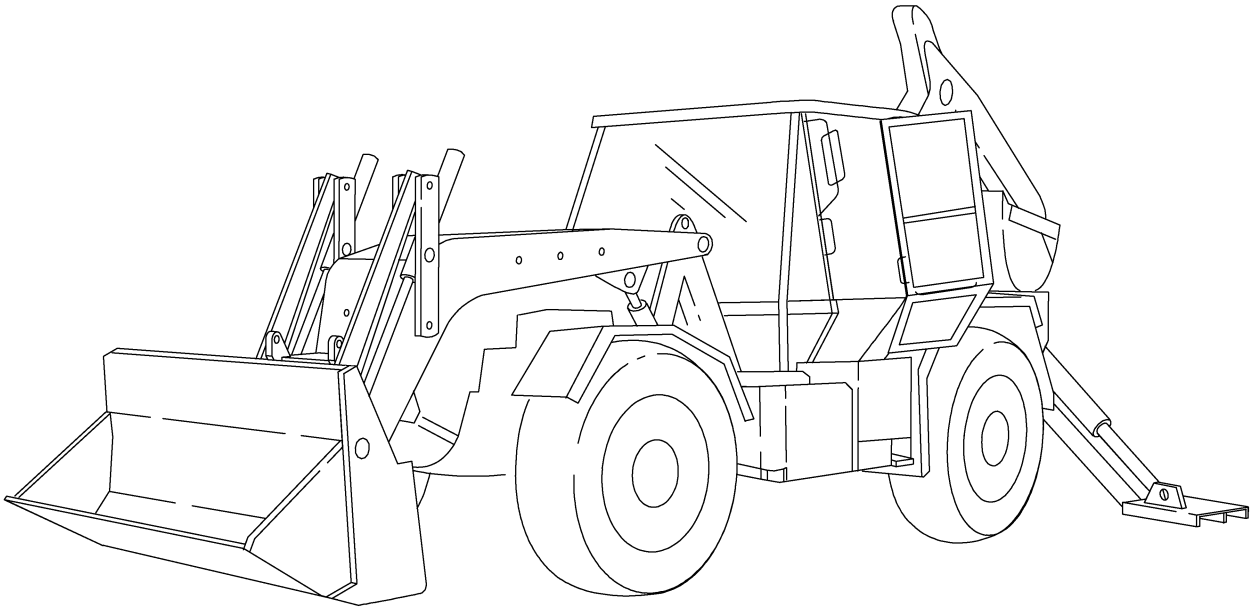
TM 5-2420-230-10

TECHNICAL MANUAL

OPERATOR'S MANUAL FOR INTERIM HIGH-MOBILITY ENGINEER EXCAVATOR (IHMEE)

NSN 2420-66-148-7692



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HEADQUARTERS, DEPARTMENT OF THE ARMY OCTOBER 2003

WARNING

A wheel and tire assembly weighs 518 lb. (235 kg). Ensure that wheel and tire assembly does not fall on personnel. Failure to comply may result in injury or death to personnel.

WARNING

Adhesives, solvents, and sealing compounds burn easily and give off vapors that are harmful to the skin and clothing. To avoid injury or death, keep away from open fire when using these materials, and use only in well-ventilated areas. If adhesives, solvents, or sealing compounds contact the skin or clothing, wash immediately with soap and water, and rinse thoroughly. Failure to comply may result in injury or death to personnel.

WARNING

All fuels, most lubricants, and some coolants are flammable. Do not store flammable fluids in cab. Failure to comply may result in injury or death to personnel.

WARNING

All required safety equipment must be mounted on the vehicle prior to operation. Failure to do so could result in personal injury.

WARNING

Always securely support vehicle if required to work under it. Failure to comply may result in injury or death to personnel.

WARNING

Always use the electrical master switch to disable battery power when disconnecting or connecting electrical connections. Failure to comply may result in injury or death to personnel.

WARNING

APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.

WARNING

Avoid contact with hot oil. Failure to comply may result in serious injury.

WARNING

Be aware that other road users may have difficulty in judging the speed of the IHMEE. To avoid the possibility of an accident, it is important that the operator of this vehicle use caution and drive defensively. Failure to comply may result in injury or death to personnel.

WARNING

Be aware that the FEL reduces forward visibility and may create blind spots. To reduce the possibility of a collision when driving on the highway, use extreme caution. Failure to comply may result in injury or death to personnel.

WARNING

Before jacking any wheel, chock another wheel to keep vehicle from rolling. Never crawl under equipment when performing maintenance unless equipment is securely chocked. Failure to comply may result in serious injury or death to personnel.

WARNING

Before operating the vehicle, visually check area around vehicle to ensure there is sufficient, safe clearance. Failure to do so could result in personnel injury and/or damage to equipment.

WARNING

Before releasing parking brake, chock wheels to keep vehicle from rolling. Failure to do so may result in serious injury or death to personnel.

WARNING

Caution MUST be exercised at all times when traveling or operating in off-road conditions or extreme weather conditions, i.e., icy roads. Failure to comply may result in injury to personnel and/or damage to equipment.

WARNING

Caution must be exercised at all times when traveling or operating in off-road conditions. Reduce vehicle speeds and avoid deep ruts and potholes. Use the manual level indicators during FEL operations. Failure to comply could result in injury to personnel and/or damage to equipment.

WARNING

CARBON MONOXIDE POISONING CAN BE DEADLY

- CARBON MONOXIDE IS A COLORLESS, ODORLESS, DEADLY POISONOUS GAS, WHICH, WHEN BREATHED, DEPRIVES THE BODY OF OXYGEN AND CAUSES SUFFOCATION. EXPOSURE TO AIR CONTAMINATED WITH CARBON MONOXIDE PRODUCES SYMPTOMS OF HEADACHE, DIZZINESS, AND LOSS OF MUSCULAR CONTROL, APPARENT DROWSINESS, OR COMA. PERMANENT BRAIN DAMAGE OR DEATH CAN RESULT FROM SEVERE EXPOSURE.
- CARBON MONOXIDE OCCURS IN THE EXHAUST FUMES OF FUEL-BURNING HEATERS AND INTERNAL COMBUSTION ENGINES AND BECOMES DANGEROUSLY CONCENTRATED UNDER CONDITIONS OF INADEQUATE VENTILATION. THE FOLLOWING PRECAUTIONS MUST BE OBSERVED TO ENSURE THE SAFETY OF PERSONNEL WHENEVER THE PERSONNEL HEATER, MAIN, OR AUXILIARY ENGINE OF ANY VEHICLE IS OPERATED FOR MAINTENANCE PURPOSES OR TACTICAL USE:
  1. DO NOT operate engine of vehicle in an enclosed area unless it is ADEQUATELY VENTILATED.
  2. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in the personnel compartments.
  3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.
  4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either is present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm, DO NOT PERMIT EXERCISE; if necessary, administer artificial respiration (see FM 4-25.11).
- THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.

WARNING

Caution must be exercised during backhoe operations on side slopes. Always operate the backhoe toward the uphill side of the worksite. Digging/excavation operations must be conducted as close to vehicle centerline as possible. Do not raise the bottom of a loaded bucket more than 1 ft. (30 cm) above the ground. Avoid abrupt changes in position of the backhoe or bucket. Failure to comply may result in personnel injury and/or damage to equipment.

WARNING

Caution must be exercised during FEL operations. Do not carry a loaded bucket more than 24 in. (61 cm) above ground while traveling over rough or hilly terrain. Failure to comply could result in injury to personnel and/or damage to equipment.

WARNING

Death or serious injury may result if you attempt to mount or stop a moving vehicle.

WARNING

Degreasing Solvent (MIL-PRF-680) is toxic and flammable. Keep away from heat or flame. Never smoke when using solvent. The flashpoint for Type II Degreasing Solvent is 141 °F (61 °C). Wear protective goggles, face shield, and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes; and do not breathe vapors. Failure to comply may result in injury or death to personnel.

WARNING

Do not adjust steering wheel during operation. Failure to comply may result in injury or death to personnel.

WARNING

Do not allow personnel to perform maintenance on FEL or backhoe with buckets loaded and/or raised. Failure to comply may result in injury and/or death to personnel.

WARNING

Do not attempt to jump clear of a tipping vehicle; serious or fatal crushing injuries may result. Vehicle tips faster than driver or passenger can jump free. Failure to comply may result in injury or death to personnel.

WARNING

Do not check for leaks by hand; oil under hydraulic pressure can penetrate the skin and cause severe injury. Failure to comply may result in injury or death to personnel.

WARNING

Do not drain air from a tank with any part of body in air spray path. Skin embolisms and/or debris in eyes can occur from released pressure. Failure to comply may result in injury or death to personnel.

WARNING

Do not exceed 20 percent side slope and avoid turning across soft side slopes while descending. Failure to comply could result in injury to personnel and/or damage to equipment.

WARNING

Do not exceed 25 mph (40 km/h) when operating the vehicle on secondary roads or cross-country. Failure to comply may result in injury to personnel and/or damage to equipment.

WARNING

Do not exceed the maximum rated towing capacity of the IHMEE is 8.8 tons (8 tonnes) for the combined weight of the trailer and load. Failure to comply may result in injury or death to personnel and/or damage to equipment.

WARNING

Do not start engine or move vehicle when anyone is under vehicle. Severe injury or death could result.

WARNING

Do not work on fuel system when engine is hot; fuel can be ignited by a hot engine.

WARNING

Do not work under raised FEL arms unless the maintenance arm is fitted. Failure to comply may result in serious injury or death to personnel.

WARNING

During road and highway movement, the backhoe and FEL buckets must be empty and secured with the travel stops and locking clevises. Failure to do so could result in injury to personnel.

WARNING

Ensure air pressure is drained to 0 psi (0 kPa) before taking off any air components. If pressure is not released, components could blow off and harm personnel. The IHMEE air system is pressurized to 119 psi (820 kPa). Do not drain air from a tank with any part of body in air spray path. Skin embolisms and/or debris in eyes can occur from released pressure. Failure to comply may result in injury or death to personnel.

WARNING

Ensure MODE CONTROL switch is set to ROAD/BACKHOE before shutting OFF engine. Failure to do so will allow suspension to rise and may result in injury to personnel.

WARNING

Ensure that no personnel are near or around the IHMEE when reversing during operations with vehicle lights set to BO DRIVE or BO MARKER. In this condition, the reverse alarm is not operational. Failure to comply may result in serious injury or death to personnel.

WARNING

Ensure that only the indicated auxiliary valve is operated. You are within the backhoe crush zone when operating the backhoe auxiliary valve. Manual operation of any other valves can cause serious injury or death.

WARNING

Ensure you do not catch your hands between extension bar and other parts of IHMEE. Failure to comply may result in injury or death to personnel.

WARNING

Entanglement in moving parts can cause serious injury or death.

WARNING

- Failure to comply with the following may result in injury or death to personnel:
- Mount and dismount the IHMEE only where steps and/or handrails are provided. Do not use any controls as handholds.
- Clean shoes and wipe hands before climbing on the vehicle. Use handholds when mounting the IHMEE.
- Inspect, clean, and have any necessary repairs made to steps prior to mounting the IHMEE.
- Always use "three-point contact" with the IHMEE; face the vehicle when entering or leaving the cab. Three-point contact means that three out of four arms and legs are in contact with the vehicle at all times during mount and dismount.
- Never get on or off a moving IHMEE.
- Never jump off the IHMEE.
- Do not attempt to climb on or off the IHMEE while carrying tools or supplies.
- Never jump on or off a moving vehicle. Be careful of slippery conditions on platforms, handholds, and steps when leaving vehicle.
- Do not use the IHMEE as a platform.

WARNING

Follow safe working procedures when lifting or moving heavy items. Use an appropriate lifting device whenever part to be moved exceeds 50 lb. (23 kg). Failure to comply may result in injury or death to personnel.

WARNING

Hot parts can burn personnel. Let hot parts cool before starting work.

WARNING

Hydraulic fluid (Dexron III) is TOXIC. Wear protective goggles and gloves; use only in well-ventilated area; avoid contact with skin, eyes, and clothes. Skin and clothing that come in contact with hydraulic oil should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury or death to personnel.

WARNING

If a maintenance procedure must be performed with the engine running, do not leave vehicle unattended. Failure to comply may result in injury or death.

WARNING

If engine is running while belly plates are removed, stay clear of air drier discharge. Skin embolisms and/or debris in eyes can occur from released pressure. Failure to comply may result in injury to personnel.

WARNING

If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.

WARNING

If the FEL arms are required to be raised for service work, the maintenance arm must be fitted. Do not work under raised FEL arms unless the maintenance arm is fitted. Failure to comply may result in serious injury or death to personnel.

WARNING

If vehicle has been operating, use extreme care to avoid being burned when removing radiator cap or coolant reservoir cap. Sudden release of pressure can cause a steam flash which could seriously injure personnel. Use heavy rags to protect hands. Slowly loosen cap to the first stop and allow pressure to be relieved before removing cap completely. After use, securely tighten cap. Failure to comply may result in injury or death to personnel.

WARNING

If working alone, it is important to keep tire vertical and to not allow wheel and tire to lay on ground. Failure to comply may result in injury or death to personnel.

WARNING

If you experience problems operating any controls, turn off your SINGAR radio unit. Failure to comply may result in death or injury to personnel and/or damage to equipment.

WARNING

It is very important that T-section of release bolt fully engages in bottom seat. Failure to comply may result in injury or death to personnel.

WARNING

Keep a fire extinguisher within easy reach when working with fuel or on a fuel system.

WARNING

Keep clear of equipment when equipment is being raised or lowered. Equipment may fall and cause serious injury or death to personnel.

WARNING

Keep hands and arms away from fan blade and drive while engine is running, or serious injury to personnel will result.

WARNING

Lead-acid battery gases can explode. Do not smoke, have open flames, or make sparks around a battery, especially if caps are off. Battery may give off gas which can explode. Failure to comply may result in injury or death to personnel.

WARNING

Manually operating hydraulic components is extremely dangerous. This procedure should only be done when normal hydraulic operations do not function and emergency movement of the vehicle is required. Manual operation of these valves can cause serious injury or death.

WARNING

Never lubricate or service vehicle while it is moving. Keep hands, feet, and clothing clear of moving parts. Failure to comply may result in serious injury or death to personnel.

WARNING

Never use fuel to clean parts. Fuel is highly flammable. Failure to comply may result in injury or death to personnel.

WARNING

Never work under vehicle raised by the FEL, backhoe, or stabilizers. If the vehicle must be raised, place supporting blocks under frame. Failure to comply may result in serious injury or death to personnel.

WARNING

No smoking, flames, sparks, or glowing or hot objects allowed within 50 ft. (15 m) of vehicle. Failure to comply may result in injury or death to personnel.

WARNING

Operating a vehicle with an underinflated or defective tire may lead to premature tire failure and may result in serious injury or death to personnel and/or equipment damage.

WARNING

Personnel outside the vehicle must stand clear of implements whenever operator is near controls. Failure to do so could result in personal injury.

WARNING

Place the backhoe in the stowed position whenever travel speeds exceed 12 mph (20 km/h). Failure to do so could result in personnel injury and/or damage to equipment.

WARNING

Read all operating instructions and safety rules in this manual carefully. Important information is emphasized in each respective section. Failure to do so could result in personal injury and/or damage to equipment.

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal, a direct short may result in instant heating of tools, damage to equipment, and injury or death to personnel.

WARNING

Remove or disconnect batteries and turn electrical master switch off prior to performing maintenance in immediate battery area or working on electrical system. Such disconnections prevent electrical shock to personnel or equipment.

WARNING

Seat belts and protective headgear must always be worn when operating, driving, or riding in the vehicle. Failure to comply may result in injury or death to personnel.

WARNING

Serious injuries can occur if bucket is not resting firmly on ground.

WARNING

Serious injuries can occur if forklift attachment is not resting firmly on ground.

WARNING

Serious injury or death can result from contact with electric power lines. Never move any part of vehicle or load closer to power lines than 9 ft. (3 m). Failure to comply may result in injury or death to personnel.

WARNING

Some belly plates weigh more than 50 lb. (23 kg). Use the aid of an assistant when removing larger belly plates. Failure to comply may result in injury or death to personnel.

WARNING

Stay clear of moving FEL arms and ensure that no personnel are within the FEL crush zone when operating the FEL hydraulic valves. Failure to comply will result in serious injury or death to personnel.

WARNING

The IHMEE hydraulic system operates at oil pressures up to 3,000 psi (20 680 kPa). Never disconnect any hydraulic line or fitting without first dropping system pressure to zero. Failure to comply may result in injury or death to personnel.

WARNING

The IHMEE is a large vehicle, over 28 ft. (8.6 m) long and 8 ft. (2.5 m) wide. When traveling on the highway, the FEL and backhoe extend a considerable distance in front and behind the vehicle. Operators are to be aware of the front and rear overhang and drive accordingly. Failure to comply may result in injury or death to personnel.

WARNING

The IHMEE requires an escort and may not exceed 30 mph (48 km/h) when operating on primary roads. Failure to comply may result in injury to personnel and/or damage to equipment.

WARNING

The passenger seat is not to be occupied during earth-moving or excavation operations. It is only to be used during highway travel. Failure to comply may result in injury or death to personnel.

WARNING

- The rim flange and/or lock ring may blow off when inflating or deflating tires. Failure to comply with the following may result in serious injury or death to personnel.
- All personnel must remain a minimum of 10 ft. (3 m) away from tire and not in trajectory of lock ring or rim flange.
- Never lean, stand, or reach over a wheel/tire assembly during inflation or deflation.
- Never put hands or fingers near rim flanges or bead seats when inflating or deflating tires.
- Improperly seated lock rings and side rings may blow off during inflation. Never inflate or deflate a tire without first checking to ensure that the side ring is still properly seated in the lock ring groove and that the side ring, lock ring and lock ring groove are not damaged. Never attempt to seat a lock ring or side ring during or after inflation.
- Never reinflate a tire that has been run flat or seriously underinflated without first removing and checking for tire or rim damage.

WARNING

The ROPS/FOPS is designed only to protect the operator during earth-moving operations. The passenger seat is not to be occupied during earth-moving operations. Failure to comply may result in injury or death to personnel.

WARNING

The wheel, tire, and carrier combination weighs 564 lb. (256 kg), therefore wheel changing should be carried out by two persons if practical. If the procedure is to be carried out by one person, extreme care should be exercised. Failure to comply may result in injury or death to personnel.

WARNING

This procedure is for emergency towing of the vehicle only, and will manually release the vehicle's brakes. Ensure that vehicle is secured by the towing vehicle or wheel chocks before attempting the following procedure. Failure to comply may allow the vehicle to move, resulting in serious injury or death to personnel and/or equipment damage.

WARNING

To ensure the safety of the operator, the operator must always be seated in the operator's seat prior to starting the engine. Failure to comply may result in injury or death to personnel.

WARNING

To prevent inadvertent movement of the FEL arms when installing the maintenance arm, CROSS COUNTRY DRIVING must be selected on the backhoe mode switch. Failure to comply may result in injury or death to personnel.

WARNING

Turn ignition switch to OFF to stop engine. Lock ignition switch in OFF position. Death or serious injury may result if the unsupported vehicle moves unexpectedly during maintenance.

WARNING

Use a clean, thick waste cloth, rags, or like material to remove the cap. Avoid using gloves. If hot water soaks through gloves, personnel could be burned.

WARNING

Use care when removing or installing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

WARNING

Use ground guide when operating near personnel, buildings and other equipment, and when backing vehicle. Failure to do so could result in personnel injury and/or damage to equipment.

WARNING

Vehicle must be taken to Unit maintenance to have wheel nuts accurately tightened to 475 to 525 lbf/ft (644 to 712 N·m) at first opportunity. Wheel nuts must also be check-tightened to a torque of 475 to 525 lbf/ft (644 to 712 N·m) after 60 mi. (100 km) of driving. Failure to comply may result in injury or death to personnel, and/or damage to equipment.

WARNING

Wheel and rim components can separate at any time, and with very explosive force. Always stay out of the trajectory of components. Failure to do so may result in serious injury or death to personnel.

WARNING

Wheel nuts are tightened to a torque of 475 to 525 lbf/ft (644 to 712 N·m). Take care when using extension bar to loosen them. Failure to comply may result in injury to personnel.

WARNING

When checking connections, do not let tools touch battery box. A direct short, arcing, tool heating to red hot, and battery explosion could result, causing injury or death to personnel.

WARNING

When checking pressure, personnel must remain a minimum of 10 ft. (3 m) away from tire and not in trajectory of lock ring or rim flange. Failure to comply may result in serious injury or death.

WARNING

When loading on to a C-130, vehicle must be lined up with aircraft entrance before deflating tires to required pressure. Do not deflate tire pressure below 23 psi (159 kPa). Do not make any sharp turns, and keep vehicle speed below 1.6 mph (2.5 km/h). Failure to comply may result serious injury or death and/or damage to equipment.

WARNING

When operating the vehicle in the construction mode, i.e., filling dump trucks, stockpiling, and backhoe operations, avoid working on side slopes greater than 5 percent. Failure to comply may result in personnel injury and/or damage to equipment.

WARNING

When removing any pins during removal and/or installation, gloves must be used. Failure to comply may result in serious injuries.

WARNING

When traveling over uneven ground, it is important to keep the FEL active, to allow it to be raised or lowered as required for ground clearance. Failure to comply may result in injury or death to personnel.

WARNING

When using forklift attachment, always use a guide. The guide should stand clear of vehicle. Failure to comply may result in injury or death to personnel.

WARNING

You are within the backhoe crush zone when operating the backhoe valves. Stay clear of moving backhoe and ensure that no personnel are within the backhoe crush zone when operating the backhoe hydraulic valves. Failure to comply will result in serious injury or death to personnel.

INSERT LATEST UPDATED PAGES / WORK PACKAGES. DESTROY SUPERSEDED DATA.

LIST OF EFFECTIVE PAGES / WORK PACKAGES

NOTE: The portion of text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages / work packages are:

Original..... 0... 01 OCT 2003

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 40 AND TOTAL NUMBER OF WORK PACKAGE PAGES IS 206 CONSISTING OF THE FOLLOWING:

Page / WP No.	*Change No.	Page / WP No.	*Change No.	Page / WP No.	*Change No.
Front Cover	0	5-1 — 5-18	0	D-1 — D-4	0
a — p	0	6-1 — 6-8	0	E-1 — E-6	0
i — iv	0	7-1 — 7-8	0	F-1 — F-6	0
1-1 — 1-18	0	8-1 — 8-10	0	INDEX-1 — INDEX-6	0
2-1 — 2-18	0	A-1 — A-2	0		
3-1 — 3-86	0	B-1 — B-4	0		
4-1 — 4-16	0	C-1 — C-2	0		

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

TECHNICAL MANUAL
NO. 5-2420-230-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 01 OCT 2003

OPERATOR'S MANUAL FOR INTERIM HIGH-MOBILITY ENGINEER EXCAVATOR (IHMEE)

NSN 2420-66-148-7692

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 Publications and Blank Forms) through the Internet on the Army Electronic Product Support (AEPS) Web site. The Internet address is http://aeps.ria.army.mil. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or e-mail your letter or DA Form 2028 directly to: AMSTA-LC-CI / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, 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.

Approved for public release; distribution unlimited.

Table of Contents

PURPOSE OF MANUAL.

The information in this manual is for the operation and maintenance of the Interim High-Mobility Engineer Excavator (IHMEE) vehicle. It is intended to serve as a guide to assist qualified drivers and mechanics in the operation and maintenance of the vehicle.

Keep this manual with the vehicle at all times.

HOW TO USE THIS MANUAL.

This manual is designed to help operate and maintain the IHMEE. Listed below are some of the features included in this manual to help locate and use the needed information:

- A main Table of Contents lists all chapters and appendixes, along with the sections within them.
- Each chapter begins with a Table of Contents listing all paragraph headings in the chapter.
- A simplified Index at the rear of the manual lists all paragraphs in alphabetical order for easy reference.
- Task boxes have been provided at the beginning of operator maintenance tasks to provide initial setup data.
- Warning, caution, note, and subject headings and other essential information are printed in bold type, making them easier to see.

WARNING

Read all operating instructions and safety rules in this manual carefully. Important information is emphasized in each respective section. Failure to do so could result in personal injury and/or damage to equipment.

Follow these guidelines when using this manual:

- Read all WARNINGS and CAUTIONS before performing any procedure.
- The operator must read this manual and become familiar with the contents before attempting to use the IHMEE.

CHAPTER 1
INTRODUCTION

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Section I. General Information.

1-1. SCOPE.

This chapter contains general information on the Interim High-Mobility Engineer Excavator (IHMEE). It also provides a basic overview of the vehicle's systems and components.

1-2. MAINTENANCE, FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 738-750, Functional User's Manual for The Army Maintenance Management System (TAMMS) or AR 700-138, Army Logistics Readiness and Sustainability.

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS) AND SUBMITTING QUALITY DEFICIENCY REPORTS (QDRS).

If your vehicle 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 368 (QDR) and mail it to us at:

U.S. Army Tank-automotive and Armaments Command
ATTN: AMSTA-TR-E/PQDR MS 267
Warren, MI 48397-5000

We'll send you a reply.

1-4. CORROSION PREVENTION AND CONTROL (CPC).

Corrosion Prevention and Control (CPC) of Army materiel is a constant concern. It is important that any corrosion problem with this item be reported so that the problem can be corrected and improvements made to prevent the problem in future items.

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 368, Product Quality Deficiency Report (QDR). 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, Functional User's Manual for The Army Maintenance Management System (TAMMS).

1-5. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Command decision, according to the tactical situation, will determine when the destruction of the IHMEE vehicle will be accomplished. A destruction plan will be prepared by the using organization unless one has been prepared by a higher authority. For general destruction procedures for this equipment, refer to TM 750-244-6, Procedures for Destruction of Tank-automotive Equipment to Prevent Enemy Use (U.S. Army Tank-automotive and Armaments Command).

1-6. WARRANTY INFORMATION.

The IHMEE vehicles are warranted by ADI Limited and various component equipment manufacturers. The warranty starts on the date found in block 23 of DA Form 2408-9, in the logbook. Report all defects in material or workmanship to the supervisor, who will take appropriate action through the Unit maintenance shop. Refer to TB 5-2420-230-14 for more information on the warranty procedures for the IHMEE vehicles.

1-7. METRIC SYSTEM.

The equipment described herein contains metric components and requires metric, common, and special tools. Therefore, metric units and English units will be used throughout this publication. English values are listed first, with the metric equivalent shown afterward in parentheses. An English-to-metric conversion table is included as the last page of this manual inside the back cover.

1-8. REFERENCE INFORMATION.

This listing includes a nomenclature cross-reference list and a list of abbreviations used in this manual.

a. Nomenclature Cross-Reference List.

Common Name	Official Nomenclature
Engine coolant	- Antifreeze, ethylene glycol mixture
Glad hand	- Quick-disconnect air coupling
Light bulb	- Incandescent lamp
Service brake pedal	- Brake pedal
Accelerator	- Throttle pedal
Washer fluid	- Windshield cleaning compound

b. Abbreviations/Acronyms.

amp . . . . . ampere
A/C . . . . . Air-Conditioning
AAL . . . . . Additional Authorization List
ADI . . . . . Australian Defense Industries
AOAP . . . . . Army Oil Analysis Program
BII . . . . . Basic Issue Item
BO . . . . . Blackout
BRT . . . . . Bright
°C . . . . . degree Celsius
CAGE . . . . . Commercial and Government Entity
CARC . . . . . Chemical Agent Resistant Coating
CBR . . . . . Chemical, Biological, Radiological
CCA . . . . . Cold-Cranking Amps
cfm . . . . . cubic feet per minute
cid . . . . . cubic inch displacement
CKT . . . . . Circuit
cm . . . . . centimeter
COEI . . . . . Components of End Item
CPC . . . . . Corrosion Prevention and Control
CTA . . . . . Common Table of Allowance
DA . . . . . Department of the Army
DS/GS . . . . . Direct Support/General Support
EGS . . . . . Electronic Gear Shift
EIR MD . . . . . Equipment Improvement Report and Maintenance Digest

EIR MS . . . . . Equipment Improvement Report and Maintenance Summary
EMI . . . . . Electromagnetic Interference
°F . . . . . degree Fahrenheit
fl oz . . . . . fluid ounce
FOPS . . . . . Falling Object Protection Structure
ft . . . . . foot
g . . . . . gram
gal . . . . . gallon
GCWR . . . . . Gross Combination Weight Rating
GPFU . . . . . Gas Particulate Filter Unit
gpm . . . . . gallons per minute
GVW . . . . . Gross Vehicle Weight
GVWR . . . . . Gross Vehicle Weight Rating
HDI . . . . . Isocyanate
hp . . . . . horsepower
HVAC . . . . . Heating, Ventilation, and Air-Conditioning
id . . . . . inside diameter
IHMEE . . . . . Interim High-Mobility Engineer Excavator
in . . . . . inch
inH_20 . . . . . inches of water
ISO . . . . . International Standards Organization
JTA . . . . . Joint Tables of Allowances
kg . . . . . kilogram
km/h . . . . . kilometers per hour
kPa . . . . . kilopascal
kW . . . . . kilowatt
L . . . . . liter
L/min . . . . . liters per minute
lb . . . . . pound
lbf . . . . . pound-force
lbf/ft . . . . . pound-force foot
lbf/in . . . . . pound-force inch
LED . . . . . Light-Emitting Diode
LOEP . . . . . List of Effective Pages
m . . . . . meter
m^3/min . . . . . cubic meters per minute
mi . . . . . mile
min . . . . . minute
ml . . . . . milliliter
mm . . . . . millimeter
mmH_20 . . . . . millimeters of water
mph . . . . . miles per hour
N·m . . . . . Newton meters
NBC . . . . . Nuclear, Biological, Chemical
od . . . . . outside diameter
OTC . . . . . Oshkosh Truck Corporation
oz . . . . . ounce
PMCS . . . . . Preventive Maintenance Checks and Services
psi . . . . . pound-force per square inch
pt . . . . . pint
QDR . . . . . Quality Deficiency Reports
qt . . . . . quart
RFI . . . . . Radio-Frequency Interference
ROPS . . . . . Rollover Protection Structure

RPM . . . . . revolutions per minute
RPSTL. . . . . Repair Parts and Special Tools List
SAE . . . . . .Society of Automotive Engineers
SER . . . . . .service
SOP . . . . . Standard Operating Procedure
TAMMS. . . . . The Army Maintenance Management System
TDA. . . . . Tables of Distribution and Allowance
TM. . . . . Technical Manual
V . . . . . Volt
Vdc . . . . . Volts direct current
W . . . . . watt

Section II. Equipment Description.

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. Equipment Characteristics.

The IHMEE is manufactured by ADI Limited to provide a highly mobile, multipurpose, engineering excavator for engineering construction.

WARNING

- The IHMEE requires an escort and may not exceed 30 mph (48 km/h) when operating on primary roads. Failure to comply may result in injury to personnel and/or damage to equipment.
- Do not exceed 25 mph (40 km/h) when operating the vehicle on secondary roads or cross-country. Failure to comply may result in injury to personnel and/or damage to equipment.

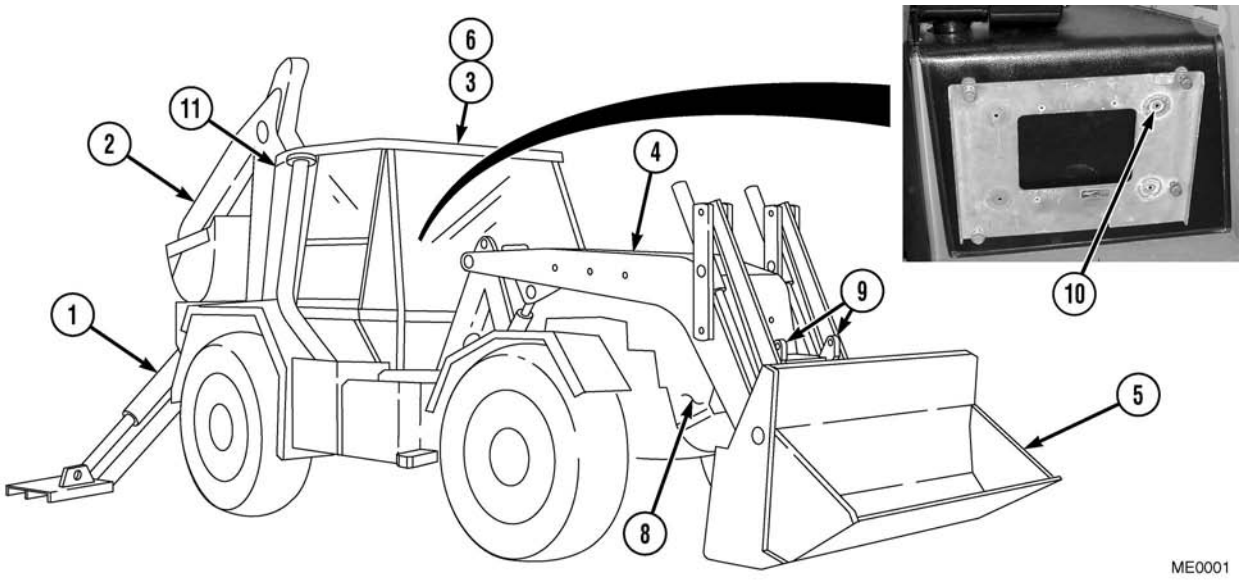
The IHMEE is a high-speed, all-terrain, multipurpose engineering vehicle fitted with a Front-End Loader (FEL) and a backhoe. The IHMEE can be fitted with a forklift and towing attachments. The vehicle suspension and transmission enable the IHMEE to maintain average speeds of 30 mph (48 km/h) on primary roads or 25 mph (40 km/h) on secondary roads or cross-country. The cab is fully enclosed and air-conditioned and provides seating for the operator and one passenger.

b. Capabilities.

The IHMEE has the following mobility performance:

- Average highway speed of 30 mph (48 km/h) on sealed roads having a grade up to 7 percent.
- Cross-country capabilities.
- Capability to ford water obstacles to a depth of 30 in. (762 mm) with wake.
- Air, sea, rail, and road transportable.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.



(1) **Stabilizer**. Use in conjunction with the backhoe to stabilize vehicle during earth-moving operation.

(2) **Backhoe**. Digs excavations and trenches.

(3) **Cab**. All-steel construction.

(4) **Front-End Loader (FEL) Arms**. Used for lifting 4-in-1 bucket during excavating and filling excavations.

(5) **4-in-1 Bucket**. Used for excavating and filling excavations.

(6) **Rollover Protection Structure/Falling Object Protection Structure (ROPS/FOPS)**. Provides protection to the operator and passenger from falling objects or in the event of a vehicle rollover.

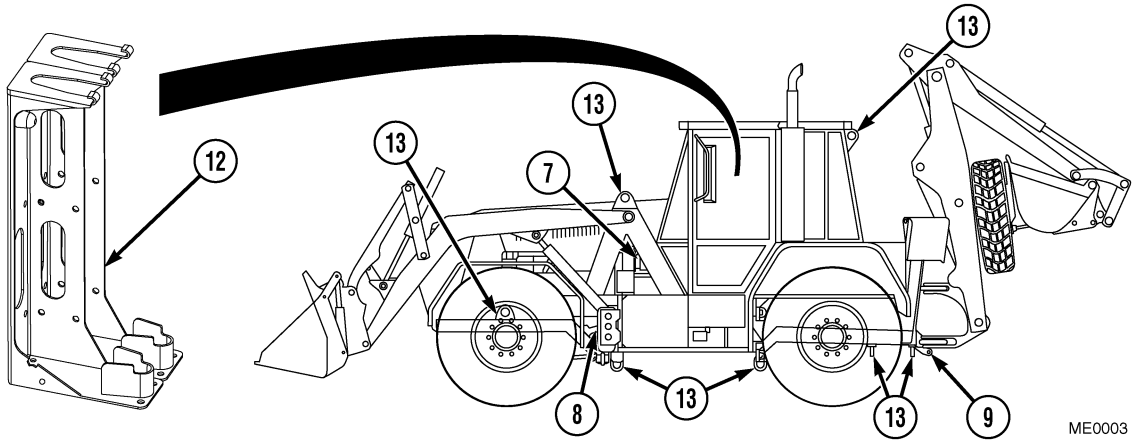
(7) **NATO Slave Receptacle**. The NATO connector is a standard receptacle with which one vehicle can be slave-started with another in the event of battery failure.

(8) **Army Oil Analysis Program (AOAP) Sampling Valves**. Valves designed to simplify the process of collecting oil samples for AOAP.

(9) **Front and Rear Towing Lugs**. Provides connecting points for towing the IHMEE if it is disabled.

(10) **Radio Mount**. Used to secure radio inside the cab.

(11) **Radio Antenna Mount**. Provides a location to mount a communications antenna.



(12) **Rifle Racks**. Used to store weapons inside cab.

(13) **Slinging and Tie-Down Points**. Locations provided to air-lift the IHMEE and/or to tie it down during shipping.

1-11. EQUIPMENT DATA.

WEIGHTS AND PAYLOADS

Gross Vehicle Weight Rating (GVWR). . . . . 26,433 lb. (11 990 kg)

GENERAL SPECIFICATIONS

WARNING

- The IHMEE requires an escort and may not exceed 30 mph (48 km/h) when operating on primary roads. Failure to comply may result in injury to personnel and/or damage to equipment.
- Do not exceed 25 mph (40 km/h) when operating the vehicle on secondary roads or cross-country. Failure to comply may result in injury to personnel and/or damage to equipment.

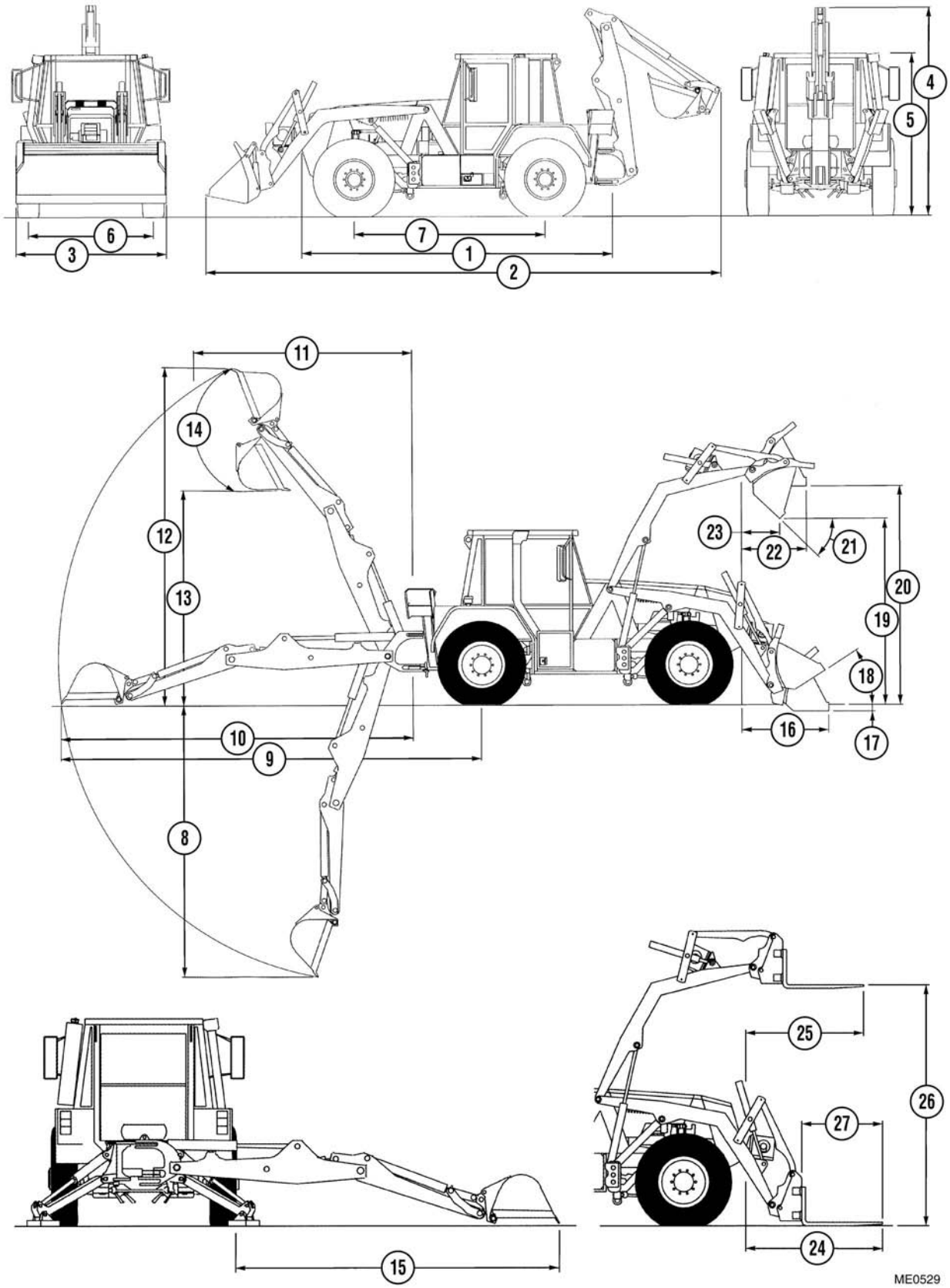
Maximum average speed. . . . . 30 mph (48 km/h)
Maximum off-road speed . . . . . 25 mph (40 km/h)
Travel speeds (with 14R-24 tires and engine at 2,500 RPM)

Ratio	Speed
Low 1	4 mph (7 km/h)
Low 2	9 mph (15 km/h)
Low 3	16 mph (26 km/h)
Low 4	26 mph (42 km/h)
High 1	11 mph (17 km/h)
High 2	23 mph (37 km/h)
High 3	30 mph (48 km/h) - *Maximum allowed speed based on safety issue*
High 4	30 mph (48 km/h) - *Maximum allowed speed based on safety issue*

Road range (maximum). . . . . 373 mi. (600 km)
Fording depth (maximum) . . . . . 30 in. (760 mm) with wake
Gradient (maximum). . . . . 60 percent
Side slope (maximum) . . . . . 20 percent
Vertical obstacle (maximum) . . . . . 24 in. (620 mm)

DIMENSIONS

Length (bare vehicle) (1)	201.3 in. (5 112 mm)
Length (overall, with bucket and backhoe) (2)	336.3 in. (8 541 mm)
Width (3)	98.0 in. (2 490 mm)
Height (overall) (4)	137.3 in. (3 487 mm)
Height (cabin) (5)	105.4 in. (2 677 mm)
Track (front) (6)	81.6 in. (2 073 mm)
Wheelbase (7)	124.0 in. (3 150 mm)
Front overhang	96.5 in. (2 450 mm)
Rear overhang	115.8 in. (2 941 mm)
Angle of approach (in transport mode)	13°
Angle of departure	29°
Ground clearance (under suspension arm)	13.2 in. (335 mm)
Ground clearance (under chassis)	14.8 in. (377 mm)
Ground clearance (under differential)	16.9 in. (428 mm)
Turning circle (curb-to-curb)	614.2 in. (15 600 mm)
Backhoe maximum dig depth (8)	171.7 in. (4 360 mm)
Backhoe reach (ground level, to center of rear wheel) (9)	257.5 in. (6 540 mm)
Backhoe reach (ground level, to slew center) (10)	214.2 in. (5 440 mm)
Backhoe reach (at full height, to slew center) (11)	104.7 in. (2 660 mm)
Backhoe operating height (12)	230.3 in. (5 850 mm)
Backhoe maximum loadover height (13)	120.9 in. (3 070 mm)
Backhoe bucket rotation (14)	180°
Backhoe side reach (15)	160.8 in. (4 085 mm)
Backhoe bucket width	24.0 in. (610 mm)
FEL reach at ground (toe plate horizontal) (16)	47.0 in. (1 195 mm)
FEL dig depth (toe plate horizontal) (17)	3.9 in. (100 mm)
FEL roll back (at ground) (18)	38°
FEL dump height (19)	107.2 in. (2 724 mm)
FEL loadover height (20)	127.0 in. (3 225 mm)
FEL dump angle (21)	43°
FEL maximum reach (at full height) (22)	44.2 in. (1 123 mm)
FEL reach (at full height – fully dumped) (23)	28.1 in. (714 mm)
FEL bucket width	98.0 in. (2 490 mm)
FEL jaw opening width	35.8 in. (910 mm)
Forklift reach (at ground) (24)	75.8 in. (1 925 mm)
Forklift reach (at full height) (25)	70.9 in. (1 800 mm)
Forklift full lift height (26)	103.1 in. (2 620 mm)
Forklift tine length (27)	41.7 in. (1 060 mm)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CAPACITIES

- Fuel tank . . . . . 55 gal. (210 L)
- Engine oil
  - Sump . . . . . 15 qt. (14.2 L)
  - Filter . . . . . 2.3 qt. (2.2 L)
- Coolant . . . . . 31.7 qt. (30 L)
- Transmission oil . . . . . 34.9 qt. (33 L)
- Hydraulic fluid (including reservoir) . . . . . 160.6 qt. (152 L)
- Steering . . . . . 4.2 qt. (4 L)
- Differentials
  - Front . . . . . 9 qt. (8.5 L)
  - Rear . . . . . 10.3 qt. (9.7 L)
- Hubs
  - Front . . . . . 1.6 qt. (1.5 L)
  - Rear . . . . . 1.22 qt. (1.15 L)
- Backhoe bucket . . . . . 6.40 ft^3 (0.18 m^3)
- Backhoe bucket tearout force . . . . . 10,976 lbf (48 824 N)
- Backhoe dipper tearout force . . . . . 7,049 lbf (31 356 N)
- FEL bucket (rated) . . . . . 28.25 ft^3 (0.80 m^3)
- FEL bucket (struck) . . . . . 21.19 ft^3 (0.60 m^3)
- FEL breakout force (at bucket) . . . . . 7,956 lbf (35 388 N)
- FEL breakout force (at arms) . . . . . 9,485 lbf (42 190 N)
- Forklift safe working load (at 19.7 in. (500 mm) load centers) . . . . . 4,409 lb. (2000 kg)

ENGINE

- Make . . . . . Cummins
- Model . . . . . 6 BTA 5.9-C185
- Power (at 2,500 RPM) . . . . . 185 hp (138 kW)
- Torque (at 1,500 RPM) . . . . . 550 lbf/ft (746 N·m)
- Cylinders 6
- Bore . . . . . 4.02 in. (102 mm)
- Stroke . . . . . 4.72 in. (120 mm)
- Displacement . . . . . 358.8 cid (5.88 L)
- Mass (dry) . . . . . 915 lb. (415 kg)

COOLING

- Engine radiator . . . . . Air - Coolant
- Hydraulic oil . . . . . Air - Oil
- Transmission . . . . . Oil - Coolant
- Air-conditioning condenser . . . . . Air - Refrigerant

TRANSMISSION

- Make . . . . . Clark
- Model . . . . . 12.5 LHR 32821-3
- Forward gears . . . . . Four high range and four low range
- Reverse gears . . . . . Two high range and two low range
- Torque converter . . . . . 12.5 in. (317.5 mm) stall multiplication 1.82
- Mass (dry) . . . . . 966 lb. (438 kg)
- Transmission ratios:

Gear	Low range ratio	High range ratio
1	11.69	4.73
2	5.52	2.24
3	3.19	1.29
4	1.97	0.8

AXLES

Make . . . . . Dana Spicer
Model
Front axle SD66-12C-1S
Rear axle D66-12C-1S
Type . . . . . Hub reduction
Traction control . . . . . Lockable, driver-operated
Total reduction 7.457:1

BRAKING SYSTEM

Make . . . . . Dana Spicer
Service brake . . . . . Pneumatic operated with leading and trailing shoes
Parking brake . . . . . Spring-applied - pneumatic release on each wheel
Secondary brake . . . . . Spring-applied - pneumatic release on each wheel

HYDRAULIC SYSTEM

Make . . . . . Case/ADI
Pump . . . . . Double-gear, fixed-displacement
Maximum operating pressure . . . . . 3,000 psi (20 684 kPa)
Output at engine idling . . . . . 11.9 gpm (45 L/min)
Output at 2,000 RPM . . . . . 25.1 gpm (95 L/min)
Output at rated RPM (2,500 RPM) . . . . . 31.2 gpm (118 L/min)
Reservoir capacity . . . . . 21.1 gal. (80 L)
Total system capacity . . . . . 40.2 gal. (152 L)

FAN DRIVE HYDRAULIC SYSTEM

Make . . . . . ADI
Maximum operating pressure . . . . . 3,200 psi (22 063 kPa)
Output at rated RPM (2,500 RPM) . . . . . 11.9 gpm (45 L/min)

STEERING

Make . . . . . Sheppard
Model M110 PED1
Hydraulic pump (Vickers) . . . . . Engine-mounted
System operating pressure . . . . . 2,500 psi (17 237 kPa)
Reservoir capacity . . . . . 1.1 gal. (4 L)

WHEELS

Wheel rim size . . . . . 24 x 10.00 VA
Wheel type . . . . . Steel, 3-piece
Quantity . . . . . 5 (including spare)

TIRES

Tire type . . . . . Bridgestone VKT tubeless steel radial
Tire size . . . . . 14.00 R24 3 Star E1A
Tire pressure and speed (all tires): Refer to Para 3-17 for operating tire pressure information.

AIR-CONDITIONING

Make . . . . . Air International Transit
Model . . . . . HFC 134a
Fan speed . . . . . 3 speed
Heating capacity . . . . . 4 kW
Cooling capacity . . . . . 6 kW

ELECTRICAL SYSTEM

Voltage	24-Vdc
Alternator	110 amp
Batteries, maintenance-free	2 x 12-Vdc
Driving lights, front	75/70 W
Indicators, front	21 W
Parking, front	4 W
Tail, rear	5 W
Stop, rear	21 W
Indicators, rear	21 W
Reversing light	21 W
Work lights, front	55 W
Work lights, rear	70 W
Markers, front	5 W
Markers, rear	3 W
Interior cabin light	10 W
License plate light	5 W
Driving lights (blackout)	18 W
Markers (blackout)	LED
Taillight (blackout)	LED
Stop light (blackout)	LED
Convoy light	2 W
Flashing beacon	3 W

PNEUMATIC SYSTEM

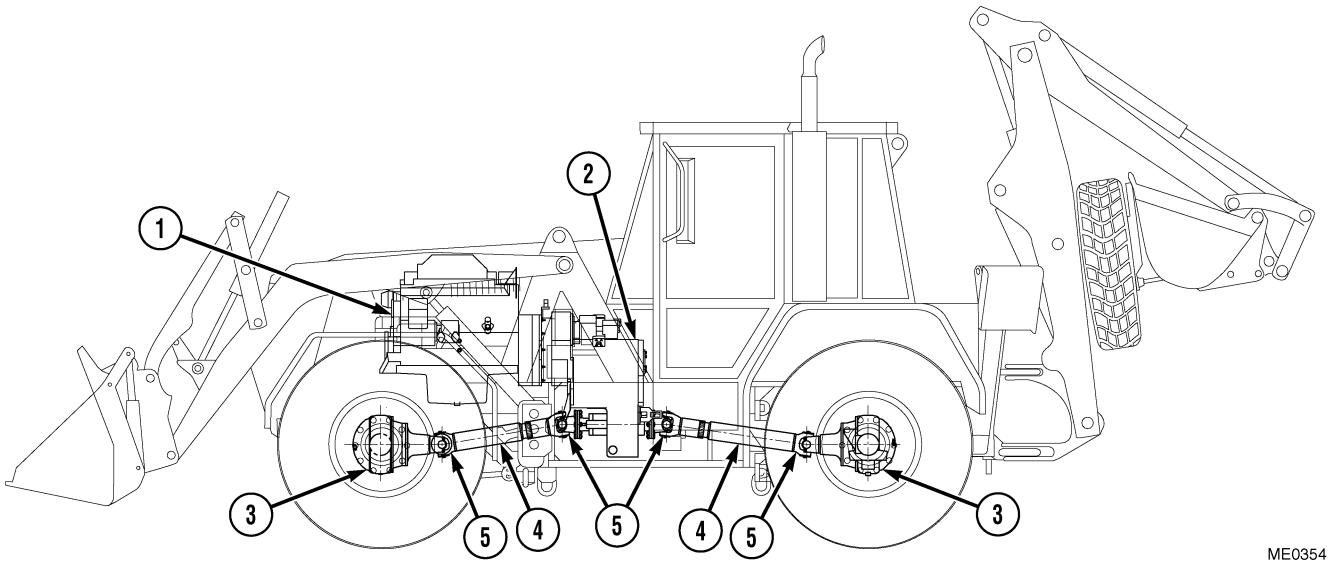
Compressor (engine-mounted)	15 cfm (0.42 m³/min)
System pressure	114.6 - 117.5 psi (790 - 810 kPa)
Air tanks	3 ea. x 2.6 gal. (9.7 L)
	2 ea. x 7.4 gal. (28 L)
	1 ea. x 3.6 gal. (13.8 L)
	1 ea. x 5.3 gal. (20 L)
	1 ea. x 4.4 gal. (16.8 L)

Section III. Technical Principles of Operation.

1-12. SYSTEMS INTRODUCTION.

The IHMEE contains seven functional systems: the power train; engine system; electrical system; pneumatic system; hydraulic system; steering system; and the Heating, Ventilation, and Air-Conditioning (HVAC) system. This section explains the overall operation of the functional systems.

1-13. POWER TRAIN.

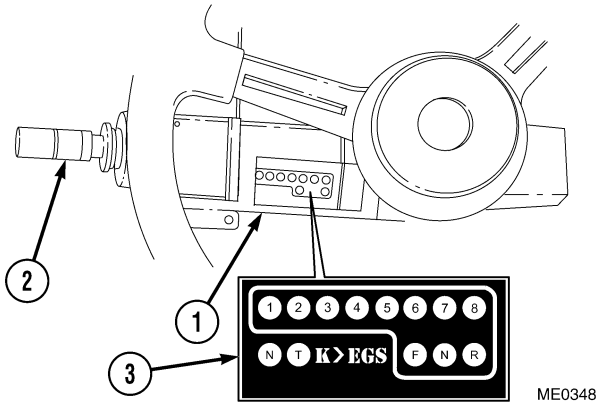


Power for the vehicle is provided by a diesel engine (1) which is coupled directly to an automatic transmission (2). Power from the transmission is transferred to the front and rear axles (3) through the front and rear drive shafts (4) and U-joints (5).

a. Engine. The engine is a 185-hp, 6-cylinder, 5.88-L diesel engine.

b. Automatic Transmission. The transmission provides 12 gears and 8 speeds controlled by the Electronic Gear Selector (EGS): four high-range and four low-range forward gears, and two high-range and two low-range reverse gears.

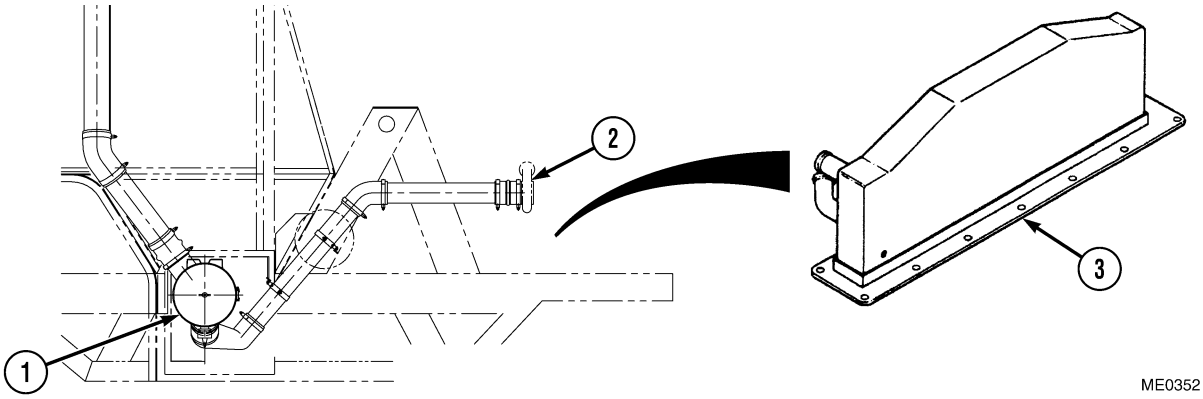
The EGS (1) is comprised of a mechanical shift lever (2), a microcomputer, and an indicator display (3) integrated into the shift lever housing. The EGS computer system receives information internally from the shift lever (2) and externally from a speed sensor. This information, together with acquired vehicle speed information, is used to shift to the requested gear, or to prevent this while indicating this on the indicator display (3).



c. Axles and Suspension. The front and rear axles are hub-reduction, full-floating, axle-shaft type. The front axle provides steering. The rear axle is nonsteering. Both the front and rear axles are equipped with wheel differentials. The front and rear suspensions consist of shock absorbers, air bags, and check straps. Check straps are used to limit the separation of the suspension and avoid damage to the air bags.

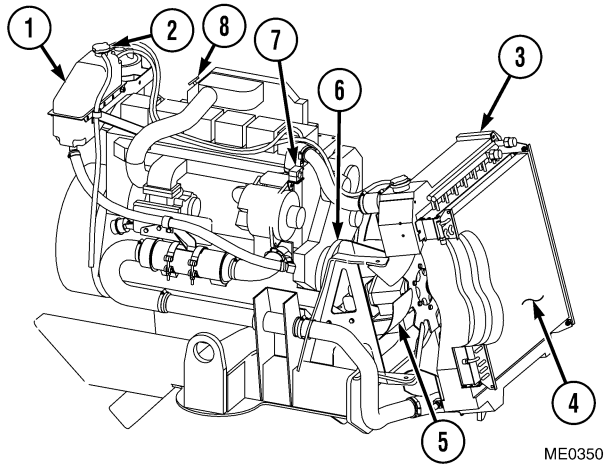
d. Drive Shafts and U-Joints. The drive shafts and U-joints transmit engine power to the axles.

1-14. ENGINE SYSTEM.



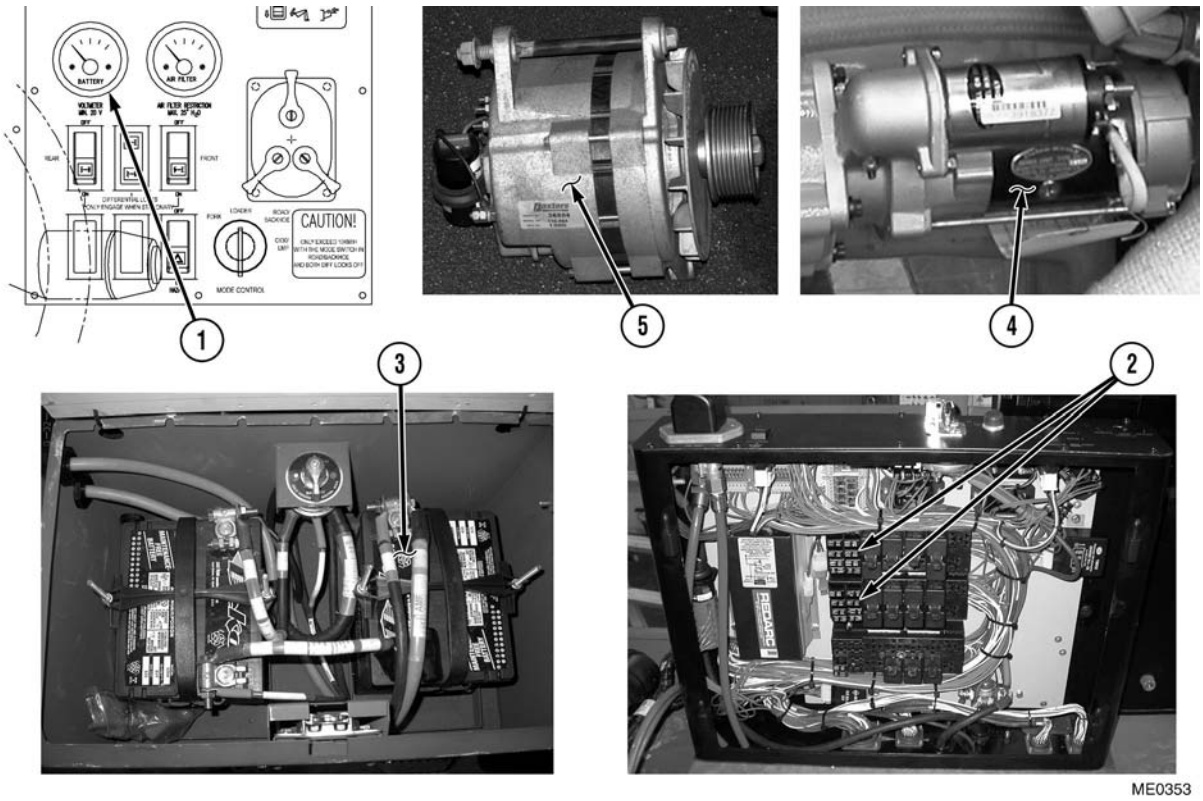
a. Air Intake. The air intake system consists of a dry-type air cleaner (1), a turbocharger (2), and an aftercooler (3). Engine exhaust gases flow through the turbocharger (2) driving a turbine wheel. A compressor wheel on the opposite end of the turbine wheel shaft rotates and draws in fresh air through the air cleaner (1). Air from the air cleaner (1) flows through the aftercooler (3) which cools the air before it is delivered to the engine cylinders.

b. Cooling System. The pressure-type cooling system protects the engine by removing heat generated during the combustion process. Coolant is added to the coolant reservoir (1) through the filler cap (2). Pressure within the cooling system is regulated by pressure releases in the filler cap (2) and a relief cap on the radiator. Hot coolant flows from the engine to the top radiator tank (3) and through the radiator core (4), where a stream of air removes heat. This air is drawn through the cores by a hydraulically activated fan (5). A water pump (6) draws the coolant from the bottom of the radiator and pushes it through the engine, repeating the cooling process. Thermostats (7), mounted in each coolant outlet elbow, remain closed until the coolant approaches a predetermined temperature, at which time they open. When the coolant temperature drops below the thermostat rating, they close. An air vent line (8), between the radiator (3) and the water pump inlet, removes air trapped in the engine when the cooling system is being filled.



c. Fuel System. Fuel is drawn from the fuel tank by the fuel pump. It passes through the supply line to a fuel/water separator (Primary Fuel Filter) and a secondary fuel filter to the engine fuel injector pump. There, fuel is metered and sent to the six fuel injectors via the fuel injector lines. Surplus fuel from injectors is returned to the fuel tank through the return line. The fuel/water separator removes water and large solid particles from the fuel. The finer particles are removed by the secondary filter before they can enter the fuel injector pump.

1-15. ELECTRICAL SYSTEM.



