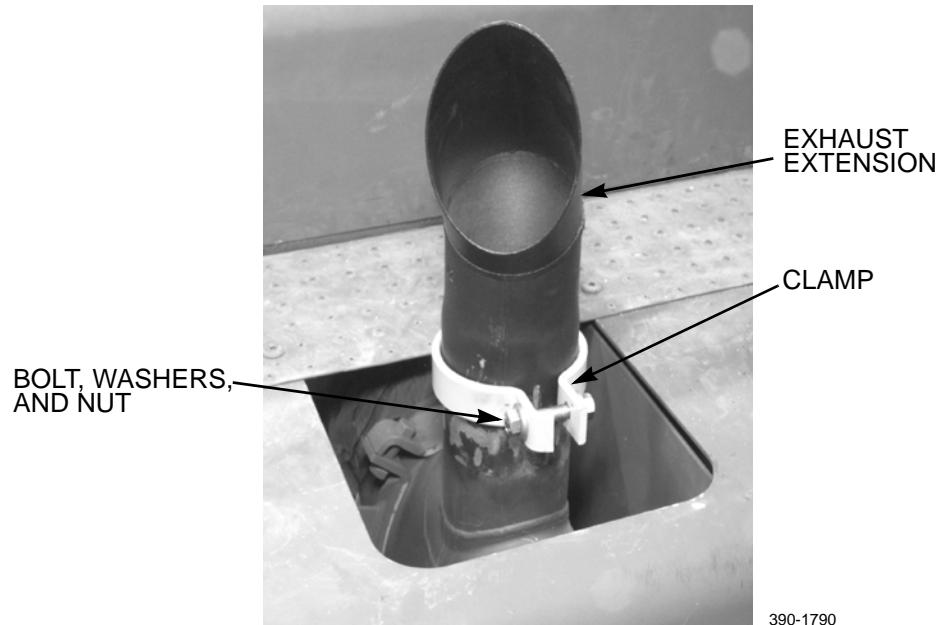
**CONFIGURE MACHINE FOR AIRDROP - CONTINUED****WARNING**

Do NOT remove exhaust stack until it has cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

13. Remove exhaust stack from muffler on right side of tractor and install exhaust extension in its place:
  - a. Loosen nut, bolt, two washers, and clamp, and remove exhaust stack from right side of tractor. Retain mounting hardware on exhaust stack and set exhaust stack aside for stowage in ISU-60 container.

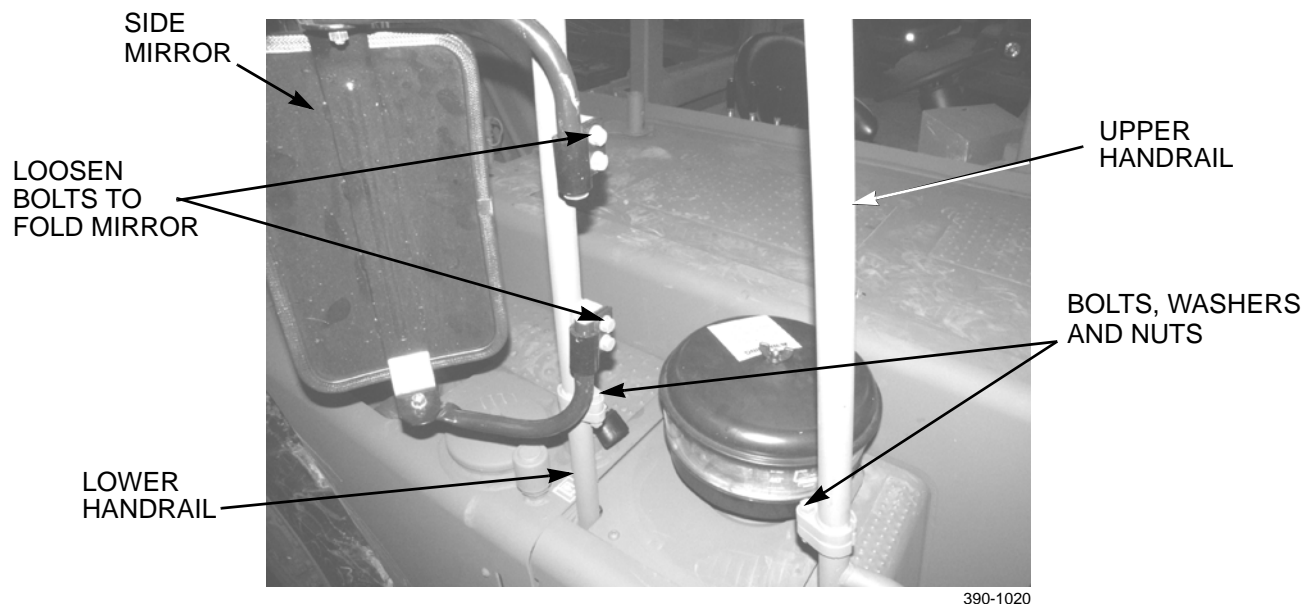


- b. Install exhaust extension on muffler with clamp, bolt, two washers, and nut. Position extension so that exhaust fumes will be directed away from cab. Tighten nut securely.

**CONFIGURE MACHINE FOR AIRDROP - CONTINUED****WARNING**

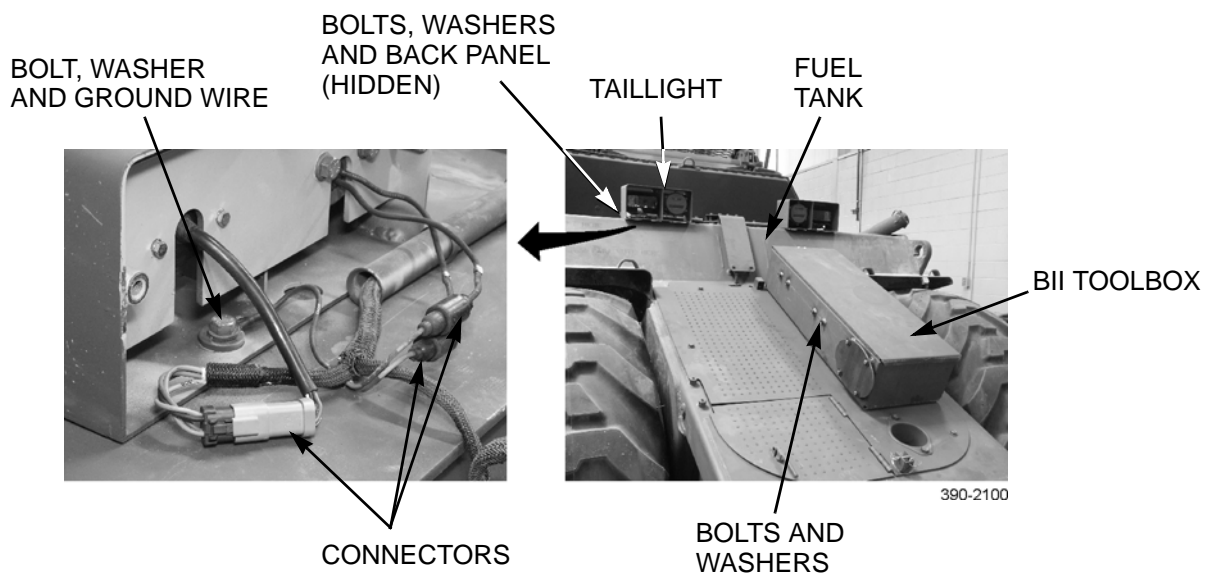
Removal of upper handrail on right side of tractor leaves right side of tractor without any means to safely climb on machine. Use caution when climbing on right side if upper handrail has been removed. Failure to do so may result in injury to personnel.

14. Remove two nuts, washers, bolts, and upper handrail with side mirror from lower handrail on right side of tractor. Reinstall mounting hardware on lower handrail.
15. Loosen bolts and fold side mirror flat against upper handrail. Set handrail with side mirror aside for stowage in ISU-60 container.



**CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

16. Remove taillights and stow on side of BII toolbox:
- Remove three bolts, washers and back panel from taillight.
  - Disconnect three connectors.
  - Remove bolt, washer and disconnect ground wire.
  - Remove two bolts, washers and taillight from top of fuel tank. Reinstall washers and bolts.
  - Install taillight on side of BII toolbox using two bolts and washers on side of BII toolbox.
  - Install back panel, three washers and bolts on taillight.
  - Repeat for other taillight.

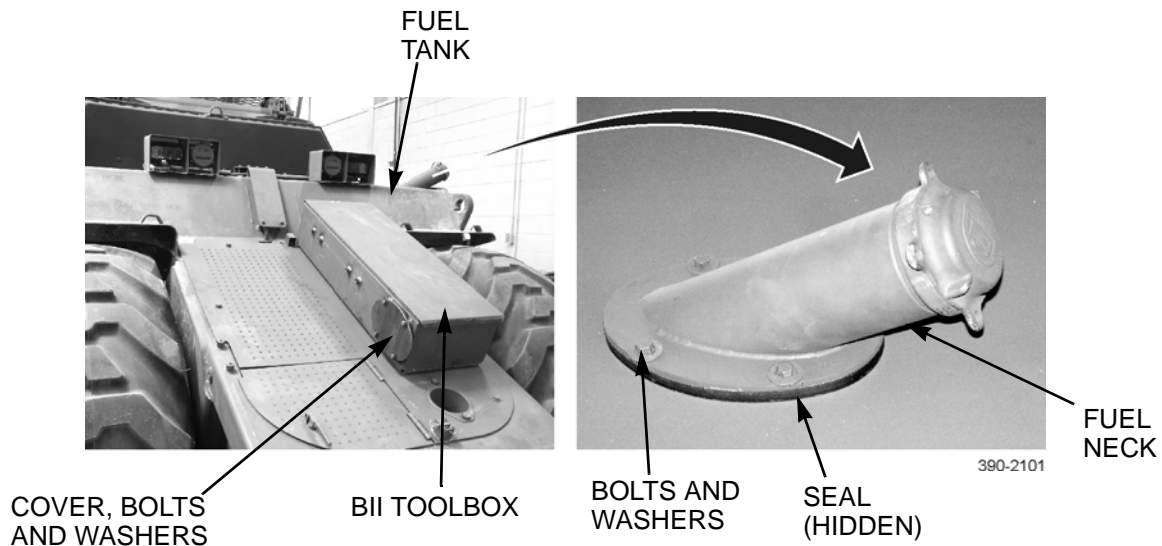


17. Remove fuel neck and stow on side of BII toolbox:

**WARNING**

DO NOT perform fuel system maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing injury or death to personnel or damage to machine.

- Remove four bolts, washers and fuel neck from top of fuel tank.
- Inspect seal and replace if damaged.
- Remove four bolts, washers and cover from side of BII toolbox.
- Install cover, four washers and bolts on top of fuel tank.
- Install fuel neck, four washers and bolts on side of BII toolbox.

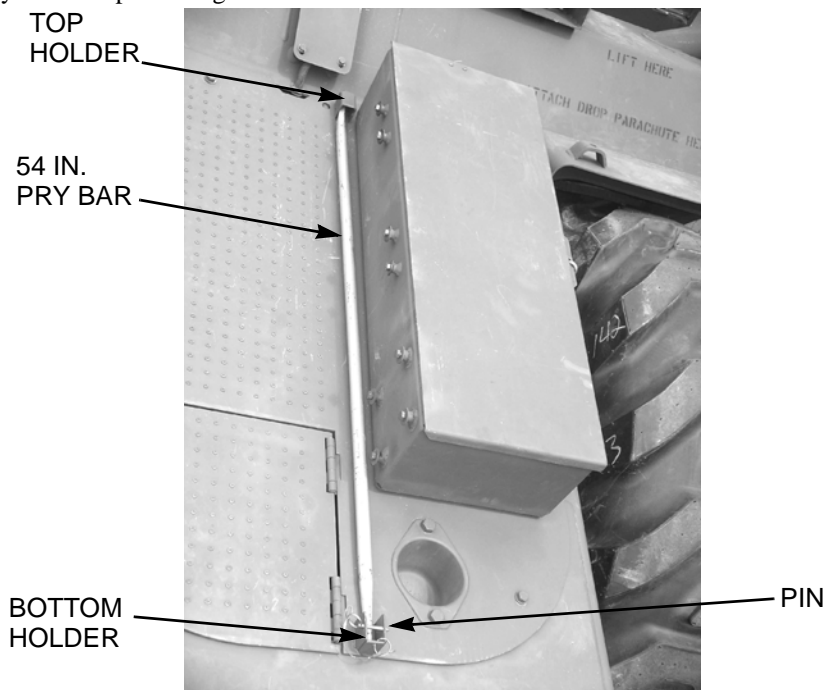
**CONFIGURE MACHINE FOR AIRDROP - CONTINUED****NOTE**

- Tires are deflated to decrease height of machine. If a tire pressure gage is not available, a measurement can be taken, from ground to Bottom Dead Center (BDC) of rim, to determine if tire has been adequately deflated.
- Distance between ground and BDC of rim on each front tire should be 11.5 in. (29.2 cm). Distance between ground and BDC of rim on each rear tire should be 14.25 in. (36.2 cm).

18. Reduce tire inflation pressure to 17 psi (117 kPa) on front tires and 24 psi (165 kPa) on rear tires, using repair tool (Item 5U, Table 1, WP 0024 00).

**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

19. Stow 54 in. pry bar on rear deck of scraper as follows.
  - a. Place pry bar in top holder, then place in bottom holder.
  - b. Secure pry bar with pin through bottom holder.



20. Cover all lights with adhesive tape (Item 23, WP 0026 00).

**CAUTION**

Exhaust pipe must be taped closed to prevent wind from entering exhaust system and causing turbocharger to spin without the benefit of lubrication. Failure to cover exhaust pipe may damage turbocharger.

21. Use duct tape (Item 22, WP 0026 00) to cover exhaust extension.
22. Install instrument panel covers (WP 0005 00).
23. Stow the following tools, required for machine assembly after airdrop, in BII toolbox on rear deck of scraper:
  - a. bar, breaker, 1/2 in. drive;
  - b. extension, socket, 1/2 in. drive, 5 in. long;
  - c. socket, 1/2 in. drive, 9/16 in.;
  - d. socket, 1/2 in. drive, 15/16 in.;
  - e. tool, tire repair;
  - f. wrench, combination, 7/16 in. (2);
  - g. wrench, combination, 1/2 in.; and
  - h. wrench, combination, 9/16 in.
24. Ensure all compartment doors and BII toolbox on rear deck of scraper are closed, latched, and secured with padlocks.
25. Position machine on airdrop platform that has been suitably prepared.



**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****CONFIGURE MACHINE FOR AIRDROP - CONTINUED**

26. Block and shore machine securely and tie down on platform in accordance with shipping data plate on machine, FM 10-576 (*Airdrop of Supplies and Equipment*), and Air Force regulations.
27. Check security of machine on airdrop platform. Ensure all blocking and shoring is properly installed and secured to platform with nails. Ensure all electrical, hydraulic, fuel or air lines are secured with straps.
28. Rig machine for airdrop by parachute, in accordance with shipping data plate on machine. Suspension provisions are stenciled "ATTACH DROP PARACHUTE HERE".
29. Load platform into C-130 aircraft.

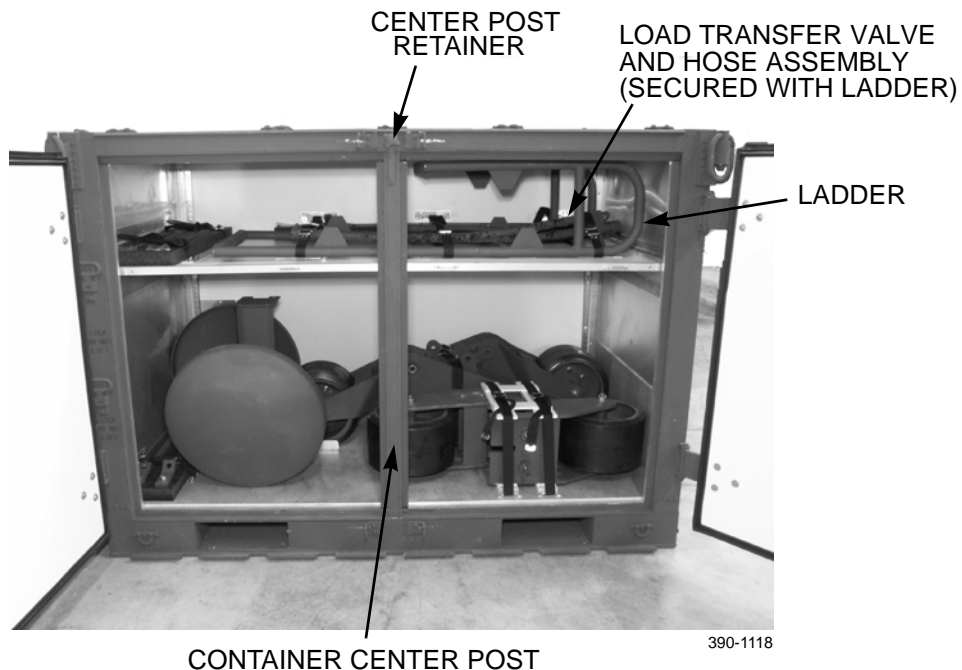
**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

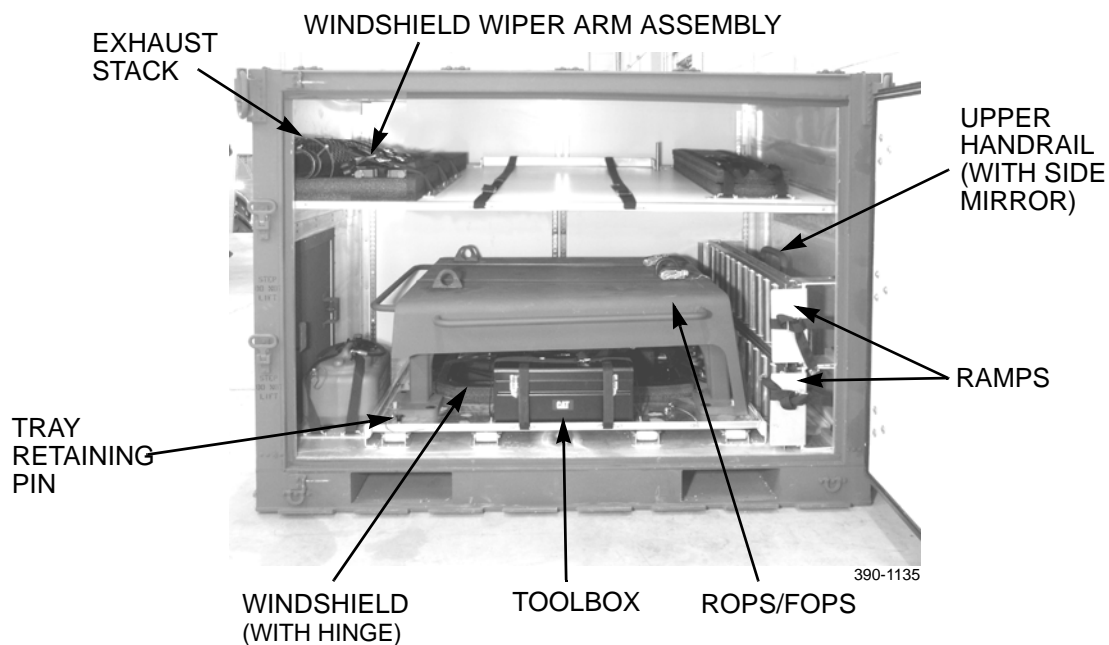
30. Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 1 and 2.
  - a. ladder;




**CONFIGURE MACHINE FOR AIRDROP - CONTINUED****Table 1. Stowage Instructions for ISU-60 Container - Two-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Ladder	<ol style="list-style-type: none"> <li>1. Place on shelf, with top of ladder facing right.</li> <li>2. Ensure load transfer valve and hose assembly is positioned on top of ladder.</li> <li>3. Secure with three straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>1. Position center post, installing bottom end first.</li> <li>2. Raise shelf slightly to lock center post into position.</li> <li>3. Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

- b. exhaust stack;
- c. windshield wiper arm assembly;
- d. upper handrail (with side mirror);
- e. ROPS/FOPS; and
- f. toolbox (minus tools placed in BII toolbox on scraper).



**CONFIGURE MACHINE FOR AIRDROP - CONTINUED****Table 2. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Exhaust Stack and Windshield Wiper Arm Assembly	<ol style="list-style-type: none"> <li>1. Place exhaust stack in left cutout of cushion pad, on left side of shelf. Lower end of stack should be facing out.</li> <li>2. Place windshield wiper arm assembly next to exhaust stack.</li> <li>3. Secure components with three straps.</li> </ol>
Upper Handrail (with Side Mirror)	<ol style="list-style-type: none"> <li>1. Place against right-side wall of container.</li> <li>2. Secure with one strap.</li> </ol>
ROPS/FOPS	<div style="text-align: center;">  <p><b>WARNING</b></p> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do NOT allow to swing free. Failure to do so may result in injury or death to personnel.</p> <p><b>CAUTION</b></p> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> <ol style="list-style-type: none"> <li>1. Using a suitable three-point lifting device, lift ROPS/FOPS into position over tray, with front of ROPS/FOPS to the right.</li> <li>2. Lower ROPS/FOPS onto four studs, one at each corner of tray.</li> <li>3. Secure ROPS/FOPS with two straps.</li> </ol> </div>
Toolbox	<ol style="list-style-type: none"> <li>1. Place toolbox on front edge of tray.</li> <li>2. Secure with three straps.</li> <li>3. Slide tray all the way in.</li> <li>4. Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>1. Position each ramp against right wall of container.</li> <li>2. Secure each ramp with strap.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

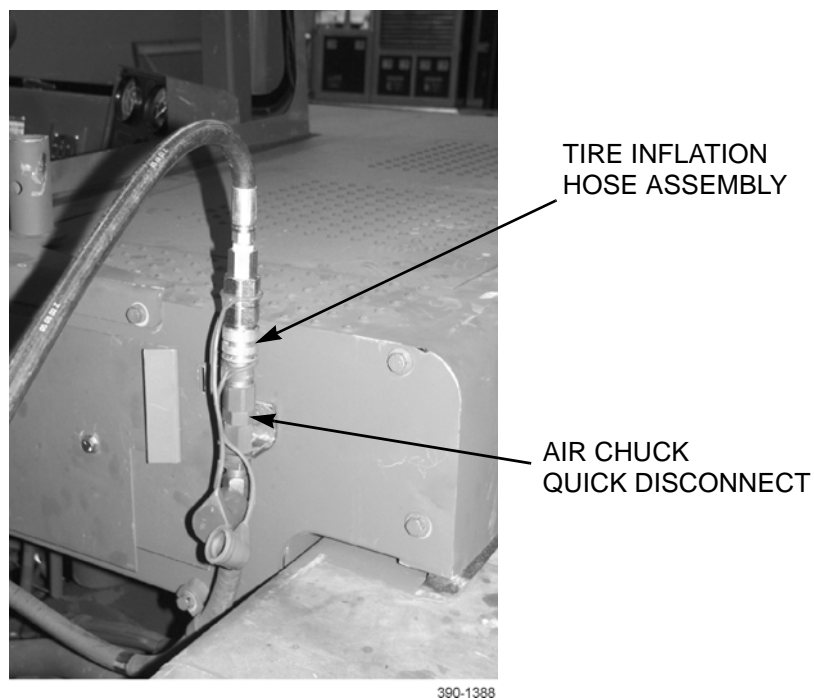
**CONFIGURE MACHINE FOR AIRDROP - CONTINUED****CAUTION**

Do NOT deliver container by airdrop. Failure to follow this caution will damage container and its contents.

31. Transport ISU-60 container inside aircraft (NOT on air delivery platform) OR arrange for transport by some other means. Container is not air-droppable.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION****NOTE**

- Whenever hydraulic hose quick disconnects need to be disconnected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate disconnection of hoses.
  - Tools required for machine assembly are located in BII toolbox on rear deck of scraper.
1. Remove parachute rigging and tie downs from machine. Remove all blocking and shoring material.
  2. Remove machine from airdrop platform. Block tractor and scraper wheels.
  3. Remove tape from all lights. Remove tape from exhaust extension.
  4. Remove 54 in. pry bar from stowage on rear deck of scraper.
  5. Start tractor engine and inflate all tires to 45 psi (310 kPa), using pneumatic tire inflation hose assembly (Item 10, Table 2, WP 0024 00) connected to air chuck quick disconnect on right side of tractor, at rear of hood.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

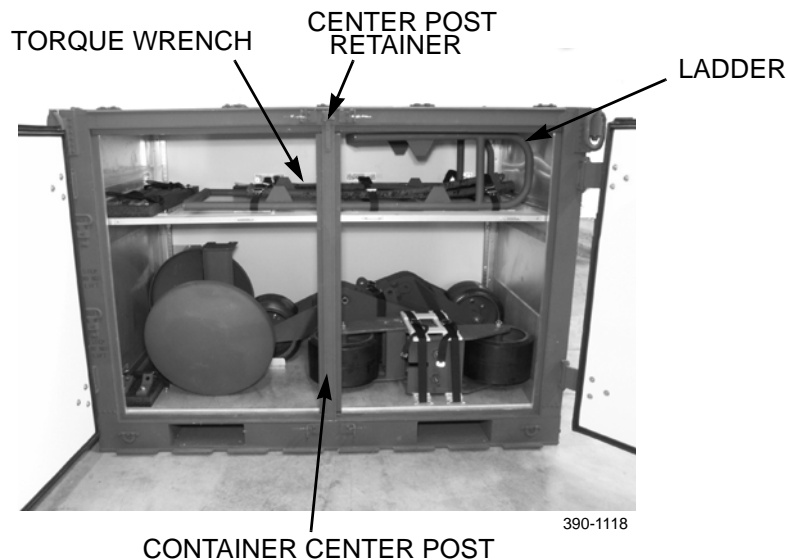
If ISU-60 container has not been delivered to site of machine assembly, performance of certain steps will need to be delayed until container arrives. Proceed with assembly of machine, returning to these steps as soon as container is available.

6. Place ISU-60 container near work area and remove the following items from container, in accordance with illustrations and information in Table 3:

**NOTE**

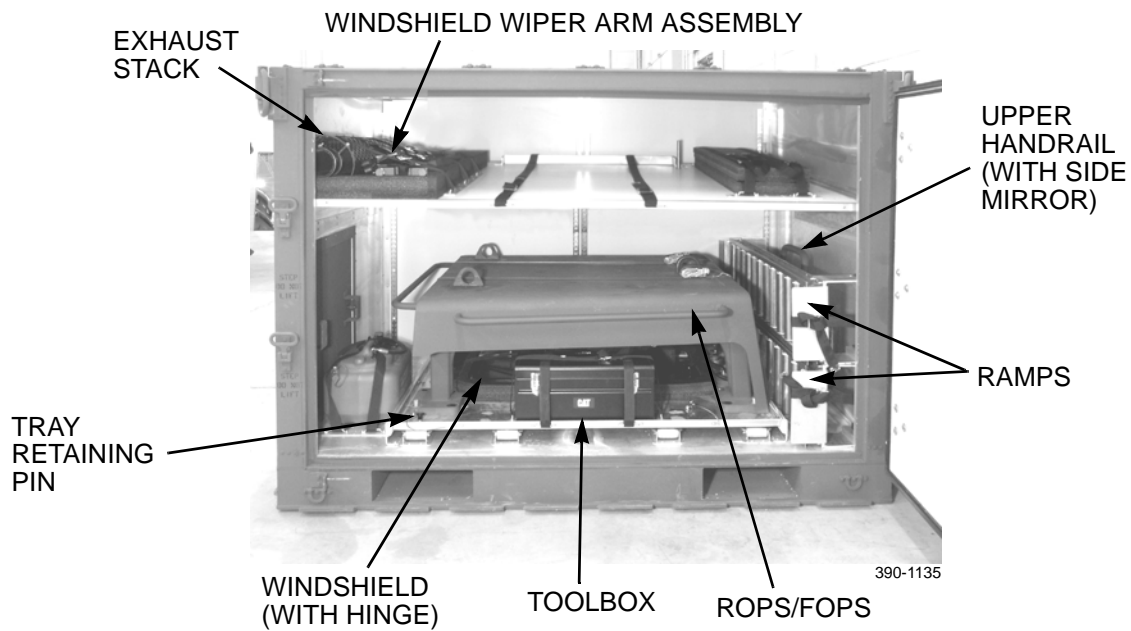
Container center post must be removed to remove ladder. Remove retainer and post.

- a. ladder;
- b. torque wrench;



**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- c. toolbox (minus tools placed in BII toolbox on scraper);
- d. ROPS/FOPS;
- e. windshield (with hinge);
- f. exhaust stack;
- g. windshield wiper arm assembly; and
- h. upper handrail (with side mirror).

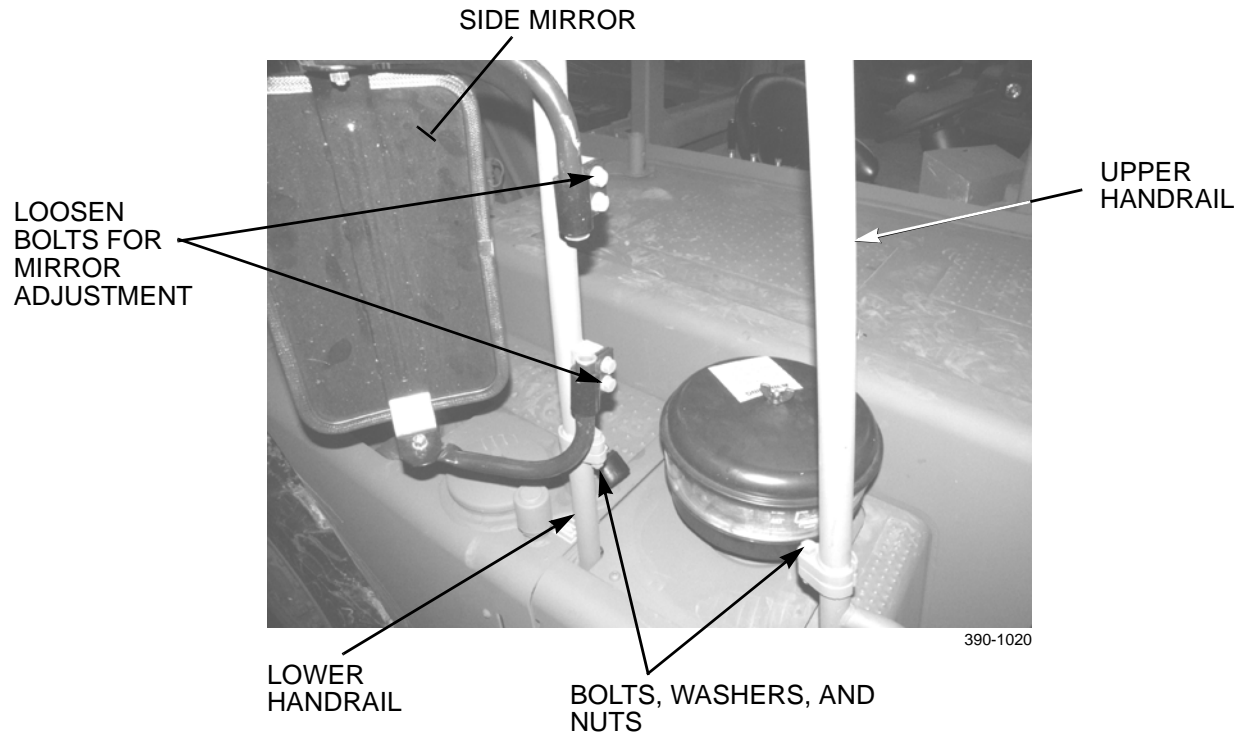


**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****Table 3. Unpacking ISU-60 Container - Single-Door End.**

COMPONENT	UNPACKING INSTRUCTIONS
Ramps	<ol style="list-style-type: none"> <li>1. Remove two roller ramps from right-side wall of container.</li> <li>2. Install each ramp at door opening, with two pins through each ramp into holes in edge of floor.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Remove two pins and slide out tray.</li> <li>2. Release three straps and remove toolbox from tray.</li> </ol>
ROPS/FOPS	<ol style="list-style-type: none"> <li>1. Release two straps from ROPS/FOPS.  <div> </div> <p><b>WARNING</b></p> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do NOT allow to swing free. Failure to do so may result in injury or death to personnel.</p> <p><b>CAUTION</b></p> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> </li> <li>2. Use a suitable three-point lifting device to lift ROPS/FOPS clear of tray.</li> </ol>
Windshield (with Hinge)	<p><b>CAUTION</b></p> <p>Use caution not to damage windshield during handling. Do not remove from container until ready to install.</p> <ol style="list-style-type: none"> <li>1. Release one strap from windshield</li> <li>2. Carefully remove windshield (with hinge) from cushion pad.</li> </ol>
	<p><b>NOTE</b></p> <p>To remove all remaining components, remove straps as required and lift out component.</p>

**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

7. Install upper handrail with side mirror on lower handrail of tractor with two bolts, washers, and nuts. Tighten nuts securely.
8. Loosen bolts and unfold side mirror. Adjust to provide visibility to side and rear of machine. Tighten bolts.

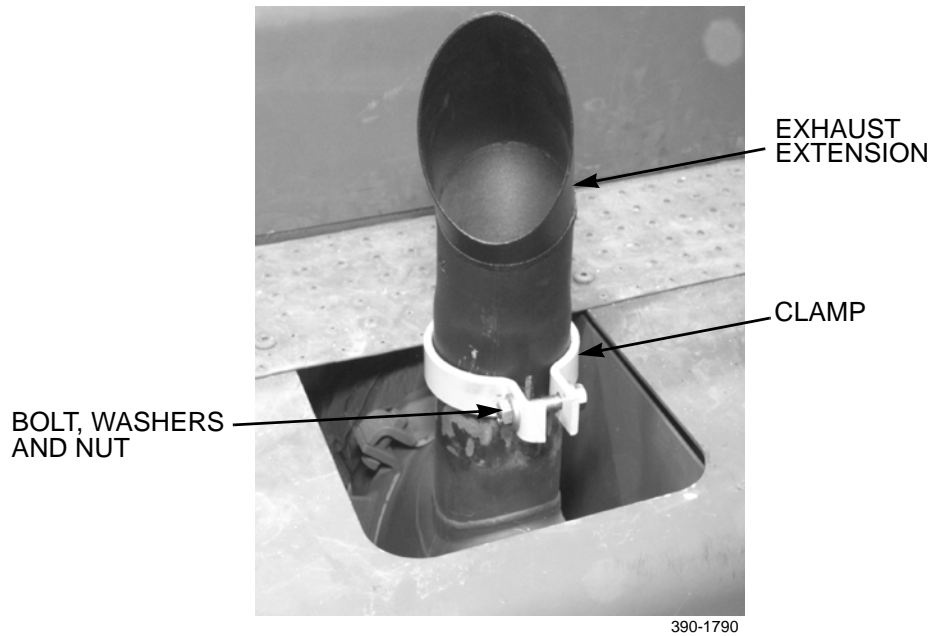
**WARNING**

Do NOT install exhaust stack until engine exhaust components have cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

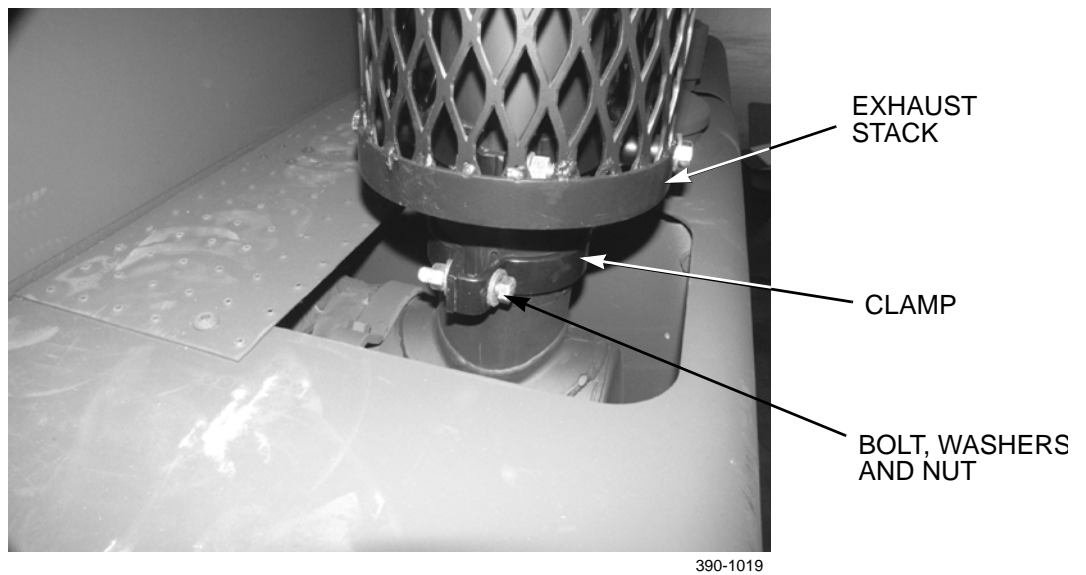
9. Remove exhaust extension from muffler on right side of tractor and install exhaust stack in its place:
  - a. Loosen nut, bolt, two washers, and clamp, and remove exhaust extension from muffler. Retain mounting hardware on extension and set extension aside for stowage in ISU-60 container.



RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED



- b. Install exhaust stack with clamp, bolt, two washers, and nut. Tighten nut securely.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

**CAUTION**

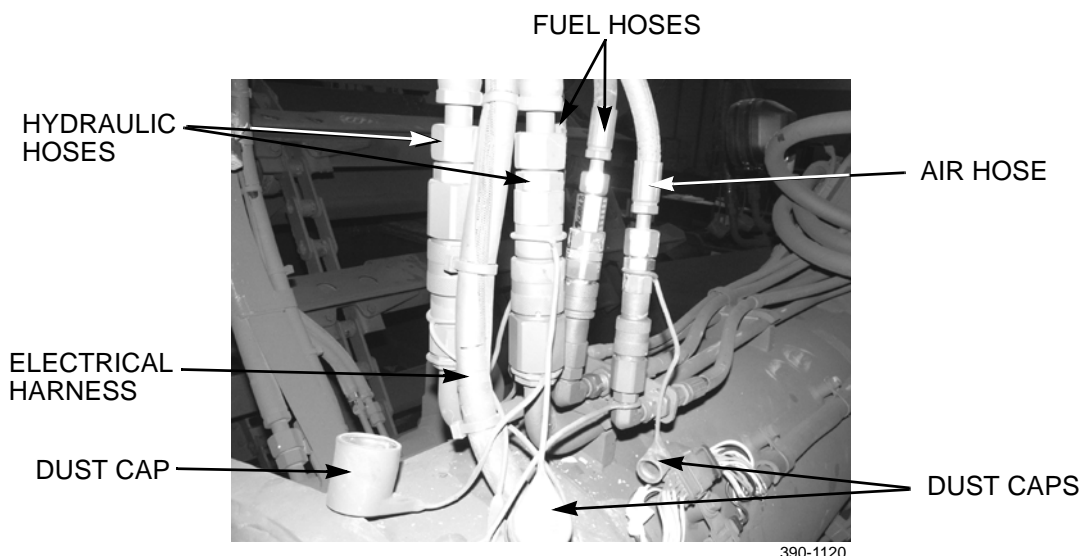
Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

10. On right side of scraper bowl, perform the following steps:
- Remove straps from two hydraulic hoses, two fuel hoses, air hose, and electrical harness stowed inside bowl and reposition harness and hoses at right side of draft frame.