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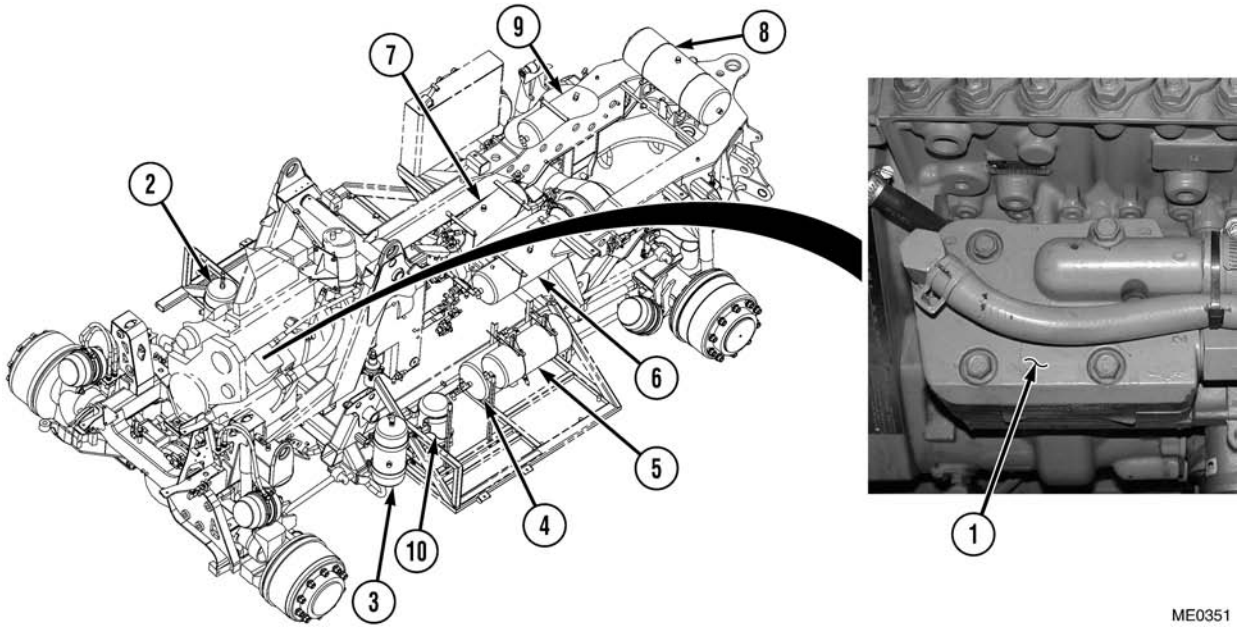
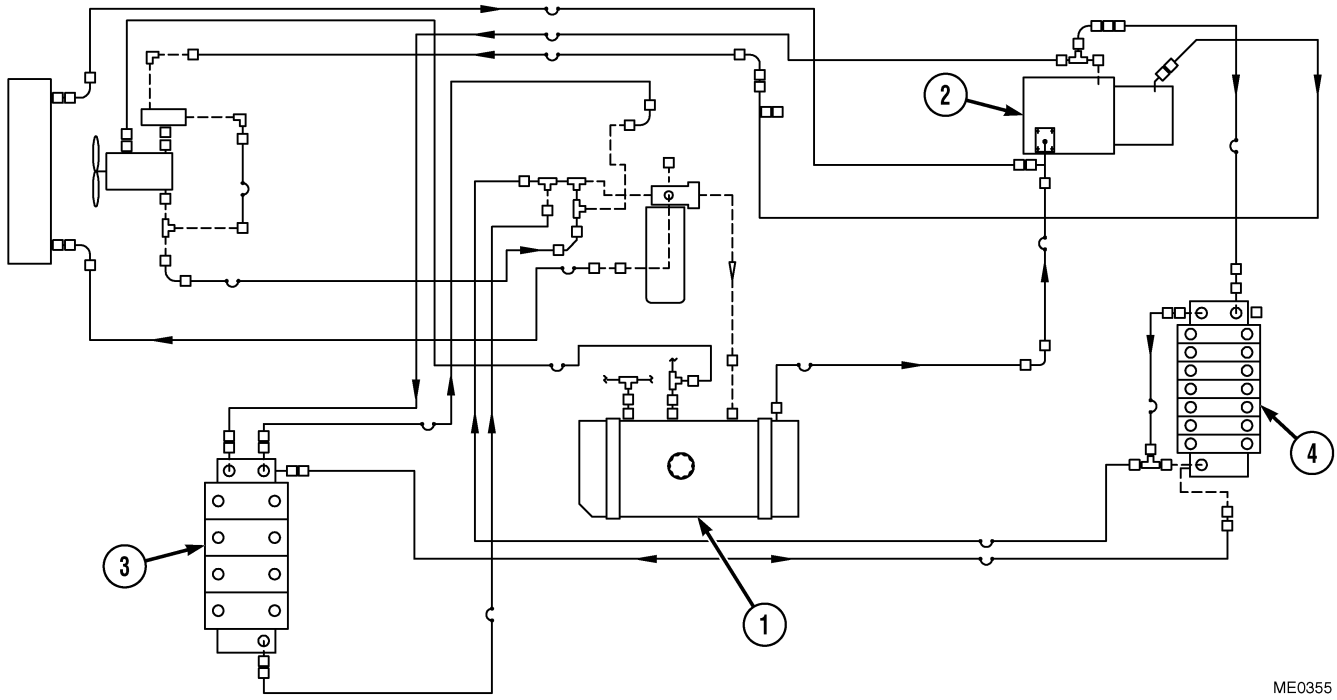
The voltage and current for the electrical system are indicated by a voltmeter (1) located on the dash panel, inside the cab. Circuit breakers (2) located in the cab protect the main circuits. Electrical power is provided by two 12-Vdc series-connected batteries (3). Power is distributed throughout the vehicle by wiring harnesses. The harnesses are interconnected by pin connectors. A heavy-duty starting motor (4) is mounted on the engine flywheel housing and provides the cranking power necessary for starting the engine. The belt-driven alternator (5) maintains a 24-Vdc level for battery charging.

1-16. PNEUMATIC SYSTEM.



The air system consists of an engine-driven air compressor (1) and eight air reservoirs (2) through (9). Air is drawn from the engine air intake and routed to the air compressor (1). Pressurized air flows from the air compressor through an aftercooler, a coalescing filter, and through an air dryer (10) where the air is cooled and the moisture/oil is removed. Moisture not removed by the air dryer will condense in the air reservoir. System air pressure is 119 psi (820 kPa). The air system includes the necessary valves and air lines to control the vehicles's air-operated devices. The air compressor supplies 15 cfm at 119 psi (3.25 m^3/min. at 820 kPa). Air pressure in this system is shown by the red needle on the DUAL BRAKE PRESSURE gauge inside the cab.

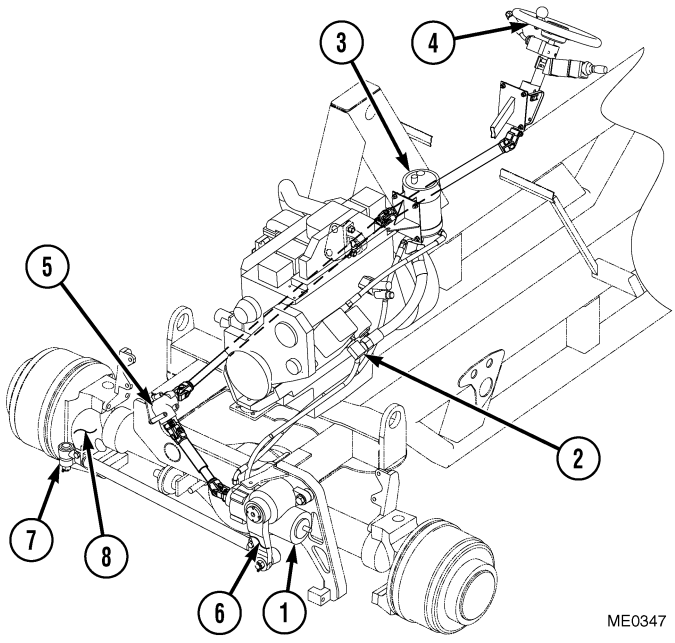
1-17. HYDRAULIC SYSTEM.



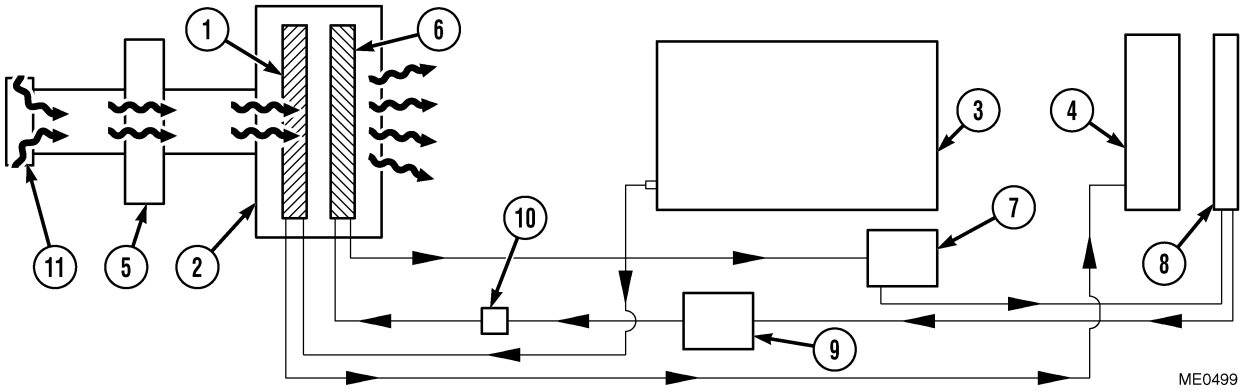
Hydraulic reservoir (1) supplies the hydraulic pump (2), which is mounted on the back of the transmission on the left-hand side. Hydraulic pump (2) provides fluid power to the FEL and the backhoe through hydraulic lines to the FEL valve block (3) and backhoe valve block (4).

1-18. STEERING SYSTEM.

Power is supplied to the main steering gear box (1) by an engine-driven pump (2). The fluid reservoir (3) is separate from the main hydraulic system. The steering wheel (4) is mechanically linked to the steering gear box (1) by steering linkages and a mitre box (5). When the steering wheel is rotated, the actuating valve in the steering gear box opens. Pressured oil is applied to one end of the steering gear piston, causing it to move the sector shaft and pitman arm. The pitman arm (6) is mechanically connected to the drag link (7). The drag link moves the steering mechanism on the front axles (8) to the left or right, causing the vehicle to steer in the same direction.



1-19. HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC).



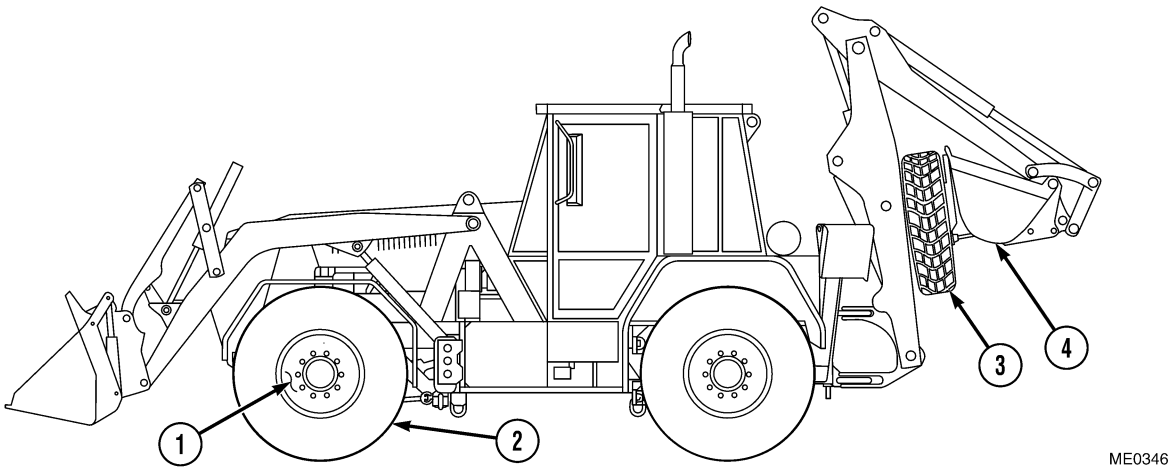
The IHMEE is equipped with an HVAC system that is capable of heating, cooling, and pressurizing the cab.

The cab heating system consists of a heater core (1) inside the cab A/C control unit (2), the engine (3), and the radiator (4). Hot coolant from the engine (3) flows to the cab A/C control unit (2) before returning to the radiator (4). The cab air pressurizer (5) blows air through the heater core (1), extracting heat from the coolant to warm the cab.

The cab cooling system consists of an evaporator (6) inside the cab A/C control unit (2), the A/C compressor (7) mounted on the engine (3), the A/C condenser (8), and the dryer (9). R-134a refrigerant is pressurized by the A/C compressor (7) and then converted to a high-pressure liquid state by the A/C condenser (8). Liquid from the A/C condenser (8) passes through the dryer (9), then to a thermal expansion valve (10), which meters the refrigerant to the evaporator (6). As expansion takes place within the evaporator (6), heat is absorbed, cooling and dehumidifying the air that the cab air pressurizer (5) blows through the evaporator (6).

In both heating and cooling, the air feeding into the cab A/C control unit (2) enters the cab through the A/C precleaner (11) and the cab air pressurizer (5), which also contains an air filter.

1-20. WHEELS AND TIRES.



There are two front and two rear steel, three-piece, 24 x 10.00 wheels (1) with 14.00 R24 tubeless, steel radial tires (2). One spare tire (3) can be mounted to the backhoe bucket (4).

CHAPTER 2
SAFETY INSTRUCTIONS

Contents

Section I. General Safety.

2-1. INTRODUCTION.

WARNING

Read all operating instructions and safety rules in this manual carefully. Important information is emphasized in each respective section. Failure to do so could result in personal injury and/or damage to equipment.

This chapter contains the safety instructions for the Interim High-Mobility Engineer Excavator (IHMEE). Personnel responsible for the equipment covered in this manual must ensure it is properly and safely operated and maintained. Only appropriately qualified personnel should be employed in these activities.

Statutory and local requirements concerning work practices, safety, and health precautions must be observed. Where appropriate, warnings, cautions, and notes are included in the manual and are defined as follows:

WARNING

Calls attention to instructions which, if not correctly followed, may result in injury or death to personnel.

CAUTION

Calls attention to instructions which, if not strictly observed, may result in damage to equipment.

NOTE

Indicates an operating procedure, maintenance practice, or condition that requires highlighting.

2-2. PRECAUTIONS.

Carefully read and follow all safety signs on the vehicle and all safety messages in this manual. If a safety sign is damaged or missing, notify Unit maintenance.

Unauthorized modifications to the vehicle may impair its function or safety, affecting vehicle life. The safety information illustrates basic safety procedures of hydraulic Front-End Loader (FEL)/backhoe vehicles, however, it is impossible for this information to cover every hazardous situation that may be encountered. If in doubt, consult the supervisor before operating and maintaining the vehicle.

2-3. PROTECTIVE CLOTHING.

WARNING

Seat belts and protective headgear must always be worn when operating, driving, or riding in the vehicle. Failure to comply may result in injury or death to personnel.

Avoid wearing loose clothing, jewelry, or other items that can catch on control levers or other parts of the vehicle. Wear close-fitting clothing and safety equipment appropriate to the job.

Safety equipment that may be required includes:

- Safety shoes or boots
- Safety glasses, goggles, or face shield
- Heavy gloves
- Reflective clothing
- Respirator or filter mask

2-4. NOISE PROTECTION.

WARNING

APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.

To avoid the risk of hearing damage, approved hearing protection devices must be worn in the situations specified. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with DA Pam 40-501. Hearing loss occurs gradually, but becomes permanent over time.

2-5. VEHICLE INSPECTION.

To avoid the possibility of personal injury, inspect vehicle carefully each day or shift by walking around it before starting work. For additional details on PMCS and the walkaround inspection, refer to Para 3-6.

2-6. SAFETY DECALS.

Safety decals are fitted to the IHMEE to raise awareness of potential hazards. Refer to Appendix F for locations of warning and caution stencils, decals, and data plates.

2-7. ROLLOVER PROTECTION STRUCTURE (ROPS)/FALLING OBJECT PROTECTION STRUCTURE (FOPS).

The IHMEE is fitted with a ROPS/FOPS which complies with the requirements of OSHA 1926-1001. The ROPS/FOPS is designed to protect the operator only during earth-moving operations.

Protection offered by the ROPS/FOPS will be impaired if it is subjected to structural damage. Any damage to the ROPS/FOPS must be reported to U.S.Army TACOM. Repairs may only be undertaken with the prior written permission of U.S.Army TACOM. ROPS/FOPS is integral with the chassis, therefore it is not to be modified in any way by welding, bending, drilling, or cutting except as authorized in writing by U.S. Army TACOM.

2-8. HANDHOLDS AND STEPS.

WARNING

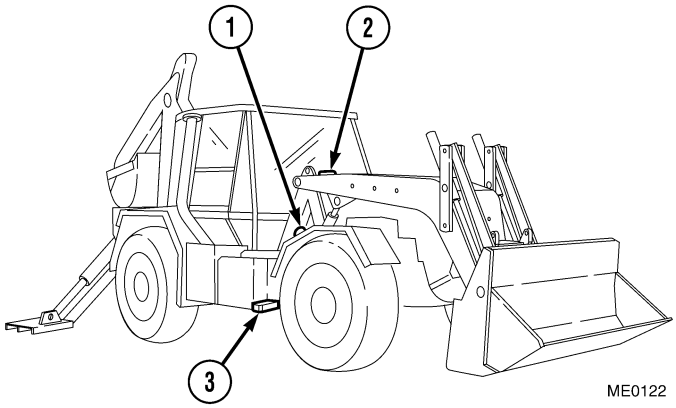
- Failure to comply with the following may result in injury or death to personnel:
- Mount and dismount the IHMEE only where steps and/or handrails are provided. Do not use any controls as handholds.
- Clean shoes and wipe hands before climbing on the vehicle. Use handholds when mounting the IHMEE.
- Inspect, clean, and have any necessary repairs made to steps prior to mounting the IHMEE.
- Always use “three-point contact” with the IHMEE; face the vehicle when entering or leaving the cab. Three-point contact means that three out of four arms and legs are in contact with the vehicle at all times during mount and dismount.
- Never get on or off a moving IHMEE.
- Never jump off the IHMEE.
- Do not attempt to climb on or off the IHMEE while carrying tools or supplies.
- Never jump on or off a moving vehicle. Be careful of slippery conditions on platforms, handholds, and steps when leaving vehicle.
- Do not use the IHMEE as a platform.

The following list shows the proper handholds and footsteps on the right side of the IHMEE:

(1) Fender handhold

(2) FEL handhold

(3) Fuel tank footstep



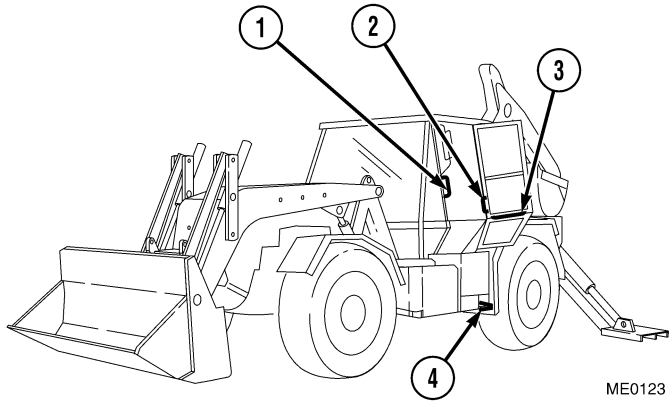
The following list shows the proper handholds and footsteps on the left side of the IHMEE:

(1) Door frame handhold

(2) Cabin handhold

(3) Door handhold

(4) Battery box footstep



2-9. MIRRORS.

Each mirror should be adjusted to give a clear and unobstructed view behind the vehicle, with no blind spots.

2-10. SEAT ADJUSTMENT.

Ensure seat is adjusted to suit operator. The operator must be able to fully depress pedals when seated. If not, move seat forward and check again.

2-11. SEAT BELT USE AND MAINTENANCE.

WARNING

Seat belts and protective headgear must always be worn when operating, driving, or riding in the vehicle. Failure to comply may result in injury or death to personnel.

The seat belts will help keep the operator and passenger safe in the event of a collision or other accident. The seat belts, in conjunction with the ROPS/FOPS, will minimize the chance of injury from a rollover accident.

The seat belts must be maintained in a good condition. Carefully examine buckle, webbing, and fittings. Ensure seat belts operate correctly. Replace seat belt if it does not operate correctly or if it is damaged, worn, or deteriorated.

Section II. Operational Safety.

2-12. SAFE OPERATION.

WARNING

- Before operating the vehicle, visually check area around vehicle to ensure there is sufficient, safe clearance. Failure to do so could result in personnel injury and/or damage to equipment.
- Personnel outside the vehicle must stand clear of implements whenever operator is near controls. Failure to do so could result in personal injury.
- Use ground guide when operating near personnel, buildings and other equipment, and when backing vehicle. Failure to do so could result in personnel injury and/or damage to equipment.
- When operating the vehicle in the construction mode, i.e., filling dump trucks, stockpiling, and backhoe operations, avoid working on side slopes greater than 5 percent. Failure to comply may result in personnel injury and/or damage to equipment.
- All required safety equipment must be mounted on the vehicle prior to operation. Failure to do so could result in personal injury.
- Operating a vehicle with an underinflated or defective tire may lead to premature tire failure and may result in serious injury or death to personnel and/or equipment damage.
- Ensure that no personnel are near or around the IHMEE when reversing during operations with vehicle lights set to BO DRIVE or BO MARKER. In this condition, the reverse alarm is not operational. Failure to comply may result in serious injury or death to personnel.

(1) Walk around vehicle to clear all personnel from area of operation and vehicle movement.

(2) Be aware of the location of other personnel before moving vehicle.

(3) Always check behind vehicle before selecting R (Reverse) gear. Reverse warning alarm must always be audible to warn personnel vehicle is moving in R (Reverse).

(4) Drive carefully in congested areas, over rough ground, near ditches or excavations, and on slopes.

(5) Use vehicle lights to warn drivers of other vehicles in low-visibility conditions.

(6) Check location of underground power cables, gas lines, and water mains before digging.

(7) Keep loading area smooth to assist with vehicle stability.

(8) Increase power gradually when pulling heavy load or when driving out of ditch or excavation.

2-13. ROLLOVER.

WARNING

Do not attempt to jump clear of a tipping vehicle; serious or fatal crushing injuries may result. Vehicle tips faster than driver or passenger can jump free. Failure to comply may result in injury or death to personnel.

To avoid rollovers:

(1) Read and understand all instructions in this manual.

(2) Carry tools and loads close to ground to aid visibility and lower center of gravity.

(3) Balance loads so weight is evenly distributed and load is stable.

(4) Be alert when operating on slopes.

(5) Reduce speed before turning or swinging load.

(6) Know capacity of vehicle's FEL and backhoe. Do not overload.

(7) Be careful when operating at edge of excavation trench.

(8) Avoid sharp turns.

2-14. PASSENGERS.

WARNING

The ROPS/FOPS is designed only to protect the operator during earth-moving operations. The passenger seat is not to be occupied during earth-moving operations. Failure to comply may result in injury or death to personnel.

A passenger seat is fitted to facilitate transporting a passenger safely and comfortably between work sites. The seat is only to be used for use on the highway and not to be used during work operations. No other personnel are to ride on the vehicle. Unauthorized riders are subject to personal injury and also obstruct the operator's view, resulting in the vehicle being operated in an unsafe manner.

2-15. POWER LINES.

WARNING

Serious injury or death can result from contact with electric power lines. Never move any part of vehicle or load closer to power lines than 9 ft. (3 m). Failure to comply may result in injury or death to personnel.

2-16. OPERATING ON SLOPES.

WARNING

Do not attempt to jump clear of a tipping vehicle; serious or fatal crushing injuries may result. Vehicle tips faster than driver or passenger can jump free. Failure to comply may result in injury or death to personnel.

Always travel straight up and down slopes, never at an angle or perpendicular to slope. Drive up slope in F (Forward) gear, and drive down slope in R (Reverse) gear. Remember: the danger of tipping is always present.

CAUTION

When traveling over uneven ground, it is important to keep the FEL active to allow it to be raised or lowered for ground clearance. Failure to comply may result in damage to equipment.

When traveling uphill or downhill with a loaded bucket, keep bucket on uphill side, as low as possible. If vehicle starts to slip or become unstable, lower bucket to ground and stop vehicle immediately.

In steep slope conditions, use engine braking to maintain speed control of vehicle; however, do not allow engine to overspeed. Select a low gear speed before starting down slopes and use brakes to control speed of vehicle if necessary.

2-17. TRAVELING.

WARNING

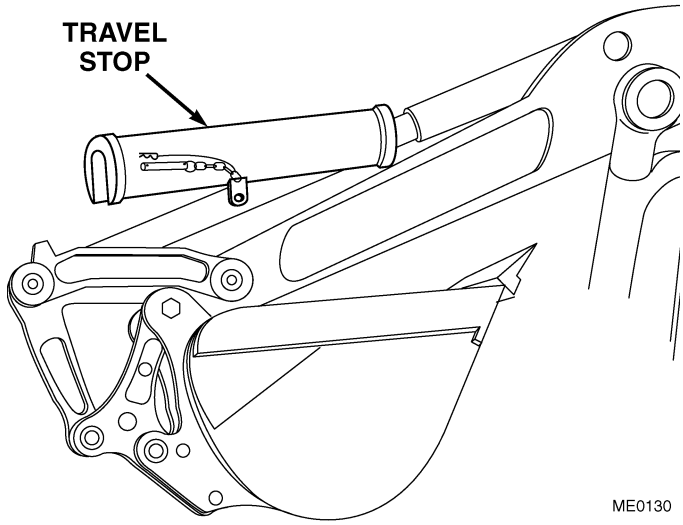
- Place the backhoe in the stowed position whenever travel speeds exceed 12 mph (20 km/h). Failure to do so could result in personnel injury and/or damage to equipment.
- During road and highway movement, the backhoe and FEL buckets must be empty and secured with the travel stops and locking clevises. Failure to do so could result in injury to personnel.

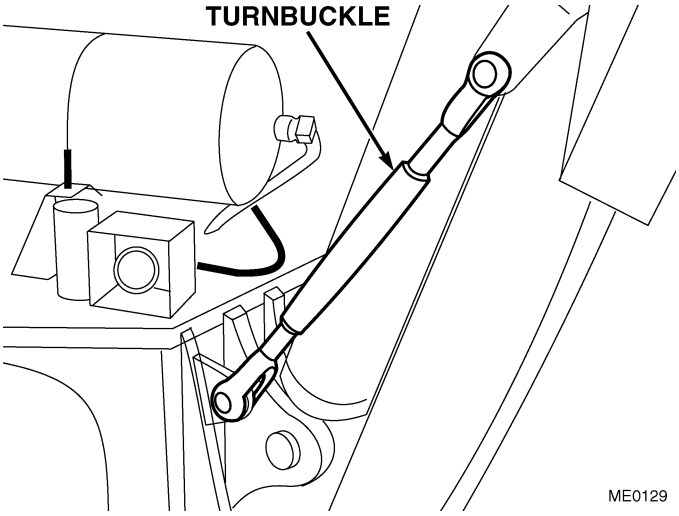
When traveling with a loaded bucket, position bucket as low as possible for better stability and visibility.

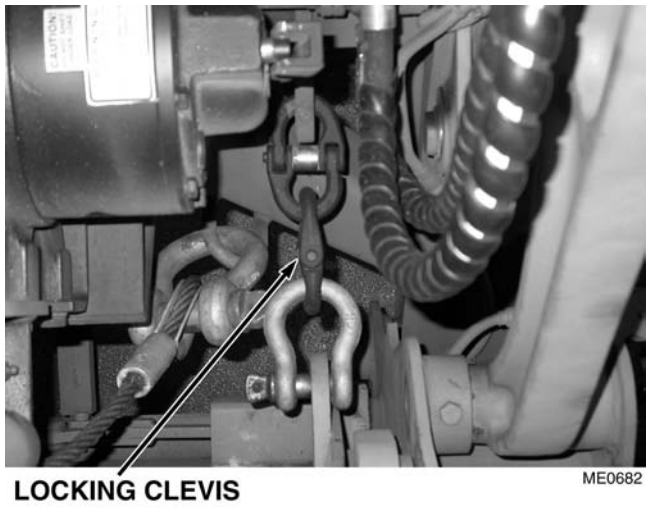
When driving the vehicle on a public road, comply with all local laws and regulations. For traveling at speeds in excess of 12 mph (20 km/h), the vehicle must be prepared as follows:

(1) Set MODE CONTROL switch to ROAD/BACKHOE (Para 5-3).

(2) Fit backhoe travel stop (Para 7-6).

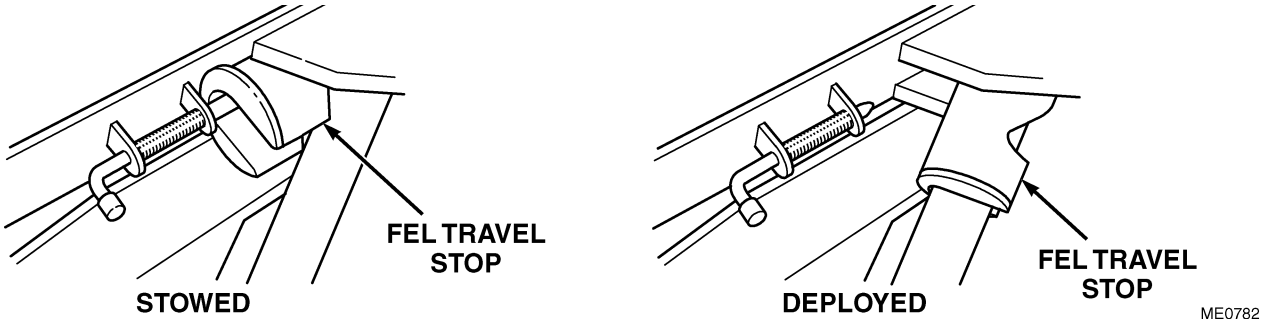






(3) Fully raise stabilizer arms and secure turnbuckles (Para 7-7).

(4) Secure FEL locking clevis (Para 6-2).



(5) Deploy FEL travel stops (Para 6-2).

(6) Place headlights on FEL bucket (Para 5-12).

2-18. RUNAWAY ACCIDENTS.

WARNING

Death or serious injury may result if you attempt to mount or stop a moving vehicle.

To avoid runaways:

(1) Select level ground to park vehicle when possible.

(2) Ensure PARK BRAKE lever is ON (Para 4-11).

(3) Lower bucket to ground.

(4) If you must park on a gradient, chock all wheels and lower bucket to ground.

2-19. TRANSPORTING.

Observe local laws and regulations when transporting vehicle on public road. Use suitable truck or trailer for transporting vehicle. For specific shipping requirements, refer to Appendix E.

Always load and unload IHMEE on solid, level surfaces, using a loading dock or ramp.

Select a low gear and 4WD mode while driving up or down ramps.

Do not operate any functions other than travel and service brakes when traveling up or down ramps, as this will unbalance vehicle.

When positioned on trailer or flatbed, tie down vehicle using tie-down points:

(1) Position vehicle and chock all tires.

(2) With the ignition switch in the IGN position, set MODE CONTROL switch to C130/LIMP and wait for suspension to lower.

(3) Turn each airbag pneumatic control valve off.

(4) Turn ignition switch OFF.

(5) Secure vehicle using tie-down points.

(6) Ensure you know height and weight of IHMEE on trailer.

Section III. Maintenance Safety.

2-20. SAFE SERVICING AND MAINTENANCE.

WARNING

Do not allow personnel to perform maintenance on FEL or backhoe with buckets loaded and/or raised. Failure to comply may result in injury and/or death to personnel.

Before performing any work on the IHMEE, prepare and isolate vehicle. It is important to understand all service procedures before undertaking any work.

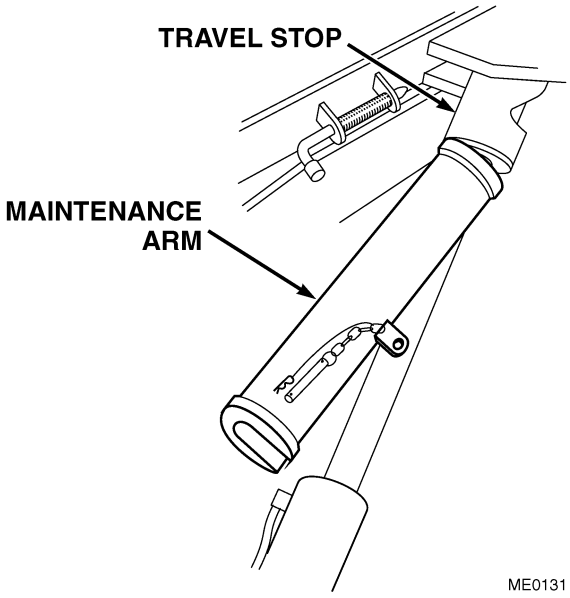
(1) Ensure vehicle is positioned on level ground.

(2) Ensure PARK BRAKE lever is ON (Para 4-11).

(3) Ensure EGS shift lever is in N (Neutral) (Para 5-4).

WARNING

- To prevent inadvertent movement of the FEL arms when installing the maintenance arm, CROSS COUNTRY DRIVING must be selected on the backhoe mode switch. Failure to comply may result in injury or death to personnel.
- Do not allow personnel to perform maintenance on FEL or backhoe with buckets loaded and/or raised. Failure to comply may result in injury and/or death to personnel.
- If the FEL arms are required to be raised for service work, the maintenance arm must be fitted. Do not work under raised FEL arms unless the maintenance arm is fitted. Failure to comply may result in serious injury or death to personnel.
- Never work under vehicle raised by the FEL, backhoe, or stabilizers. If the vehicle must be raised, place supporting blocks under frame. Failure to comply may result in serious injury or death to personnel.



(4) To secure FEL arms, lower bucket to ground or use travel stops and maintenance arm.

(5) If the engine is hot, run engine at idle speed without load for 2 min. to cool turbo.

WARNING

- Turn ignition switch to OFF to stop engine. Lock ignition switch in OFF position. Death or serious injury may result if the unsupported vehicle moves unexpectedly during maintenance.
- Never lubricate or service vehicle while it is moving. Keep hands, feet, and clothing clear of moving parts. Failure to comply may result in serious injury or death to personnel.
- If a maintenance procedure must be performed with the engine running, do not leave vehicle unattended. Failure to comply may result in injury or death.

WARNING

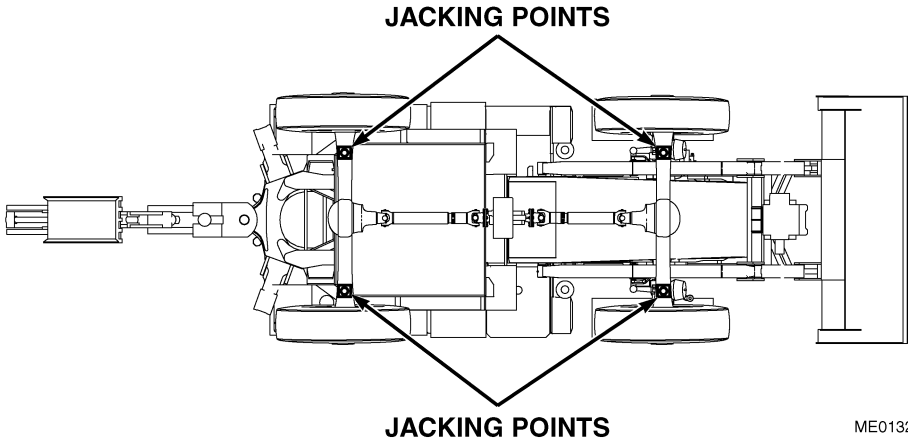
Ensure MODE CONTROL switch is set to ROAD/BACKHOE before shutting OFF engine. Failure to do so will allow suspension to rise and may result in injury to personnel.

(6) Ensure MODE CONTROL switch is set to ROAD/BACKHOE (Para 5-3).

(7) Unless otherwise specified, shut OFF Engine (Para 5-2) and place electrical master switch in OFF position (Para 5-1).

(8) Attach "Do Not Operate" tag to ignition switch.

2-21. JACKING POINTS.



WARNING

- Before jacking any wheel, chock another wheel to keep vehicle from rolling. Never crawl under equipment when performing maintenance unless equipment is securely chocked. Failure to comply may result in serious injury or death to personnel.
- Keep clear of equipment when equipment is being raised or lowered. Equipment may fall and cause serious injury or death to personnel.

The jacking points for the IHMEE are illustrated above.

2-22. CLEANLINESS.

Keep engine compartment, radiator, batteries, hydraulic lines, fuel tank, lights, windows, BII toolboxes, and operator's station clean. Remove any grease, oil, or debris buildup to avoid possible injury or vehicle damage. Do not spray water or steam inside cab.

2-23. PRESSURE HAZARDS.

WARNING

- Ensure air pressure is drained to 0 psi (0 kPa) before taking off any air components. If pressure is not released, components could blow off and harm personnel. The IHMEE air system is pressurized to 119 psi (820 kPa). Do not drain air from a tank with any part of body in air spray path. Skin embolisms and/or debris in eyes can occur from released pressure. Failure to comply may result in injury or death to personnel.

- Hydraulic fluid (Dexron III) is TOXIC. Wear protective goggles and gloves; use only in well-ventilated area; avoid contact with skin, eyes, and clothes. Skin and clothing that come in contact with hydraulic oil should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury or death to personnel.

- The IHMEE hydraulic system operates at oil pressures up to 3,000 psi (20 680 kPa). Never disconnect any hydraulic line or fitting without first dropping system pressure to zero. Failure to comply may result in injury or death to personnel.

Always relieve pressure before disconnecting hydraulic or pneumatic lines. Upon completion of work, tighten all connections before restoring system pressure.

Hydraulic oil under pressure can penetrate skin, causing serious injury, blindness, or death. If a maintenance procedure must be performed on the hydraulic system, hydraulic pressure must be released prior to beginning any work.

Search for hydraulic leaks with a piece of cardboard, taking care to protect hands and body from high-pressure fluids. If an accident occurs, seek medical attention immediately. Any fluid injected into skin must be surgically removed without delay.

2-24. FLAMMABLE FLUIDS.

WARNING

- All fuels, most lubricants, and some coolants are flammable. Do not store flammable fluids in cab. Failure to comply may result in injury or death to personnel.

- Never use fuel to clean parts. Fuel is highly flammable. Failure to comply may result in injury or death to personnel.

- No smoking, flames, sparks, or glowing or hot objects allowed within 50 ft. (15 m) of vehicle. Failure to comply may result in injury or death to personnel.

Handle fuel with care. Do not refuel vehicle while smoking or when near open flame or sparks. Always stop engine before refueling vehicle. Fill fuel tank and fuel cans outdoors.

2-25. BATTERY EXPLOSIONS.

WARNING

Lead-acid battery gases can explode. Do not smoke, have open flames, or make sparks around a battery, especially if caps are off. Battery may give off gas which can explode. Failure to comply may result in injury or death to personnel.

Never check battery charge by placing metal object across posts. Do not charge frozen batteries; they may explode. Ensure battery compartment ventilation holes are not obstructed or blocked.

2-26. MOVING PARTS HAZARD.

WARNING

Entanglement in moving parts can cause serious injury or death.

To prevent accidents, care should be taken to ensure hands, feet, clothing, jewelry, and hair do not become entangled when working around moving parts.

2-27. SCALD/BURN HAZARD.

WARNING

- If vehicle has been operating, use extreme care to avoid being burned when removing radiator cap or coolant reservoir cap. Sudden release of pressure can cause a steam flash which could seriously injure personnel. Use heavy rags to protect hands. Slowly loosen cap to the first stop and allow pressure to be relieved before removing cap completely. After use, securely tighten cap. Failure to comply may result in injury or death to personnel.

- Use a clean, thick waste cloth, rags, or like material to remove the cap. Avoid using gloves. If hot water soaks through gloves, personnel could be burned.

- Hot parts can burn personnel. Let hot parts cool before starting work.

After operation, the engine coolant is hot and is under pressure. Hot fluid and steam may be contained in engine, radiator, and heater lines. When removing radiator cap or coolant reservoir cap, ensure engine is cool and turn cap slowly to pressure-relief stop point. Allow all pressure to release before continuing to remove cap.

Engine oil, gear oil, and hydraulic oil become hot during operation. The engine, hoses, lines, and exhaust system also become hot. Wait for oil and components to cool before starting any maintenance or inspection work.

2-28. MANUAL HANDLING.

WARNING

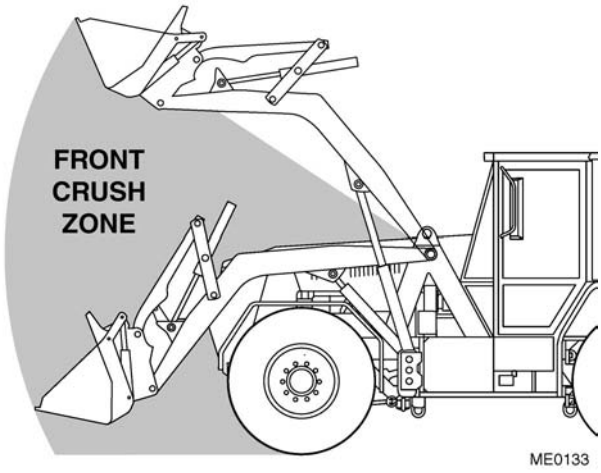
Follow safe working procedures when lifting or moving heavy items. Use an appropriate lifting device whenever part to be moved exceeds 50 lb. (23 kg). Failure to comply may result in injury or death to personnel.

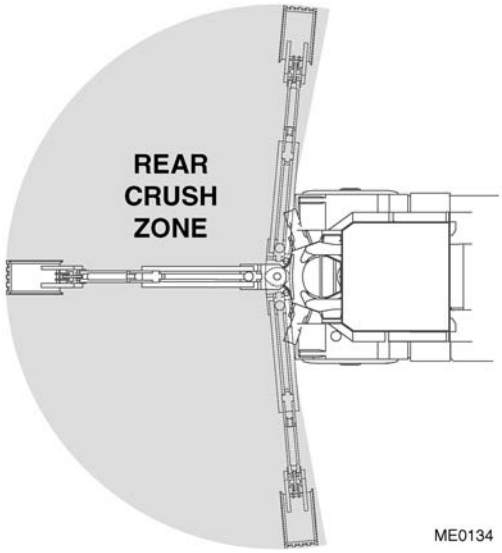
Many of the operating and maintenance procedures require the manual handling of heavy items (e.g., changing a tire). Refer to appropriate manuals and regulations for guidance and follow all safe working procedures.

2-29. FLYING DEBRIS HAZARD.

Guard against injury from flying pieces of metal or debris. Wear safety glasses or goggles. Keep personnel away from the working area and take care when striking any object with IHMEE tools in order to avoid personal injury.

2-30. CRUSH HAZARD.





WARNING

Always securely support vehicle if required to work under it. Failure to comply may result in injury or death to personnel.

The front and rear crush zones are illustrated above.

Always lower attachment or implement to ground before working on vehicle. If you must work on a lifted vehicle or attachment, securely support them.

Do not support vehicle on soft or brittle blocks, hollow tiles, or props that may crumble under continuous load. Do not work under vehicle that is supported solely by a jack.

2-31. DISPOSAL OF WASTE.

Follow appropriate regulations and Unit Standard Operating Procedures (SOP) on correct ways to recycle or dispose of waste. Potentially harmful waste includes such items as oil, fuel, coolant, brake fluid, filters, and batteries. Improper disposal of waste can threaten the environment and ecology.

Use leak-proof containers when draining fluids. Do not pour waste on ground, down drains, or into any water source.

Air-conditioning refrigerants escaping into the air can damage the atmosphere. Government regulations require a certified service center to recover and recycle used air-conditioning refrigerants.

2-32. ELECTROMAGNETIC INTERFERENCE.

WARNING

If you experience problems operating any controls, turn off your SINGAR radio unit. Failure to comply may result in death or injury to personnel and/or damage to equipment.

Electronic controls, devices, and systems may be susceptible to electromagnetic interference (EMI) if inadequately shielded or otherwise configured for electromagnetic compatibility. When operating any of the vehicle's controls while the SINGAR radio is on, EMI could occur. If you notice controls not responding correctly, or at all, turn your SINGAR radio off.

Also, use of the hazard warning lights may cause emissions that could cause interference with some radio communications.

2-33. CARBON MONOXIDE HAZARD.

WARNING

CARBON MONOXIDE POISONING CAN BE DEADLY

- CARBON MONOXIDE IS A COLORLESS, ODORLESS, DEADLY POISONOUS GAS, WHICH, WHEN BREATHED, DEPRIVES THE BODY OF OXYGEN AND CAUSES SUFFOCATION. EXPOSURE TO AIR CONTAMINATED WITH CARBON MONOXIDE PRODUCES SYMPTOMS OF HEADACHE, DIZZINESS, AND LOSS OF MUSCULAR CONTROL, APPARENT DROWSINESS, OR COMA. PERMANENT BRAIN DAMAGE OR DEATH CAN RESULT FROM SEVERE EXPOSURE.

- CARBON MONOXIDE OCCURS IN THE EXHAUST FUMES OF FUEL-BURNING HEATERS AND INTERNAL COMBUSTION ENGINES AND BECOMES DANGEROUSLY CONCENTRATED UNDER CONDITIONS OF INADEQUATE VENTILATION. THE FOLLOWING PRECAUTIONS MUST BE OBSERVED TO ENSURE THE SAFETY OF PERSONNEL WHENEVER THE PERSONNEL HEATER, MAIN, OR AUXILIARY ENGINE OF ANY VEHICLE IS OPERATED FOR MAINTENANCE PURPOSES OR TACTICAL USE:

  1. DO NOT operate engine of vehicle in an enclosed area unless it is ADEQUATELY VENTILATED.
  2. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in the personnel compartments.
  3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.
  4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either is present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm, DO NOT PERMIT EXERCISE; if necessary, administer artificial respiration (see FM 4-25.11).

- THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.

CHAPTER 3
OPERATOR MAINTENANCE

Contents **Para** **Page**

Section I. Preventive Maintenance Checks and Services (PMCS).

3-1. PMCS INTRODUCTION.

This section contains PMCS requirements for the IHMEE. The PMCS tables contain checks and services necessary to ensure that the vehicle is ready for operation. Using PMCS tables, perform maintenance at specified intervals.

3-2. MAINTENANCE FORMS AND RECORDS.

Every mission begins and ends with paperwork. There is not much, but it must be kept up. The filled-out forms and records have several uses. They are a permanent record of services, repairs, and modifications made on the vehicle. They are reports to Unit maintenance and to your Commander. They are a checklist to know what was wrong with the vehicle after its last use, and whether those faults have been fixed. For information needed on forms and records, refer to DA PAM 738-750.

3-3. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. Do the before (B) PREVENTIVE MAINTENANCE just before operating vehicle. Pay attention to the CAUTIONS and WARNINGS.

b. Do the during (D) PREVENTIVE MAINTENANCE while vehicle and/or its component systems are in operation. Pay attention to the CAUTIONS and WARNINGS.

c. Do the after (A) PREVENTIVE MAINTENANCE right after operating vehicle. Pay attention to the CAUTIONS and WARNINGS.

d. Do the (M) PREVENTIVE MAINTENANCE once a month. Pay attention to the CAUTIONS and WARNINGS.

e. If something does not work, troubleshoot with instructions in Para 3-12 and notify the supervisor.

f. Always do PREVENTIVE MAINTENANCE in the same order until it gets to be habit. Once practiced, problems can be spotted in a hurry.

g. If something looks wrong and cannot be fixed right then, write it on DA Form 2404 or DA Form 5988-E. If something seems seriously wrong, report it to Unit maintenance RIGHT NOW.

h. When doing PREVENTIVE MAINTENANCE, take along the tools needed and a rag (Item 8, Appendix D) or two to make all the checks.

3-4. GENERAL MAINTENANCE PROCEDURES.

WARNING

- APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.
- Degreasing Solvent (MIL-PRF-680) is toxic and flammable. Keep away from heat or flame. Never smoke when using solvent. The flashpoint for Type II Degreasing Solvent is 141 °F (61 °C). Wear protective goggles, face shield, and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes; and do not breathe vapors. Failure to comply may result in injury or death to personnel.
- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.
- Adhesives, solvents, and sealing compounds burn easily and give off vapors that are harmful to the skin and clothing. To avoid injury or death, keep away from open fire when using these materials, and use only in well-ventilated areas. If adhesives, solvents, or sealing compounds contact the skin or clothing, wash immediately with soap and water, and rinse thoroughly. Failure to comply may result in injury or death to personnel.

a. Cleanliness. Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Use degreasing solvent (Item 9, Appendix D) on all metal surfaces.

b. Bolts, Nuts, and Screws. Check bolts, nuts, and screws for obvious looseness or missing, bent, or broken condition. Look for chipped paint, bare metal, or rust around boltheads. If any part seems loose, tighten it, or report it to Unit maintenance.

c. Welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If a bad weld is found, report it to Unit maintenance.

d. Electric Wires and Connectors. Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and ensure wires are in good shape. If a bad wire or connector is found, report it to Unit maintenance.

e. Hydraulic Lines and Fittings. Look for wear, damage, and leaks, and ensure clamps and fittings are tight. Wet spots show leaks, and a stain around a fitting or connector can 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 Unit maintenance.

f. Damage. Damage is defined as any conditions that affect safety or would render the vehicle unserviceable for mission requirements.

g. Lubrication. When performing lubricating tasks, have clean rags (Item 8, Appendix D), a clean grease gun (Item 7, Appendix B), and the proper lubricant (Para 3-10) for the climate in which IHMEE will be operating.

3-5. FLUID LEAKAGE.

It is necessary to know how fluid leakage affects the status of fuel, oil, coolant, and the hydraulic systems. The following are definitions of the different types/classes of leakage that determine the status of the vehicle. Learn them, then be familiar with them. REMEMBER – WHEN IN DOUBT, NOTIFY THE SUPERVISOR!

CAUTION

Equipment operation is allowable with minor leakage (Class I or II). Consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify the supervisor. When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS. Class III leaks should be reported to the supervisor or to Unit maintenance. Failure to comply may result in damage to equipment.

a. Class I. Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

b. Class II. Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.

c. Class III. Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

3-6. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES TABLE.

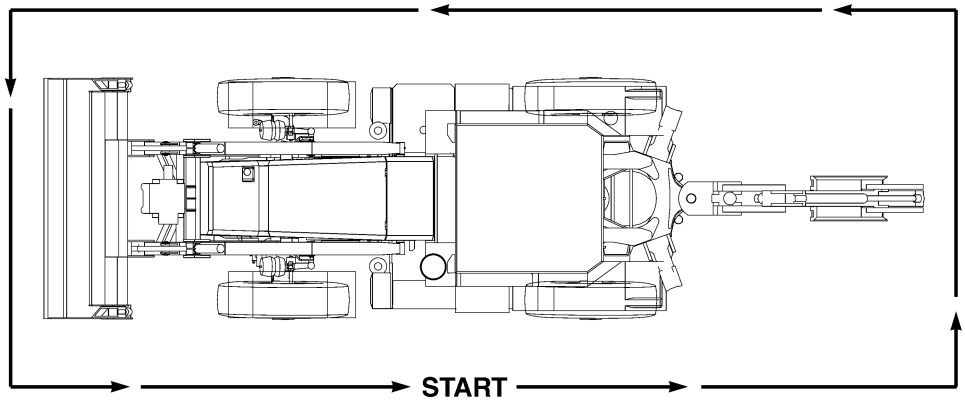
a. General.

NOTE

Prior to performing your PMCS, check with your PLL clerk to verify that the latest publications are being used by the operator and Unit maintenance.

Table 3-1 covers items on the IHMEE vehicle.

b. Daily "Walk Around" PMCS Diagram. This routing diagram will be of help to complete the B, D, or A PMCS. It shows the general sequence in which the PMCS is to be performed.



ME0253

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE.

Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
			CAUTION If any faults are found when operating hydraulic, electrical, or fuel components, notify Unit maintenance.	
1	Before	Exterior	Look under IHMEE for signs of fluid leakage (fuel, oil, and coolant).	Any leakage of fuel or Class III leakage of oil or coolant is found.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

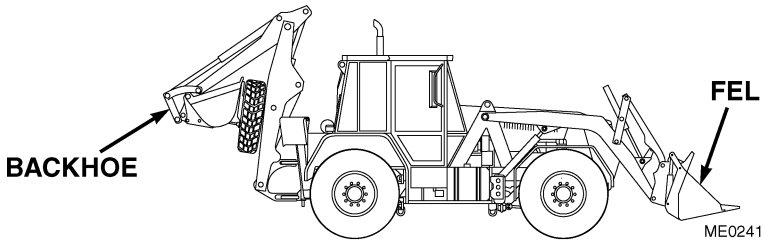
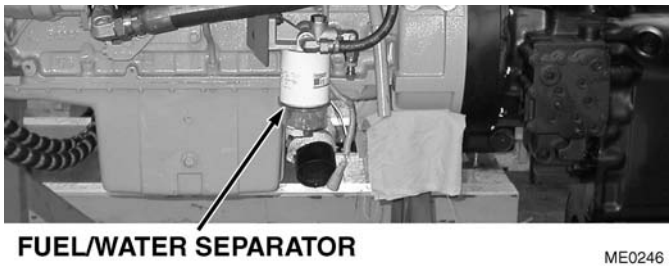
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
2	Before	Tires and Wheels	a. Visually inspect tires for proper inflation. Check pressure of any tire that looks low (Para 3-17).	Tires will not hold air.
			b. Check for obvious damages such as cuts, gouges, abrasions, cracks, leaks, bulges, or damage that extends to the cord body.	Any tires have cuts, gouges, abrasions, cracks, leaks, bulges, or damage that exposes cord body.
			c. Check for loose or missing lug nuts or broken studs.	One or more lug nuts are loose or missing. One or more studs are broken off.
3	Before	Front-End Loader (FEL) and Backhoe		
				
			Verify all safety travel bars, locking devices, safety pins, and latches are present and implements are securely locked in travel position (Para 6-2 and Para 7-6).	Travel bars, locking devices, or safety pins are missing or damaged, or latches not locked.
4	Before	Fuel/Water Separator		
				
			a. Open engine hood (Para 3-14).	
			b. Check fuel/water separator for water or excessive debris in sediment bowl. Drain water if present (Para 3-21).	Excessive debris in sediment bowl.
			c. Check fuel/water separator for fuel leaks.	Fuel leak present.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

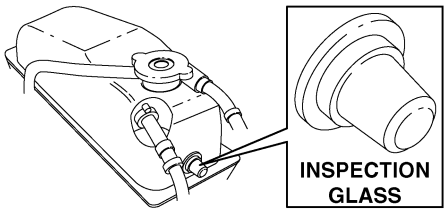
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
5	Before	Coolant		
			 ME0019	
			NOTE The coolant reservoir must be used to fill or check coolant level. If coolant is not visible in inspection glass, refill the system through the coolant reservoir (Para 3-10).	
			a. Check coolant level in the coolant reservoir by using inspection glass.	Coolant level is low.
			WARNING If vehicle has been operating, use extreme care to avoid being burned when removing radiator cap or coolant reservoir cap. Sudden release of pressure can cause a steam flash which could seriously injure personnel. Use heavy rags to protect hands. Slowly loosen cap to the first stop and allow pressure to be relieved before removing cap completely. After use, securely tighten cap. Failure to comply may result in injury or death to personnel.	
			b. Slowly open coolant reservoir fill cap by turning cap to the left until pressure starts to release. Wait until pressure is fully released before removing cap.	
			c. Visually check coolant reservoir and radiator for damage or obstruction. Remove any obstruction.	
			d. Check fan to ensure it moves freely.	Fan doesn't move freely.
			e. Inspect coolant reservoir fill cap for torn, missing, cracked, or stretched gasket.	Gasket is torn, missing, cracked, or stretched.
			f. Install fill cap on coolant reservoir. Turn cap to the right until tight.	
			g. Check coolant reservoir and hoses for obvious leaks, damage, or missing components.	Class III leak present, or any components are missing or damaged.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

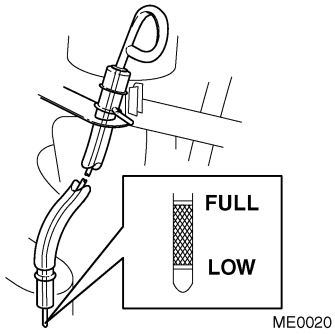
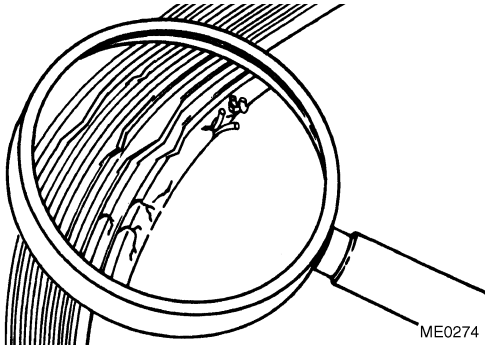
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
6	Before	Engine Oil Level		
				
			WARNING Avoid contact with hot oil. Failure to comply may result in serious injury.	
			NOTE Dispose of items containing oil according to Unit standard operating procedures.	
			Check engine oil level. Maintain oil level between the LOW and FULL marks. If oil level is low, add oil (Para 3-10).	Engine oil level is above FULL.
7	Before	Engine Drive Belt		
				
			Check drive belt for cracking, fraying, and breaks.	Drive belt fiber has more than one crack (0.13 in. (3.3 mm) in depth or 50 percent of belt thickness) or has frays more than 2 in. (51 mm) long.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
8	Before	Windshield Wipers	**CAUTION** Do not operate wipers on dry windshield for extended periods of time. Failure to comply may result in equipment damage. a. Check windshield wiper operation. b. Check operation of front and rear windshield wiper washers. Keep wiper washer fluid reservoir full (Item 2, Appendix D). c. Close engine hood (Para 3-14).	Front wipers inoperative.
9	Before	Warning and Indicator Lights	**NOTE** • Do not allow engine to start during this check. • Refer to Table 4-1 for description and location of warning and indicator lights. a. Turn ignition switch to IGN position; observe warning and indicator lights. b. Return ignition switch to OFF position.	Warning or indicator lights do not illuminate.
10	Before	All Lights	Check lights for operation and broken lenses (if tactical situation permits).	Lights inoperative.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

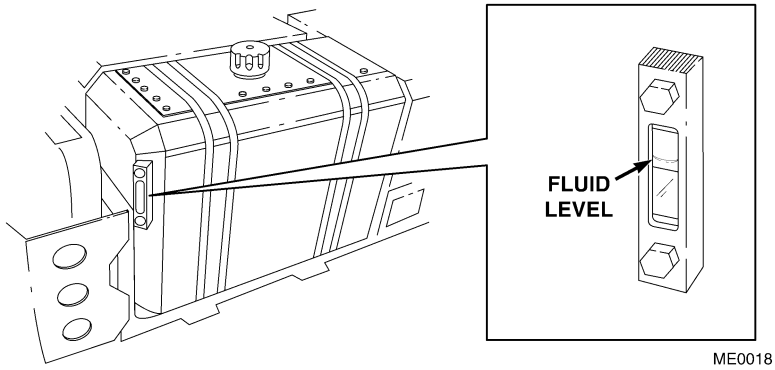
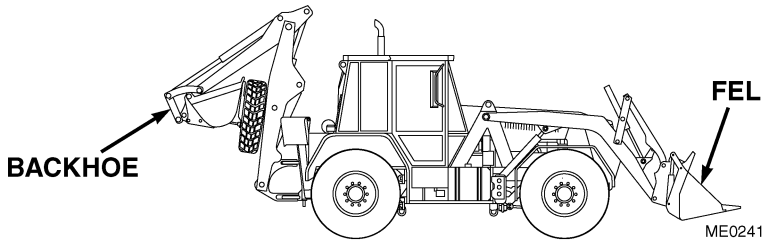
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
11	During	Hydraulic Reservoir		
				
			With FEL, backhoe, and stabilizers retracted, check oil level in tanks. Maintain oil level between marks in the sight glass, as shown. Fill as necessary (Para 3-10).	Oil level is below required minimum.
12	During	FEL and Backhoe		
				
			WARNING Do not check for leaks by hand; oil under hydraulic pressure can penetrate the skin and cause severe injury. Failure to comply may result in injury or death to personnel.	
			Operate attachments and listen for unusual noises. Check for leaking cylinders or control valves and improper operation.	Class III leak evident.
13	During	Gauges and Warning Indicators	a. Monitor all gauges and warning indicators during vehicle operation.	Gauges or indicators do not function properly.
			b. Coolant temperature should be 180-210 °F (82-99 °C).	Coolant temperature above 210 °F (99 °C).

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
		Gauges and Warning Indicators — Continued	c. Normal engine oil pressure is 30-90 psi (207-621 kPa). Minimum oil pressure allowable at idle is 10 psi (69 kPa).	Engine oil pressure less than 10 psi (69 kPa).
			d. VOLTMETER in safe zone, 26-28.5 V.	VOLTMETER not in safe zone.
			e. Transmission oil temperature should not exceed 250 °F (121 °C).	Transmission oil temperature exceeds 250 °F (121 °C).
			f. DUAL BRAKE PRESSURE gauge should read between 75-110 psi (517-758 kPa).	DUAL BRAKE PRESSURE gauge reads below 75 psi (517 kPa) or above 110 psi (758 kPa).
14	During	Inclinometer	Check inclinometer for proper operation.	Inclinometer not operating properly.
15	During	AIR FILTER RESTRICTION Gauge		
			Check AIR FILTER RESTRICTION gauge.	Gauge reads above 25 inH_2O (625 mmH_2O).
16	During	Systems Operation Check	a. Depress service brake pedal and check to ensure that pedal is firm and does not depress completely to the floor.	Pedal goes to the floor.

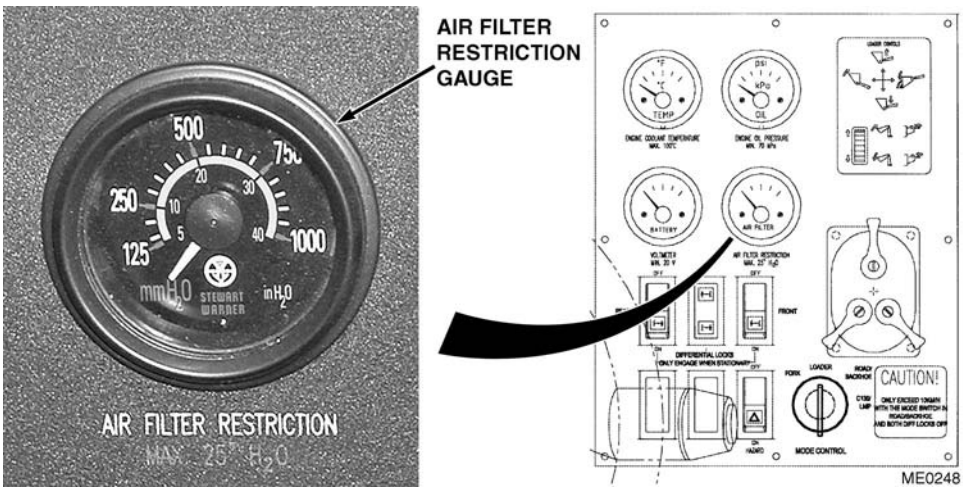


Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
		Systems Operation Check — Continued	b. Place transmission in forward gear and allow vehicle to move. Operate the service brakes. Vehicle should stop.	Vehicle does not stop.
			c. With PARK BRAKE lever ON, place travel select control lever in second gear. Vehicle should not move.	Parking brake does not hold vehicle.
17	During	Steering	Check for any unusual steering noise, binding, or difficulty in turning.	Steering binds or is unresponsive.
18	During	Accelerator and Throttle Control	a. Check accelerator for proper operation.	Accelerator not working properly.
			b. Check hand throttle for proper operation (Para 4-13).	Hand throttle not working properly.
19	During	Transmission	Shift transmission in all ranges (Para 5-4); observe any unusual stiffness or binding.	Transmission does not operate.
20	During	Drive Line	Listen for unusual noises or vibrations. **WARNING** If a maintenance procedure must be performed with the engine running, do not leave vehicle unattended. Failure to comply may result in injury or death. **CAUTION** Do not operate engine at low idle for long periods (more than 10 min.). Operating engine for long periods at low idle may result in damage to equipment. **NOTE** Park vehicle (Para 5-13) and leave engine running while performing checks 21 through 32d.	Unusual noises or vibrations are present.
21	After	Horn	Check that horn sounds when horn switch is pressed (if tactical situation permits).	Horn does not sound.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
22	After	Fire Extinguisher	a. Check for proper charge level. b. Check mounting bracket for loose or missing hardware.	Not properly charged or missing.
23	After	Operator's and Passenger Seats and Seat Belts	a. Check operator's and passenger seat belts for damage. b. Check operator's seat adjustment latch. c. Check operator's seat suspension adjuster. d. Check operator's and passenger seats for damaged upholstery, loose or missing hardware, and ease of operation.	Either seat belt torn or belt retractor inoperative. Seat latch inoperative or broken. Seat adjuster inoperative or broken. Operator's or passenger seat hardware loose or missing.
24	After	Instrument Panel Lights	Move lights switch through all positions and check that instrument panel lights are functioning properly (refer to Table 4-4).	Instrument panel lights do not illuminate (if mission is to occur during low light or night time).
25	After	Instrument Panels and Controls	Inspect the instrument panels for broken glass and unserviceable gauges.	Any of the following gauges are unreadable: • ENGINE COOLANT TEMPERATURE • ENGINE OIL PRESSURE • TRANSMISSION OIL TEMPERATURE • TRANSMISSION OIL PRESSURE
26	After	Reverse Alarm	With ignition switch in IGN position, shift EGS to R (Reverse). Check reverse alarm operation (if tactical situation permits).	Reverse alarm inoperative.
27	After	Hourmeter	Check hourmeter for physical damage.	Hourmeter damaged.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
28	After	Fuel Level	**WARNING** • No smoking, flames, sparks, or glowing or hot objects allowed within 50 ft. (15 m) of vehicle. Fire or explosion may cause personal injury or death. • Keep a fire extinguisher within easy reach when working with fuel or on a fuel system. Check FUEL LEVEL gauge. Fill fuel tank if level is low (Item 11, Appendix D).	Fuel level is very low or empty.
29	After	A/C Filter Element	 **CAUTION** When operating in desert or extremely dusty conditions, clean air cleaner element after every 4 hours of operation. Failure to comply may result in equipment damage. **NOTE** Cap opening must be correctly postioned at top of housing before installation. Remove, clean, and install air cleaner filter element and cap (Para 3-19).	Filter element damaged, collapsed, or missing.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

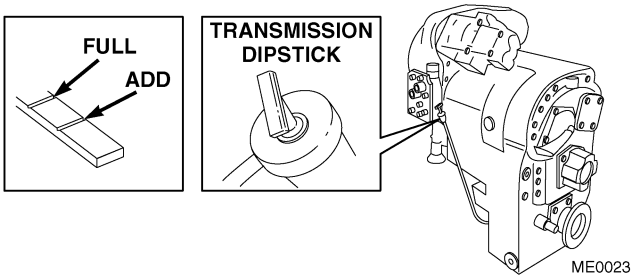
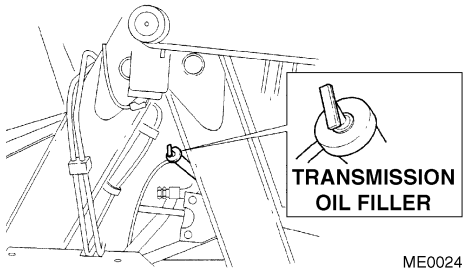
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
30	After	All Lights		
			  Check lights for operation and broken lenses (if tactical situation permits).	Lights inoperative.
31	After	Transmission Oil		
			  With engine running and transmission temperature between 180 and 199 °F (82 and 93 °C), check oil level on dipstick. Maintain oil level between ADD and FULL marks. Fill as necessary (Para 3-10).	

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

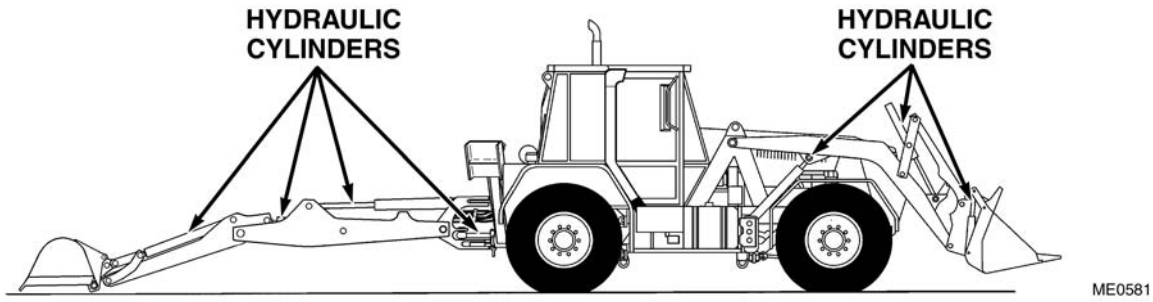
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
32	After	Backhoe and FEL		
				
			a. Inspect backhoe pedal lock.	Pedal will not release.
			b. Remove tow hitch (Para 7-4).	
			c. Fully extend backhoe with bucket resting on ground (Para 7-3).	
			d. Shut OFF engine (Para 5-2).	
			WARNING Do not check for leaks by hand; oil under hydraulic pressure can penetrate the skin and cause severe injury. Failure to comply may result in injury or death to personnel.	
			e. Visually inspect hydraulic lines for crimping, leaks, or damage. Check fittings, control valve, and cylinders for leaks or damage.	Class III leak evident.
			f. Visually check for loose or missing bolts, fittings, hoses, and digging teeth. Check for broken or cracked wear plates, cutting edges, and mounting points.	Any parts are missing. Wear plates or mounting points are cracked or damaged.
			g. Check backhoe boom, dipper, stabilizer, main frame, and swing tower assembly for cracks, broken welds, and loose or missing hardware.	Broken or cracked welds apparent. Loose or missing hardware.
			h. Check FEL frame assembly and lift arm assembly bucket for loose or missing hardware. Check for physical damage and cracked or broken welds.	Physical damage or broken or cracked welds are apparent. Loose or missing hardware.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

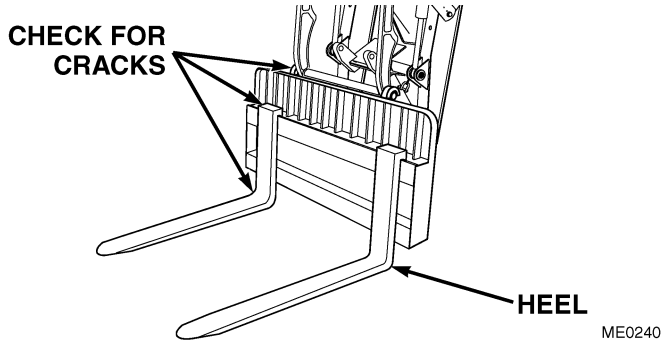
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
		Backhoe and FEL — Continued	i. Clean 4-in-1 bucket.	
			j. Check for physical damage, cracks, or broken welds.	Cracks, broken welds, or holes are apparent.
			k. Perform daily lubrication in accordance with Para 3-10.	
			l. Start engine (Para 5-2).	
			m. Return vehicle to parked position (Para 5-13).	
			n. Install tow hitch (Para 7-4).	
			o. Shut OFF engine (Para 5-2).	
33	After	Forklift (If Installed)		
				
			a. Clean forklift attachment assembly.	
			b. Check quick-hitch mounts and each tine's heel and fork-locking mechanism for cracks, damage, wear, and correct operation.	Excessive wear or damage evident. Any cracks evident.
34	After	Exterior	a. Look under IHMEE for signs of fluid leakage (fuel, oil, and coolant).	Any leakage of fuel or Class III leakage of oil or coolant is found.
			b. Inspect carriage, boom, and attachments for cracked, bent, or broken members.	Carriage, attachments, or boom are bent, cracked, broken, or missing.
			c. Check exterior wiring and connectors for secure mounting and frayed, broken, or burned wires.	Wiring or connectors are frayed, broken, or burned.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

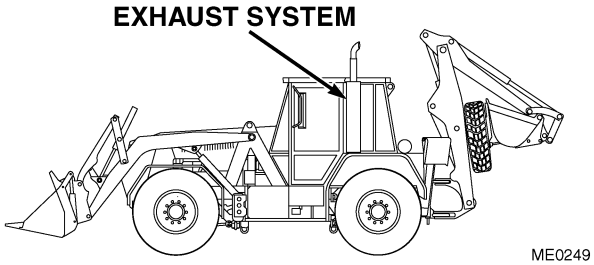
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
		Exterior — Continued	d. Check warning and data labels for damage, cleanliness, and readability.	
			e. Inspect airbags, suspension limit straps, and mounting hardware.	Airbags or suspension limit straps torn, loose, or missing hardware.
			f. Check front and rear shock absorbers for leaks or loose or missing hardware.	Class III leak evident or any hardware is loose or missing.
			g. Check front and rear glad hands.	Rubber grommet missing or cracked.
			h. Check rear view mirrors for obvious damage and broken or cracked glass.	Rear view mirrors missing or unusable.
35	After	Exhaust System		
				
			a. Check exhaust system for leaks or loose or missing clamps/hardware.	Any missing hardware or evidence of leaks.
			b. Check for evidence of leaks at all joints and connections.	
36	After	Windows and Windshields	Check windows for obvious damage and broken or cracked windows.	Vision is distorted due to crack in windshield.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

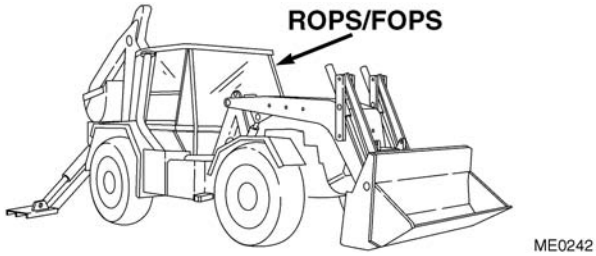
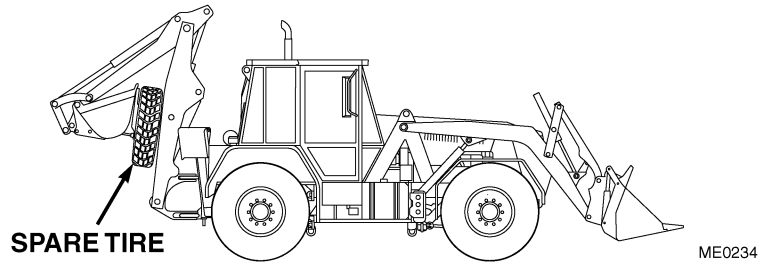
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
37	After	Rollover Protection Structure (ROPS) and Falling Object Protection Structure (FOPS)		
				
			Check frame for damage such as cracks, holes, broken welds, and loose or missing mounting bolts.	Cracked welds, buckled or loose seams, and missing or loose bolts.
38	After	Spare Tire		
				
			a. Check spare tire and carrier for security, loose or missing hardware, and proper function.	Loose or missing spare tire or carrier.
			b. Visually inspect spare tire for proper inflation. Check pressure if it looks low (Para 3-17).	Spare tire will not hold air.
			c. Check spare tire for obvious damage such as cuts, gouges, abrasions, cracks, leaks, bulges, or damage that extends to the cord body.	Spare tire has cuts, gouges, abrasions, cracks, leaks, bulges, or damage that exposes cord body.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

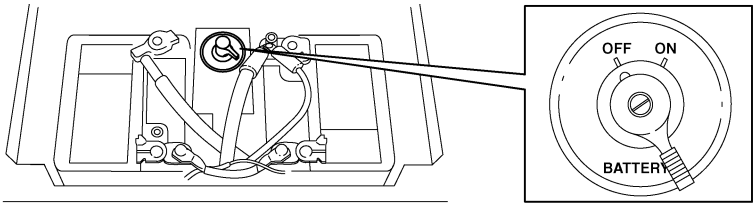
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
39	After	Batteries	 ME0252	
			WARNING • Lead-acid battery gases can explode. Do not smoke, have open flames, or make sparks around a battery, especially if caps are off. Battery may give off gas which can explode. Failure to comply may result in injury or death to personnel. • Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal, a direct short may result in instant heating of tools, damage to equipment, and injury or death to personnel. a. Open battery box (Para 3-15). b. Ensure electrical master switch is in OFF position (Para 5-1). c. Inspect batteries and cables for broken, loose, or corroded terminals and cables. d. Close battery box (Para 3-15).	Cables or terminals are broken, loose, or heavily corroded. Batteries will not crank engine.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

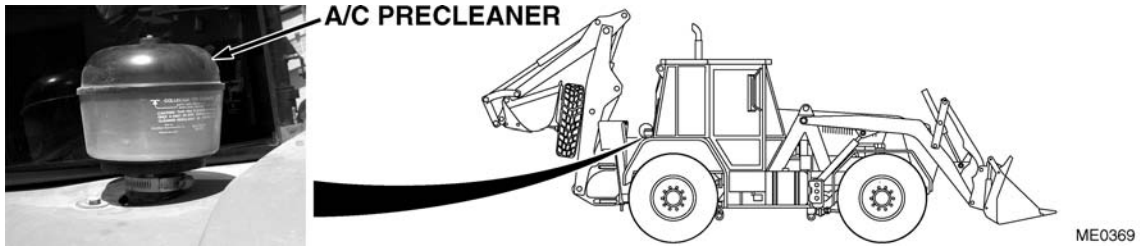
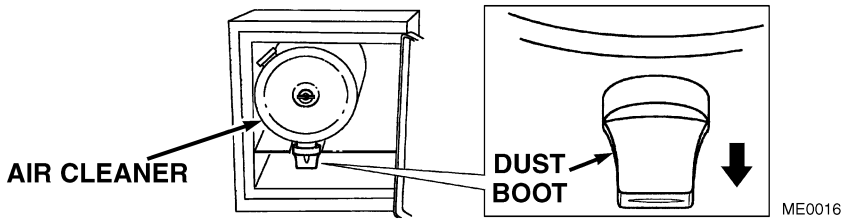
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
40	After	A/C Precleaner		
				
			CAUTION When operating in desert or extremely dusty conditions, clean A/C precleaner after every 4 hours of operation. Failure to comply may result in equipment damage.	
			Remove, clean, and install A/C precleaner dust bowl (Para 3-20).	
41	After	Air Cleaner Filter Element and Hoses		
				
			CAUTION When operating in desert or extremely dusty conditions, clean air cleaner element after every 4 hours of operation. Failure to comply may result in equipment damage.	
			NOTE Dust boot must be correctly postioned at bottom of cap before installation.	
			a. Remove, clean, and install air cleaner filter element and cap (Para 3-18).	Filter element damaged, collapsed, or missing.
			b. Check air intake hoses for loose or missing clamps.	Clamp missing.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

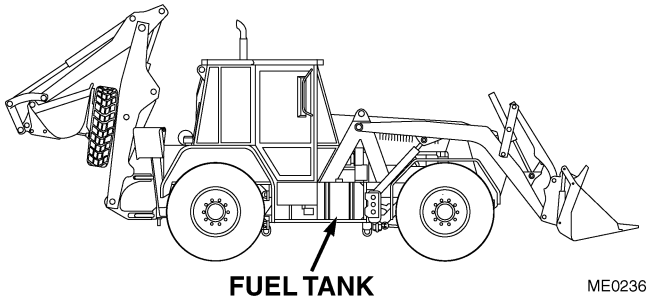
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
42	After	Fuel System		
				
			WARNING • No smoking, flames, sparks, or glowing or hot objects allowed within 50 ft. (15 m) of vehicle. Fire or explosion may cause personal injury or death. • Keep a fire extinguisher within easy reach when working with fuel or on a fuel system.	
			Check fuel tanks for leaks, missing cap, or broken supports.	Cap missing. Fuel leak present.
43	After	Front Axle and Steering	a. Visually check for obvious damage, loose or missing hardware, and fluid leaks.	Class III leaks evident.
			b. Check tie rods, drag links, pitman arm, and control arms for physical damage, or loose or missing hardware.	Broken components or loose or missing hardware.
44	After	Rear Axle	Visually check for obvious damage, loose or missing hardware, and fluid leaks.	Class III leak evident. Loose, bent, damaged, or missing hardware.
45	After	Hydraulic Oil Cooler	a. Open front grill (Para 3-13).	
			b. Check for loose or missing hardware, fitting oil leaks, and physical damage.	Class III leak evident.
			c. Close front grill (Para 3-13).	
46	After	Radiator	a. Open engine hood (Para 3-14).	Radiator is damaged, leaking, or debris is restricting airflow.
			b. Check radiator for damage, leaks, and debris that can restrict airflow.	

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

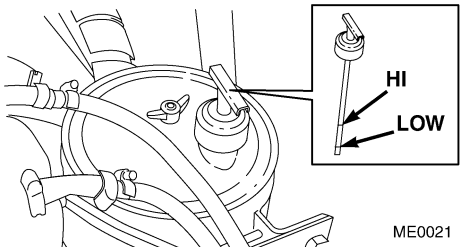
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
47	After	Transmission Oil Cooler	Check transmission oil cooler for damage or signs of leakage	Transmission oil cooler is damaged or leaking.
48	After	Air Compressor	Visually check brake lines for cracks, breaks, or wear and/or broken or damaged fittings. Listen for evidence of air leakage.	Damaged hoses or any leak evident.
49	After	Power Steering		
				
50	Monthly	Differential and Axle Hub	a. Check power steering oil level on dipstick. Maintain oil level between HI and LOW marks. Fill as necessary (Para 3-10). b. Close engine hood (Para 3-14). **NOTE** • Wheel must be raised off ground to allow proper alignment of hub level plugs. • If possible, check oil when it is warm, after vehicle has been running. • The axle hub oil level plug has two levels, marked STEER (front) and RIGID (rear). Ensure correct level is used for each axle. a. Chock front or rear wheels as appropriate (opposite axle of hubs to be checked). b. Use jack (Item 12, Appendix B) and jack plate (Item 13, Appendix B) to raise wheel about 1 in. (25 mm) above ground (Para 2-21). c. Place PARK BRAKE lever in OFF position (Para 4-11).	Oil level at or below LOW mark.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

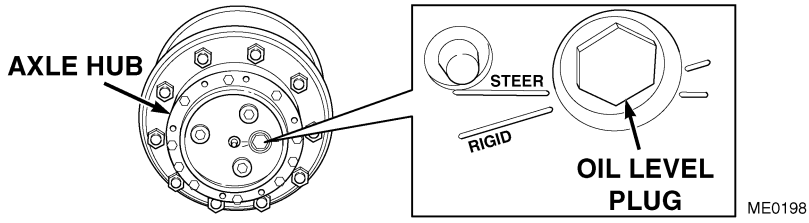
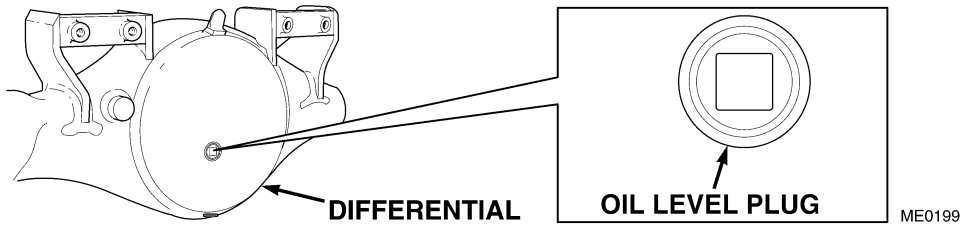
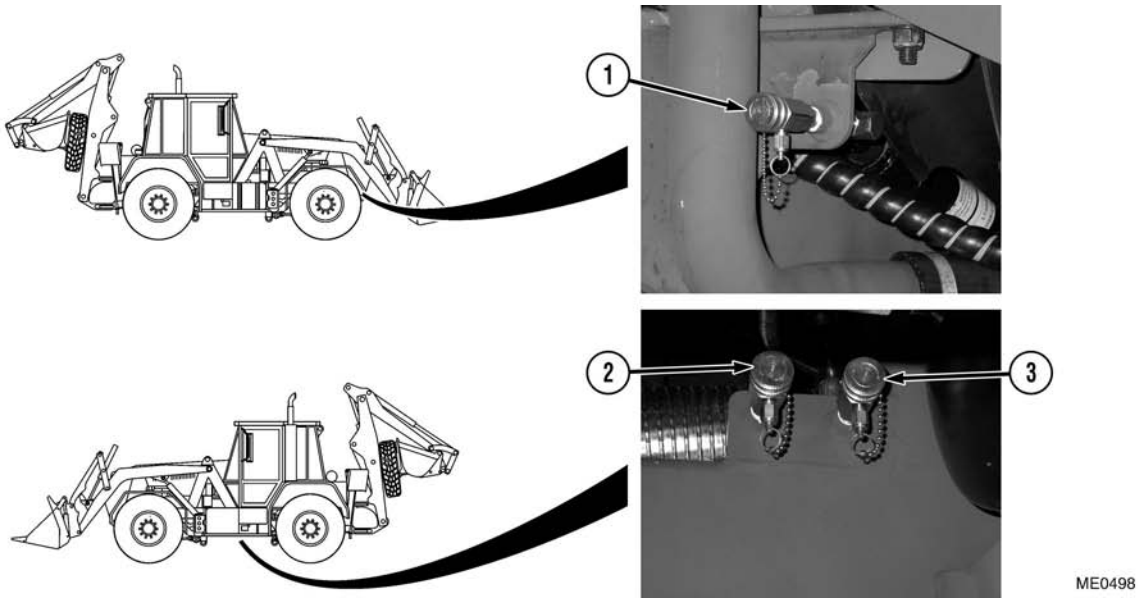
Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
		Differential and Axle Hub — Continued		
				
			d. Rotate wheel so axle hub oil level plug is in proper position. e. Use 1-1/16-in. socket (Item 25, Appendix B) and 1/2-in. breaker bar (Item 3, Appendix B) to remove oil level plug on axle hub. **NOTE** When filling drive hubs with oil, use funnel and hose rather than pressurized line filler. This method allows oil to percolate through gears during filling. f. Ensure level is even with plug hole. If low, fill with correct grade of oil (Para 3-10). g. Install plug and tighten. h. Lower wheel. i. Repeat Steps a through h for remaining three axle hubs. j. Place PARK BRAKE lever in ON position (Para 4-11).	
				
			k. Using 1/2-in.breaker bar, remove oil level plug from front axle housing. l. Ensure that oil is level with plug hole. If oil level is low, replenish with correct grade of oil (Para 3-10).	

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) for IHMEE. (Continued)

Item No.	Interval	Item to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
		Differential and Axle Hub — Continued	m. Install plug and tighten. n. Repeat Steps k through m for rear axle housing. o. Stow wheel chocks.	
51	Monthly		a. Remove belly plates (Para 3-26) and firewall (Para 3-27). b. Perform monthly lubrication in accordance with Para 3-10. c. Install belly plates (Para 3-26) and firewall (Para 3-27).	

3-7. AOAP OIL SAMPLING VALVE LOCATIONS.

To ensure a new vehicle is being correctly lubricated, a sample of oil from each of the parts shown in the following list is to be taken, at 100 hours of operation or at 90-day intervals, whichever comes first, as prescribed by DA Pam 738-750. Hard-time intervals will be applied in the event AOAP laboratory support is not available. The components that require AOAP oil sampling are provided below.

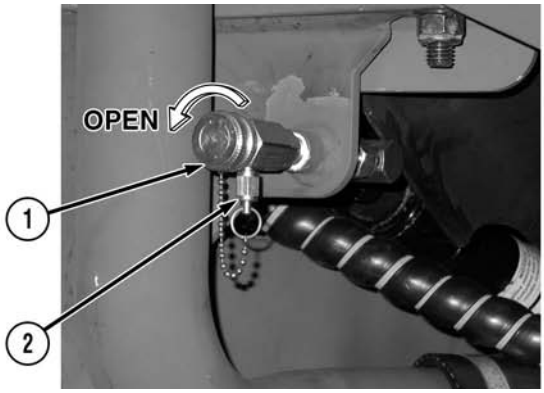


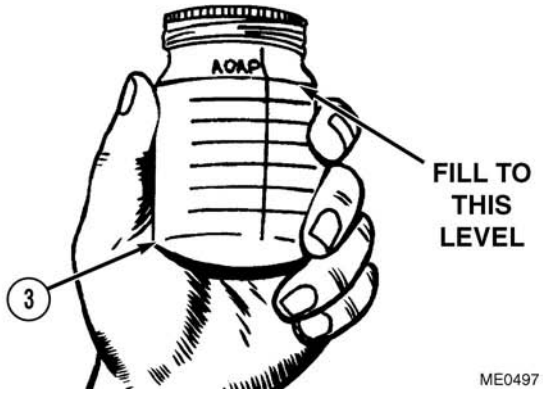
(1) Engine

(2) Transmission

(3) Hydraulics system

3-8. AOAP OIL SAMPLING PROCEDURE.





The procedure for carrying out AOAP oil sampling is:

WARNING

Avoid contact with hot oil. Failure to comply may result in serious injury.

(1) The sample must be taken while the oil is hot, as soon as possible after shutdown.

(2) Clean all dirt from around AOAP sampling valve (1).

(3) Remove valve cap (2).

(4) Hold clean sample bottle (3) under sampling valve (1).

(5) Open sampling valve (1) and drain approximately 1 pint of oil. Fill sample bottle (3) to within 0.5 in. (13 mm) from top. Cap bottle immediately.

(6) Install valve cap (2).

Section II. Lubricating Instructions.

3-9. MAINTAINING LUBRICANT LEVELS.

Lubricant levels must be checked as specified in the PMCS Table (Para 3-3) and the General Lubrication Instructions (Para 3-10). Steps must be taken to replenish and maintain lubricant levels.

3-10. GENERAL LUBRICATION INSTRUCTIONS.

WARNING

- Degreasing Solvent (MIL-PRF-680) is toxic and flammable. Keep away from heat or flame. Never smoke when using solvent. The flashpoint for Type II Degreasing Solvent is 141 °F (61 °C). Wear protective goggles, face shield, and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes; and do not breathe vapors. Failure to comply may result in injury or death to personnel.
- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.
- Adhesives, solvents, and sealing compounds burn easily and give off vapors that are harmful to the skin and clothing. To avoid injury or death, keep away from open fire when using these materials, and use only in well-ventilated areas. If adhesives, solvents, or sealing compounds contact the skin or clothing, wash immediately with soap and water, and rinse thoroughly. Failure to comply may result in injury or death to personnel.

a. Cleaning Fittings Before Lubrication. Clean parts with Degreasing Solvent (Item 9, Appendix D) or equivalent. Dry before lubricating. Dotted arrow points indicate lubrication on both sides of the equipment.

b. Lubrication After Fording. If fording operation occurs, lubricate all fittings below fording depth, and check axles for contamination.

c. Lubrication After High-Pressure Washing. After a thorough washing, lubricate all grease fittings and oilcan points outside and underneath vehicle.

d. Localized Views. A reference to the appropriate localized view is given after most lubrication entries. Localized views begin on page 3-32.

e. Notes.

(1) COLD TEMPERATURE OPERATION.For operating of equipment in expected continuous temperatures below 0 °F (-18 °C), remove lubricants prescribed in Table 3-2 for temperatures above 0 °F (-18 °C). Relubricate with lubricants specified in Table 3-2 for temperatures 0 °F to -50 °F (-18 °C to -46 °C). After changing to OEA, drain one pint of oil from oil sampling valve.

(2) CHASSIS.

(a) **Purging of Lubricant.** When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated.

WARNING

Do not start engine or move vehicle when anyone is under vehicle. Severe injury or death could result.

(b) **U-joints.** Use the proper lubricant to purge all four bearing seals of each U-joint. This flushes abrasive contaminants from each bearing and ensures all four bearings are filled properly. Pop the seals, which are made to be popped.

If any seals fail to purge, move drive shaft from side to side while applying gun pressure. This allows greater clearance on thrust end of bearing that is not purging. If seals still do not purge, rock vehicle by releasing the parking brake, start engine, put transmission in F (Forward) or R (Reverse), and allow vehicle to roll. This

removes the windup in the drive line and allows for a greater clearance on the thrust end of the U-joint. Because of the U-joint seal's design, there will occasionally be one or more bearing seals of a joint that may not purge. If any bearing seals do not purge, notify Unit maintenance.

(c) **Drive Shaft Slip Joints.** When lubricating spline end of drive shafts, apply grease to spline fitting until lubricant appears at pressure relief hole. Cover hole with finger and continue adding grease until it appears at sleeve yoke seal.

(d) **Severe Operating Conditions.** When vehicle is operating under severe conditions, lubricate drive shafts and U-joints every 50 hours.

(3) ENGINE, TRANSMISSION, HYDRAULIC SYSTEM.

(a) **Transmissions.** Operate engine 1 minute at 1,500 RPM, then idle until transmission reaches normal operating temperature. With engine idling, check transmission dipstick. If oil level is on or below LOW line, add oil. Approximately 1 qt. (0.9 L) of oil is required to bring oil level from bottom of LOW band to desired level between LOW and FULL band. See Para 3-6.

(b) **Crankcase.** Check oil level with vehicle parked on level ground and the engine off and cool. Do not overfill.

(c) **Army Oil Analysis Program (AOAP).** Refer to TB 43-0211 for sampling requirements. Refer to Para 3-7 and Para 3-8 for additional information regarding the AOAP for the IHMEE.

After expiration of warranty, active Army units will send an engine oil sample to an AOAP laboratory for analysis every 100 hours of operation or 90 days, whichever occurs first. Reserve and National Guard units will send an oil sample to an AOAP laboratory for analysis every 100 hours of operation or 180 days, whichever occurs first.

Intervals for sampling as well as draining and refilling lubricants may be changed by an AOAP laboratory.

If AOAP laboratory support is not available, drain and refill crankcase oil every 3,000 mi. (4 800 km) or every 6 months, whichever comes first; and drain and refill transmission oil every 6,000 mi. (9 700 km) or annually, whichever comes first. Drain and refill hydraulic reservoir every 6,000 mi. (9 700 km) or annually, whichever comes first.

1 After the engine's initial warranty period, crankcase oil will be changed only when directed by an oil analysis laboratory. When AOAP laboratory support is not available, change oil and filter element(s) at prescribed hardtime intervals, 3,000 mi. (4 800 km) or 6 months, whichever occurs first.

2 After the transmission's initial warranty period, transmission oil will be sampled every 90 days or 1,000 mi. (1 600 km), whichever occurs first. Reserve and National Guard units will sample every 180 days or 1,000 mi. (1 600 km), whichever occurs first. Transmission oil will be changed only when directed by an oil analysis laboratory. When AOAP laboratory support is not available, change oil each 6,000 mi. (9 600 km) or 12 months, whichever occurs first.

3 Hydraulic reservoir oil will be sampled every 12 months. Oil will be changed only when directed by an oil analysis laboratory. When AOAP laboratory support is not available, change oil every 6,000 mi. (9 600 km) or 12 months, whichever occurs first.

4 The lower ball joints should be given 10-12 strokes with a grease gun through existing grease fitting.

(4) OILCAN POINTS.Every 1,000 mi. (1 600 km) or monthly; lubricate doors, side panels and engine cover hinges, locks, mirror swivels, and latches.

(5) CV JOINTS.Only 2 fittings per wheel should be lubricated.

(6) BACKHOE.The backhoe must be fully extended and lowered to the ground before lubrication.

Table 3-2. Lubricants by Temperature Range.

LUBRICANTS		CAPACITIES	EXPECTED TEMPERATURES: Above +15 °F (Above -9 °C)	EXPECTED TEMPERATURES: +40 to -15 °F (+4 to -26 °C)	EXPECTED TEMPERATURES: +40 to -50 °F (+4 to -46 °C)	DESERT CONDITIONS
OE/HDO- (MIL-PRF-2104) OEA (MIL-PRF-46167)	Lubricating Oil Ice, Tactical Lubricating Oil Ice, Arctic Engine w/Filter	17.3 qt. (16.4 L)	OE/HDO-15/40	OE/HDO-15/40 or OEA See notes a and e.	OE/HDO-15/40 or OEA See note b.	OE/HDO-40
	Transmission	34.9 qt. (33 L)	OE/HDO-10	OE/HDO-10	OEA	For arctic operation, refer to FM 9-207.
Dexron III OE/HDO- (MIL-PRF-46167)	Hydraulic Reservoir w/Filter	160.6 qt. (152 L)	Dexron III	Dexron III	OEA	
Dexron III OE/HDO- (MIL-PRF-46167)	Power Steering Reservoir w/Filter	1.1 gal. (4 L)	Dexron III	Dexron III	OEA	
GO- (MIL-PRF-2105)	Differential, Front	9 qt. (8.5 L)	GO-85/140	GO-85W/140 or GO-80W/90 See note c.	GO-80W/90 or GO-75 See note d.	
	Differential, Rear	10.3 qt. (9.7 L)				
GO- (MIL-PRF-2105)	Axle Hub, Front	1.6 qt. (1.5 L)	GO-85W/140	GO-85/140 or GO-80/90 See note c.	GO-80/90 or GO-75 See note d.	
	Axle Hub, Rear	1.22 qt. (1.15 L)				
Oilcan Points		As required.	OE/HDO-30	OE/HDO-10	OEA	
GO- (MIL-PRF-2105)	Oil, Lubricating, Gear, Multipurpose, Oil-Lubed Wheel Bearings		GO-85/140	GO-85/140 or GO-80/90 See note c.	GO-80/90 or GO-75 See note d.	
Antifreeze (Ethylene Glycol) (A-A-52624)	Type I (Standard)	31.7 qt. (30 L)	Use above -50 °F (-46 °C)			
	Type IP (Arctic)	31.7 qt. (30 L)	Use in extended periods of -40 °F (-40 °C) and below.			
Grease, Automotive and Artillery (GAA) (MIL-PRF-10924)		As required.	GAA all temperatures			

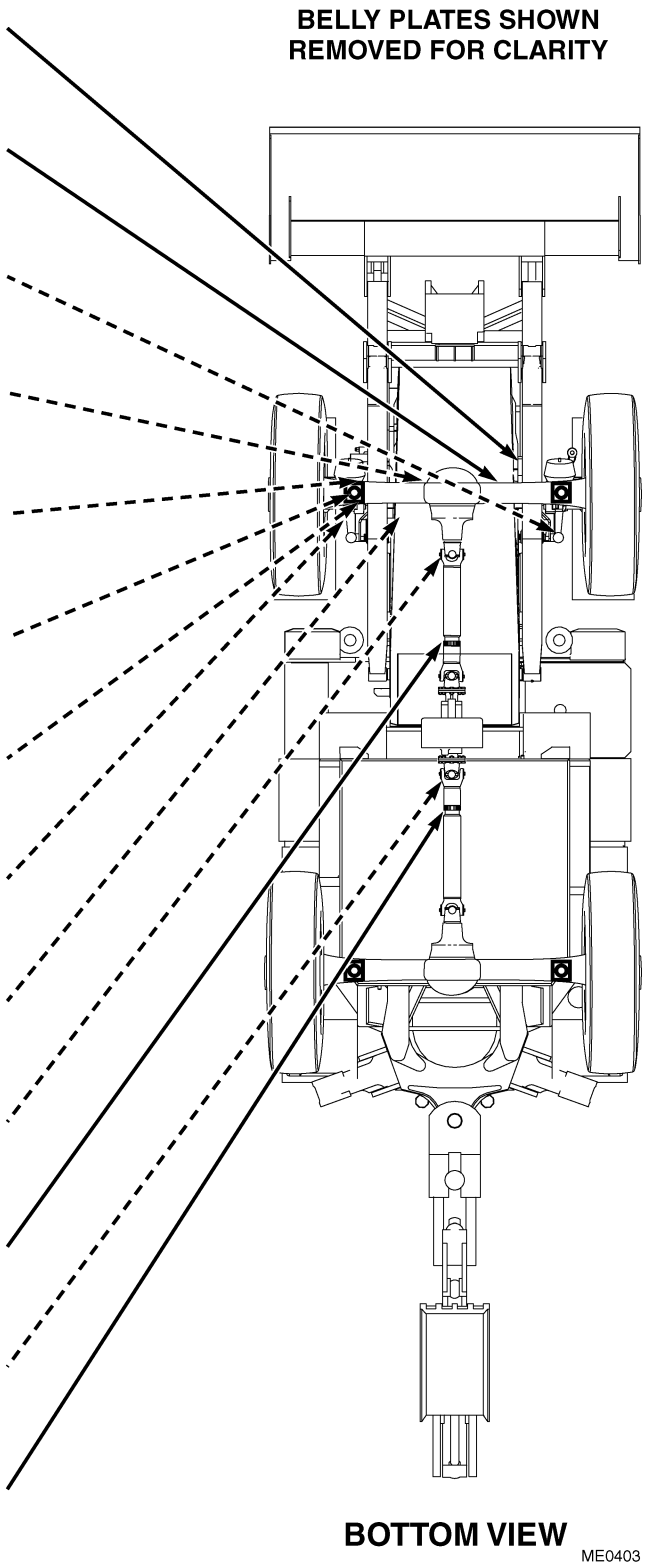
KEY NOTES:

a. OEA must be used when temperatures are consistently below 0 °F (-18 °C).
b. OE/HDO-15/40 must be used when temperatures are consistently above 0 °F (-18 °C).
c. GO-85/140 must be used when temperatures are consistently above 30 °F (-1 °C).
d. GO-80/90 must be used when temperatures are consistently above -15 °F (-26 °C).
e. After changing to OEA, drain 1 pint of oil from oil sampling valve.
f. Refer to Appendix D for lubricant National Stock Number information.

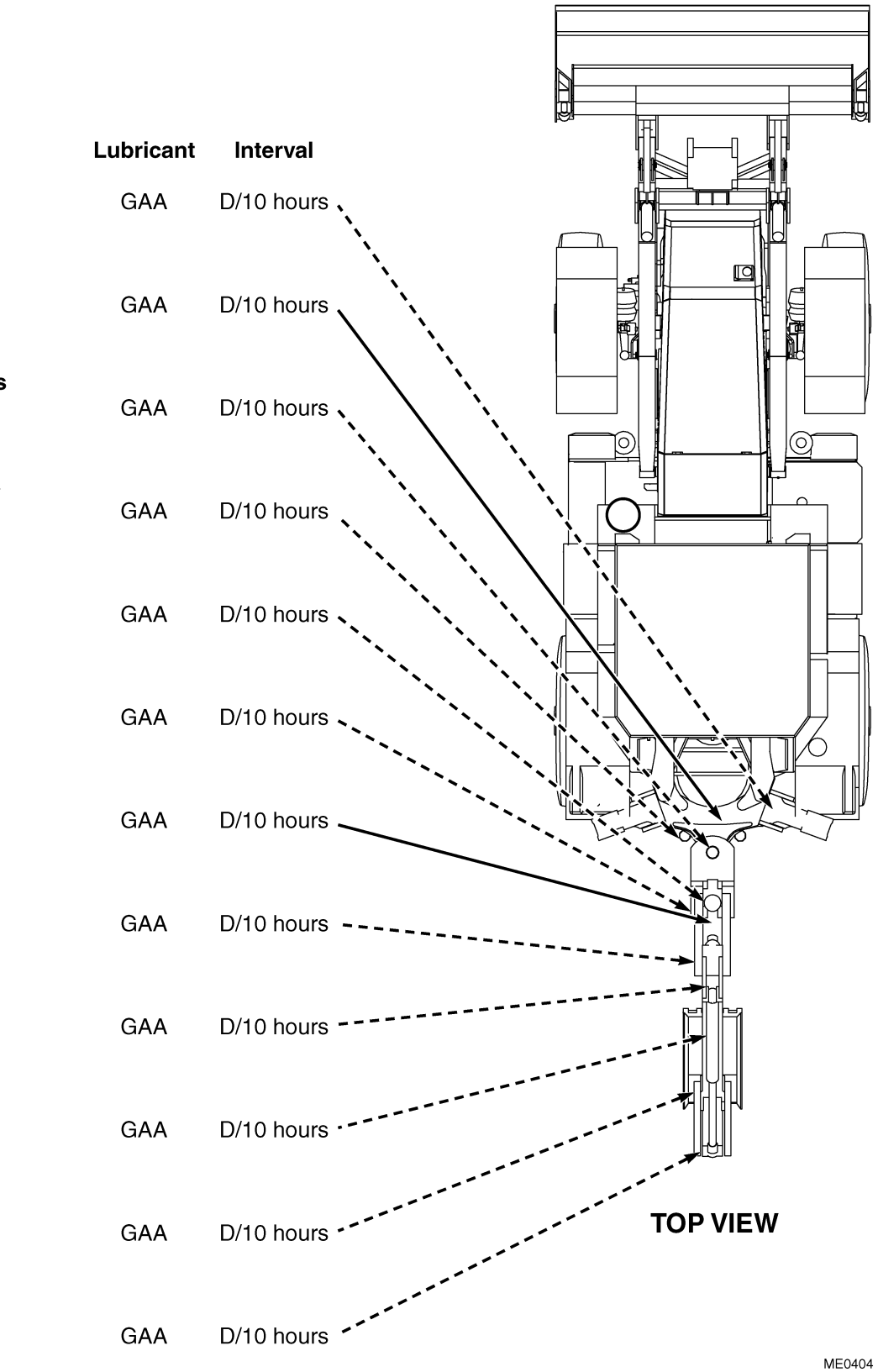
INTERVALS:

D (Daily) - 10 Hours
M (Monthly) - 50 Hours

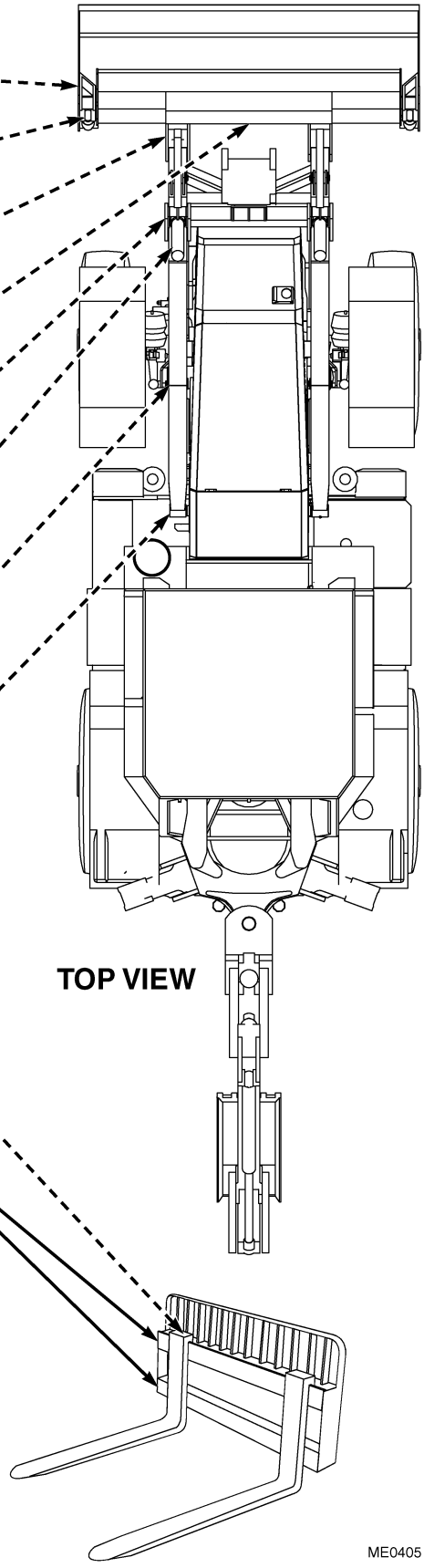
	Lubricant	Interval
Steering Shafts and Carrier Bearing		
Lubricate (5 fittings). (See View 1)	GAA	M/50 hours
Miter Box		
Lubricate. (See View 2)	GAA	M/50 hours
Tie Rod Ends		
Lubricate (2 fittings). (See View 3)	GAA	M/50 hours
Steer Gear Box Slip Joints and U-Joints		
Lubricate (3 fittings). (See View 4)	GAA	M/50 hours
Ball Joints		
Lubricate (2 fittings per wheel). (See Views 5 and 6)	GAA	M/50 hours
Front Axle CV Joints		
Lubricate (2 fittings per wheel). (See View 7 and Note 5)	GAA	M/50 hours
Slack Adjusters		
Lubricate (1 fitting per wheel). (See View 6)	GAA	M/50 hours
S-cam Bushings		
Lubricate (2 fittings per wheel). (See View 6)	GAA	M/50 hours
Drag Link		
Lubricate (2 fittings). (See View 8)	GAA	M/50 hours
Front Drive Shaft U-joints		
Lubricate (1 fitting each end). (See View 9)	GAA	M/50 hours
Front Drive Shaft Slip Joint		
Lubricate. (See View 10)	GAA	M/50 hours
Rear Drive Shaft U-joints		
Lubricate (1 fitting each end). (See View 9)	GAA	M/50 hours
Rear Drive Shaft Slip Joint		
Lubricate. (See View 10)	GAA	M/50 hours



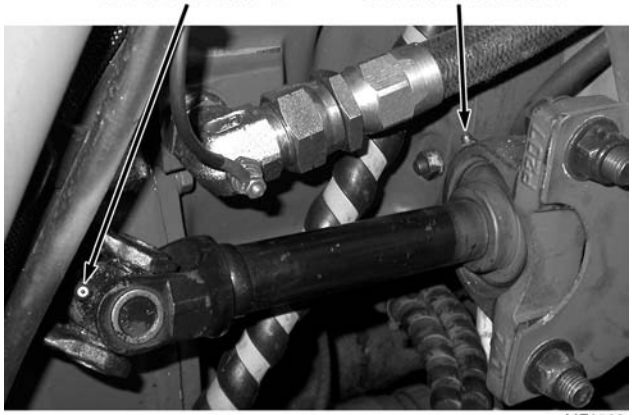
	Lubricant	Interval
Stablizer Cylinders Lubricate (2 fittings). (See View 11)	GAA	D/10 hours
Boom Lock Lubricate. (See View 12)	GAA	D/10 hours
Swing Tower Pivot Pins Lubricate (2 fittings). (See View 12)	GAA	D/10 hours
Swing Tower Cylinders Lubricate (6 fittings). (See View 13)	GAA	D/10 hours
Boom Cylinder Lubricate (2 fittings). (See View 14)	GAA	D/10 hours
Boom Pivot Pin Lubricate (2 fittings). (See View 15)	GAA	D/10 hours
Tow Pintle Lubricate. (See View 15)	GAA	D/10 hours
Dipper Pivot Pin Lubricate (2 fittings). (See View 16)	GAA	D/10 hours
Dipper Cylinder Lubricate (2 fittings). (See Views 17 and 18)	GAA	D/10 hours
Bucket Cylinder Lubricate (2 fittings). (See View 19)	GAA	D/10 hours
Bucket Pivot Pins Lubricate (2 fittings). (See View 20)	GAA	D/10 hours
Hinge Pins Lubricate (4 fittings). (See View 21)	GAA	D/10 hours



	Lubricant	Interval
Clamshell Pivot Pins Lubricate (2 fittings). (See View 22)	GAA	D/10 hours
Clamshell Cylinders Lubricate (4 fittings). (See Views 22 and 23)	GAA	D/10 hours
Quick Hitch Pivot Pins Lubricate (4 fittings). (See View 24)	GAA	D/10 hours
Quick Hitch Lubricate (3 fittings). (See Views 25)	GAA	D/10 hours
Bucket Pivot Pins Lubricate (2 fittings). (See View 26)	GAA	D/10 hours
Bucket Tilt Cylinders Lubricate (4 fittings). (See Views 24 and 27)	GAA	D/10 hours
FEL Arm Lift Cylinders Lubricate (4 fittings). (See Views 28 and 29)	GAA	D/10 hours
FEL Arm Pivot Pins Lubricate (2 fittings). (See View 30)	GAA	D/10 hours
Forklift Tine Locking Pins Lubricate. (See Note 4)	OE/HDO	M/50 hours
Forklift Tine Slides Lubricate.	GAA	M/50 hours



1 STEERING SHAFTS CARRIER BEARING



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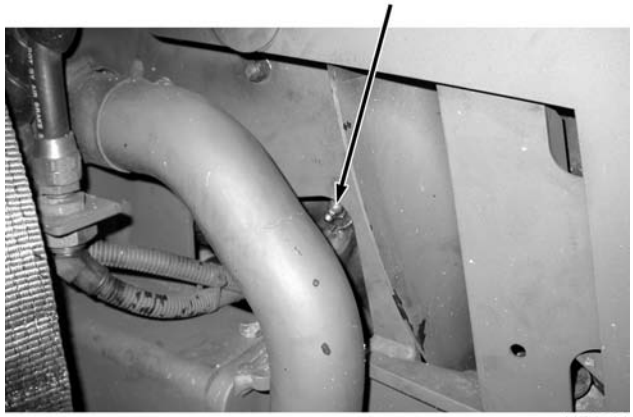
STEERING SHAFTS AND CARRIER BEARING

2 LUBE FITTING



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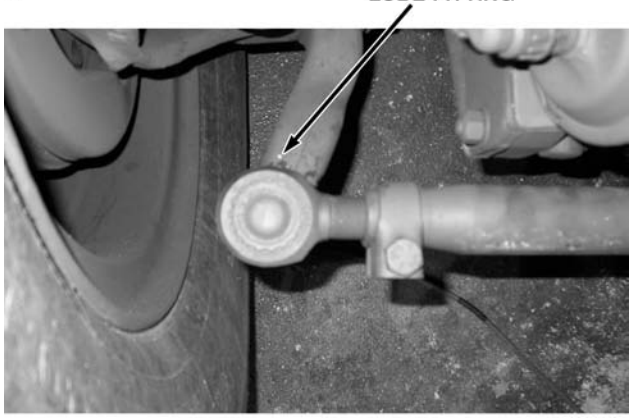
MITER BOX

3 LUBE FITTING



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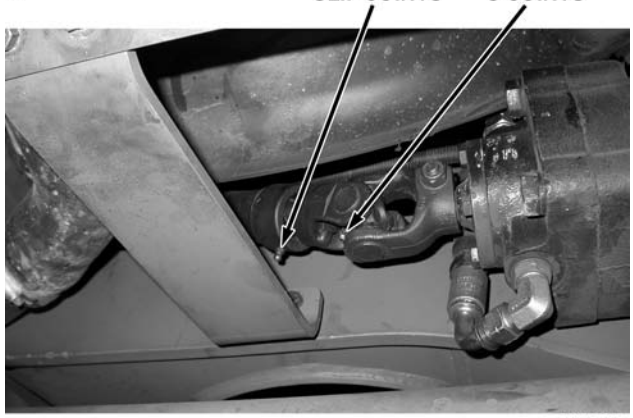
TIE ROD ENDS

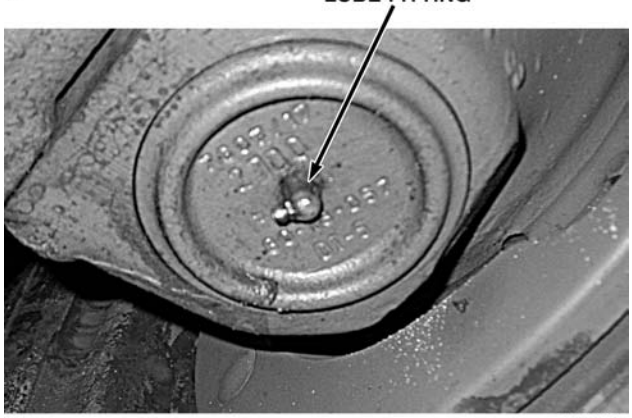
4 SLIP JOINTS U-JOINTS



ME0395

STEER GEAR BOX SLIP JOINTS AND U-JOINTS

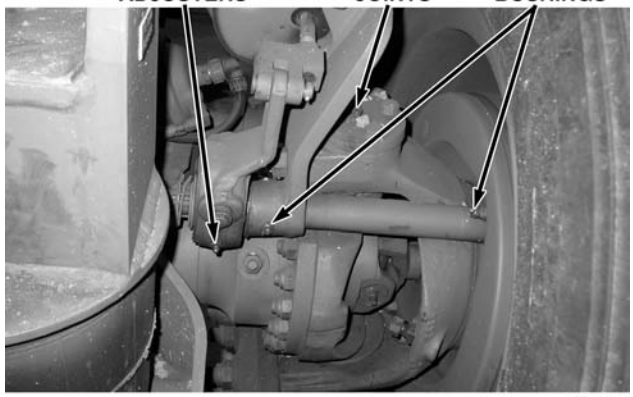
5 LUBE FITTING



ME0402

BALL JOINTS

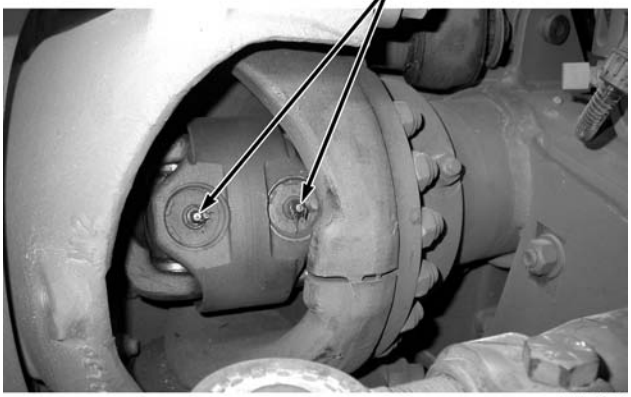
6 SLACK ADJUSTERS BALL JOINTS S-CAM BUSHINGS



ME0400

SLACK ADJUSTERS, S-CAM BUSHINGS, AND BALL JOINTS

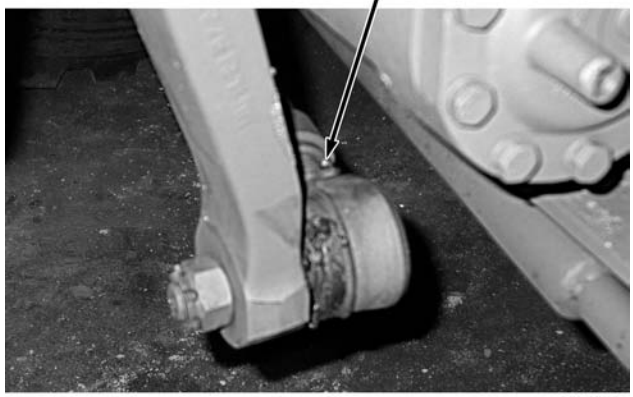
7 LUBE FITTINGS



ME0574

FRONT AXLE CV JOINTS

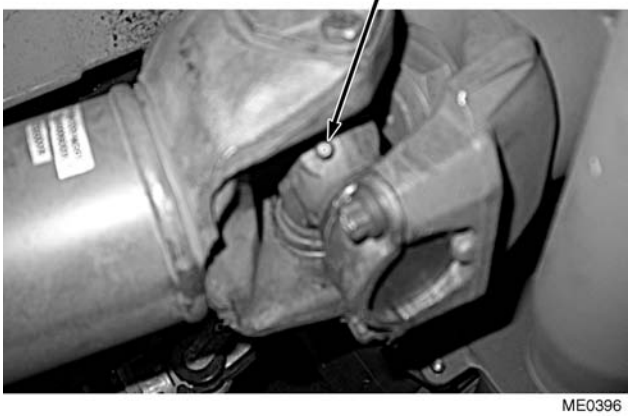
8 LUBE FITTING



ME0398

DRAG LINK

9 LUBE FITTING



ME0396

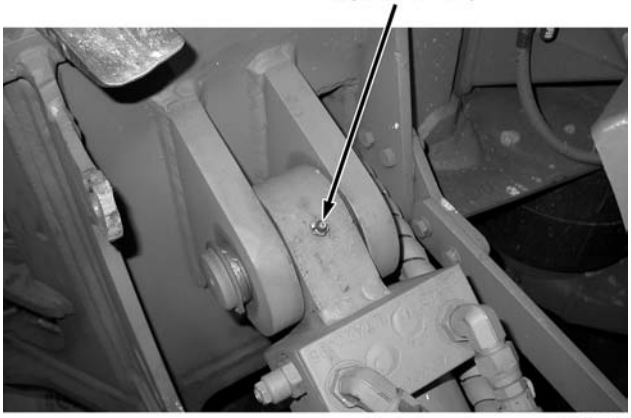
FRONT AND REAR DRIVE SHAFT U-JOINTS

10 LUBE FITTING

ME0503

FRONT AND REAR DRIVE SHAFT SLIP JOINT

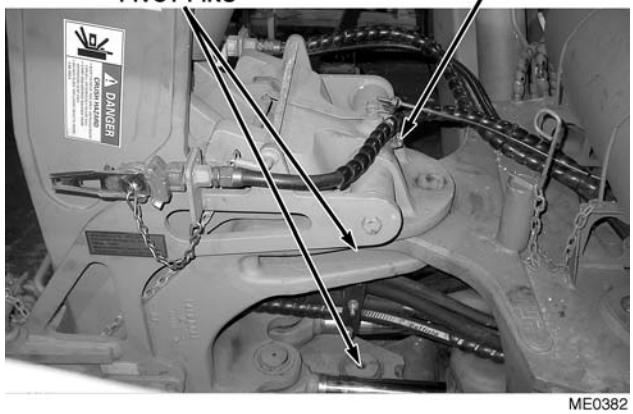
11 LUBE FITTING



ME0506

STABILIZER CYLINDER

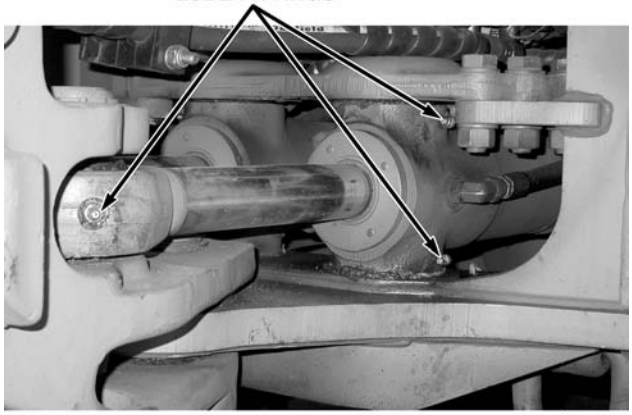
12 SWING TOWER PIVOT PINS BOOM LOCK



ME0382

SWING TOWER PIVOTS PINS AND BOOM LOCK

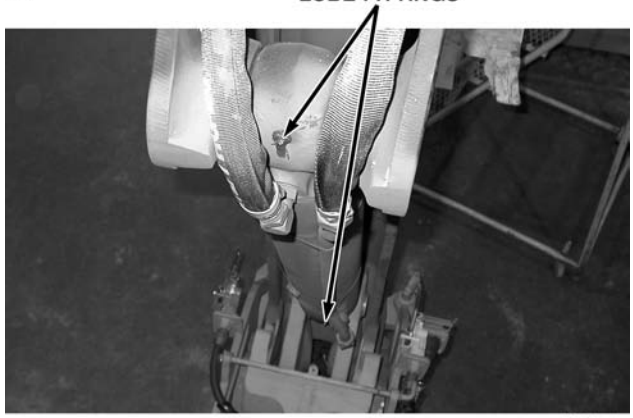
13 LUBE FITTINGS



ME0384

SWING TOWER CYLINDERS

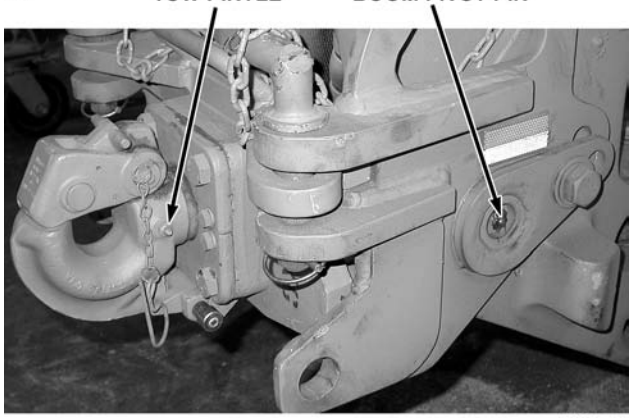
14 LUBE FITTINGS



ME0576

BOOM CYLINDER

15 TOW PINTLE BOOM PIVOT PIN



ME0504

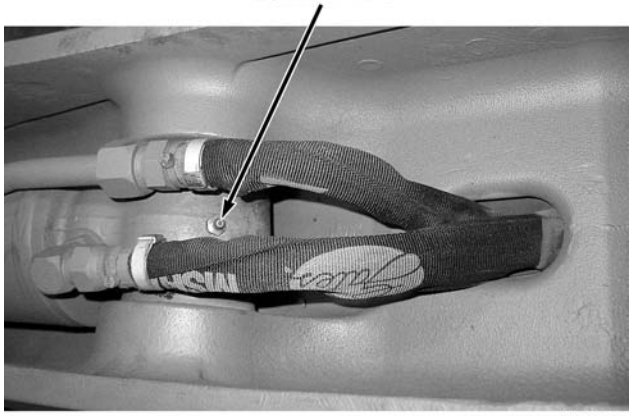
BOOM PIVOT PIN AND TOW PINTLE

16 LUBE FITTING

ME0383

DIPPER PIVOT PIN

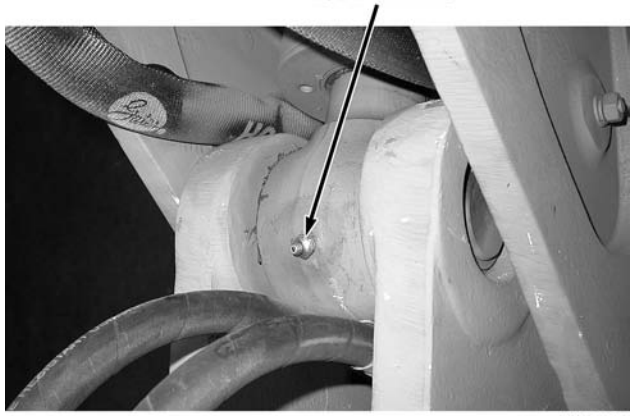
17 LUBE FITTING



ME0505

DIPPER CYLINDER

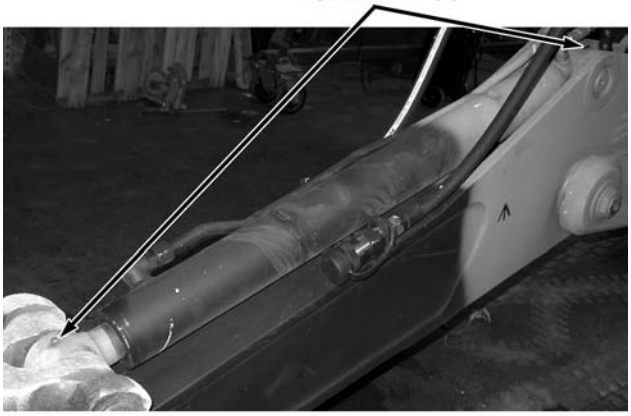
18 LUBE FITTING



ME0386

DIPPER CYLINDER

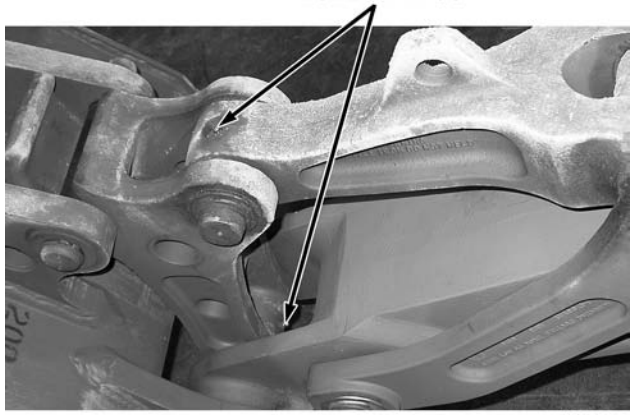
19 LUBE FITTINGS



ME0507

BUCKET CYLINDER

20 LUBE FITTINGS



ME0575

BUCKET PIVOT PINS

21 LUBE POINTS

ME0385

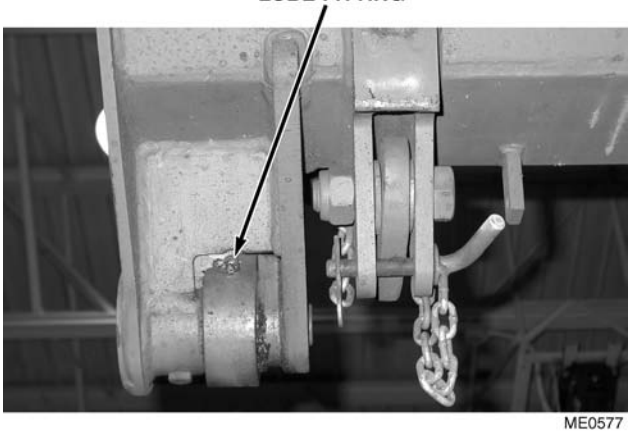
HINGE PINS

22 CLAMSHELL PIVOT PINS CLAMSHELL CYLINDERS

ME0388

CLAMSHELL PIVOT PINS AND CLAMSHELL CYLINDERS

23 LUBE FITTING



ME0577

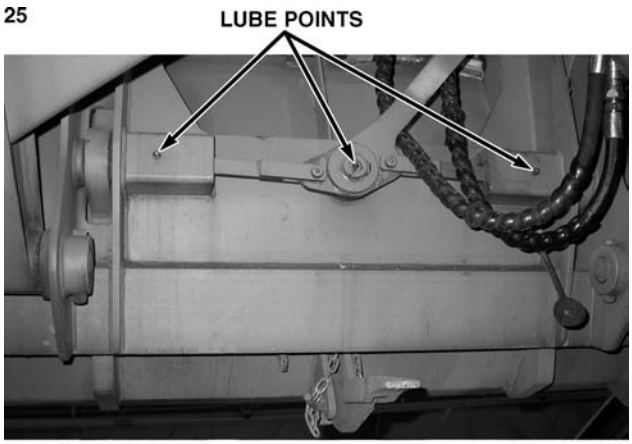
CLAMSHELL CYLINDERS

24 QUICK-HITCH PIVOT PINS BUCKET TILT CYLINDERS

ME0387

QUICK-HITCH PIVOT PINS AND BUCKET TILT CYLINDERS

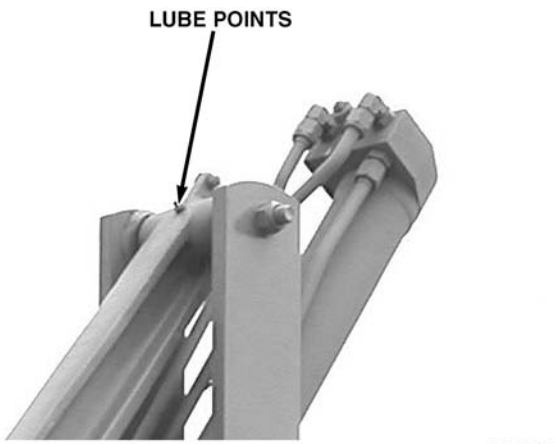
25



ME0573

QUICK HITCH

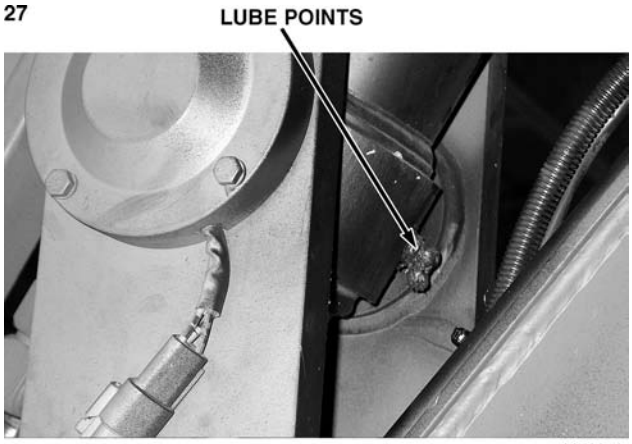
26



ME0392

BUCKET PIVOT PINS

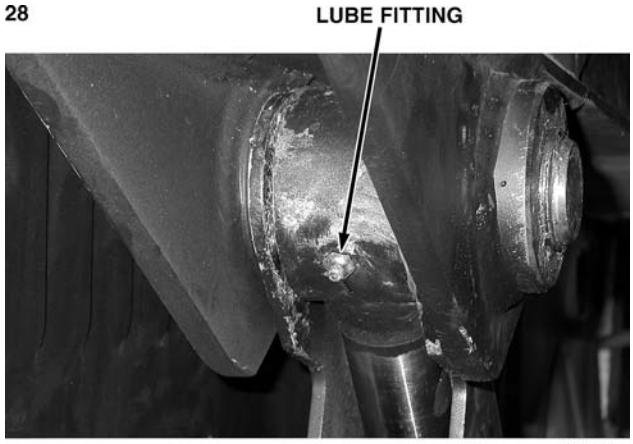
27



ME0390

BUCKET TILT CYLINDERS

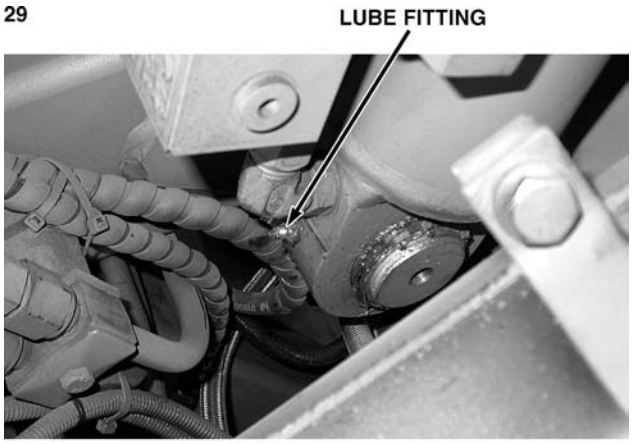
28



ME0391

FEL ARM LIFT CYLINDERS

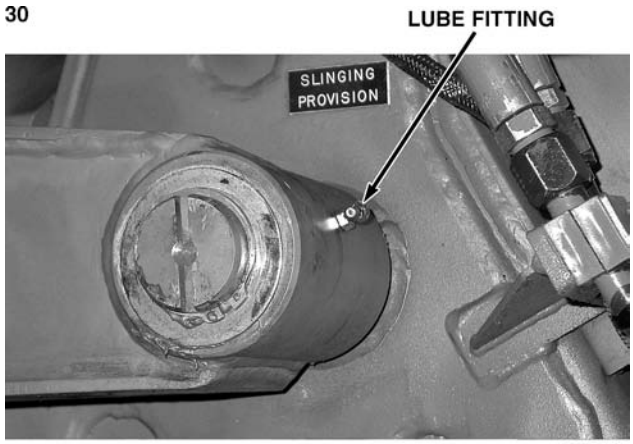
29



ME0393

FEL ARM LIFT CYLINDERS

30



ME0389

FEL ARM PIVOT PINS

Section III. Operator Troubleshooting.