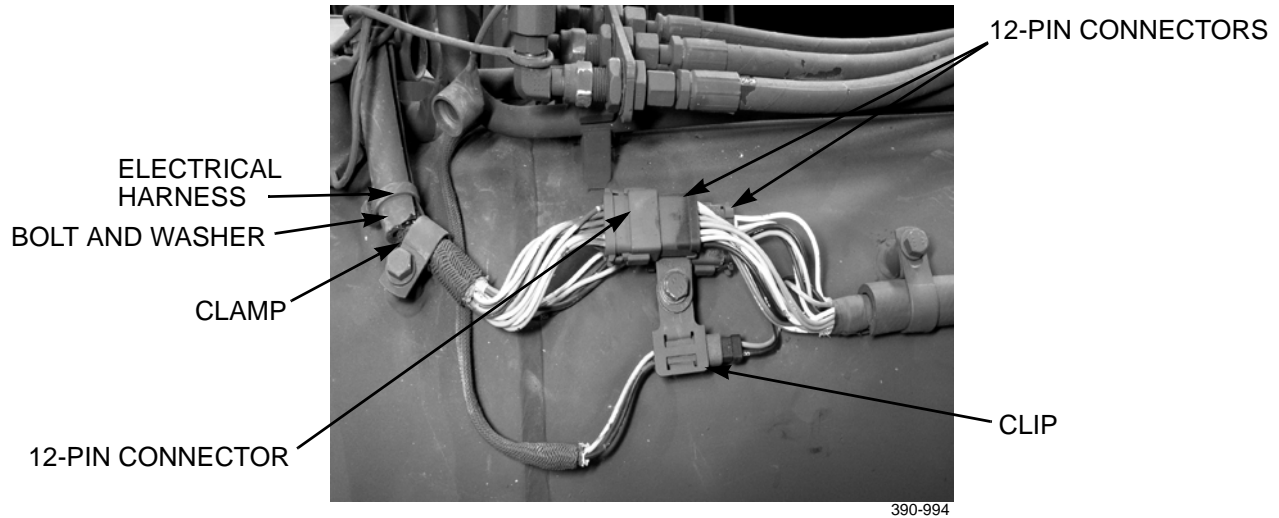
**NOTE**

All quick disconnect connections (hydraulic, fuel, and air) are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

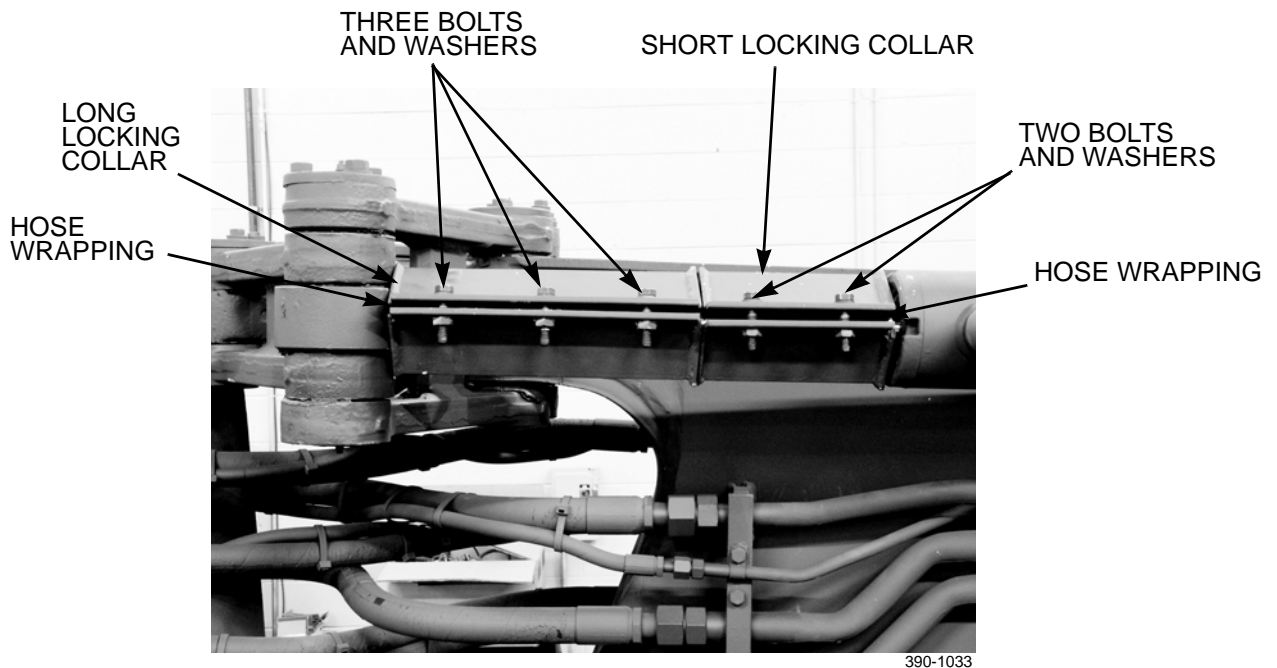
- Remove dust caps and connect two hydraulic hoses at quick disconnect fittings. Turn quick disconnect collars a half turn after connecting to lock connection.
- Remove dust caps and connect two fuel hoses at quick disconnect fittings.
- Remove dust cap and connect air hose at quick disconnect fitting.



- Connect four 12-pin electrical connectors as shown.
- Secure clip to draft frame with washer and bolt.
- Secure electrical harness with clamp, washer, and bolt.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

11. Remove steering cylinder locking collars and set aside for stowage in ISU-60 container:
- Remove five bolts and washers and remove two locking collars (one short and one long), and hose wrappings from each steering cylinder.
  - Reassemble each locking collar assembly with its mounting hardware.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

12. NOTE: Machine is now drivable. However, until ROPS/FOPS is installed, it should be operated only with extreme caution, at low idle and in first gear or reverse ONLY. As required, move machine to a new location to complete reconfiguration.
13. Remove straps and three elevator motor hydraulic hoses from stowage on elevator flight.
14. Return elevator to work configuration:

**WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- a. Start engine and raise elevator by moving ejector forward until elevator shafts are free of hangers.

ELEVATOR SHAFT



HANGER

**ELEVATOR LOWERED****ELEVATOR RAISED**

390-1077

- b. Install elevator hangers:
  - (1) Remove hangers from BII toolbox on rear deck of scraper.

**NOTE**

GAA grease (Item 10, WP 0026 00) coated on elevator shafts will make hangers easier to install.

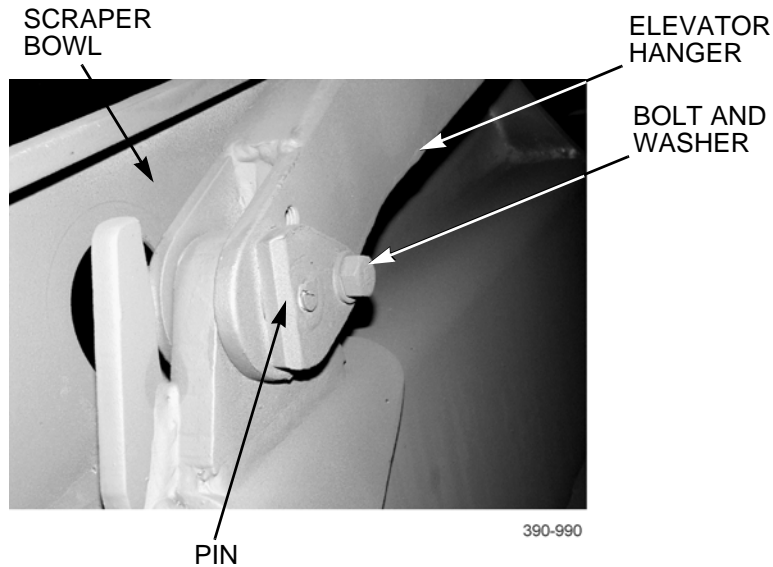
- (2) Position large end of each hanger on elevator shaft.

**NOTE**

- To assist in installing pins, work on both sides of scraper bowl at the same time.
- Ejector can be moved slightly forward or rearward to allow installation of pins.

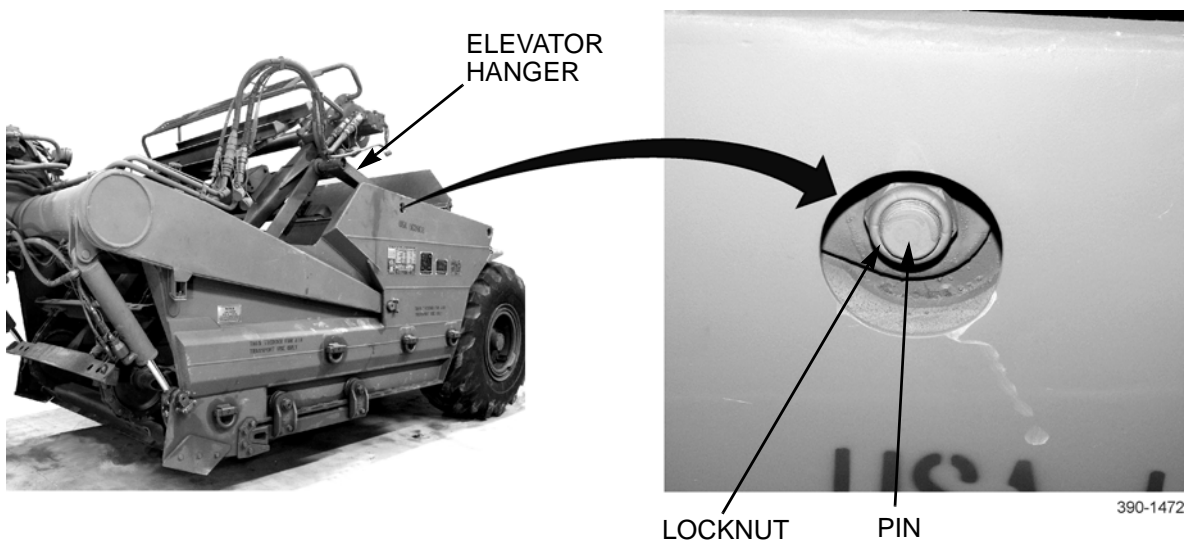
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- (3) Install pin on each side of scraper bowl, by driving pin in.
- (4) Install washer and bolt on pin. Tighten bolt securely.

**NOTE**

Notify Unit Maintenance to obtain and install new locknuts on pins as soon as possible.

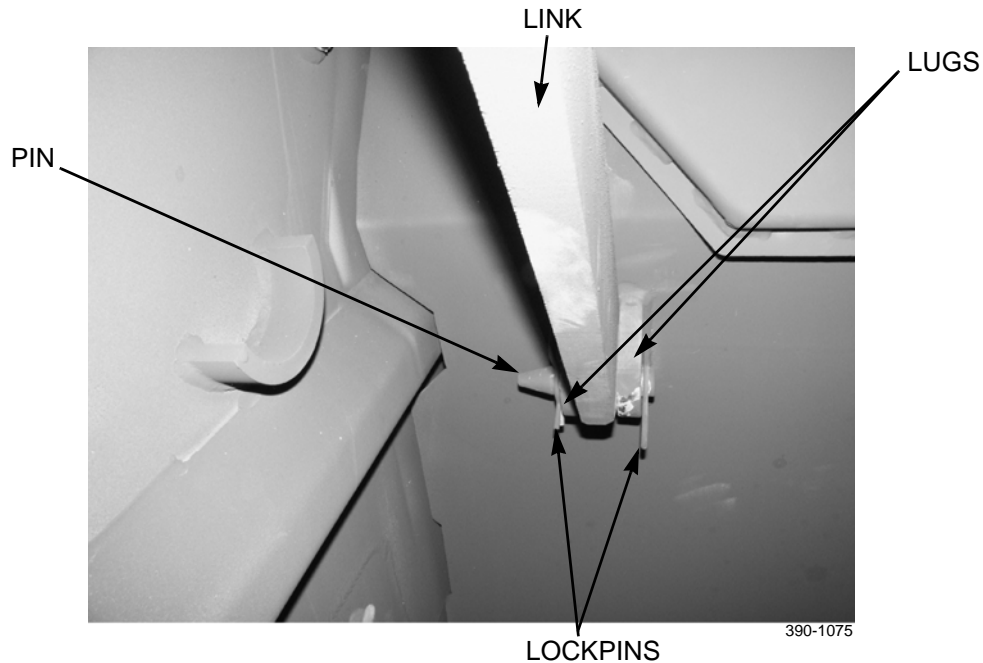
- (5) Install locknut on pin and tighten securely.



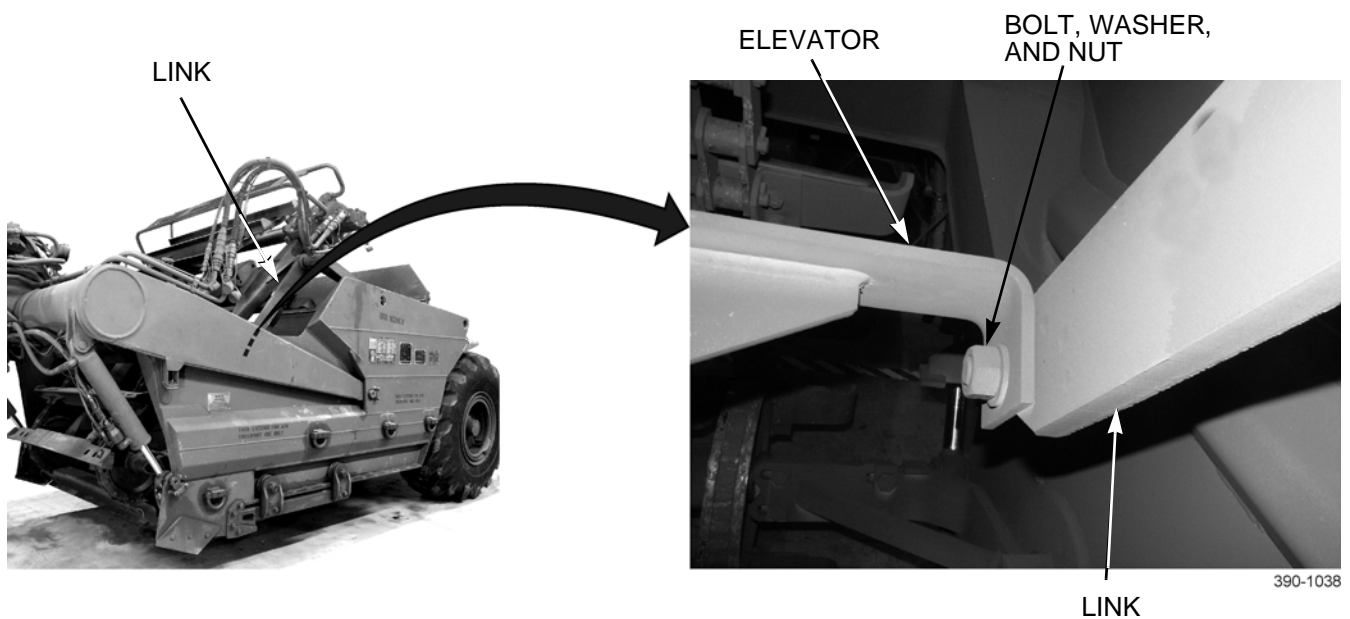
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

Ejector can be moved slightly forward or rearward to allow removal of pins.

- c. Remove lockpins and unpin two elevator links from lugs on ejector rear wall. Stow pins and lockpins in BII tool-box.



- d. Position each link toward front of scraper bowl and install to side of elevator with bolt, washer, and nut.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

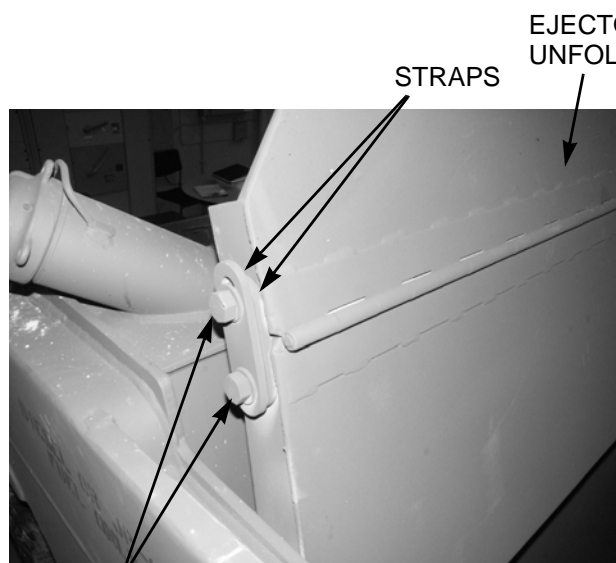
Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- e. Move ejector fully to the rear. Shut down engine.

**WARNING**

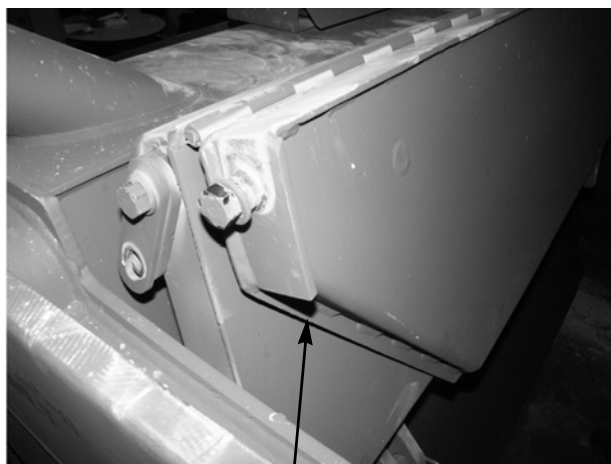
Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

- f. Use a suitable lifting device to unfold ejector. Secure two straps on each side with two washers and bolts.



BOLTS AND WASHERS

STRAPS

EJECTOR  
UNFOLDED

EJECTOR FOLDED

390-1040

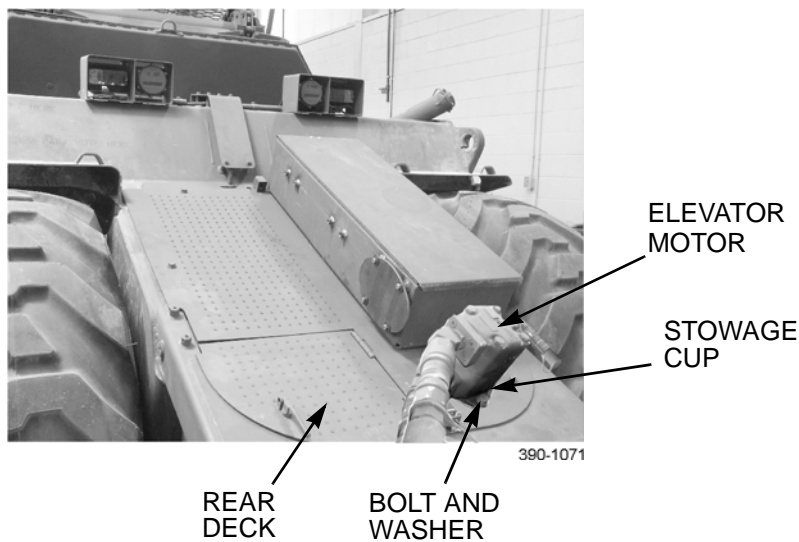
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

Hydraulic motor weighs approximately 85 lb (39 kg).

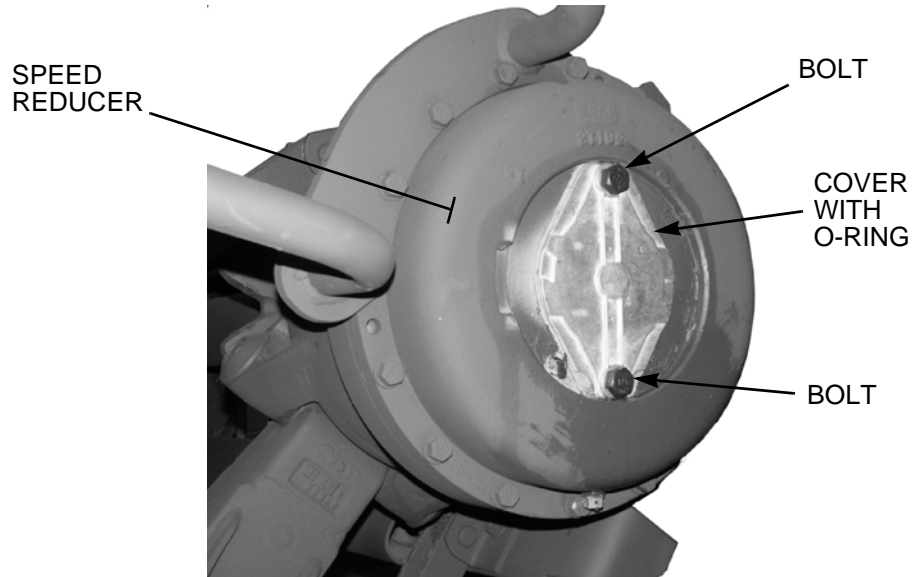
- g. Attach a suitable overhead lifting device to elevator motor. Take up slack in sling. Remove two bolts, washers, and elevator motor from mounting on stowage cup on rear deck of scraper.

**WARNING**

Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel.

- h. Place ladder against left side of scraper to access elevator motor mounting.
- i. Remove two bolts and cover with O-ring from speed reducer. Reinstall two bolts removed from cover to stowage cup on rear deck of scraper. Return cover with O-ring and mounting bolts to ISU-60 container toolbox.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

390-1070

- j. Install elevator motor to speed reducer with two washers and bolts that were moved in step g. Tighten bolts to 158 lb-ft (214 Nm). Remove lifting device from elevator motor.

**CAUTION**

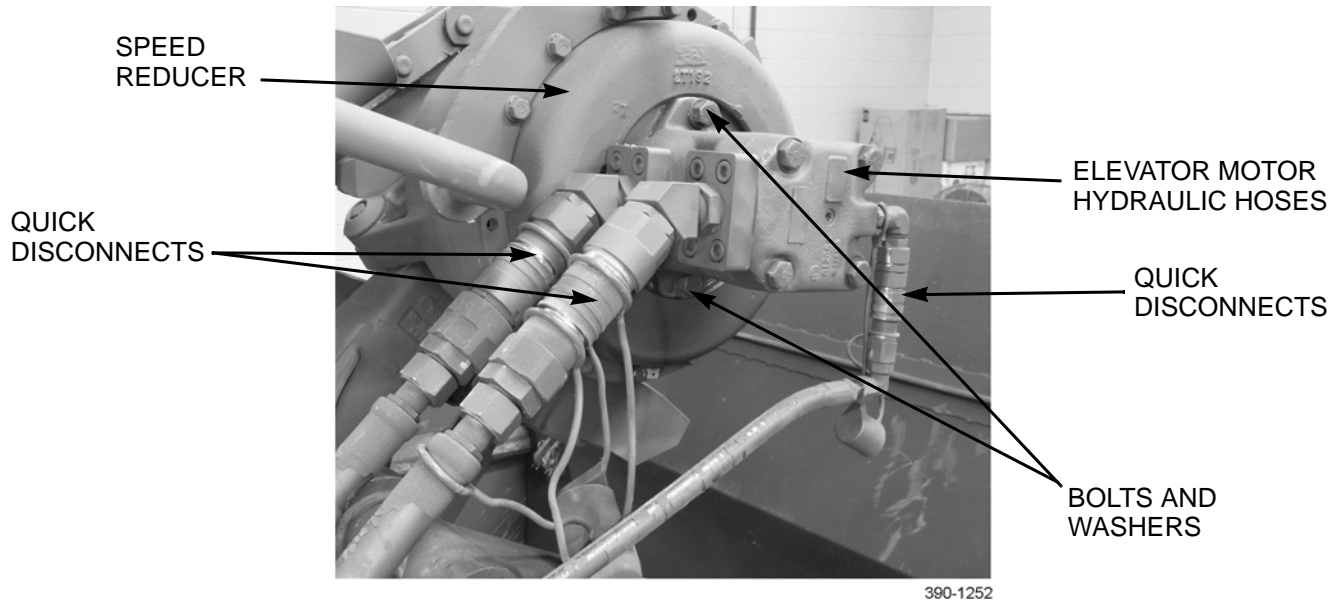
Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

**NOTE**

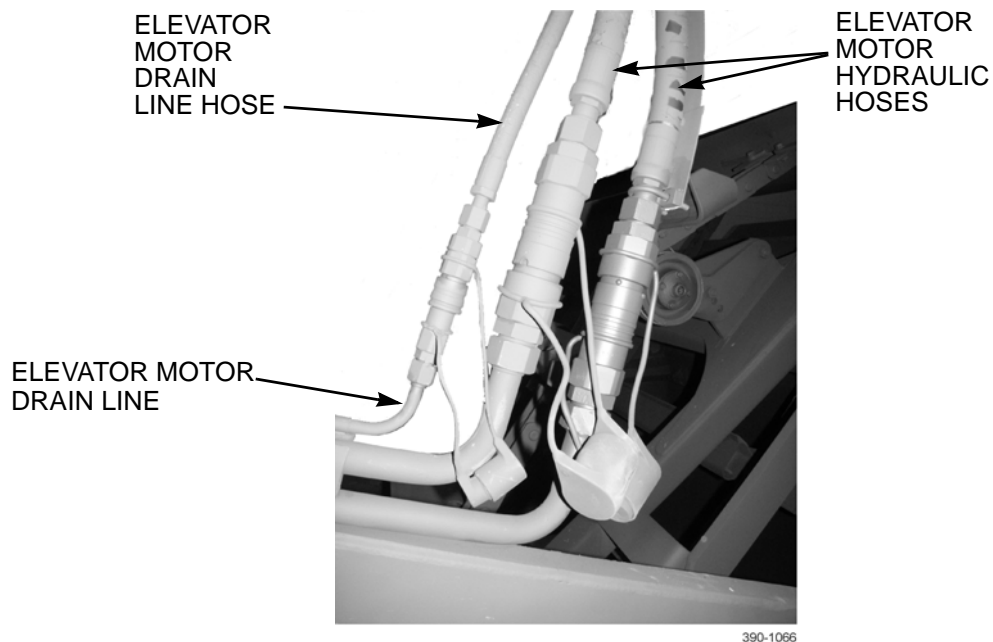
All quick disconnect connections are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- k. Remove dust caps and connect three hydraulic hose quick disconnects at elevator motor. Turn each quick disconnect collar a half turn after connecting to lock connection.

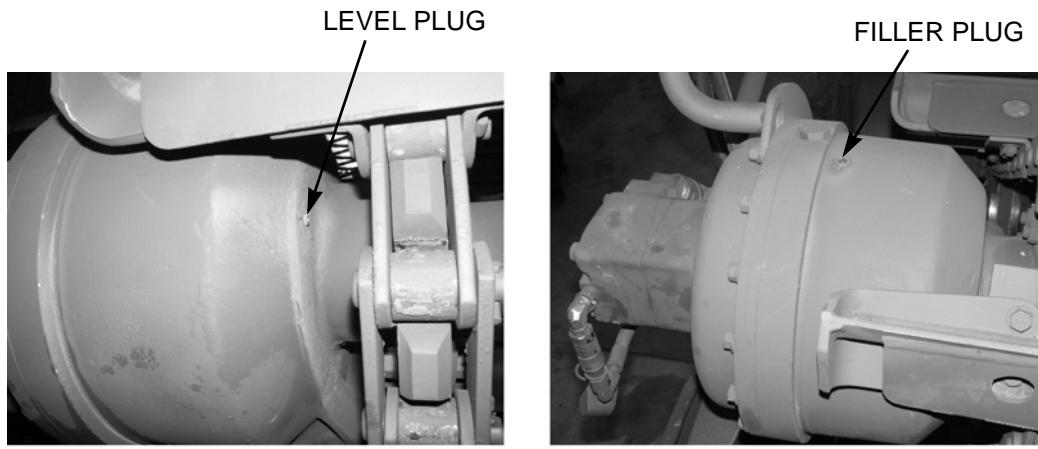


- l. Remove dust caps and connect two large elevator motor hydraulic hoses at quick disconnect fittings on left side of scraper bowl.
- m. Connect third elevator motor drain line hydraulic hose to elevator motor drain line.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- n. Check level of oil in gearbox:
- (1) Clean area around level plug.
  - (2) Remove level plug. Oil should drip out opening.
  - (3) If oil level is low, remove filler plug and add gear lubricating oil (Item 12, 13 or 14, WP 0026 00) until oil drips out level plug opening.
  - (4) Clean level and filler plugs and install.



- o. Remove ladder and set aside for stowage in ISU-60 container.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

ROPS/FOPS weighs 447 lb (203 kg).

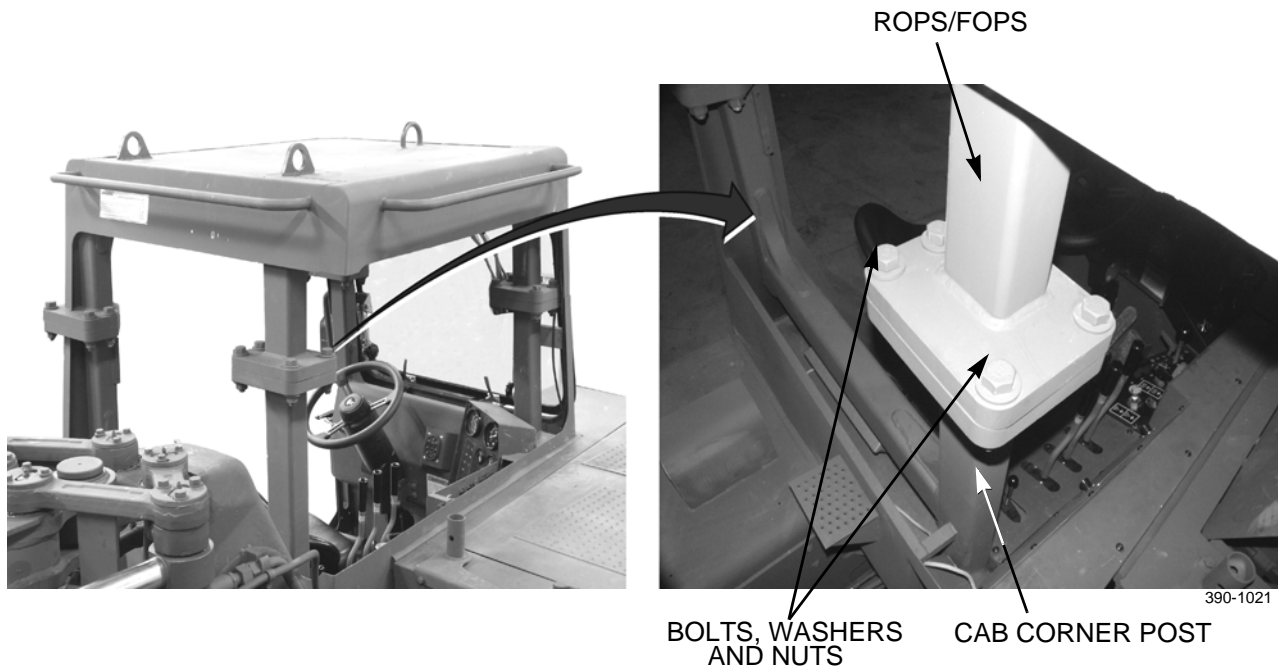
15. Install ROPS/FOPS on cab corner posts:

- a. Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.

**NOTE**

Tighten all mounting nuts using a crisscross tightening pattern. This will ensure even tightening and correct installation alignment on all four cab corner posts.

- b. Lift ROPS/FOPS into position at four corner posts. While positioning ROPS/FOPS, loosely install all 16 bolts, 32 washers, and 16 nuts. Final tighten nuts in a crisscross tightening pattern to 317 lb-ft (430 Nm).
- c. Remove lifting device from ROPS/FOPS.

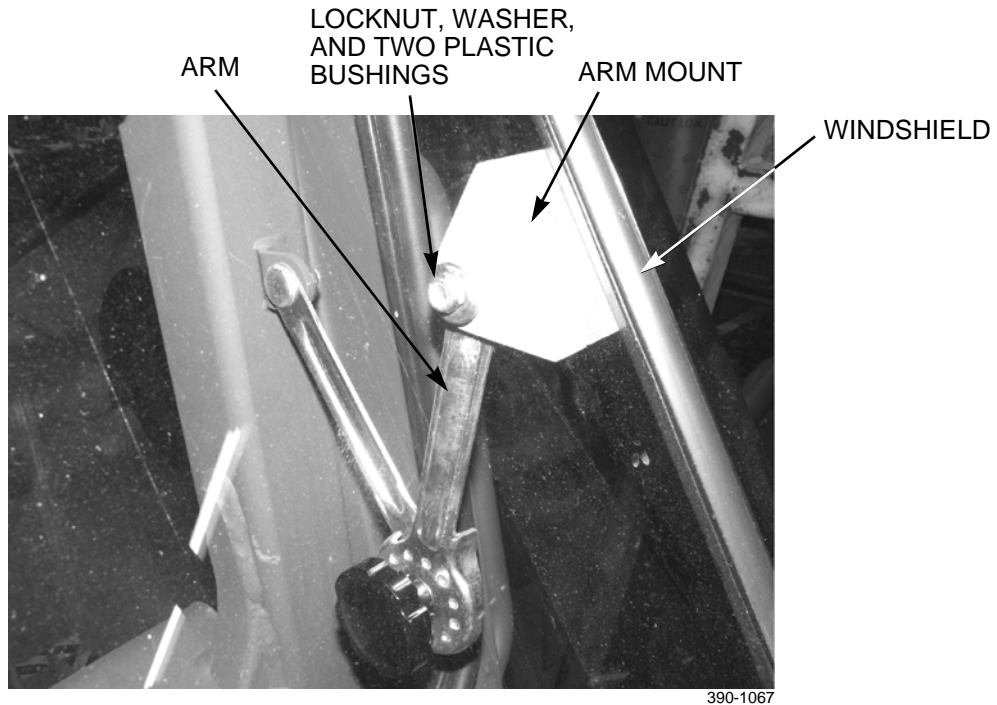
**WARNING**

Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.

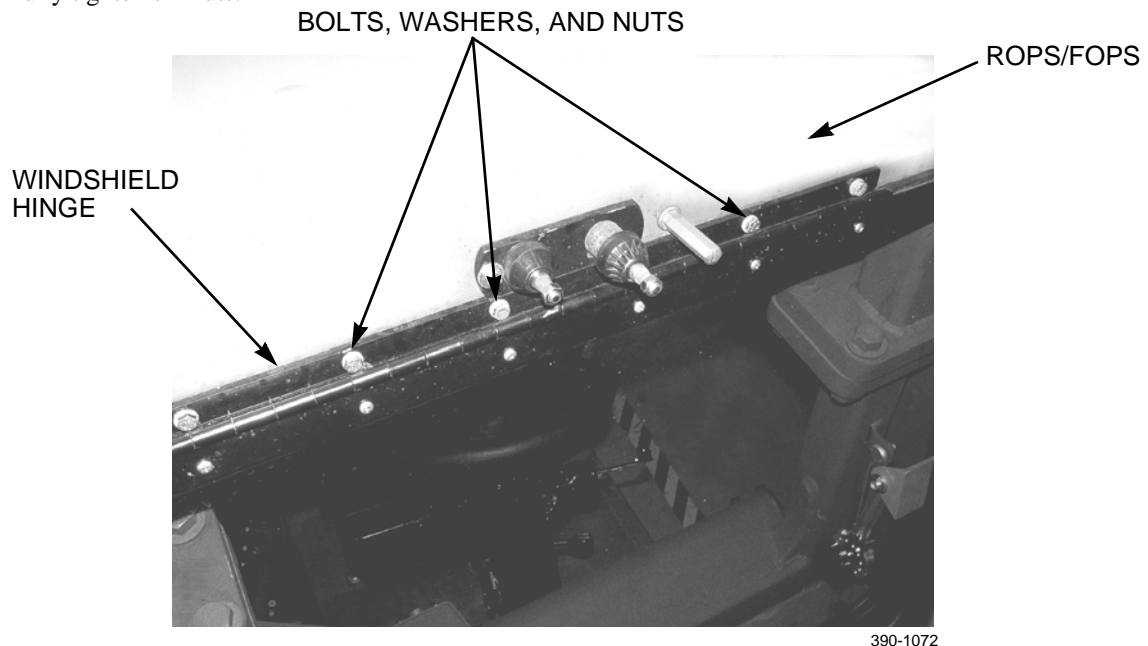
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

## 16. Install windshield:

- a. Position windshield and install arms to arm mounts with two plastic bushings, washer, and locknut on each side.

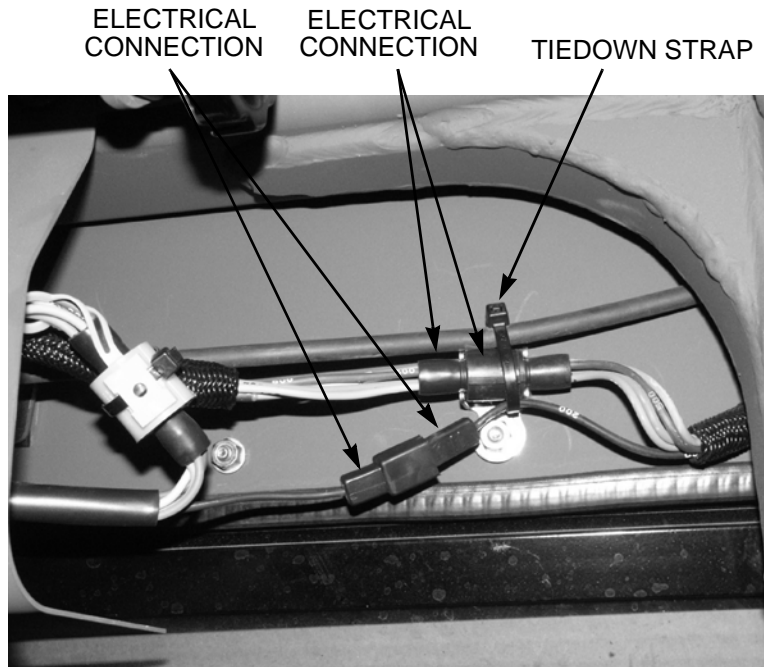


- b. Loosely install windshield hinge to ROPS/FOPS with six bolts, 12 washers, and six nuts.
- c. Close windshield and latch.
- d. Fully tighten six nuts.