3-11. TROUBLESHOOTING INTRODUCTION AND PROCEDURES.

WARNING

APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.

Table 3-3 lists common malfunctions that you may find with IHMEE. To quickly find a troubleshooting procedure, use the Fault Symptom Index (Table 3-3). Table 3-4 is the Troubleshooting Table, which contains the operator troubleshooting steps.

Before using troubleshooting tables, be sure all applicable Preventive Maintenance Checks and Services (PMCS) have been performed. Perform tests, inspections, and corrective actions in the order listed. Try to return the vehicle or component to operation after each test, inspection, and corrective action has been performed.

Perform the tests, inspections, and corrective actions in the order they appear in the table. **This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions.** If a malfunction is not listed or is not corrected by listed corrective actions, notify the supervisor.

While doing troubleshooting, refer to any figures, procedures, and publications mentioned in the text. This information will help isolate and locate troubles and get the vehicle back in service as quickly as possible.

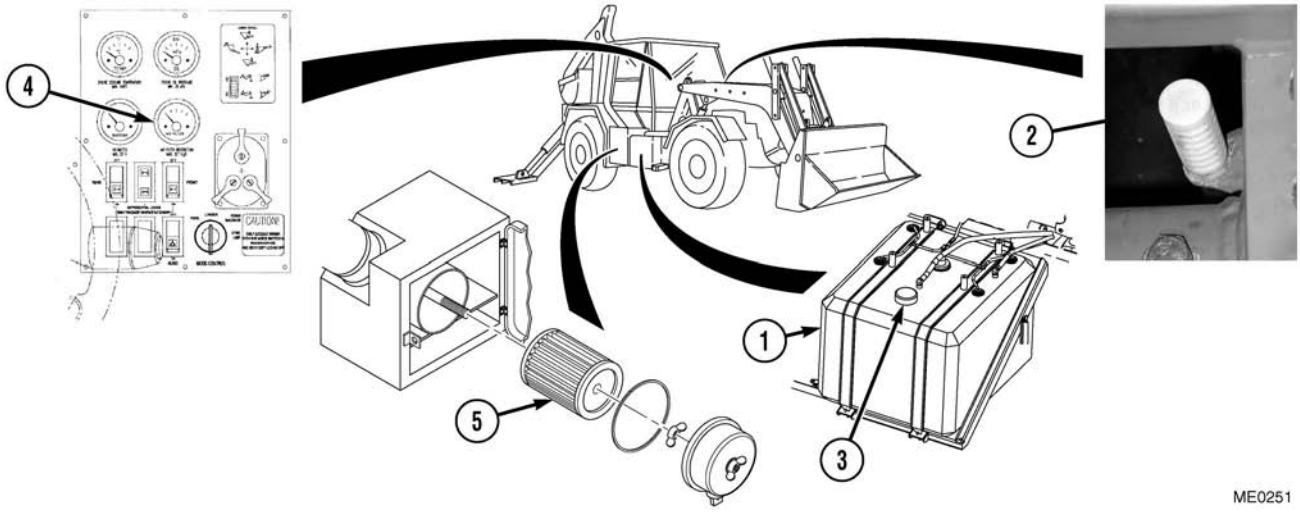
3-12. TROUBLESHOOTING TABLE.

Table 3-3. Fault Symptom Index.

Table 3-3. Fault Symptom Index. (Continued)

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
1. ENGINE CRANKS, BUT WILL NOT START.



WARNING

- No smoking, flames, sparks, or glowing or hot objects allowed within 50 ft. (15 m) of vehicle. Fire or explosion may cause personal injury or death.
- Keep a fire extinguisher within easy reach when working with fuel or on a fuel system.

Step 1. Check fuel tank (1) for fuel level, water in fuel, and correct grade of fuel (Para 3-21).

If there is no fuel, fill fuel tank (1) with JP-8 fuel (Item 11, Appendix D).

If water in fuel or incorrect grade of fuel, notify Unit maintenance.

Step 2. Check fuel tank breather (2) for blockage.

Loosen fuel tank filler cap (3), listen for air rushing into tank. If air rushes into tank, clean fuel tank breather (2). Notify Unit maintenance.

Step 3. Check air filter restriction indicator (4).

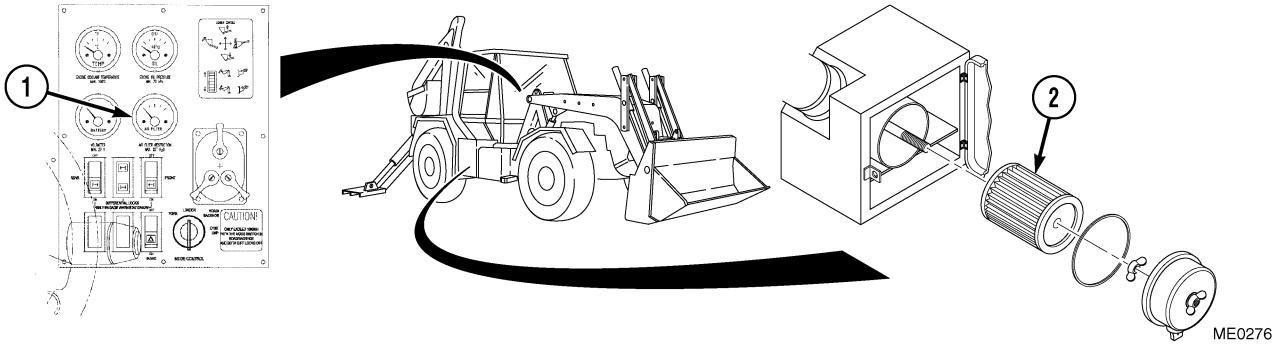
If indicator (4) reads less than 25 inH_2O (625 mmH_2O), but engine will not start, notify Unit maintenance.

If indicator (4) reads more than 25 inH_2O (625 mmH_2O), clean air filter element (5) (Para 3-18).

If indicator (4) still reads more than 25 inH_2O (625 mmH_2O) after cleaning air filter element (5), notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
2. ENGINE SURGES OR STALLS FREQUENTLY, MISSES, OR DOES NOT DEVELOP FULL POWER.



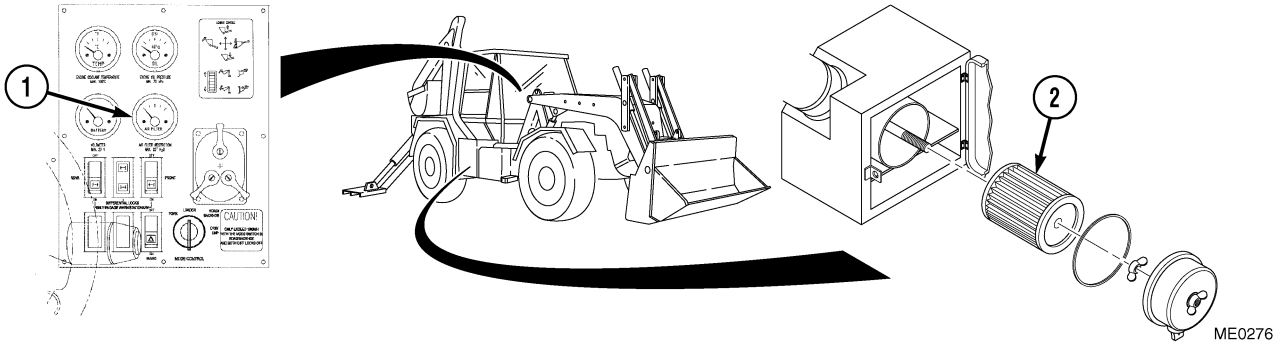
Step 1. Check air filter restriction indicator (1) (Para 3-18).

If indicator (1) reads less than 25 inH_2O (625 mmH_2O), but engine will not start, notify Unit maintenance.

If indicator (1) reads more than 25 inH_2O (625 mmH_2O), clean air filter element (2) (Para 3-18).

If indicator (1) still reads more than 25 inH_2O (625 mmH_2O) after cleaning air filter element (2), notify Unit maintenance.

3. EXCESSIVE FUEL CONSUMPTION.

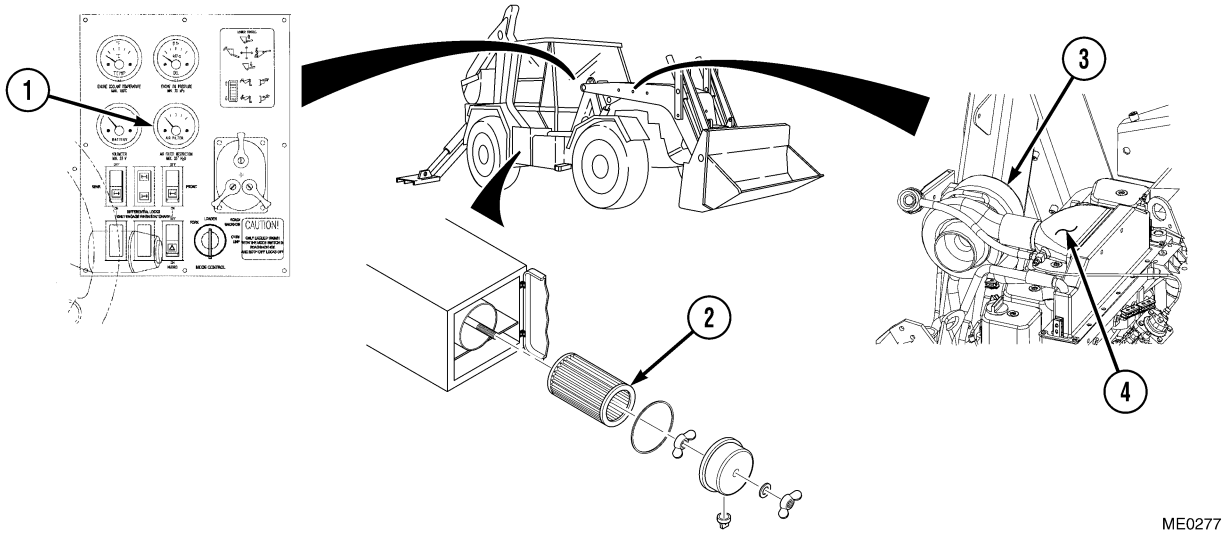


Step 1. Check air filter restriction indicator (1) and air filter (2) (Para 3-18).

If indicator (1) reads more than 25 inH_2O (625 mmH_2O), clean air filter element (2) (Para 3-18).

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
4. ENGINE EMITS EXCESSIVE BLACK OR GREY EXHAUST SMOKE.



Step 1. Check air filter restriction indicator (1).

If indicator (1) reads less than 25 inH_2O (625 mmH_2O), but engine will not start, notify Unit maintenance.

If indicator (1) reads more than 25 inH_2O (625 mmH_2O), clean air filter element (2) (Para 3-18).

Step 2. Check for air leak between turbo (3) and manifold (4).

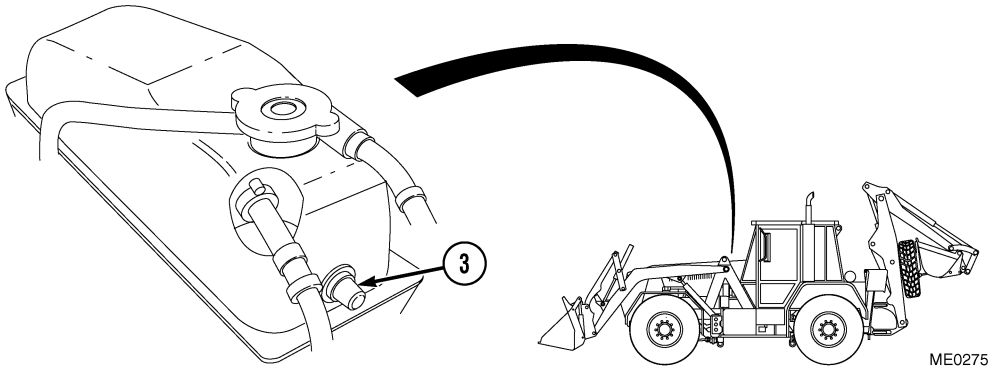
If leak is detected, notify Unit maintenance.

If no leak is detected, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction
Test or Inspection
Corrective Action

5. ENGINE EMITS EXCESSIVE BLUE OR WHITE SMOKE.



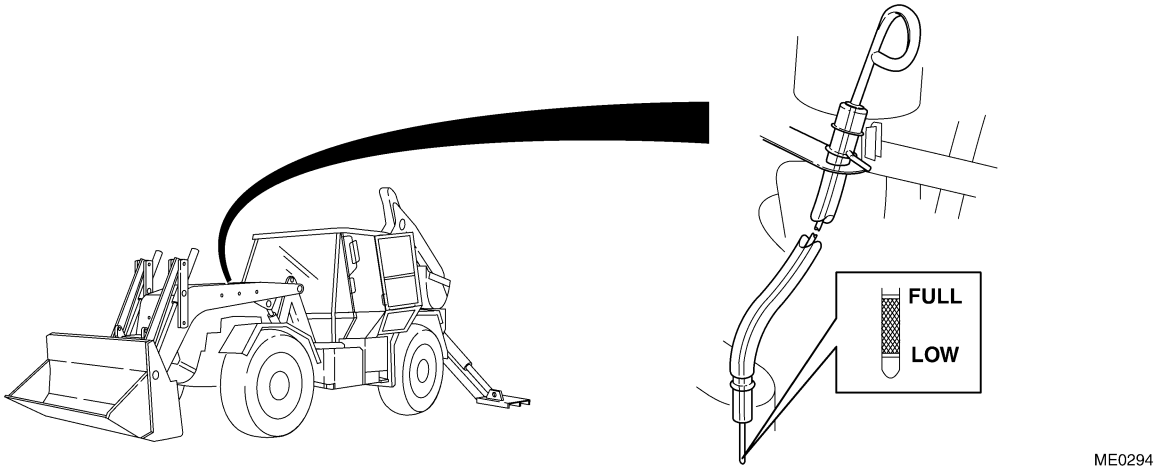
Step 1. If engine emits white smoke, or coolant level continues to be low, check coolant level with inspection glass (1).

If coolant level continues to be low, notify Unit maintenance.

Step 2. If engine emits blue smoke, check oil level and exhaust stack.

If oil level is overfull, or continues to be low, notify Unit maintenance.

6. ABNORMAL ENGINE NOISE OR LOW OIL PRESSURE.



Step 1. Check engine oil level.

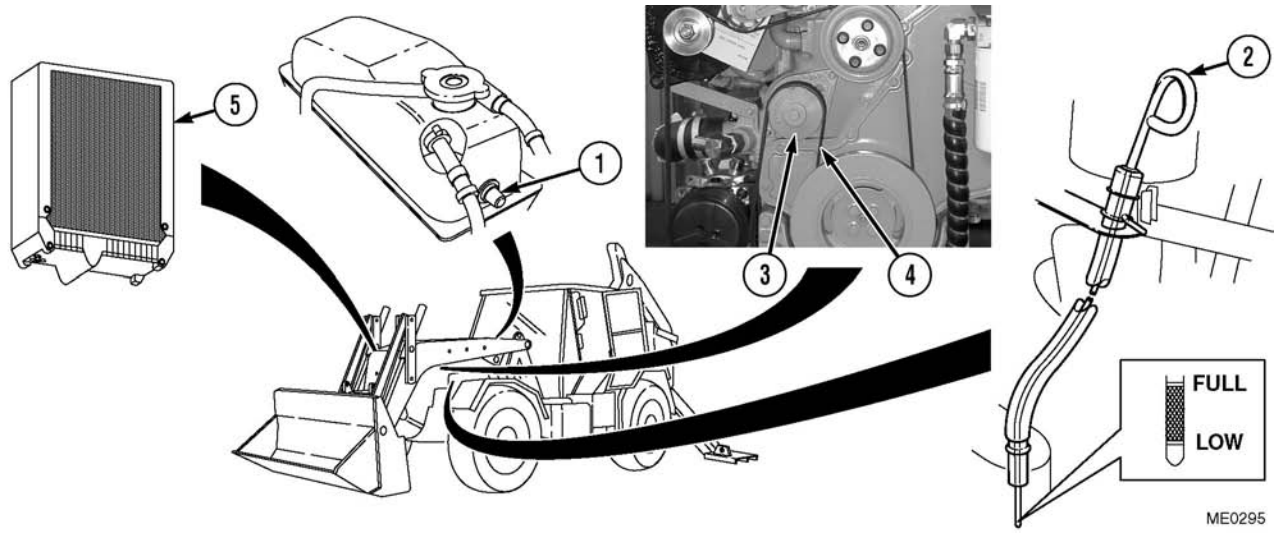
If engine oil level is full or over full, notify Unit maintenance.

If engine oil level is low, add oil (Para 3-10).

If abnormal engine noise remains, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
7. ENGINE OVERHEATS.



Step 1. Check coolant level at inspection glass (1).

If coolant level is low, add coolant (Para 3-10).

Step 2. Check engine oil level with dipstick (2).

If engine oil level is low, add oil (Para 3-10).

Step 3. Check water pump (3) and drive belt (4) for obvious signs of damage.

If water pump (3) or drive belt (4) is damaged, notify Unit maintenance.

Step 4. Inspect radiator (5) for debris, bent or damaged fins, or damaged or missing shroud.

Clean dirt and debris from radiator (5).

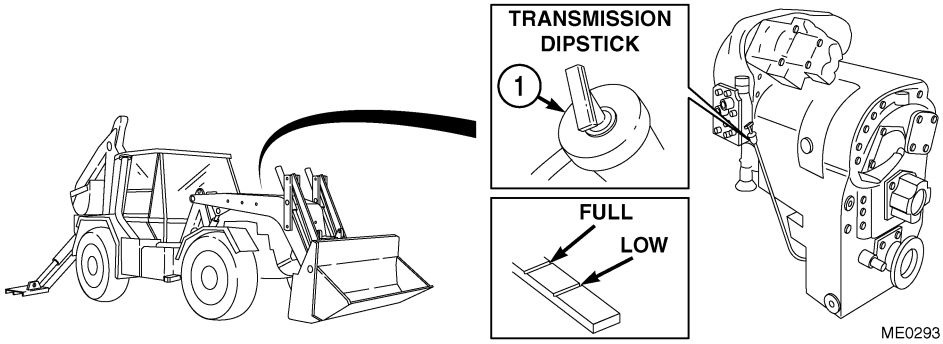
If shroud is missing or damaged, or fins are bent or damaged, notify Unit maintenance.

If engine still overheats, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction
Test or Inspection
Corrective Action

8. TRANSMISSION OVERHEATING, LACKS POWER, HAS NO DRIVE, OR FAILS TO SHIFT.



Step 1. Check transmission fluid level on dipstick (1).

If transmission fluid is over full, notify Unit maintenance.

If transmission fluid is low, add fluid (Para 3-10).

Step 2. Check brake shoes for dragging.

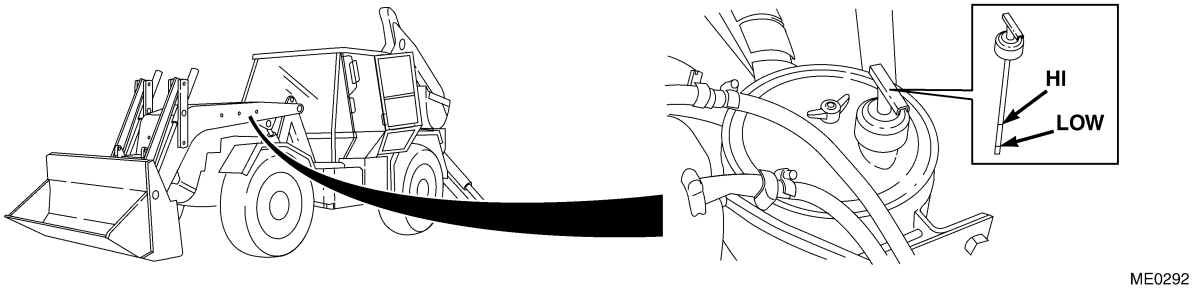
If brake shoes are dragging, notify Unit maintenance.

Step 3. If vehicle has been driven at excessive speed for a long duration of time, stop vehicle and let it cool down.

Step 4. If pulling a trailer with an excessive load, reduce trailer load.

Step 5. If vehicle fails to shift during operation, refer to to Para 4-10 for emergency movement of the IHMEE and notify Unit maintenance.

9. STEERING HEAVY OR NOISE FROM STEERING PUMP.



Step 1. Check steering fluid level.

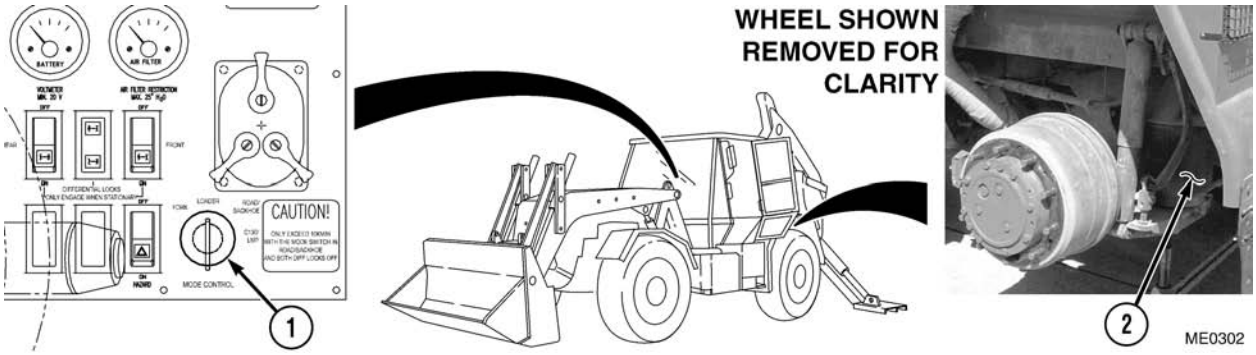
If steering fluid is full or over full, notify Unit maintenance.

If steering fluid is low, add fluid (Para 3-10).

If heavy steering or noise from the steering pump continues, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
10. VEHICLE LEANS TO ONE SIDE OR RIDES TOO HARD.



Step 1. Check suspension selector switch (1) to ensure it is set correctly for current operation conditions.

Move suspension selector switch (1) into appropriate mode for current operation conditions.

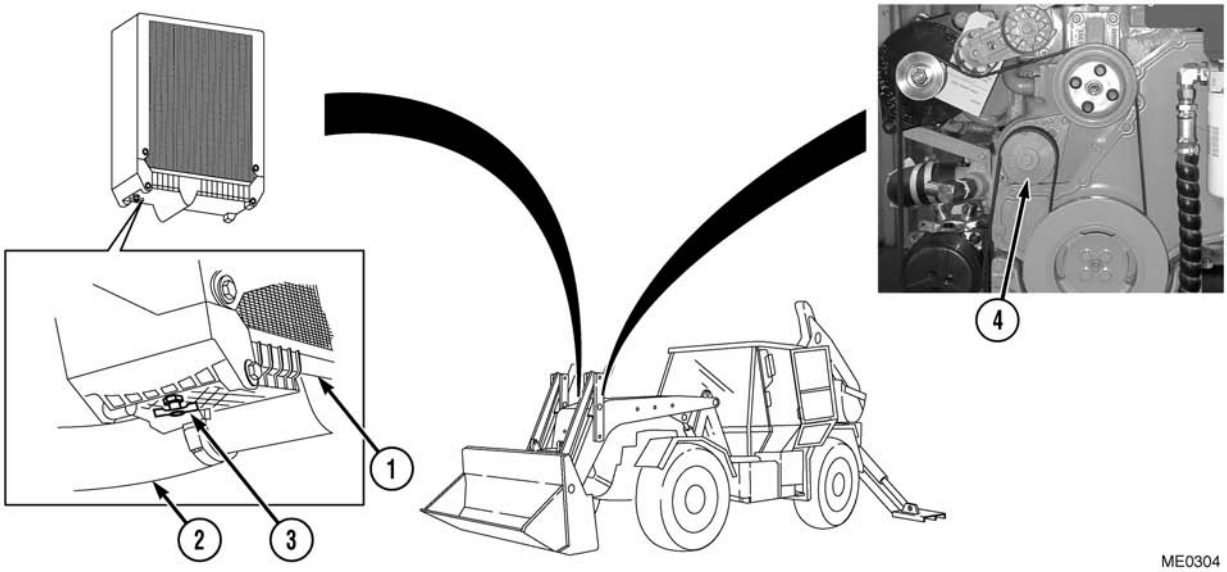
Step 2. Check airbags (2) for visible damage.

If airbags (2) are damaged, notify Unit maintenance.

If airbags (2) are not damaged, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
11. CONTINUOUSLY LOW COOLANT LEVEL.



Step 1. Check radiator (1) and hose (2) for damage and to ensure a tight connection.

If radiator (1) or hose (2) has a loose connection, tighten it.

If radiator (1) or hose (2) is damaged, notify Unit maintenance.

Step 2. Check drain valve (3) to ensure it is closed.

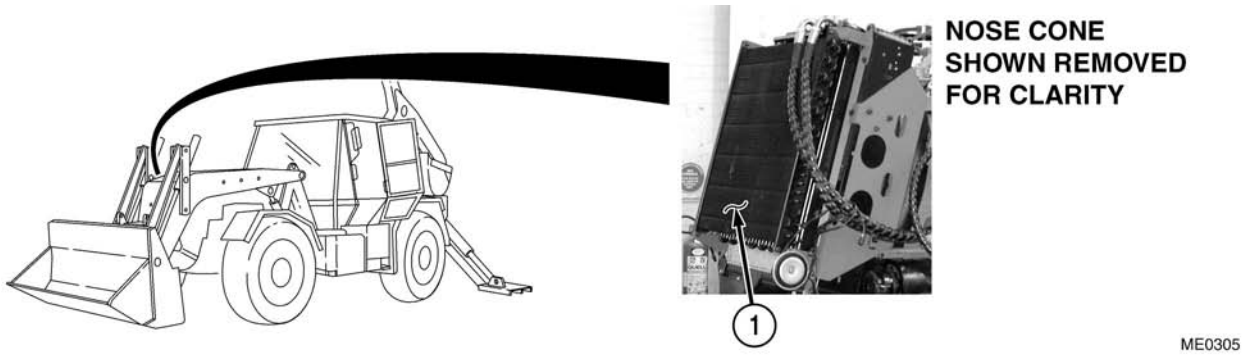
If drain valve (3) is opened or loose, close it.

Step 3. Check water pump (4) seals for leaks.

If water pump (4) seals are leaking, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
12. AIR-CONDITIONING NOT COOLING.

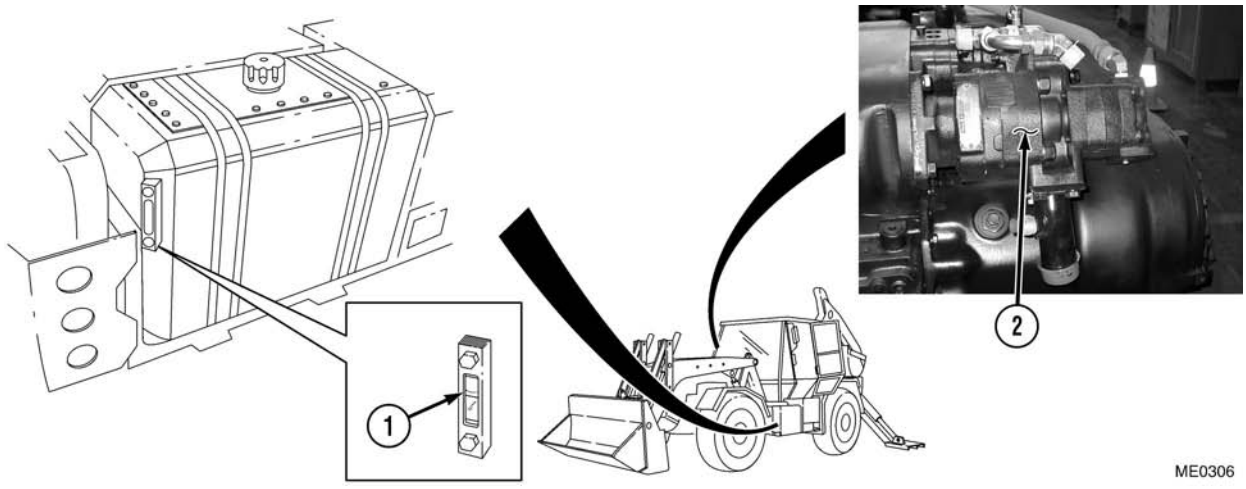


Step 1. Check air-conditioning condenser (1) for visible obstructions or damage.

Open front grill (Para 3-13) and clear any foreign material from air-conditioning (1) condenser.

If air-conditioning still does not cool, or is damaged, notify Unit maintenance.

13. NOISY HYDRAULIC PUMP.



Step 1. Check hydraulic oil level (1).

If level is low, add hydraulic oil (Para 3-10).

Step 2. Check lines for loose or missing clamps, and to ensure lines are not contacting frame.

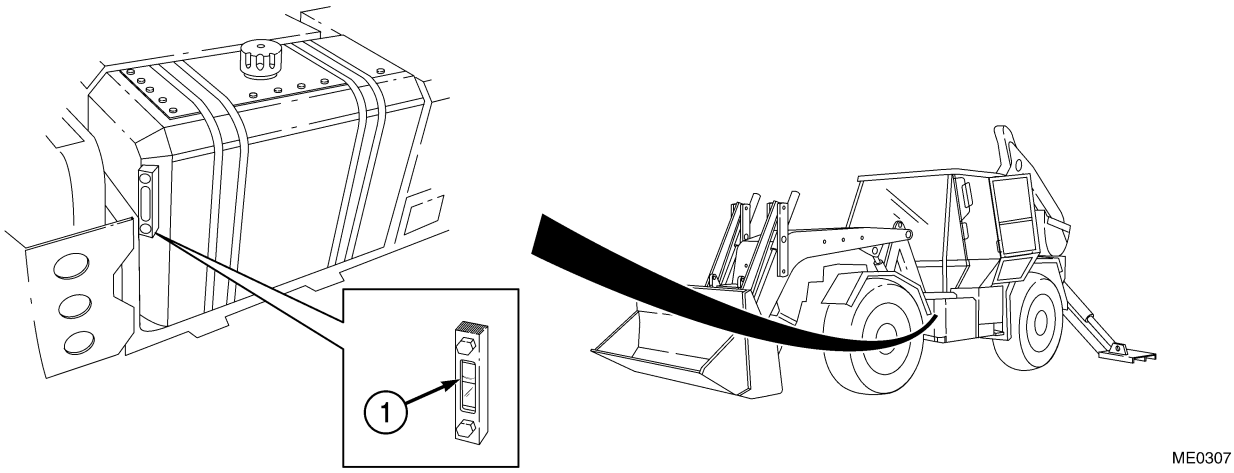
Tighten or replace clamps as necessary and ensure lines are not contacting frame.

If pump (2) is still noisy, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction
Test or Inspection
Corrective Action

14. SLOW HYDRAULIC FUNCTIONS OR NO HYDRAULIC FUNCTION.



Step 1. Check hydraulic oil level (1).

If oil level is low, add hydraulic oil (Para 3-10).

If there is still no hydraulic function, notify Unit maintenance.

Step 2. Check for collapsed lines.

If any lines are collapsed, notify Unit maintenance.

Step 3. If hydraulic functions are still slow, ensure engine speed is set correctly.

Step 4. Warm the hydraulic oil by operating the system.

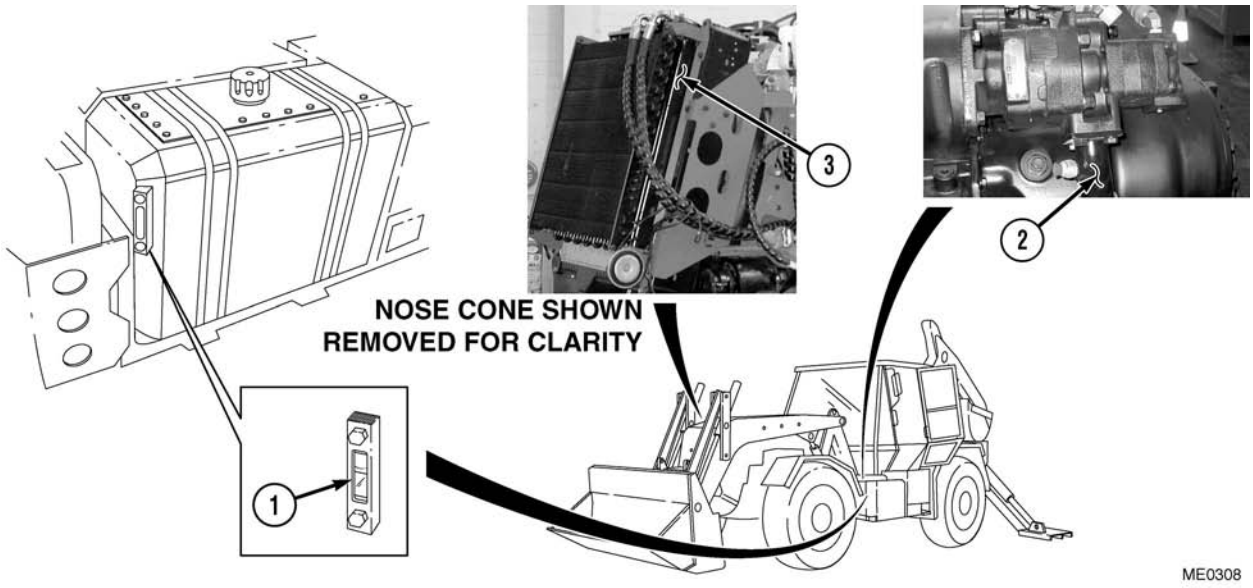
If hydraulic function is still slow, notify Unit maintenance.

Step 5. Check for an ECU fault at joystick indicator lights.

If lights are blinking, ECU is reporting fault code(s). Notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
15. HYDRAULIC OIL OVERHEATS OR FOAMS.



Step 1. Check hydraulic oil level (1).

If oil level is low, add hydraulic oil (Para 3-10).

Step 2. Check 2-in. supply lines (2).

If supply lines (2) are loose or collapsed, tighten them.

If supply lines (2) are faulty, notify Unit maintenance.

Step 3. Check oil cooler (3) for visible obstructions.

Clear any foreign material from oil cooler (3).

Step 4. Check to ensure hydraulic fan is operating.

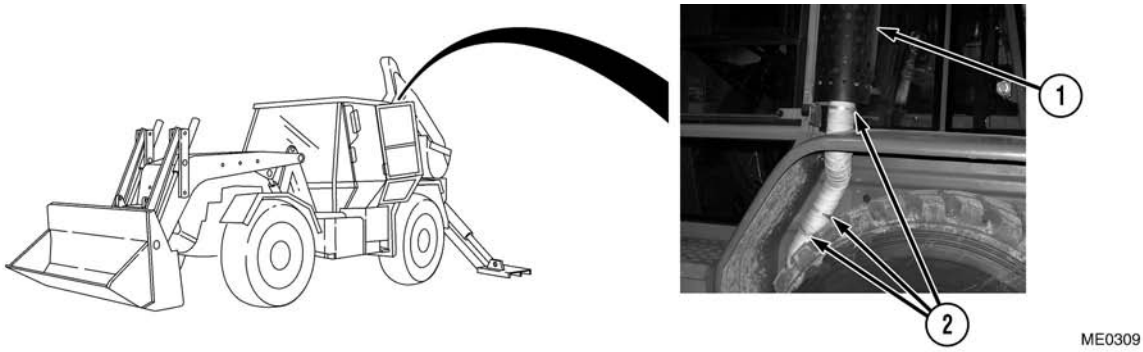
If hydraulic fan is not operating, notify Unit maintenance.

Step 5. Reduce operating load.

If oil still overheats or foams, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
16. EXCESSIVE EXHAUST NOISE OR RATTLING.



Step 1. Inspect muffler (1) and exhaust system for loose, worn, or broken clamps (2) or mounts.

Tighten clamps (2) or mounts as necessary.

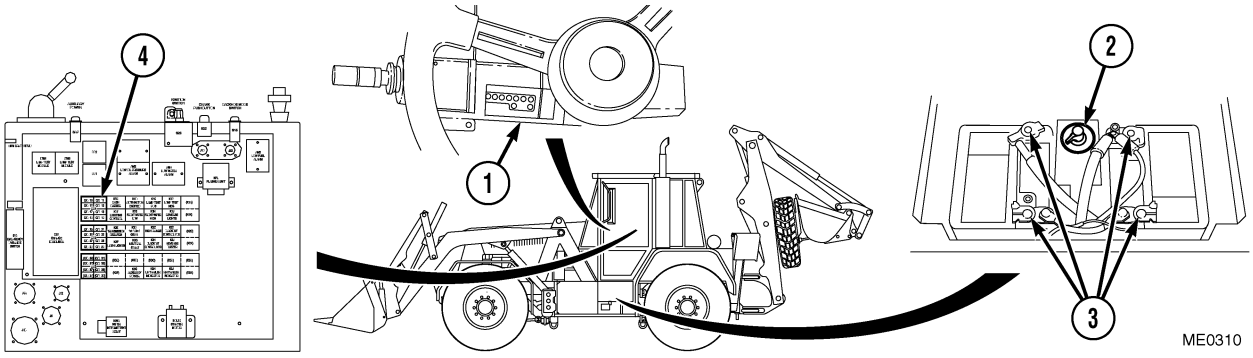
If clamps (2) are damaged, notify Unit maintenance.

Step 2. Inspect muffler (1) and exhaust system for damage.

If muffler (1) is damaged, or noise continues although no damage is apparent, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
17. NO IGNITION, STARTER WILL NOT CRANK, ENGINE CRANKS SLOWLY, LOW BATTERY OUTPUT, CHARGING INDICATOR LIGHT REMAINS ON, OR NOTHING WORKS.



Step 1. Ensure transmission selector (1) is in N (Neutral) and electrical master switch (2) is ON.

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal, a direct short may result in instant heating of tools, damage to equipment, and injury or death to personnel.

Step 2. Check battery cable connections (3) at battery, starter solenoid, and ground for looseness and corrosion.

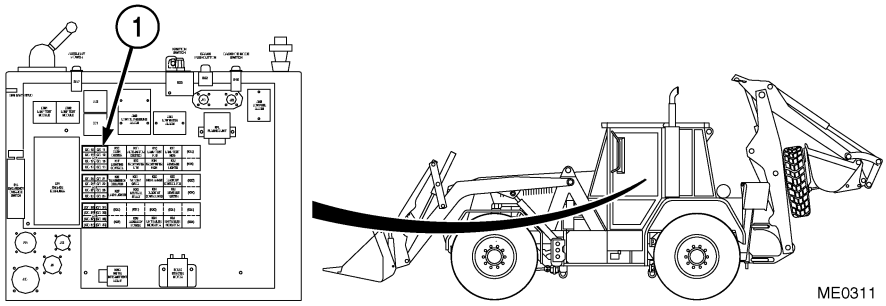
Tighten any loose connections.

Step 3. Check the appropriate circuit breaker in the Power Distribution Panel (PDP) box (4).

If circuit breaker is tripped, reset circuit breaker (Para 4-16).

If circuit breaker is not tripped, trips again, or will not reset, notify Unit maintenance.

18. FRONT OR REAR WIPERS, HYDRAULIC POWER, OR EGS POWER DOES NOT WORK.



Step 1. Check the appropriate circuit breaker in the Power Distribution Panel (PDP) box (1).

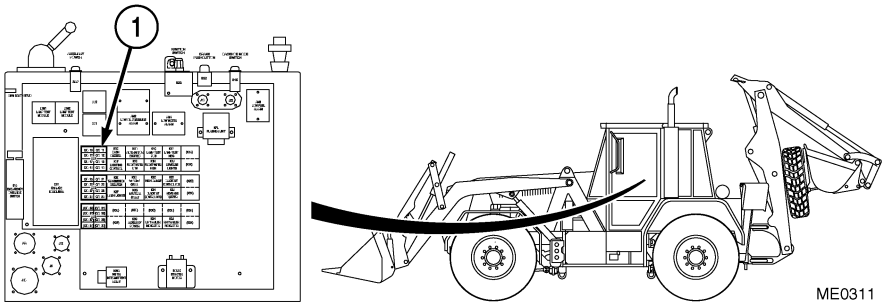
If circuit breaker is tripped, reset circuit breaker (Para 4-16).

If circuit breaker is not tripped, trips again, or will not reset, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction
Test or Inspection
Corrective Action

19. HORN, REVERSE ALARM, HEADLIGHTS, TURN SIGNALS, OR BRAKE LIGHTS DO NOT WORK.



Step 1. Ensure electrical master switch is ON (Para 5-1).

Step 2. Ensure main light switch is set correctly (Table 4-4).

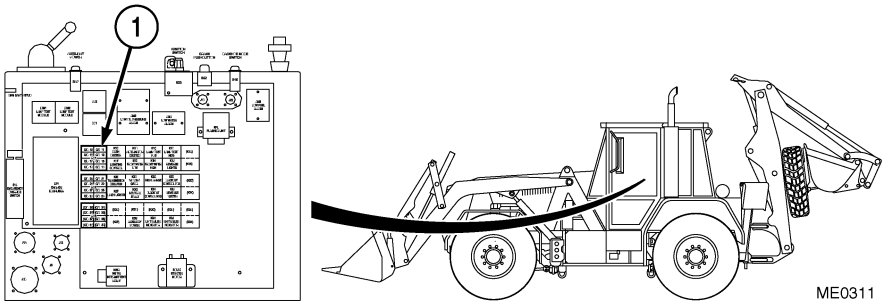
Step 3. Ensure that plugs are connected correctly (for lights only).

Step 4. Check the appropriate circuit breaker in the Power Distribution Panel (PDP) box (1).

If circuit breaker is tripped, reset circuit breaker (Para 4-16).

If circuit breaker is not tripped, trips again, or will not reset, notify Unit maintenance.

20. DEFROSTER DOES NOT CLEAR WINDSHIELD.



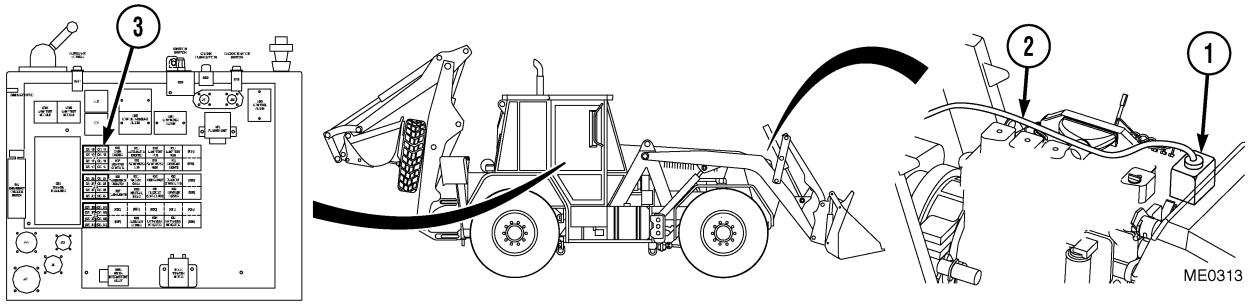
Step 1. Check the appropriate circuit breaker in the Power Distribution Panel (PDP) box (1).

If circuit breaker is tripped, reset circuit breaker (Para 4-16).

If circuit breaker is not tripped, trips again, or will not reset, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
21. WINDSHIELD WASHERS DO NOT WORK.



Step 1. Check washer fluid reservoir (1) level.

If reservoir (1) is empty, refill with washer fluid (Item 2, Appendix D).

If washer still does not work, notify Unit maintenance.

Step 2. Check washer fluid hoses (2).

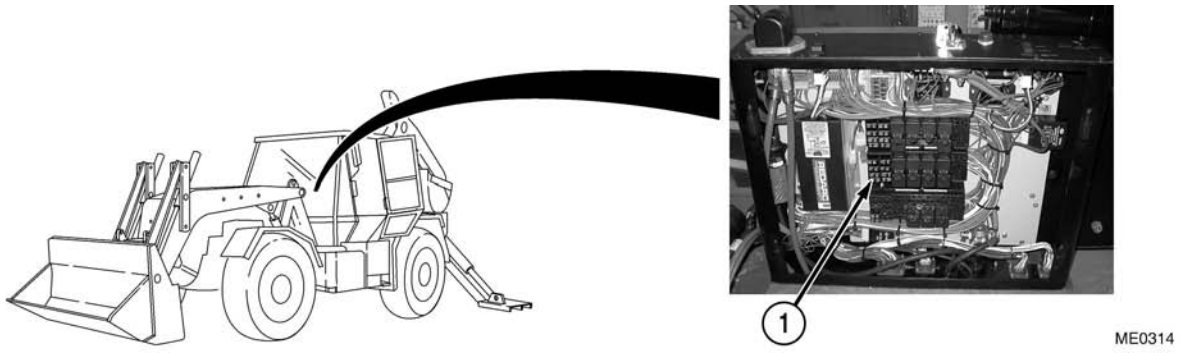
If hoses are missing, broken, or damaged, notify Unit maintenance.

Step 3. Check the appropriate circuit breaker in the Power Distribution Panel (PDP) box (3).

If circuit breaker is tripped, reset circuit breaker (Para 4-16).

If circuit breaker is not tripped, trips again, or will not reset, notify Unit maintenance.

22. AIR-CONDITIONER WILL NOT OPERATE.



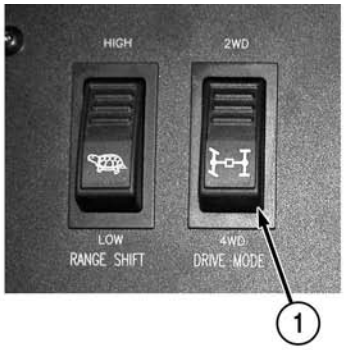
Step 1. Check for a tripped circuit breaker in PDP box (1) or damaged wiring.

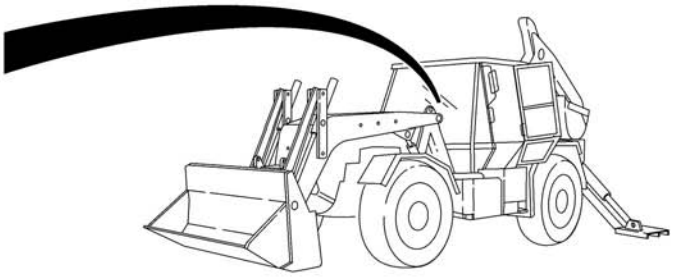
If circuit breaker is tripped, reset circuit breaker (Para 4-16).

If wiring is damaged or breaker trips again, or will not reset, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
23. VIBRATION FROM DRIVETRAIN.





ME0315

Step 1. Ensure DRIVE MODE switch (1) is in 2WD position for high-speed driving.

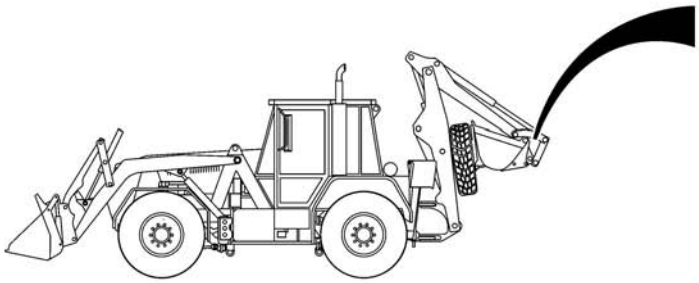
If DRIVE MODE switch is in 4WD position, change to 2WD position.

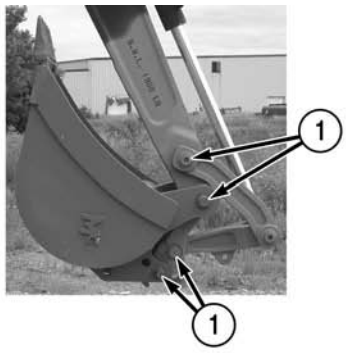
Step 2. Check tire presssure to ensure it is correct for current operation conditions.

Adjust air pressure in tires to correct pressure for current operation conditions (Para 3-17).

If vibration from drivetrain continues, notify Unit maintenance.

24. BACKHOE NOISY IN OPERATION.





ME0316

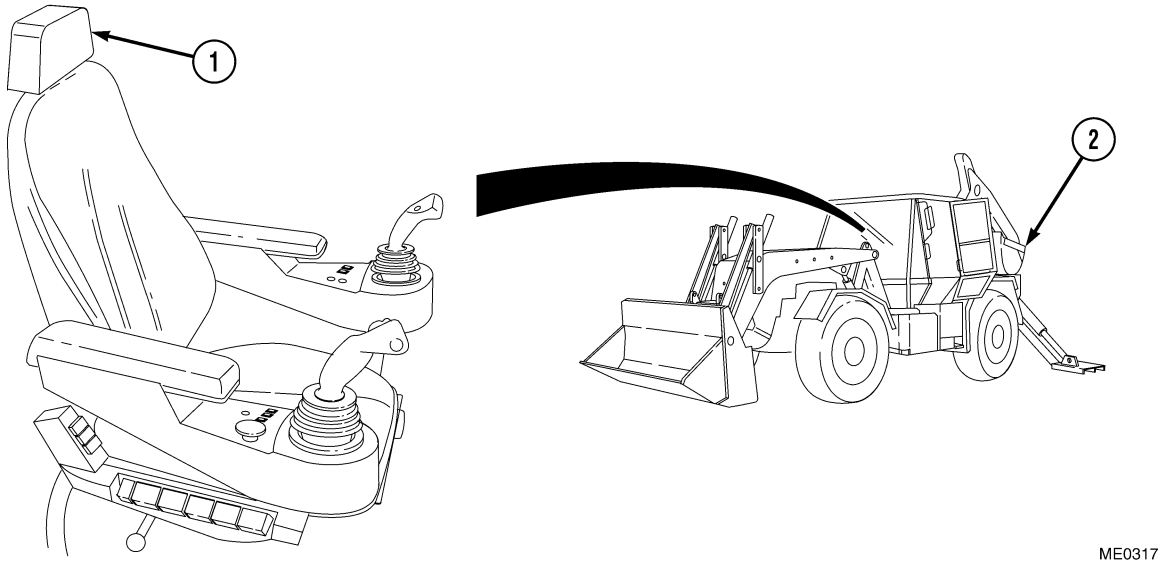
Step 1. Check for seized or worn pins or bushings (1).

Lubricate pins and bushings (1) (Para 3-10).

If noisy operation continues, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
25. BACKHOE WILL NOT OPERATE.



Step 1. Check to ensure operator seat (1) is facing backhoe (2).

Rotate operator seat (1) to face backhoe (2).

Step 2. Ensure hydraulic master switch is on.

Step 3. Ensure backhoe mode switch is set to BACKHOE A or BACKHOE B.

Step 4. If backhoe (2) still does not operate, refer to fault 15.

Table 3-4. Troubleshooting Table.

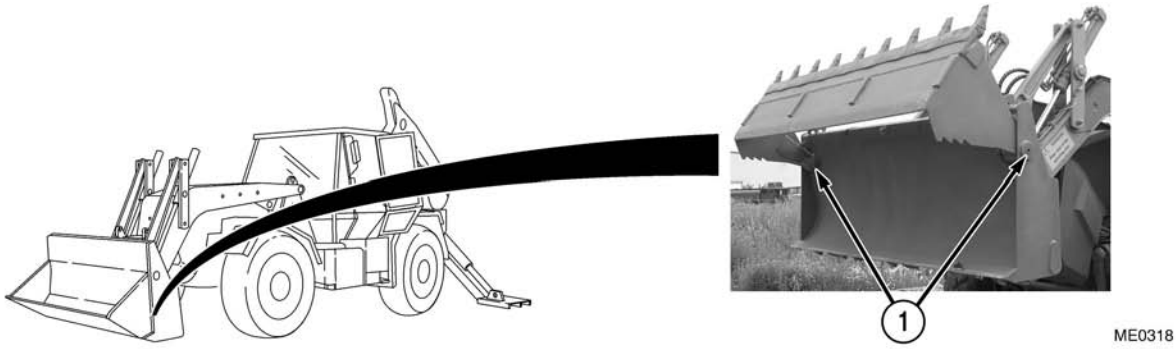
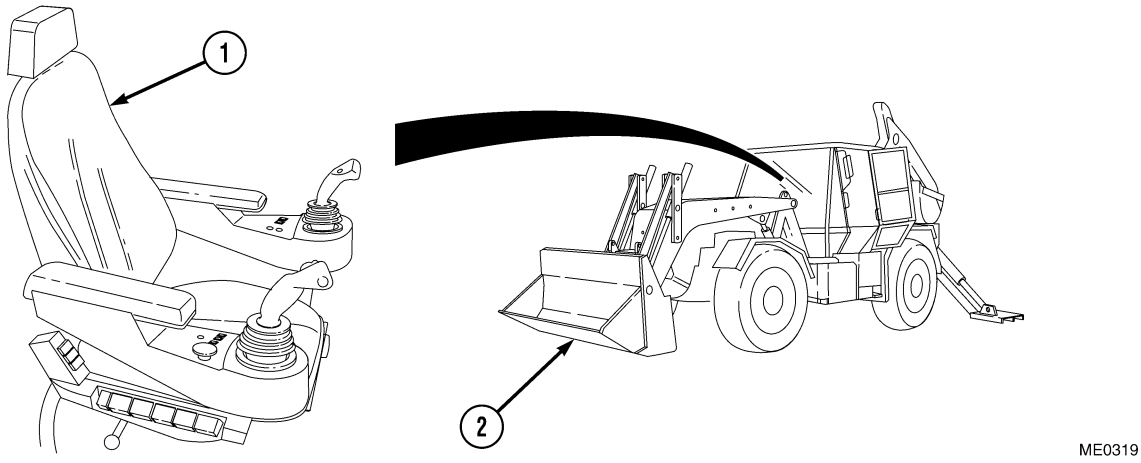
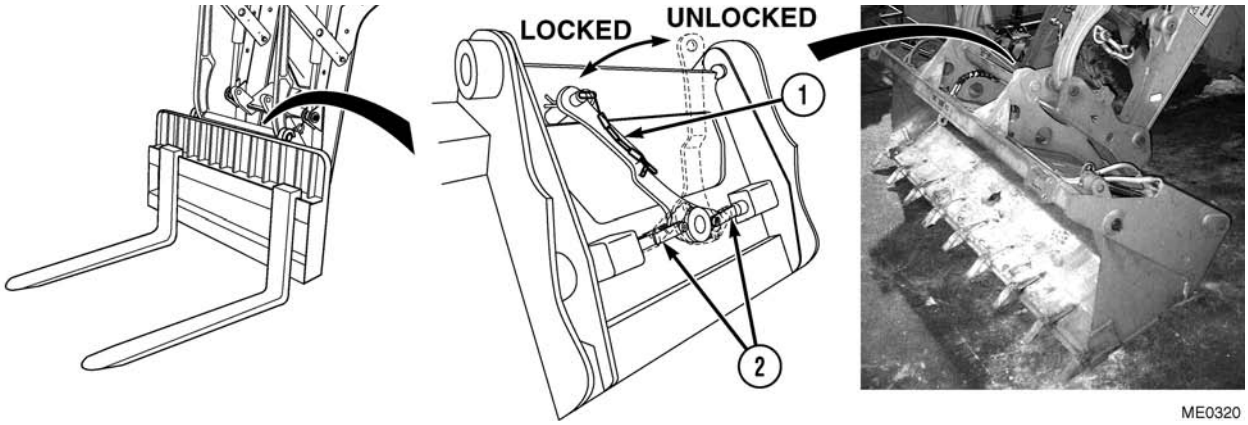
Malfunction Test or Inspection Corrective Action
26. FEL NOISY IN OPERATION.
 Step 1. Check for seized or worn pins or bushings (1). Lubricate pins and bushings (1) (Para 3-10). If noisy operation continues, notify Unit maintenance.
27. FEL WILL NOT OPERATE.
 Step 1. Check to ensure operator seat (1) is facing FEL (2). Rotate operator seat (1) to face FEL (2). Step 2. Ensure hydraulic master switch is on. Step 3. Ensure backhoe mode switch is set to BACKHOE A or BACKHOE B. Step 4. If FEL (2) still does not operate, refer to fault 15.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
28. ATTACHMENTS WILL NOT MOUNT ON QUICK-HITCH FRAME.



Step 1. Inspect quick-hitch assembly (1) for seized locking pins (2).

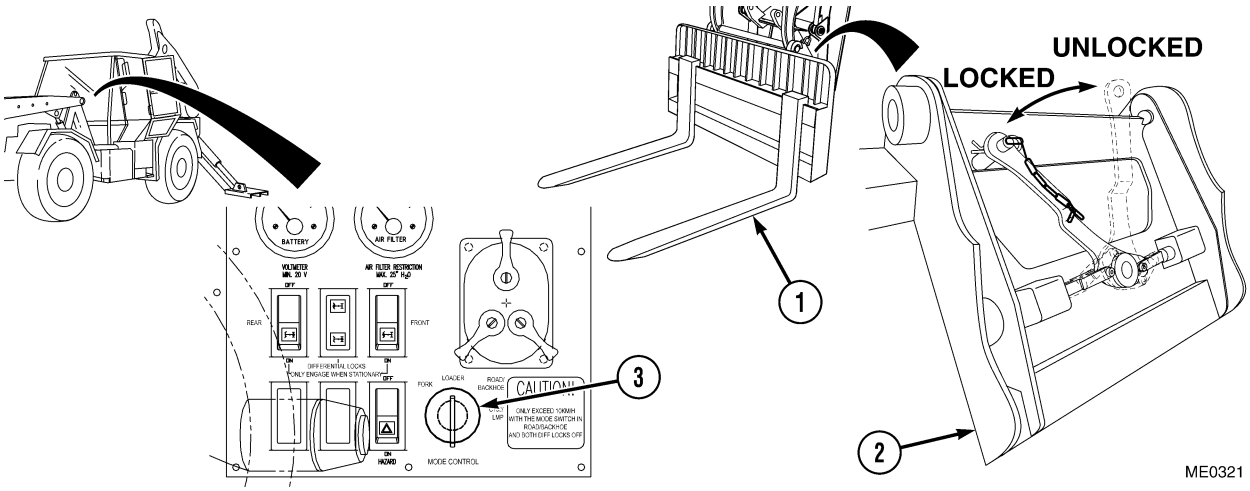
Clean and lubricate locking pins (2) (Para 3-10).

Step 2. Inspect quick-hitch assembly (1) for damage.

If quick-hitch assembly (1) is damaged, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
29. FORKS WILL NOT LEVEL.



Step 1. Check forklift attachment (1) to ensure it is properly mounted on quick-hitch frame (2).

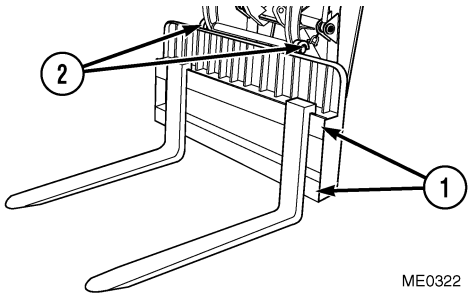
Remove and refit forklift attachment (1) on quick-hitch frame (2) (Para 8-3).

Step 2. Ensure MODE CONTROL switch (3) is in FORK position (Para 5-3).

Place MODE CONTROL switch (3) in FORK position.

If forks will still not level, notify Unit maintenance.

30. FORKS WILL NOT ADJUST.



Step 1. Check for dirt or debris in mounting rails (1).

Clean mounting rails (1).

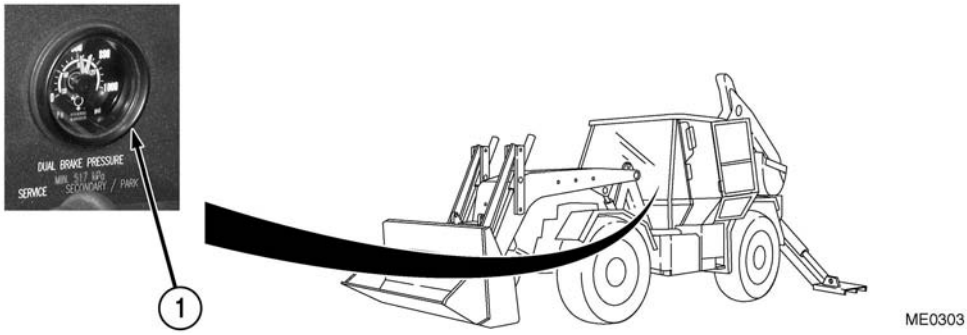
Step 2. Check for seized locking pins (2).

Lubricate locking pins (2) (Para 3-10).

If locking pins (2) remain seized, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
31. NO SERVICE BRAKES OR NO TRAILER BRAKES.



Step 1. Check DUAL BRAKE PRESSURE gauge (1) to ensure it is reading between 75 and 110 psi (517 and 758 kPa).

If DUAL BRAKE PRESSURE gauge (1) is not reading between 75 and 110 psi (517 and 758 kPa), proceed to Step 4.

Step 2. Ensure brake chambers and slack adjusters are properly operating.

If brake chambers and slack adjusters are not properly operating, notify Unit maintenance.

Step 3. Visually check axle hubs for fluid leaks.

If axle hubs have visible fluid leaks, notify Unit maintenance.

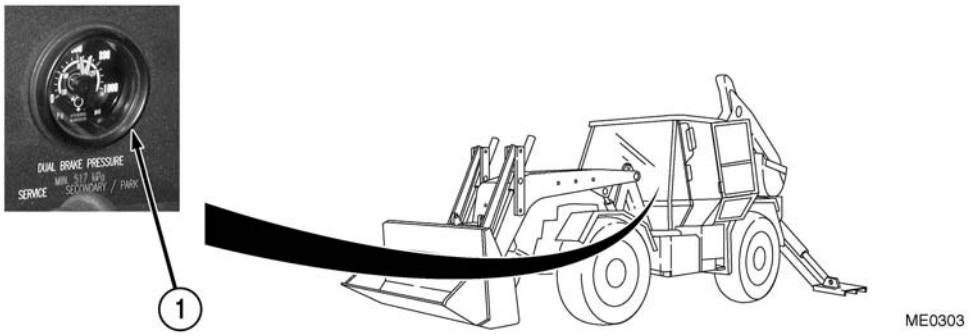
Step 4. Check air hoses for leaks, damage, or loose connections.

Tighten any loose connections found.

If leaks or damaged hoses are found, notify Unit maintenance.

Table 3-4. Troubleshooting Table.

Malfunction Test or Inspection Corrective Action
32. PARKING BRAKES WILL NOT RELEASE.



Step 1. Check DUAL BRAKE PRESSURE gauge (1) to ensure it is reading between 75 and 110 psi (517 and 758 kPa).

If DUAL BRAKE PRESSURE gauge (1) is reading between 75 and 110 psi (517 and 758 kPa), proceed to Step 2.

Step 2. Check air hoses for leaks, damage, or loose connections.

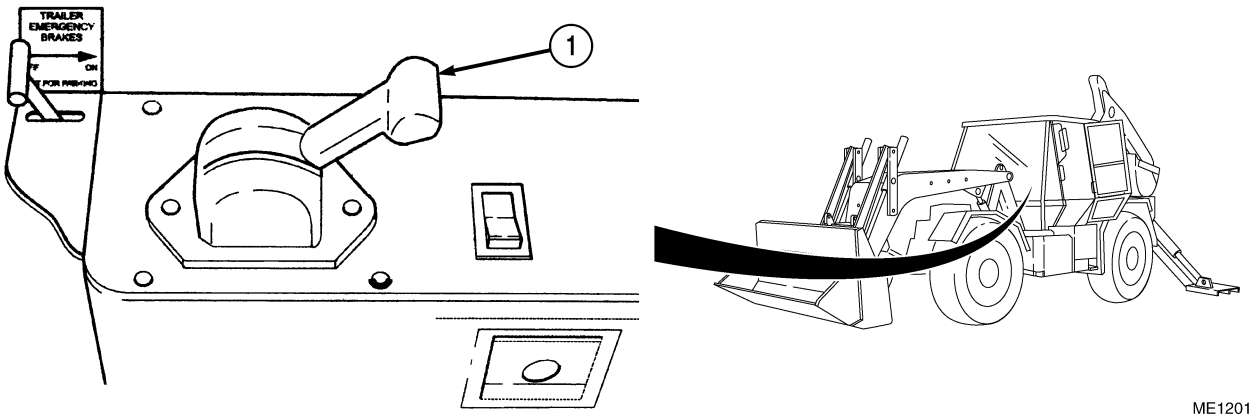
Tighten any loose connections found.

If leaks or damaged hoses are found, notify Unit maintenance.

Step 3. Ensure brake chambers and slack adjusters are properly operating.

If brake chambers and slack adjusters are not properly operating, notify Unit maintenance.

33. PARKING BRAKE WILL NOT HOLD VEHICLE.



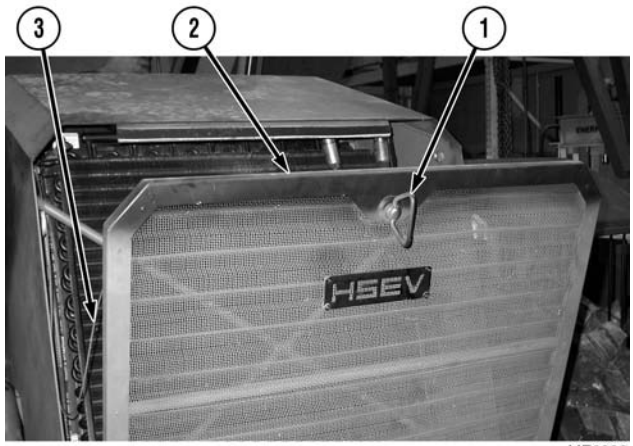
Step 1. Check to ensure that PARK BRAKE lever (1) locks into ON position.

If PARK BRAKE lever (1) will not lock into ON position, notify Unit maintenance.

Section IV. Maintenance Tasks.

3-13. FRONT GRILL OPERATION.

a. Opening.



ME0886

WARNING

Hot parts can burn personnel. Let hot parts cool before starting work.

(1) Prepare vehicle for servicing, ensuring that FEL arms are raised and maintenance arm is installed (Para 2-20).

(2) Lift latch (1) and rotate to vertical position.

(3) Pull front grill (2) forward until fully open.

b. Closing.

(1) Push front grill (2) into closed position, ensuring that retaining cables (3) are inside compartment.

(2) Rotate latch (1) to horizontal orientation and fold down to stowed position.

(3) Remove and stow maintenance arm.

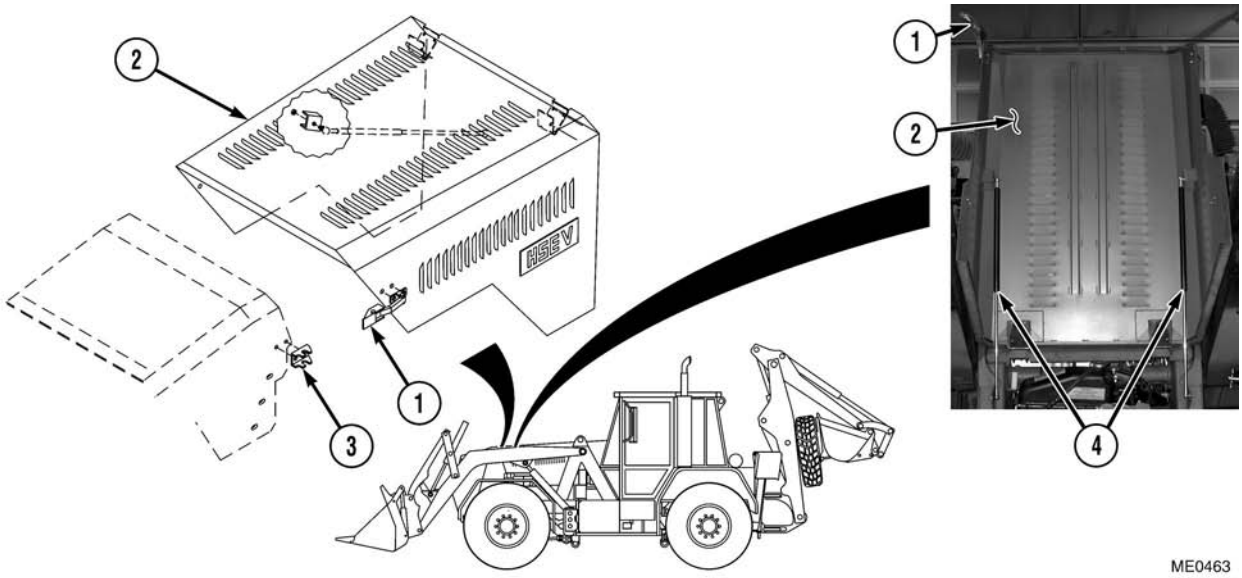
(4) Return FEL to parked position (Para 5-13).

(5) Remove “Do Not Operate” tag from ignition switch.

END OF TASK

3-14. ENGINE HOOD OPERATION.

a. Opening.



WARNING

- Keep hands and arms away from fan blade and drive while engine is running, or serious injury to personnel will result.
- Hot parts can burn personnel. Let hot parts cool before starting work.

NOTE

FEL must be in traveling position (Para 5-11) prior to opening or closing hood.

(1) Ensure PARK BRAKE lever is ON (Para 4-11).

(2) Pull up latch (1) on each side of hood (2).

(3) Unhook latch (1) from hook (3) on each side of hood (2).

(4) Raise hood (2) until shocks (4) are completely extended.

b. Closing.

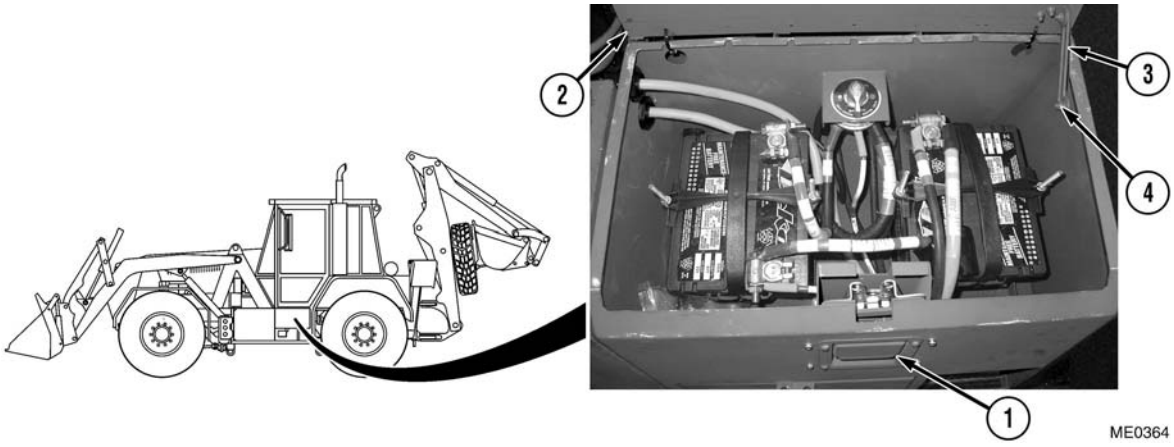
(1) Lower hood (2) into closed position.

(2) Connect latch (1) to hook (3) and secure latch (1).

END OF TASK

3-15. BATTERY BOX COVER OPERATION.

a. Opening.



WARNING

- When checking connections, do not let tools touch battery box. A direct short, arcing, tool heating to red hot, and battery explosion could result, causing injury or death to personnel.
- Remove or disconnect batteries and turn electrical master switch off prior to performing maintenance in immediate battery area or working on electrical system. Such disconnections prevent electrical shock to personnel or equipment.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal, a direct short may result in instant heating of tools, damage to equipment, and injury or death to personnel.

(1) Ensure PARK BRAKE lever is ON (Para 4-11).

(2) Pull up on latch handle (1) and raise battery box cover (2).

(3) Ensure support latch (3) slides over bolt (4) to secure battery box cover (2) in raised position.

b. Closing.

(1) Slide support latch (3) from bolt (4).

(2) Lower battery box cover (2) and ensure it latches securely.

END OF TASK

3-16. MUD FLAP OPERATION.

a. Deploy.

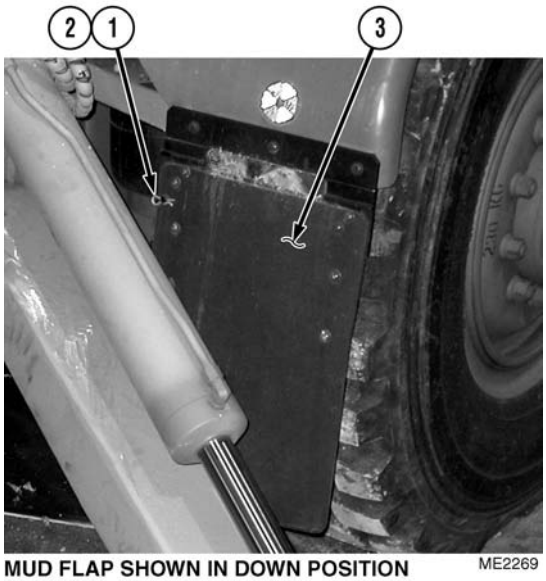
CAUTION

Mud flaps must be in the down position prior to lowering/raising stabilizers, backhoe operation, or road use. Failure to comply may result in damage to equipment.

(1) Remove retaining clip (1) from pin (2) and lower mud flap (3).

(2) Replace retaining clip (1) in pin (2).

(3) Repeat steps for remaining mud flap.



MUD FLAP SHOWN IN DOWN POSITION ME2269

b. Stow.

CAUTION

Mud flaps must be in the up position prior to off-road driving or FEL operations. Failure to comply may result in damage to equipment.

(1) Remove retaining clip (1) from pin (2).

(2) Fold mud flap (3) in half, and place hole in lower portion of flap on pin (2).

(3) Replace retaining clip (1) in pin (2).

(4) Repeats steps for remaining mud flap.

END OF TASK

3-17. WHEEL AND TIRE ASSEMBLY REPLACEMENT.

This Task Covers:

a. Change Wheel and Tire Assembly b. Check Tire Pressure c. Inflate Tire

d. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Adapter, tire valve, BII, Item 1, Appendix B
Bar, breaker, 1/2-in., BII, Item 3, Appendix B
Bar, breaker, 3/4-in., BII, Item 4, Appendix B
Handle assembly, BII, Item 9, Appendix B
Hammer, BII, Item 10, Appendix B
Jack, bottle, BII, Item 12, Appendix B
Plate, jacking, BII, Item 13, Appendix B
Chain, BII, Item 15, Appendix B
Socket, 30 mm, BII, Item 29, Appendix B
Socket, 33 mm, BII, Item 30, Appendix B
Tire gauge and hose assembly, BII, Item 32, Appendix B

Materials/Parts
Rag, Wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

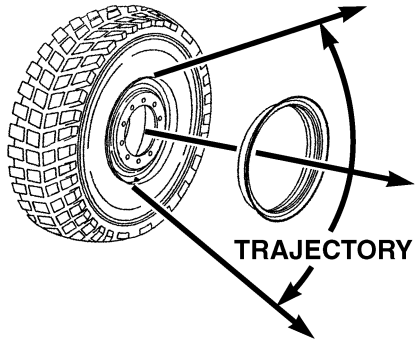
TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
20 min.

WARNING

Wheel and rim components can separate at any time, and with very explosive force. Always stay out of the trajectory of components. Failure to do so may result in serious injury or death to personnel.



ME2266

a. Change Wheel and Tire Assembly.

WARNING

The wheel, tire, and carrier combination weighs 564 lb. (256 kg), therefore wheel changing should be carried out by two persons if practical. If the procedure is to be carried out by one person, extreme care should be exercised. Failure to comply may result in injury or death to personnel.

(1) Remove stabilizer arm turnbuckles (Para 7-7).

(2) Lower stabilizers to ground (Para 7-5).

(3) Lower backhoe bucket to ground (Para 7-3).

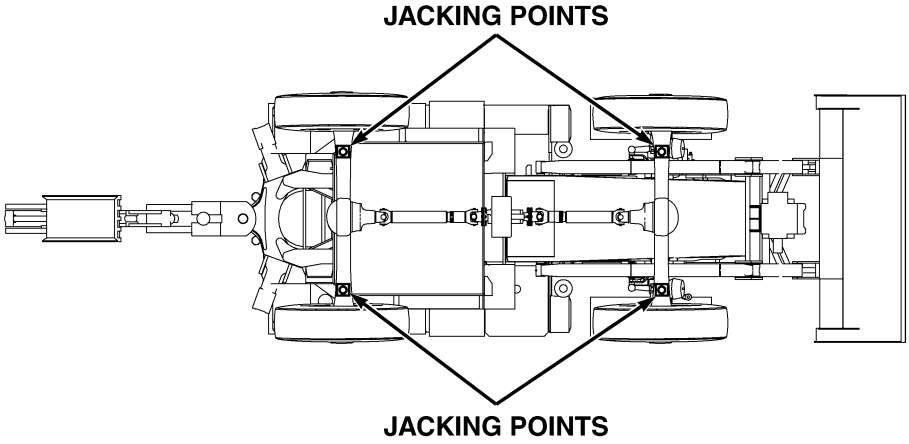
(4) Remove backhoe travel stop (Para 7-6).

(5) Extend backhoe until spare wheel is in vertical position and resting on ground.

WARNING

Wheel nuts are tightened to a torque of 475 to 525 lbf/ft (644 to 712 N·m). Take care when using extension bar to loosen them. Failure to comply may result in injury to personnel.

(6) Loosen wheel nuts on wheel to be removed using 33 mm socket, handle, and extension bar, but do not remove nuts.



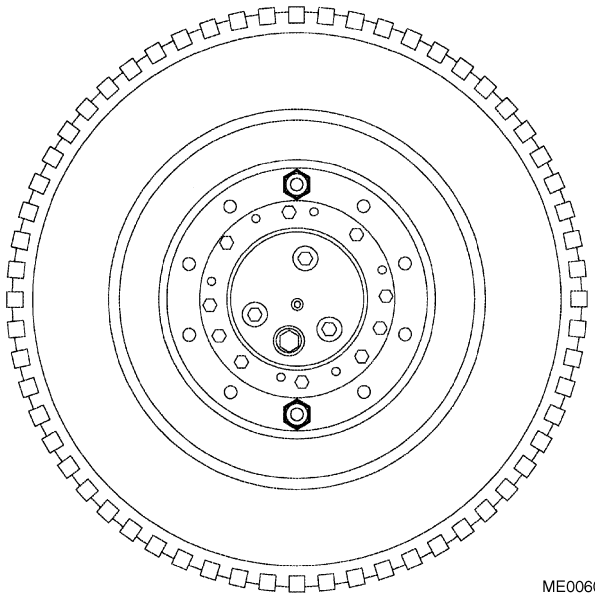
ME0059

(7) Place jack on jacking plate, and position under jacking point of wheel to be removed.

(8) Operate jack to raise vehicle until wheel is off ground.

(9) Remove all but two of previously loosened wheel nuts. Leave one nut loosely in place at 12 o'clock and 6 o'clock positions.

(10) Rock wheel to ensure it is free and not jammed on hub. If wheel will not free from hub, use hammer to strike wheel rim to separate wheel from hub.



ME0060

WARNING

- A wheel and tire assembly weighs 518 lb. (235 kg). Ensure that wheel and tire assembly does not fall on personnel. Failure to comply may result in injury or death to personnel.
- If working alone, it is important to keep tire vertical and to not allow wheel and tire to lay on ground. Failure to comply may result in injury or death to personnel.

(11) Using 1/2-in. breaker bar and 30 mm socket, loosen two nuts retaining spare wheel to spare wheel carrier.

(12) Remove nuts ensuring spare wheel remains upright and does not fall over.

(13) Remove spare wheel and tire from carrier, and move it to position adjacent to wheel being installed.

NOTE

If spare wheel does fall over, use chain from BII and backhoe to lift it to upright position.

(14) Rest spare wheel against IHMEE, ensuring it does not fall over.

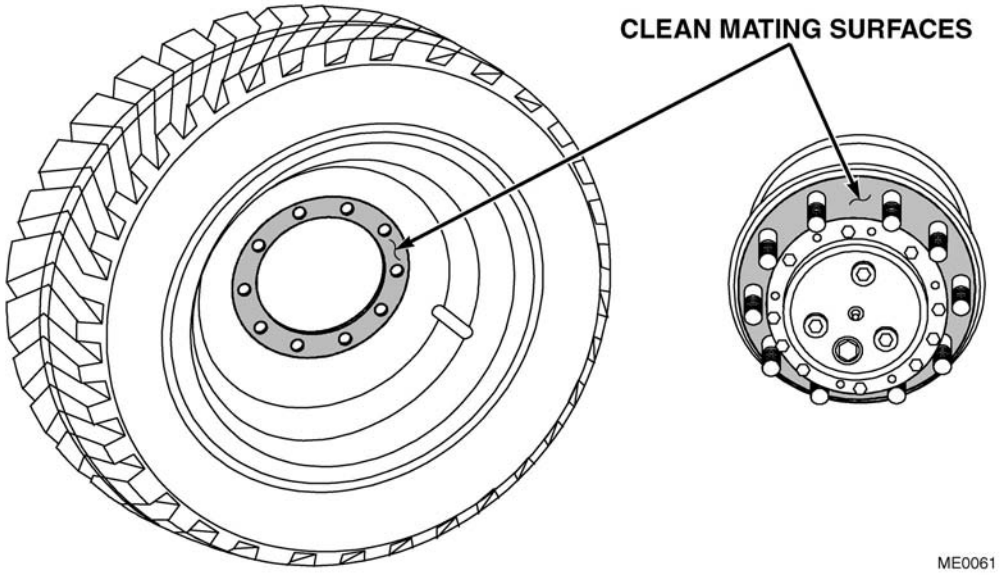
(15) Remove wheel nuts at 12 o'clock and 6 o'clock positions, and walk wheel off hub. Roll wheel to position under backhoe bucket and lay it on ground with outside facing up.

WARNING

Before releasing parking brake, chock wheels to keep vehicle from rolling. Failure to do so may result in serious injury or death to personnel.

(16) Ensure wheels are chocked.

(17) Place PARK BRAKE lever in OFF position (Para 4-11).



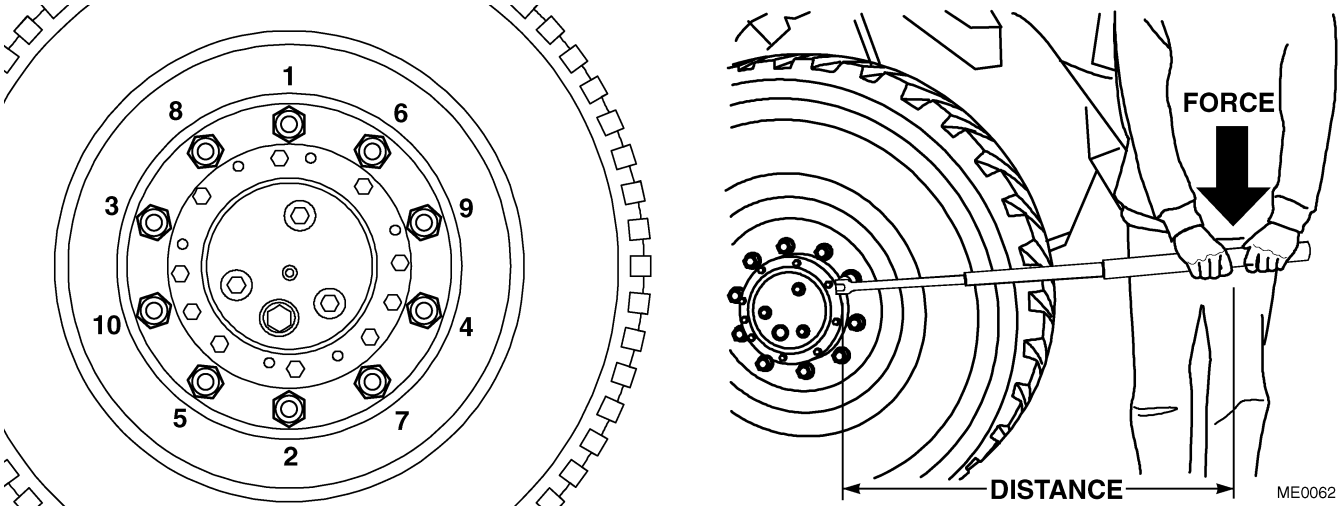
CAUTION

Cleanliness of the mating face between hub and inside wheel face is critical to wheel security. If dirt enters mating surface between hub and wheel, there is a danger that wheel nuts will work loose. Failure to comply may result in damage to vehicle.

(18) Clean mating face of hub and inside mating face of wheel with wiping rag. Ensure area is free from dirt and rust.

(19) Position wheel against hub. Adjust height of jack to allow wheel to locate on hub. Install one wheel nut and walk wheel onto hub. Install all remaining wheel nuts.

(20) Place PARK BRAKE lever in ON position (Para 4-11) and lower vehicle from jack.



WARNING

- Ensure you do not catch your hands between extension bar and other parts of IHMEE. Failure to comply may result in injury or death to personnel.
- Vehicle must be taken to Unit maintenance to have wheel nuts accurately tightened to 475 to 525 lbf/ft (644 to 712 N·m) at first opportunity. Wheel nuts must also be check-tightened to a torque of 475 to 525 lbf/ft (644 to 712 N·m) after 60 mi. (100 km) of driving. Failure to comply may result in injury or death to personnel, and/or damage to equipment.

CAUTION

When using an extension bar, it is easy to exceed correct torque figures. Use extension and breaker bars with extreme caution to prevent over- or undertightening of wheel nuts. Failure to comply may result in damage to vehicle.

NOTE

- Table 3-5 shows approximate torque values resulting from several combinations of operator weight and extension bar lengths.
- Tighten wheel nuts in order illustrated.

(21) Use extension bar, 3/4-in. breaker bar, and 33 mm socket to tighten wheel nuts to 475 to 525 lbf/ft (644 to 712 N·m).

Table 3-5. Approximate Torque.

Combined Length of Breaker and Extension Bars	Operator Weight	Resulting Force	Approximate Torque Applied
43 in. (1 100 mm)	143 lb. (65 kg)	143 lbf (637 N)	516 lbf/ft (700 N·m)
37 in. (950 mm)	165 lb. (75 kg)	165 lbf (735 N)	516 lbf/ft (700 N·m)
32 in. (800 mm)	198 lb. (90 kg)	198 lbf (880 N)	516 lbf/ft (700 N·m)
27 in. (680 mm)	231 lb. (105 kg)	232 lbf (1 030 N)	516 lbf/ft (700 N·m)

(22) Move damaged wheel to a position near the backhoe, ensuring that wheel does not tip over.

(23) Using 1/2-in. breaker bar and 30 mm socket, install damaged wheel to spare tire carrier using two nuts.

(24) Pick up spare tire and carrier assembly and place backhoe in stowed position (Para 5-13).

(25) Raise stabilizers (Para 7-5).

(26) Install turnbuckles (Para 7-7).

(27) Remove chocks from wheels.

b. Check Tire Pressure.

WARNING

When checking pressure, personnel must remain a minimum of 10 ft. (3 m) away from tire and not in trajectory of lock ring or rim flange. Failure to comply may result in serious injury or death.

(1) Remove tire gauge and hose assembly and tire valve adapter from stowage box.

(2) Remove cap from valve stem and install tire valve adapter.

(3) Using tire gauge and hose assembly, check inflation of tires. Use Table 3-6 to ensure tires have correct pressure for road conditions and driving speed.

(4) Install cap on valve stem.

(5) Stow tire gauge and hose assembly and tire valve adapter in stowage box.

Table 3-6. Tire Pressure.

	Minimum Pressure	Maximum Pressure	Maximum Speed
Highway	103 psi (710 kPa)	131 psi (900 kPa)	30 mph (48 km/h)
Cross-Country	95 psi (655 kPa)	125 psi (860 kPa)	30 mph (48 km/h)
Earth-Moving	60 psi (415 kPa)	131 psi (900 kPa)	See instrument panel decal
Sand, Mud	45 psi (310 kPa)	131 psi (900 kPa)	19 mph (30 km/h)
C-130 Loading/Unloading	23 psi (159 kPa)	25 psi (172 kPa)	less than 1.6 mph (2.5 km/h)

c. Inflate Tire.

WARNING

- The rim flange and/or lock ring may blow off when inflating or deflating tires. Failure to comply with the following may result in serious injury or death to personnel:
- All personnel must remain a minimum of 10 ft. (3 m) away from tire and not in trajectory of lock ring or rim flange.
- Never lean, stand, or reach over a wheel/tire assembly during inflation or deflation.
- Never put hands or fingers near rim flanges or bead seats when inflating or deflating tires.
- Improperly seated lock rings and side rings may blow off during inflation. Never inflate or deflate a tire without first checking to ensure that the side ring is still properly seated in the lock ring groove and that the side ring, lock ring and lock ring groove are not damaged. Never attempt to seat a lock ring or side ring during or after inflation.
- Never reinflate a tire that has been run flat or seriously underinflated without first removing and checking for tire or rim damage.

(1) Remove tire gauge and hose assembly and tire valve adapter from stowage box.

(2) Remove protective cap from quick-release connector on auxiliary air tank and connect tire gauge and hose assembly to it.

(3) With engine running, and air pressure at normal operating pressure, remove dust cap from tire valve, fit tire valve adapter to valve, and attach tire gauge and hose assembly to it.

(4) Operate inflation lever on tire gauge and hose assembly until desired pressure is indicated on pressure gauge.

(5) Remove tire gauge and hose assembly from tire valve adapter, remove adapter from valve and install dust cap.

(6) Remove tire gauge and hose assembly from auxiliary air tank, replace protective cap, and put tire gauge and hose assembly and tire valve adapter in stowage box.

d. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

END OF TASK

3-18. AIR CLEANER FILTER SERVICE.

This Task Covers:

a. Removal
b. Inspection
c. Cleaning
d. Installation
e. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
None

Materials/Parts
Rag, wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
12 min.

CAUTION

- When operating in desert or extremely dusty conditions, clean air cleaner element after every 4 hours of operation. Failure to comply may result in equipment damage.
- Do not operate engine without air filter installed. Failure to comply may result in damage to equipment.

a. Removal.

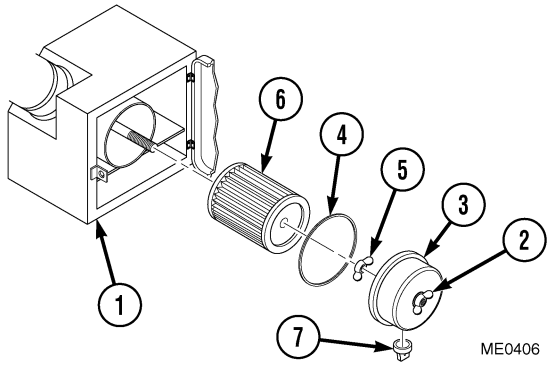
(1) Open air cleaner filter compartment (1).

(2) Loosen wingnut (2) and remove cap (3).

(3) Remove sealing ring (4). Do not discard sealing ring.

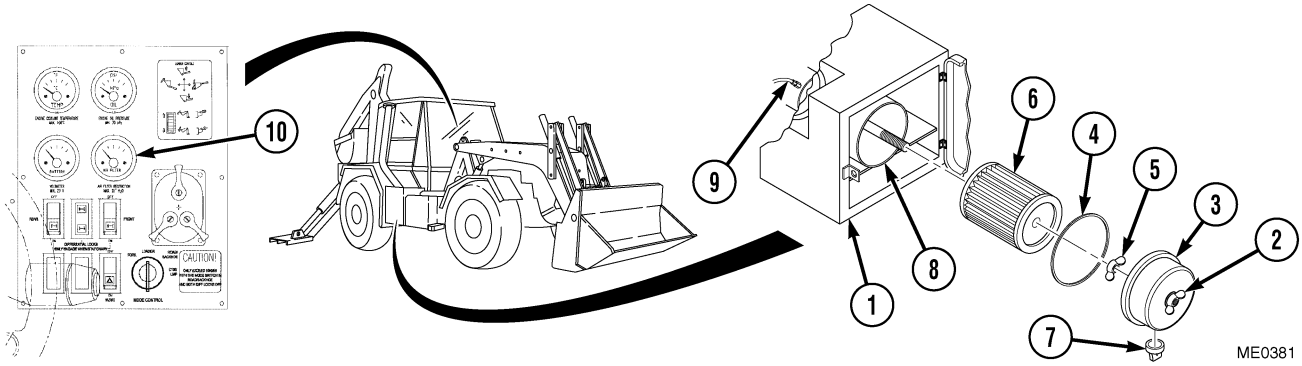
(4) Remove wingnut (5) and filter element (6).

(5) Remove dust boot (7) from cap (3).



b. Inspection.

(1) Using light source, inspect filter element (6) for holes, collapse, and excessive contamination.



(2) If filter element (6) has holes, is collapsed, or is excessively contaminated, notify Unit maintenance.

(3) Inspect dust boot (7) and sealing ring (4) for signs of damage or deterioration.

(4) Inspect air cleaner housing (8) for damage and/or deterioration.

(5) Inspect air line (9), which services AIR FILTER RESTRICTION gauge (10), for signs of damage, looseness, and/or deterioration.

(6) If dust boot (7), sealing ring (4), air cleaner housing (8), or air line (9) is damaged or deteriorated, notify Unit maintenance.

c. Cleaning.

(1) Gently tap filter element (6) on flat surface to loosen dirt.

(2) Wipe down filter element (6) and sealing ring (4) with clean wiping rag to free trapped dirt.

(3) Wipe down air cleaner housing (8) and cap (3) with clean wiping rag.

(4) Thoroughly clean all dust from dust boot (7).

d. Installation.

(1) Install dust boot (7) on cap (3).

(2) Install filter element (6) with wingnut (5).

(3) Install sealing ring (4) on air cleaner housing (8).

(4) Place cap (3) on air cleaner housing (8) with dust boot (7) positioned at bottom. Tighten wingnut (2).

(5) Close air cleaner filter compartment (1).

e. Follow-On Maintenance.

(1) Check AIR FILTER RESTRICTION gauge (10) to ensure it reads below 25 inH_2O (625 mmH_2O). If AIR FILTER RESTRICTION gauge still reads too high after servicing air filter element, notify Unit maintenance.

(2) Remove “Do Not Operate” tag from ignition switch.

END OF TASK

3-19. A/C FILTER SERVICE.

This Task Covers:

a. Removal
b. Inspection
c. Cleaning
d. Installation
e. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
None

Materials/Parts
Rag, wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
12 min.

CAUTION

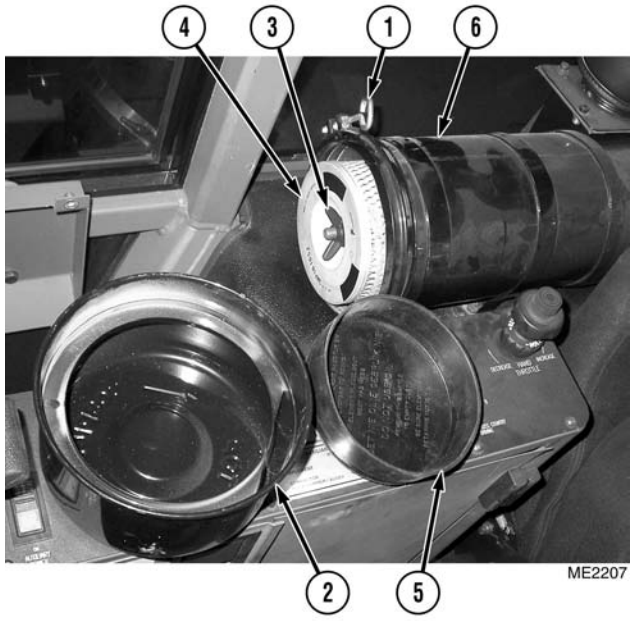
- When operating in desert or extremely dusty conditions, clean A/C filter after every 4 hours of operation. Failure to comply may result in equipment damage.
- Do not operate A/C unit without filter installed. Failure to comply may result in damage to equipment.

a. Removal.

(1) Loosen thumbscrew (1) and remove cap (2).

(2) Remove wingnut (3) and filter element (4).

(3) Remove dust boot (5) from cap (2).



b. Inspection.

(1) Using light source, inspect filter element (4) for holes, collapse, and excessive contamination.

(2) If filter element (4) has holes, is collapsed, or is excessively contaminated, notify Unit maintenance.

(3) Inspect dust boot (5) for signs of damage or deterioration.

(4) Inspect A/C filter housing (6) for damage and/or deterioration.

(5) If dust boot (5) or A/C filter housing (6) is damaged or deteriorated, notify Unit maintenance.

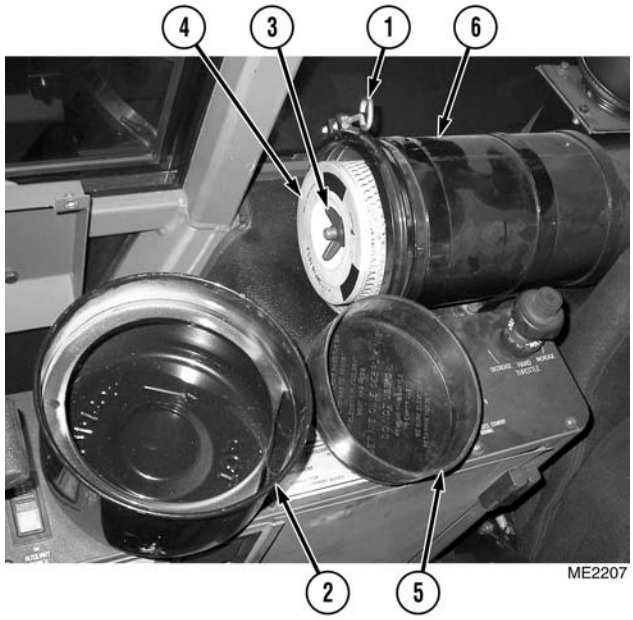
c. Cleaning.

(1) Gently tap filter element (4) on flat surface to loosen dirt.

(2) Wipe down filter element (4) with clean wiping rag to free trapped dirt.

(3) Wipe down A/C filter housing (6) and cap (2) with clean wiping rag.

(4) Thoroughly clean all dust from dust boot (5).



d. Installation.

(1) Install dust boot (5) on cap (2).

(2) Install filter element (4) with wingnut (3).

(3) Place cap (2) on A/C filter housing (6) with opening in cap positioned at top.

(4) Tighten thumbscrew (1).

e. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

END OF TASK

3-20. A/C PRECLEANER SERVICE.

This Task Covers:

a. Removal b. Cleaning c. Installation

d. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
None

Materials/Parts
Rag, wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
6 min.

a. Removal.

(1) Loosen knurled nut (1) and remove cap (2) from precleaner dust bowl (3).

(2) Remove precleaner dust bowl (3).

b. Cleaning.

(1) Empty contents of precleaner dust bowl (3).

(2) Use wiping rag to wipe inside and outside of precleaner dust bowl (3).

c. Installation.

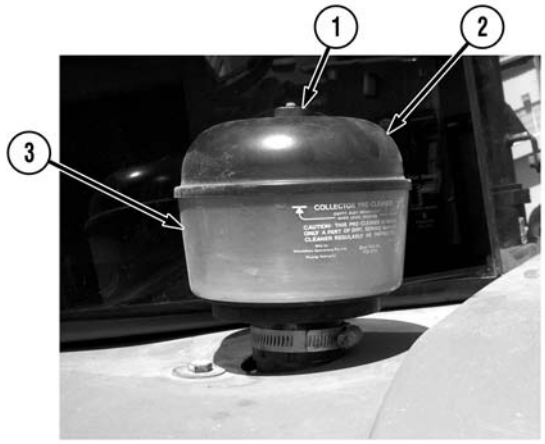
(1) Position precleaner dust bowl (3) on vehicle.

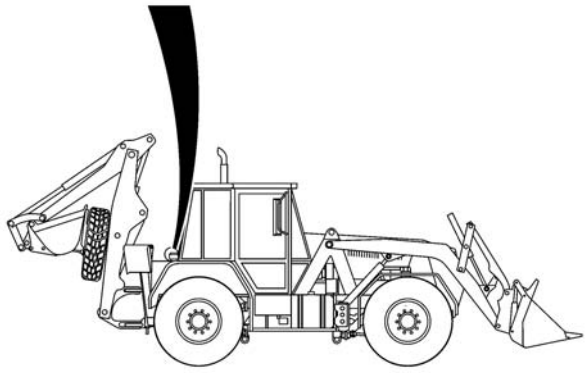
(2) Position cap (2) on precleaner dust bowl (3). Tighten knurled nut (1).

d. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

END OF TASK





ME0380

3-21. FUEL/WATER SEPARATOR SERVICE.

This Task Covers:

a. Servicing b. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Pliers, BII, Item 19, Appendix B

Materials/Parts
Rag, wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).
Para 3-14	Hood opened.

Drawings Required
None

Estimated Time to Complete
6 min.

a. Servicing.

WARNING

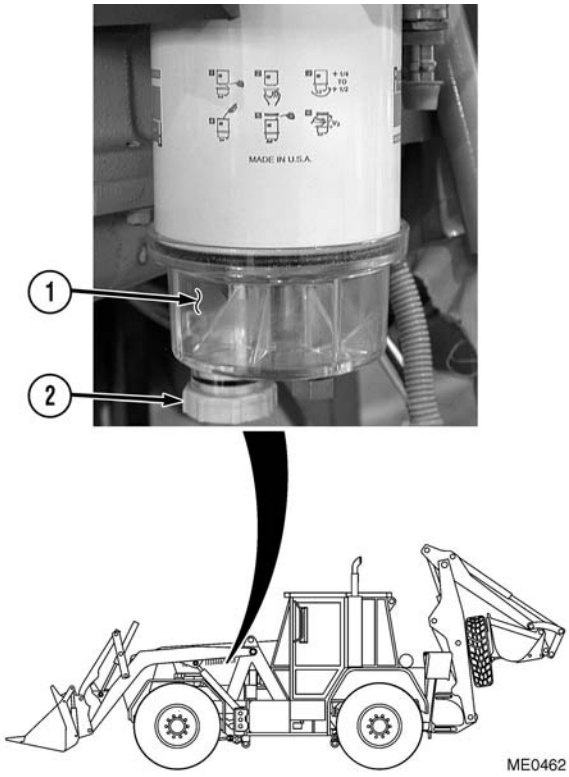
- No smoking, flames, sparks, or glowing or hot objects allowed within 50 ft. (15 m) of vehicle. Fire or explosion may cause personal injury or death.
- Do not work on fuel system when engine is hot; fuel can be ignited by a hot engine.
- Keep a fire extinguisher within easy reach when working with fuel or on a fuel system.

NOTE

If excessive water and/or debris is present in sediment bowl, notify Unit maintenance.

(1) Empty water from sediment bowl (1) into suitable, clean container by opening drain (2) using pliers. Using a clean rag, wipe up any spills.

(2) Close drain (2) using pliers.



b. Follow-On Maintenance.

(1) Close hood (Para 3-14).

(2) Remove "Do Not Operate" tag from ignition switch.

END OF TASK

3-22. BACKHOE BUCKET TOOTH REPLACEMENT.

This Task Covers:

a. Removal b. Installation c. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Hammer, BII, Item 10, Appendix B
Punch, BII, Item 20, Appendix B

Materials/Parts
Tooth, backhoe bucket Item 24, Appendix C
Pin, retaining, backhoe bucket tooth, Item 19, Appendix C

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
6 min.

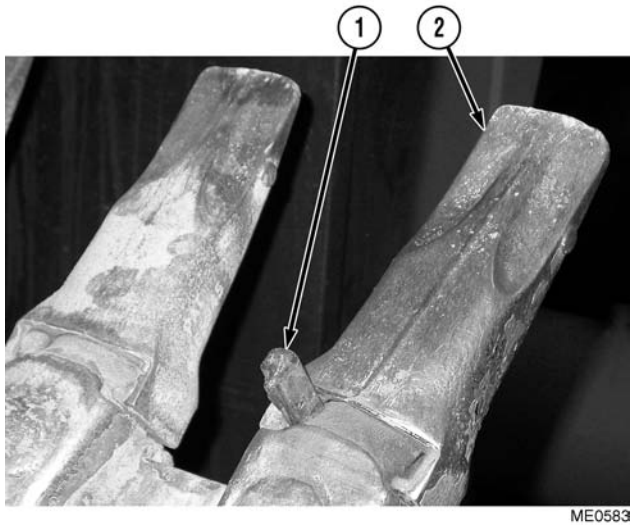
a. Removal.

NOTE

Retaining pin must be driven out from outside of bucket.

(1) Use hammer and punch to drive retaining pin (1) out of tooth (2). Discard pin.

(2) Remove tooth (2). Discard tooth.



ME0583

b. Installation.

NOTE

- When placing tooth on bucket, ensure that it is oriented the same as other bucket teeth.
- Retaining pin must be driven in from inside of bucket.

(1) Position new tooth (2) on bucket.

(2) Use hammer to drive new retaining pin (1) into tooth (2).

c. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

END OF TASK

3-23. FEL 4-IN-1 BUCKET TOOTH REPLACEMENT.

This Task Covers:

a. Removal b. Installation c. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Hammer, BII, Item 10, Appendix B
Punch, BII, Item 20, Appendix B

Materials/Parts
Tooth, FEL 4-in-1 bucket Item 25, Appendix C
Pin, retaining, FEL 4-in-1 bucket tooth, Item 20, Appendix C
Bushing, rubber, FEL 4-in-1 bucket tooth, Item 8, Appendix C

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
6 min.

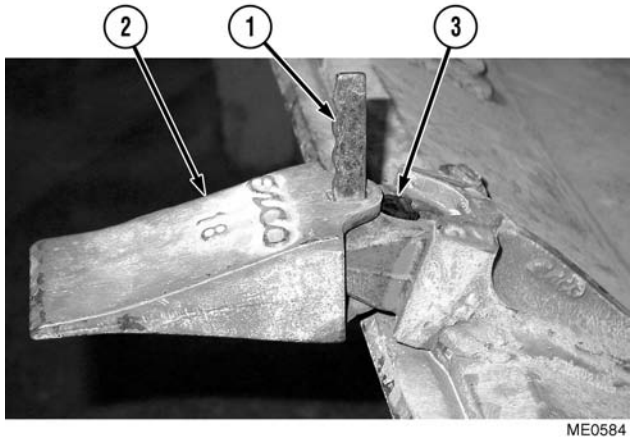
a. Removal.

NOTE

Retaining pin must be driven out from outside of bucket.

(1) Use hammer and punch to drive retaining pin (1) out of tooth (2). Discard pin.

(2) Remove tooth (2) and bushing (3). Discard tooth and bushing.



ME0584

b. Installation.

(1) Position new bushing (3) in bucket.

(2) Position new tooth (2) on bucket.

NOTE

Retaining pin must be driven in from inside of bucket.

(3) Use hammer to drive new retaining pin (1) into tooth (2).

c. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

END OF TASK

3-24. FEL RIPPER TOOTH REPLACEMENT.

This Task Covers:

a. Removal b. Installation c. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Hammer, BII, Item 10, Appendix B

Materials/Parts
Tooth, FEL ripper, Item 26, Appendix C

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

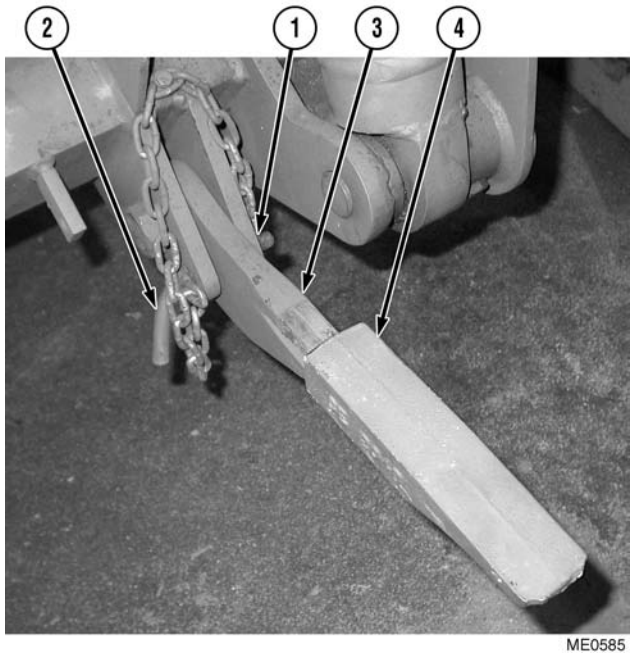
Estimated Time to Complete
6 min.

a. Removal.

(1) Remove locking clip (1) and retaining pin (2).

(2) Raise ripper arm (3) to horizontal position and replace retaining pin (2).

(3) Use hammer to drive ripper tooth (4) off of ripper arm (3). Discard tooth.



ME0585

b. Installation.

(1) Position new ripper tooth (4) on ripper arm (3).

(2) Use hammer to drive ripper tooth (4) fully onto ripper arm (3).

(3) Remove locking clip (1) and retaining pin (2), and lower ripper arm (3) to down position.

(4) Install retaining pin (2) and locking clip (1).

c. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

END OF TASK

3-25. ENGINE ACCESS PANEL REMOVAL/INSTALLATION.

This Task Covers:

a. Removal b. Installation c. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Breaker bar, 1/2-in., BII, Item 3, Appendix B
Ratchet, 1/2-in., BII, Item 21, Appendix B
Socket, 10 mm, BII, Item 26, Appendix B

Materials/Parts
None

Personnel Required
MOS 62J, Construction Engineer Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

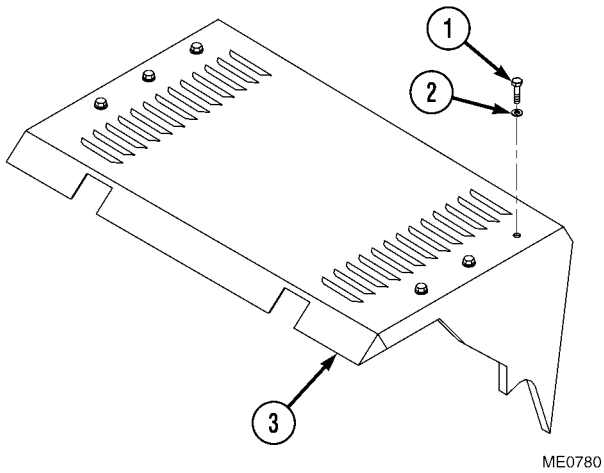
Drawings Required
None

Estimated Time to Complete
6 min.

a. Removal.

(1) Using ratchet/breaker bar and socket, remove six bolts (1) and washers (2) from engine access panel (3).

(2) Remove engine access panel (3) from vehicle.



ME0780

b. Installation.

(1) Position engine access panel (3) on vehicle, ensuring that moutning holes are aligned.

(2) Using ratchet/breaker bar and socket, install six washers (2) and bolts (1). Tighten bolts.

c. Follow-On Maintenance.

Remove "Do Not Operate" tag from ignition switch.

END OF TASK

3-26. BELLY PLATES REMOVAL/INSTALLATION.

This Task Covers:

a. Removal b. Installation c. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Breaker bar, 1/2-in., BII, Item 3, Appendix B
Ratchet, 1/2-in., BII, Item 21, Appendix B
Socket, 18 mm, BII, Item 28, Appendix B

Materials/Parts
Rag, wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineer Operator (2)

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
30 min.

WARNING

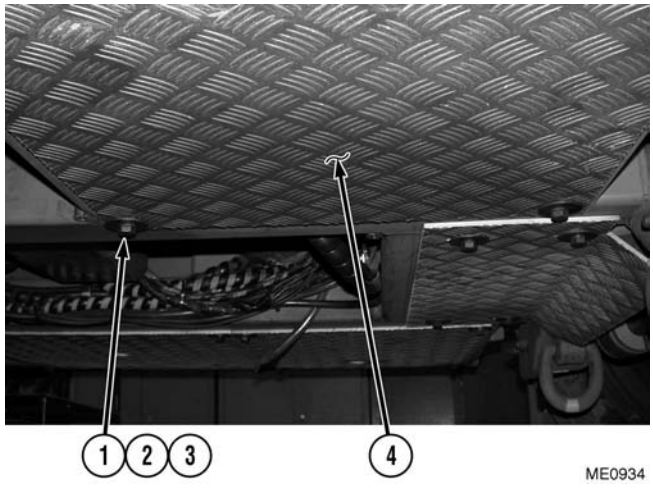
- Some belly plates weigh more than 50 lb. (23 kg). Use the aid of an assistant when removing larger belly plates. Failure to comply may result in injury or death to personnel.
- If engine is running while belly plates are removed, stay clear of air drier discharge. Skin embolisms and/or debris in eyes can occur from released pressure. Failure to comply may result in injury to personnel.

NOTE

All belly plates are removed and installed in the same way.

a. Removal.

Using ratchet/breaker bar and socket, remove bolts (1), flat washers (2), spring washers (3), and carefully lower belly plate (4).



b. Installation.

(1) Clean holes and surface of belly plate (4) using a rag.

CAUTION

Vehicle must be taken to Unit maintenance to have spring washers replaced at first opportunity. Failure to comply may result in damage to equipment.

(2) Using ratchet/breaker bar and socket, carefully raise belly plate (4) and install with spring washers (3), flat washers (2), and bolts (1).

c. Follow-On Maintenance.

Remove "Do Not Operate" tag from ignition switch.

END OF TASK

3-27. FIREWALL COVER REMOVAL/INSTALLATION.

This Task Covers:

a. Removal b. Installation c. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Breaker bar, 1/2-in., BII, Item 3, Appendix B
Ratchet, 1/2-in., BII, Item 21, Appendix B
Socket, 15 mm, BII, Item 27, Appendix B
Wrench, Allen, 4 mm, BII, Item 37, Appendix B

Materials/Parts
Rag, wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineer Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

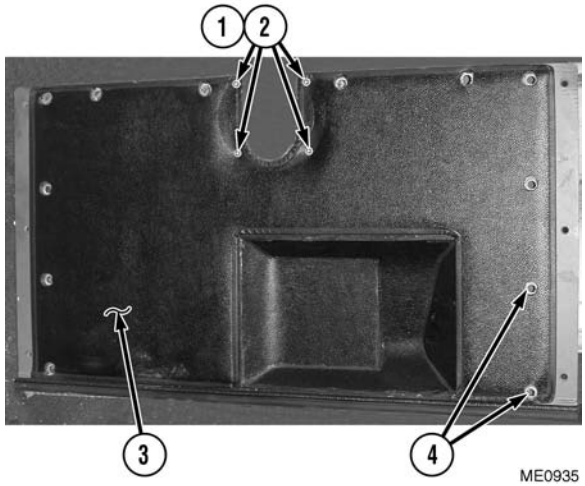
Estimated Time to Complete
18 min.

a. Removal.

(1) Using Allen wrench, remove four screws (1) and washers (2) securing collar to firewall cover (3) and lift out of position.

(2) Using ratchet/breaker bar and socket, remove 12 bolts (4).

(3) Remove firewall cover (3).



b. Installation.

(1) Using a clean rag, clean holes and surface of firewall cover (3).

(2) Install firewall cover (3), ensuring pilot holes are aligned.

(3) Using ratchet/breaker bar and socket, install 12 bolts (4). Tighten bolts.

(4) Using Allen wrench, install four washers (2) and screws (1) securing collar to firewall cover (3). Tighten scews.

c. Follow-On Maintenance.

Remove "Do Not Operate" tag from ignition switch.

END OF TASK

3-28. MANUAL OPERATION OF HYDRAULIC COMPONENTS.

This Task Covers:

a. Front-End Loader (FEL) Components b. Backhoe Components c. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Hydraulic valve manual override lever, BII, Item 11, Appendix B
Ratchet, 1/2-in., BII, Item 21, Appendix B
Socket, 10 mm, BII, Item 26, Appendix B

Materials/Parts
None

Personnel Required
MOS 62J, Construction Engineer Operator

References
None

Equipment Conditions

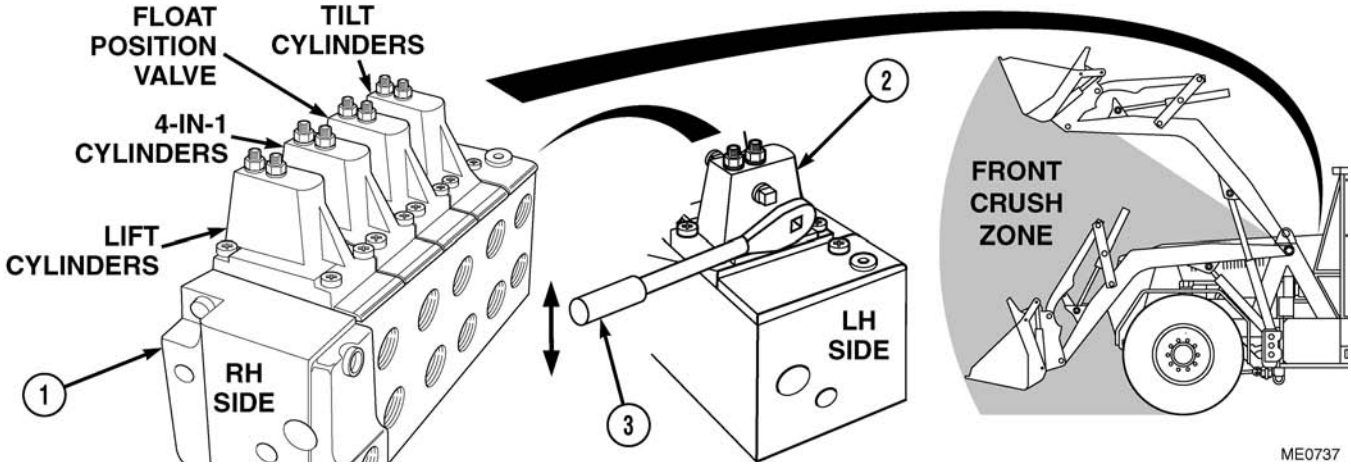
TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).
Para 3-25	Engine access panel removed.