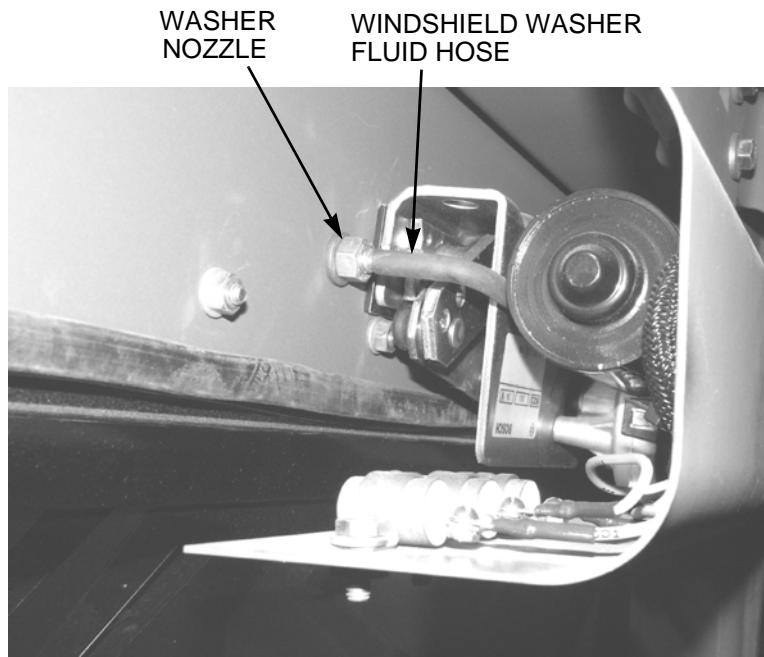
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

17. Connect two windshield wiper motor connectors. Secure wires with new tiedown strap (Item 21, WP 0026 00).



390-1053

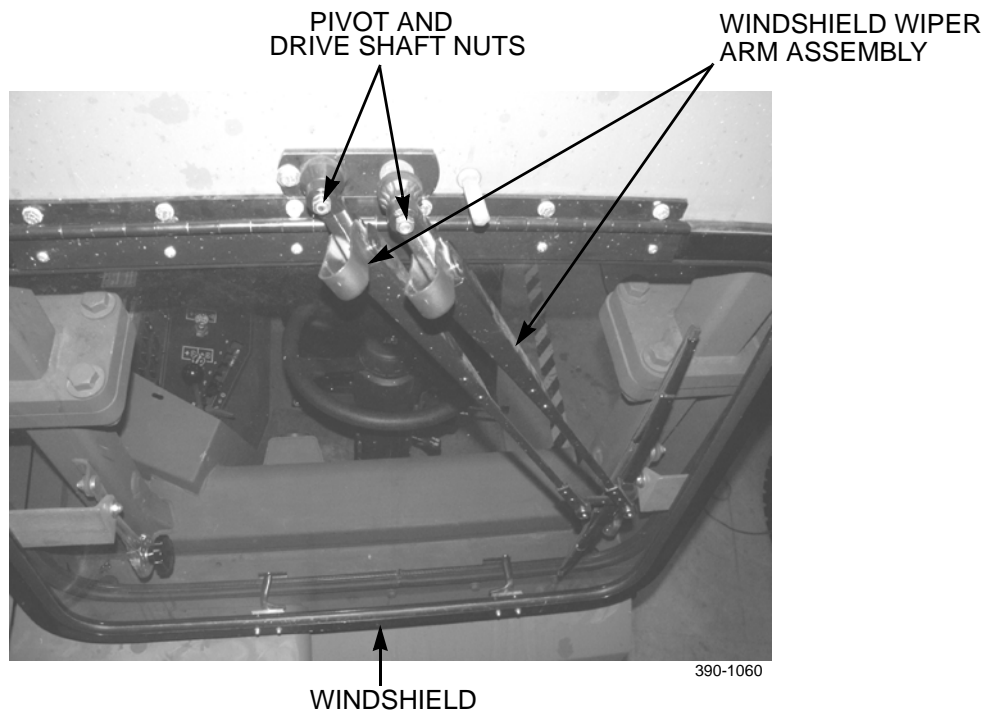
18. Install windshield washer hose on washer nozzle.



390-1052

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

19. Install windshield wiper arm assembly to drive and pivot shafts with two nuts.



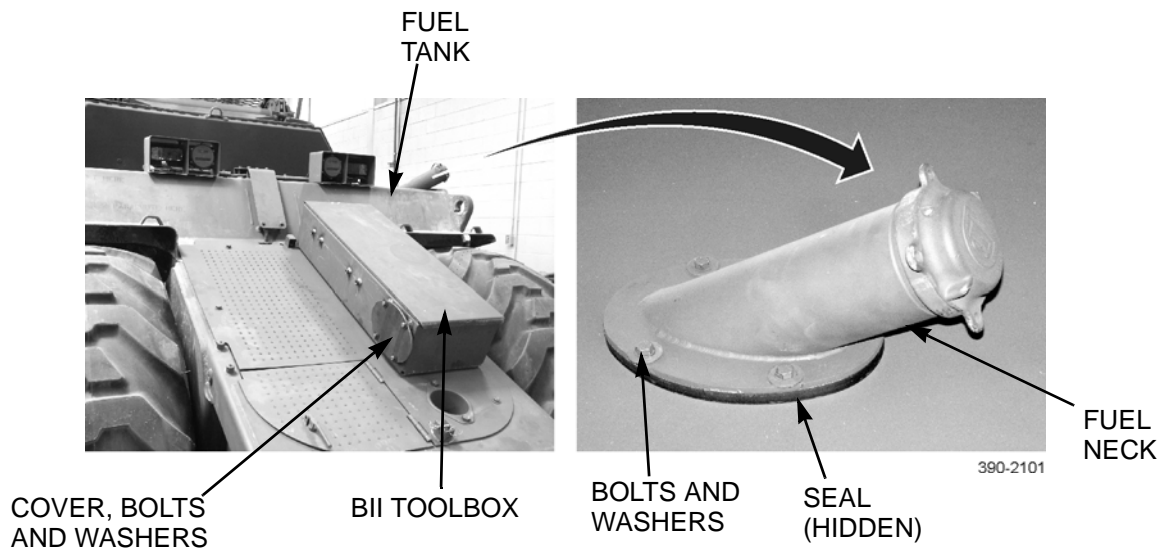
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

20. Remove fuel neck from stowage position and install on top of fuel tank:

**WARNING**

DO NOT perform fuel system maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing injury or death to personnel or damage to machine.

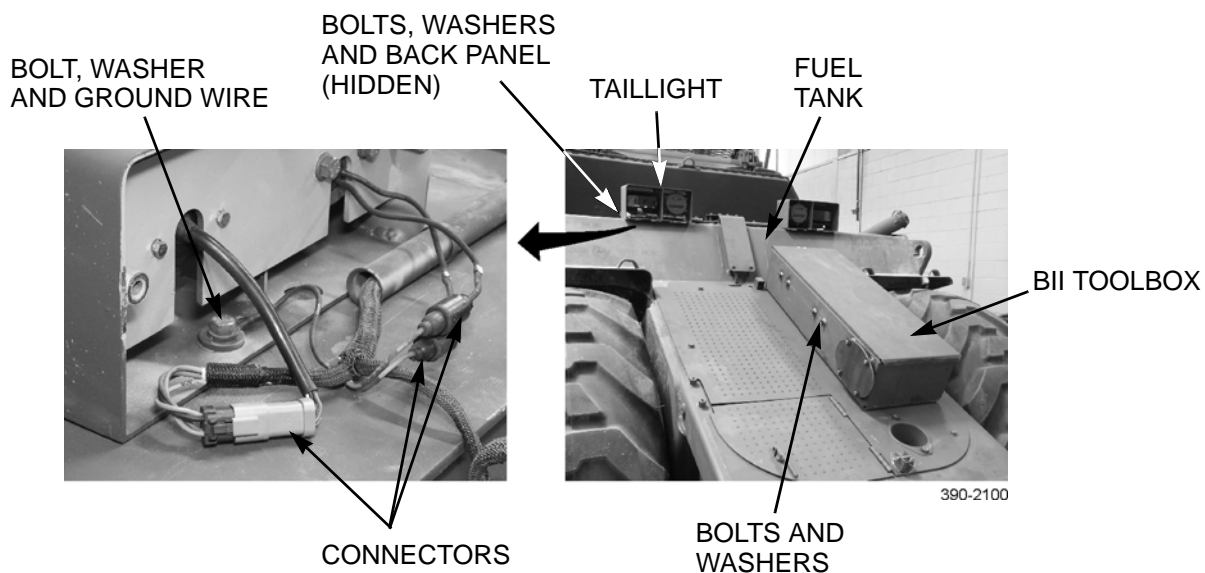
- Remove four bolts, washers and cover from top of fuel tank.
- Remove four bolts, washers and fuel neck from side of BII toolbox.
- Install fuel neck, four washers and bolts on top of fuel tank.
- Install cover, four washers and bolts on side of BII toolbox.





**AIRDROP BY C-130 AIRCRAFT - CONTINUED****0019 00****RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

21. Remove taillights from stowage position and install on top of fuel tank:
- Remove three bolts, washers and back panel from taillight.
  - Remove two bolts, washers and taillight from side of BII toolbox. Reinstall washers and bolts.
  - Install taillight, two washers and bolts on top of fuel tank.
  - Connect ground wire and install washer and bolt.
  - Install back panel, three washers and bolts on taillight.
  - Repeat for other taillight.



22. Machine is now fully assembled and operational.

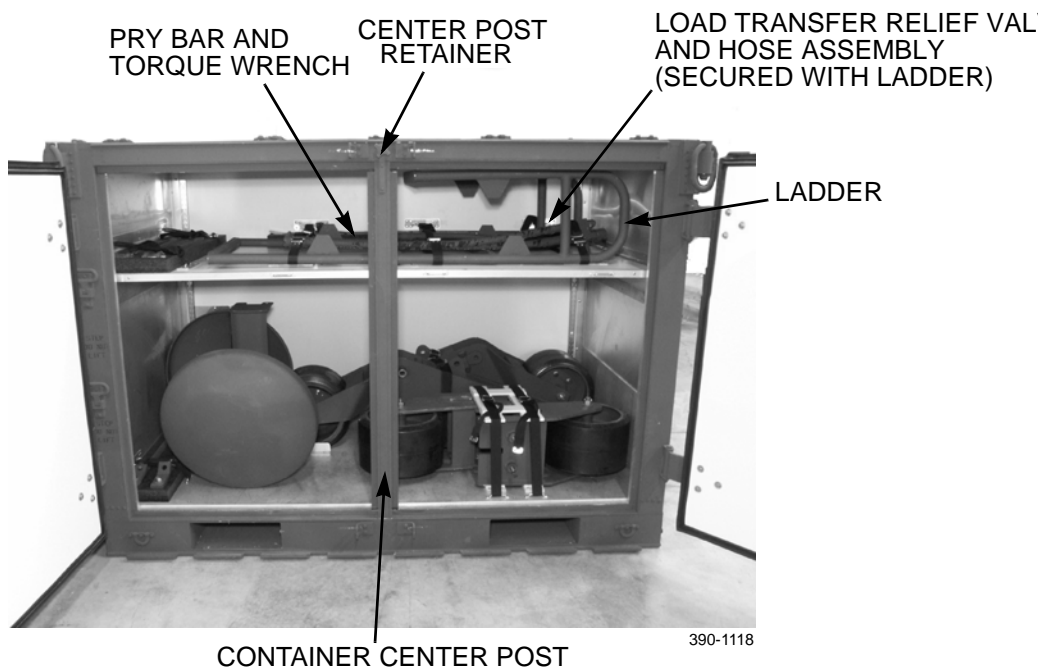
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

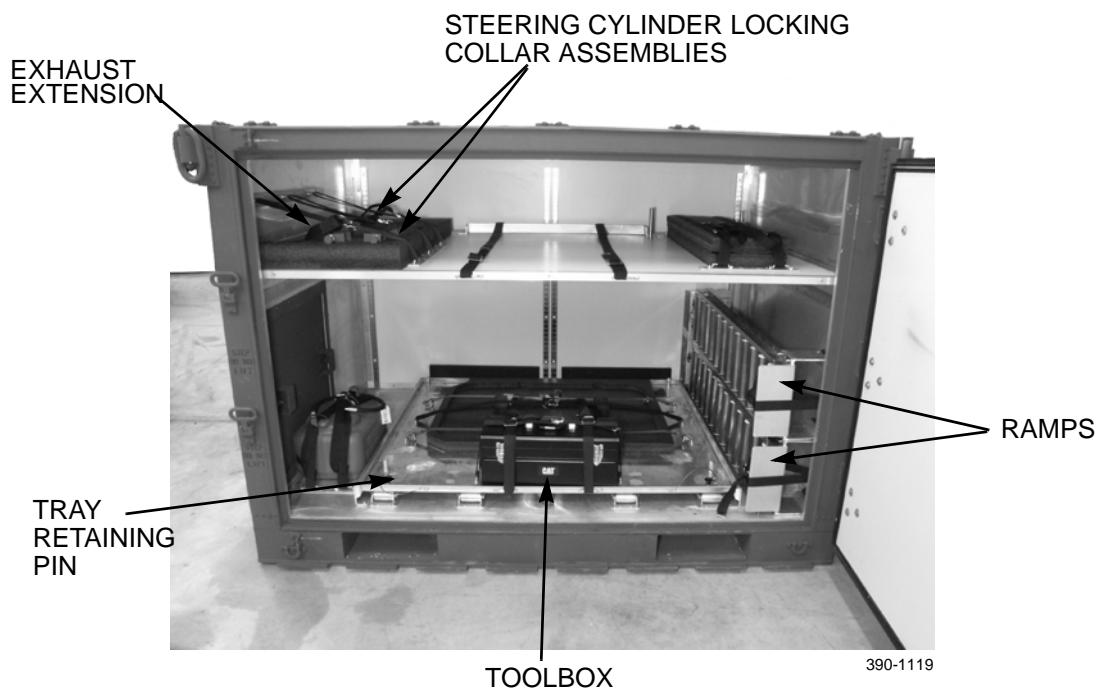
23. Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 4 and 5:
  - a. pry bar and torque wrench;
  - b. ladder;

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****Table 4. Stowage Instructions for ISU-60 Container - Two-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Pry Bar and Torque Wrench	<ol style="list-style-type: none"> <li>1. Place each component in cushion pad on shelf, against back wall of container.</li> <li>2. Secure components with three straps.</li> </ol>
Ladder	<ol style="list-style-type: none"> <li>1. Place ladder on shelf with top of ladder facing right.</li> <li>2. Ensure load transfer relief valve and hose assembly is positioned on top of ladder.</li> <li>3. Secure components with three straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>1. Position center post, installing bottom end first.</li> <li>2. Raise shelf slightly to lock center post in position.</li> <li>3. Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- c. four steering cylinder locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);
- d. exhaust extension; and
- e. toolbox.

**Table 5. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Steering Cylinder Locking Collar Assemblies and Exhaust Extension	<ol style="list-style-type: none"> <li>1. Place steering cylinder locking collar assemblies in two right cutouts in cushion pad, on left side of shelf.</li> <li>2. Place exhaust extension in left cutout in cushion pad, on left side of shelf.</li> <li>3. Secure with three straps.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Place toolbox on front edge of tray.</li> <li>2. Secure with three straps.</li> <li>3. Slide tray all the way in.</li> <li>4. Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>1. Position each ramp against wall of container.</li> <li>2. Secure each ramp with strap.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**END OF WORK PACKAGE**

**MARINE TRANSPORT—ROLL-ON/ROLL-OFF (RO/RO) PROCEDURES****0020 00****INTRODUCTION**

1. This work package describes how to load the scraper on ships using RO/RO procedures, in preparation for marine transport.
2. At all times, the machine's movements are under the overall control of the RO/RO vehicle director. Loading and unloading is accomplished by following the vehicle director's traffic control pattern.
3. Machines are loaded by moving them from dockside to the appropriate level and hold on board ship. Once parked, crews secure machines for shipping by lashing, shoring, blocking or bracing, as appropriate. Unloading is accomplished by moving machines from on board ship to dockside.
4. In order to accomplish RO/RO, the machine must operate up and down ramps. The grade of the ramps will vary, depending on the tide and the weight of the ship at the time of loading or unloading. Ground guide assistance is **MANDATORY** when operating on ramps.
5. In order to ensure the safety of all personnel involved, the machine's operator must be familiar with all RO/RO regulations and procedures.
6. The machine requires no special preparation by Unit Maintenance prior to loading.

**RO/RO REGULATIONS****WARNING**

Safe RO/RO operation depends on strict adherence to RO/RO regulations. Failure to do so may result in injury or death to personnel or damage to equipment.

1. Only qualified and screened operators are permitted to drive machine in RO/RO operations.

**WARNING**

All personnel working in machine operating areas during RO/RO must wear hearing protection. Failure to wear hearing protection may result in hearing loss.

2. All personnel working in machine operating areas must wear hearing protection.
3. Do not move machine about the ship without a ground guide present.
4. Do not start machine until directed to do so. Before moving out, test brakes.
5. Operate machine with lights on.
6. Only one vehicle may transit a ramp at any time.
7. Do not leave machine engine running unattended.
8. Do not exceed 5 mph (8 kph) while moving about the ship.
9. Fuel tank on machine must be filled in accordance with Military Traffic Management Command (MTMC) port call message.

**RO/RO PROCEDURES**

1. At all times, follow ground guide's instructions when moving about the ship.
2. At all times, keep machine under control and within the speed limit of 5 mph (8 kph). Negotiate ramps in 1<sup>st</sup> gear **ONLY**.

***RO/RO PROCEDURES - CONTINUED***

3. Raise or lower scraper bowl as required to clear the crest of ramps.
4. After loading, park machine where directed to do so:
  - a. Place transmission in N (Neutral) and lock.
  - b. Apply parking brake.
  - c. Move ejector all the way to the rear and close floor of bowl.
  - d. Lower bowl and position cutting edge onto suitable shoring.
  - e. Shut down engine and secure machine against vandalism.
  - f. Fold side mirror inward.
5. Provide assistance, as required, to ship's crew in blocking/shoring/lashing machine for transport.
6. After transport:
  - a. Fold side mirror outward.
  - b. Remove vandalism guards and start engine.
  - c. Raise bowl.
  - d. Open floor of bowl and move ejector all the way to the front.
  - e. Release parking brake.

**END OF WORK PACKAGE**

**INTRODUCTION**

1. This work package describes how to prepare the scraper for rail transport within the Continental United States (CONUS) and in countries outside the Continental United States (OCONUS). In both cases, the machine is most often loaded/unloaded on a rail flatcar using drive-on/drive-off procedures at the railhead.
2. CONUS rail transport is governed by Association of American Railroads (AAR) regulations. CONUS rail transport does not require component removal to meet dimensional requirements.
3. OCONUS rail transport is governed by Gabarit International de Chargement (GIC) regulations. Prior to loading, the machine must be configured to reduce height, in order to meet rail transport dimensional profiles. Machine components that exceed these profiles are either removed or folded down. After arrival, the machine must be returned to operational configuration after being unloaded from the rail flatcar.
4. Both CONUS and OCONUS rail transport procedures are described in this work package. Procedural steps apply to both CONUS and OCONUS, unless a step specifies otherwise.
5. Safest rail transport is with machine's fuel tank as close to empty as possible. Rail transport with fuel tank more than three-quarters full is prohibited.
6. Assistance from two Unit Maintenance mechanics is required to prepare the machine for rail transport.

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

7. As part of this procedure, the ROPS/FOPS may need to be removed from the tractor. Operation of the machine without ROPS/FOPS may be required.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

8. Many components, that must be removed and installed during this procedure, are very heavy. Use assistance, caution, and follow safe work practices when handling them.

**WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

9. Throughout procedure, be aware of potential hazards when working around hitch. Do NOT work in area of hitch link unless engine is shut down.

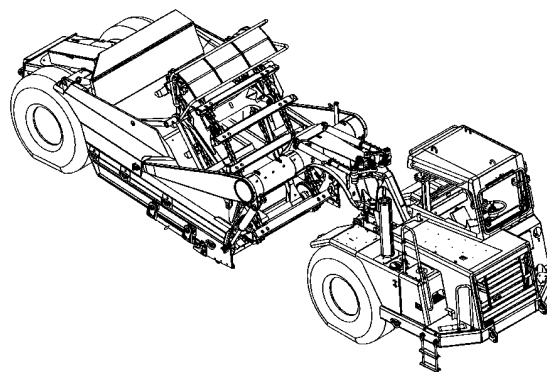
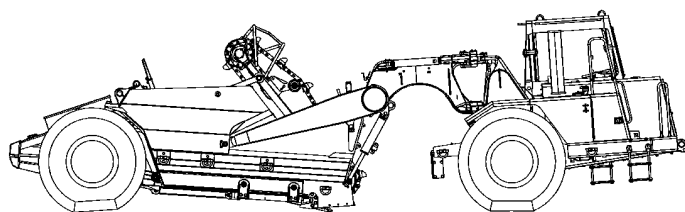
**RAIL TRANSPORT - CONTINUED****0021 00****TOOLS AND EQUIPMENT**

1. Tools and equipment required to prepare the machine for rail transport are stored in an ISU-60 shipping and storage container (Item 1, Table 1, WP 0024 00). BII tools (Table 2, WP 0024 00) must also be used.
2. Components of the machine that must be removed in preparation for rail transport are stowed in the ISU-60 container or in the BII toolbox on the rear deck of the scraper.
3. Reinstall mounting hardware for all removed components on machine, to secure against loss during transport.
4. Once the machine has been loaded onto the flatcar, the ISU-60 container is also loaded onto flatcar.

**SUMMARY OF PROCEDURES—RAIL TRANSPORT (CONUS)****NOTE**

The following summary of procedures is provided to assist personnel preparing the machine for CONUS rail transport.

1. Load machine onto flatcar.
2. Secure machine on flatcar:
  - a. Install all steering locks.
  - b. Provide blocking, shoring, wind protection safeguards, and vandalism protection. Tie down machine.
  - c. Pack ISU-60 container and load on flatcar. Tie down container.
3. The following illustration shows the scraper prepared for CONUS rail transport.

**CONUS RAIL**

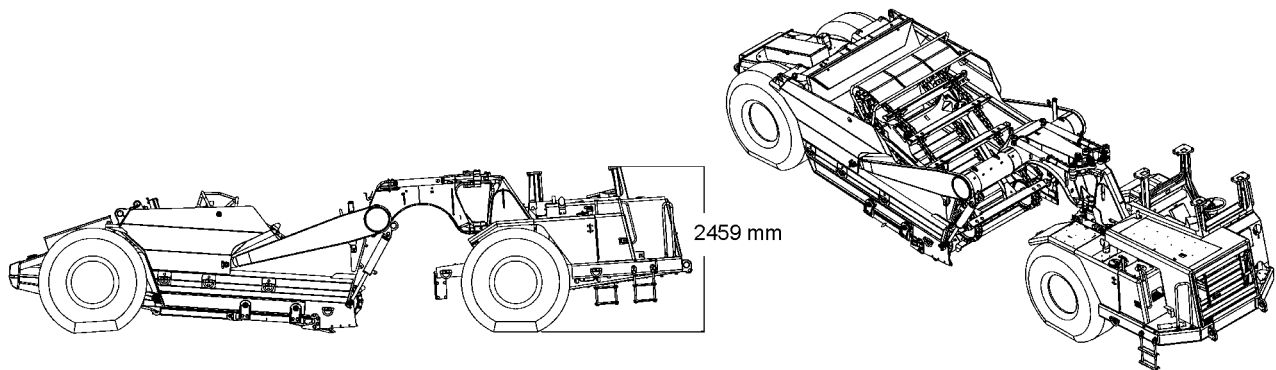
390-2050



**SUMMARY OF PROCEDURES—RAIL TRANSPORT (OCONUS)****NOTE**

The following summary of procedures is provided to assist personnel preparing the machine for OCONUS rail transport.

1. Configure machine for rail transport:
  - a. Remove windshield wiper arm and windshield.
  - b. Remove ROPS/FOPS.
  - c. Configure elevator for rail transport.
  - d. Remove exhaust stack and install exhaust extension.
  - e. Remove upper handrail with side mirror.
2. Load machine onto flatcar.
3. Secure machine on flatcar:
  - a. Install all steering locks.
  - b. Provide blocking, shoring, wind protection safeguards, and vandalism protection. Tie down machine.
  - c. Pack ISU-60 container and load on flatcar. Tie down container.
4. The following illustration shows the scraper configured for OCONUS rail transport.

**OCONUS RAIL**

390-2051

**CONFIGURE MACHINE FOR RAIL TRANSPORT****NOTE**

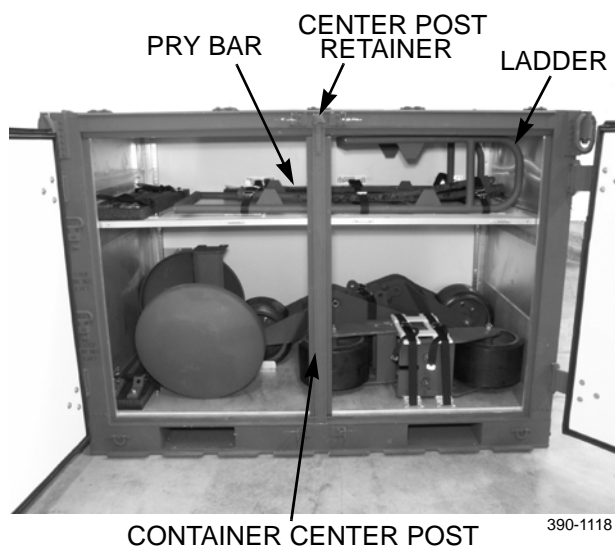
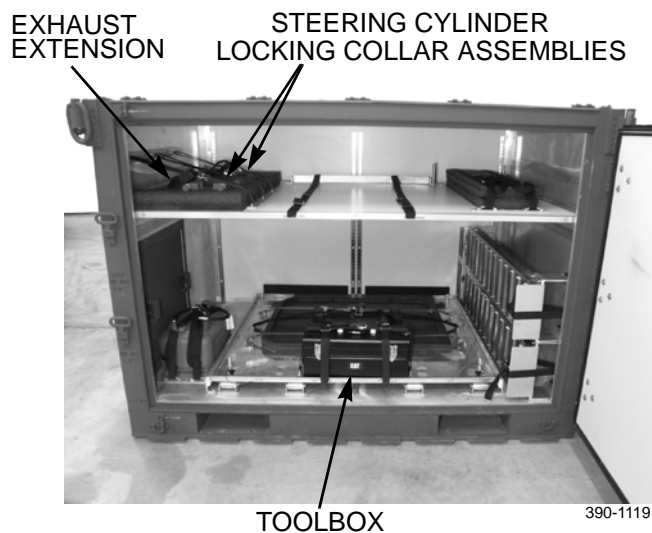
Whenever hydraulic hose quick disconnects need to be disconnected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate disconnection of hoses.

1. Position scraper on level ground, in railhead staging area and in line with railhead. Ensure tractor and scraper are aligned and steering wheel is centered. Move ejector fully to the rear and close floor of bowl.
2. Place ISU-60 container in railhead staging area and remove the following items from container:
  - a. toolbox;
  - b. exhaust extension (OCONUS ONLY);
  - c. four steering locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);

**NOTE**

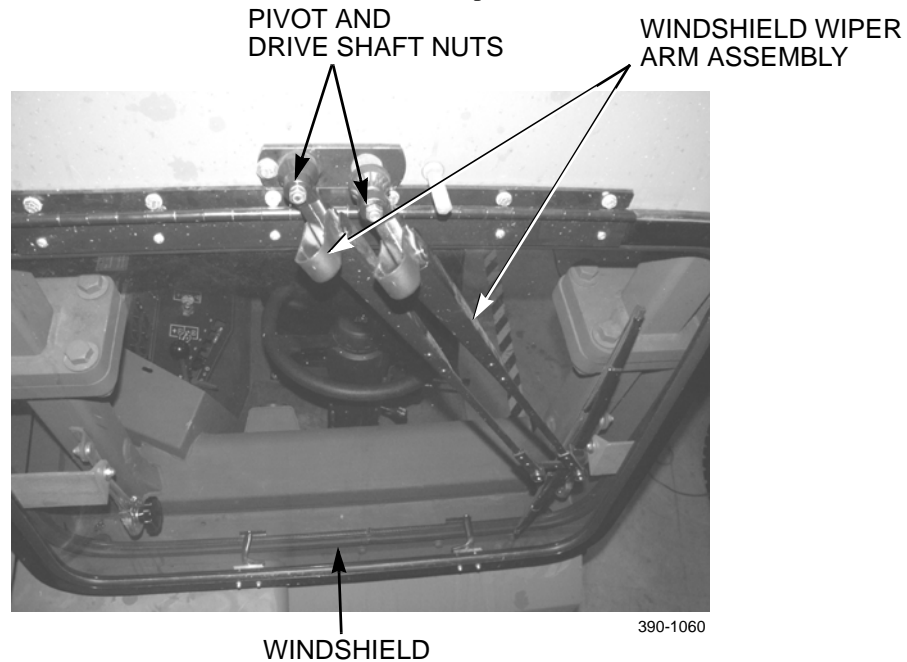
Before removing ladder, remove center post retainer and center post.

- d. ladder (OCONUS ONLY); and
- e. pry bar (OCONUS ONLY).

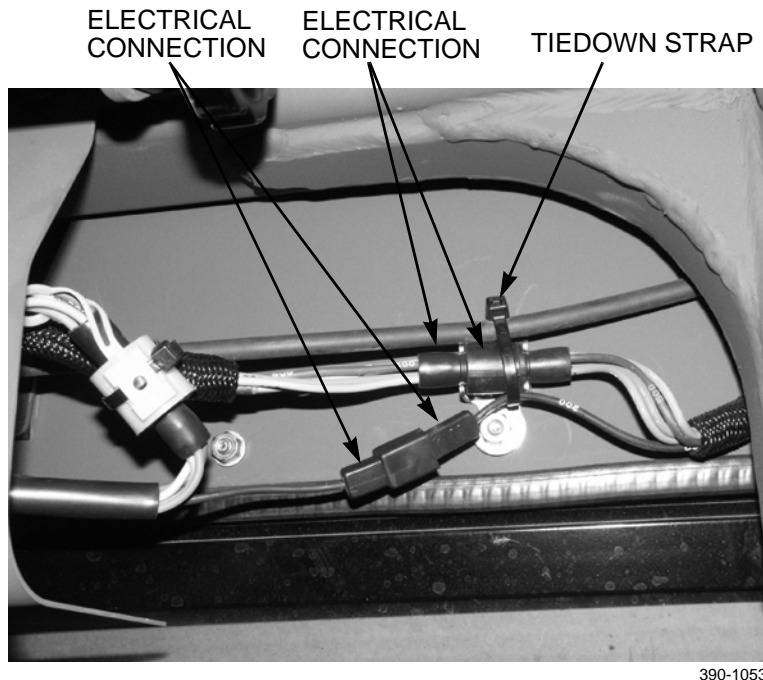


**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

3. If machine is being transported by rail (CONUS), machine needs no further preparation. Proceed to *Load Machine Onto Flatcar* on page 0021 00-21.
4. OCONUS ONLY: Place transmission in N (Neutral) and lock, apply parking brake, lower bowl to the ground and shut down engine. Block tractor and scraper wheels.
5. OCONUS ONLY: Remove two nuts and windshield wiper arm assembly from windshield. Set wiper arm assembly aside for stowage in ISU-60 container. Reinstall nuts on drive and pivot shafts.

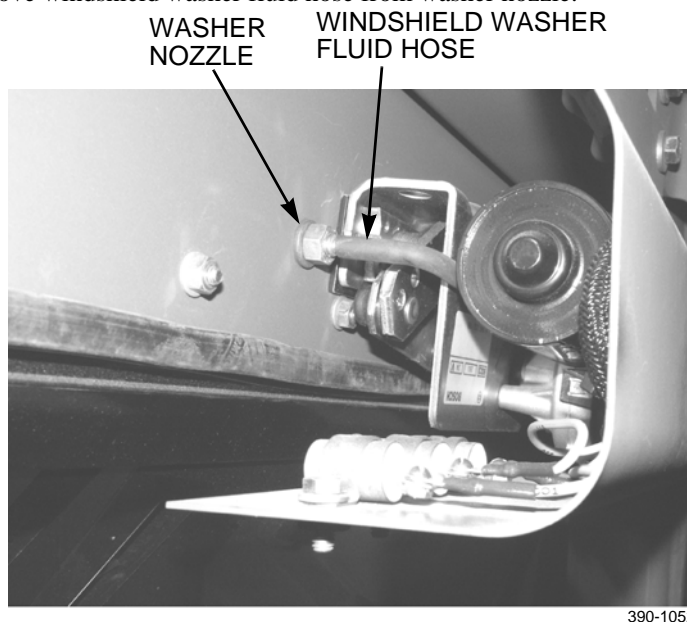


6. OCONUS ONLY: Cut tiedown strap and disconnect two electrical connectors at wiper motor inside cab. Discard tiedown strap.



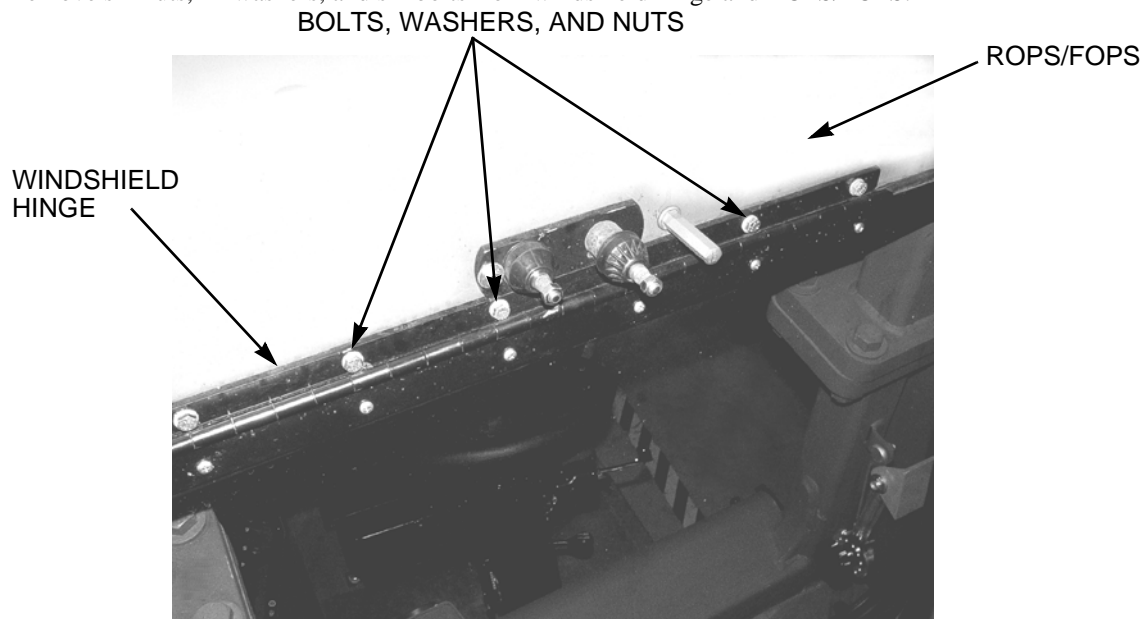
**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

7. OCONUS ONLY: Remove windshield washer fluid hose from washer nozzle.

**WARNING**

Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.

8. OCONUS ONLY: Remove windshield from ROPS/FOPS:
- Unlatch and open window.
  - Remove six nuts, 12 washers, and six bolts from windshield hinge and ROPS/FOPS.