Drawings Required
None

Estimated Time to Complete
30 min.

a. Front-End Loader (FEL) Components.

(1) Start engine (Para 5-2) and ensure hydraulic master switch is OFF (Para 6-3).



(2) Locate FEL hydraulic valve block (1) below front windshield and identify hydraulic valve (2) that operates component to be manually operated.

WARNING

- Manually operating hydraulic components is extremely dangerous. This procedure should only be done when normal hydraulic operations do not function and emergency movement of the vehicle is required. Manual operation of these valves can cause serious injury or death.
- Stay clear of moving FEL arms and ensure that no personnel are within the FEL crush zone when operating the FEL hydraulic valves. Failure to comply will result in serious injury or death to personnel.

(3) Use hydraulic valve manual override lever (3) to operate hydraulic valve (2) until vehicle component is stowed.

(4) Repeat Steps (2) and (3) for any additional components to be manually operated.

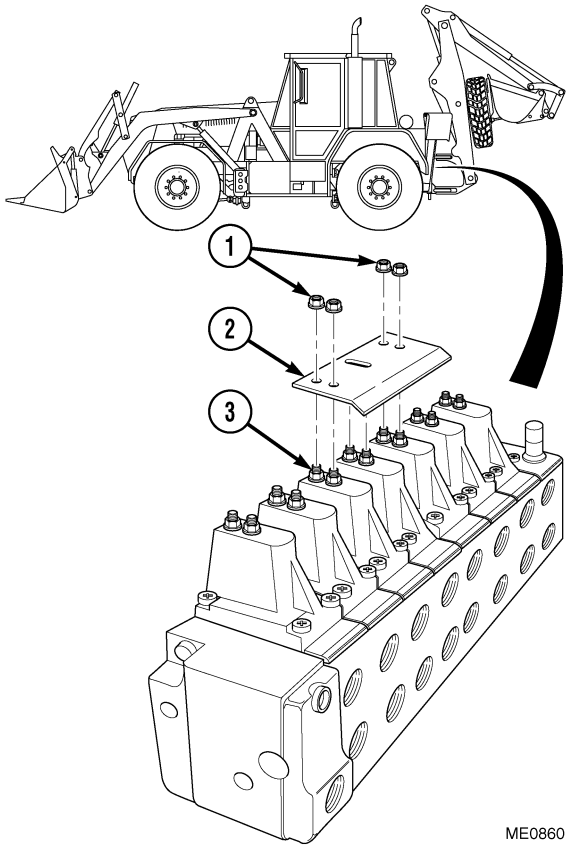
b. Backhoe Components.

WARNING

- Manually operating hydraulic components is extremely dangerous. This procedure should only be done when normal hydraulic operations do not function and emergency movement of the vehicle is required. Manual operation of these valves can cause serious injury or death.
- You are within the backhoe crush zone when operating the backhoe valves. Stay clear of moving backhoe and ensure that no personnel are within the backhoe crush zone when operating the backhoe hydraulic valves. Failure to comply will result in serious injury or death to personnel.

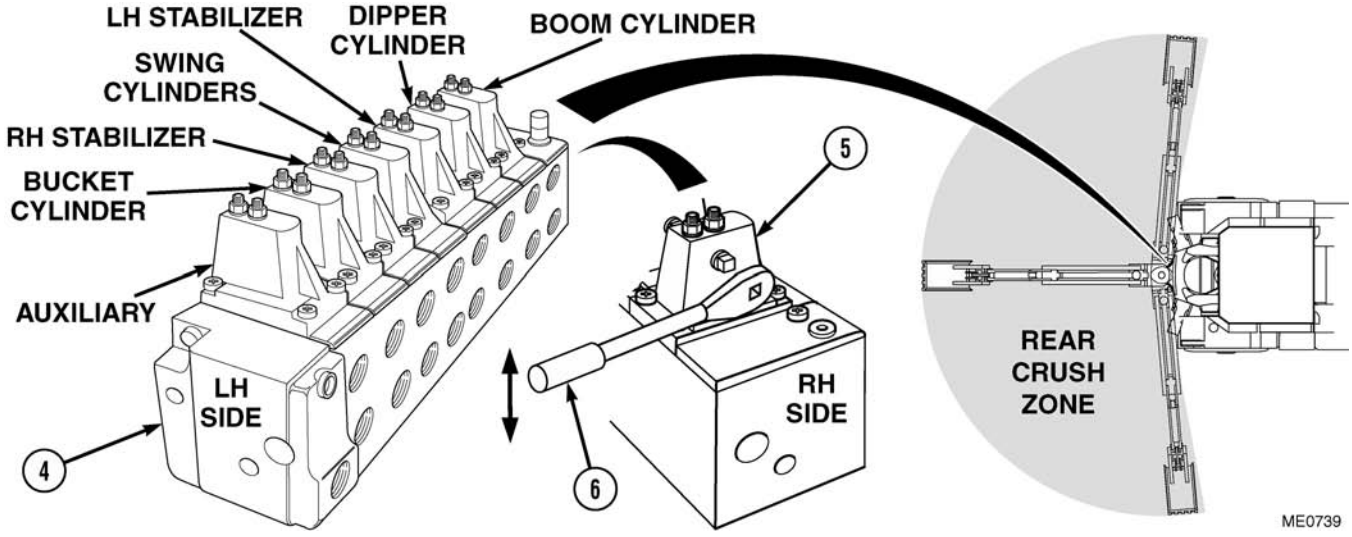
NOTE

- Perform Step (1) only if the stabilizers and/or backhoe swing need to be manually stowed.
- When removing backhoe valve guard, ensure that position of valve setscrews does not change.



(1) Using ratchet and socket, remove four nuts (1) and backhoe valve guard (2). Stow backhoe valve guard and nuts in cab.

(2) Start engine (Para 5-2) and ensure hydraulic master switch is OFF (Para 6-3).



(3) Locate backhoe hydraulic valve block (4) under backhoe top plate and identify hydraulic valve (5) that operates component to be manually operated.

(4) Use hydraulic valve manual override lever (6) to operate hydraulic valve (5) until vehicle component is stowed.

(5) Repeat Steps (3) through (4) for any additional components to be manually operated.

c. Follow-On Maintenance.

(1) Shut OFF engine (Para 5-2).

(2) Stow manual override lever.

(3) Install engine access panel (Para 3-25).

END OF TASK

3-29. SPRING BRAKE CHAMBER CAGING.

This Task Covers:

a. Caging b. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Wrench, adjustable, BII, Item 36, Appendix B

Materials/Parts
None

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
30 min.

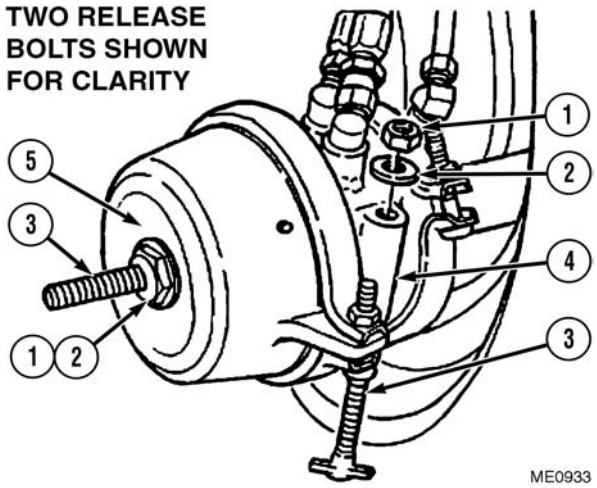
a. Caging.

WARNING

This procedure is for emergency towing of the vehicle only, and will manually release the vehicle's brakes. Ensure that vehicle is secured by the towing vehicle or wheel chocks before attempting the following procedure. Failure to comply may allow the vehicle to move, resulting in serious injury or death to personnel and/or equipment damage.

(1) Remove nut (1), washer (2), and release bolt (3) from stowed position on side of brake chamber housing (4).

(2) Remove plug and ensure bottom seat (5) is clear of dirt and debris.



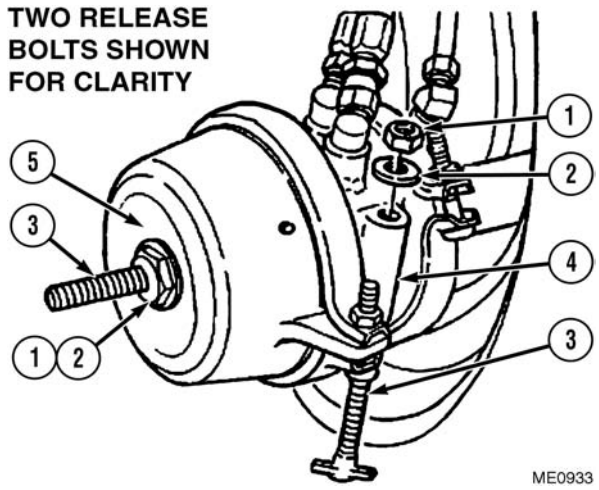
WARNING

It is very important that T-section of release bolt fully engages in bottom seat. Failure to comply may result in injury or death to personnel.

(3) Insert release bolt (3) until it bottoms (will no longer turn) in seat and rotate clockwise until it fully locks.

(4) Pull release bolt (3) several times by hand to ensure it is locked.

(5) Fit washer (2) and nut (1) to release bolt and wind up nut by hand until it almost seats.



NOTE

You will experience a large degree of resistance as you are compressing return spring.

(6) Use adjustable wrench to continue to winding nut (1) in clockwise direction until it bottoms out.

(7) Repeat Steps (1) through (6) for remaining three spring brake chambers.

(8) Stow wheel chocks, if applicable. Vehicle is now ready to be moved.

b. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

END OF TASK

CHAPTER 4
CONTROLS AND INDICATORS

Contents

4-1. INSTRUMENT PANELS.

WARNING

- APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.
- If you experience problems operating any controls, turn off your SINGAR radio unit. Failure to comply may result in death or injury to personnel and/or damage to equipment.

Electronic controls, devices, and systems may be susceptible to electromagnetic interference (EMI) if inadequately shielded or otherwise configured for electromagnetic compatibility. When operating any of the vehicle's controls while the SINGAR radio is on, EMI could occur. If you notice controls not responding correctly, or at all, turn your SINGAR radio off.

There are two instrument panels in the cab of the IHMEE. These are the main instrument panel and the side instrument panel.

The main instrument panel is located in front of the operator, behind the steering wheel. It houses all the controls and instruments required for driving the vehicle. The side instrument panel is located on the right side of the operator's seat, and it houses auxiliary controls. The panels' functions are described in Table 4-1 and Table 4-2.

Table 4-1. Main Instrument Panel.

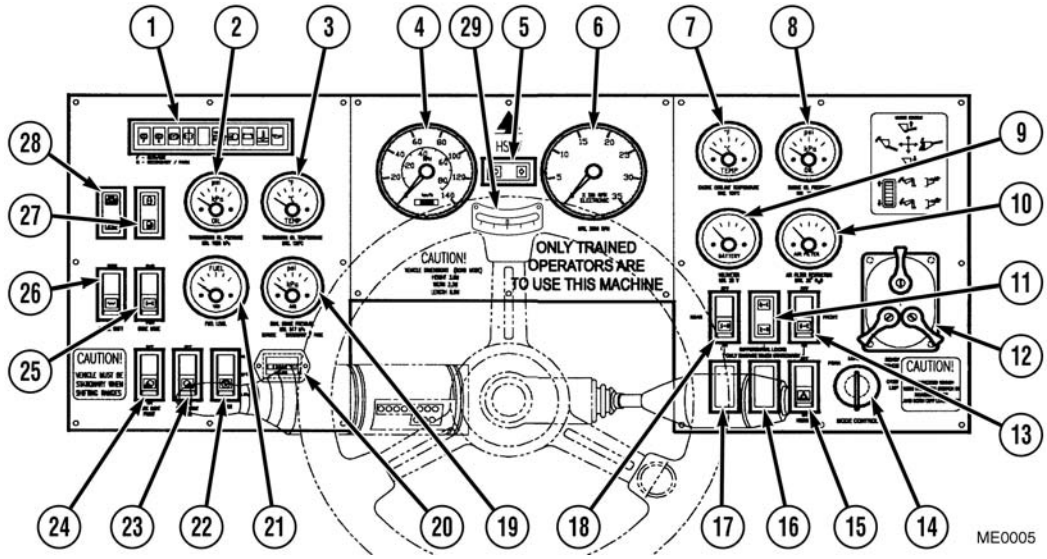
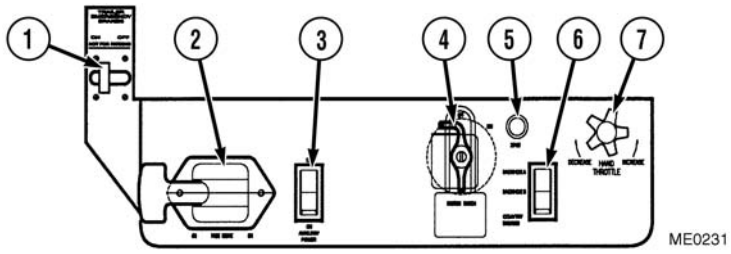
Key	Control or Indicator	Function
		
1	Warning Indicators	Give the operator a visual indication of: • Low service brake air pressure • Low secondary/parking brake air pressure • PARK BRAKE lever ON • MODE CONTROL switch in any mode other than ROAD/BACKHOE setting • Transmission filter blocked • Headlight high beams on • Battery not charging • High coolant temperature • Low engine oil pressure
2	TRANSMISSION OIL PRESSURE Gauge	Indicates the transmission oil pressure when the engine is running.
3	TRANSMISSION OIL TEMPERATURE Gauge	Indicates the transmission oil temperature when the engine is running.
4	Speedometer	Indicates the speed of the vehicle. The inner graduations are mph, and the outer graduations are km/h. The gauge also incorporates an odometer that records the number of kilometers the vehicle has traveled.
5	Turn Signal Indicator	The indicator flashes, showing the turn signal has been activated. The arrow indicates the direction selected.
6	Tachometer	Indicates the speed of the engine in RPM.
7	ENGINE COOLANT TEMPERATURE Gauge	Indicates the temperature of the coolant in the cooling system. The gauge is calibrated in Fahrenheit and Celsius.
8	ENGINE OIL PRESSURE Gauge	Indicates the engine oil pressure when the engine is running. The gauge is calibrated in psi and kPa.
9	VOLTMETER	Indicates the voltage of the batteries when the engine is running. The gauge is calibrated in volts.

Table 4-1. Main Instrument Panel. (Continued)

Key	Control or Indicator	Function
10	AIR FILTER RESTRICTION Gauge	Indicates the amount of restriction being felt in the engine air filter. The gauge is calibrated in units of inH_2O.
11	FRONT and REAR DIFFERENTIAL LOCKS Indicators	Indicates when one or both differential locks are engaged.
12	Light Switch	Controls the operation of the vehicle's lighting system.
13	FRONT DIFFERENTIAL LOCK Switch	Operates the front differential lock.
14	MODE CONTROL Switch	Selects suspension mode for the vehicle.
15	HAZARD Warning Light Switch	Operates the hazard warning lights.
16	Spare Switch Position.	Not used.
17	Spare Switch Position.	Not used.
18	REAR DIFFERENTIAL LOCK Switch	Operates the rear differential lock.
19	DUAL BRAKE PRESSURE Gauge	White needle indicates the air pressure in the service brake system and the green needle indicates air pressure in the secondary/parking brake system. The gauge is calibrated in psi and kPa.
20	Hourmeter	Indicates the running hours of the engine.
21	FUEL LEVEL Gauge	Indicates the amount of fuel in fuel tank.
22	DIMMER Switch	Allows the operator to select OFF, LOW, or HIGH setting for the instrument panel lights. The switch works only when light switch is in the DIM or PARK positions.
23	REAR WORK LIGHT Switch	Operates the rear work lights. Works in conjunction with the light switch.
24	FRONT WORK LIGHT Switch	Operates the front work lights. Works in conjunction with the light switch.
25	DRIVE MODE Switch	Allows the operator to select 2WD (2-wheel drive) or 4WD (4-wheel drive), depending on the conditions.
26	RANGE SHIFT Switch	Allows the operator to select HIGH or LOW range depending on the conditions.
27	Low Fuel and Low Coolant Indicators	Indicates low fuel level (when there are less than 13 gal. (50 L) of fuel remaining) and low coolant level.
28	Low Hydraulic Fluid and Hydraulic Filter Blocked Indicators	Indicates low hydraulic fluid and hydraulic filter blockage.
29	Inclinometer	Indicates limits for operating on a 20 percent slope/incline.

Table 4-2. Side Instrument Panel.

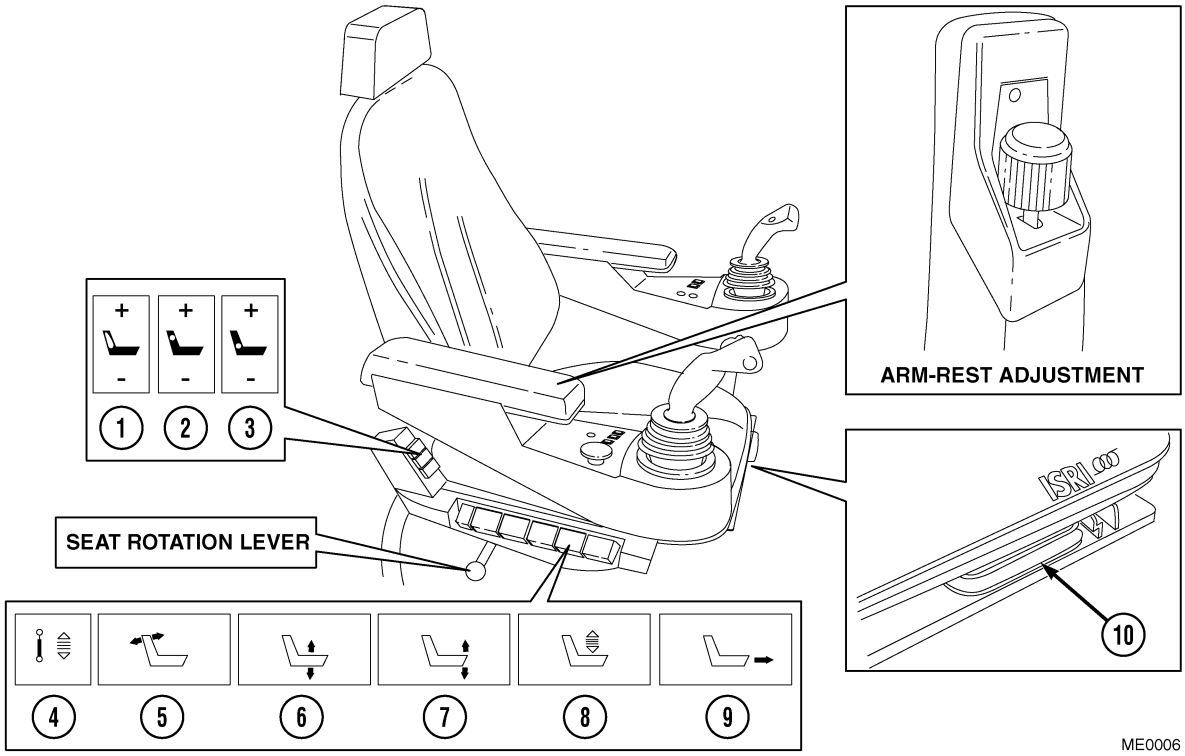
Key	Control or Indicator	Function
		
1	TRAILER EMERGENCY BRAKES Lever	Operates the trailer brakes.
2	PARK BRAKE Lever	Operates the parking brake.
3	AUXILIARY POWER Switch	Switches the auxiliary power on (for the trailer plug).
4	Ignition Switch	Allows the operator to control the vehicle's ignition. The switch is marked IGN and OFF, and is lockable in the OFF position.
5	START Button	Operates the engine's starter motor when depressed.
6	Backhoe Mode Switch	Selects BACKHOE A, BACKHOE B, or CROSS COUNTRY DRIVING modes.
7	HAND THROTTLE	Allows the operator to open and close the throttle while the seat is in the backhoe position. The control incorporates a friction lock, with a button in the center, used in an emergency to close the throttle without releasing the friction lock.

4-2. OPERATOR'S AND PASSENGER SEATS.

a. Operator's Seat.

The operator's seat has been designed to accommodate the operator comfortably and safely for traveling only. The seat is fitted with an integral lap and sash seat belt.

The seat incorporates an air suspension system with a weight adjustment feature. This allows operators to input their weight to ensure comfortable operation of the seat suspension system.



Lumbar adjustment buttons are located at the right rear of the operator's seat. Press (+) or (-) to either increase or decrease support for:

(1) Back

(2) Shoulders

(3) Hips

The following adjustment controls are included in a bank of buttons located on the right-hand side of the operator's seat:

(4) Seat Damper. Move button up to increase damping and down to decrease damping.

(5) Seat Back Angle. Move button up and press on backrest to change angle.

(6) Seat Height. Move button up to raise seat and down to lower seat. Release button when desired height is reached.

(7) Squab Angle. Move button up and load or unload front of seat cushion.

(8) Seat Lower/Raise. Move button up to move seat to lowest position and down to raise seat to previous position.

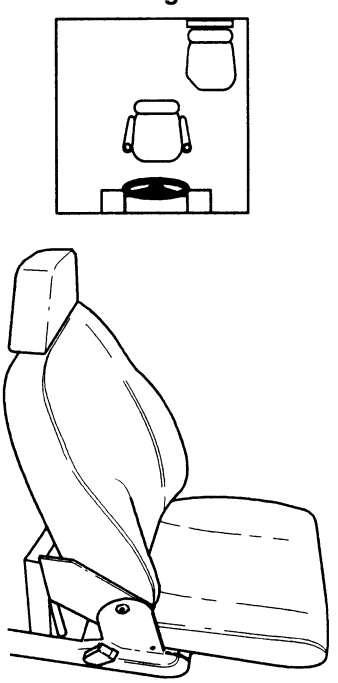
(9) Seat Cushion Removal. Press button to allow seat cushion to be removed.

(10) Seat Cushion Forward/Backward. Move lever to adjust seat forward/backward to desired position.

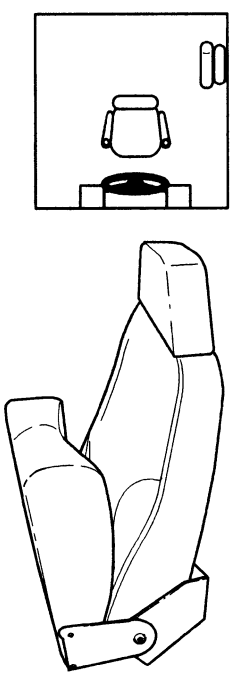
The operator's seat incorporates a rotating mounting plate which allows the operator to face forward to drive and operate the FEL, or to turn 180 degrees to face the rear and operate the backhoe. The mounting plate has a seat position detector which automatically selects FEL mode or backhoe mode, depending on the position of the seat.

To prevent the possibility of damaging either the operator’s or passenger seat, the passenger seat must be unoccupied and locked in the folded position prior to the operator's seat being rotated to the rear position.

b. Passenger Seat.



READY FOR USE POSITION



STOWED POSITION

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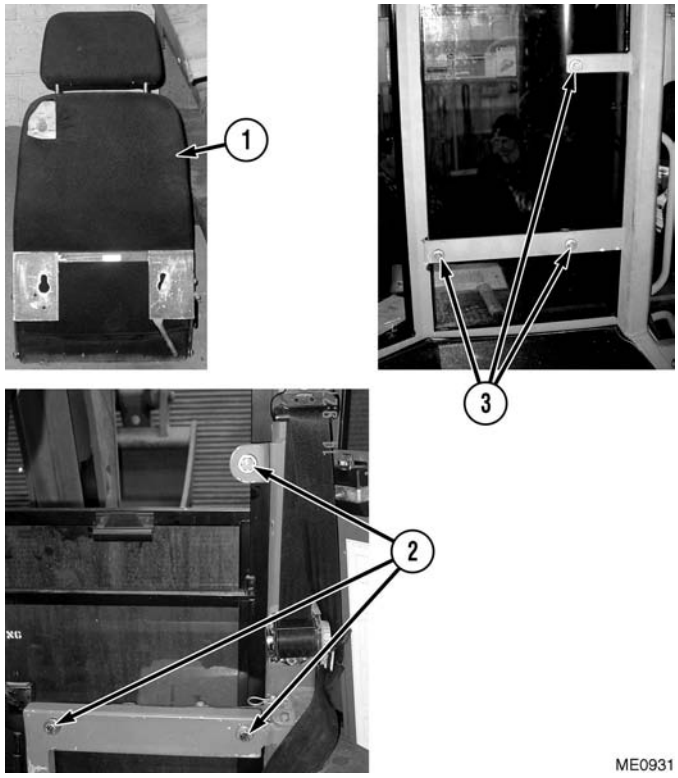

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WARNING

The passenger seat is not to be occupied during earth-moving or excavation operations. It is only to be used during highway travel. Failure to comply may result in injury or death to personnel.

The IHMEE passenger seat is designed to transport a passenger safely and comfortably. The passenger seat is fitted with a headrest, lap seat belt, and sash seat belt.

The passenger seat may be folded and locked when not in use. This is achieved by releasing the locking lever located on the left side of the seat and raising the seat. The locking lever locks the seat base in this position. Release the locking lever to lower the seat.

Before performing any earth-moving or excavation operations, the passenger seat must stowed as follows:

(1) Lift passenger seat (1) off three bolts (2).

(2) Position passenger seat (1) on three stowage bolts (3).

To deploy the passenger seat for use:

(3) Lift passenger seat (1) off three stowage bolts (3).

(4) Position passenger seat (1) on three bolts (2).

4-3. OPERATOR'S SEAT CONTROLS.

NOTE

The operator's seat armrests should be adjusted so that the joysticks do not interfere with the operation of any of the driving controls.

The operator's seat is equipped with two joysticks, one on each armrest. These devices provide control over the FEL, backhoe, and forklift. The left joystick is used for extending and retracting the dipper, dipper boom, and backhoe swing. The right joystick is used to control FEL and backhoe operations. Functions of the joystick controls are explained in greater detail in Para 6-3 and Para 7-5.

4-4. STEERING WHEEL.

WARNING

Do not adjust steering wheel during operation. Failure to comply may result in injury or death to personnel.

The IHMEE steering wheel is adjustable for height and reach. To make an adjustment, loosen locking lever on right side of instrument console, adjust steering wheel, and tighten locking lever.

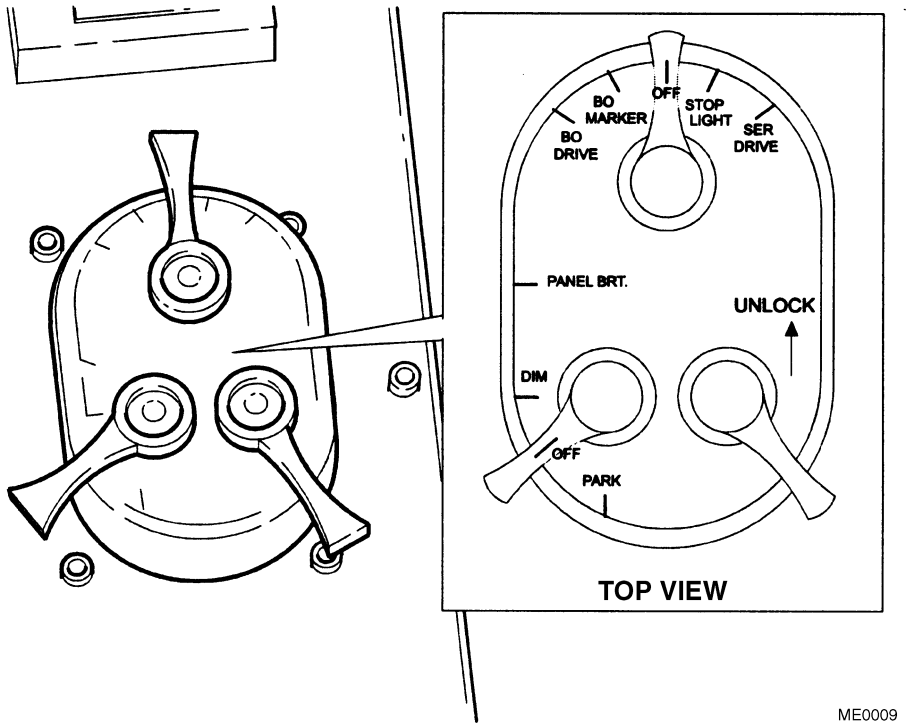
The IHMEE is equipped with full-time power steering with a manual backup to provide the operator with steering control in the event of a hydraulic failure.

4-5. LIGHTING.

The IHMEE is fitted with full, standard lighting and military blackout (BO) lighting to allow the vehicle to be operated under all conditions. The type and the location of the lights are given in Table 4-3.

Table 4-3. Type and Location of Lights.

Type	Location
Driving Lights, Front; Indicators, Front; Parking, Front	Mounted on the upper edge of the FEL bucket for driving on the road. Mounted on the upper edge of the front windshield for earth-moving operations.
Tail, Stop, Rear Indicators, Reverse Light	Mounted in a light unit positioned on the rear of the fenders.
Work Lights, Front	Mounted behind the radiator grill.
Work Lights, Rear	Mounted facing the rear on the upper edge of the rear windshield.
Markers, Front	Mounted on the mirrors.
Markers, Rear	Mounted on the upper-rear edge of the cab side windows, and the outer side of the rear fenders.
Interior Cab Light	Mounted centrally in the roof of the cab.
Driving Lights (Blackout) Markers (Blackout)	Mounted in the light unit mounted on the upper edge of FEL bucket. This unit can be relocated to a mounting on the upper edge of the front windshield.
Taillight (Blackout,) Stop Light (Blackout)	Mounted in a unit on the rear of the fenders.
Convoy Light	Mounted on the right-hand side of the rear fender.
Instrument Lights	Mounted in the instrument panel.
Flashing Beacon*	Magnetically mounted on roof.
** This is to be removed for C-130 air transport.*	



The light switch assembly is located on the right side of the main instrument panel.

The light switch assembly contains three lever-type switches. It is possible to select different lighting modes appropriate for operating conditions the vehicle is operating under. The top switch has five positions:

- BO (Blackout) DRIVE
- BO (Blackout) MARKER
- OFF
- STOP LIGHT
- SER (Service) DRIVE

The lower-left switch has four positions:

- PANEL BRT. (Bright)
- DIM
- OFF
- PARK

The lower-left switch is placed in the OFF position to turn lights off. Only when set to DIM or PARK can the instrument lights come on. In this configuration, the panel light DIMMER switch controls the intensity of the instrument lights.

The lower-right switch is a mechanical lock. This switch must be turned counterclockwise to the UNLOCK position before it is possible to change the position of the other two switches. The operating modes and the lighting available for each mode are given in Table 4-4.

Table 4-4. Lighting Operating Modes.

	Operating Mode				
Lighting Type	**BO DRIVE**	**BO MARKER**	**OFF**	**STOP LIGHT**	**SER DRIVE**
Driving Lights, Front	NO	NO	NO	NO	YES
Indicators, Front	NO	NO	NO	YES	YES
Parking, Front	NO	NO	NO	NO	YES
Tail, Rear	NO	NO	NO	NO	YES
Stop, Rear	NO	NO	NO	YES	YES
Indicators, Rear	NO	NO	NO	YES	YES
Reverse Lights	NO	NO	NO	YES	YES
Work Lights, Front*	NO	NO	NO	NO	YES
Work Lights, Rear*	NO	NO	NO	NO	YES
Markers, Front	NO	NO	NO	NO	YES
Markers, Rear	NO	NO	NO	NO	YES
Interior Cab Light	NO	NO	YES	YES	YES
Horn	YES	YES	YES	YES	YES
Warning Buzzer	YES	YES	YES	YES	YES
Reverse Buzzer	NO	NO	YES	YES	YES
Driving Lights (Blackout)	YES	NO	NO	NO	NO
Markers (Blackout)	YES	YES	NO	NO	NO
Taillight (Blackout)	YES	NO	NO	NO	NO
Stop Light (Blackout)	YES	YES	NO	NO	NO
Convoy Light	YES	YES	NO	NO	NO
Instrument Lights	NO	NO	YES	YES	YES
Flashing Beacon	NO	NO	YES	YES	YES
** The work lights are controlled by two switches mounted on the lower left of the main instrument panel.*					

NOTE

The instrument lights do not operate when the light switch is placed in either the BO DRIVE or BO MARKER position. These lights only operate when the light switch is set to SER DRIVE.

All the instrument panel controls and indicators are illuminated for night driving. The level of illumination is controlled from the panel light DIMMER switch mounted on the lower left of the main instrument panel. The switch has three positions:

- OFF - No panel light
- LOW - Dim panel light
- HIGH - Bright panel light

NOTE

The interior light does not operate when the light switch is in either the BO DRIVE or BO MARKER position.

The cab has an interior light, which turns on automatically when the door is opened. Light can be manually operated using the switch located on the side of the light.

4-6. TURN INDICATORS.

NOTE

The turn indicators will only operate when the light switch is set to STOP LIGHT or SER DRIVE.

The turn indicators are controlled from the High/Low beam and turn indicator combination stalk switch, mounted on the right side of the steering column.

4-7. WINDSHIELD WIPERS.

The IHMEE is equipped with both front and rear windshield wipers. The front windshield wiper has intermittent control and low and high speeds. The wipers are controlled by the rotary switch on the high/low beam and turn indicator combination stalk switch. Switch indicators and their descriptions are shown in Table 4-5.

Table 4-5. Windshield Wiper Control.

Indicator	Description
0	Off
J	Intermittent operation
1	Low speed
2	High speed

The front windshield washer is activated by pressing the rotary sleeve on the high/low beam and turn indicator stalk switch.

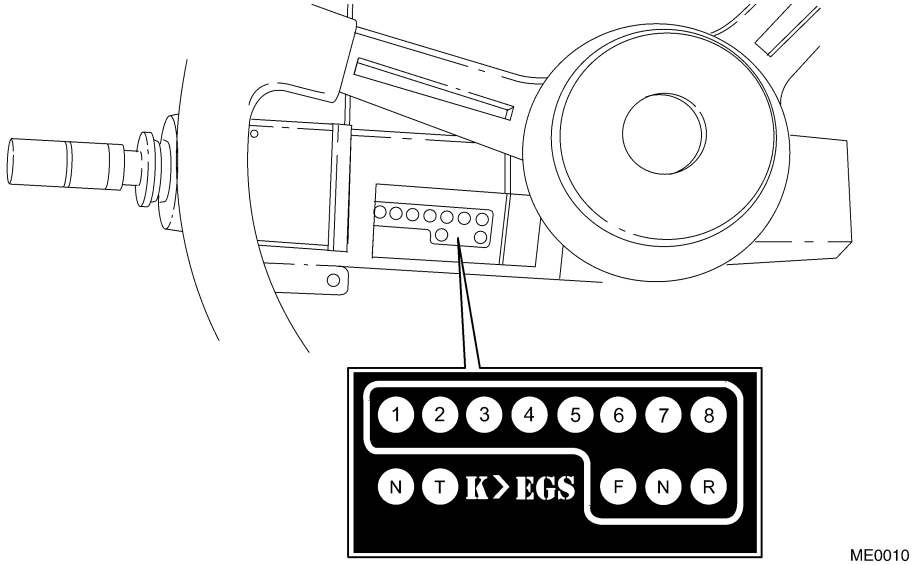
The rear window wiper and washer are controlled from a switch on the upper edge of the rear windshield.

The common reservoir for both the front windshield and rear window washers is located under the hood, on the front-left side of the engine.

4-8. HORN.

The horn button is located on the end of the high/low beam and turn indicator lever. To sound the horn, push button.

4-9. ELECTRONIC GEAR SHIFT (EGS).



The Electronic Gear Shift (EGS) is used to control the selected gear in the powershift transmission.

The EGS includes a mechanical shift lever, microcomputer, and indicator display integrated into the shift lever housing. The EGS computer system receives information internally from the shift lever and externally from a speed sensor. This information, together with acquired vehicle speed information, is used to shift to the requested gear or to prevent the shift. The shift lever display indicates shift status.

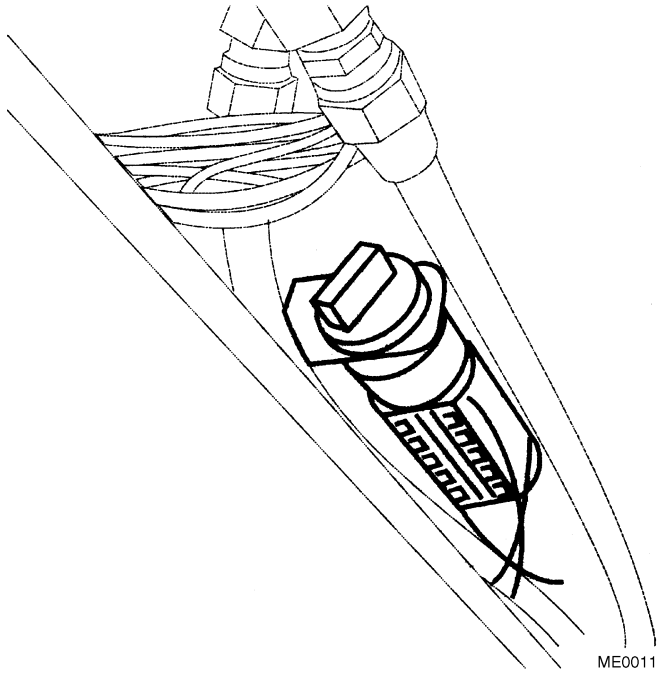
4-10. EMERGENCY GEAR SWITCH.

CAUTION

Do not drive or use the vehicle for earth-moving while in emergency gearshift mode. Failure to comply may result in damage to equipment.

In the case of a severe EGS malfunction, the gearshift can be used to select an emergency mode. This is done by the use of the emergency gearshift switch, located inside the Power Distribution Panel (PDP) cabinet. Placing the switch in the emergency position locks the gearbox in second gear, giving the driving options of forward or reverse in either high or low range.

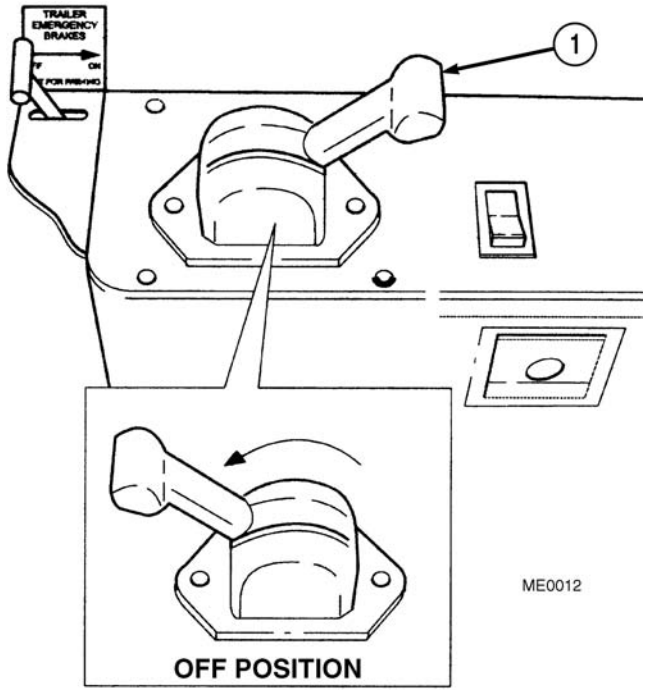
This switch must only be used in the event of a malfunction, to move the vehicle onto a trailer for transport to a suitable repair location. The vehicle must not be driven or used for earth-moving or any other operation while the gearbox is in emergency mode.



4-11. PARKING BRAKE.

The IHMEE is fitted with a parking brake system that is spring-operated and locks all four wheels. The PARK BRAKE lever is mounted on the console on the right side of the operator's seat.

To engage the parking brake, move PARK BRAKE lever (1) from OFF to ON and simultaneously raise lever to hold it in locked position.

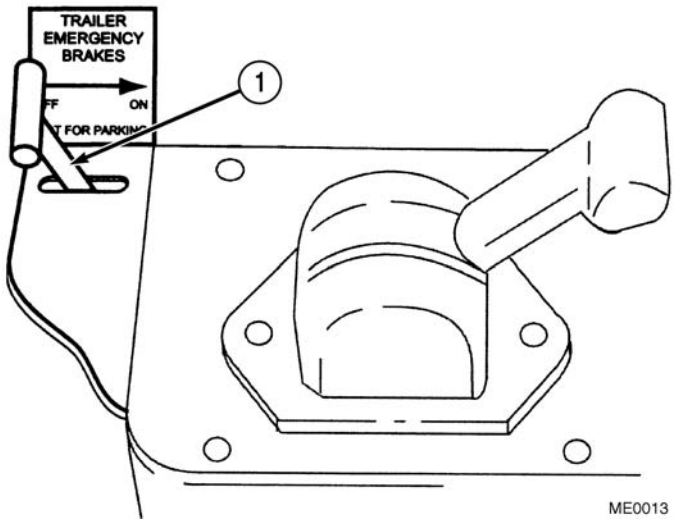


4-12. TRAILER BRAKES.

The IHMEE is fitted with a separate proportional braking system for use when towing a trailer. When a trailer is attached to the IHMEE, trailer service brakes are coupled to the vehicle's foot brake and parking brake. Normal operation of the foot brake causes the trailer service brakes to be applied at the same time. Use of the IHMEE parking brake also applies the trailer's service brakes.

The trailer parking brakes are operated using a spring-loaded lever, attached to the front of the side console. To prevent the trailer from overrunning the IHMEE, the trailer parking brakes should be applied before the vehicle brakes are applied. The trailer parking brakes may also be used to slow the vehicle on long declines.

To activate the trailer brakes, move TRAILER EMERGENCY BRAKES lever (1) to ON position.



4-13. HAND THROTTLE.

The HAND THROTTLE is located at the rear of the side console. This device is used to control the speed of the engine when the backhoe is being operated. Operate backhoe at 1,500 RPM only.

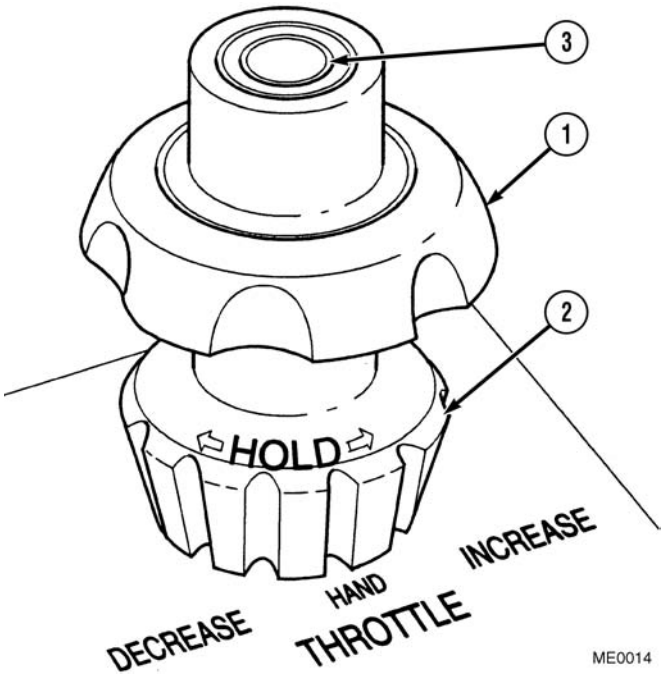
(1) Raise throttle (1) to increase speed of engine and lower to decrease speed of engine.

(2) Lock throttle in selected position by tightening locking collar (2).

NOTE

The control incorporates a safety feature to close the throttle in an emergency.

(3) Depress button (3) and throttle (1) simultaneously. This automatically disengages locking collar and sets throttle to idle.



4-14. PEDALS.

The IHMEE is equipped with two foot pedals located on the floor beneath the steering wheel. The right pedal is the accelerator pedal, used to control the speed of the engine. The left pedal is the brake pedal, used to control braking system of the vehicle.

4-15. HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC).

a. A/C Controls Introduction.

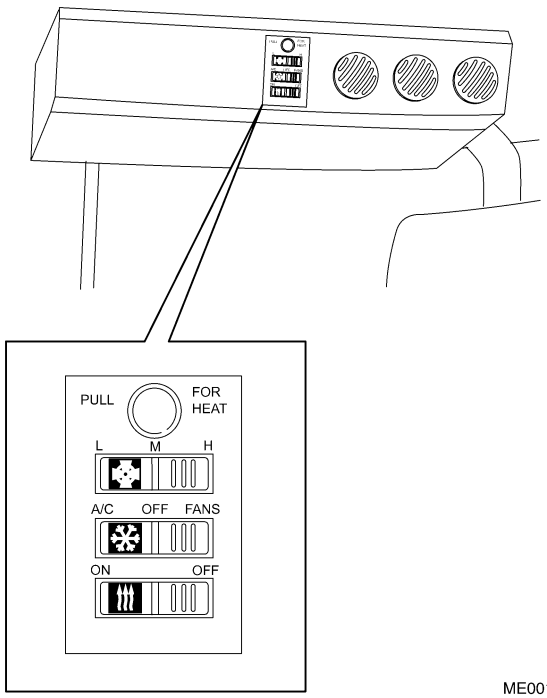
The temperature in the IHMEE cab is fully controlled by a compact, ceiling-mounted unit, which provides 8 hp (6 kW) of cooling and 5 hp (4 kW) of heating. The unit also provides prefiltered make-up air to the cab.

CAUTION

To prevent the possibility of damaging the air-conditioning compressor, ensure the air-conditioning unit is switched OFF prior to starting the engine. Failure to comply may result in damage to equipment.

The controls of the air-conditioning unit are shown in the enlarged view of the control panel:

- PULL FOR HEAT control
- A/C fan speed switch (only operative when A/C or FANS are selected)
- A/C selector switch
- Cab pressurization switch



ME0015

b. Cab Cooling.

Cooling the cab is achieved by selecting A/C on the selector switch and pushing in on the PULL FOR HEAT control. This sets the temperature control to the coldest setting, and sets the fan speed to H (High). Once the desired comfort level is reached, fan speed can be reduced to M (Medium) or L (Low) to maintain a comfortable temperature in the cab.

c. Cab Heating.

NOTE

The cab heater utilizes engine coolant as a heat source. Therefore, the heater reaches maximum efficiency only when the engine has reached normal operating temperature.

To heat the cab, pull the PULL FOR HEAT control out, select either A/C or FANS, and turn fan speed to H (High). As soon as the cab has reached the desired temperature, the temperature and the fan speed controls can be progressively reduced to maintain a comfortable temperature in the cab.

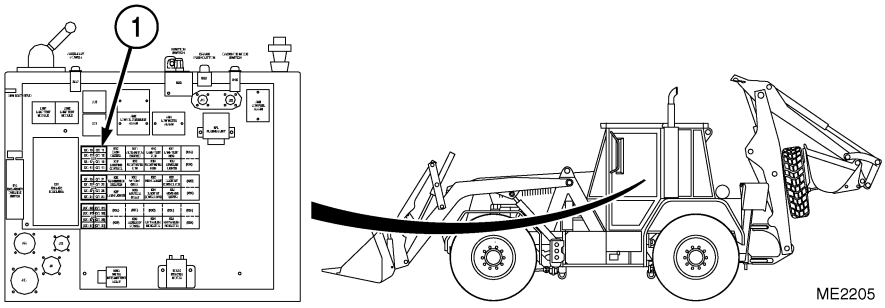
d. Cab Defrosting.

To defrost the cab, pull the PULL FOR HEAT control partially out, select A/C, and set fan speed to H (High). The dehumidifier in the air-conditioner unit removes excess moisture from the cab. When the windows have been defrosted, the fan speed can be reduced to M (Medium) or L (Low) to maintain clear vision through the cab glass.

e. Cab Pressurization.

It is possible to provide a positive air pressure in the cab to minimize dust invasion while operating in dusty conditions. This is achieved by closing the cab windows and switching the cab pressurization switch to ON.

4-16. CIRCUIT BREAKER IDENTIFICATION.



The IHMEE is equipped with three banks of circuit breakers (1) located within the PDP box next to the operator's seat. Table 4-6 lists each circuit breaker and the item(s) that it controls.

Table 4-6. Circuit Breaker Identification.

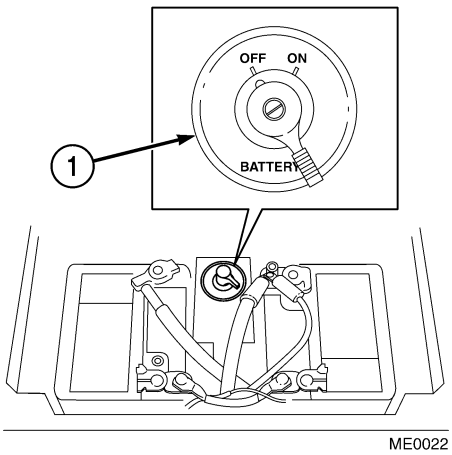
Circuit Breaker	Description
CB11	Charge Equalizer, 24Vdc
CB12	Air-Conditioning Unit
CB13	Work Lights
CB14	Instruments
CB15	Pneumatic Control
CB16	Annunciators
CB17	Wipers
CB18	EGS
CB21	Starter Switch
CB22	SINGARS Radio
CB23	Brake Lights
CB24	Lights
CB25	Charge Equalizer, 24V
CB26	Hydraulic Master Switch and Ignition
CB27	Hydraulic Battery, 12Vdc
CB28	Commercial Radio
CB31-CB36	Unused Spare Positions
CB37	Trailer Auxiliary Power
CB38	Trailer Indicators

CHAPTER 5
OPERATING INSTRUCTIONS

Contents

5-1. ELECTRICAL MASTER SWITCH.

The electrical master switch (1) is used to disconnect power from the vehicle (when it is not in use) to prevent battery drain and make electrical repairs safer.



ME0022

WARNING

Always use the electrical master switch to disable battery power when disconnecting or connecting electrical connections. Failure to comply may result in injury or death to personnel.

CAUTION

Electrical master switch must only be used while engine is OFF. Failure to comply may result in damage to vehicle.

Place electrical master switch (1) in ON position to operate IHMEE. Place electrical master switch (1) in OFF position after parking IHMEE or when working with electrical system.

5-2. STARTING THE ENGINE.

a. Prior to Starting Engine.

WARNING

- Before operating the vehicle, visually check area around vehicle to ensure there is sufficient, safe clearance. Failure to do so could result in personnel injury and/or damage to equipment.
- To ensure the safety of the operator, the operator must always be seated in the operator's seat prior to starting the engine. Failure to comply may result in injury or death to personnel.
- Use ground guide when operating near personnel, buildings and other equipment, and when backing vehicle. Failure to do so could result in personnel injury and/or damage to equipment.
- APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.

CAUTION

To prevent the possibility of damaging the air-conditioning compressor, ensure the air-conditioning is switched off prior to starting the engine. Failure to comply may result in damage to equipment.

Prior to starting engine, driver must carry out all before PMCS steps that are detailed in Para 3-6.

b. Starting Engine.

(1) Ensure electrical master switch is ON (Para 5-1).

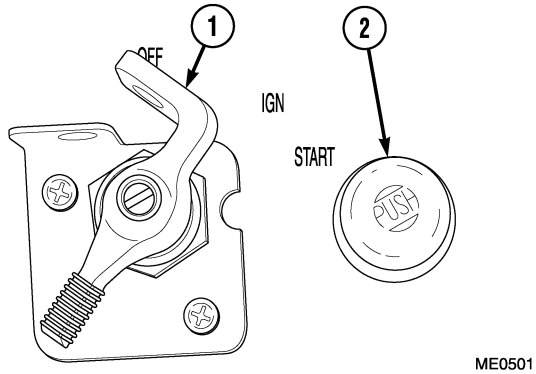
(2) Ensure EGS lever is in N (Neutral) position (Para 5-4).

(3) Ensure PARK BRAKE lever is ON (Para 4-11).

(4) Turn ignition switch (1) to IGN position.

CAUTION

To avoid possible damage to the starter motor, do not press START button for more than 15 seconds at a time. If the engine fails to start after three attempts, allow 2 min. for the starter motor to cool before trying to start engine again. Failure to comply may result in damage to equipment.



(5) Press and hold START button (2) until engine starts.

(6) If engine does not start, turn ignition switch (1) to OFF position and repeat Steps (4) and (5).

c. Engine Warm-Up (Above 0 °F (-18 °C).)

NOTE

The warm-up period depends on the ambient temperature. Care should be taken at lower temperatures to allow vehicle to warm up sufficiently.

Operate vehicle carefully, avoiding high loads and speeds until temperatures and pressures reach normal operating range. During operation of vehicle, operator should:

(1) Monitor instruments regularly.

(2) Stop vehicle and carry out troubleshooting procedures if any warning indicators or buzzers come on.

(3) Be aware of unusual noises or handling characteristics. If this occurs, stop the vehicle and carry out troubleshooting procedures.

NOTE

The brake low-pressure indicator and warning buzzer should both turn off within 3-4 min. of engine starting. If this fails to happen, switch engine off and investigate the cause of the alarm.

Check instruments after engine has been running for 3-4 min. All warning indicators should be off. If any warning indicators remain on, stop engine and investigate the cause of the alarm.

d. Cold Weather Warm-Up (0 °F (-18 °C) and Below).

In addition to the normal warm-up procedures, the hydraulic systems will require additional warm-up procedures during very cold weather (0 °F (-18 °C) and below).

NOTE

During cold weather operations, the hydraulic functions may operate slowly. Do not attempt Front-End Loader (FEL) or backhoe operations until the hydraulic oil has reached operating temperature.

To allow hydraulic oil to reach normal operating temperature:

(1) Run engine at half speed for 5 min.

(2) Cycle boom and bucket functions until hydraulic oil has reached normal operating temperature and functions move at normal speed.

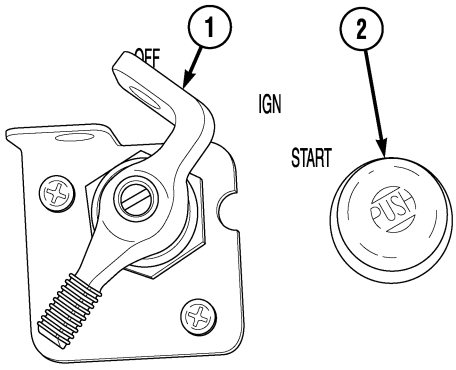
e. Shutting Engine OFF.

(1) Ensure EGS lever is in N (Neutral) position (Para 5-4).

(2) Ensure PARK BRAKE lever is ON (Para 4-11).

(3) Turn ignition switch (1) to OFF position.

(4) Turn electrical master switch OFF (Para 5-1).



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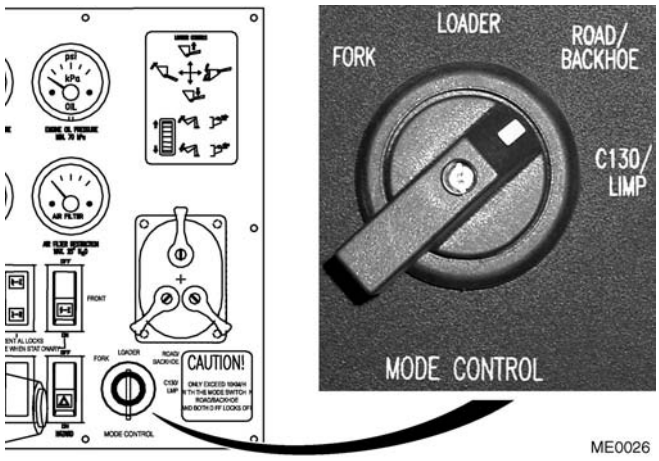
5-3. SUSPENSION MODE.

The operator can select one of four suspension modes, depending on the task. Modes are selected with the suspension MODE CONTROL switch on the main instrument panel.

The four settings for the MODE CONTROL switch are:

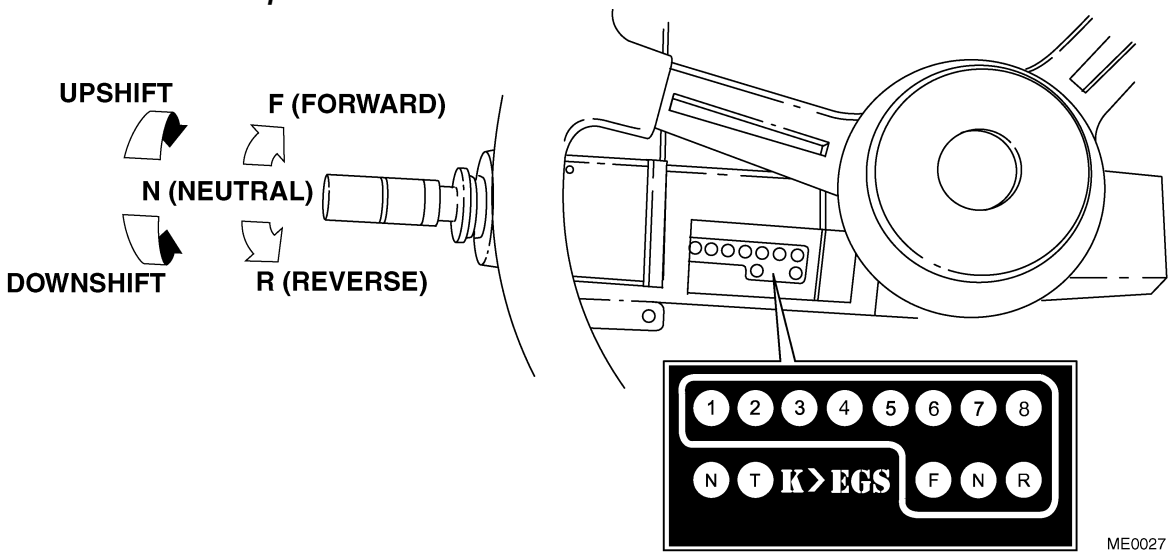
- FORK
- LOADER
- ROAD/BACKHOE
- C130/LIMP

Ensure suspension mode selected is appropriate for the task to be performed.



5-4. GEAR SELECTION.

a. Introduction to EGS Operation.



The Electronic Gear Selector (EGS) is used to select transmission gears. A total of eight forward and four reverse gears are available – four forward and two reverses in high range, and four forward and two reverses in low range. The EGS is comprised of a microcomputer and an indicator display integrated into the shift lever housing. The computer system receives information internally from the shift lever and externally from a speed sensor.

The EGS has a mechanical shift lever which passes information to the computer. This information and acquired vehicle speed information is used to shift to the requested gear or prevent the shift. A prevented shift is indicated on the shift lever display.

The shift lever is spring-loaded to one of three positions, F (Forward), N (Neutral), or R (Reverse). When electrical power is applied to the EGS, N (Neutral) is always selected, regardless of the position of the shift lever. However, if the shift lever is in another position, the driver has to place the lever in the N (Neutral) position before a direction of travel can be selected.

b. Indicator Display.

The indicator display consists of Light-Emitting Diodes (LEDs), which give information to the driver. The following information about the EGS and the transmission can be displayed on the indicator display:

- Selected EGS lever position
- Selected transmission position
- Application-specific information
- Diagnostic information.

The LEDs are numbered (1) through (8). They are also multicolored and may display red, green, or yellow. The LEDs indicate the selected shift lever position and the selected transmission position. They can also indicate operating mode and diagnostic information.

LEDs (1) through (6) indicate the status of the transmission. The gear that the transmission is in is indicated by one of the LEDs displaying a steady light. If the driver requests a different gear, a second LED begins to blink, indicating the requested gear has not yet been selected.

The LED colors indicate if F (Forward), R (Reverse), or N (Neutral) has been selected. Displayed colors are:

- Green = F (Forward)
- Yellow = R (Reverse)
- Red = N (Neutral)

LED (7) indicates converter lockup is engaged. It always displays orange, regardless of direction, if lockup is active in normal operating mode.

LED (8) indicates the status of the speed sensor and the status of the transmission protection system.

Table 5-1 lists and describes system LED colors and their meanings.

Table 5-1. Transmission Protection System.

LED Color	Indication
Green	“Go” condition - neutral lock not active, and gears can be selected, but there is no speed signal, e.g., vehicle is stationary.
Orange	Neutral lock is active, and gears cannot be selected.
Red	Neutral lock is active, and speed is not zero.
Blinking	Either disengage, neutral lock, or throttle switch is closed, preventing drive (Note: N (Neutral) LED should be red).

The red LED, labeled N (Neutral), indicates transmission is in neutral (even if the shift lever is not in the neutral position).

The yellow LED, labeled T (Troubleshooting), indicates the EGS is carrying out a troubleshooting self-test.

c. Changing Direction of Travel.

NOTE

The vehicle must be stationary, and the throttle position must be at idle, before a new direction of travel can be selected.

Direction of travel and gear selection is selected as follows:

- **Forward Movement**. To select an F (Forward) gear, driver must push shift lever forward. To request a higher gear, driver must rotate the shift lever in a forward direction.
- **Reverse Movement**. To select an R (Reverse) gear, shift lever must be pulled toward the driver. To request a higher gear, driver must rotate the shift lever in a forward direction. To downshift, driver must rotate shift lever in a rearward direction.
- **Neutral**. N (Neutral) can be selected by placing the shift lever in the central detent position.

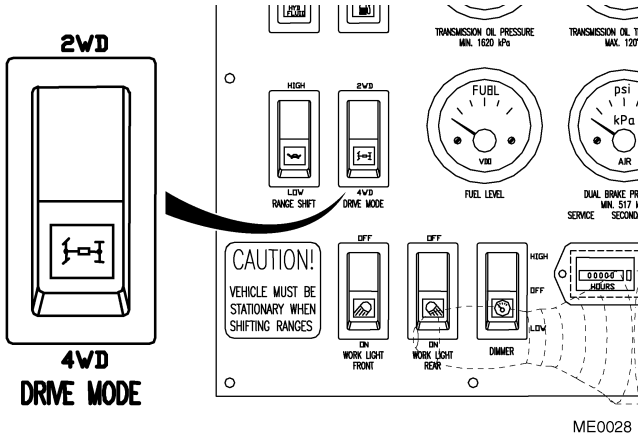
The EGS has a built-in protection system that prevents the transmission from selecting a new direction of travel until after the vehicle has come to a standstill, and the throttle position is at idle. After a change of direction, first gear is automatically selected, and the driver is free to make further gear selections.

5-5. DRIVE MODE.

NOTE

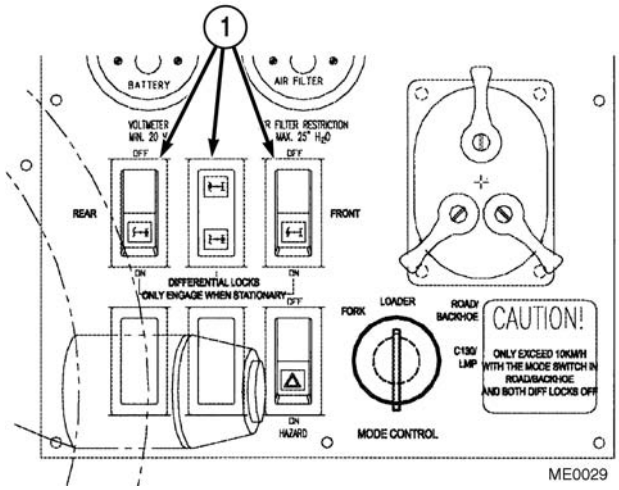
Drive mode cannot be changed until vehicle is stationary and in N (Neutral).

The DRIVE MODE switch allows the driver to select 2WD (two-wheel drive) or 4WD (four-wheel drive). The vehicle must be stationary and in N (Neutral) before changing the drive mode.



5-6. DIFFERENTIAL LOCKS.

The DIFFERENTIAL LOCKS switches (1) allow the driver to lock the front, rear, or both differentials. The DIFFERENTIAL LOCK indicator shows which differential is locked.



NOTE

- The vehicle must be stationary when engaging or disengaging differential locks.
- Locking the front differential considerably increases vehicle turning radius, and additional effort is required to steer the vehicle.

In conditions where four-wheel drive is not providing sufficient traction, the rear differential should be locked by pressing the REAR DIFFERENTIAL LOCK switch. In extreme conditions where more traction is required, the front differential may be locked by pressing the FRONT DIFFERENTIAL LOCK switch. The front differential lock should only be used when traveling in a straight line or on low-friction surfaces.

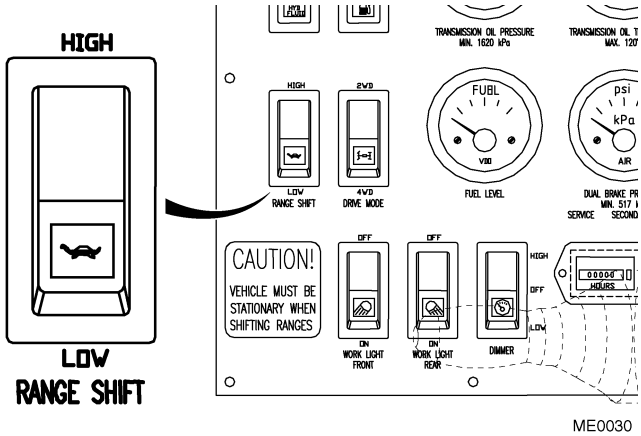
If the differential lock fails to disengage, stop the vehicle, then drive in reverse a short distance. Differential lock should disengage. If it does not, repeat procedure.

5-7. RANGE SHIFT.

NOTE

The vehicle must be stationary and in N (Neutral) before changing the range shift.

The RANGE SHIFT switch allows the driver to select a LOW or HIGH range ratio for the transmission. The HIGH range is used for highway and fast off-road driving, and the LOW range is used for off-road and FEL operations. The vehicle must be stationary and in N (Neutral) before changing the range shift.



5-8. STEERING.

The IHMEE is equipped with full-time power steering, operating on the front wheels. To turn the vehicle to the left, the driver turns the steering wheel to the left. To turn the vehicle to the right, the driver turns the steering wheel to the right. The driver only has to assert enough manual effort to overcome the torsion bar and the rotary valve in the system.

5-9. BRAKING.

CAUTION

Except in the event of an emergency, the parking brake is not to be applied while the vehicle is in motion. Failure to comply may result in damage to equipment.

To reduce the speed of the vehicle, the driver is required to apply the brake. This action supplies air from the air reservoir to the pneumatically operated brakes.

If the Low Air Pressure indicator comes on, and the warning buzzer sounds while the vehicle is in motion, the driver must stop the vehicle as soon as possible.

5-10. HIGH-SPEED DRIVING.

WARNING

- The IHMEE requires an escort and may not exceed 30 mph (48 km/h) when operating on primary roads. Failure to comply may result in injury to personnel and/or damage to equipment.
- Caution MUST be exercised at all times when traveling or operating in off-road conditions or extreme weather conditions, i.e., icy roads. Failure to comply may result in injury to personnel and/or damage to equipment.
- Be aware that other road users may have difficulty in judging the speed of the IHMEE. To avoid the possibility of an accident, it is important that the operator of this vehicle use caution and drive defensively. Failure to comply may result in injury or death to personnel.
- The IHMEE is a large vehicle, over 28 ft. (8.6 m) long and 8 ft. (2.5 m) wide. When traveling on the highway, the FEL and backhoe extend a considerable distance in front and behind the vehicle. Operators are to be aware of the front and rear overhang and drive accordingly. Failure to comply may result in injury or death to personnel.
- Be aware that the FEL reduces forward visibility and may create blind spots. To reduce the possibility of a collision when driving on the highway, use extreme caution. Failure to comply may result in injury or death to personnel.

CAUTION

To avoid damaging the transmission and differentials, two-wheel drive must be selected and both differentials must be unlocked before driving at highway speeds. Failure to comply may result in damage to equipment.

The IHMEE is capable of maintaining an average speed of 30 mph (48 km/h) on the highway, allowing it to maintain position in a convoy.

The use of the vehicle headlights, even in good visibility conditions, may help other road users become aware of the IHMEE.

5-11. TRAVEL MODE.

WARNING

During road and highway movement, the backhoe and FEL buckets must be empty and secured with the travel stops and locking clevises. Failure to do so could result in injury to personnel.

CAUTION

Mud flaps must be in the down position prior to lowering/raising stabilizers, backhoe operation, or road use. Failure to comply may result in damage to equipment.

(1) Ensure mud flaps are deployed (Para 3-16).

(2) Ensure headlights are stowed on the bucket (Para 5-12).

(3) Install spare tire on backhoe bucket (Para 8-6).

(4) Install backhoe pivot pin (Para 7-2).

(5) Install travel stop on backhoe (Para 7-6).

(6) Install backhoe stabilizer turnbuckles (Para 7-7).

(7) Install travel stops on FEL (Para 6-2).

(8) Install locking clevis on 4-in-1 bucket (Para 6-2).

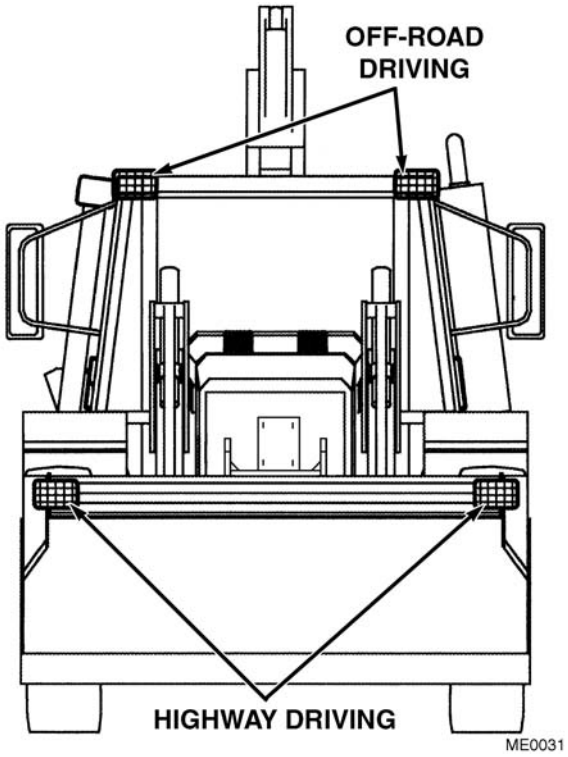
5-12. HEADLIGHT POSITION.

a. General.

CAUTION

Headlights must be mounted on cab before driving off-road or performing any earth-moving operations. Failure to comply will result in damage to equipment.

The IHMEE is provided with two headlight positions: one for off-road driving and the other for highway driving. Headlights should be mounted on the bucket for highway driving, and must be moved to the top of the windshield for off-road driving and earth-moving operations.



b. Headlight Removal.

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal, a direct short may result in instant heating of tools, damage to equipment, and injury or death to personnel.

NOTE

Procedure to remove headlights is the same for all locations. Right-side bucket position shown.

(1) Ensure electrical master switch is OFF (Para 5-1).

(2) Disconnect light plug (1).

NOTE

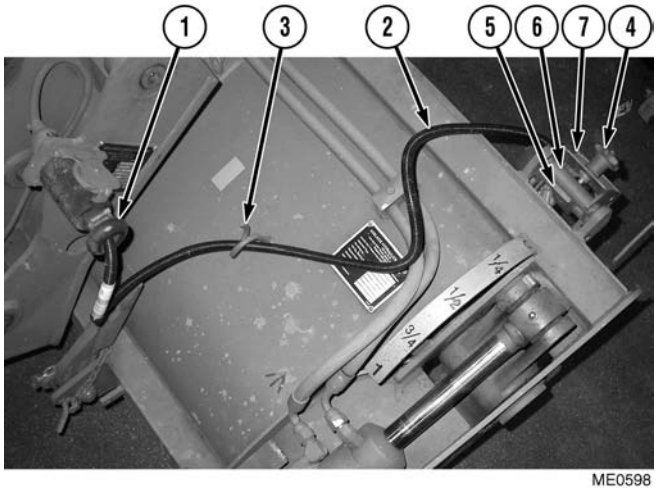
Perform Step (3) for 4-in-1 bucket positions only.

(3) Remove cable (2) from eye loop (3).

(4) Loosen knob (4) until T-bar (5) can be rotated freely.

(5) Rotate T-bar (5) approximately 90° so that it can fit between retaining bars on light mount (6).

(6) Remove headlight assembly (7) from light mount (6).



c. Headlight Installation.

NOTE

Procedure to install headlights is the same for all locations. Right-side bucket position shown.

(1) Position headlight assembly (7) on light mount (6).

(2) Rotate T-bar (5) approximately 90° so that it will not fit between retaining bars on light mount (6).

(3) Tighten knob (4) to secure T-bar (5) against retaining bars on light mount (6).

NOTE

Perform step (4) for 4-in-1 bucket positions only.

(4) Route cable (2) through eye loop (3).

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal, a direct short may result in instant heating of tools, damage to equipment, and injury or death to personnel.

(5) Connect light plug (1).

5-13. PARKING VEHICLE.

(1) Ensure headlights are stowed on the bucket (Para 5-12).

(2) Ensure spare tire is stowed on backhoe bucket (Para 8-6).

(3) Ensure backhoe pivot pin is installed (Para 7-2).

(4) Ensure travel stop is installed on backhoe (Para 7-6).

(5) Ensure turnbuckles are installed on backhoe stabilizer (Para 7-7).

(6) Position IHMEE where it is to be parked.

(7) Stow FEL travel stops and remove locking clevis from 4-in-1 bucket (Para 6-2).

(8) If installed, lower 4-in-1 bucket to the ground, ensuring that bucket is rolled forward and teeth are on ground (Para 6-4).

(9) If installed, lower forklift attachment to the ground, ensuring that forklift tines are lowered and on ground (Para 6-4).

WARNING

Ensure MODE CONTROL switch is set to ROAD/BACKHOE before shutting OFF engine. Failure to do so will allow suspension to rise and may result in injury to personnel.

(10) Ensure MODE CONTROL switch is set to ROAD/BACKHOE (Para 5-3).

(11) Shut OFF engine (Para 5-2).

5-14. OFF-ROAD OPERATION.

WARNING

- Do not exceed 25 mph (40 km/h) when operating the vehicle on secondary roads or cross-country. Failure to comply may result in injury to personnel and/or damage to equipment.
- Caution must be exercised at all times when traveling or operating in off-road conditions. Reduce vehicle speeds and avoid deep ruts and potholes. Use the manual level indicators during FEL operations. Failure to comply could result in injury to personnel and/or damage to equipment.
- Caution MUST be exercised at all times when traveling or operating in off-road conditions or extreme weather conditions, i.e., icy roads. Failure to comply may result in injury to personnel and/or damage to equipment.
- Do not exceed 20 percent side slope and avoid turning across soft side slopes while descending. Failure to comply could result in injury to personnel and/or damage to equipment.
- Caution must be exercised during FEL operations. Do not carry a loaded bucket more than 24 in. (61 cm) above ground while traveling over rough or hilly terrain. Failure to comply could result in injury to personnel and/or damage to equipment.

a. Traveling Over Soft Ground.

The IHMEE is equipped with a switchable four-wheel drive, incorporating differential locks. This enables the vehicle to negotiate almost all types of terrain. When required to travel over soft ground or in difficult conditions:

CAUTION

Mud flaps must be in the up position prior to off-road driving or FEL operations. Failure to comply may result in damage to equipment.

(1) Ensure mud flaps are stowed (Para 3-16).

(2) Adjust tire pressures according to conditions. Refer to Para 3-17 for proper tire pressures.

(3) To allow bucket to be raised or lowered to suit terrain, unchain bucket and turn hydraulic master switch ON.

(4) Set DRIVE MODE switch to 4WD.

(5) Set backhoe mode switch to CROSS COUNTRY DRIVING.

(6) Engage front or rear differential locks as necessary.

(7) Travel slowly and steadily.

(8) Mud can accumulate on the chassis and around components. Keep it cleared away.

b. Traveling Over Rough Ground.

Reduce vehicle speed as necessary when traveling over rough ground.

c. Traveling on a Slope.

The greatest danger of the vehicle tipping over exists while negotiating slopes. Great care must be exercised when operating on slopes.

WARNING

Do not attempt to jump clear of a tipping vehicle; serious or fatal crushing injuries may result. Vehicle tips faster than driver or passenger can jump free. Failure to comply may result in injury or death to personnel.

If the vehicle starts to tip, stay seated. The Rollover Protection Structure/Falling Object Protection Structure (ROPS/FOPS) protects the operator in the event of the vehicle tipping.

Always travel straight up and down slopes, never at an angle, and never perpendicular to the slope. Drive up the slope in forward gear and down the slope in reverse gear. Remember, the danger of tipping is always present.

WARNING

When traveling over uneven ground, it is important to keep the FEL active, to allow it to be raised or lowered as required for ground clearance. Failure to comply may result in injury or death to personnel.

When traveling up- or down-hill with a loaded bucket, keep the bucket on the uphill side, as low as possible. If the vehicle starts to slip or become unstable, lower the bucket to the ground and stop the vehicle immediately.

In steep slope conditions, do not allow the engine to race. Select low gear speed before starting down slopes.

If the engine stalls on a slope, quickly apply the brake and lower the bucket to the ground. Apply the parking brake and restart the engine.

d. Fording.

CAUTION

- Water seriously affects the performance of brakes. Ensure that brakes are dried out completely after crossing any water hazard. Failure to comply may result in damage to equipment.
- Serious damage can occur to the axles if they are submerged in water. Determine the depth of any water required to be forded before entering.

The IHMEE has a fording depth of 30 in. (760 mm) with wake, enabling vehicle to ford water or mud up to that depth.

After crossing any water hazard, it is essential that water be removed from the brakes. This can be achieved by making several light applications of the brake pedal until full efficiency of the brakes is restored. Refer to Para 3-10 for information on lubrication after fording.

5-15. TOWING A TRAILER.

The vehicle is supplied with a towing hitch that can be fitted to the backhoe arm. To install towing hitch, refer to Para 7-4. The only trailer authorized for use with the IHMEE is the M353 trailer (TM 9-2330-247-14&P, TM 9-6115-646-14&P, or TM 9-6115-647-14&P).

WARNING

Do not exceed the maximum rated towing capacity of the IHMEE is 8.8 tons (8 tonnes) for the combined weight of the trailer and load. Failure to comply may result in injury or death to personnel and/or damage to equipment.

CAUTION

When using the vehicle for towing, maintain the transmission in converter lockup mode as much as possible to minimize transmission overheating. Failure to comply may result in damage to equipment.

To improve efficiency, the vehicle is equipped with a torque converter lockup system. The system should be engaged as much as possible when driving on the highway.

When a trailer is attached to the IHMEE, the trailer service brakes are coupled to the vehicle foot brake and parking brake. For additional information on the trailer brake, refer to Para 4-12.

When using the vehicle for towing, maintain the torque converter lockup mode as much as possible to reduce the possibility of the transmission overheating. This requires the selection of the correct gear for the conditions. For example, if the torque converter lockup drops out when towing up a steep incline, driver must engage a lower gear and then reselect the torque converter lockup mode.

5-16. TOWING A DISABLED IHMEE.

CAUTION

- The IHMEE must be towed by a vehicle that has sufficient capacity and capabilities to safely perform the task. The towing vehicle must also be equipped with a suitable tow bar that applies an equal force to each of the two recovery lugs.

- To avoid damaging the transmission, the drive shafts must be disconnected prior to towing the vehicle a distance greater than 547 yards (500 m). Failure to comply may result in damage to equipment.

Whenever possible, load the IHMEE on to a flat rack or truck if the towing distance is greater than 547 yards (500 m).

CAUTION

Exercise extreme caution when towing over uneven terrain to ensure that the structure of towing vehicle and the IHMEE do not collide. Failure to comply may result in damage to the IHMEE and the towing vehicle.

During all towing operations, ensure that the tow bar will not foul on the IHMEE or its backhoe or FEL bucket attachments when towing over uneven terrain (such as crossing a ditch or ridge).

If the IHMEE engine is not operational, it will not be possible to release the parking brake. To overcome this, it is possible to attach a slave air supply to the IHMEE. This will allow the parking brake to be released and will also allow normal operation of the footbrake.

CAUTION

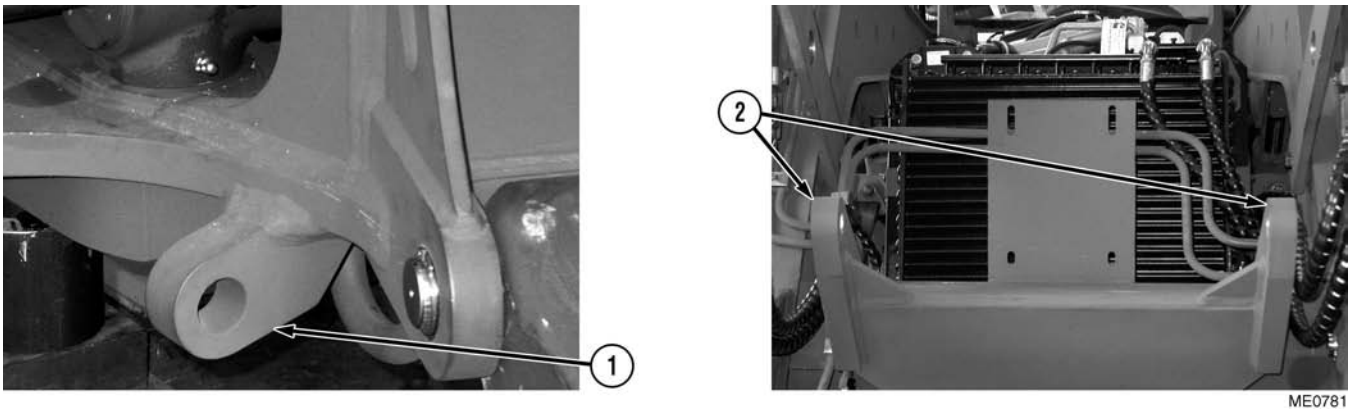
Caging the spring brake chambers is for emergency towing of the vehicle only, and will manually release the vehicle's brakes. Ensure that vehicle is secured by the towing vehicle or wheel chocks before caging the brake. Failure to comply may allow the IHMEE to move, resulting in serious injury or death to personnel and/or equipment damage.

If a slave air supply is not available, it is possible to manually release the vehicle's brakes (refer to Para 3-29). Exercise extreme caution after caging the brakes, because no braking actions will be available on the IHMEE.

If the engine is not running while the vehicle is being towed, the power steering does not operate, and the steering requires more effort to operate.

CAUTION

The IHMEE's front towing points are limited to a maximum force of 12,000 lbf (53,400 N) before permanent damage will occur. Exceeding this force will cause damage to the vehicle.



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Always tow the IHMEE by the rear towing points (1) whenever possible. The front towing points (2) must only be used when the towing vehicle cannot attach to the rear towing points for some reason.

5-17. SLAVE-STARTING THE IHMEE.

CAUTION

Do not allow vehicles to touch while slave-starting. Failure to comply may result in damage to equipment.

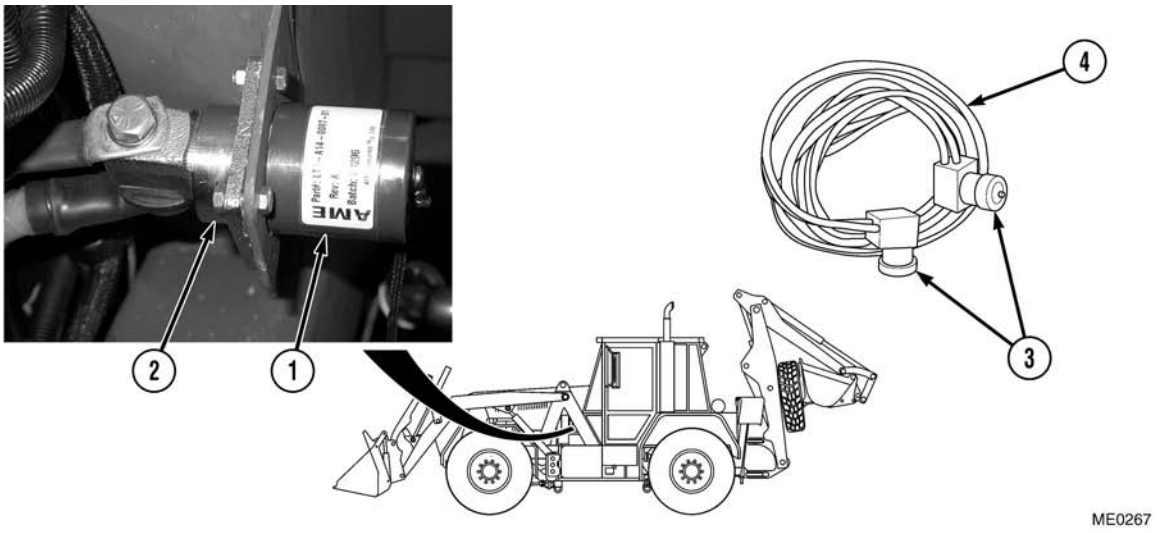
NOTE

Slave-starting is a two-person task.

(1) Start another vehicle with a good charging system and battery (refer to other vehicle's Operator's Manual).

(2) Move other vehicle into position beside IHMEE so NATO slave receptacles on both vehicles are side by side.

(3) Shut off other vehicle (refer to other vehicle's Operator's Manual).



WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal, a direct short may result in instant heating of tools, damage to equipment, and injury or death to personnel.

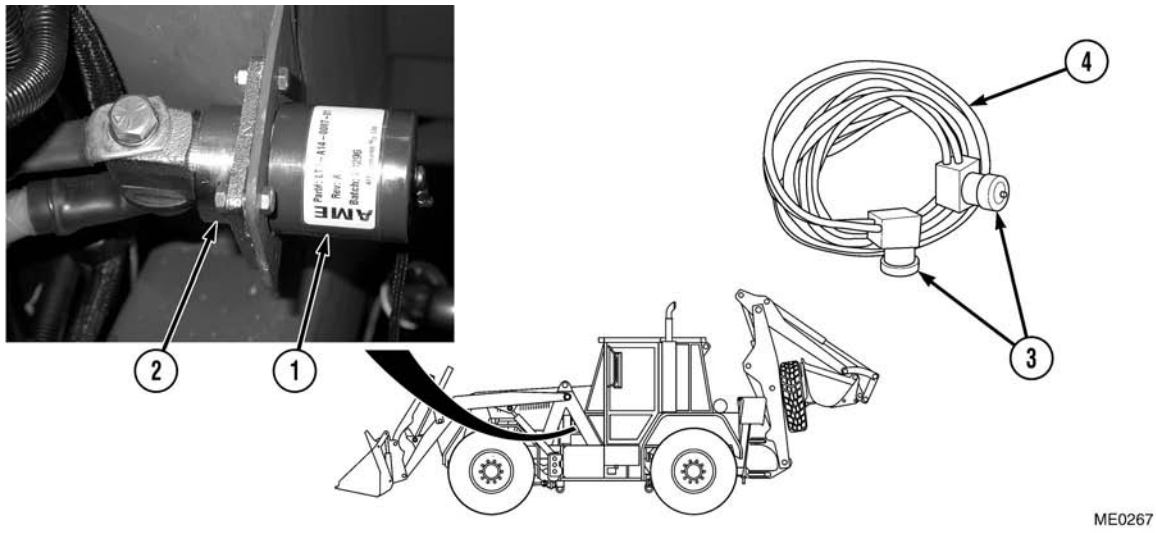
(4) Remove caps (1) from NATO slave receptacles (2) on both vehicles.

CAUTION

To avoid equipment damage, ensure all connectors are free of dirt, sand, and debris. Failure to comply may result in damage to equipment.

(5) If equipped, remove caps (3) from NATO slave cable connector (4).

(6) Plug NATO slave cable connector (4) into NATO slave receptacle (2) on other vehicle.



(7) Plug NATO slave cable connector (4) into NATO slave receptacle (2) on IHMEE.

(8) Start other vehicle (refer to other vehicle's Operator's Manual).

(9) Ensure electrical master switch is turned ON (Para 5-1).

(10) Operate other vehicle at high idle (refer to other vehicle's Operator's Manual) while attempting to start IHMEE engine.

(11) When IHMEE engine is running smoothly, remove NATO slave cable connectors (4) from NATO slave receptacles (2) of other vehicle and IHMEE.

(12) If equipped, install caps (3) on NATO slave cable connectors (4).

(13) Install caps (1) on NATO slave receptacles (2) of other vehicle and IHMEE.

(14) Move and park other vehicle (refer to other vehicle's Operator's Manual).

(15) Shut off other vehicle (refer to other vehicle's Operator's Manual).

CHAPTER 6
FRONT-END LOADER (FEL) OPERATION

Contents

6-1. OVERVIEW.

WARNING

- APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.

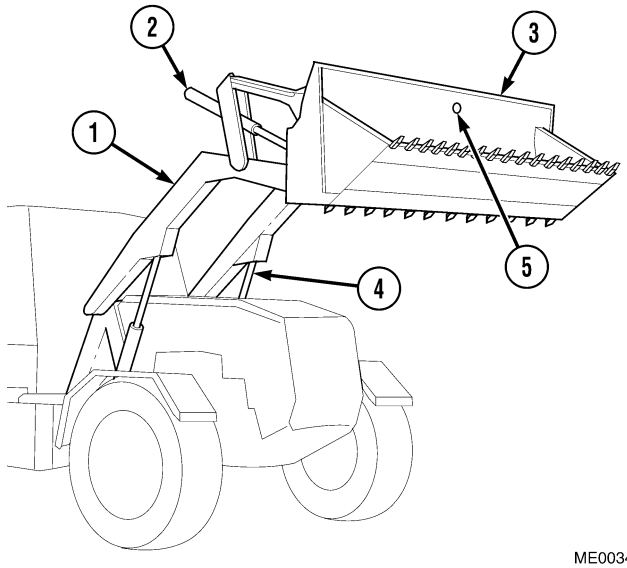
- When operating the vehicle in the construction mode, i.e., filling dump trucks, stockpiling, and backhoe operations, avoid working on side slopes greater than 5 percent. Failure to comply may result in personnel injury and/or damage to equipment.

The IHMEE is fitted with a multifunctional Front-End Loader (FEL) assembly. The FEL is equipped with twin loader arms, operated by two hydraulic cylinders. The loader arms are fitted with a quick-release mounting, which enables a variety of attachments to be fitted.

The 4-in-1 bucket can be operated as a standard face or a clam shell bucket, a scraper blade, a dozer blade, or a ripper. In addition, the bucket has a lifting eye with a lifting capacity of 2,000 lb. (900 kg).

The main components of the FEL are:

(1) Loader arm
(2) Tilt cylinder
(3) 4-in-1 bucket
(4) Lift cylinder
(5) Lifting eye



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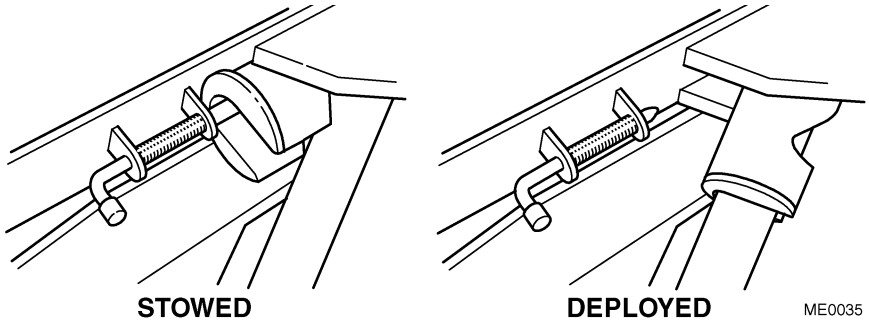
6-2. PREPARING FOR FEL OPERATION.



CAUTION

To prevent damage to the hydraulic cylinders, both travel stops on the loader arms are to be deployed whenever the travel stops are required. Failure to comply may result in damage to vehicle.

The hydraulic cylinders on each loader arm incorporate a travel stop fixture at the uppermost attachment point. The travel stops are locked in the stowed position by spring-loader locking pins. When the travel stops are deployed, they physically restrict the amount the hydraulic cylinder retracts, thereby limiting the distance they may be lowered, and a locking clevis is used to secure the 4-in-1 bucket to the frame. This prevents the 4-in-1 bucket from coming into contact with the ground while the vehicle is traveling.

To prepare the vehicle for FEL operation:

(1) Ensure travel stops are stowed.

(2) Ensure locking clevis is detached.

CAUTION

Mud flaps must be in the up position prior to off-road driving or FEL operations. Failure to comply may result in damage to equipment.

(3) Ensure mud flaps are stowed (Para 3-16).

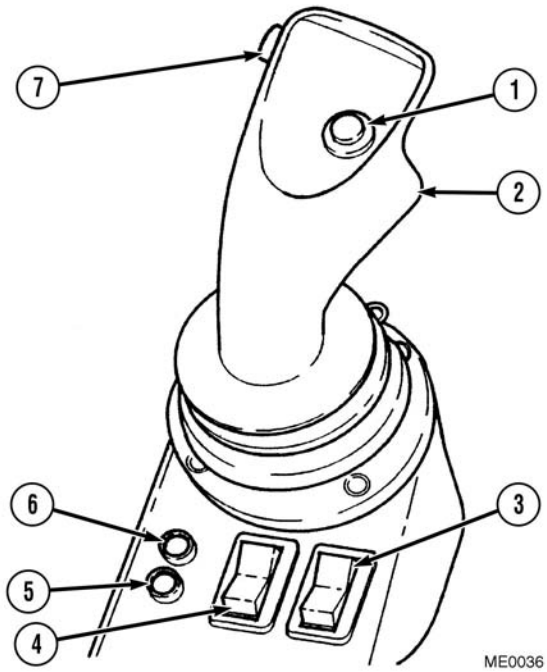
6-3. JOYSTICK CONTROLS.

WARNING

If you experience problems operating any controls, turn off your SINGAR radio unit. Failure to comply may result in death or injury to personnel and/or damage to equipment.

Electronic controls, devices, and systems may be susceptible to electromagnetic interference (EMI) if inadequately shielded or otherwise configured for electromagnetic compatibility. When operating any of the vehicle's controls while the SINGAR radio is on, EMI could occur. If you notice controls not responding correctly, or at all, turn your SINGAR radio off.

The FEL assembly is operated by hydraulic pressure supplied by the vehicle's hydraulic system. The driver controls the functions of the FEL using joystick controls incorporated into the armrests of the driver's seat.



a. Left Joystick.

The functions of the switch and indicator components of the left joystick are shown in Table 6-1.

Table 6-1. Left Joystick Control and Indicator FEL Functions.

Key	Description	Function
1	Bucket Shaker Push Button	Causes bucket to oscillate backward and forward.
2	Control Lever	Used to control dipper and backhoe swing.
3	Right Stabilizer Rocker Switch	Used to extend and retract right stabilizer.
4	Left Stabilizer Rocker Switch	Used to extend and retract left stabilizer.
5	Backhoe Indicator and Fault Lamp (Blue)	Indicates the operator has selected the backhoe (NOTE: the operator's seat must be facing rearward, or facing forward with button (7) depressed).
6	Loader Indicator and Fault Lamp (Green)	Indicates the operator has selected the loader (NOTE: the operator's seat must be facing forward, or facing rearward with button (7) depressed).
7	Backhoe/Loader Selector Push Button	If the operator has the seat in the backhoe position, the operator can press this button to work the FEL equipment.

b. Right Joystick.

The functions of the switch and indicator components of the right joystick are shown in Table 6-2.

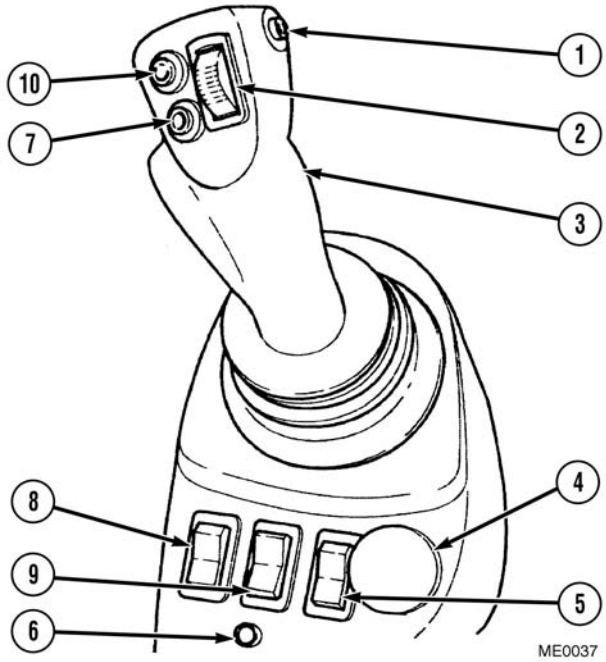


Table 6-2. Right Joystick Control and Indicator FEL Function.

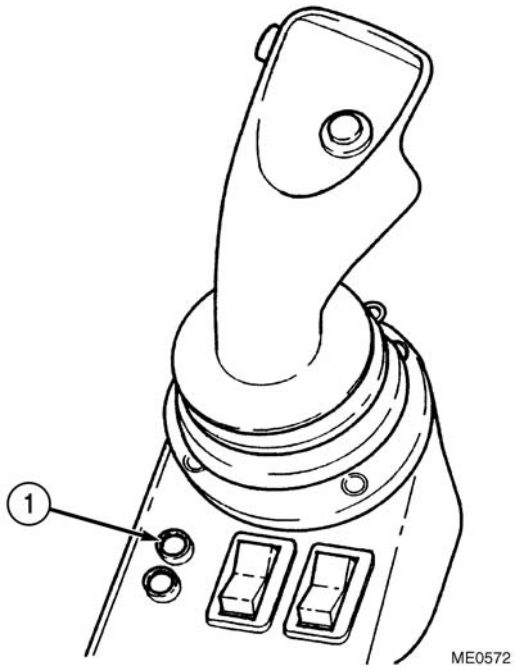
Key	Description	Function
1	Transmission Cutout	This button, when pressed, disengages the transmission. The transmission is re-engaged when the button is released. The button only functions when the electrohydraulic circuit is switched on and when the RANGE SHIFT switch is set to LOW.
2	Proportional Control Rotary Switch	Used by operator to control opening/closing of the 4-in-1 bucket.
3	Control Lever	The operator can raise/lower FEL/attachments and open/close bucket.
4	Hydraulic Master Switch	Pressing this button isolates the FEL and the backhoe.
5	Mode Selector for Backhoe Operation	Provides three speeds for backhoe operation.
6	Float Position Indicator	Steady: Indicates when the loader arms are in the float position. Flashing: Indicates the loader arms are in the “ready to float” position.
9	FEL mode selection	Three-position rocker switch. • Mode 1: Bucket 16 in. (40 cm) from the ground, default postion. • Mode 2: Bucket level with the ground in normal work position. • Mode 3: Loader arms move to float position; the bucket stays in its previous position.
8	Memorization of Return to Position	Press this button to program the loader position into memory.
7	Return to Level/Dig/Float	Pressing this button and at the same time pushing the joystick forward, returns the loader to one of three preselected positions.
10	Return to Position Rocker Switch	Pressing this button returns loader to a previously programmed position. If no preselection is made, “transport” position is automatically selected.

6-4. LOADER OPERATION INSTRUCTIONS.

The hydraulic master switch is used for switching the electrohydraulic circuits on and off.

When the operator's seat is turned toward the FEL, the loader can be controlled using the right joystick. In this configuration, the left joystick and the backhoe are switched OFF. When the operator's seat is turned toward the backhoe, the backhoe can be controlled using both joysticks, and the loader is switched OFF.

On the left joystick, the backhoe/loader selector button is used to select the operation of the backhoe or the FEL. With the seat facing the FEL, this button enables the backhoe to be operated using both joysticks as if the seat were turned toward the backhoe. With the seat facing the backhoe, this button enables the loader to be operated using the right joystick as if the seat were turned toward the FEL, while at the same time permitting operation of the backhoe using the left joystick (backhoe dipper and swing movements only). When this button is pressed, an audible warning is sounded.



When the loader is operating, the green loader indicator and fault lamp (1), located in the left joystick console, is on; however, the loader is controlled with the right joystick.

The right joystick controls the raising of the loader arms and the bucket. Push joystick forward to lower loader arms and pull joystick backward to raise loader arms. Tilt the joystick left to crowd bucket and tilt joystick right to dump bucket.

NOTE

The MODE switch must be set to BACKHOE A or BACKHOE B for any auto FEL functions to work.

The return-to-position option allows operator to select an FEL position and enter that position into the electronic control box. After the position has been entered into memory, whenever the return-to-position button, located on the right joystick console, is pressed, the loader automatically returns to preselected position. The procedure for setting the return-to-position control is:

a. Position loader arms and bucket in desired position.

NOTE

The control box will not memorize positions where bucket edge is less than 16 in. (40 cm) from the ground. Trying to select a height below this minimum will cause the control box to select the default position.

b. Press and release memorization button located on right joystick console. The FEL position is now memorized. Every time the return-to-position button, located on right joystick console, is pressed, the FEL automatically returns to the memorized position. Moving right joystick in any direction stops movement.

Whenever the electronic control box or the vehicle engine is switched OFF, the position programmed by the operator is cancelled and the default position is used when the electronic control box or the engine is restarted. The default position is the travel position with the bucket positioned at half height of the engine cover.

The return-to-dig function is activated by pressing and holding the return-to-level, dig, float button, located on the right joystick console, and then pushing the right joystick forward. The electronic control box controls this system. It moves the bucket to the horizontal position regardless of the previous position of the bucket or the loader arms.

Three different return-to-dig modes can be selected, depending on position of loader mode selector. The three modes are:

(1) Mode 1 - Ready for return to dig. Using this selection, the movements of the loader arms and the bucket are coordinated to bring the arms to a height of approximately 24 in. (60 cm), with the bucket in a relatively flat position. In this position, the yellow, floating position indicator flashes. To complete the sequence and start to dig, push return-to-level, dig, float button again without moving joystick. The loader lowers to the lowest level, placing the bucket flat on the ground. The loader arms are now in the float position, and the float position indicator remains on.

(2) Mode 2 - Auto return to dig. As in Mode 1, the movements of the loader arms and the bucket are coordinated. The bucket is placed flat on the ground with the loader arms in the float position. As in Mode 1, the yellow, floating position indicator remains on.

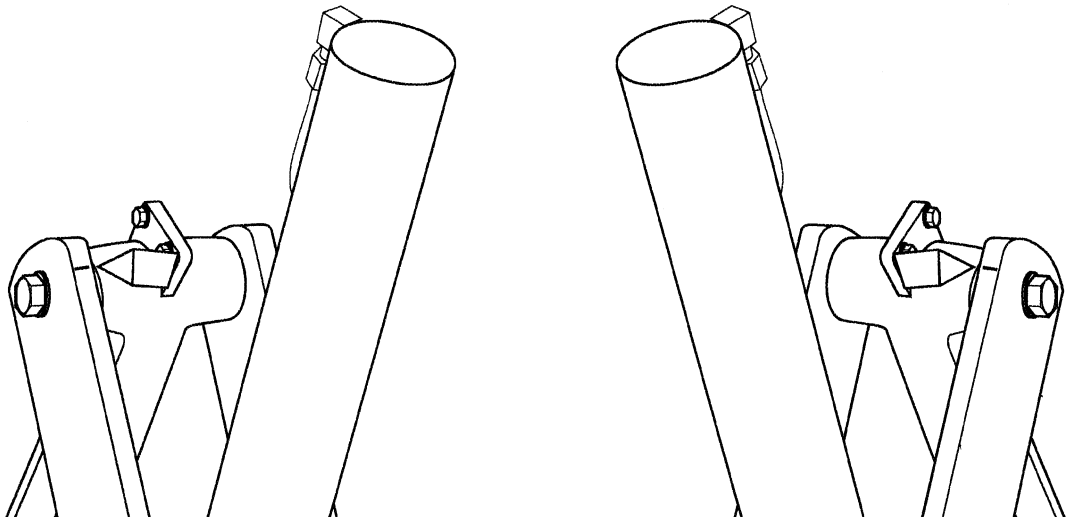
(3) Mode 3 - Float position. The loader arms take up the float position and the bucket stays in its previous position. Floating can be cancelled by pulling back on the joystick. When this mode is selected, the float position indicator flashes. The bucket does not automatically assume a horizontal position on the ground in this mode.

The following features are incorporated in the design of the FEL:

(a) Antirollback device. This device prevents the bucket from dumping material on the cab when the arms are raised and does not function when vehicle is in EMERGENCY or CROSS COUNTRY DRIVING mode.

(b) Bucket leveling control. During raising or lowering of the loader arms, the bucket remains at a constant attitude. This is useful in certain applications such as operating with the forklift attached.

6-5. MANUAL LEVEL INDICATORS.



Manual level indicators are located adjacent to the bucket tilt cylinders. These devices indicate when the bucket or forklift is level on the ground. When aligned, the yellow level indicator on the right side indicates that the bucket is level and on the ground. The red level indicator on the left side indicates that the forklift is level and on the ground.

6-6. EMERGENCY MODE.

If the loader detects an error code and no longer responds to the controls, selecting this emergency mode enables the operator to move the vehicle from the work site to the repair shop. The following procedure activates the emergency mode:

CAUTION

The automatic antirollback protection system and autoleveling function do not operate in emergency mode. This mode should be used only with an empty bucket and as a temporary solution in cases where the loader is inoperative while in normal operating mode. Failure to comply may result in damage to equipment.

(1) Start engine (Para 5-2).

(2) Turn the hydraulic master switch to OFF position by depressing it for at least 4 seconds.

(3) Hold down return-to-position button and return-to-level, dig, float button located on right joystick, and move electrical master switch to ON position by releasing it.

(4) Release return-to-position button and return-to-level, dig, float button after 5 seconds.

NOTE

In this mode, there is no coordination of movement between the arms and the bucket. When the arms are raised or lowered, the bucket does not compensate.

(5) To indicate to the operator that the vehicle is in the emergency mode, the three indicators (i.e., loader, backhoe, and float position) flash for a half second on and a half second off, repeatedly.

If emergency mode fails to operate, any hydraulic components in use must be stowed by manually operating the hydraulic valves (Para 3-28).

6-7. DIAGNOSTIC MODE.

A self-test device in the electronic control box indicates the presence and location of a malfunction in the system. This mode is used to assist the fault-finding process in the electrical system. The test device checks the condition of all wiring and detectors connected to it, in addition to its own internal, electronic logic. Diagnostics are coded by flashing of the loader indicator and the backhoe indicator located on the left joystick console. If the blue or green lights on the left joystick are not on, the system is defective and the vehicle should not be operated. Notify Unit maintenance.

6-8. FEL RIPPER ARMS OPERATION.

CAUTION

Ensure FEL ripper arms are stowed before backing vehicle with bucket on or near the ground, unless rippers are required for ground breaking. Failure to comply may result in damage to equipment.

a. Deploy.

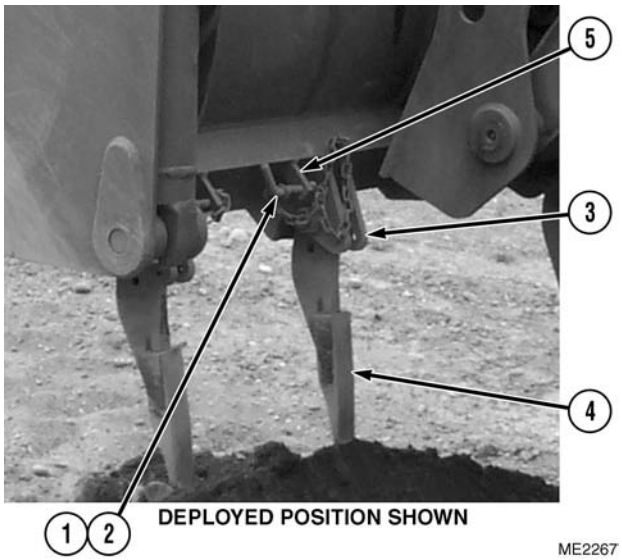
(1) Remove locking clip (1) and retaining pin (2) from bracket (3), and lower ripper arm (4) to ground.

CAUTION

Ensure ripper arms are in the full down position and that retaining pin and locking clip are secured on storage bracket for ground-breaking operations. Failure to comply may result in damage to equipment.

(2) Insert retaining pin (2) in stowage bracket (5) and replace locking clips (1).

(3) Repeat steps for remaining ripper arms.



DEPLOYED POSITION SHOWN ME2267

b. Usage.

(1) Deploy ripper arms.

(2) Ground-breaking operations are performed by moving vehicle in reverse and using ripper arms to engage ground.

(3) Operator must be familiar with 4-in-1 bucket operations and joystick controls (Para 6-3) before performing ground-breaking operations. When moving vehicle forward, roll 4-in-1 bucket forward slightly to raise base of ripper arms off ground.

(4) Stow ripper arms when finished with ground-breaking operations, or when preparing vehicle for road use.

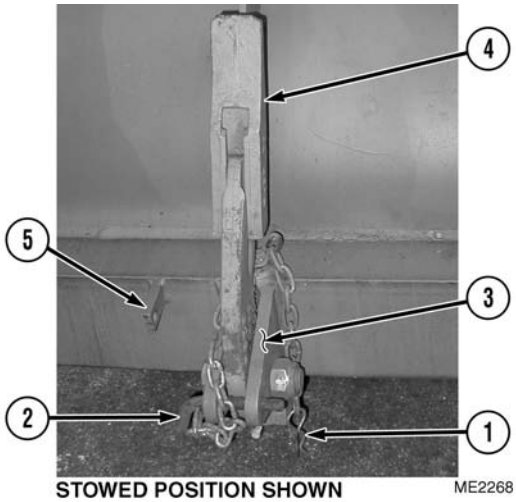
c. Stow.

(1) Remove locking clip (1) and retaining pin (2) from stowage bracket (5).

(2) Lift ripper arm (4) into full, upright position and place in bracket (3).

(3) Insert retaining pin (2) into bracket (3) only and replace locking clip (1).

(4) Perform steps for remaining ripper arms.



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CHAPTER 7
BACKHOE OPERATION

Contents

7-1. OVERVIEW.

WARNING

- When operating the vehicle in the construction mode, i.e., filling dump trucks, stockpiling, and backhoe operations, avoid working on side slopes greater than 5 percent. Failure to comply may result in personnel injury and/or damage to equipment.
- Caution must be exercised during backhoe operations on side slopes. Always operate the backhoe toward the uphill side of the worksite. Digging/excavation operations must be conducted as close to vehicle centerline as possible. Do not raise the bottom of a loaded bucket more than 1 ft. (30 cm) above the ground. Avoid abrupt changes in position of the backhoe or bucket. Failure to comply may result in personnel injury and/or damage to equipment.
- Place the backhoe in the stowed position whenever travel speeds exceed 12 mph (20 km/h). Failure to do so could result in personnel injury and/or damage to equipment.

The Interim High-Mobility Engineer Excavator (IHMEE) is fitted with a Case Model 580M Backhoe. The backhoe is center-mounted with a two-piece boom/dipper and a quick-release bucket link. The unit has arm-type stabilizers and is fitted with hydraulic controls and lines for power attachments.

The backhoe is designed for digging below ground level and for general earth-moving functions, such as trenching, truck loading, and material handling. The backhoe and bucket are used for carrying the spare wheel assembly.

The main components of the backhoe are:

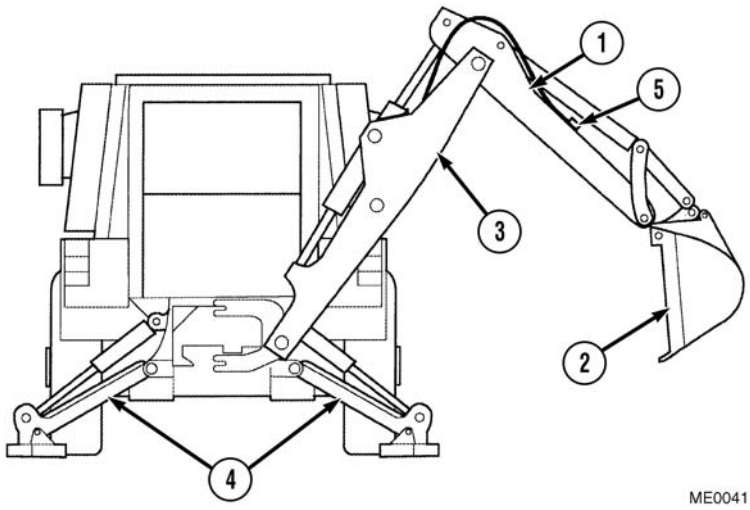
(1) Dipper

(2) Bucket

(3) Boom

(4) Stabilizers

(5) Auxiliary outlets



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7-2. PREPARING TO USE THE BACKHOE.

WARNING

APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.

Before using the backhoe for digging, complete the following steps:

CAUTION

Mud flaps must be in the down position prior to lowering/raising stabilizers, backhoe operation, or road use. Failure to comply may result in damage to equipment.

(1) Ensure mud flaps are deployed (Para 3-16).

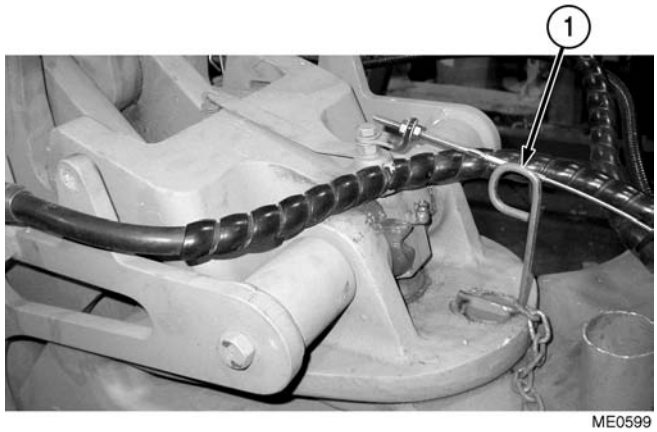
(2) Remove travel stop from bucket cylinder (Para 7-6).

(3) Remove turnbuckles from stabilizer arms (Para 7-7).

(4) Remove boom locking pin (1).

(5) Remove towing hitch (Para 7-4).

(6) Remove spare wheel (Para 8-6).



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7-3. BACKHOE OPERATION.

WARNING

If you experience problems operating any controls, turn off your SINGAR radio unit. Failure to comply may result in death or injury to personnel and/or damage to equipment.

Electronic controls, devices, and systems may be susceptible to electromagnetic interference (EMI) if inadequately shielded or otherwise configured for electromagnetic compatibility. When operating any of the vehicle's controls while the SINGAR radio is on, EMI could occur. If you notice controls not responding correctly, or at all, turn your SINGAR radio off.

The backhoe assembly is operated with hydraulic pressure supplied by the vehicle's hydraulic system. The operator controls the functions of the backhoe, using two joystick controls that are incorporated into the armrests of the operator's seat. The backhoe is automatically powered. Controls are activated whenever the operator's seat is turned to face the backhoe; however, an override switch enables the backhoe to be operated when the operator's seat is facing forward.

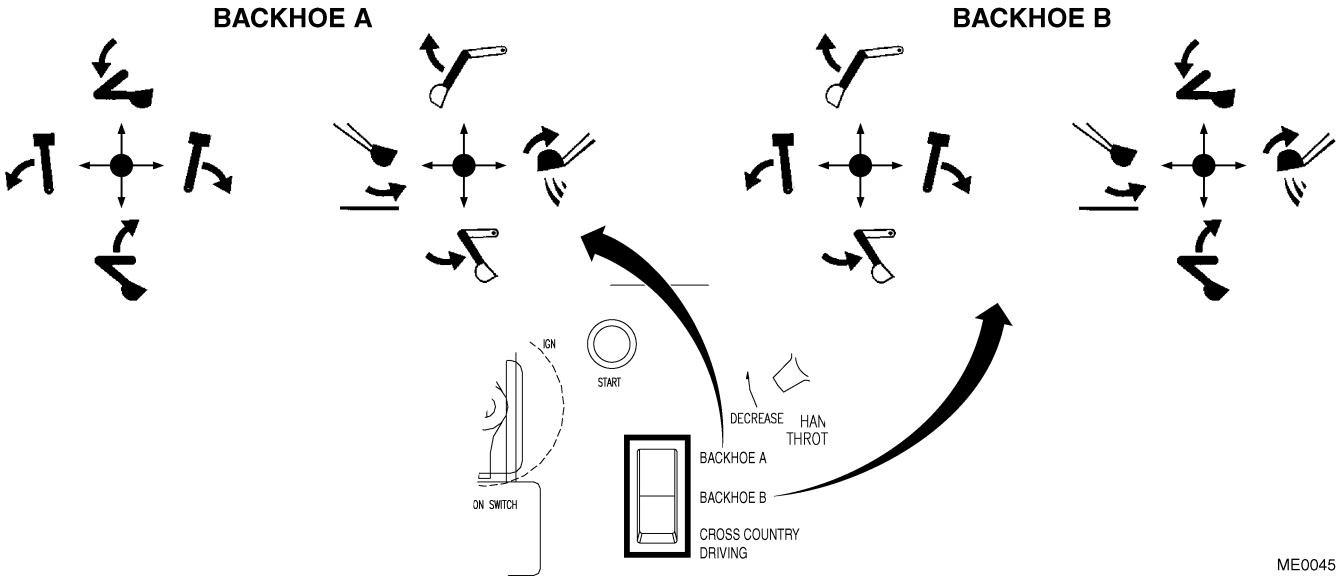
a. Operating Instructions.

(1) The hydraulic master switch is used for turning the electrohydraulic circuit ON and OFF.

(2) When the operator's seat is facing the rear, the backhoe can be controlled using both joysticks, and the loader is switched OFF. When the operator's seat is turned forward, the loader can be controlled using the right joystick. In this configuration, the left joystick and the backhoe are switched OFF.

(3) On the left joystick, the selector button is used to select the operation of backhoe or Front-End Loader (FEL). With the seat facing forward, this button enables the backhoe to be operated using both joysticks as if the seat was turned toward the rear of the vehicle. With the seat facing rearward, this button enables the loader to be operated using the right joystick as if the seat was turned toward the front of the vehicle, while at the same time permitting operation of the backhoe using the left joystick (backhoe dipper and swing movements only). When the transmission cutout button is pressed, an audible signal sounds. The transmission cutout switch will only operate when the hydraulic master switch is on and the RANGE SHIFT switch is set to LOW.

b. Backhoe Mode Switch.

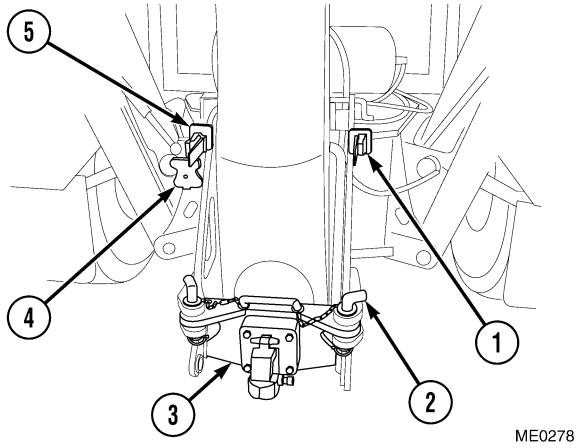


The backhoe control system incorporates a mode switch that allows some joystick functions to be swapped from left to right. The switch, located on the side console, has three positions: BACKHOE A, BACKHOE B, and CROSS COUNTRY DRIVING. The functions of each of these positions are shown on a decal on the rear window of the vehicle.

7-4. TOW HITCH.

a. General.

The backhoe mounting frame also provides the attachment point for the tow hitch. The towing pintle must be removed by removing three retaining pins and hitch prior to operating backhoe.



The main components of the tow hitch are:

(1) Emergency air gladhand

(2) Pintle retaining pins

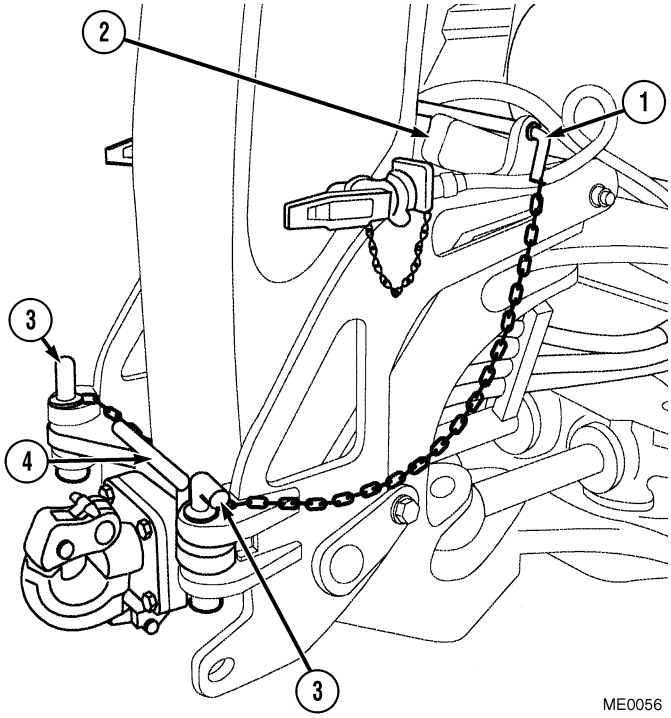
(3) Towing pintle

(4) Trailer electrical plug

(5) Supply air gladhand

b. Removal.

The vehicle is supplied with a towing hitch fitted to the backhoe arm. The hitch must be removed before the backhoe can be used. Complete the following steps when removing tow hitch assembly:



(1) Remove locking pin (1).

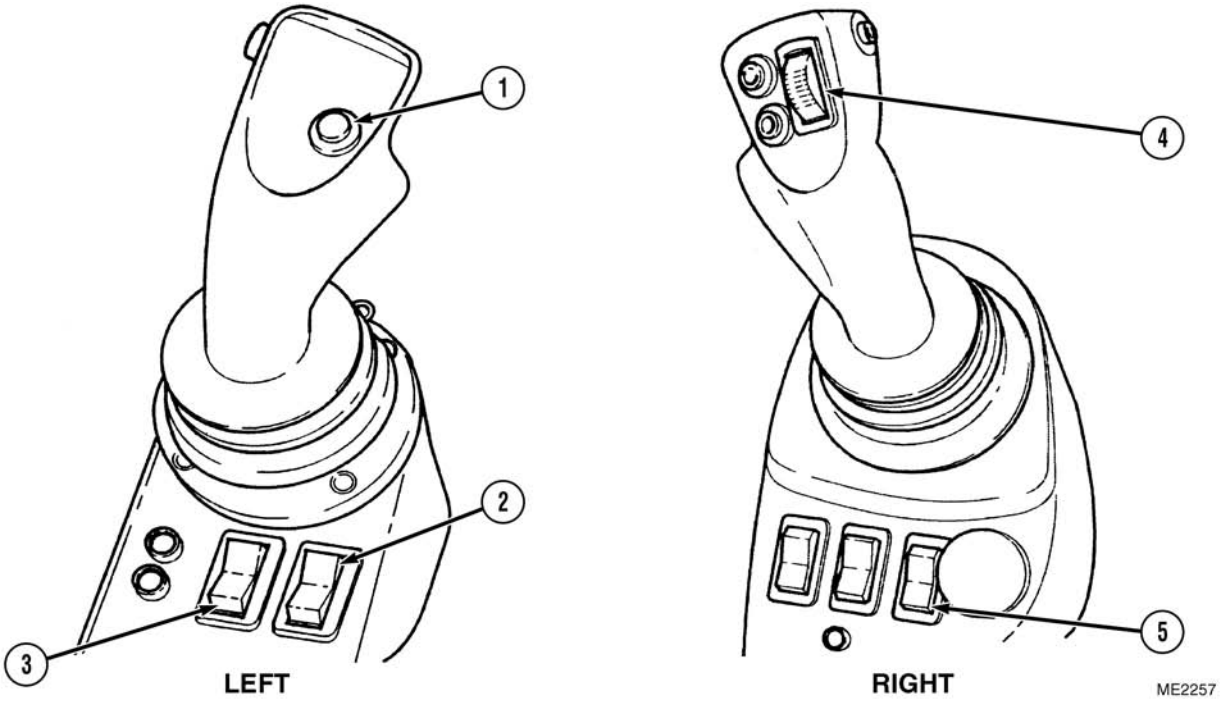
(2) Remove two pins (3).

(3) Using handle (4), lift towing hitch forward and up to remove it.

c. Installation.

The installation of the towing hitch is the reverse of the steps in the removal procedure.

7-5. JOYSTICK CONTROLS.



a. Backhoe Operation.

When the backhoe is operating, the blue backhoe indicator, located in the left joystick console, is on. The backhoe is controlled using both right and left joysticks. The joysticks incorporate the following controls:

(1) The left joystick has a bucket shaker button (1). Pressing this button causes the bucket to oscillate backward and forward to remove any clinging material.

(2) The left joystick console contains switches for left (2) and right (3) stabilizers. These two-position rocker switches extend and retract stabilizers.

(3) The right joystick has the proportional control rotary switch (4), which controls auxiliary hydraulics used to power any attachments that may be fitted.

(4) The right joystick console has the MODE SELECTOR for the backhoe operation switch (5). This three-position switch is used to select one of the three backhoe operating modes. Further information on backhoe operating modes is contained in Para 7-3.

(5) The right joystick controls the boom and the bucket. Pull joystick backward to raise boom, push joystick forward to lower boom. Tilt joystick to left to close bucket and tilt to right to open bucket.

(6) The left joystick controls the dipper and backhoe swing. Pull joystick backward to move dipper toward cab and push joystick forward to move dipper away from cab. Tilt joystick to left to swing backhoe to left and tilt joystick to right to swing backhoe to right.