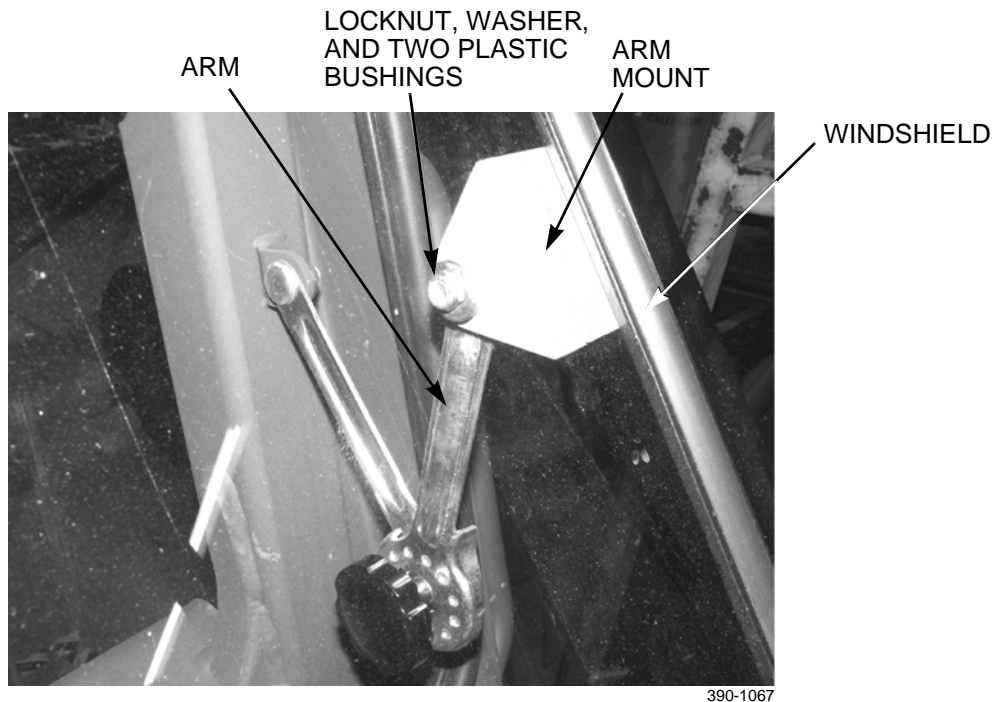


## RAIL TRANSPORT - CONTINUED

0021 00

**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

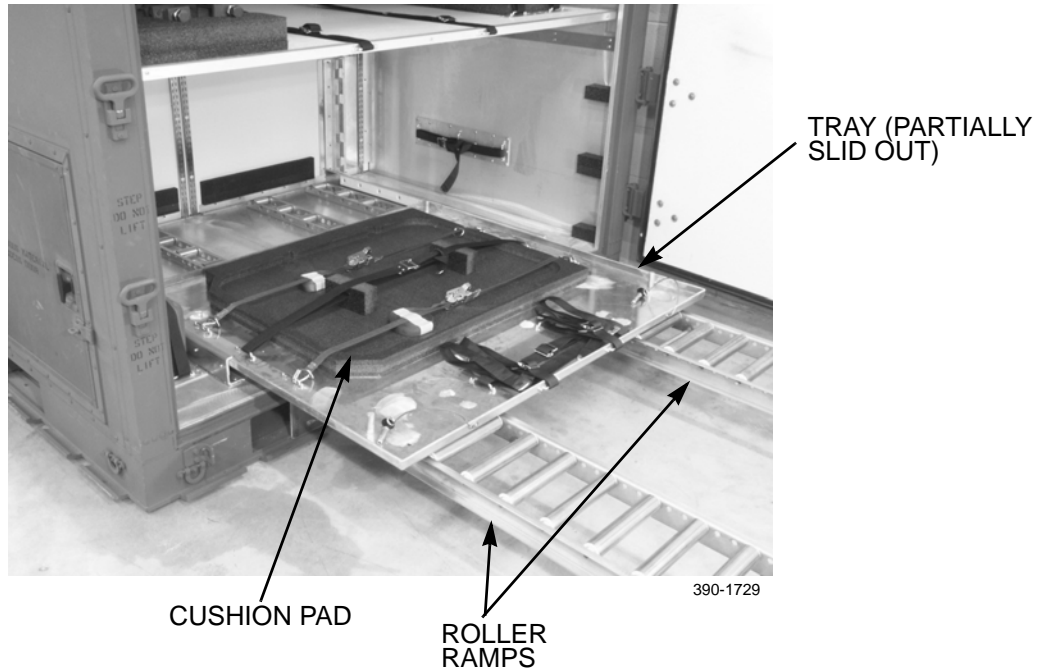
- c. Remove locknut, washer, and two plastic bushings. Separate arm from arm mount on each side of windshield and remove windshield.



- d. Reinstall bolts, washers, and nuts to windshield hinge. Reinstall two plastic bushings, washer, and locknut on each arm.
9. Stow windshield in ISU-60 container:
    - a. Open single-door end of container.
    - b. Remove two roller ramps from right-side wall of container.
    - c. Install each ramp at door opening, with two pins through each ramp into holes in edge of container floor.

**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

- d. Remove two pins and slide out tray.

**CAUTION**

Use caution not to damage windshield during handling.

- e. Place windshield in cushion pad on tray, with hinge facing out.
- f. Place cushion pad on top of windshield.
- g. Secure windshield with one strap.



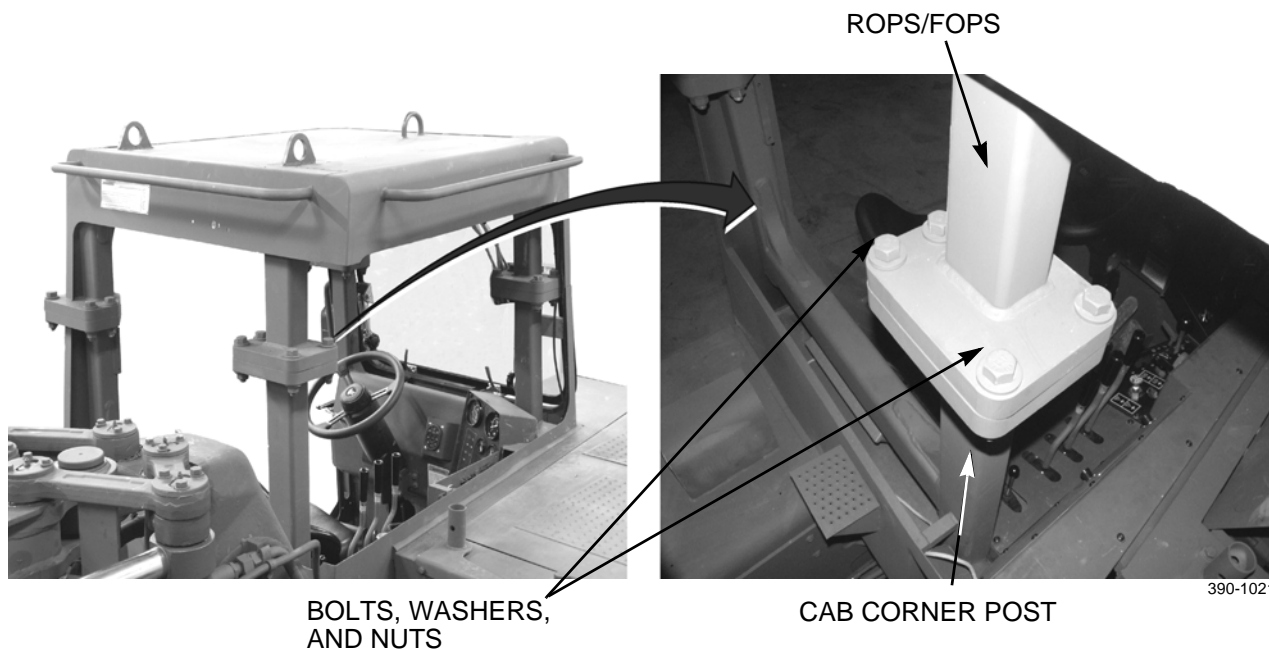
**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

ROPS/FOPS weighs 447 lb (203 kg).

10. OCONUS ONLY: Remove ROPS/FOPS and set aside for stowage in ISU-60 container:
  - a. Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.
  - b. Remove 16 nuts, 32 washers, and 16 bolts from four corners of ROPS/FOPS.
  - c. Lift ROPS/FOPS free of cab corner posts and lower to the ground.
  - d. Stow mounting hardware in BII toolbox on rear deck of scraper.



**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

11. Configure elevator for air transport:

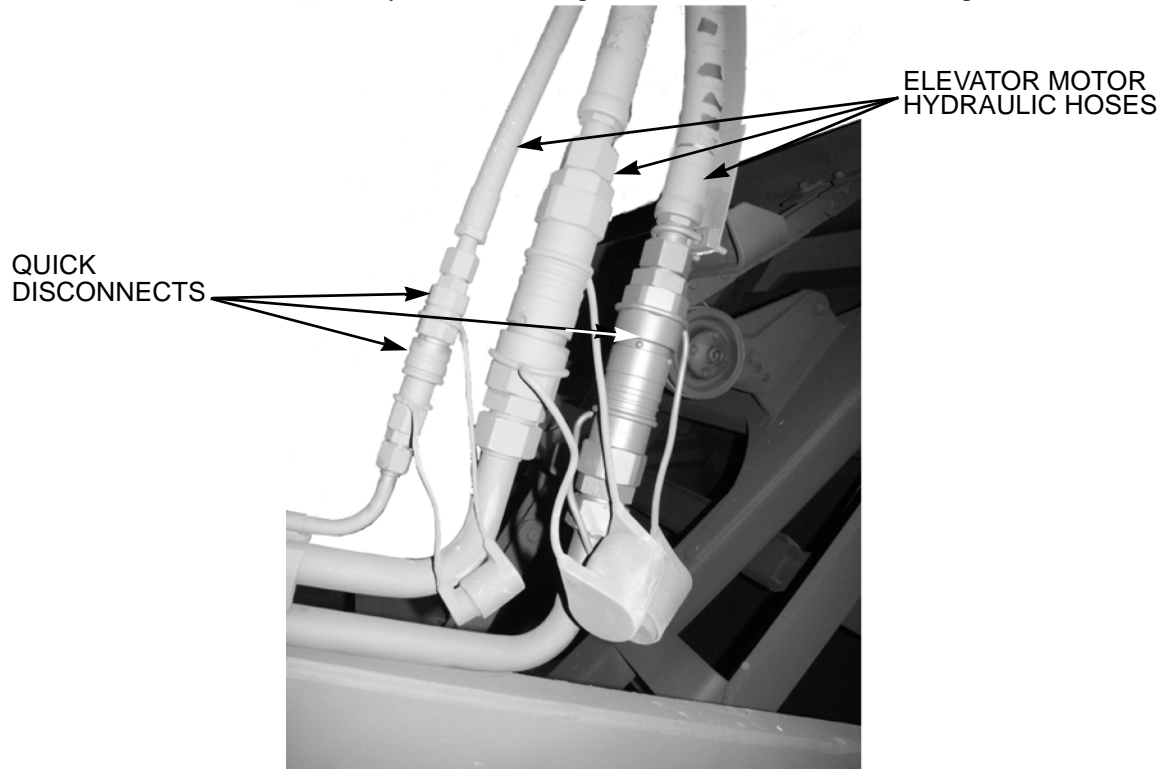
**CAUTION**

Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

**NOTE**

Whenever hydraulic hose quick disconnects need to be disconnected, operate control levers through all positions (WP 0004 00) to relieve any trapped hydraulic pressure in hoses. This will facilitate disconnection of hoses.

- a. Disconnect three elevator motor hydraulic hoses at quick disconnects on left side of scraper bowl. Install dust caps.



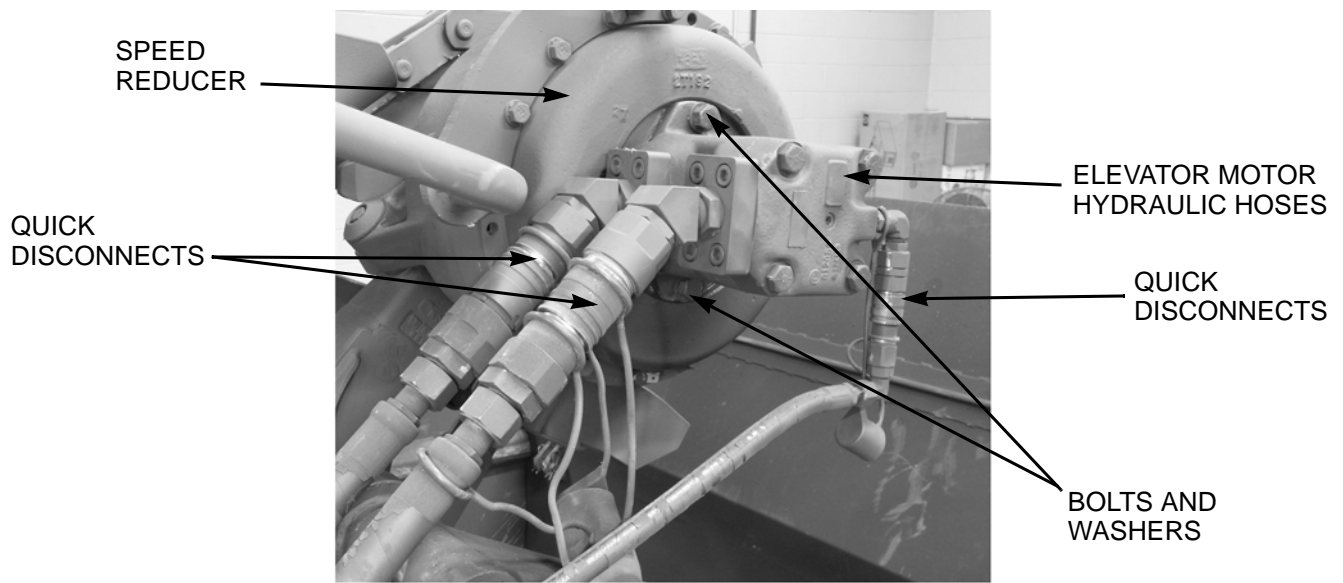
390-1066



**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED****WARNING**

Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel.

- b. Position ladder for access to elevator motor on left side of scraper bowl.
- c. Disconnect three hydraulic hose quick disconnects at elevator motor and remove hoses. Install dust caps. Set hoses aside until they are stowed, after elevator has been configured for air transport.
- d. Remove speed reducer cover with O-ring from stowage in ISU-60 container toolbox.



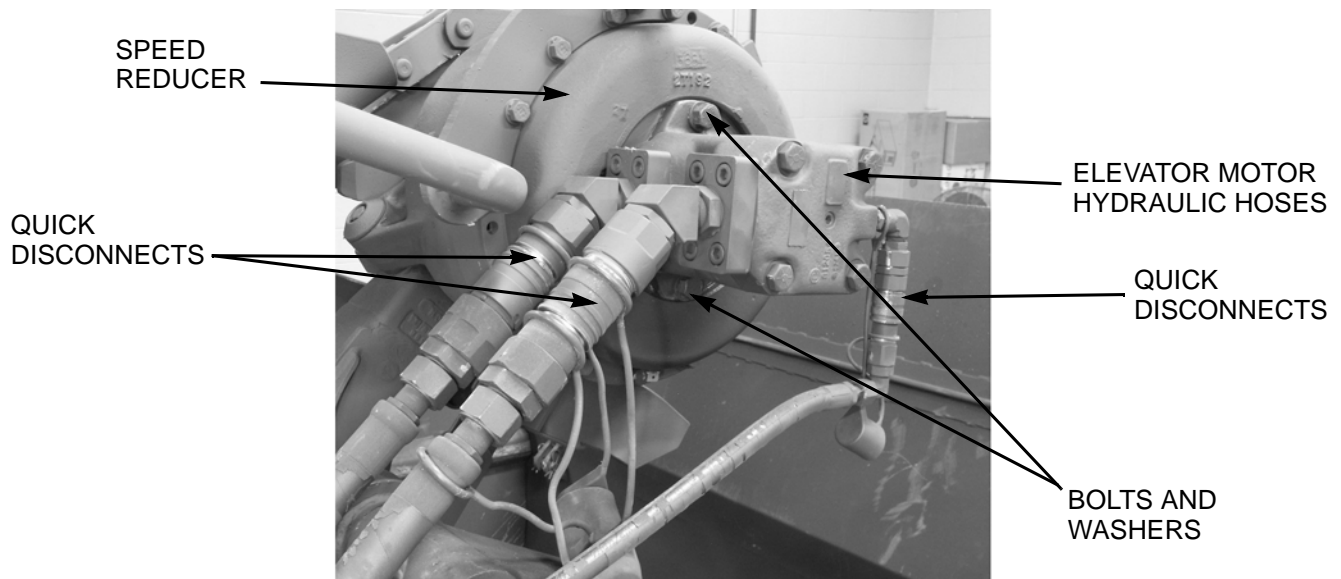
**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED****WARNING**

- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
- Some oil will spill as hydraulic motor is removed. Oil is very slippery. Ensure all spills are cleaned up. Failure to do so may cause injury to personnel.

**NOTE**

Hydraulic motor weighs approximately 85 lb (39 kg).

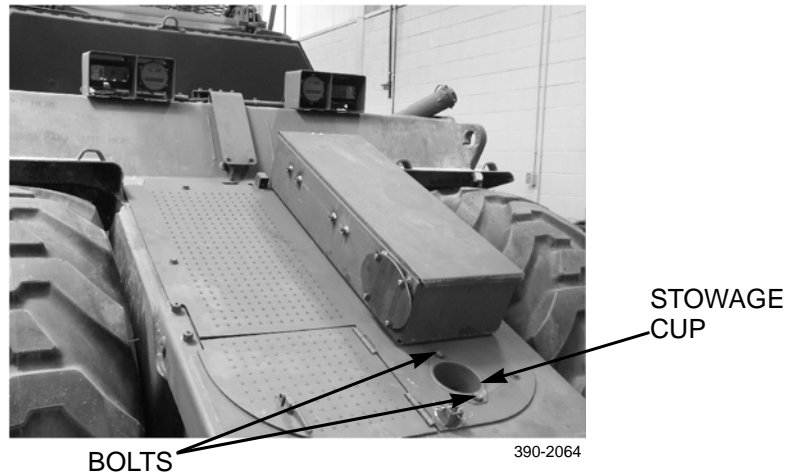
- e. Attach a suitable overhead lifting device to elevator motor. Take up slack in sling.
- f. Remove two bolts, washers, and elevator motor from speed reducer.



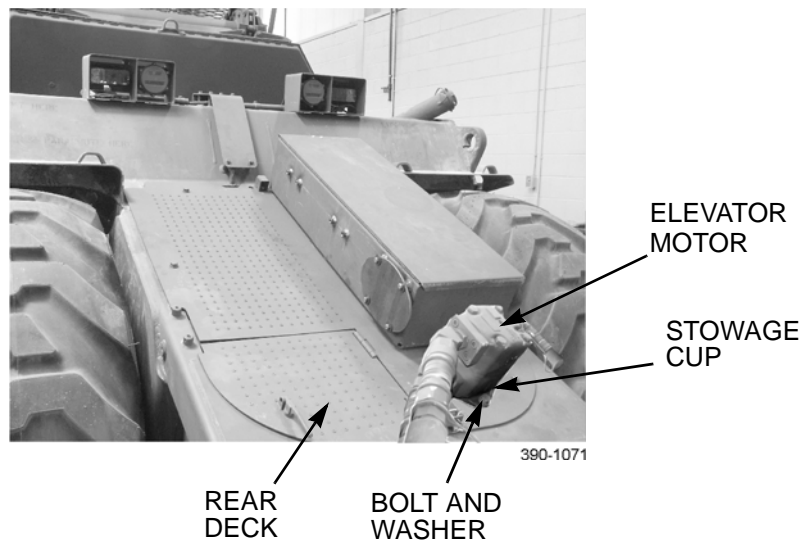
390-1252

**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

- g. Remove two bolts from elevator motor stowage cup and rear desk of scraper. Install cover with O-ring on speed reducer with two bolts removed from stowage cup.



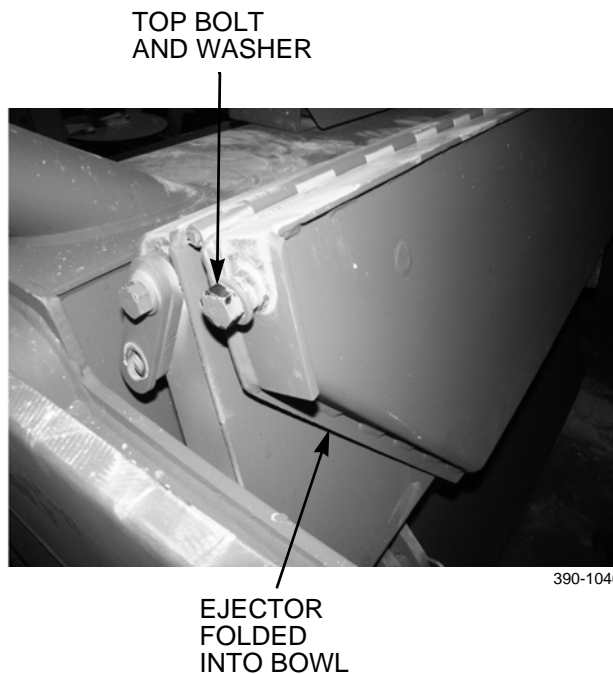
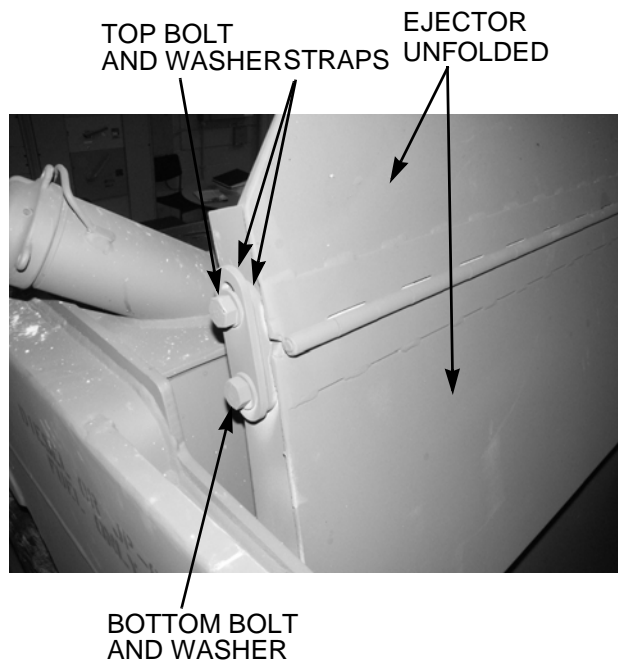
- h. Remove any dirt or accumulated debris from stowage cup. Install elevator motor on cup on rear deck with two washers and bolts that were removed in step F.



**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

- i. Fold ejector down:
  - (1) Attach a lifting sling through lifting eye of top flap of ejector. Take up slack in sling.
  - (2) Remove top bolt and washer from two straps and ejector.
  - (3) Loosen bottom bolt and washer. Reinstall top bolt and washer in top flap of ejector.
  - (4) With assistance, fold ejector down into bowl.

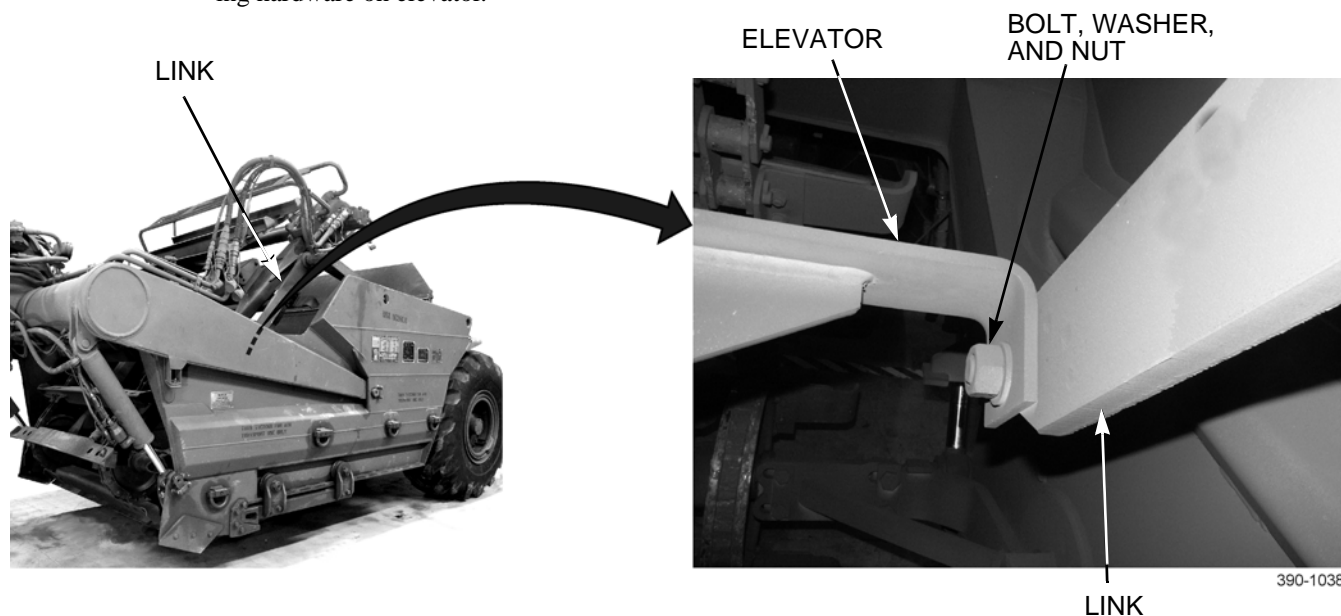


390-1040

**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED****WARNING**

Do NOT enter or stand in bowl or on elevator flights. Flights may move if stepped on. Failure to follow this warning may result in injury to personnel.

- j. Move ejector forward and pin elevator links to rear wall of ejector:
- (1) Remove nut, bolt, and washer and remove link from attachment to each side of elevator. Reinstall mounting hardware on elevator.



- (2) From rearmost ejector position, measure 31 3/4 in. (80.6 cm) forward and mark location on wall of bowl.
- (3) Remove ladder out of the way, clear of scraper bowl.

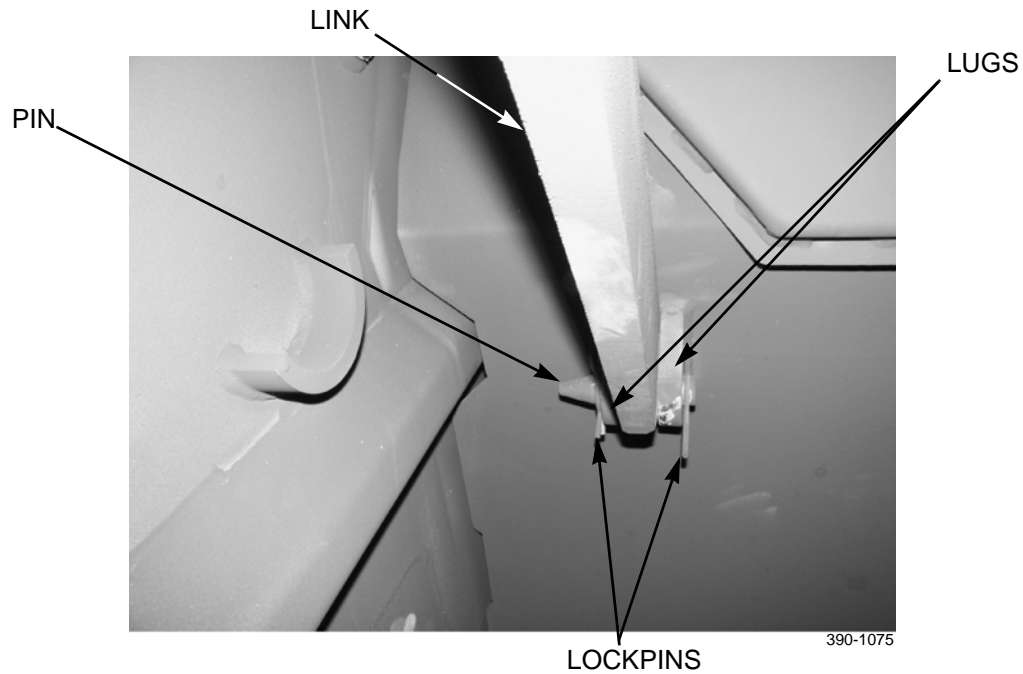
**WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- (4) Start engine and operate ejector forward until ejector is even with mark and links can be pinned through lugs on ejector rear wall.

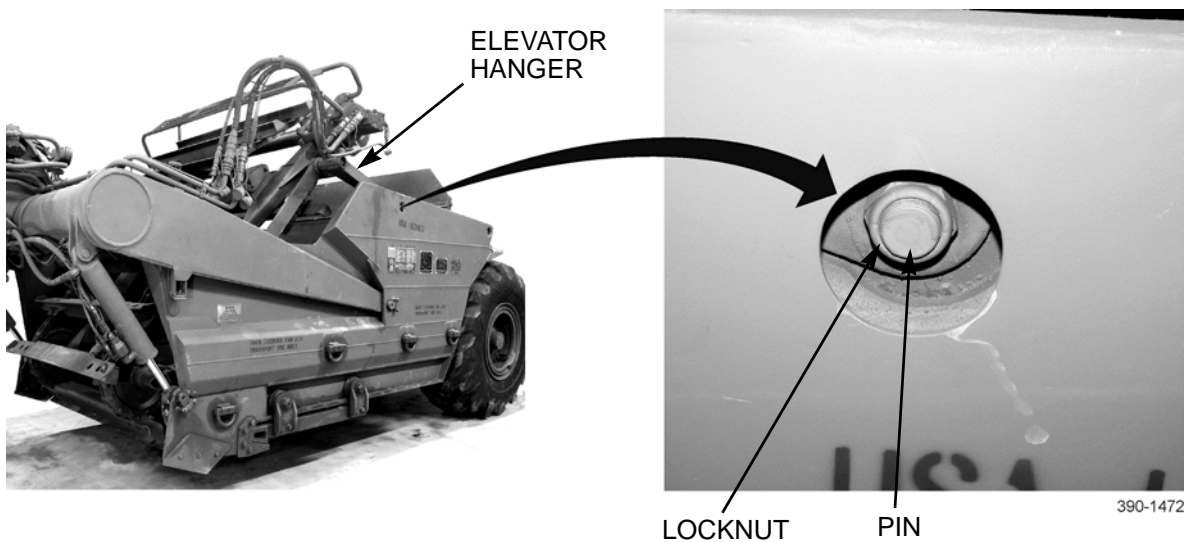
**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

- (5) Pin each link to lugs on ejector. Secure with two lockpins.



- k. Remove elevator hangers:

- (1) Remove locknut from pin on each side of bowl.

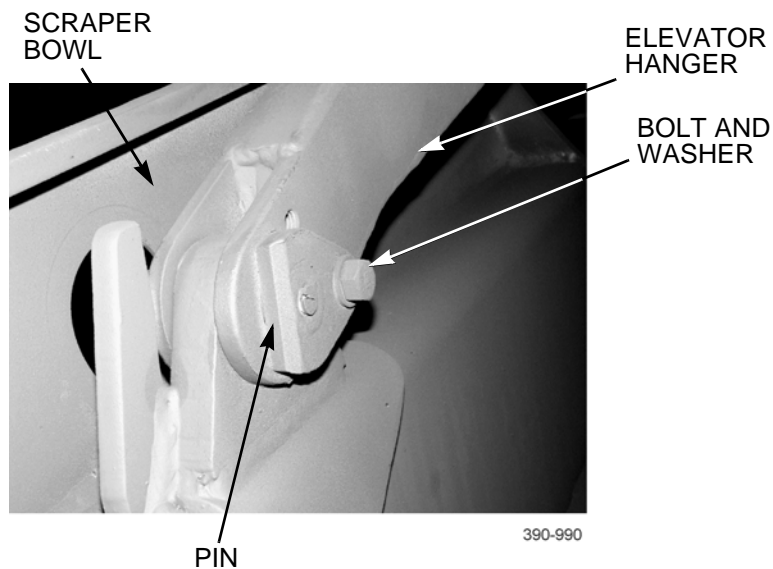


**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

- (2) Remove bolt and washer from pin.

**NOTE**

- To relieve tension on hangers, ejector can be moved slightly forward.
  - Another means to relieve tension on hangers is to attach a come-along (load binder) between one scraper bowl lifting eye and elevator drive cross shaft.
  - To assist in removing pins, work on both sides of scraper bowl at the same time.
- (3) Remove pin from each side of bowl, by driving pin out.
- (4) Lift each hanger free of bowl and remove from elevator shaft. Reinstall mounting hardware on hangers.
- (5) Stow hangers in BII toolbox on rear deck of scraper.



**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED****WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- l. Operate ejector rearward until elevator shafts rest on hangers.

**ELEVATOR RAISED****HANGER ELEVATOR LOWERED**

390-1076

- m. Place three elevator motor hydraulic hoses on an elevator flight and secure with three straps.

**ELEVATOR MOTOR  
HYDRAULIC HOSES**

390-1735



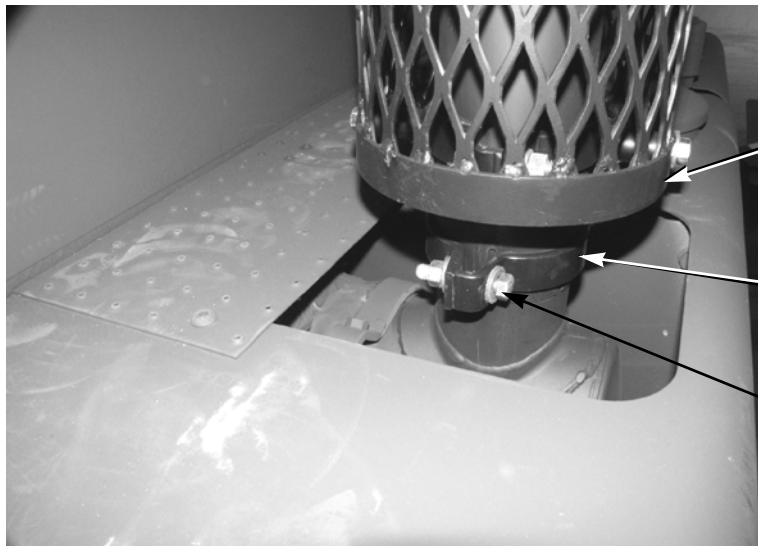
**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

12. Shut down engine.

**WARNING**

Do NOT remove exhaust stack until it has cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

13. OCONUS ONLY: Remove exhaust stack from muffler on right side of tractor and install exhaust extension in its place.
- a. Loosen nut, bolt, two washers, and clamp, and remove exhaust stack from right side of tractor. Retain mounting hardware on exhaust stack and set exhaust stack aside for stowage in ISU-60 container.



EXHAUST  
STACK

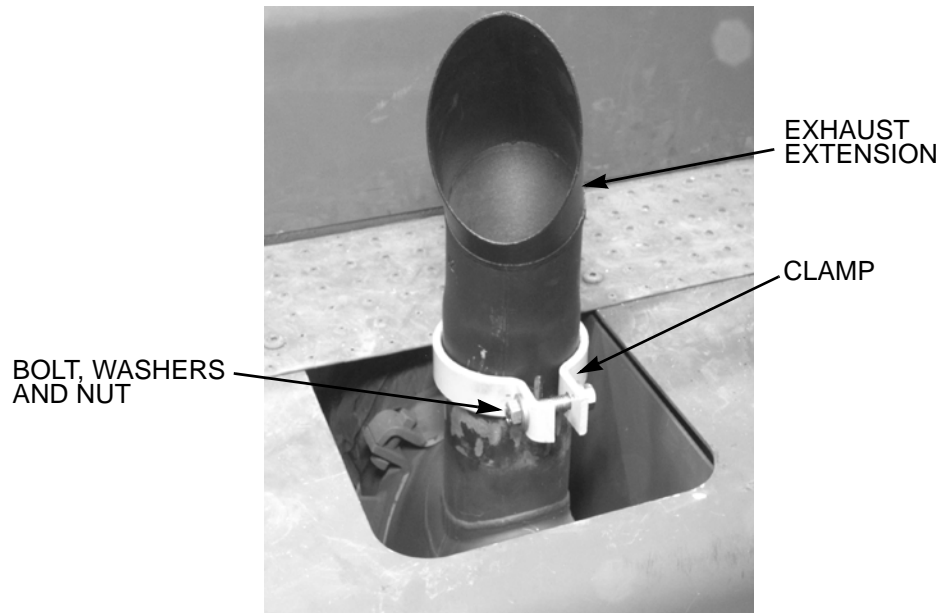
CLAMP

BOLT, WASHERS,  
AND NUT

390-1019

**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED**

- b. Install exhaust extension on muffler with clamp, bolt, two washers, and nut. Position extension so that fumes will be directed away from cab. Tighten nut securely.

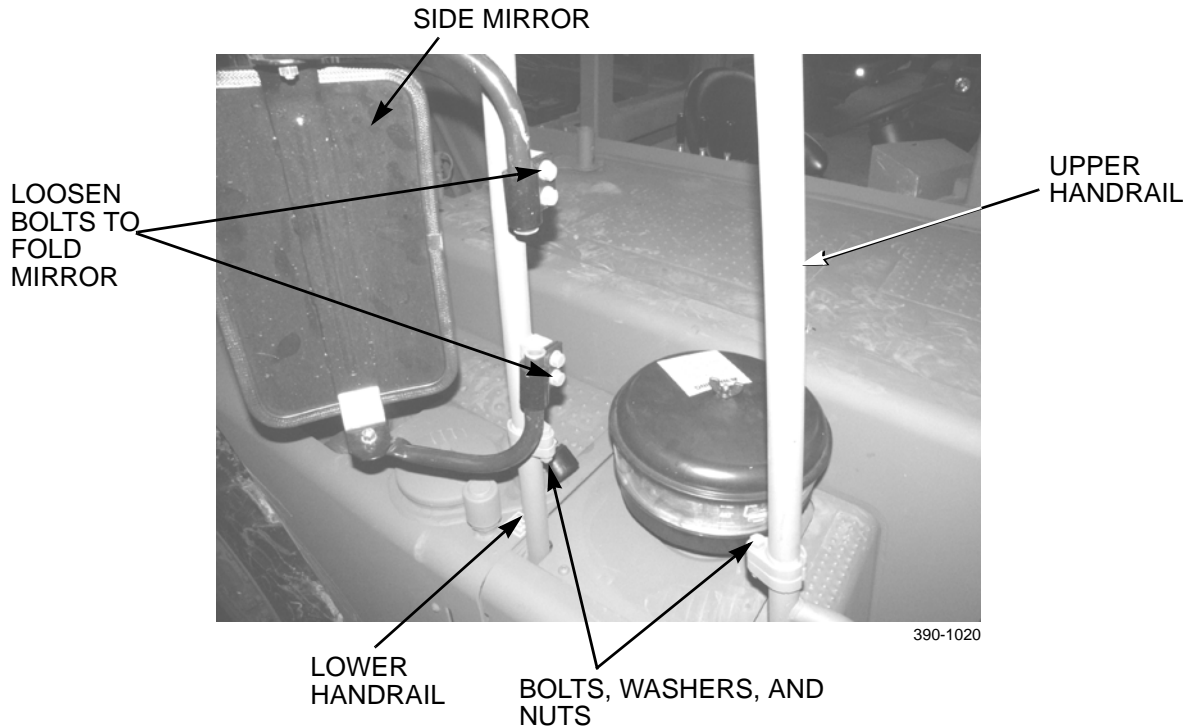


390-1790

**WARNING**

Removal of upper handrail on right side of tractor leaves right side of tractor without any means to safely climb on machine. Use caution when climbing on right side with upper handrail removed. Failure to do so could result in injury to personnel.

14. OCONUS ONLY: Remove two nuts, washers, bolts, and upper handrail with side mirror from lower handrail on right side of tractor. Reinstall mounting hardware on lower handrail.
15. OCONUS ONLY: Loosen two bolts and fold side mirror flat against upper handrail. Set handrail with side mirror aside for stowage in ISU-60 container.

**CONFIGURE MACHINE FOR RAIL TRANSPORT - CONTINUED****LOAD MACHINE ONTO FLATCAR****WARNING**

- Always use a ground guide when driving machine onto flatcars. Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
  - If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.
1. Remove wheel blocks. Following instructions from railcar load master and ground guides, slowly drive machine straight onto flatcars.
    - a. Use 1<sup>st</sup> gear ONLY.
    - b. When passing over spanners between flatcars, maintain a constant speed. Do NOT jam on brakes or reverse direction.
    - c. Stop machine when directed to do so by ground guide.
  2. Lower bowl and position cutting edge onto suitable shoring.
  3. Ensure steering wheel is centered. Place transmission in N (Neutral) and lock, apply parking brake, and shut down engine.

**SECURE MACHINE ON FLATCAR****WARNING**

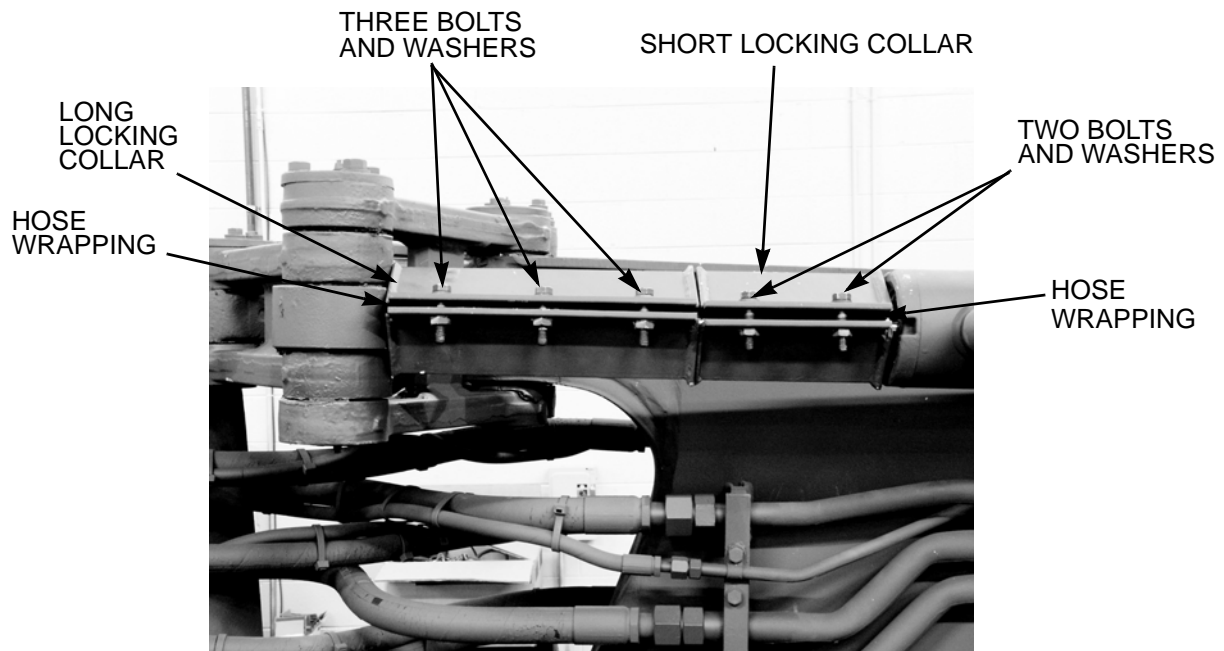
Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

1. Install all steering cylinder locking collars:
  - a. Disassemble each of four locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.): remove two bolts and washers and open each short locking collar and remove hose wrapping. Remove three bolts and washers and open each long locking collar and remove hose wrapping.

**CAUTION**

To prevent damage to cylinder rod, ensure rod surface is free of dirt or other debris before locking collars are installed.

- b. Position hose wrappings and one short and one long locking collar around rod end of each steering cylinder.
  - c. Install three washers and bolts to each long locking collar. Install two washers and bolts to each short locking collar. Tighten bolts evenly and securely.



390-1033

2. Tie machine down on flatcar in accordance with shipping data plate on machine. Provide blocking and shoring of machine and all wheels.

**SECURE MACHINE ON FLATCAR - CONTINUED****CAUTION**

- Machines transported by rail without proper safeguards may incur wind damage. Ensure all doors and compartments are securely latched and secured against flying open. Failure to do so may cause equipment damage in transit.
  - Exhaust pipe must be taped closed to prevent wind from entering exhaust system and causing turbo-charger to spin, without the benefit of lubrication. Failure to cover exhaust pipe may damage turbo-charger.
3. Use duct tape (Item 22, WP 0026 00) to cover exhaust pipe (CONUS) or exhaust extension (OCONUS).
  4. Protect windshield (CONUS ONLY) and lights from possible damage from objects thrown by wind. Install instrument panel covers (WP 0005 00).
  5. Ensure all compartment doors and BII toolbox on rear deck of scraper are closed, securely latched, and secure against vandalism.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

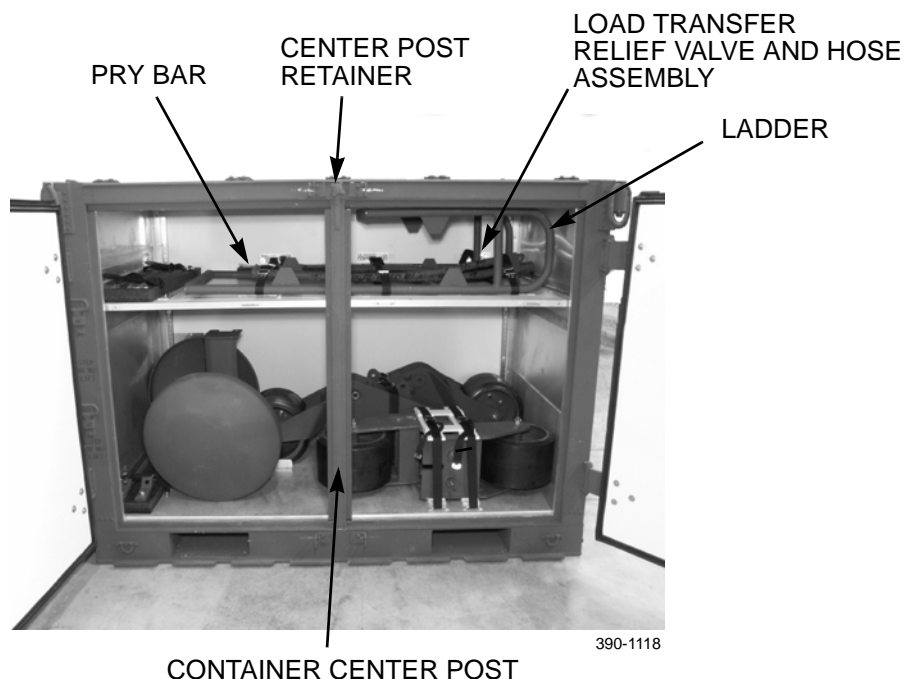
It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

## RAIL TRANSPORT - CONTINUED

0021 00

**SECURE MACHINE ON FLATCAR - CONTINUED**

6. Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 1 and 2.
- pry bar (OCONUS ONLY);
  - ladder (OCONUS ONLY);

**Table 1. Stowage Instructions for ISU-60 Container - Two-Door End.**

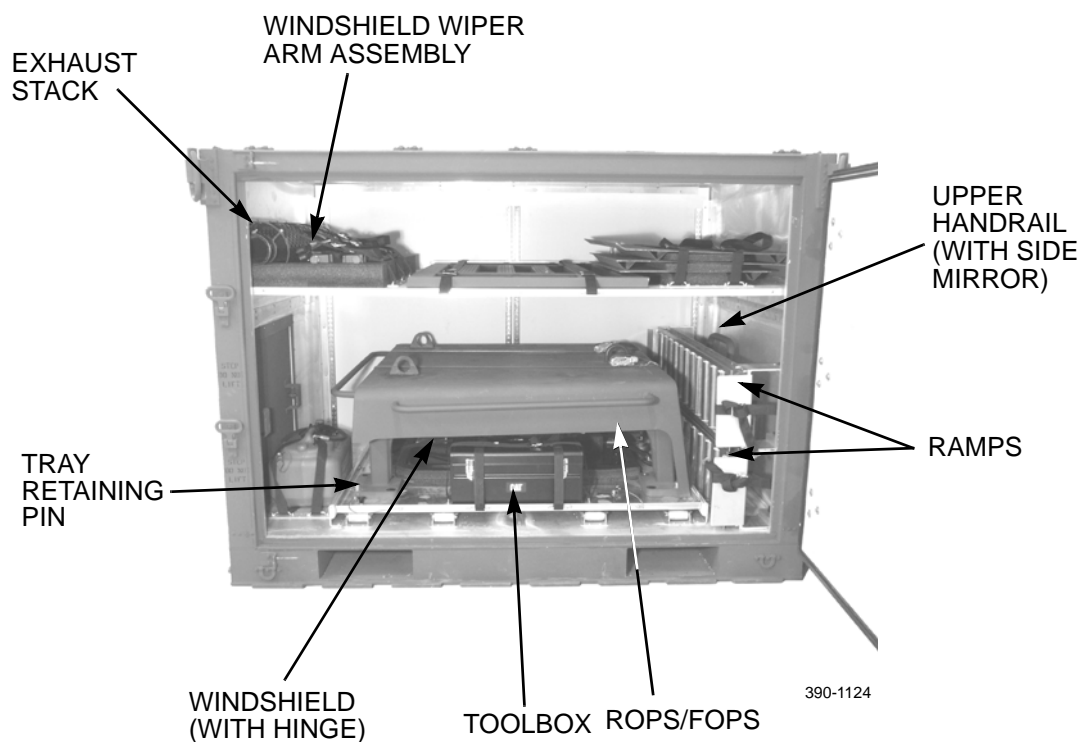
COMPONENT	STOWAGE INSTRUCTIONS
Pry Bar	<ol style="list-style-type: none"> <li>Place component in cushion pad against rear wall of container.</li> <li>Secure with three straps.</li> </ol>
Ladder	<ol style="list-style-type: none"> <li>Place ladder on shelf with top of ladder facing right.</li> <li>Ensure load transfer relief valve and hose assembly is positioned on top of ladder.</li> <li>Secure components with three straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>Position center post, installing bottom end first.</li> <li>Raise shelf slightly to lock center post in position.</li> <li>Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing doors. Failure to do so may result in damage to equipment.</p>

## RAIL TRANSPORT - CONTINUED

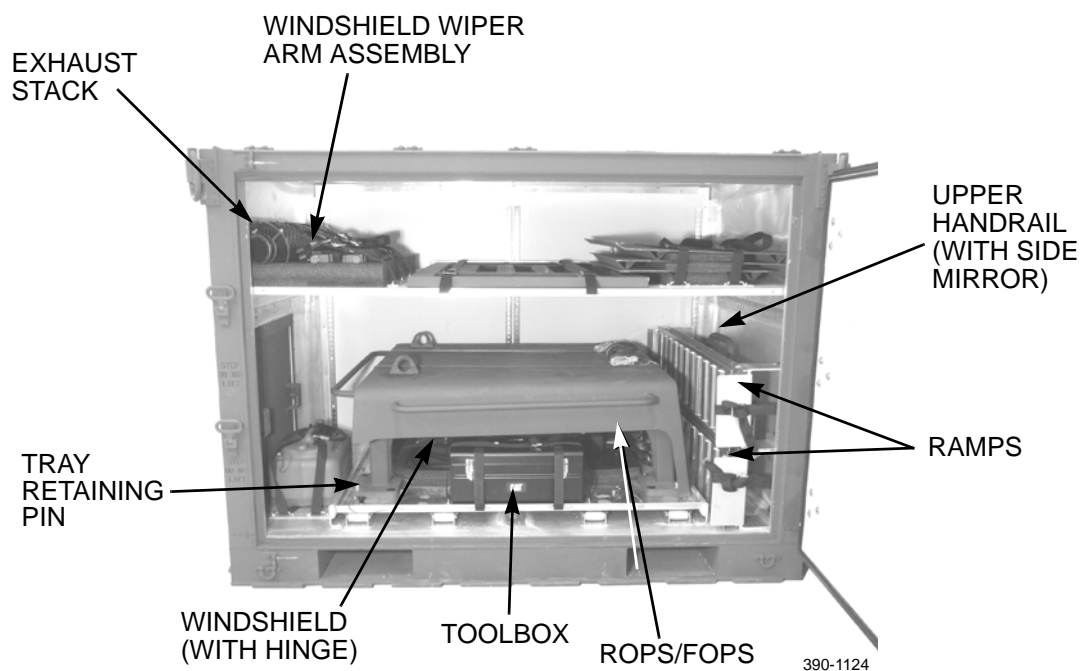
0021 00


**SECURE MACHINE ON FLATCAR - CONTINUED**

- c. exhaust stack (OCONUS ONLY);
- d. windshield wiper arm assembly (OCONUS ONLY);
- e. upper handrail (with side mirror) (OCONUS ONLY);
- f. ROPS/FOPS (OCONUS ONLY); and
- g. toolbox.

**Table 2. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Exhaust Stack and Windshield Wiper Arm Assembly	<ol style="list-style-type: none"> <li>1. Place exhaust stack in left cutout of cushion pad, on left side of shelf. Lower end of stack should be facing out.</li> <li>2. Place windshield wiper arm assembly next to exhaust stack.</li> <li>3. Secure components with three straps.</li> </ol>
Upper Handrail (with Side Mirror)	<ol style="list-style-type: none"> <li>1. Place against right-side wall of container.</li> <li>2. Secure with one strap.</li> </ol>

**SECURE MACHINE ON FLATCAR - CONTINUED****Table 3. Stowage Instructions for ISU-60 Container - Single-Door End - Continued.**

COMPONENT	STOWAGE INSTRUCTIONS
ROPS/FOPS	 <p><b>WARNING</b></p> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do not allow to swing free.</p> <p><b>CAUTION</b></p> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> <ol style="list-style-type: none"> <li>Using a suitable three-point lifting device, lift ROPS/FOPS into position over tray, with front of ROPS/FOPS to the right.</li> <li>Lower ROPS/FOPS onto four studs, one at each corner of tray.</li> <li>Secure ROPS/FOPS with two straps.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>Place toolbox on front edge of tray.</li> <li>Secure with three straps.</li> <li>Slide tray all the way in.</li> <li>Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>Position each ramp against right wall of container.</li> <li>Secure each ramp with strap.</li> </ol>
	<p><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>



**SECURE MACHINE ON FLATCAR - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

7. Load ISU-60 container onto flatcar. Secure container with tie downs in accordance with shipping data plate on container.

**UNLOAD MACHINE FROM FLATCAR****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

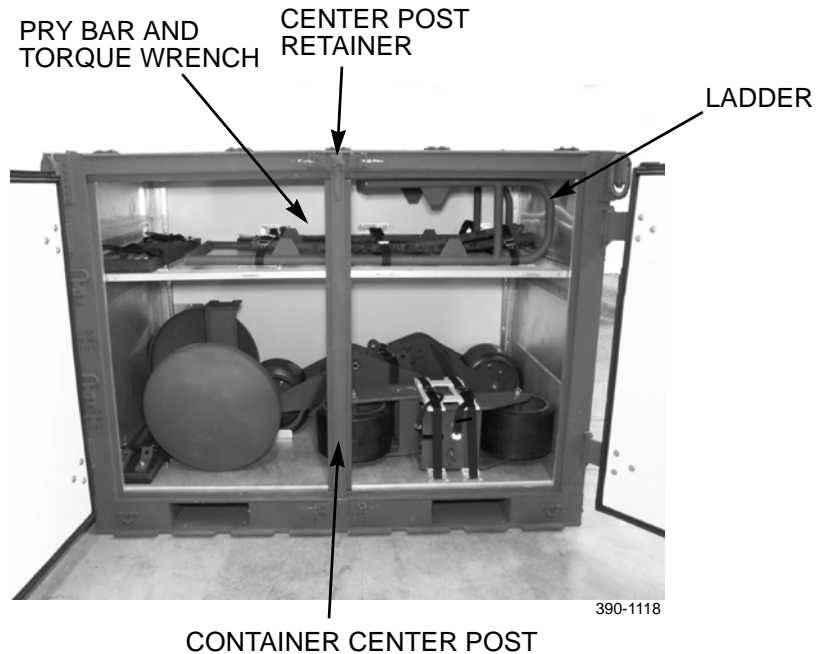
1. Remove tie downs and unload ISU-60 container from flatcar.
2. Place ISU-60 container near machine assembly area and remove the following items from container, in accordance with illustrations and information in Table 3:

**NOTE**

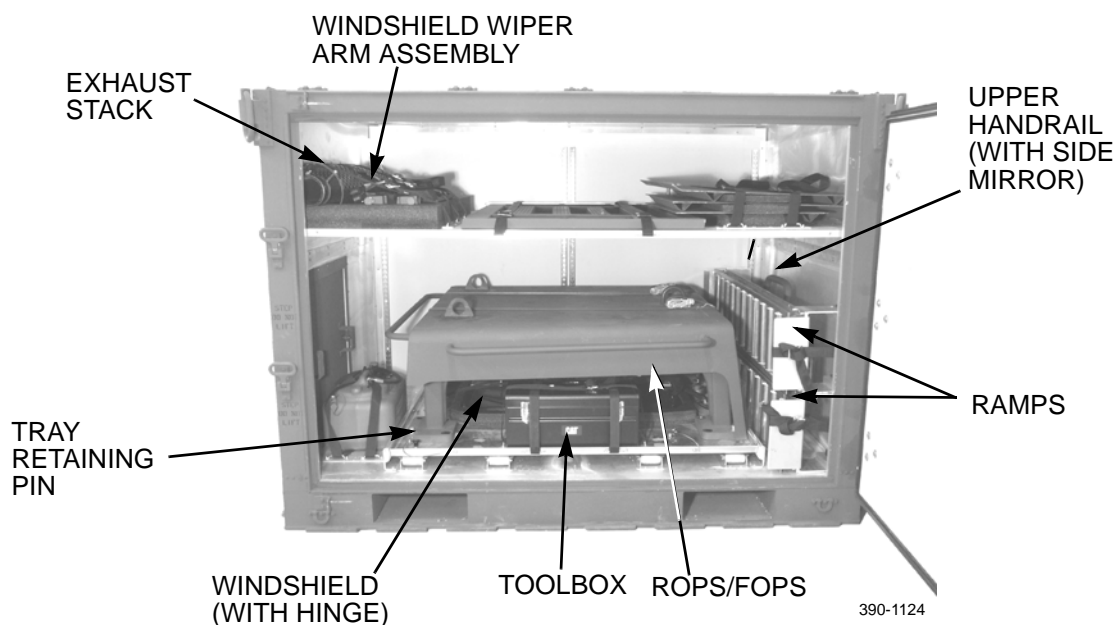
Container center post must be removed to remove ladder. Remove retainer and post.

**RAIL TRANSPORT - CONTINUED****0021 00****UNLOAD MACHINE FROM FLATCAR - CONTINUED**

- a. ladder (OCONUS ONLY);
- b. pry bar and torque wrench (OCONUS ONLY);



- c. toolbox;
- d. ROPS/FOPS (OCONUS ONLY);
- e. windshield (with hinge) (OCONUS ONLY);
- f. exhaust stack (OCONUS ONLY);
- g. windshield wiper arm assembly (OCONUS ONLY); and
- h. upper handrail (with side mirror) (OCONUS ONLY).

**UNLOAD MACHINE FROM FLATCAR - CONTINUED****Table 4. Unpacking ISU-60 Container - Single-Door End.**

COMPONENT	UNPACKING INSTRUCTIONS
Ramps	<ol style="list-style-type: none"> <li>1. Remove two roller ramps from right-side wall of container.</li> <li>2. Install each ramp at door opening, with two pins through each ramp into holes in edge of floor.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Remove two pins and slide out tray.</li> <li>2. Release three straps and remove toolbox from tray.</li> </ol>
ROPS/FOPS	<ol style="list-style-type: none"> <li>1. Release two straps from ROPS/FOPS. <div> </div> <div><b>WARNING</b></div> <p>ROPS/FOPS weighs 447 lb (203 kg). Use extreme caution when lifting and do not allow to swing free. Failure to do so may result in injury or death to personnel.</p> <div><b>CAUTION</b></div> <p>Use caution not to damage windshield when handling ROPS/FOPS.</p> </li> <li>2. Use a suitable three-point lifting device to lift ROPS/FOPS clear of tray.</li> </ol>
Windshield (with Hinge)	<div><b>CAUTION</b></div> <p>Use caution not to damage windshield during handling. Do not remove from container until ready to install.</p> <ol style="list-style-type: none"> <li>1. Release one strap from windshield.</li> <li>2. Carefully remove windshield (with hinge) from cushion pad.</li> </ol> <div><b>NOTE</b></div> <p>To remove all remaining components, remove straps as required and lift out component.</p>

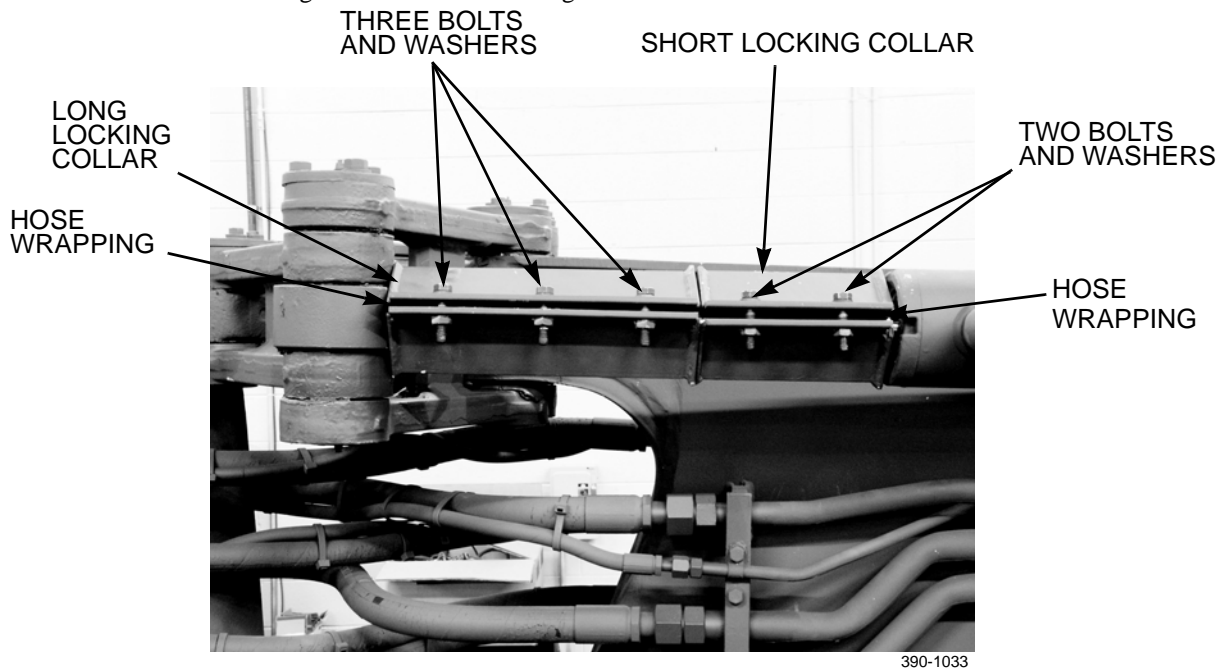
**UNLOAD MACHINE FROM FLATCAR - CONTINUED**

3. Remove tie downs, blocking, and shoring from machine. Remove protective coverings from lights and windshield (CONUS ONLY). Remove tape from exhaust pipe (CONUS) or exhaust extension (OCONUS). Remove instrument panel covers (WP 0005 00).

**WARNING**

Hitch and steering movement can reduce clearances suddenly and cause personnel injury. Always stop engine BEFORE working in area of hitch link.

4. Remove steering cylinder locking collars and set aside for stowage in ISU-60 container:
  - a. Remove five bolts and washers and remove two locking collars (one short and one long) and hose wrappings from each steering cylinder.
  - b. Reassemble each locking collar with its mounting hardware.



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**WARNING**

- Always use a ground guide when driving machine off flatcars. Failure to use a ground guide may result in an accident, causing death or injury to personnel or damage to equipment.
  - If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.
5. Start engine and allow to warm up. Raise bowl. Following instructions from railcar load master and ground guides, slowly drive straight off flatcars until clear of railhead.
    - a. Use 1<sup>st</sup> gear ONLY.
    - b. When passing over spanners between flatcars, maintain a constant speed. Do NOT jam on brakes or reverse direction.
    - c. Park machine when positioned at a convenient location to reconfigure. Place transmission in N (Neutral) and lock, apply parking brake, and lower bowl to the ground. Shut down engine. Block tractor and scraper wheels.

**UNLOAD MACHINE FROM FLATCAR - CONTINUED**

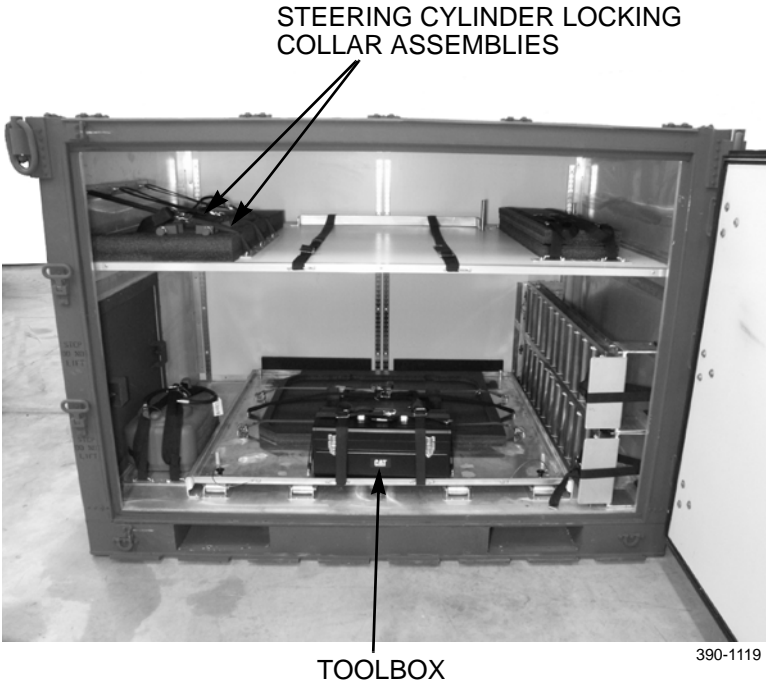
6. CONUS ONLY: Machine is now fully operational.

**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

7. CONUS ONLY: Stow the following items in ISU-60 container in accordance with illustration and information in Table 4:

- a. toolbox; and
- b. four steering locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.).



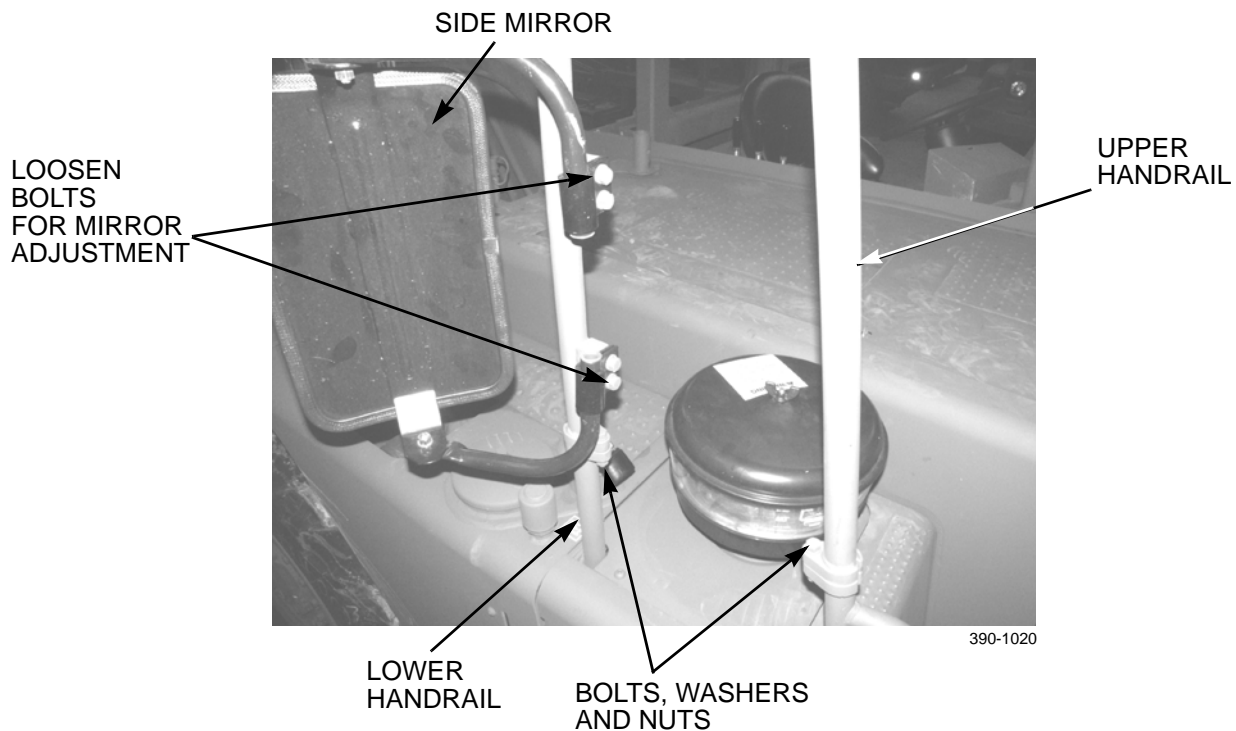
**Table 5. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Steering Cylinder Locking Collar Assemblies	<ol style="list-style-type: none"><li>1. Place steering cylinder locking collar assemblies in two right cutouts in cushion pad, on left side of shelf.</li><li>2. Secure with three straps.</li></ol>
Toolbox	<ol style="list-style-type: none"><li>1. Place toolbox on front edge of tray.</li><li>2. Secure with three straps.</li></ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**RETURN MACHINE TO OPERATIONAL CONFIGURATION****NOTE**

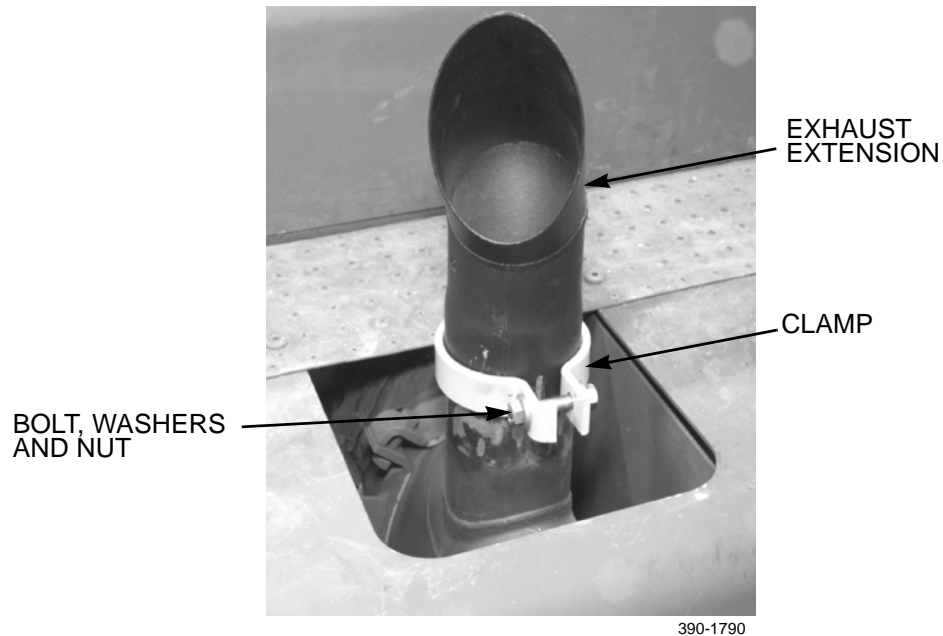
Whenever hydraulic hose quick disconnects need to be connected, operate control levers through all positions (WP 0004 00) to relieve any dropped hydraulic pressure in hoses. This will facilitate connection of hoses.

1. OCONUS ONLY: Install upper handrail with side mirror on lower handrail of tractor with two bolts, washers, and nuts. Tighten nuts securely.
2. OCONUS ONLY: Loosen two bolts and unfold side mirror. Adjust to provide visibility to side and rear of machine. Tighten bolts.

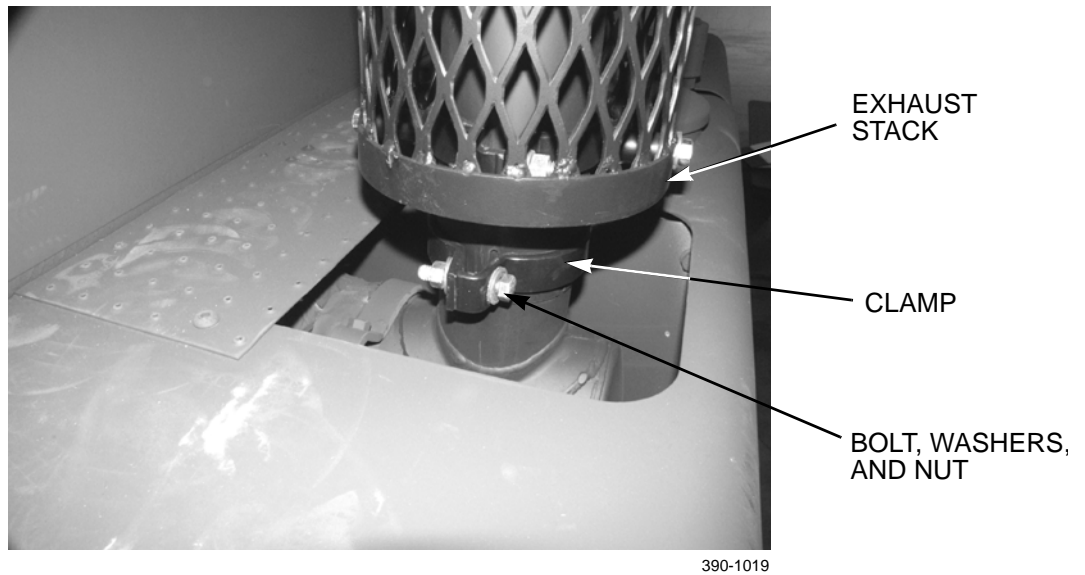
**WARNING**

Do NOT install exhaust stack until engine exhaust components have cooled to the touch. Wear gloves and protective clothing as required to guard against burns. Failure to follow this warning may cause personnel injury.

3. OCONUS ONLY: Remove exhaust extension from muffler on right side of tractor and install exhaust stack in its place:
  - a. Loosen nut, bolt, two washers, and clamp, and remove exhaust extension from muffler. Retain mounting hardware on extension and set aside for stowage in ISU-60 container.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION**

- b. Install exhaust stack with clamp, bolt, two washers, and nut. Tighten nut securely.



4. OCONUS ONLY: Remove straps and three elevator motor hydraulic hoses from stowage on elevator flight.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

5. OCONUS ONLY: Return elevator to work configuration:

**WARNING**

If operating machine without ROPS/FOPS, drive with extreme caution, at low idle, and in 1<sup>st</sup> gear or reverse ONLY. Machine has no rollover/falling object protection without ROPS/FOPS. Failure to follow this warning may cause injury or death to personnel or damage to equipment.

6. NOTE: Machine is now drivable. However, until ROPS/FOPS is installed, it should be operated only with extreme caution, at low idle and in 1<sup>st</sup> gear or reverse ONLY. As required, move machine to a new location to complete machine assembly.
7. Return elevator to work configuration:

**WARNING**

Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

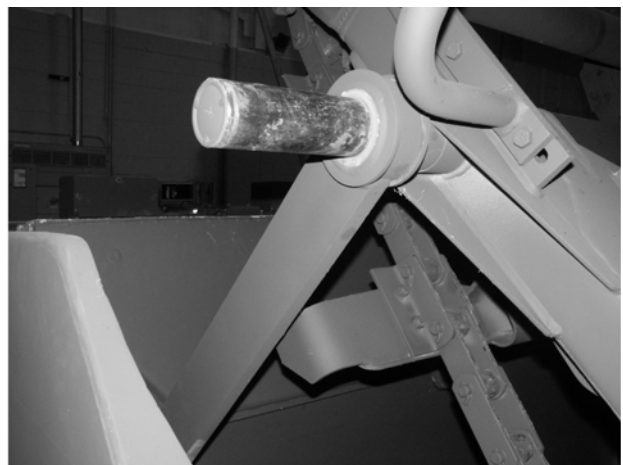
- a. Start engine and raise elevator by moving ejector forward until elevator shafts are free of hangers.

ELEVATOR SHAFT



HANGER

ELEVATOR LOWERED



ELEVATOR RAISED

390-1077

- b. Install elevator hangers:
- (1) Remove hangers from BII toolbox on rear deck of scraper.

**NOTE**

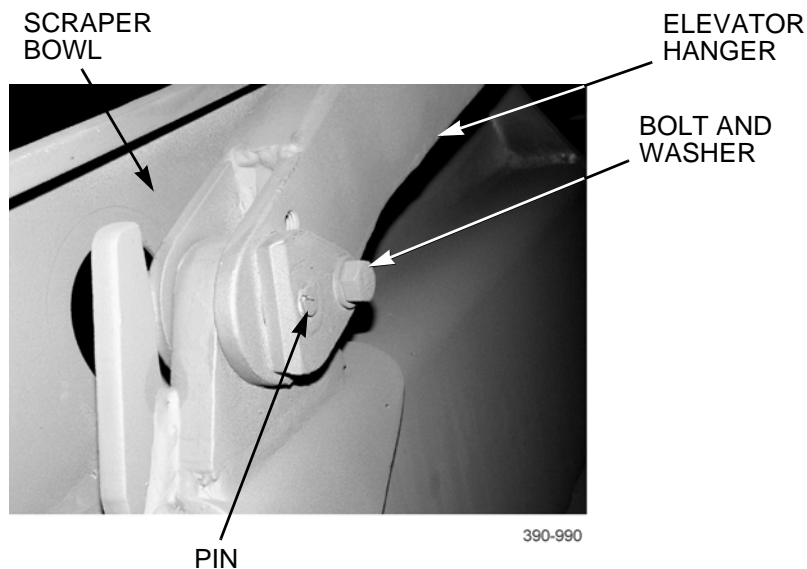
GAA grease (Item 10, WP 0026 00) coated on elevator shafts will make hangers easier to install.

- (2) Position large end of each hanger on elevator shaft.



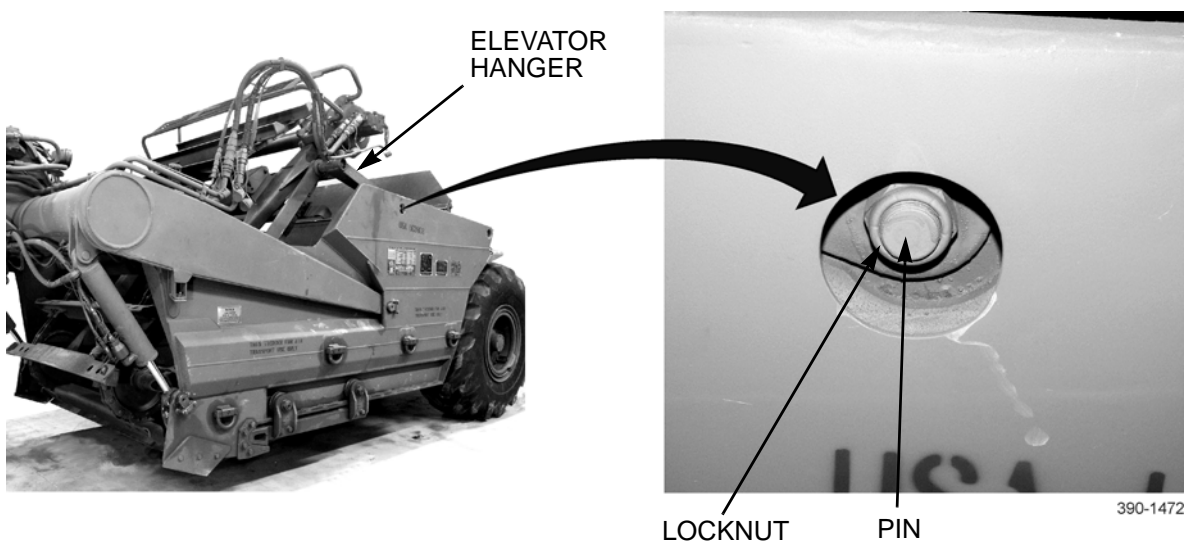
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

- To assist in installing pins, work on both sides of scraper bowl at the same time.
  - Ejector can be moved slightly forward or rearward to allow installation of pins.
- (3) Install pin on each side of scraper bowl, by driving pin in.
  - (4) Install washer and bolt on pin. Tighten bolt securely.

**NOTE**

Notify Unit Maintenance to obtain and install new locknuts on pins as soon as possible.

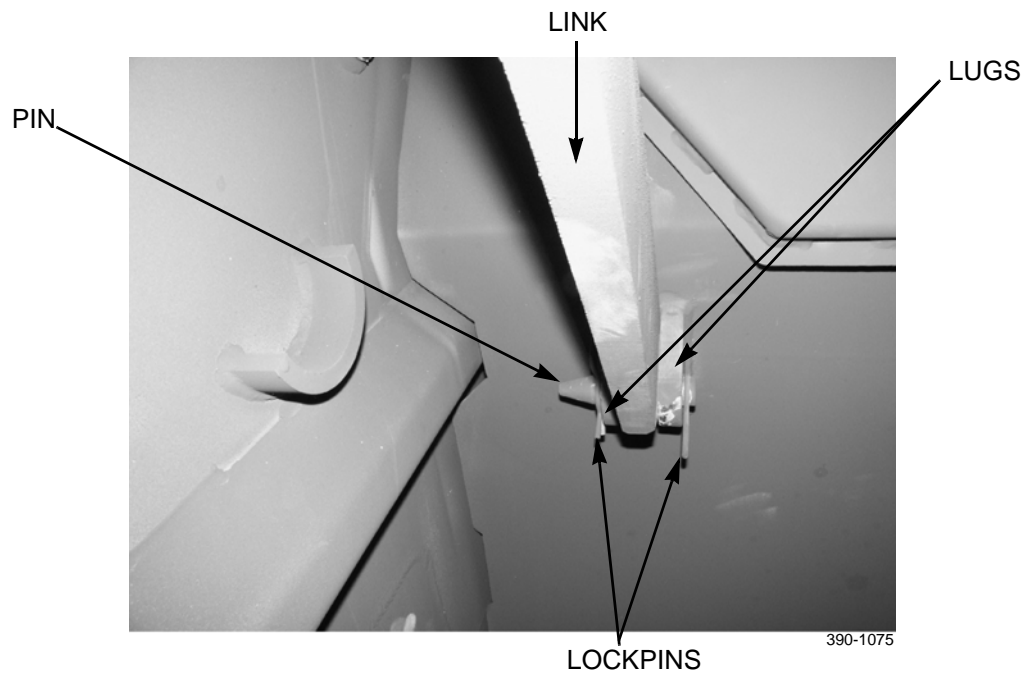
- (5) Install locknut on pin and tighten securely.



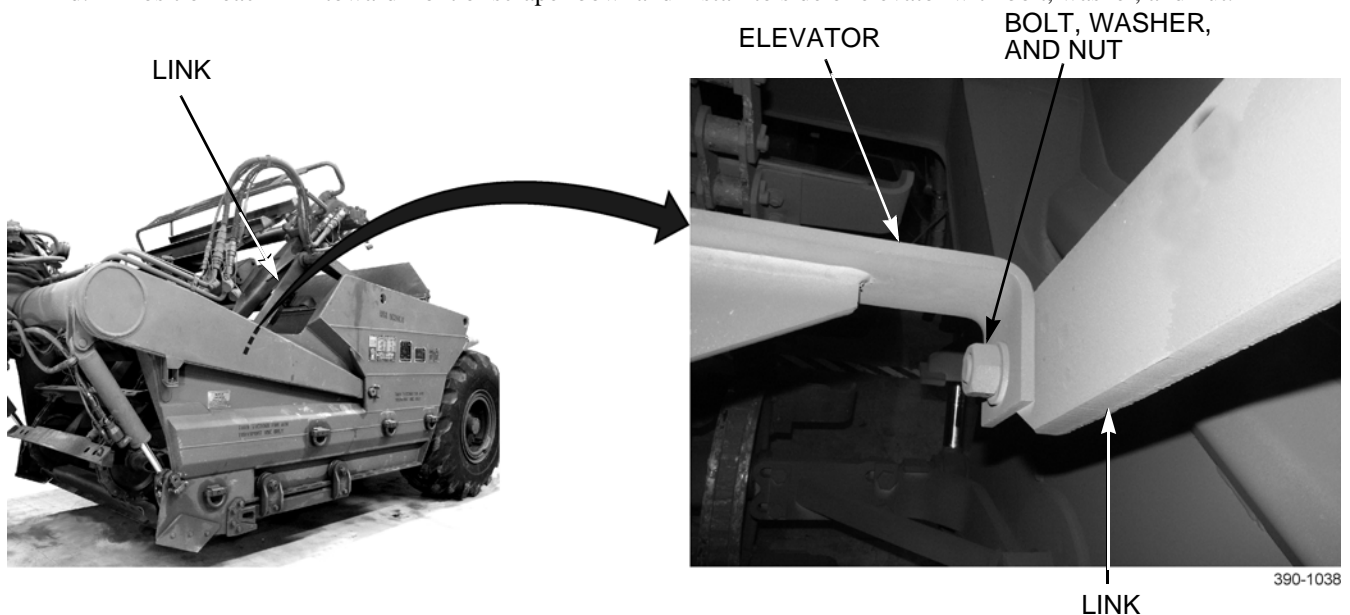
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****NOTE**

Ejector can be moved slightly forward or rearward to allow removal of pins.

- c. Remove lockpins and unpin two elevator links from lugs on ejector rear wall. Stow pins and lockpins in BII tool-box.



- d. Position each link toward front of scraper bowl and install to side of elevator with bolt, washer, and nut.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

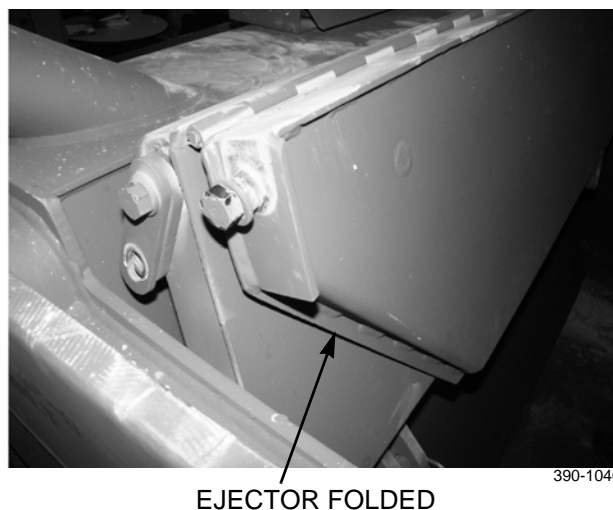
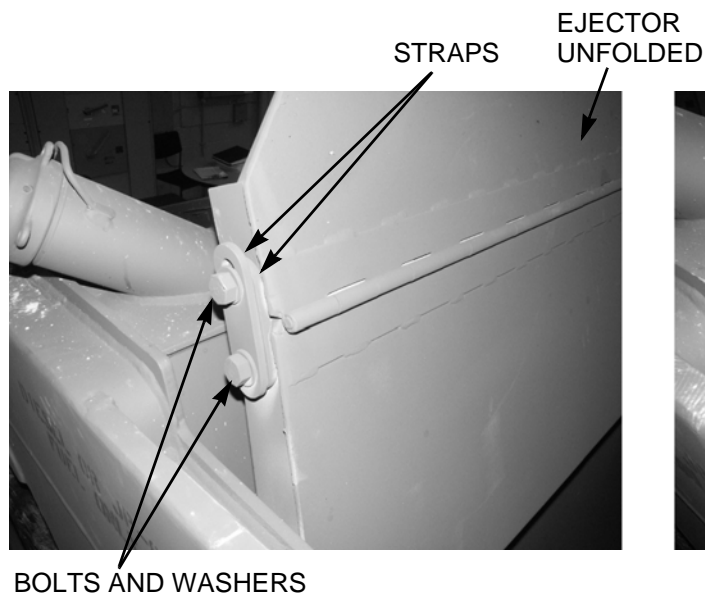
Scraper floor and floor rollers are in motion when ejector is in motion. Stand clear of scraper bowl to avoid injury to personnel.

- e. Move ejector fully to the rear. Shut down engine.

**WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

- f. Use a suitable lifting device to unfold ejector. Secure two straps on each side with two washers and bolts.



390-1040

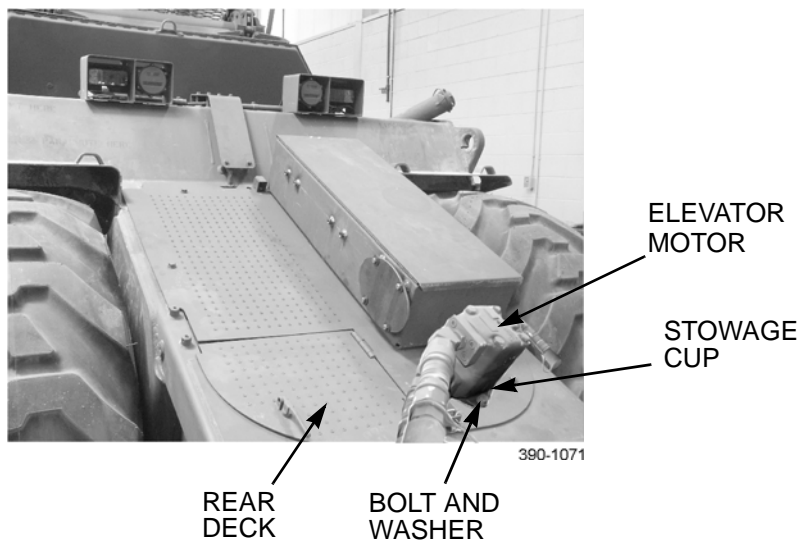
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

Hydraulic motor weighs approximately 85 lb (39 kg).

- g. Attach a suitable overhead lifting device to elevator motor. Take up slack in sling. Remove two bolts, washers, and elevator motor from mounting on stowage cup on rear deck of scraper.

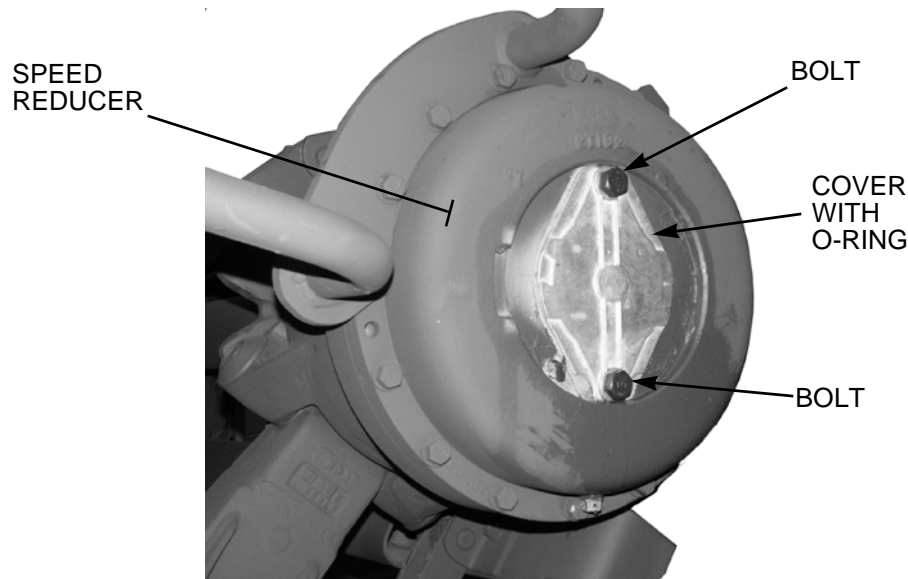
**WARNING**

Use extreme caution when climbing on ladder. Failure to exercise caution may result in a fall, causing injury to personnel.

- h. Place ladder against left side of scraper to access elevator motor mounting.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- i. Remove two bolts and cover with O-ring from speed reducer. Return cover with O-ring and mounting bolts to ISU-60 container toolbox.



390-1070

- j. Install elevator motor to speed reducer with two washers and bolts that were moved in step g. Tighten bolts to 158 lb-ft (214 Nm). Remove lifting device from elevator motor.

**CAUTION**

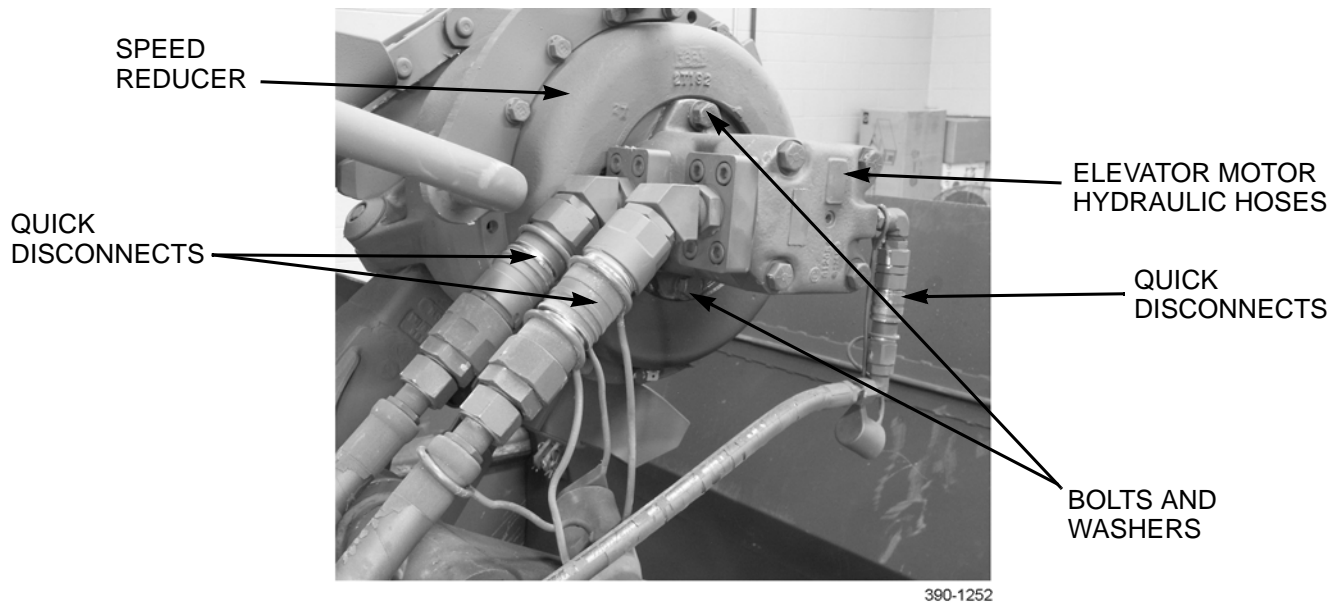
Always wipe ends clean prior to disconnecting hydraulic lines. Ensure ends are clean prior to reconnecting. Failure to do so may introduce contamination into hydraulic system.

**NOTE**

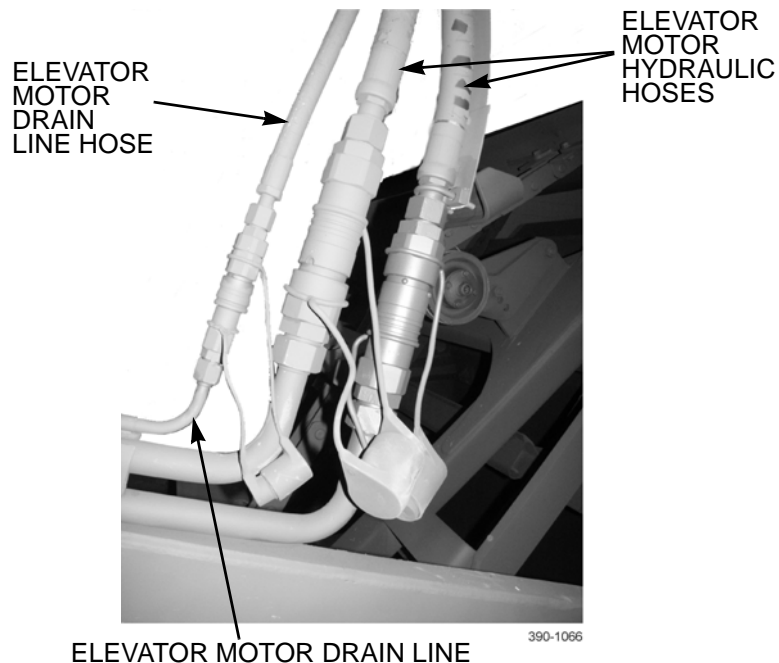
All quick disconnect connections are made the same way. Be sure to turn quick disconnect collar a half turn after connecting to lock connection.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- k. Remove dust caps and connect three hydraulic hose quick disconnects at elevator motor. Turn each quick disconnect collar a half turn after connecting to lock connection.

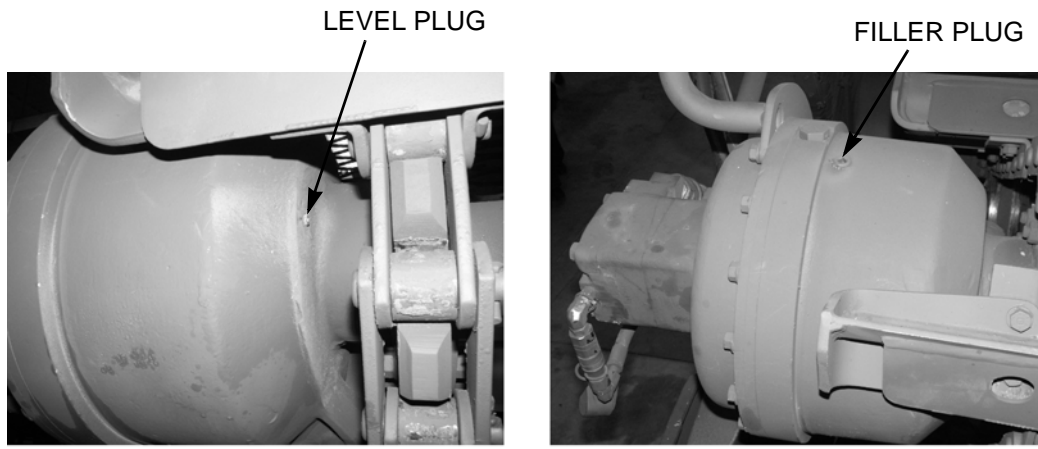


- l. Remove dust caps and connect two large elevator motor hydraulic hoses at quick disconnect fittings on left side of scraper bowl.
- m. Connect third elevator motor drain line hydraulic hose to elevator motor drain line.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- n. Check level of oil in gearbox:
- (1) Clean area around level plug.
  - (2) Remove level plug. Oil should drip out opening.
  - (3) If oil level is low, remove filler plug and add gear lubricating oil (Item 12, 13 or 14, WP 0026 00) until oil drips out level plug opening.
  - (4) Clean level and filler plugs and install



390-1079

- o. Remove ladder and set aside for stowage in ISU-60 container.

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****WARNING**

Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure any lifting device used is in good condition and of suitable lift capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.

**NOTE**

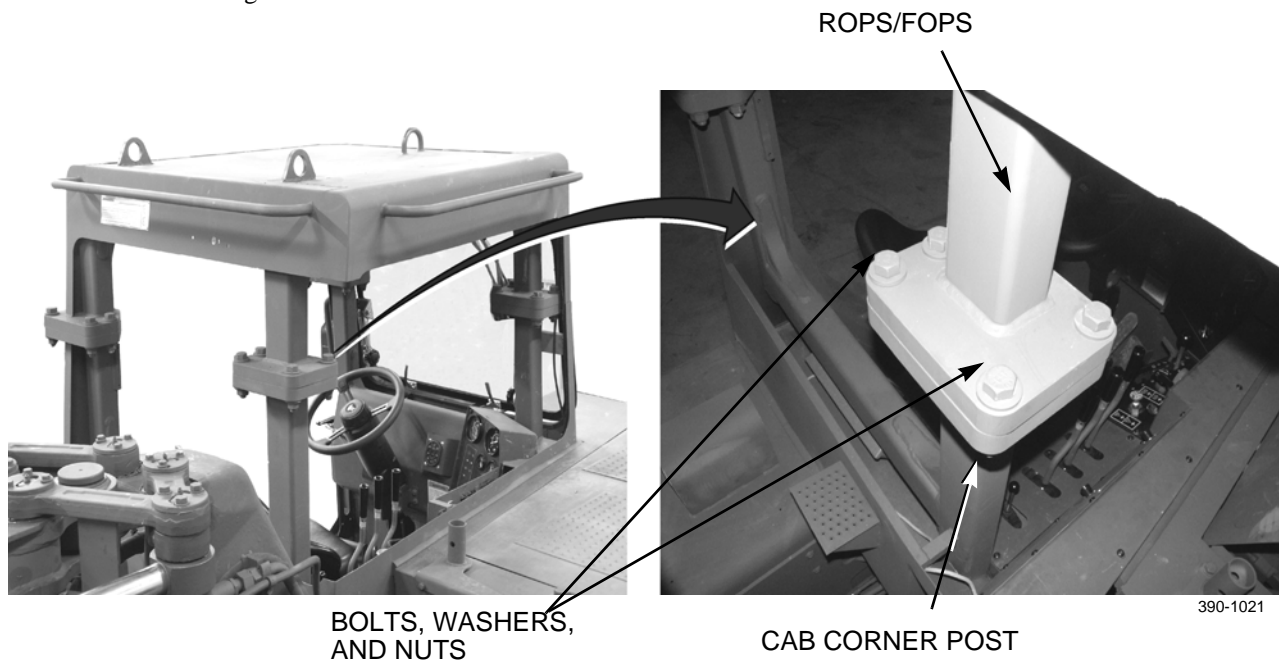
ROPS/FOPS weighs 447 lb (203 kg).

8. OCONUS ONLY: Install ROPS/FOPS on cab corner posts:
  - a. Attach a suitable overhead lifting device to three lift points on top of ROPS/FOPS. Take up slack in slings.

**NOTE**

Tighten all mounting nuts using a crisscross tightening pattern. This will ensure even tightening and correct installation alignment on all four cab corner posts.

- b. Lift ROPS/FOPS into position at four corner posts. While positioning ROPS/FOPS, loosely install all 16 bolts, 32 washers, and 16 nuts. Final tighten nuts in a crisscross tightening pattern to 317 lb-ft (430 Nm).
  - c. Remove lifting device from ROPS/FOPS.

**WARNING**

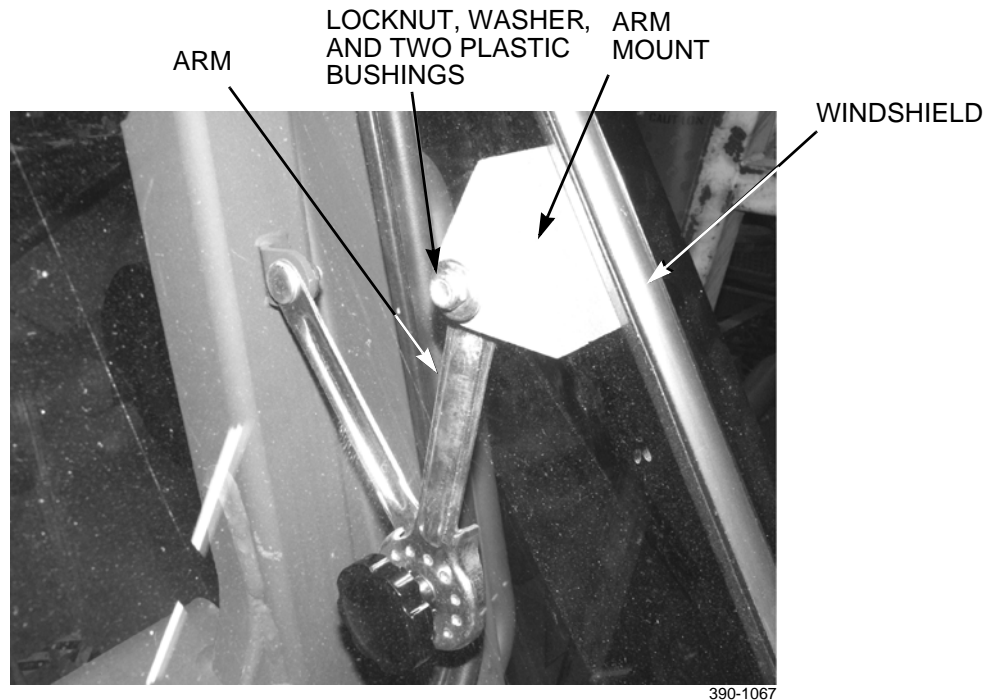
Use assistance and handle windshield with caution to ensure it does not become damaged. Failure to do so may damage windshield or cause personnel injury from cut glass if windshield breaks.



**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

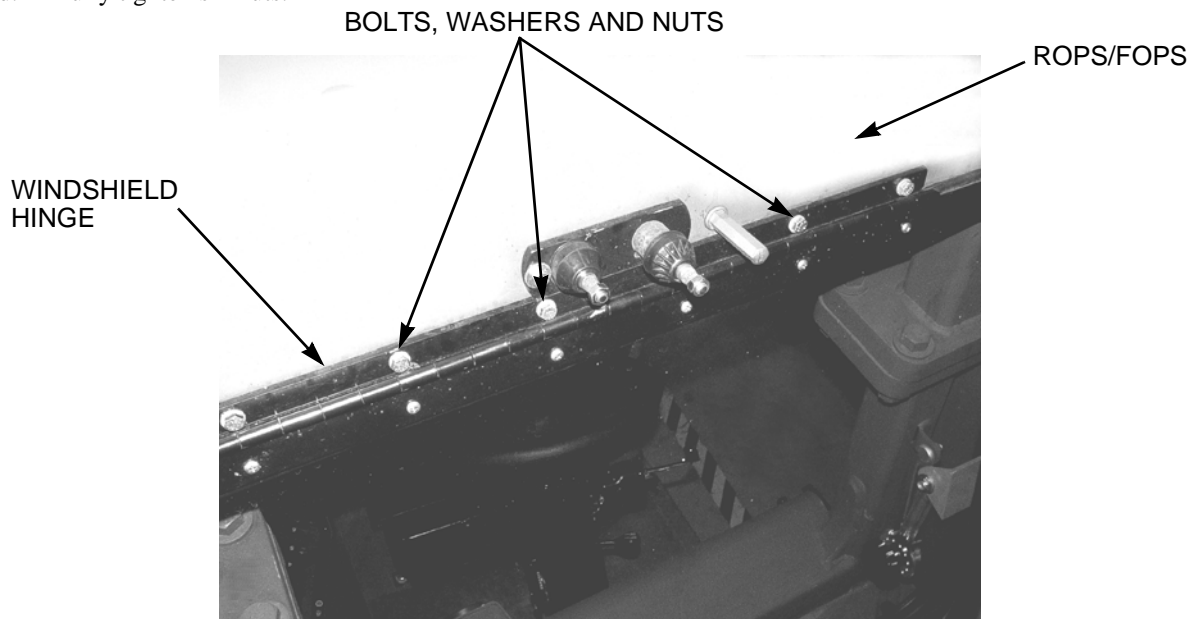
## 9. OCONUS ONLY: Install windshield:

- a. Position windshield and install arms to arm mounts with two plastic bushings, washer, and locknut on each side.



390-1067

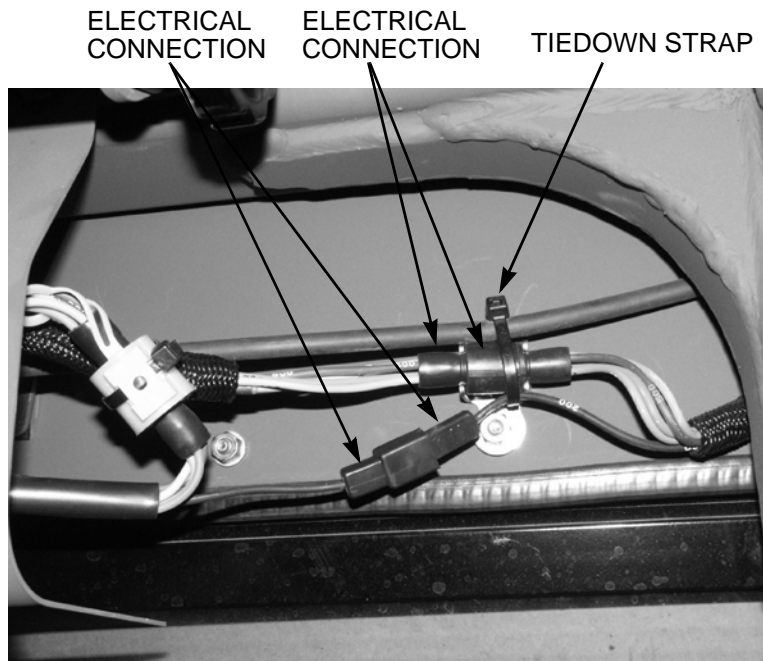
- b. Loosely install windshield hinge to ROPS/FOPS with six bolts, 12 washers, and six nuts.
- c. Close windshield and latch.
- d. Fully tighten six nuts.



390-1072

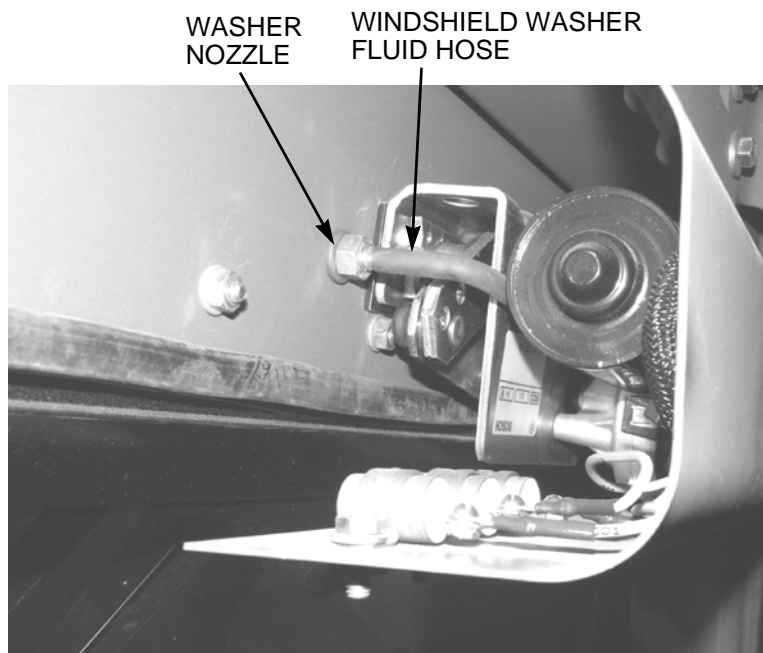
**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

10. OCONUS ONLY: Connect two windshield wiper motor connectors. Secure wires with new tiedown strap (Item 21, WP 0026 00).



390-1053

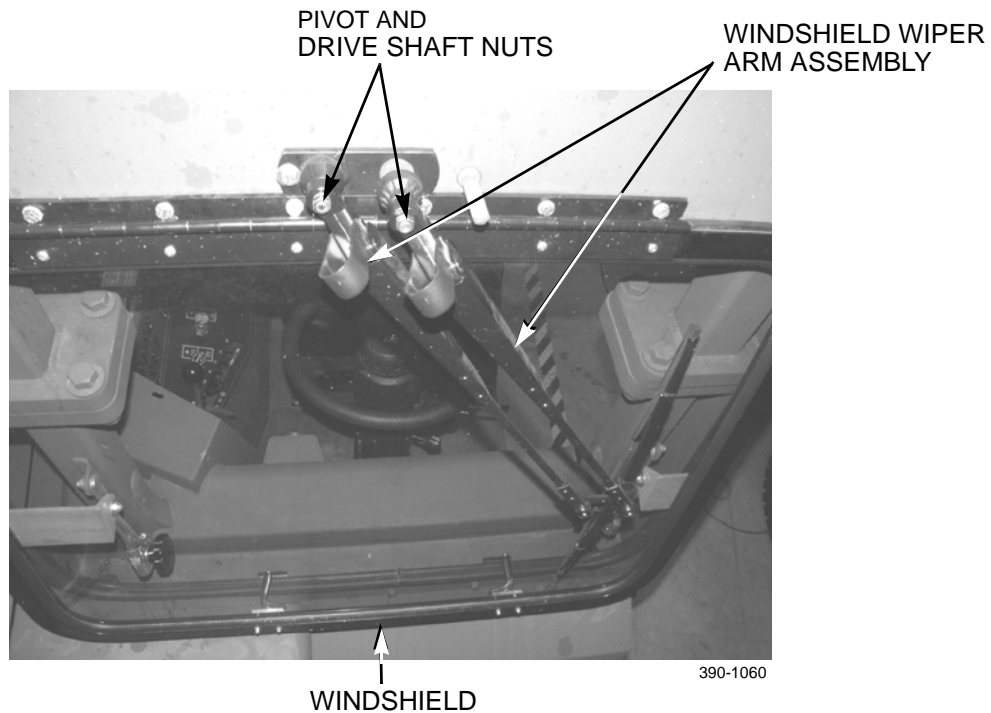
11. OCONUS ONLY: Install windshield washer hose on washer nozzle.



390-1052

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

12. OCONUS ONLY: Install windshield wiper arm assembly on drive and pivot shafts with two nuts.

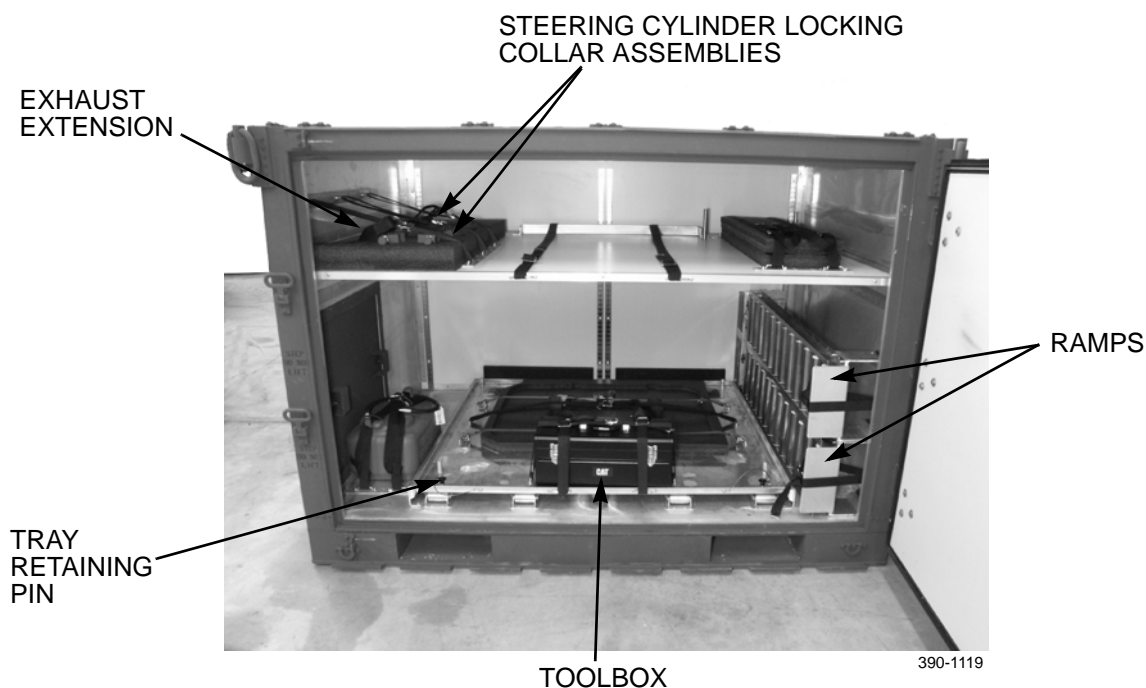


13. OCONUS ONLY: Machine is now fully assembled and operational.

**NOTE**

It is important to stow components in container in accordance with indicated sequence. This will ensure efficient and timely packing of container.

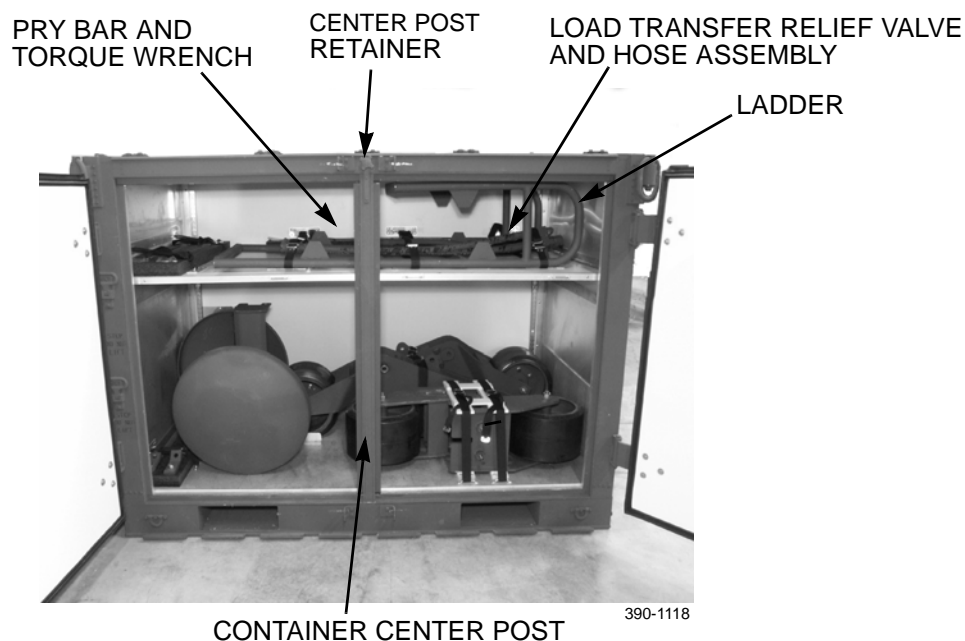
14. OCONUS ONLY: Stow the following items in ISU-60 container in accordance with illustrations and information in Tables 5 and 6.
- a. four steering locking collar assemblies, two short (6 5/8 in.) and two long (10 3/4 in.);
  - b. exhaust extension;
  - c. toolbox;

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED****Table 6. Stowage Instructions for ISU-60 Container - Single-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Steering Cylinder Locking Collar Assemblies and Exhaust Extension	<ol style="list-style-type: none"> <li>1. Place steering cylinder locking collar assemblies in two right cutouts in cushion pad, on left side of shelf.</li> <li>2. Place exhaust extension in left cutout in cushion pad, on left side of shelf.</li> <li>3. Secure with three straps.</li> </ol>
Toolbox	<ol style="list-style-type: none"> <li>1. Place toolbox on front edge of tray.</li> <li>2. Secure with three straps.</li> <li>3. Slide tray all the way in.</li> <li>4. Secure tray with two pins through tray and container floor.</li> </ol>
Ramps	<ol style="list-style-type: none"> <li>1. Position each ramp against wall of container.</li> <li>2. Secure each ramp with strap.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**RETURN MACHINE TO OPERATIONAL CONFIGURATION - CONTINUED**

- d. pry bar and torque wrench; and
- e. ladder.

**Table 7. Stowage Instructions for ISU-60 Container - Two-Door End.**

COMPONENT	STOWAGE INSTRUCTIONS
Pry Bar and Torque Wrench	<ol style="list-style-type: none"> <li>1. Place each component in cushion pad on shelf, against back wall of container.</li> <li>2. Secure with three straps.</li> </ol>
Ladder	<ol style="list-style-type: none"> <li>1. Place ladder on shelf with top of ladder facing right.</li> <li>2. Ensure load transfer relief valve and hose assembly is positioned on top of ladder.</li> <li>3. Secure components with three straps.</li> </ol>
Container Center Post	<ol style="list-style-type: none"> <li>1. Position center post, installing bottom end first.</li> <li>2. Raise shelf slightly to lock center post in position.</li> <li>3. Install center post retainer and tighten.</li> </ol>
	<p style="text-align: center;"><b>CAUTION</b></p> <p>Check to ensure all components are securely fastened prior to closing and securing door. Failure to do so may result in damage to equipment.</p>

**END OF WORK PACKAGE**

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**HIGHWAY TRANSPORT**

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**0022 00**

**NOTE**

If transport by highway is required, commercial trailers must transport the scraper. There is no military trailer designated for this purpose.

**END OF WORK PACKAGE**

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## **CHAPTER 6**

### **SUPPORTING INFORMATION**

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**REFERENCES****0023 00****SCOPE**

This work package lists all forms, field manuals, technical bulletins, technical manuals, and other publications referenced in this manual and which apply to the operation of the scraper.

**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  
 Consolidated Publication of Component Lists . . . . . EM 0074  
 Functional User's Manual for the Army Maintenance Management System. . . . . DA Pam 738-750

**FORMS**

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  
 Maintenance Request . . . . . DA Form 2407  
 Material Receiving and Inspection Report . . . . . DD Form 250  
 Product Quality Deficiency Report. . . . . SF Form 368  
 Recommended Changes to Publications and Blank Forms. . . . . DA Form 2028  
 Report of Discrepancy (ROD). . . . . SF Form 364

**FIELD MANUALS**

Airdrop of Supplies and Equipment . . . . . FM 10-576 Series  
 Basic Cold Weather Manual . . . . . FM 31-70  
 Camouflage, Concealment, and Decoys . . . . . FM 20-3  
 Chemical and Biological Contamination Avoidance . . . . . FM 3-3  
 Desert Operations . . . . . FM 90-3  
 First Aid. . . . . FM 4-25.11  
 Manual for the Wheeled Vehicle Driver . . . . . FM 21-305  
 Multiservice Helicopter Sling Load: Dual-Point Load Rigging Procedures. . . . . FM 10-450-5  
 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  
 Unit Air Movement Planning . . . . . FM 55-9

**REFERENCES - CONTINUED**

**0023 00**

**TECHNICAL BULLETINS**

CARC Spot Painting . . . . . TB 43-0242  
 Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment  
 and Materials Handling Equipment . . . . . TB 43-0209

**TECHNICAL MANUALS**

Care, Maintenance, Repair, and Inspection of Pneumatic Tires and Inner Tubes. . . . . TM 9-2610-200-14  
 Field Maintenance Manual (Includes Unit and Direct Support Maintenance) for Scraper,  
 Tractor and Distributor, Water, Tank Type, Tractor and Common Components . . . . . TM 5-3800-205-23-1  
 Field Maintenance Manual (Includes Unit and Direct Support Maintenance) for Scraper,  
 Tractor, Elevating, 613CS. . . . . TM 5-3800-205-23-2  
 Operator's, Unit, Intermediate Direct Support, and Intermediate General Support  
 Maintenance Manual for Lead-Acid Storage Batteries . . . . . TM 9-6140-200-14  
 Operator's and Organizational Maintenance Manual for Decontaminating Apparatus,  
 Portable, 14 Liter M13. . . . . TM 3-4230-214-12&P  
 Operator's and Unit Maintenance Manual for Decontaminating Apparatus,  
 Portable, ABC-M11 . . . . . TM 3-4230-214-12&P  
 Operator's Manual for Decontaminating Kit, Skin: M258A1 and Training Aid,  
 Skin Decontaminating: M58A1 . . . . . TM 3-4230-216-10  
 Operator's Manual for Decontaminating Kit, Skin: M291 . . . . . TM 3-4230-229-10  
 Operator's Manual for Decontaminating Kit, Individual Equipment: M280 . . . . . TM 3-4230-224-10  
 Painting Instructions for Army Materiel . . . . . TM 43-0139  
 Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command) . . . . . TM 750-244-3

**TECHNICAL ORDERS**

Technical Manual, Cargo Loading Manual, USAF Series, C-130A, C-130B, C-130E, C-130H, HC-130H,  
 HC-130(H)N, HC-130N, HC-130P, LC-130H, MC-130E, MC-130P, MC-130H and WC-130H Airplanes . TO IC-130A-9  
 Technical Manual, Cargo Loading Manual, USAF Series, C-130J, CC-130J,  
 CC-130J, EC-130J and WC-130J Aircraft. . . . . TO IC-130J-9

**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  
 Marine Lifting and Lashing Handbook. . . . . MTMCTEA Reference 97-55-22  
 Prevention of Motor Vehicle Accidents . . . . . AR 385-55  
 Tiedown Handbook for Rail Movements . . . . . MTMCTEA Pamphlet 55-19  
 Tiedown Handbook for Truck Movements . . . . . MTMCTEA Pamphlet 55-20  
 Transportability Criteria . . . . . MIL-STD-1366D  
 Vehicle Preparation Handbook for Fixed Wing Air Movements . . . . . MTMCTEA Reference 99-55-24

**END OF WORK PACKAGE**

**COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS****0024 00****SCOPE**

This work package lists COEI and BII for the scraper, 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 (COEI) 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 (BII) List.** These are the minimum essential items required to place the machine in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the machine during operation and whenever it is transferred between property accounts. This manual is your authority to request/requisition replacement BII, based on Table of Organization and Equipment/Modified Table of Organization and Equipment (TOE/MTOE) authorization of end item. Illustrations are furnished to assist you in identifying the items.

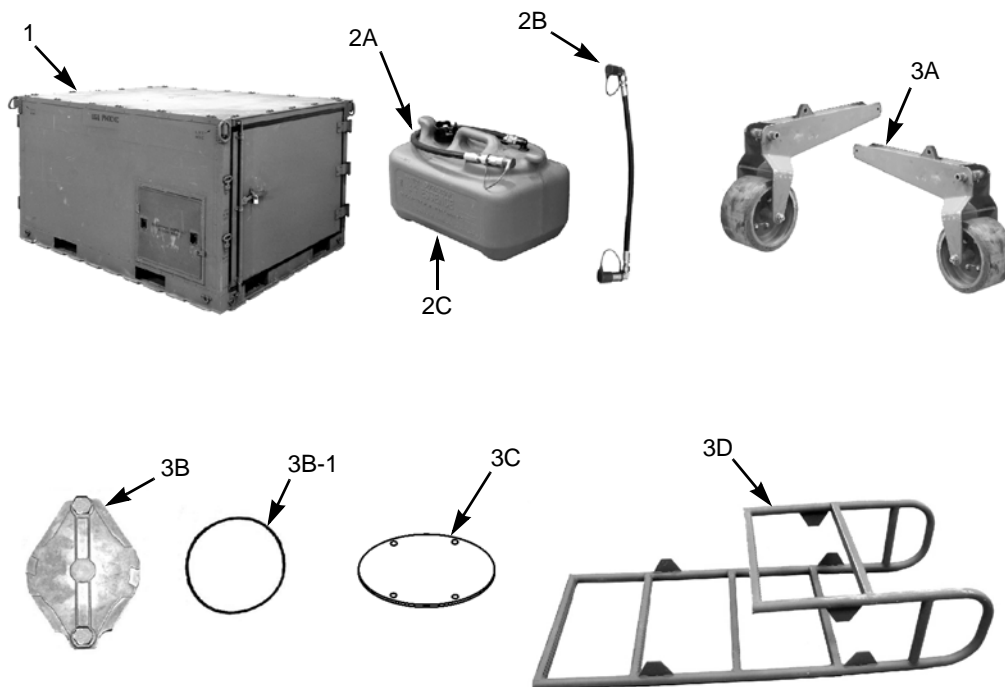
**EXPLANATION OF COLUMNS**

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 Code is not applicable to the scraper.
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.

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00



390-1136

Table 1. Components of End Item (COEI) 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	2910-01-192-4680	Container, Storage: Air Mobility Kit ISU-60E0, 3 Doors (11083) 2847		EA	1
2		Fuel Group, Auxiliary (11083) 213-2958		EA	1
2A		Hose Assembly (11083) 8W-4917		EA	1
2B		Hose Assembly, Fuel Jumper (11083) 6Y-0595		EA	1
2C		Tank, Fuel, Engine (70842) 827-8067		EA	1

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

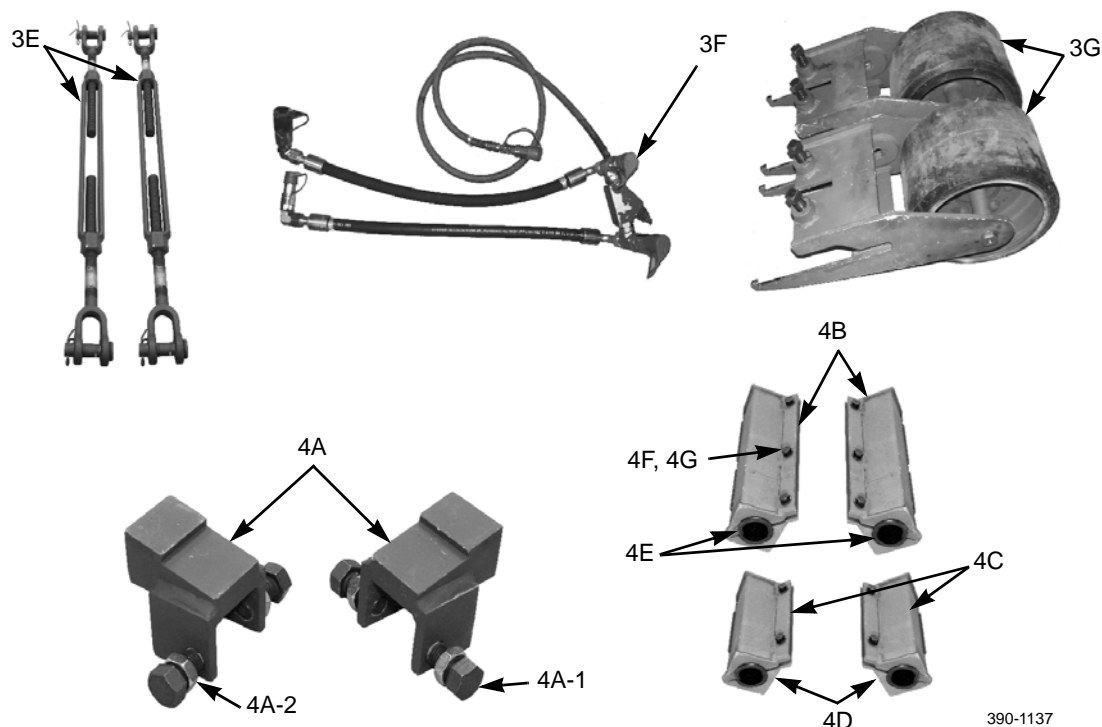
0024 00

Table 1. Components of End Item (COEI) List - Continued.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
3	5340-01-150-9807	Load Transfer Group (11083) 213-2848		EA	1
3A		Axle Assembly, Load Transfer (11083) 213-2921		EA	2
3B		Cover, Access: Elevator Speed Reducer (11083) 7N8374		EA	1
3B1		O-ring (11083) 0314392		EA	1
3C		Cover Assembly, Fuel Tank (11083) 253-9565		EA	1
3D		Ladder Assembly (11083) 218-7365		EA	1

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00



390-1137

Table 1. Components of End Item List (COEI) - Continued.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
3E	5340-01-519-1592	Turnbuckle (11083) 2187395		EA	2
3F		Valve and Hose Assembly, Load Transfer, Relief (11083) 213-2959		EA	1
3G		Wheel Assembly, Cutting Edge (11083) 213-2859		EA	2
4		Stability Group (11083) 213-2849		EA	1
4A	5306-00-814-6588	Block Assembly, Hitch Lock (11083) 218-0007		EA	2
4A-1		Bolt, Machine (11083) 0S1626		EA	4
4A-2	5310-00-246-4560	Nut, Plain, Hexagon (11083) ID5119		EA	4



## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00

Table 1. Components of End Item List (COEI) - Continued.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
4B	5305-01-026-9518	Collar Assembly, Steering Cylinder Lock (Long) (11083) 218-7389		EA	2
4C		Collar Assembly, Steering Cylinder Lock (Short) (11083) 218-7409		EA	2
4D		Hose, Steering Cylinder Cover (Short): 161 mm long (11083) 218-7400-161		EA	2
4E		Hose, Steering Cylinder Cover (Long): 265 mm long (11083) 218-7400-265		EA	2
4F		Screw, Cap, Hexagon (11083) 0S1571		EA	10
4G		Washer, Flat (11083) 9Y2695		EA	10

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

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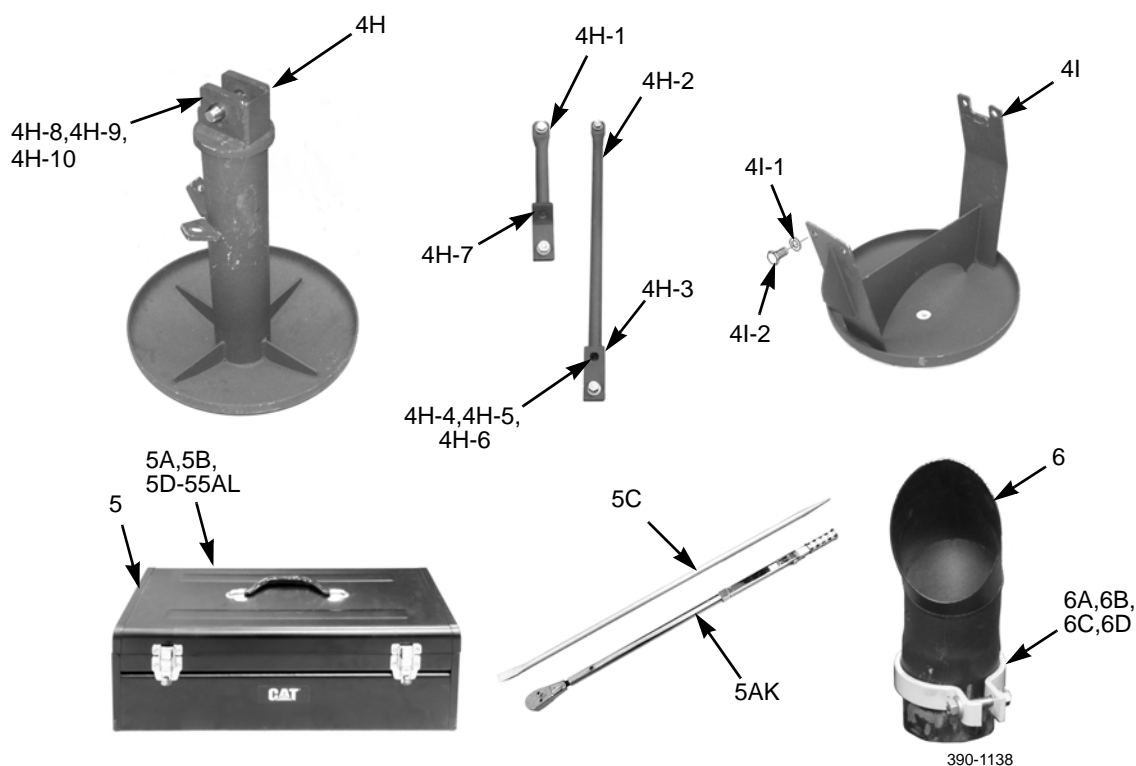


Table 1. Components of End Item List (COEI) - Continued.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
4H	2590-01-518-2028	Skid Assembly, Front (11083) 213-2960		EA	1
4H-1	5340-01-518-3881	Bracket, Mounting (11083) 2187357		EA	1
4H-2	5340-01-518-7441	Bracket, Mounting (11083) 2187373		EA	1
4H-3	5340-01-518-6401	Bracket, Angle (11083) 2187374		EA	1
4H-4	5306-01-430-9057	Bolt, Machine (11083) 7X0346		EA	4
4H-5	5310-01-423-9059	Nut, Plain, Hexagon (11083) 7X0448		EA	4

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00

Table 1. Components of End Item List (COEI) - Continued.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
4H-6	5310-01-364-7468	Washer, Flat (11083) 8T4122		EA	8
4H-7	5340-01-518-6400	Bracket, Angle (11083) 2187371		EA	1
4H-8	5315-01-518-6404	Pin, Quick Release (11083) 218-7383		EA	1
4H-9	5305-01-285-7096	Screw, Cap, Hexagon Head (11083) 5P2228		EA	1
4H-10	5310-01-098-0624	Washer, Flat (11083) 8T4223		EA	1
4I	5310-01-518-2036	Skid Assembly, Rear (11083) 213-2961		EA	1
4I-1	5306-00-426-3139	Bolt, Machine (11083) 1A8063		EA	4
4I-2	5310-01-298-3199	Washer, Flat (11083) 8T4994		EA	4
5		Tool Group (11083) 218-7366		EA	1
5A	5120-01-508-9182	Adapter, Socket Wrench (11083) 2P8261		EA	1
5B		Bar, Pry: 12 in. long (11083) 194-3553		EA	1
5C	5120-01-518-2384	Bar, Pry: 54 in. long (11083) 4C5647		EA	1
5D		Breaker Bar: 1/2 in. drive (11083) 168-0383		EA	1
5E	5110-01-518-2391	Cutter, Rivet (11083) 6V6193		EA	1
5F		Extension, Socket Wrench: 1/2 in. drive, 11 in. long (11083) 8H8548		EA	2
5G	5120-01-518-2395	Extension, Socket Wrench: 3/4 in. drive, 8 in. long (11083) 8H8548		EA	1
					1

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00

Table 1. Components of End Item List (COEI) - Continued.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
5H	5120-01-518-2396	Extension, Socket: 1/2 in. drive, 5 in. long (11083) 9S1732		EA	5H
5I	5120-01-518-2405	Hammer, Hand (11083) 2231694		EA	1
5J	5120-01-518-2399	Handle, Socket Wrench: 3/4 in. drive, 19.25 in. long (11083) 1628716		EA	1
5AG	5120-01-518-4489	Wrench, Socket (11083) 8H8546		EA	1
5N	5120-01-518-2398	Ratchet, Attachment, Socket Wrench: 3/4 in. drive (11083) 1606389		EA	1
5K	5120-01-300-1170	Key, Socket Head Screw: 1/4 in. x 3- 1/4 in. long (55719) GAW8		EA	1
5L	5120-01-188-9124	Puller, Mechanical (11083) 5R5862		EA	1
5M	5120-01-369-0651	Punch, Drift: brass, 3/4 in. (39068) 25075		EA	1
5AF	5120-01-518-2403	Wrench, Ratchet: 1/2 in. drive, 10.31 in. long (11083) 214-7338		EA	1
5AG	5120-01-518-4484	Wrench, Socket: 3/4 in. drive, 7/8 in. (11083) 8H8530		EA	1
5AH	5120-01-518-4492	Wrench, Socket: 3/4 in. drive, 15/16 in. (11083) 8H8531		EA	1
5AI	5120-01-518-4485	Wrench, Socket: 3/4 in. drive, 1-1/8 in. (11083) 8H8534		EA	1
5Q.1	5120-01-498-0111	Socket, Socket Wrench: 3/4 in. drive, 1-5/16 in. (11083) 8H8536		EA	1
5AJ	5120-01-518-4486	Wrench, Socket: 3/4 in. drive, 1-1/2 in. (11083) 8H8537		EA	1

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00

Table 1. Components of End Item List (COEI) - Continued.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
5O	5120-01-518-2393	Ratchet Head, Socket Wrench Handle: 1/2 in. drive, 9/16 in. (11083) 8H8549		EA	1
5P	5120-01-518-2394	Ratchet Head Socket Wrench Handle: 1/2 in. drive, 3/4 in. (11083) 8H8552		EA	1
5Q	5120-01-430-2974	Socket, Socket Wrench: 1/2 in. drive, 15/16 in. (2K880) 40130		EA	1
5AK	5120-01-518-4483	Wrench, Socket: 1 in. drive, 1-15/32 in. (11083) 5P3581		EA	1
5R	5340-01-483-1447	Strap, Webbing (11083) 241-8902		EA	6
5S		Strap, Ratchet (11083) 248-7690		EA	4
5T	5140-01-518-2397	Tool Box, Portable (11083) 9U6219		EA	1
5U	5130-01-518-2392	Tool, Tire (11083) 7F8240		EA	1
5V	5120-01-430-3055	Universal Joint, Socket Wrench Attachment: 1/2 in. drive		EA	1
5W	5120-01-518-2402	Wrench, Adjustable: 12 in. 1-5/16 in. jaw capacity (11083) 2147330		EA	2
5X	5120-00-595-9201	Wrench, Box: 1-5/16 in. (11083) 8H8519		EA	1
5Y	5120-01-518-2404	Wrench, Box and Open End, Combination: 7/16 in. (11083) 4C9593		EA	2
5Z	5120-01-518-2385	Wrench, Box and Open End, Combination: 1/2 in. (11083) 4C9594		EA	1
5AA	5120-01-518-2388	Wrench, Box and Open End, Combination: 9/16 in. (11083) 4C9595		EA	1

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00

Table 1. Components of End Item List (COEI) - Continued.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
5AB	5120-01-518-2386	Wrench, Box and Open End, Combination: 3/4 in. (11083) 4C9598		EA	1
5AC	5120-01-518-2387	Wrench, Box and Open End, Combination: 15/16 in. (11083) 4C- 9602		EA	1
5AD	5120-01-518-2389	Wrench, Box and Open End, Combination: 1-1/8 in. (11083) 8H- 8517		EA	1
5AE	5120-01-518-2390	Wrench, Box and Open End, Combination: 1-1/2 in. (11083) 8H- 8424		EA	2
5AL	5120-01-462-8874	Wrench, Torque: 3/4 in. drive, 200- 600 lb-ft capacity (11083) 162-8718		EA	1
6		Tube: Exhaust Extension (11083) 7R-3627		EA	1
6A	5306-01-413-8763	Bolt, Shoulder (11083) 8T2501		EA	1
6B	4730-01-508-3002	Clamp; Pipe (11083) 8F-5714		EA	1
6C	5310-01-429-7859	Nut, Plain, Hexagon (11083) 6V8801		EA	1

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

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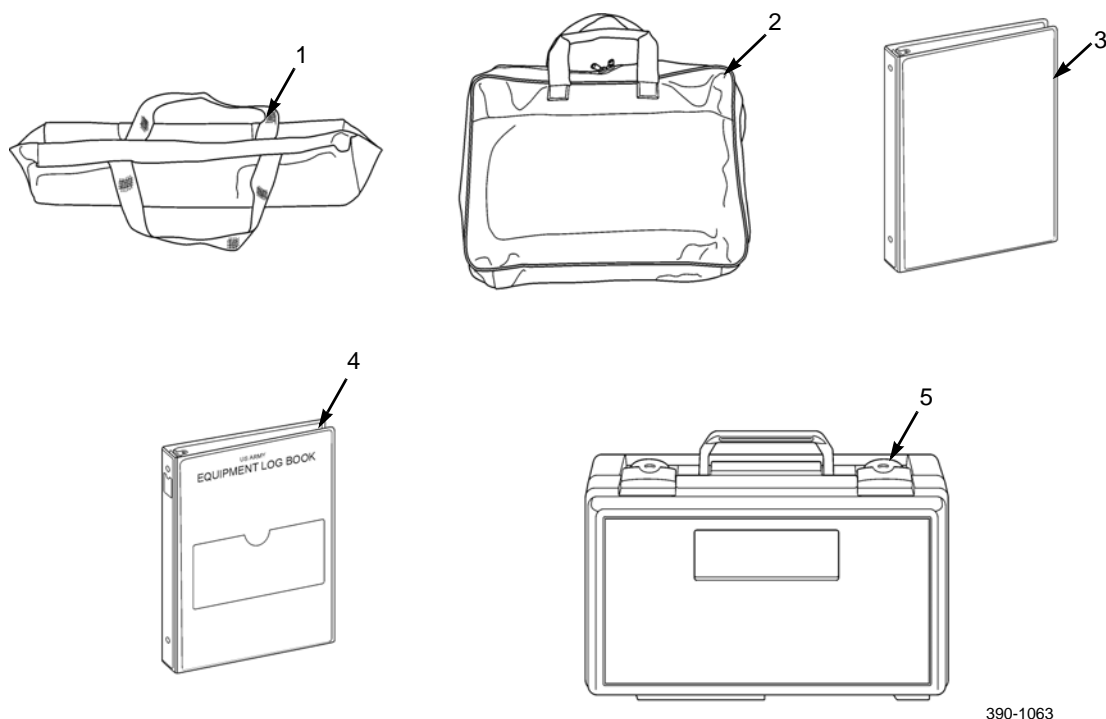
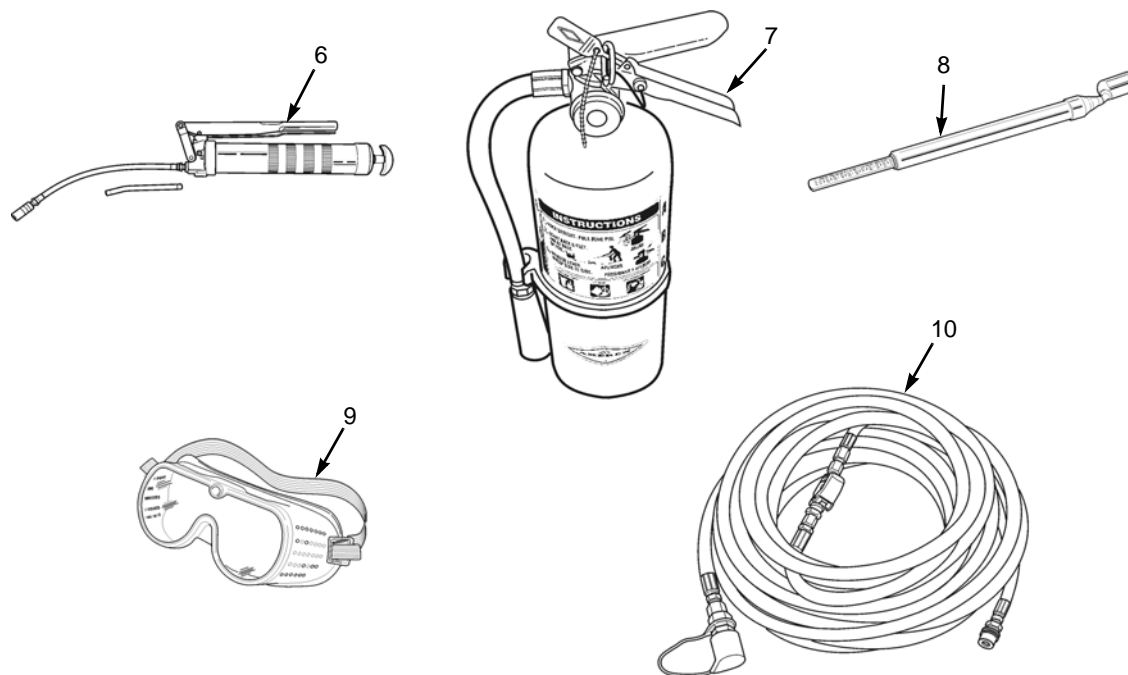


Table 2. Basic Issue Items (BII) List.

(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RQD
1	5140-00-473-6256	Bag, Tool: 10 X 20 in. (64067) 5140-00-473-6256		EA	1
2	2540-00-670-2459	Bag Assembly, Pamphlet (19207) 11676920		EA	1
3	7510-00-281-6180	Binder, Loose-Leaf (88001) O391M		EA	1
4	7510-00-889-3494	Binder, Loose-Leaf: U.S. Army Equipment Log Book (19207) 11677003		EA	1
5	7520-00-559-9618	Case, Maintenance and Operational Manuals (83421) 7520-00-559-9618		EA	1

## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00



390-1054

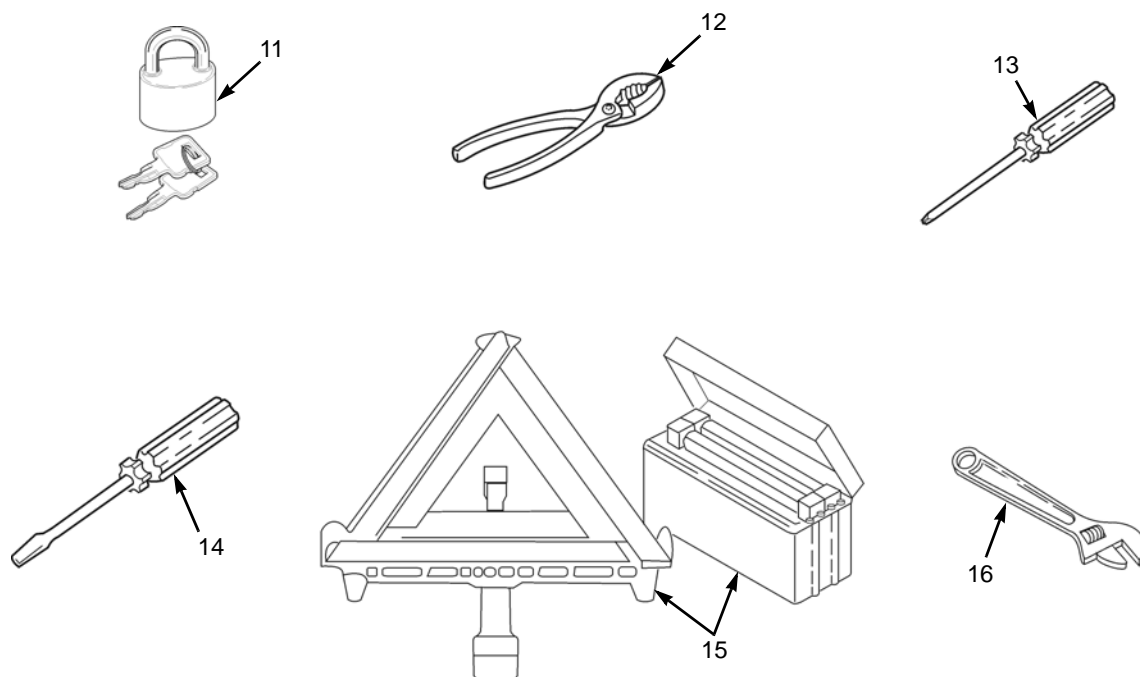
Table 2. Basic Issue Items (BII) List - Continued.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
6	4930-00-007-2185	Coupling, Grease Gun (29510) 999809R92		EA	1
7	4210-01-493-8162	Extinguisher, Fire (54905) B500T		EA	1
8	4910-00-204-3170	Gage, Tire Pressure (27783) 7188BH		EA	1
9	4240-00-052-3776	Goggles, Industrial (80204) ANSI Z87.1		EA	1
10		Hose Assembly, Pneumatic: Tire Inflation (11083) 225-4310		EA	1



## COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS - CONTINUED

0024 00



390-1065

Table 2. Basic Issue Items (BII) List - Continued.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQD
11	5340-01-181-2579	Padlock (74842) 4510B-A-11		EA	12
12	5120-00-278-0352	Pliers, Slip Joint: 10 Inch (96508) 12230		EA	1
13	5120-00-224-7375	Screwdriver, Cross Tip (64067) 5120-00-224-7375		EA	1
14	5120-00-227-7338	Screwdriver, Flat Tip: 5 Inch (77948) D339		EA	1
15	9905-00-148-9546	Warning Device Kit, Highway (19207) 11669000		EA	1
16	5120-00-264-3796	Wrench, Adjustable: 12 Inch (19207) 11655778-5		EA	1

END OF WORK PACKAGE

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**ADDITIONAL AUTHORIZATION LIST (AAL)**

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**0025 00****SCOPE**

This work package lists additional items that you are authorized for the support of the scraper.

**GENERAL**

This list identifies items that do not have to accompany the machine and that do not have to be turned in with it. These items are authorized to you by CTA, MTOE TDA or JTA.

**EXPLANATION OF COLUMNS**

1. **Column (1) - National Stock Number.** Indicates the National Stock Number (NSN) assigned to the item and will be used for requisitioning purposes.
2. **Column (2) - Description, CAGEC, and Part Number.** Indicates the Federal item name followed by a minimum description when needed. The entry for each item ends with the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.
3. **Column (3) - Usable on Code.** Indicates a code if the item needed is not the same for different models of equipment. Usable on Code is not applicable for the scraper.
4. **Column (4) - Unit of Measure (U/M).** Indicates how the item is issued for the National Stock Number shown in Column (1).
5. **Column (5) - Qty Recm.** Indicates the quantity recommended.

## ADDITIONAL AUTHORIZATION LIST (AAL) - CONTINUED

0025 00

Table 1. Additional Authorization List.

(1)	(2)	(3)	(4)	(5)
NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	USABLE ON CODE	U/M	QTY RECM
	Tooth Group, Scraper (11083) 220-2925		EA	1
5306-01-201-0293	Bolt, Square Neck: 3/4-10 (11083) 5F8933		EA	8
5310-00-978-5406	Nut, Plain, Hexagon: 3/4-10 (11083) 2J3506		EA	8
3830-01-230-9035	Shank-Tooth, Surface Ripping (11083) IU3252		EA	4

END OF WORK PACKAGE

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EXPENDABLE AND DURABLE ITEMS LIST

---

0026 00

**SCOPE**

This work package lists expendable and durable items you will need to operate and maintain the scraper. This listing is for informational purposes 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, Class V Repair Parts, and 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 listing and is referenced in the narrative instructions to identify the item [e.g., Use antifreeze (Item 1, WP 0026 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 National Stock Number 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 column shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

## EXPENDABLE AND DURABLE ITEMS LIST - CONTINUED

0026 00

Table 1. Expendable and Durable Items List.

(1)	(2)	(3)	(4)	(5)
ITEM NUMBER	LEVEL	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	U/M
1	C	6850-01-441-3218	ANTIFREEZE: Permanent Ethylene Glycol, Inhibited, Heavy-Duty (58536) A-A-52624 1 Gallon Can	GAL
		6850-00-181-7933	(81349) MILA46153 5 Gallon Container	GAL
		6850-01-441-3223	(58536) A-A-52624 55 Gallon Drum	GAL
2	C		ANTIFREEZE: Permanent, Type: Arctic Grade (58536) A-A-52624	PT
		6850-01-441-3248	55 Gallon Drum	GAL
3	C		CLEANING COMPOUND: Solvent, Type III (81349) MIL-PRF-680	
		6850-01-474-2320	5 Gallon Can	GAL
		6850-01-474-2321	55 Gallon Drum	GAL
4	C		CLEANING COMPOUND: Windshield (0FTT5) 0854000	
		6850-00-926-2275	16 Ounce Bottle	OZ
5	C		COMPOUND: Antiseize (05972) 76764	
		8030-00-251-3980	1 Pound Can	LB
6	C		DETERGENT: General Purpose, Liquid (83421) 7930-00-282-9699	
		7930-00-282-9699	1 Gallon Can	GAL
7	C		DIESEL FUEL: DF-1 Grade, Arctic (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
8	C		DIESEL FUEL: DF-2 Grade (81346) ASTM D 975	
		9140-00-286-5294	Bulk	GAL

Table 1. Expendable and Durable Items List - Continued.

(1)	(2)	(3)	(4)	(5)
ITEM NUMBER	LEVEL	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	U/M
9	C	9140-00-286-5295	5 Gallon Can	GAL
		9140-00-286-5296	55 Gallon Drum	GAL
		9130-01-031-5816	FUEL, TURBINE: Aviation (81349) MILT83133 GR JP8	GAL
10	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
11	C		OIL: Lubricating, Arctic, OEA	
		9150-00-402-4478	(81349) MIL-L-46167 1 Quart Can	QT
		9150-00-402-2372	(81349) MIL-PRF-46167 5 Gallon Drum	GAL
12	C	9150-00-491-7197	(81349) MIL-PRF-46167 55 Gallon Drum	GAL
			OIL: Lubricating, GO 75 (81349) MIL-PRF-2105	
		9150-01-035-5390	1 Quart Can	QT
13	C	9150-01-035-5391	5 Gallon Can	GAL
			OIL: Lubricating, GO 80W/90 (81349) MIL-PRF-2105	
		9150-01-035-5392	1 Quart Can	QT
14	O	9150-00-001-9395	5 Gallon Can	GAL
		9150-01-035-5394	55 Gallon Drum	GAL
			OIL: Lubricating, GO 85W/140 (81349) MIL-PFRF-2105	
		9150-01-048-4591	1 Quart Can	QT
		9150-01-035-5395	5 Gallon Can	GAL
		9150-01-035-5396	55 Gallon Drum	GAL

Table 1. Expendable and Durable Items List - Continued.

(1)	(2)	(3)	(4)	(5)
ITEM NUMBER	LEVEL	NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	U/M
15	C		OIL: Lubricating, OE/HDO 10 (81349) MIL-PRF-2104	
		9150-00-189-6727	1 Quart Can	QT
		9150-00-186-6668	5 Gallon Can	GAL
		9150-00-191-2772	55 Gallon Drum	GAL
16	C	9150-00-247-0481	OIL: Lubricating, OE/HDO 10W/30 (81349) MIL-L-2104	QT
17	C		OIL: Lubricating, OE/HDO 15W/40 (81349) MIL-PRF-2104	
		9150-01-152-4117	1 Quart Can	QT
		9150-01-152-4118	5 Gallon Can	GAL
		9150-01-152-4119	55 Gallon Drum	GAL
18	C		OIL: Lubricating, OE/HDO 30 (81349) MIL-PRF-2104	
		9150-00-186-6681	1 Quart Can	QT
		9150-00-188-9858	5 Gallon Can	GAL
19	C		OIL: Lubricating, OE/HDO 40 (81349) MIL-PRF-2104	
		9150-00-188-9862	55 Gallon Drum	GAL
20	C		RAG: Wiping (64067) 7920-00-205-1711	
		7920-00-205-1711	50 Pound Bale	LB
21	C		STRAP: Tiedown, Electrical Components (96906) MS3367-1-0	
		5975-00-984-6582	6 Inch Length, Package of 100	EA
22	C		TAPE: Duct, 2 Inches Wide (39482) 1791K70	
		5640-00-103-2254	60 Yard Roll	YD
23	C		TAPE: Pressure Sensitive Adhesive, 1-1/2 Inches Wide (81346) A&TM D-6123	
		7510-00-266-6709	60 Yard Roll	YD

END OF WORK PACKAGE



**WARRANTY INFORMATION (CATERPILLAR, INC.)****0027 00****GENERAL WARRANTY INFORMATION**

1. The Airborne Scraper and Water Distributor System (ASWDS) is covered by a number of different warranties as described in Table 1. This work package contains information on overall machine, ground engaging tools, battery, and engine specific warranties provided by Caterpillar, including instructions on filing warranty claims. Warranty information for the ISU-60 container and tires is found in WP 0028 00.

**Table 1. ASWDS Warranty Information.**

<b>Warranted Component</b>	<b>Duration of Warranty</b>	<b>Manufacturer Responsible</b>	<b>Contact Information</b>
Overall Machine	18 Months/1000 Hours	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Ground Engaging Tools	Not limited by time	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Battery	3 Years	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Engine Emission Components (613 ASWDS Engine is EPA Certified)	5 Years/3000 Hours	Caterpillar Inc.	Defense and Federal Products (309) 578-3295
<b>Warranty Information Contained in WP 0028 00</b>			
Tires	5 Years	Bridgestone/Firestone Off Road Tire Company	(800) 572-8905
ISU-60 Container	12 Months	AAR Mobility Systems	(800) 355-2015

2. Scheduled machine maintenance is contained in WP 0014 00, TM 5-3800-205-23-1 and TM 5-3800-205-23-2. The fact that the machines are covered by a warranty does not relieve the user of the responsibility for proper machine operation, care, and maintenance.
3. The manufacturer's lubrication and service intervals must be followed.
4. A listing of principle Caterpillar dealers is provided at the end of this work package, as is information on locating Caterpillar dealers in the event of OCONUS deployment.

**EXPLANATION OF TERMS**

1. **Abuse.** The improper use, maintenance, repair, or mishandling of warranted items that may cause the warranty of those items to become void.
2. **Acceptance Date.** The date the equipment is accepted in the Army's inventory as annotated on DD Form 250, *Material Receiving and Inspection Report*.
3. **Acquiring Command or Activity.** An activity that procures the items or material for a user.
4. **Defect.** An imperfection that impairs the worth or utility of the part or component.
5. **Repair.** To restore an item to a serviceable condition without affecting warranty.
6. **Repairable.** An item that may be reconditioned or economically repaired for reuse.

**WARRANTY INFORMATION (CATERPILLAR, INC.) - CONTINUED****0027 00****EXPLANATION OF TERMS - CONTINUED**

7. **Warranty.** A written agreement between a contractor and the Government that outlines the rights and obligations of both parties for defective supplies.
8. **Warranty Claim.** Action started by the equipment users for authorized warranty repair or reimbursement.
9. **Warranty Period.** Time during which the warranty is in effect.
10. **Warranty Start Date.** The date the warranty is put into effect (stamped on warranty plate). The warranty plate is proof of warranty start date for all warranties.

**ADMINISTRATIVE INFORMATION**

1. **Machine Registration.** Upon machine handoff to the assigned unit, the warranty plate will be stamped by the local Caterpillar dealer with the machine warranty start and end dates. The warranty start date for each machine will then be entered into the Caterpillar Warranty Database. Entry of the warranty start date activates the coverage for each machine and allows any Caterpillar dealer worldwide to view the warranty coverage for the machine. This data is accessed by Caterpillar machine serial number.
2. **Warranty Questions.** Any questions regarding warranty coverage should be directed to Caterpillar, Defense and Federal Products at (309) 578-3295 or Caterpillar Operator at (309) 675-1000 and ask for Defense and Federal Products.
3. **Local Caterpillar Dealer Contact Information.** To be completed by Caterpillar Dealer at time of machine delivery.

<b>Dealer Name:</b>
<b>Address:</b>
<b>Point of Contact:</b>
<b>Telephone Number:</b>
<b>Cellular Number:</b>
<b>E-mail Address:</b>

4. **To Obtain Warranty Service.** The ASWDS contract provides you with two options (Caterpillar repair or Government repair) for correcting warranty defects. The choice is the responsibility of the local unit or installation.
  - a. **Caterpillar Repair.**
    - (1) The using unit should contact the local Caterpillar Dealer (locations and phone numbers are available at <http://www.cat.com> or in Table 2 at the end of this work package) to coordinate delivery of the machine to the dealer for analysis or providing for dealer travel to the machine for analysis.
    - (2) The Caterpillar Dealer will evaluate the problem to determine if the required repair is covered by warranty.
      - (a) If the required repair is not covered by warranty, the dealer will contact the unit for further instructions and the unit will be responsible for dealer expenses incurred during machine analysis.
      - (b) If the required repair is covered by warranty, the dealer will make the repairs and submit claims to Caterpillar for reimbursement.
    - (3) The Caterpillar dealer will provide travel time and mileage or transportation of the machine as part of the warrantable repair.

**ADMINISTRATIVE INFORMATION - CONTINUED**

- (4) If the Caterpillar dealer disputes your warranty claim and you feel the claim is valid, contact Caterpillar Defense and Federal Products at (309) 578-3295 for a review of the claim.
- b. **Government Repair.**
  - (1) Any warranty repairs made by the user are at the user's expense.
  - (2) Government repairs do NOT void Caterpillar warranty. Government is fully responsible for the repair and/or any maintenance induced failures due to the repair.
5. **Warranty Dispute.** If Caterpillar Defense and Federal Products declines to perform repairs on items for which you believe the Government has a valid warranty claim:
  - a. Perform the repairs yourself; use your own repair parts.
  - b. Immediately report the situation using DA Form 2407 (or DA Form 5504).
    - (1) Record "Warranty Dispute" and complete description of the failure.
    - (2) Enter name, activity, and telephone number of the person submitting the warranty dispute.
    - (3) Enter the name, address, and telephone number of the Caterpillar representative or dealership that refused the service.
    - (4) Give specific reasons for the refusal.
    - (5) Enter the specific facts/evidence that you feel will disprove Caterpillar's reason for refusal. Include photographs and sketches as appropriate.
    - (6) Submit copies of DA Form 2407 (or DA Form 5504) to: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-AF-CE, 6501 E. 11 Mile Road, Warren, MI 48397-5000.
6. **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:
  - a. Provide (at Caterpillar's choice) new, remanufactured, or Caterpillar-approved repaired parts or assembled components needed to correct the defect. Items replaced under this warranty become the property of Caterpillar.
  - b. Replace lubricating oil, filters, antifreeze, and other service items made unusable by the defect.
  - c. Provide reasonable and customary labor needed to correct the defect.
7. **User Responsibilities.**  
The user is responsible for the following:
  - a. Providing proof of the warranty start date if warranty data plate is not available.
  - b. Labor costs, except as stated under "Caterpillar Responsibilities".
  - c. Local taxes, if applicable.
  - d. Parts shipping charged in excess of those which are usual and customary.
  - e. Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
  - f. Performance of the required maintenance (including use of proper fuel, oil, lubricants and coolant) and replacement of items due to normal wear and tear. Failures caused by contaminated fluids are not covered by warranty.
8. **Limitations.**  
Caterpillar is not responsible for failures resulting from:
  - a. Any use or installation which Caterpillar judges improper.
  - b. Attachments, accessory items, and parts not sold or approved by Caterpillar.
  - c. Abuse, neglect, and/or improper repair.

**WARRANTY INFORMATION (CATERPILLAR, INC.) - CONTINUED****0027 00****ADMINISTRATION INFORMATION - CONTINUED**

- d. User's delay in making the product available after being notified of a potential product problem.
- e. Unauthorized repair or adjustments, and unauthorized fuel setting changes.
- f. Breakage of Ground Engaging Tools (GET) due to worn mating components or those that have been hardfaced or improperly welded.
- g. Remedies under this warranty are limited to providing parts and labor as stated above. Caterpillar is not responsible for incidental or consequential damages.

**OVERALL MACHINE WARRANTY**

1. **General.**
  - a. The ASWDS machines are covered by Caterpillar's material and workmanship machine for a period of 18 months or 1,000 hours, whichever occurs first.
  - b. The warranty period begins on the date of machine handoff to the first using unit. Check the machine data plate for warranty start date.
2. **To Obtain Warranty Service.** To obtain warranty service, follow procedures outlined above in *Administrative Information*.

**GROUND ENGAGING TOOLS (GET) WARRANTY**

1. **General.**
  - a. Caterpillar GET is covered by warranty by Caterpillar Inc.
  - b. The warranty period is not limited by time and is applicable throughout the *useful life* of the ground engaging tools covered. GET is considered worn out when it is no longer protecting the structural surface to which the GET is mounted.
2. **To Obtain Warranty Service.** To obtain warranty service on GET, follow procedures outlined above in *Administrative Information*.
3. **Specific Warranty Information.**
  - a. The Caterpillar warranty is applicable after the expiration of any standard machine or parts warranty. The following Caterpillar GET are covered:
    - (1) Cutting edge (P/N 4T6611)
    - (2) Cutting edge (P/N 4T6613)
    - (3) Router bits (P/N 4T4336)
  - b. After the machine warranty period, the unit is responsible for all labor (including welding) and hardware costs associated with removal and installation of GET. The unit is also responsible for delivering the hardware to the dealer and getting replacement GET.

**BATTERY WARRANTY**

1. **General.** The battery is covered by 3 year warranty by Caterpillar Inc.
2. **To Obtain Warranty Service.** To obtain warranty service on the battery, follow procedures outlined above in *Administrative Information*.
3. **Specific Warranty Information.**
  - a. Caterpillar will replace the battery which it finds to be defective in material or workmanship with a new battery at the following cost to the user:
    - (1) For the first 12 months from machine warranty start date there is not charge to the user.

**BATTERY WARRANTY - CONTINUED**

(2) After 12 months from machine warranty start date, user cost is determined by the following formula:

$$\frac{\text{Current Customer's Battery Price} \times \text{Months in Service}}{36 \text{ (months in battery warranty)}} = \text{User Cost}$$

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

**EMISSIONS WARRANTY****NOTE**

- California users must also refer to *Emission Control Warranty for California*.
- Certification tags illustrated are sample tags only and may not reflect the tags found on your machine.
- Items covered by the emission warranty are:
  - Fuel injector group
  - Fuel-air ratio control (FRC) and FRC boost line
  - Unit injector governor group
  - Fuel injector control assembly
  - Turbocharger and gasket
  - Intake manifold and gasket
  - Exhaust manifold and gasket
  - Turbocharger-to-aftercooler hoses and clamps
  - Engine inlet air aftercooler and gasket.

1. **General.**

- a. Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants that certified nonroad diesel engine (powering mobile machinery) are:
  - (1) Designed, built, and equipped so as to conform, at the time of sale, with all applicable regulations adopted by the United States Environmental Protection Agency (EPA).
  - (2) Free from defects in materials and workmanship in specific emission-related parts for a period of 60 months, or 3,000 hours of operation, whichever occurs first, after the date of delivery to the first user.
- b. If an emission-related part fails during the warranty period, it will be repaired, or replaced. Any such part repaired or replaced under warranty is warranted for the remainder of the warranty period.
- c. The engine is certified if it has a special certification label. A Caterpillar dealer can also inform you if the engine is certified.
- d. During the term of this warranty, Caterpillar will provide, through a Caterpillar dealer or other source approved by it, repair or replacement of any warranted part at no charge.
- e. In an emergency, repairs may be performed at any service establishment, or by the user. Caterpillar will reimburse the user for their expenses, including diagnostic charges for such emergency repair. These expenses shall not exceed Caterpillar's suggested retail price for all warranted parts replaced, and labor charges based on Caterpillar's recommended time allowance for the warranty repair and the geographically appropriate hourly labor rate.
- f. A part not being available within 30 days or a repair not being complete within 30 days constitutes an emergency.

**WARRANTY INFORMATION (CATERPILLAR, INC.) - CONTINUED****0027 00*****EMISSIONS WARRANTY - CONTINUED***

- g. As a condition of reimbursement, replaced parts and validated invoices must be presented at a place of business of a Caterpillar dealer or other source approved by Caterpillar.

2. **Responsibilities and Limitations.** The warranty is subject to the following:

- a. **Caterpillar Responsibilities.** During the emission warranty period, if a defect in material or workmanship of an emission-related part or component is found, Caterpillar will provide:
  - (1) New, remanufactured, or repaired parts and/or components, approved pursuant to EPA Regulations, required to correct the defect.
  - (2) Note: Items replaced under warranty become the property of Caterpillar.
  - (3) Reasonable or customary labor, during normal working hours, needed to correct the defect, including labor for removal and installation when necessary to make the repair.
- b. **User Responsibilities.** During the emission warranty period, the user is responsible for:
  - (1) Providing proof of the delivery date to the first user.
  - (2) Premium or overtime labor costs.
  - (3) Costs to investigate complaints which are not caused by a defect in Caterpillar material or workmanship.
  - (4) Providing timely notice of a warrantable failure and promptly making the product available for repair.
  - (5) Performance of the required maintenance and use of proper fuel, oil, lubricants and coolant.
  - (6) Maintenance, replacement, or repair of the emission control devices and systems may be performed by any non-road engine repair establishment or individual using certified nonroad engine parts.

3. **Limitations.**

- a. Caterpillar is not responsible for resultant damages to an emission-related part of component resulting from:
  - (1) Any use or installation which Caterpillar judges improper.
  - (2) Attachments, accessory items and parts not sold or approved by Caterpillar.
  - (3) Abuse, neglect and/or improper engine repair.
  - (4) User's delay in making the product available after being notified of a potential product problem.
  - (5) Unauthorized repair or adjustments and unauthorized fuel setting changes.
- b. This warranty is in addition to Caterpillar's standard warranty, applicable to the nonroad diesel engine product involved.
- c. 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.
- d. 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.

4. **Maintenance Recommendations.**

- a. Some Caterpillar nonroad diesel engines are certified by the United States Environmental Protection Agency (EPA) to comply with smoke and gaseous emission standards prescribed by Federal laws at the time of manufacture.

## WARRANTY INFORMATION (CATERPILLAR, INC.) - CONTINUED

0027 00

## EMISSIONS WARRANTY - CONTINUED

- b. The engine is certified if it has a special certification label. Two types of labels that are used by Caterpillar are illustrated. A Caterpillar dealer can also inform you if the engine is certified.
- c. Efficiency of emission control and engine performance depends on adherence to proper operation and maintenance recommendations AND use of recommended fuels and lubricating oils. It is recommended that major adjustments and repair be made by your authorized Caterpillar dealer.
- d. Various chemical fuel additives, which claim to reduce visible smoke, are available commercially. Although additives have been used by individuals to solve some isolated smoke problems in the field, they are not recommended for general use. Federal smoke regulations require that engines be certified without smoke depressants.

<b>CATERPILLAR INC.</b>	
IMPORTANT ENGINE INFORMATION	
SER NO.	SRM00001
ENGINE MODEL	3516 DISPLACEMENT 69.0 L
VALVE LASH	0.50 mm INTAKE 1.00 mm EXHAUST
ENGINE FAMILY	YCPXL69.0ERK
MAX. ADVERTISED POWER	1611 kW (2160) HP
MAX. RATED SPEED	1750 RPM
MAX. LOW IDLE SPEED	700 RPM
MAX. FUEL RATE @ MAX. KW	463 mm <sup>3</sup> /STROKE
EXHAUST EMISSION CONTROL SYSTEM	EM,DI,TC,ECM,CAC
THIS ENGINE CONFORMS TO 2000 U.S. EPA AND CALIFORNIA REGULATIONS LARGE NON-ROAD COMPRESSION-IGNITION ENGINES. THIS ENGINE IS CERTIFIED TO OPERATE ON COMMERCIALY AVAILABLE DIESEL FUEL.	
DATE OF MANUFACTURE (MONTH)	08 100-2466

<b>CATERPILLAR INC.</b>		IMPORTANT ENGINE INFORMATION		2000		JDM00001	
ENGINE MODEL: 3116 - DISPLACEMENT: 6.6L - VALVE LASH: 0.38mm INTAKE 0.64mm EXHAUST							
ENGINE FAMILY YCPXL69.0ERK	MAXIMUM ADVERTISED PW (kW) 164 (220)	MAXIMUM RATED SPEED (RPM) 2000	MAXIMUM LOW IDLE SPEED (RPM) 575	MAX. FUEL RATE @ MAXIMUM SPEED (mm <sup>3</sup> /STROKE) 104	MAXIMUM INITIAL TORQUE DENOMINATED BYTS 11.5	EXHAUST EMISSION CONTROL SYSTEM EM,DI,TC,ECM,CAC	
THIS 3116 ENGINE CONFORMS TO DIRECTIVE 97/24/EC FOR NON-ROAD ENGINES. THIS 3116 ENGINE SHOWS OVER TO 2000 U.S. EPA AND CALIFORNIA REGULATIONS LARGE NON-ROAD COMPRESSION-IGNITION ENGINES. THIS ENGINE IS CERTIFIED TO OPERATE ON COMMERCIALY AVAILABLE DIESEL FUEL.				EC TYPE APPROVAL NO. 01L/07/000A-0001/00 DATE OF MANUFACTURE MONTH: 08			
				70-0000 01			
				FMT:3500			

- e. The corrective steps taken immediately upon discovery of worn parts, which may affect emission levels, will help assure proper operation of emission control systems. The use of genuine Caterpillar parts is recommended. Suppliers of non-Caterpillar parts must assure the owner that the use of such parts will not adversely affect emission levels.
- f. Regular maintenance intervals, along with special emphasis on the following items, are necessary to keep exhaust emissions within acceptable limits for the useful life of the engine. If the engine is operating under severe conditions, adjust the maintenance schedule accordingly.
- g. See your authorized Caterpillar dealer to help analyze your specific application, operating environment and maintenance schedule adjustments.
- h. The following is an explanation of maintenance for emission-related components.
  - (1) *Fuel Injectors or Nozzles.* Fuel injectors or nozzles are subject to tip wear as a result of fuel contamination. This damage can cause an increase in fuel consumption, the engine to emit black smoke, misfire or run rough. Inspect, test, and replace if necessary. Fuel injectors can be tested by an authorized Caterpillar dealer.
  - (2) *Turbocharger.* Check for any unusual sound or vibration in the turbocharger. Inspect inlet and exhaust piping and connections.
  - (3) *Air/fuel Ratio Control.*

**EMISSIONS WARRANTY - CONTINUED**

- (a) This component is a device to control the black smoke emission of an engine during its operation when low inlet manifold pressure exists.
- (b) Slow engine response and low power may indicate a need for adjustment or repair. Your Caterpillar dealer is equipped with the necessary tools, personnel, and procedures to perform this service.
- (c) The owner is encouraged to keep adequate maintenance records, but the absence of such, in and of itself, will not invalidate the warranty.
- (d) The machine or equipment owner may perform routine maintenance, repairs and other non-warranty work or have it done at any repair facility. Such non-warranty work need not be performed at a designated warranty station in order for the warranty to remain in force.

**5. Customer Assistance - Emission Control Systems Warranty.**

- a. Caterpillar Inc. aims to ensure that the Emission Control System warranty is properly administered. In the event that you do not receive the warranty service to which you believe you are entitled under the Emission Control Systems Warranty, call or write: Caterpillar, Manager of Warranty Systems, Peoria, IL 61629-1250; (309) 675-4037.
- b. Authorized dealers are recommended for major maintenance and repair work as they are staffed with trained personnel, proper tools and are aware of the latest maintenance methods and procedures. Owners and others who desire to perform their own work should purchase a Service Manual and obtain current service information from their Caterpillar dealer.

**EMISSION CONTROL WARRANTY FOR CALIFORNIA****1. Owner Warranty Rights and Obligations.**

- a. The California Air Resources Board (CARB) and Caterpillar are pleased to explain the emission control system warranty on your 2000 or later certified heavy duty off-road diesel engine. The engine is certified if it has a special certification label. Two types of labels that are used by Caterpillar are shown on previous pages. A Caterpillar dealer can also inform you if the engine is certified.
- b. In California, new heavy duty off-road diesel engines must be designed, built, and equipped to meet the state's stringent anti-smog standards. Caterpillar must warrant the emission control system on your engine for the duration of time listed below provided there has been no abuse, neglect, or improper maintenance on your engine.
- c. Your emission control system may include parts such as the fuel injection system, air induction system, and engine computer, if equipped. Also included may be hoses, connectors, clamps, and other emission-related components.
- d. Where a warrantable condition exists, Caterpillar will repair the heavy duty off-road diesel engine at no cost to the owner including diagnosis, parts, and labor.

**2. Manufacturer's Warranty Coverage.**

- a. The emissions warranty period for new heavy duty off-road diesel engines is a duration of 60 months, or 3,000 hours of operation, whichever occurs first after date of delivery to the initial owner.
- b. If an emission-related part or component on your diesel engine is defective, the part or component will be repaired, or replaced by Caterpillar. This is your emission control system WARRANTY.
- c. This warranty covers the following emission-related parts and components:
  - (1) Charge Air Cooling System (if equipped)
  - (2) Fuel Injection System
  - (3) Intake Manifold
  - (4) Exhaust Manifold
  - (5) Turbocharger System
  - (6) Air-Fuel Ratio Control System
  - (7) Electronic Control Module including Sensors and Personality Module (if equipped)



**EMMISSION CONTROL WARRANTY FOR CALIFORNIA - CONTINUED**

- (8) Miscellaneous hoses, clamps, connectors and sealing devices used in the above systems.
  - d. Any replacement part may be used for maintenance or repairs. The owner should ensure that such parts are equivalent in design and durability to genuine Caterpillar parts. Use of non-genuine Caterpillar parts does not invalidate the warranty. However, Caterpillar is not liable for parts which are not genuine Caterpillar parts.
3. **Owner's Warranty Responsibilities.**
- a. As the heavy duty off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in the owner's manual (Operation and Maintenance Manual). Caterpillar recommends that you retain all records covering the maintenance on your engine, but cannot deny warranty solely for lack of receipts and records or for failure to ensure the performance of all scheduled maintenance.
  - b. As the heavy duty off-road diesel engine owner, you should also be aware that Caterpillar may deny you warranty coverage if your heavy duty off-road diesel engine, or an emission components, or part has failed due to abuse, neglect, improper maintenance or unapproved modifications.
  - c. Your engine is designed to operate on commercial diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emission requirements.
  - d. You are responsible for contacting your Caterpillar dealer as soon as any engine problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.
  - e. If you have questions regarding your warranty rights and responsibilities contact: Caterpillar Manager, Warranty Operations, Peoria, IL 61629-1250, phone: (309) 675-4037 or California Air Resources Board (CARB), 9528 Telstar Ave., El Monte, CA 91731.

**LIST OF PRINCIPLE CATERPILLAR DEALERS**

1. Table 2 below provides the name and location of local Caterpillar dealers according to principle vehicle deployment.
2. In the event of OCONUS deployment or outside of home base area of operation, contact Caterpillar Defense and Federal Products at (309) 578-3295 for Caterpillar dealer support in that theatre of operation.

**Table 2. Caterpillar Dealer Listing.**

<b>Vehicle Location</b>	<b>Local Caterpillar Dealer</b>
Ft. Bragg, NC	Gregory Poole Equipment Co. 5633 U.S. Highway 301 at NC 59 Hope Mills, NC 28348 PH: (910) 424-4400 Fax: (910) 424-1323 www.gregpoole.com
Ft. Campbell, KY	Whayne Supply Company 651 U.S. Highway 31 W. Bypass Bowling Green, KY 42101 PH: (270) 843-3275 Fax: (270) 843-3285
Cape Girardeau, MO	Fabrick Brothers Equipment Co. 3033 Nash Road Scott City, MO 63780-9791 PH: (573) 332-1122 Fax: (573) 332-7109
St. Cloud, MN	Ziegler Inc. 2225 225th Street St. Cloud, MN 56301-8742 PH: (320) 253-2234 Fax: (320) 253-2187
Greenville, SC	Carolina Tractor and Equipment Co. 40 Interstate Blvd Asheville, NC 28806-2261 PH: (828) 251-2500 Fax: (828) 253-9341
Sharonville, OH	Holt Company of Ohio 11330 Mosteller Road Sharonville, OH 45241-1828 PH: (513) 771-0515 Fax: (513) 672-7658
Northfield, NJ	Giles & Ransome Inc. 600 S. Egg Harbor Road Hammonton, NJ 08037-8602 PH: (609) 561-0308 Fax: (609) 567-3970
Jefferson Banks, MO	John Fabick Tractor Company One Fabick Dr. Fenton, MO 63026-2986 PH: (636) 343-5900 Fax: (636) 343-2186

**END OF WORK PACKAGE**

**WARRANTY INFORMATION (ALL EXCEPT CATERPILLAR, INC.)****0028 00****GENERAL WARRANTY INFORMATION**

1. The Airborne Scraper and Water Distributor System (ASWDS) is covered by a number of different warranties as described in Table 1. This work package contains information on warranties for the tires and ISU-60 container, including instructions on filing warranty claims. Information on overall machine and engine specific warranties (covered by Caterpillar Inc.) is found in WP 0027 00.

**Table 1. ASWDS Warranty Information.**

<b>Warranted Component</b>	<b>Duration of Warranty</b>	<b>Manufacturer Responsible</b>	<b>Contact Information</b>
Tires	5 Years	Bridgestone/Firestone Off Road Tire Company	(800) 572-8905
ISU-60 Container	12 Months	AAR Mobility Systems	(800) 355-2015
	<b>Warranty Information Contained in WP 0027 00</b>		
Overall Machine	18 Months/1000 Hours	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Ground Engaging Tools	Not limited by time	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Battery	3 Years	Caterpillar Inc.	Defense and Federal Products (390) 578-3295
Engine Emission Components (613 ASWDS Engine is EPA Certified)	5 Years/3000 Hours	Caterpillar Inc.	Defense and Federal Products (309) 675-4037

2. The warranties covered in this work package are arranged by manufacturer. For example, for information on the ISU-60 container warranty, look for the heading titled *AAR Mobility Systems (ISU-60 Container Warranty)*. Paragraphs under this heading contain all information on the ISU-60 warranty, including administrative and claim filing instructions.
3. Scheduled machine maintenance is contained in WP 0014 00, TM 5-3800-205-23-1 and TM 5-3800-205-23-2. The fact that the machines are covered by a warranty does not relieve the user of the responsibility for proper machine operation, care, and maintenance.
4. The manufacturer's lubrication and service intervals must be followed.

**EXPLANATION OF TERMS**

1. **Abuse.** The improper use, maintenance, repair, or mishandling of warranted items that may cause the warranty of those items to become void.
2. **Acceptance Date.** The date the equipment is accepted in the Army's inventory as annotated on DD Form 250, *Material Receiving and Inspection Report*.
3. **Acquiring Command or Activity.** An activity that procures the items or material for a user.
4. **Defect.** An imperfection that impairs the worth or utility of the part or component.
5. **Repair.** To restore an item to a serviceable condition without affecting warranty.

**WARRANTY INFORMATION (ALL EXCEPT CATERPILLAR INC.) - CONTINUED****0028 00****EXPLANATION OF TERMS - CONTINUED**

6. **Repairable.** An item that may be reconditioned or economically repaired for reuse.
7. **Warranty.** A written agreement between a contractor and the Government that outlines the rights and obligations of both parties for defective supplies.
8. **Warranty Claim.** Action started by the equipment users for authorized warranty repair or reimbursement.
9. **Warranty Period.** Time during which the warranty is in effect.
10. **Warranty Start Date.** The date the warranty is put into effect (stamped on warranty plate). The warranty plate is proof of warranty start date for all warranties.
11. **Ton-Mile-Per-Hour.** A rating used to describe the tires ability to carry a load at a given speed; exceeding this will damage the tire.

**BRIDGESTONE/FIRESTONE OFF ROAD TIRE COMPANY (TIRE WARRANTY)**

1. **General.**
  - a. ASWDS tires are warranted on a prorated basis by Bridgestone/Firestone Off Road Tire Company (BFOR) for a period of 5 years. Refer to Table 2. for information on prorating tires.
  - b. Contact the local BFOR or TACOM-Team Tire for information regarding tire warranty. To find the closest Firestone dealer, use [www.bfor.com](http://www.bfor.com) or call 1-800-572-8905. The original tire on the ASWDS machine is a Super Ground Grip Loader Dozer L-2 Nylon 16 ply rating size 23.5-25.
2. **To Obtain Warranty Service.**
  - a. Contact an authorized Bridgestone, Firestone, or America OTR dealer. Please be prepared to provide proof of purchase of the product and purchase date.
  - b. The authorized dealer will contact BFOR to arrange for a tire inspection and claim processing. The dealer does NOT have authority/responsibility to make the determination as to eligibility for coverage under this warranty.
3. **Limited Warranty Exclusions - All Tires and Tubes.** All tire and tube warranties are subject to the following exclusions:

**NOTE**

Overloading tires voids the warranty.

- a. All limited warranties of BFOR are limited to the original purchaser and are not assignable to subsequent purchasers.
- b. Costs of mounting and balancing following prorated replacement or repair of tires or tubes, and applicable federal, state, and local taxes.
- c. Warranties do not cover damage resulting from misuse, improper mounting, misapplication, use of non-approved rims, improper inflation, overloading, running flat, misalignment or imbalance of wheels/rims, defective brakes or shock absorbers, abuse, willful damage, oil, chemical action, fire or externally - generated heat, use of tire chains, use of studs, water or other material entrapped inside the tire during mounting, vehicle damage or road hazards (such as rock cuts, punctures, cut separations, impacts, flex breaks).
- d. Claims for irregular wear are not covered.
- e. Any tire which is operated above its ton-mile per-hour (TMPH) rating, is not covered.
- f. All tube-type tires should be used with proper size Bridgestone/Firestone tubes exclusively.
- g. Warranties apply to original usable tread depth and do not extend to retreaded tires.
- h. Any modifications to the tire (added buttress shoulders, regrooving, relugging, etc.) voids all warranties.
- i. Any material added to the tire (tire fill, sealer, balancer, etc.) is not covered by this warranty and will not be compensated for in case of credit being issued for the tire. Use of solid type fill (such as urethane) voids all warranties.
- j. Any costs associated with the repair of tires are not covered, unless previously approved by the appropriate BFOR employee.

**WARRANTY INFORMATION (ALL EXCEPT CATERPILLAR INC.) - CONTINUED****0028 00****BRIDGESTONE/FIRESTONE OFF ROAD TIRE COMPANY (TIRE WARRANTY) - CONTINUED**

- k. Warranties are valid only for tires and tubes purchased and used in the United States.
- l. ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED TO THE DURATION OF THIS LIMITED WARRANTY.
- m. ALL OBLIGATIONS OR LIABILITIES FOR INCIDENTAL OR CONSEQUENTIAL DAMAGE ARE HEREBY EXCLUDED, INCLUDING LOSS OF USE OF VEHICLE AND LOSS OF TIME.
- n. Some states do not allow limitations in how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above such limitations or exclusions may not apply to you.
- o. No Bridgestone, Firestone, or America OTR dealer has the authority to make or imply any representation, promise or agreement which in any way varies or extends the terms of this warranty.

**Table 2. Tire Warranty Information.**

<b>AMOUNT OF CREDIT ISSUED TO THE CUSTOMER FOR WORKMANSHIP AND MATERIAL CONDITIONS</b>								
	<b>Percentage of Original Tread Depth Remaining</b>							
<b>AGE OF TIRE</b>	<b>81% to 100%</b>	<b>71% to 80%</b>	<b>61% to 70%</b>	<b>51% to 60%</b>	<b>41% to 50%</b>	<b>31% to 40%</b>	<b>21% to 30%</b>	<b>0% to 20%</b>
Less than 180 days	Actual%	70%	60%	50%	40%	30%	20%	0%
180 days to one year	80%	70%	60%	50%	40%	30%	10%	0%
Less than two years	75%	65%	60%	50%	40%	30%	10%	0%
Less than three years	50%	50%	40%	40%	40%	30%	10%	0%
Less than four years	40%	30%	30%	30%	30%	20%	10%	0%
Less than five years	20%	20%	20%	20%	20%	20%	10%	0%
More than five years	0%	0%	0%	0%	0%	0%	0%	0%

**AAR MOBILITY SYSTEMS (ISU-60 CONTAINER WARRANTY)**

- General.** The ISU-60 container is covered by a 12-month materials and workmanship warranty by AAR Mobility Systems.
- To Obtain Warranty Service.** Contact AAR Mobility Systems at 1-800-355-2015.
- ISU-60 Container Warranty.** AAR warrants to the Army that its new goods, excluding components not made by AAR, are free from defects in material and workmanship under normal use and service. AAR's obligation under this warranty is limited to repair or at AAR's option, replacement of any part or parts which are within 12 months after delivery to the Army returned to AAR's place of manufacture and which after examination appears to AAR's satisfaction to be defective under the above warranty. In the event a part is replaced, the aforementioned warranty term shall not be extended beyond one year after the delivery of the original manufactured part to the Army. All costs of shipping any defective goods to AAR and returning them to the Army shall be borne entirely by the Army. AAR shall use its good faith efforts to obtain, in its subcontract with each supplier of components not made by AAR, a provision that the subcontractor's standard warranty, if any, shall survive AAR's inspection, acceptance and payment and shall run to AAR, its successors, assigns and customers. AAR MAKES NO IMPLIED WARRANTY OF MERCHANTABILITY FITNESS FOR ANY SPECIAL USE OR FUNCTION OR LIFE AFTER SALE TO THE ARMY AND/OR TO SUBSEQUENT BUYERS OR USERS OF THE GOODS, BEYOND THE EXPRESSED TERMS OF THIS AGREEMENT. THERE ARE NO WARRANTIES EXPRESSED OR IMPLIED, ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE OR USAGE OF TRADE, WHICH EXTEND BEYOND THE FACE OF THIS AGREEMENT. AAR neither assumes nor authorizes any person to assume for it any other liability in connection with the sale of its goods.

**END OF WORK PACKAGE**

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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*  
0514503

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PUBLICATION/FORM NUMBER TM 5-3800-205-10-1						DATE 15 July 2005	TITLE Operator's Manual for Scraper, Tractor Elevating, Self-Propelled, 11 Cubic Yards, Sectionalized Model 613CS
ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
	0017 00-2				2	Part number supplied for item 2 is incorrect.	
<div style="font-size: 100px; opacity: 0.3; transform: rotate(-10deg); pointer-events: none;">SAMPLE</div>							
* Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE Johnny Wilson, E-5, MOTOR SGT						TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION DSN 867-7967	
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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	
<div style="position: relative; height: 300px;"> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%) rotate(-45deg); font-size: 100px; opacity: 0.5;">SAMPLE</div> </div>									
PART III - REMARKS (For general remarks, or suggestions for improvement of publications and for additional sheets may be used. Space provided.)									
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE		



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<b>TO:</b> ( <i>Forward to proponent of publication or form</i> ) ( <i>Include ZIP Code</i> )						<b>FROM:</b> ( <i>Activity and location</i> ) ( <i>Include ZIP Code</i> )	
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TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE	

## THE METRIC SYSTEM AND EQUIVALENTS

<p><b>Linear Measure</b></p> <p>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</p> <p><b>Weights</b></p> <p>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</p> <p><b>Liquid Measure</b></p> <p>1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  1 Liter = 1000 Milliliters = 33.82 Fluid Ounces</p>	<p><b>Square Measure</b></p> <p>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</p> <p><b>Cubic Measure</b></p> <p>1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches  1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p><b>Temperature</b></p> <p><math>5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}</math>  212° Fahrenheit is equivalent to 100° Celsius  90° Fahrenheit is equivalent to 32.2° Celsius  32° Fahrenheit is equivalent to 0° Celsius  <math>9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}</math></p>
--	---

## 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