(7) The backhoe selector switch allows the operator to select one of three different operating modes:

(a) Mode 1 - Fine Mode. This mode provides the maximum amount of control of the backhoe by changing the ratio between movement of the joystick and movement of the backhoe. In this mode, 100 percent movement of the joystick corresponds to 40 percent of the backhoe's maximum speed. This mode is recommended for precision work such as positioning pipes.

(b) Mode 2 - Smooth Mode. This mode provides the maximum amount of control of the backhoe with the first half of the joystick movement, while the second half of the joystick movement controls the backhoe at maximum speed. This mode selection is recommended for work requiring a combination of speed and precision.

(c) Mode 3 - Normal Mode. For this mode, the ratio between movement of the joystick and movement of the backhoe is approximately equal: 50 percent movement of the joystick gives 50 percent of the backhoe working speed, and 90 percent movement of the joystick gives 100 percent of the backhoe maximum working speed. This mode is recommended whenever speed is an important factor.

b. Diagnostic Mode.

A self-test device in the electronic control box indicates the presence and location of a malfunction in the system. This mode is used to assist in locating faults in the electrical system. The test device checks the condition of all wiring and detectors that are connected to it, in addition to its own internal electronic logic. Diagnostics are coded by the flashing of the loader indicator and the backhoe indicator located on the left joystick console. Notify Unit maintenance.

7-6. BACKHOE TRAVEL STOP.

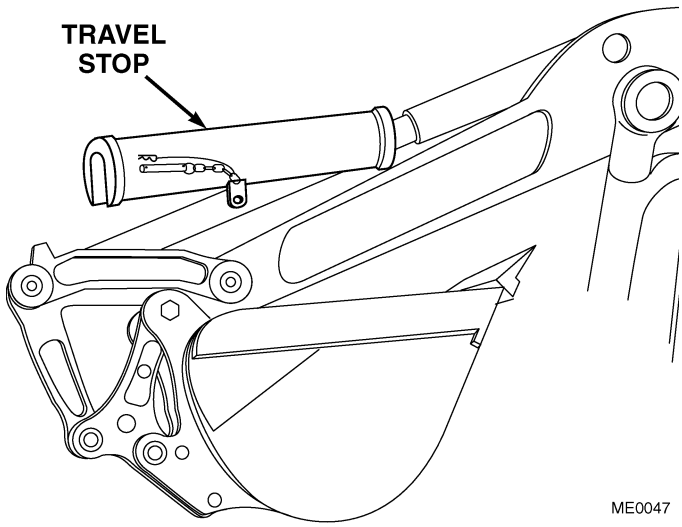
To prevent backhoe bucket movement while in raised travel position, a backhoe travel stop is provided. To install this travel stop to the dipper hydraulic cylinder, complete the following steps:

(1) Place backhoe bucket in raised travel position.

(2) Place travel stop over hydraulic cylinder shaft.

(3) Secure travel stop to backhoe arm with securing pin assembly.

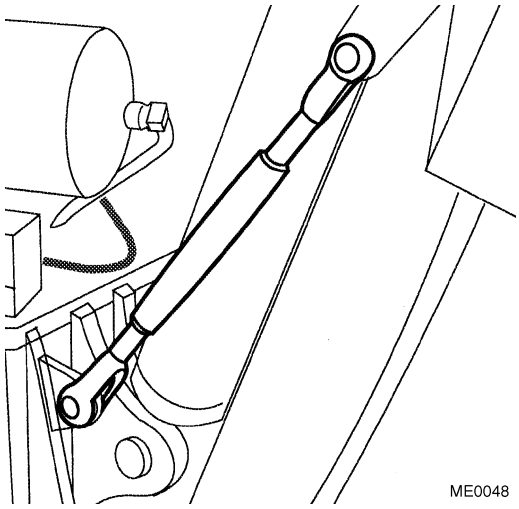
(4) Removal is the reverse of the installation procedure.



7-7. STABILIZER ARM TURNBUCKLES.

a. Turnbuckle Installation.

Turnbuckles are fitted to each of the stabilizer arms to prevent them from dropping to the road surface during travel. To attach turnbuckles, complete the following steps:



NOTE

Stabilizer arms must be at maximum height so they do not block rear blackout lights.

(1) Raise both stabilizer arms to their maximum height (Para 7-5).

(2) Align hole in one end of turnbuckle with mounting hole in stabilizer arm. Insert securing pin through aligned holes.

(3) Align hole in other end of turnbuckle with mounting hole in bracket on vehicle chassis. Insert other securing pin through aligned mounting holes.

(4) Repeat Steps (2) and (3) on other side of vehicle.

b. Turnbuckle Removal.

(1) Remove lower securing pin and detach turnbuckle from vehicle chassis.

(2) Remove upper securing pin and detach turnbuckle from stabilizer arm.

(3) Repeat Steps (1) and (2) on other side of vehicle.

(4) Stabilizer arms may now be lowered (Para 7-5).

CHAPTER 8
ATTACHMENTS

Contents **Para** **Page**

8-1. OVERVIEW.

WARNING

- APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.
- When removing any pins during removal and/or installation, gloves must be used. Failure to comply may result in serious injuries.

The Interim High-Mobility Engineer Excavator (IHMEE) is a four-wheel drive, medium vehicle which is fitted as standard with a Front-End Loader (FEL) and backhoe. A forklift attachment is available, which is capable of being fitted by the operator, to the FEL arms quick-hitch.

8-2. 4-IN-1 BUCKET REMOVAL AND INSTALLATION.

a. Removal.

(1) With the aid of an assistant, position vehicle on level ground, ensure PARK BRAKE lever is ON (Para 4-11), and select N (Neutral) gear.

(2) Lower loader arms to position just clear of the ground.

(3) Turn OFF engine (Para 5-2).

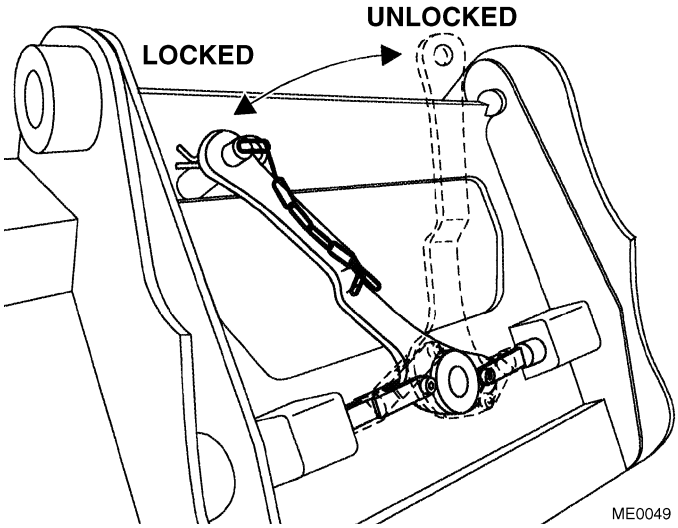
(4) Disconnect lights and remove from FEL bucket (if installed) (Para 5-12).

(5) Remove retaining clip and pin securing center ripping tooth, place tooth in down position, and install pin and retaining clip.

(6) Clean area around hydraulic quick-release couplings on loader arms.

(7) Disconnect hydraulic quick-release couplings, cap and plug hydraulic lines, remove hydraulic lines from quick-hitch, and lay over front of 4-in-1 bucket.

(8) Remove safety pin and move locking lever on bucket quick-hitch to unlocked position.



WARNING

Serious injuries can occur if bucket is not resting firmly on ground.

(9) Start engine (Para 5-2).

(10) Carefully lower bucket to ground (Para 6-4).

(11) Lower FEL arms and tilt slightly to disengage bucket mounting lugs.

(12) Move vehicle away from bucket.

b. Installation.

(1) Ensure bucket is positioned upright on firm, level ground.

(2) Drive vehicle up to bucket, making certain loader arms are lower than mounting lugs and approach is made at 90 degrees to bucket. Use painted yellow guides on bucket to assist in aligning vehicle with bucket.

(3) Carefully raise loader arms to engage mounting lugs (Para 6-4).

(4) Ensure loader arms have fully engaged both mounting lugs.

WARNING

Do not work under raised FEL arms unless the maintenance arm is fitted. Failure to comply may result in serious injury or death to personnel.

(5) Raise bucket until it is just clear of ground.

(6) Move locking lever to locked position and insert safety pin.

(7) Check both locking pins to ensure they are fully engaged.

(8) Remove retaining clip and pin and replace center ripping tooth in the upright position. Replace pin and retaining clip.

(9) Clean area around quick-release couplings.

(10) Remove caps and plugs. Route and connect hydraulic quick-release couplings to bucket.

ROUTE HOSES THROUGH QUICK-HITCH FRAME AS SHOWN

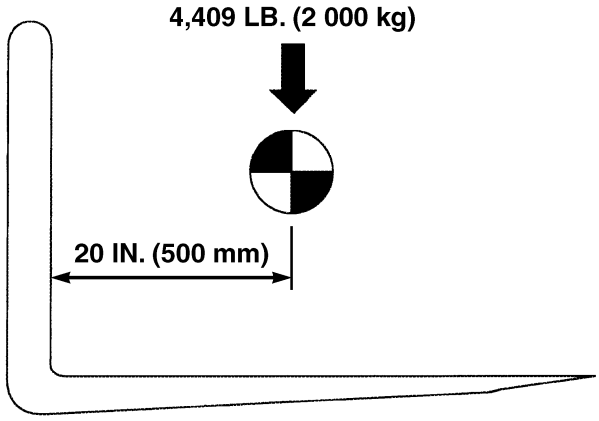
(11) Replace lights (if applicable).

(12) Start engine (Para 5-2).

(13) Check operation of 4-in-1 bucket (Para 6-4).

8-3. FORKLIFT ATTACHMENT INSTALLATION AND REMOVAL.

The FEL 4-in-1 bucket may be removed and installed with a forklift attachment. The forklift attachment is rated at lifting a 4,409-lb. (2 000-kg) load at 20-in. (500-mm) load centers.



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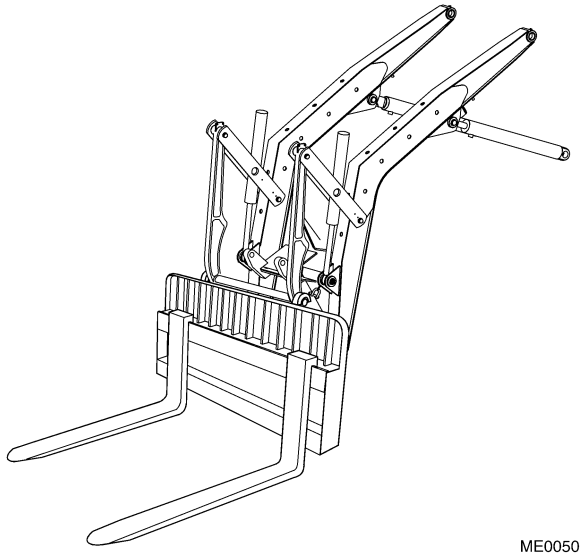
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a. Installation.

(1) With the aid of an assistant, remove 4-in-1 bucket (Para 8-2).

(2) Position forklift attachment upright on level ground.

(3) Drive vehicle up to forklift attachment, ensuring loader arms are lower than mounting lugs and approach is made at 90 degrees to attachment.

(4) Carefully raise loader arms to engage mounting lugs (Para 6-4).

(5) Ensure loader arms have fully engaged both mounting lugs.

(6) Raise forklift attachment until it is just clear of ground.

(7) Move locking lever to locked position and fit locking pin.

(8) Ensure both locking pins are fully engaged.

(9) Check operation of forklift attachment (Para 6-3).

b. Forklift Operation.

WARNING

When using forklift attachment, always use a guide. The guide should stand clear of vehicle. Failure to comply may result in injury or death to personnel.

c. Removal.

(1) Position vehicle on level ground.

(2) Ensure PARK BRAKE lever is ON (Para 4-11).

(3) Select N (Neutral) gear (Para 5-4).

(4) Lower loader arms to position just clear of ground.

(5) Remove safety pin and move locking lever to unlocked position.

WARNING

Serious injuries can occur if forklift attachment is not resting firmly on ground.

(6) Carefully lower forklift attachment to ground.

(7) Lower loader arms to disengage forklift attachment mounting lugs.

(8) Move vehicle away from forklift attachment.

8-4. BACKHOE BUCKET REMOVAL AND INSTALLATION.

a. Removal.

WARNING

When removing any pins during removal and/or installation, gloves must be used. Failure to comply may result in serious injuries.

(1) Position vehicle on level ground, ensure PARK BRAKE lever is ON (Para 4-11), and select N (Neutral) gear.

(2) Extend stabilizer arms to ground (Para 7-5).

(3) Lower backhoe close to ground and rotate (dump) bucket until it is at point of balance.

(4) Turn OFF engine (Para 5-2).

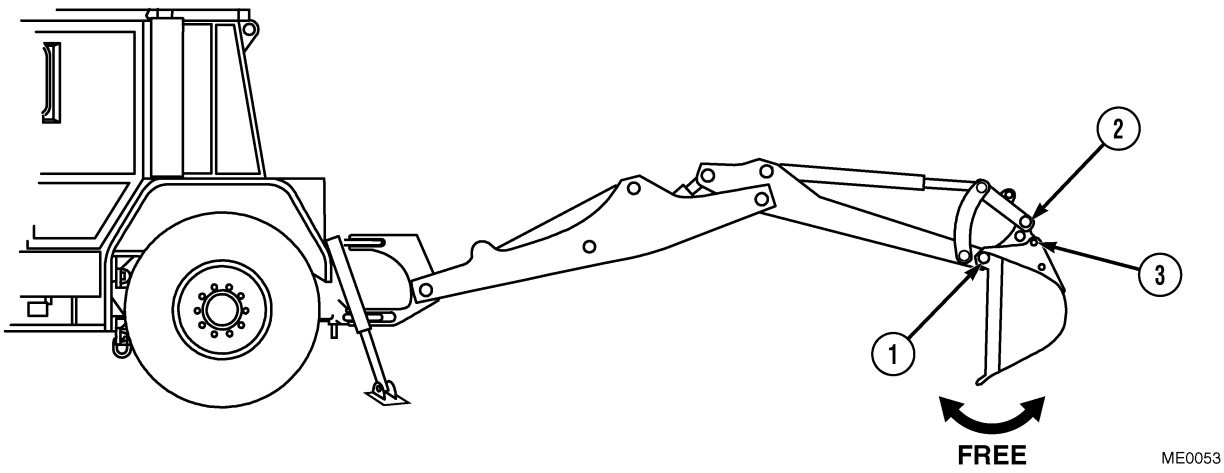
(5) Clean area around bucket locking pin (1).

WARNING

Use care when removing or installing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

(6) Using circlip pliers, (Item 18, Appendix B) located in the BII, remove circlip and washers securing bucket pivot pin (1).

(7) Remove bucket pivot pin (1). Bucket may have to be wobbled as pin is pulled.



(8) Bucket may now be removed by using boom, dipper, and bucket controls to curl quick coupler (2) from bucket pin (3).

(9) As the bucket is lowered, ensure that digging teeth are facing in the down postion.

b. Installation.

WARNING

- When removing any pins during removal and/or installation, gloves must be used. Failure to comply may result in serious injuries.
- Use care when removing or installing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

CAUTION

Before changing attachments, ensure that vehicle is positioned in firm ground, stabilizers are extended, and loader bucket is lowered. Failure to comply may result in damage to vehicle.

The installation procedure for the backhoe bucket is the reverse of the steps in the removal procedure.

(1) Using the boom, dipper, and bucket controls to curl quick coupler, pick up the bucket.

(2) Rotate bucket to point of balance, and pin holes should be aligned.

(3) Install pin, washers, and circlips.

8-5. AUXILIARY HYDRAULIC ATTACHMENTS.

This Task Covers:

a. Connection b. Operation c. Disconnection

d. Follow-On Maintenance

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Hydraulic valve manual override lever, BII, Item 11, Appendix B
Ratchet, 1/2-in., BII, Item 21, Appendix B
Socket, 10 mm, BII, Item 26, Appendix B

Materials/Parts
Grease, automotive and artillery, Item 4, Appendix D
Rag, wiping, Item 8, Appendix D

Personnel Required
MOS 62J, Construction Engineer Operator

References
None

Equipment Conditions

TM or Para	*Condition Description*
Para 2-20	Vehicle prepared for servicing (Do not install FEL maintenance arm).

Drawings Required
None

Estimated Time to Complete
30 min.

a. Connection.

The IHMEE has quick disconnect couplings on the backhoe which allow auxiliary hydraulic attachments to be fitted and operated by the vehicle's hydraulic system. Auxiliary attachments such as an auger, a rock breaker, or a compactor can be used with the IHMEE, however none of these accessories are included with the vehicle. Use the following procedure to attach auxiliary hydraulic components:

WARNING

Use care when removing or installing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

(1) Remove circlip or securing pin from attachment pin.

(2) Remove attachment pin from attachment to be fitted.

(3) Start engine (Para 5-2).

(4) Pick up attachment with backhoe arm by engaging its coupler lugs with coupler pin.

(5) Raise boom (Para 7-5).

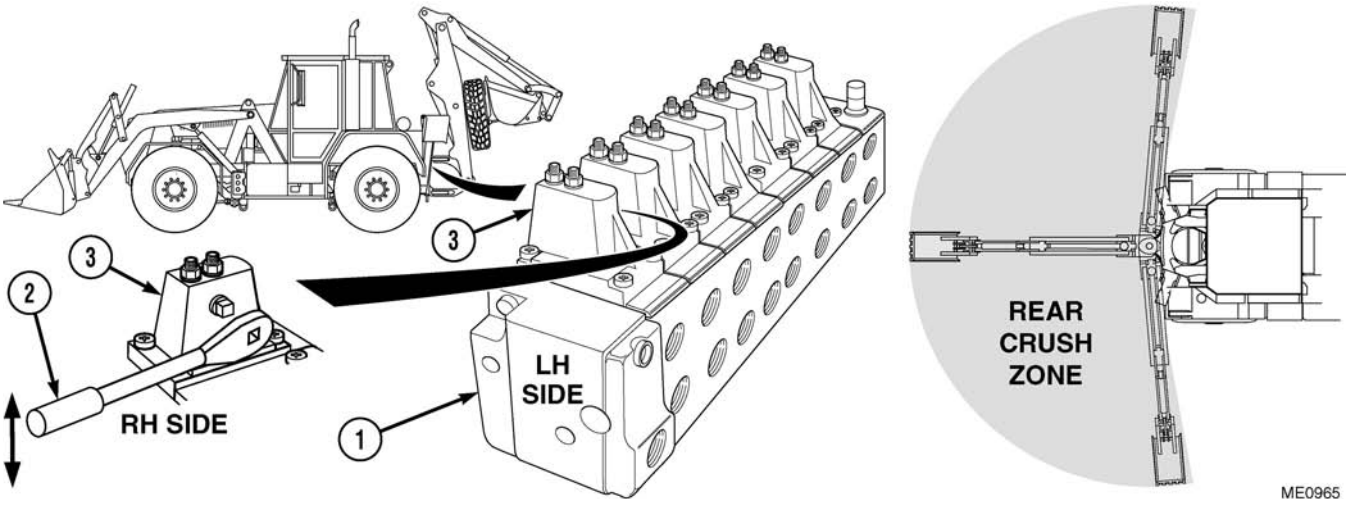
(6) Operate controls to retract coupler cylinder until attachment rotates out and obtains point of balance (Para 7-5).

(7) Turn off hydraulic master switch (Para 6-3).

(8) Shut OFF engine (Para 5-2).

(9) Apply grease and install attachment pin.

(10) Install circlip or securing pin on attachment pin.



WARNING

- The IHMEE hydraulic system operates at oil pressures up to 3,000 psi (20 680 kPa). Never disconnect any hydraulic line or fitting without first dropping system pressure to zero. Failure to comply may result in serious injury or death to personnel.
- Hydraulic fluid (Dexron III) is TOXIC. Wear protective goggles and gloves; use only in well-ventilated area; avoid contact with skin, eyes, and clothes. Skin and clothing that come in contact with hydraulic oil should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.
- Ensure that only the indicated auxiliary valve is operated. You are within the backhoe crush zone when operating the backhoe auxiliary valve. Manual operation of any other valves can cause serious injury or death.

(11) Locate backhoe hydraulic valve block (1) under backhoe top plate.

(12) Use hydraulic valve manual override lever (2) to operate auxiliary valve (3) until all hydraulic pressure is exhausted.

(13) Using a clean rag, clean area around quick disconnect coupling dust caps on dipper and attachment hoses and remove dust caps.

(14) Using a clean rag, clean quick disconnect couplings.

(15) Connect attachment hydraulic lines to backhoe quick disconnect couplings.

b. Operation.

The operation of the attachments is controlled by the joysticks on the operators seat. Refer to the attachment's OEM manuals for details of their safe operation.

CAUTION

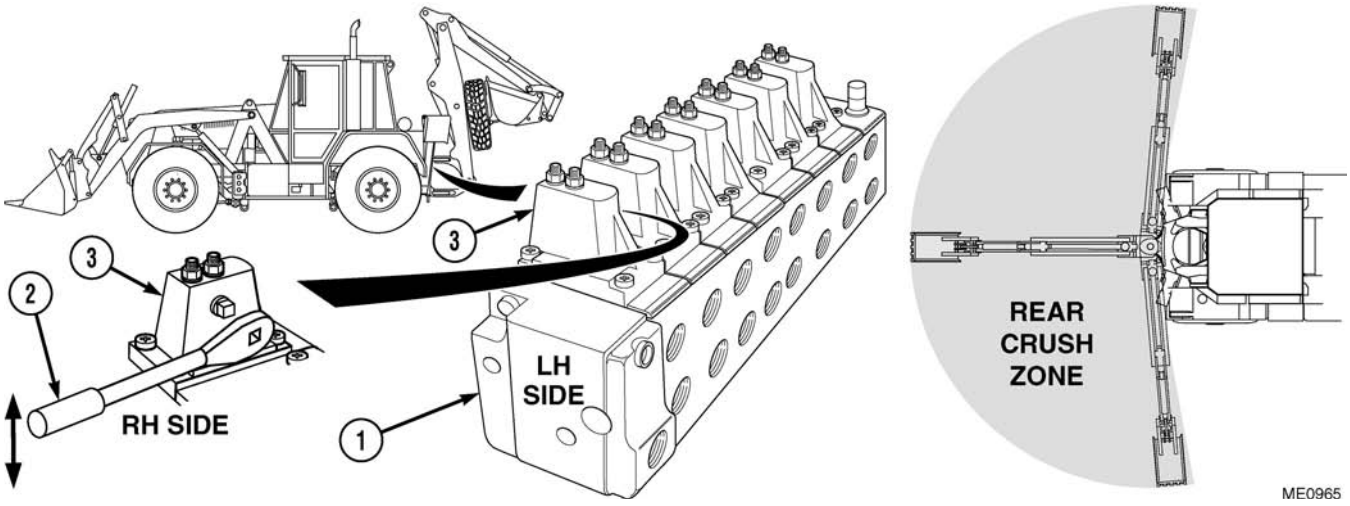
It is important to maintain the correct hydraulic fluid flow when using the attachments. If the flow is too low, the efficiency of operation will be impaired. If it is too high, damage to the attachment may result.

The flow is controlled by adjusting the engine speed. Table 8-1 shows the correct engine speed for some common hydraulic attachments. A decal showing this information is attached to the side console in the cabin of the vehicle.

Table 8-1. Auxiliary Hydraulic Flows - Mode Number 2

Attachment	Flow Rate	Engine Speed
Compactor	9 gpm (35 L/min)	Idle
Rock Hammer	21 gpm (80 L/min)	1,800 RPM
Auger	21 gpm (80 L/min)	1,800 RPM

c. Disconnection.



WARNING

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- Hydraulic fluid (Dexron III) is TOXIC. Wear protective goggles and gloves; use only in well-ventilated area; avoid contact with skin, eyes, and clothes. Skin and clothing that come in contact with hydraulic oil should be washed immediately. Saturated clothing should be removed immediately. Failure to comply may result in injury to personnel.
- Ensure that only the indicated auxiliary valve is operated. You are within the backhoe crush zone when operating the backhoe auxiliary valve. Manual operation of any other valves can cause serious injury or death.

(1) Locate backhoe hydraulic valve block (1) under backhoe top plate.

(2) Use hydraulic valve manual override lever (2) to operate auxiliary valve (3) until all hydraulic pressure is exhausted.

(3) Using a clean rag, clean quick disconnect couplings and area around connectors.

(4) Disconnect attachment hydraulic lines from backhoe quick disconnect couplings.

(5) Install dust caps on quick disconnect couplings for attachment and backhoe connectors.

(6) Start engine (Para 5-2).

(7) Operate controls to retract coupler cylinder until attachment rotates out and obtains point of balance (Para 7-5).

WARNING

Use care when removing or installing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

(8) Remove circlip or securing pin from attachment pin.

(9) Remove attachment pin from attachment.

(10) Operate boom and lower attachment to ground (Para 7-5).

(11) Operate backhoe arm to disengaging its coupler lugs from coupler pin (Para 7-5).

(12) Turn off hydraulic master switch (Para 6-3).

(13) Shut OFF engine (Para 5-2).

(14) Install attachment pin.

(15) Install circlip or securing pin on attachment pin.

d. Follow-On Maintenance.

Remove “Do Not Operate” tag from ignition switch.

8-6. SPARE WHEEL AND TIRE.

a. General.

The IHMEE carries a spare wheel and tire attached to a carrier which, during driving operations, is mounted on the backhoe bucket. The spare wheel and carrier must be removed from the IHMEE when undertaking backhoe operations.

b. Removal.

(1) Position vehicle on level ground.

(2) Ensure PARK BRAKE lever is ON (Para 4-11).

(3) Select N (Neutral) gear (Para 5-4).

(4) Remove towing hitch (Para 7-4).

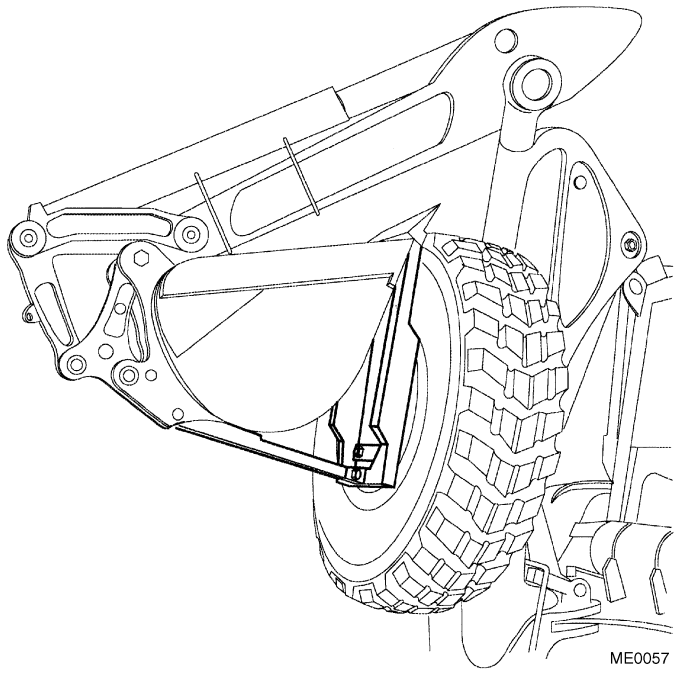
(5) Remove turnbuckles from stabilizer arms (Para 7-7).

(6) Remove boom locking pin (Para 7-2).

(7) Extend stabilizer arms to ground (Para 7-5).

(8) Remove travel stop from bucket cylinder (Para 7-6).

(9) Remove retaining clip securing holding pin.



(10) Remove holding pin, allowing arm to release.

(11) Lay spare tire and carrier assembly on the ground (Para 7-3).

(12) Rotate backhoe bucket until it releases the digging teeth from spare tire and carrier assembly.

c. Installation.

(1) Position vehicle on level ground.

(2) Ensure PARK BRAKE lever is ON (Para 4-11).

(3) Select N (Neutral) gear (Para 5-4).

(4) Rotate backhoe bucket until digging teeth engage spare tire and carrier assembly.

(5) Lift and curl spare tire and carrier assembly to balanced position (Para 7-3).

(6) Install holding pin and arm.

(7) Install retaining clip in holding pin.

(8) Install travel stop on bucket cylinder (Para 7-6).

(9) Stow backhoe assembly.

(10) Stow stabilizer arms (Para 7-5).

(11) Install boom locking pin.

(12) Install turnbuckles on stabilizer arms (Para 7-7).

(13) Install towing hitch (Para 7-4).

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists forms, field manuals, technical manuals, and other publications either referenced in this manual or which apply to the operation and maintenance of the Interim High Mobility Engineer Excavator (IHMEE). Web sites which may be useful are also included in this appendix.

A-2. FIELD MANUALS.

FM 3-4	Nuclear, Biological, and Chemical (NBC) Protection
FM 3-5	Nuclear, Biological, and Chemical (NBC) Decontamination
FM 5-20	Camouflage Pattern Painting
FM 5-103	Survivability
FM 5-434	Earthmoving Operations
FM 9-207	Operations and Maintenance of Ordnance Material in Cold Weather (0 °F to -65 °F)
FM 20-22	Vehicle Recovery Operations
FM 20-30	Battle Damage Assessment and Repair
FM 21-11	First Aid for Soldiers
FM 21-40	NBC (Nuclear, Biological, and Chemical) Defense
FM 21-305	Manual for Wheel Vehicle Diver
FM 31-70	Basic Cold Weather Operation Manual
FM 31-71	Northern Operations
FM 90-3	Desert Operations (FM 7-727)

A-3. FORMS.

DA Form 2028	Recommended Changes to DA Publications and Blank Forms
DA Form 2404/5988-E	Equipment Inspection and Maintenance Worksheet/Electronic
DA Form 2408-9	Equipment Control Record
DA Form 5504	Maintenance Request
DD Form 250	Material Inspection and Receiving Report
DD 314	Preventive Maintenance Schedule and Records
SF 364	Report of Descrepancy
SF 368	Product Quality Deficiency Report

A-4. MISCELLANEOUS.

CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-790	Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)
OSHA 1926.1001	Minimum Performance Criteria for Rollover Protective Structures for Designated Scrapers, Loaders, Dozers, Graders, and Crawler Tractors

A-5. PAMPHLETS.

DA PAM 738-750	Functional User's Manual for The Army Maintenance Management System (TAMMS)
DA PAM 40-501	Hearing Conservation Program

A-6. REGULATIONS.

AR 70-1	Army Acquisition Policy
AR 700-138	Army Logistics Readiness and Sustainability
AR 385-55	Prevention of Motor Vehicle Accidents

A-7. TECHNICAL BULLETINS.

TB 5-2420-230-14	Warranty Program for Interim High-Mobility Engineer Excavator (IHMEE)
TB 43-0142	Safety Inspection and Testing of Lifting Devices
TB 43-0209	Color, Marking, and Camouflage Painting of Military Vehicles
TB 43-0212	Purging, Cleaning, and Coating Interior Ferrous and Terne Sheet; Vehicle Fuel Tanks
TB 55-46-1	Standard Characteristics (Dimensions, Weight, and Cube) for Transportability of Military Vehicles and Other Outsized/Overweight Equipment.
TB 750-651	Use of Antifreeze Solutions, Antifreeze Extender, Cleaning Compounds, and Test Kit in Engine Cooling Systems

A-8. TECHNICAL MANUALS.

TM 3-4230-214-12&P	Decontaminating Apparatus, Portable, DS2, 1 1/2 Quart, ABC-M11
TM 3-6665-225-12	M-8 Chemical Alarm
TM 9-238	Deepwater Fording of Ordnance Material
TM 9-2610-200-14	Operator's, Unit, Direct Support, General Support Maintenance for Care, Maintenance, Repair, and Inspection of Pneumatic Tires and Inner Tubes
TM 9-4240-280-10	Operator's Manual for Mask, Chemical - Biological
TM 9-6140-200-14	Lead Acid Storage Batteries
TM 9-8662	Arctic Heater
TM 11-5820-498-12	Radio
TM 43-1043	Equipment Improvement Report and Maintenance Summary
TM 743-200-1	Storage and Material Handling
TM 746-10	Marking, Packing, and Shipment of Supplies and Equipment
TM 750-244-6	Procedures for Destruction of Tank Automotive Equipment to Prevent Enemy Use (U.S. Army Tank-automotive and Armament Command)
TM 9-2330-247-14&P	Operator’s, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) For Chassis, Trailer: General Purpose, 3-1/2 Ton, 2-Wheel, M353
TM 9-6115-646-14&P	Operator, Unit, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) Power Unit PU-495A/G and PU-495B/G, MEP-007A (100 KW 60 HZ) or MEP-007B (100 KW 60 HZ) Generator Set, M353 2-Wheel, 2-Tire Modified Trailer
TM 9-6115-647-14&P	Technical Manual Operator, Unit, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) Power Unit PU-789/M, MEP-114A (30 KW 400 HZ) Generator Set, M353 2-Wheel, 2-Tire, Modified Trailer

A-9. WEB SITES.

http://www.logsa.army.mil	Logistical Support Activity (LOGSA)
http://www.tea.army.mil	Military Traffic Management Command (MTMC)
http://www.tacom.army.mil	US Army Tank-automotive and Armaments Command (TACOM)

APPENDIX B
COMPONENTS OF END ITEM (COEI)
AND BASIC ISSUE ITEMS (BII)

Section I. Introduction.

B-1. SCOPE.

This appendix lists components of the end item and basic issue items for the IHMEE to help you inventory the items for safe and efficient operation of the equipment.

B-2. GENERAL.

The COEI and BII lists are divided into the following sections:

a. Section II, Components of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the end item. As part of the end item, these items shall be with the end item when issued or transferred between property accounts. COEI are transferred between property accounts. Illustrations are furnished to help you find and identify the items.

b. Section III, Basic Issue Items. These essential items are required to place the IHMEE in operation, operate the IHMEE, and do emergency repairs. Although shipped separately packaged, BII must be with the IHMEE during operation and when the IHMEE is transferred between property accounts. This list is your authority to request/ requisition BII for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

B-3. EXPLANATION OF COLUMNS.

a. Column (1) - Illustration Number (Illus. No.). This column indicates the number of the illustration in which the item is shown. “NI” indicates that the item is not illustrated.

b. Column (2) - Part No. Indicates the part number assigned by the manufacturer to the item and may be used for requisitioning purposes when an NSN is not listed.

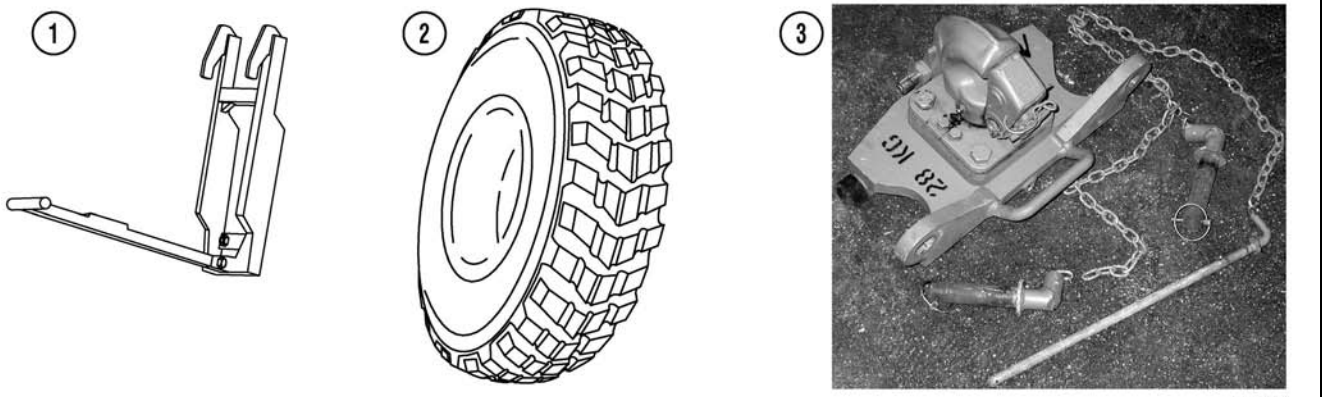
c. Column (3) - National Stock Number (NSN). Indicates the National Stock Number (NSN) assigned to the item and will be used for requisitioning purposes when available.

d. Column (4) - Description. Indicates the item name and, if required, a description to identify and locate the item.

e. Column (5) - Unit of Measure. Indicates the measure used in performing the actual operation or maintenance function. This measure is expressed by an alphabetical abbreviation (ea., in., per).

f. Column (6) - Quantity (Qty). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. Components of End Item.



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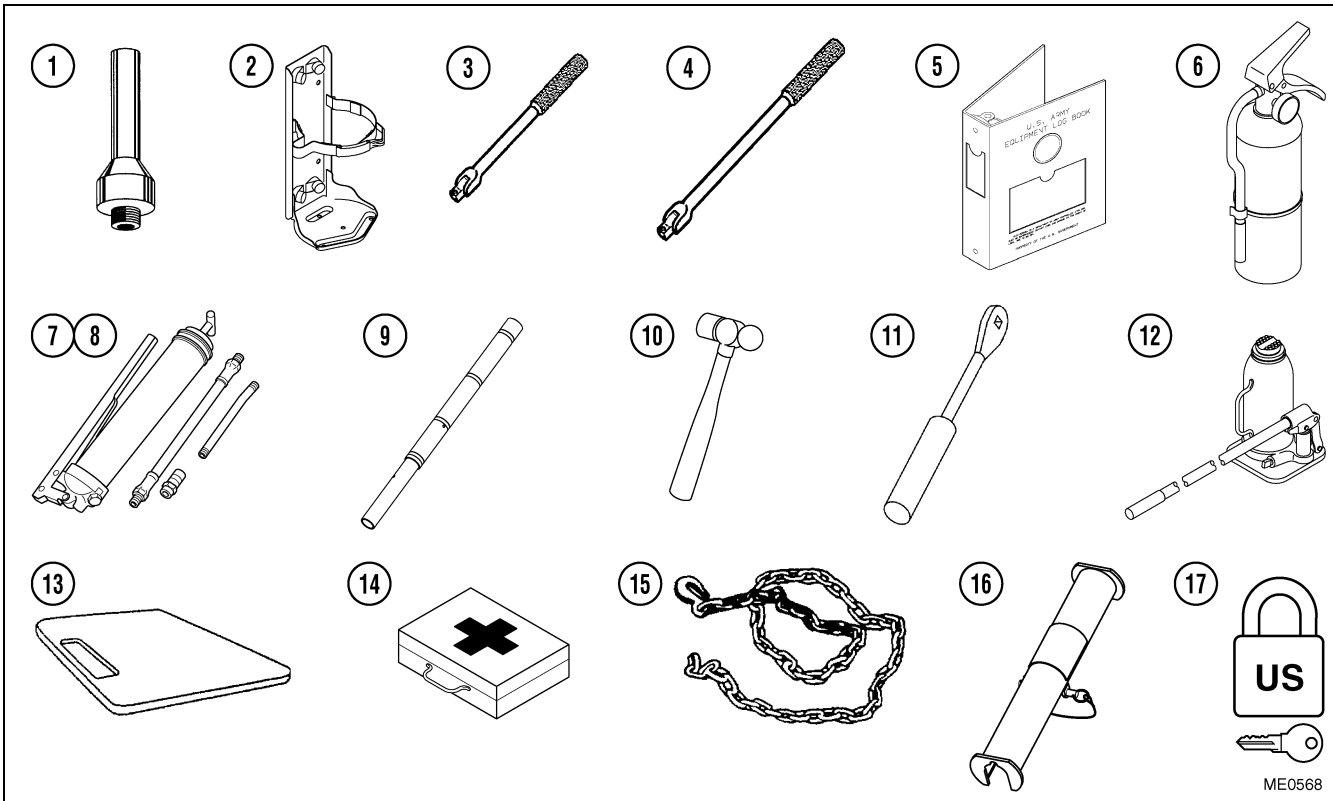
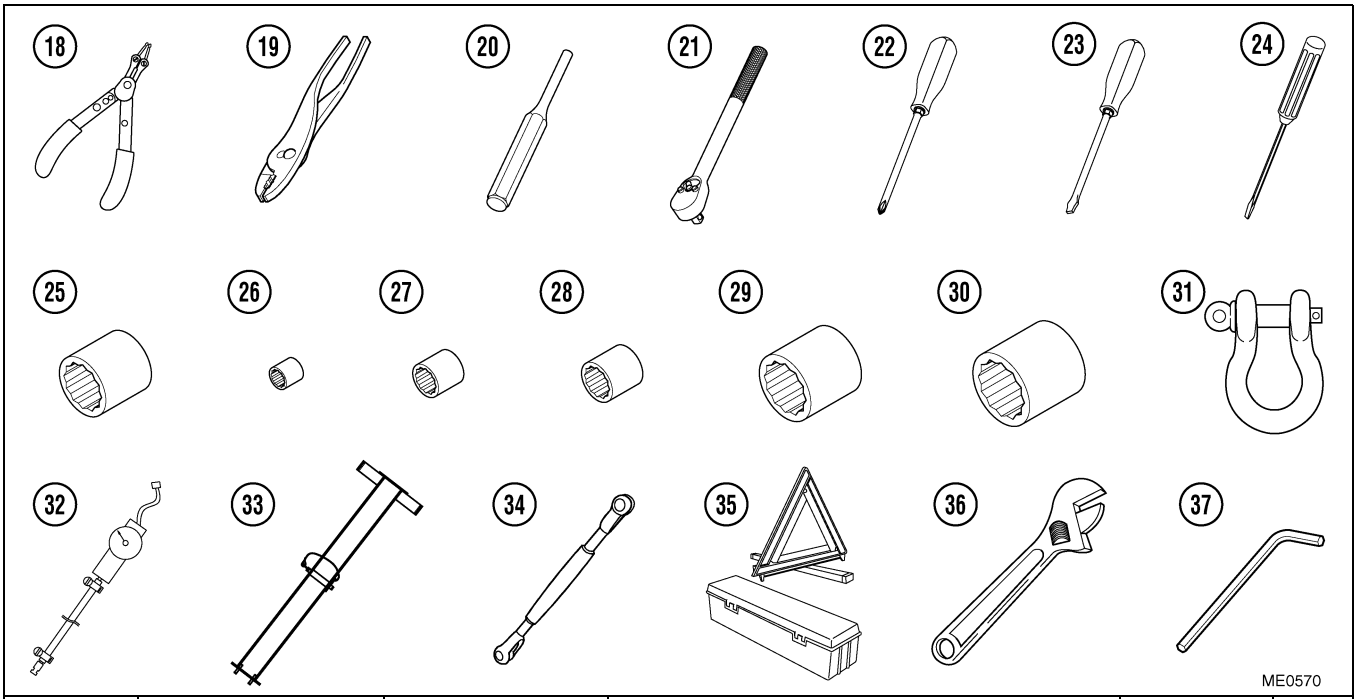
(1) Illus. No.	(2) Part No.	(3) NSN	(4) Description	(5) Unit of Measure	(6) Qty.
1	LTA-A05-303-001	2590-66-145-6870	Spare Tire Carrier Assembly	ea.	1
2	LTA-H03-004-001		Tire, Spare	ea.	1
3	LTA-A23-003-002		Tow Hitch Assembly	ea.	1

Section III. Basic Issue Items.



(1) Illus. No.	(2) Part No.	(3) NSN	(4) Description	(5) Unit of Measure	(6) Qty.
1	LTA60011	5325-66-147-5534	Adapter, Tire Valve, 6 - 10 mm	ea.	1
2	36037	4210-01-156-8098	Bracket, Fire Extinguisher	ea.	1
3	11655786-1	5120-00-236-7590	Breaker Bar, 1/2-in.	ea.	1
4	LTA60013	5120-66-016-2313	Breaker Bar, 3/4-in.	ea.	1
5	MIL-F-43986	7510-01-065-0166	Book, Log	ea.	1
6	79734	4210-01-133-9053	Extinguisher, Fire	ea.	1
7	1056-S4ANDA-908A	4930-00-640-4090	Grease Gun Assembly, 14 oz. (400 g)	ea.	1
8	M-10924-B	9150-01-197-7693	Grease Gun Cartridge, 14 oz. (400 g), GAA	ea.	1
9	LTA-A60-0008-01	3830-66-147-5499	Handle Assembly, Wheel Nut Torque	ea.	1
10	LTA60004	5120-66-010-8484	Hammer, Ball Peen 1-1/2 lb. (680 kg)	ea.	1
11	LTA60022	2590-66-147-5535	Hydraulic Valve Manual Override Lever	ea.	1
12	LTA60003	5120-66-147-5500	Jack, 5-Ton	ea.	1
13	LTA-A60-001-001	5120-66-147-5501	Jack Base Plate, Assembly	ea.	1
14	SC C-6545-IL VOL2	6545-00-922-1200	Kit, First Aid	ea.	1
15	LTA-A60-002-001	3950-66-147-5538	Lifting Chain Assembly 1,984 lb. (900 kg)	ea.	1
16	LTA-A20-035-001	2590-66-147-5536	Maintenance Arm, Front-End Loader (FEL)	ea.	1
17	5200 GL W/CHAIN	5340-00-158-3807	Padlock Set, 4-piece	ea	1



(1) Illus. No.	(2) Part No.	(3) NSN	(4) Description	(5) Unit of Measure	(6) Qty.
18	B107.19	5120-01-288-2699	Pliers, Circlip	ea.	1
19	LTA60006	5120-66-023-9518	Pliers, Combination	ea.	1
20	LTA60008	5120-66-023-8144	Punch, Pin 1/4 in. (6 mm)	ea.	1
21	4480	5120-01-323-0969	Ratchet, 1/2-in. drive	ea.	1
22	LTA60020	5120-66-031-0740	Screwdriver, Phillips Tip 6 in. (150 mm)	ea.	1
23	LTA60021	5120-66-024-7831	Screwdriver, Standard Blade 6 in. (150 mm)	ea.	1
24	LTA60007	5120-66-105-4617	Screwdriver, Standard Blade 12 in. (300 mm)	ea.	1
25	W-940-2509	5120-00-237-3782	Socket, 1-1/16 in. (Axle Hub)	ea.	1
26	5120-00-287-4150	5120-00-287-4150	Socket, 10 mm (Backhoe Valve Guard and Engine Access Panel)	ea.	1
27	MA-15	5120-00-263-4149	Socket, 15 mm (Firewall Cover)	ea.	1
28	MA-18	5120-00-263-4142	Socket, 18 mm (Belly Plates)	ea.	1
29	41-30MM	5120-00-263-4145	Socket, 30 mm (Spare Tire Mount)	ea.	1
30	SIMM332	5130-01-355-1874	Socket, 33 mm (Wheel Nuts)	ea.	1
31	M0666	4030-01-408-2774	Shackle	ea.	2
32	93-1431160U	4910-01-185-9650	Tire Gauge and Hose Assembly	ea.	1
33	LTA-A20-034-001		Travel Stop, Backhoe	ea.	1
34	LTA20088		Turnbuckle	ea.	2
35	11669000	9905-00-148-9546	Warning Device, Automotive	ea.	1
36	LTA60015	5120-66-013-6748	Wrench, Adjustable, 12 in. (300 mm)	ea.	1
37	57124	5120-01-045-4889	Wrench, Allen, 4 mm (Firewall Cover)	ea.	1

APPENDIX C
ADDITIONAL AUTHORIZED LIST (AAL)

Section I. Introduction.

C-1. SCOPE.

This appendix lists additional items that are authorized for the support of the IHMEE vehicles.

C-2. GENERAL.

This list identifies items that do not have to accompany the IHMEE vehicles and that do not have to be turned in with it. These items are all authorized for use by CTA, MTOE, TDA, or JTA.

C-3. EXPLANATION OF COLUMNS.

a. Column (1) - Item No. Indicates a sequential identification number that may be referred to in the main text of the manual.

b. Column (1) - Part No. Indicates the part number assigned by the manufacturer to the item and will be used for requisitioning purposes.

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

d. Column (3) - Description. Indicates the item name and, if required, a description to identify and locate the item.

e. Column (4) - Unit of Measure. Indicates the measure used in performing the actual operation or maintenance function. This measure is expressed by an alphabetical abbreviation (ea., in., per).

f. Column (5) - Quantity (Qty). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. Additional Authorized List.

(1) Item. No.	(2) Part No.	(3) NSN	(4) Description	(5) Unit of Measure	(6) Qty.
1	15184	4730-01-480-9171	Adapter, 1-¾ in. (44 mm) square post (54252)	ea.	1
2	15185	4730-01-480-9174	Adapter, 2 in (51 mm) round post (54252)	ea.	1
3	15187	4730-01-480-9178	Adapter, 2 in. (51 mm) square post (54252)	ea.	1
4	15186	4730-01-480-9176	Adapter, 2-¼ in. (57 mm) square post (54252)	ea.	1
5	D5-15-4826	6665-00-859-2215	Alarm Unit, Chemical Agent Automatic Alarm	ea.	1
6	6150925	5110-00-293-2336	Axe, Single Bit	ea.	1
7	MS53053-1	2540-00-409-8891	Bracket Assembly, Pioneer Tools	ea.	1
8	18LK		Bushing, Rubber, FEL 4-in-1 Bucket Tooth	ea.	2
9	11682336-1	6150-01-022-6004	Cable, Slave, NATO	ea.	1
10	E5-51-527	4230-01-133-4124	Decontaminating Apparatus	ea.	1
11	D5-15-4400	6665-00-859-2201	Detector Unit, Chemical Agent Automatic Alarm	ea.	1
12	11294	5110-01-247-3784	File, Flat (54252)	ea.	1
13	11298	5210-01-247-0754	Gauge, Depth (54252)	ea.	1
14	37G2940	8415-00-634-4658	Gloves, Men's and Women's	pr.	1
15	11677021	5120-00-288-6574	Handle, Mattock Pick	ea.	1
16	11299	5110-01-246-6114	Kit, File Guide (54252), composed of: Clamp (54252) 4553 File, Round (54252) 11268 Handle (54252) 11552 Holder (54252) 11551 Nut, Wing (54252) 11554	ea.	1
17	11677022	5120-00-243-2395	Mattock, Pick Type, 5lb. (2.3 kg)	ea.	1
18	LTA20087		Pallet Forks 4,410 lb. (2,000 kg)	ea.	1
19	V13-17PN		Pin, Retaining, Backhoe Bucket Tooth	ea.	2
20	18PN		Pin, Retaining, FEL 4-in-1 Bucket Tooth	ea.	2
21	PD45132D	2590-01-480-9166	Pounder, Picket, Hydraulic	ea.	1
22	CS06120M	3695-01-143-2325	Saw, Chain, 15-in. cut bar CS-06 (54252)	ea.	1
23	11655784	5120-00-293-3336	Shovel, D-Handle, Round	ea.	1
24	V-17SYL		Tooth, Backhoe Bucket	ea.	2
25	18LP		Tooth, FEL 4-in-1 Bucket	ea.	2
26	LTA-V20-001-001		Tooth, FEL Ripper	ea.	2
27	11464	5120-01-246-3071	Wrench, Combination (54252)	ea.	1
28	IW12140V	5130-01-300-6052	Wrench, Impact, Pneumatic	ea.	1

APPENDIX D
EXPENDABLE/DURABLES LIST

Section I. Introduction.

D-1. SCOPE.

This appendix lists expendable/durable supplies and materials needed to operate and maintain the Interim High Mobility Engineer Excavator (IHMEE). This listing is for informative purposes only and is not an authority to requisition listed items. These items are authorized to be used 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.

D-2. EXPLANATION OF COLUMNS.

a. Column (1), Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use Grease, Automotive and Artillery (GAA), Item 4, Appendix D").

b. Column (2), Level. This column identifies the Federal item name (in all capital letters), followed by a minimum description when needed.

C - Operator/Crew

c. Column (3), National Stock Number (NSN). This is the National Stock Number assigned to the item; use it to request or requisition the item.

d. Column (4), Description. Indicates the Federal item name, and, if required, a description to identify the item.

e. Column (5), Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by two-character alphabetical abbreviations (e.g., ea., in., pr.). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue to satisfy required measures.

Section II. Expendable and Durable Items.

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	C		Antifreeze, Multi-Engine Type, A-A-52624	
		6850-01-441-3218	Type I (EGAF), 1-gallon can	gal
		6850-01-441-3221	Type I (EGAF), 5-gallon can	gal
		6850-01-441-3223	Type I (EGAF), 55-gallon drum	gal
		6850-01-441-3234	Type IP (60% EGAF), 1-gallon can	gal
		6850-01-441-3240	Type IP (60% EGAF), 5-gallon can	gal
		6850-01-441-3248	Type IP (60% EGAF), 55-gallon drum	gal
2	C	6850-00-926-2275	Cleaning Compound,Windshield, (0FTT5) 0854-000	gal

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
3	C		Dexron III	
		9150-00-698-2382	1-quart can	qt
		9150-01-353-4799	1-quart bottle	qt
		9150-00-657-4959	5-gallon can	gal
		9150-01-114-9968	55-gallon drum	gal
4	C		Grease, Automotive and Artillery (GAA), MIL-PRF-10924	
		9150-01-197-7688	2.25-ounce tube	oz
		9150-01-197-7693	14-ounce cartridge	oz
		9150-01-197-7690	1.75-pound can	lb
		9150-01-197-7689	6.5-pound can	lb
		9150-00-190-0906	25-pound pail	lb
		9150-01-197-7692	35-pound can	lb
		9150-01-197-7691	120-pound can	lb
5	C		Oil, Lubricating, Gear, Multipurpose, (GO-), MIL-PRF-2105	
		9150-01-035-5390	GO-75, 1-quart can	qt
		9150-01-035-5391	GO-75, 5-gallon can	gal
		9150-01-035-5392	GO-80/90, 1-quart can	qt
		9150-01-313-2191	GO-80/90, 1-gallon can	gal
		9150-01-035-5393	GO-80/90, 5-gallon can	gal
		9150-01-035-5394	GO-80/90, 55-gallon drum	gal
		9150-01-035-5395	GO-85/140, 5-gallon can	gal
		9150-01-035-5396	GO-85/140, 55-gallon drum	gal
		9150-01-048-4591	GO-85/140, 1-quart can	qt
6	C		Oil, Lubricating, I-C Engine, Arctic, (OEA), MIL-PRF-46167	
		9150-00-402-2372	5-gallon can	gal
		9150-00-491-7197	55-gallon drum	gal
7	C		Oil, Lubricating, I-C Engine, Combat/Tactical Service, (OE/HDO-), MIL-PRF-2104	qt
		9150-00-189-6727	OE/HDO-10, 1-quart can	qt
		9150-01-177-3988	OE/HDO-10, 1-quart bottle	gal
		9150-00-186-6668	OE/HDO-10, 5-gallon can	gal
		9150-00-191-2772	OE/HDO-10, 55-gallon drum	gal
		9150-00-186-6681	OE/HDO-30, 1-quart can	qt
		9150-01-178-4726	OE/HDO-30, 1-quart bottle	qt
		9150-00-188-9858	OE/HDO-30, 5-gallon can	gal
		9150-00-189-6729	OE/HDO-30, 55-gallon drum	gal
		9150-00-188-9862	OE/HDO-40, 55-gallon drum	gal
		9150-01-152-4117	OE/HDO-15/40, 1-quart can	qt
		9150-01-178-4725	OE/HDO-15/40, 1-quart bottle	qt
		9150-01-152-4118	OE/HDO-15/40, 5-gallon can	gal
		9150-01-152-4119	OE/HDO-15/40, 55-gallon drum	gal
8	C	7920-00-205-1711	Rags, Wiping, 50 lb. bale, (A-A-531)	lb

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
9	C		Solvent, Degreasing, Type II (81348) MIL-PRF-680	
		6850-01-474-2319	1-gallon can	gal
		6850-01-474-2317	5-gallon can	gal
		6850-01-378-0698	15-gallon can	gal
		6850-01-474-2316	55-gallon drum	gal
10	C	4310-01-115-2297	Ties, Cable, (56501) TY525MX	ea.
11	C	9130-01-395-0945	Turbine Fuel, Aviation, Bulk, JP-8	gal

APPENDIX E
PREPARATION FOR SHIPMENT AND OPERATION

E-1. SCOPE.

This appendix provides instructions to prepare the Interim High-Mobility Engineer Excavator (IHMEE) for shipment by all modes of air, sea, rail, or highway along with information on readying the vehicle for operation after transportation.

E-2. PREPARATION FOR C-130 SHIPMENT AND OPERATION.

This Task Covers:

a. Preparation for Shipment b. Preparation for Operation

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
Lifting chain assembly, BII, Item 15, Appendix B
Ratchet, 1/2-in., BII, Item 21, Appendix B
Socket, 10mm, BII, Item 26, Appendix B
Wrench, adjustable, BII, Item 36, Appendix B

Materials/Parts
Ties, cable, Item 10, Appendix D
Dunnage, suitable

Personnel Required
MOS 62J, Construction Engineering Operator

References
None

Equipment Conditions
TM or Para *Condition Description*
None

Drawings Required
None

Estimated Time to Complete
30 min.

a. Preparation for Shipment.

(1) Ensure vehicle is positioned on level ground.

(2) Ensure PARK BRAKE lever is ON (Para 4-11).

(3) Ensure EGS shift lever is in N (Neutral) (Para 5-4).

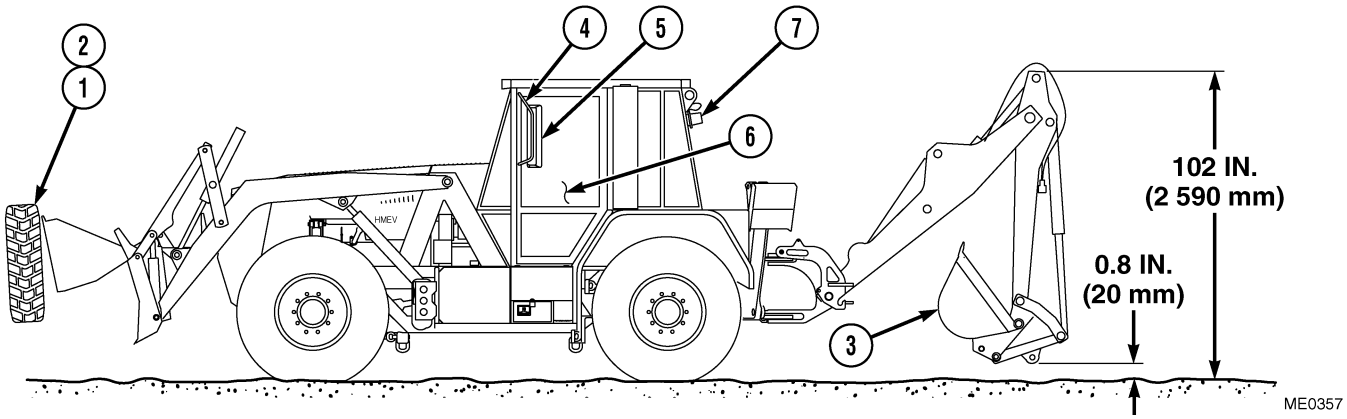
(4) Ensure headlights are stowed on the bucket (Para 5-12).

(5) Ensure backhoe pivot pin is installed (Para 7-2).

(6) Ensure FEL travel stops are deployed and locking clevis is attached to 4-in-1 bucket (Para 6-2).

(7) Remove tow hitch (Para 7-4).

(8) Ensure fuel tank is 3/4 full for C-130 transport or 1/4 full for all other transport.



(9) Remove spare tire (1) and carrier (2) from backhoe bucket (3) (Para 8-6).

(10) Attach spare tire (1) and carrier (2) to FEL 4-in-1 bucket. Secure to 4-in-1 bucket with chain.

(11) Roll the Front-End Loader (FEL) bucket to the full back position (Para 6-4).

(12) Adjust boom height until it is approximately 102 in. (2 590 mm) from ground.

(13) Ensure backhoe lifting lug is approximately 0.8 in. (20 mm) from ground.

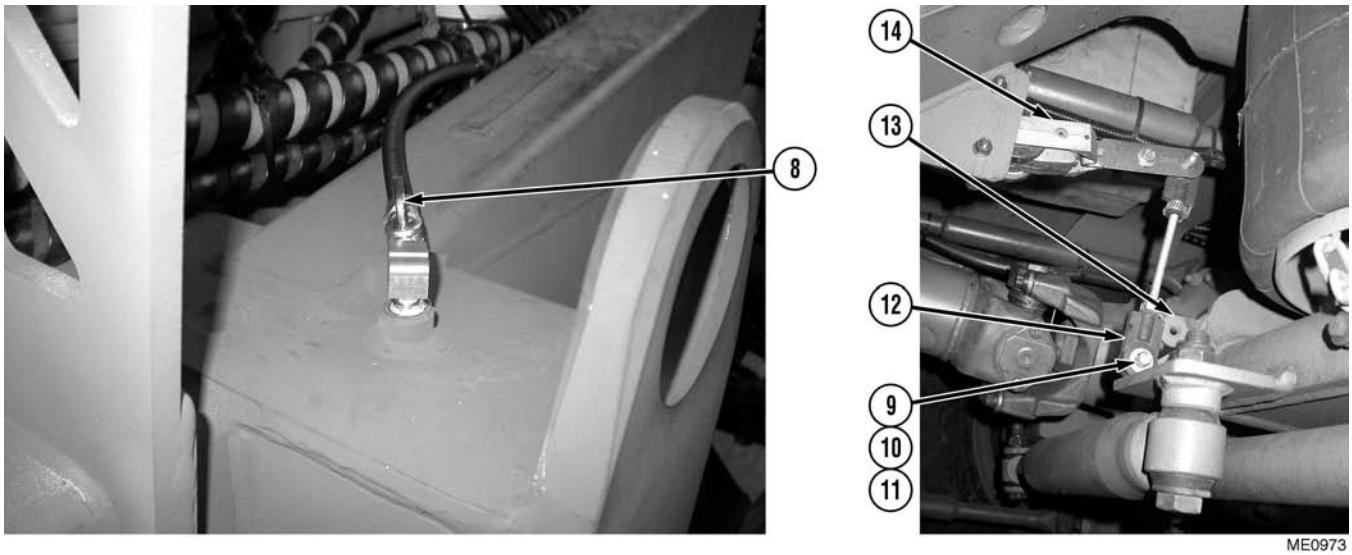
(14) Stow backhoe stabilizers and install turnbuckles (Para 7-7).

(15) Stow side mirrors (4) by holding mirror frame (5) and pushing mirror toward cab (6).

(16) Move warning beacon (7) to rear of cab (6).

(17) Remove radio antenna and base.

(18) Place MODE CONTROL switch in C130/LIMP mode (Para 5-3). Wait for all air to be exhausted from air bags.



(19) Turn air bag valve (8) off at each air bag.

(20) Shut OFF engine (Para 5-2).

(21) Using adjustable wrench, ratchet and 10 mm socket, remove nut (9), washer (10), bolt (11), and ride level valve linkage (12) from axle bracket (13).

(22) Install bolt (11), washer (10), and nut (9) in ride level valve linkage (12).

(23) Secure ride level valve linkage (12) to ride level valve body (14) with cable ties.

(24) Repeat Steps (21) through (23) for remaining three wheels.

WARNING

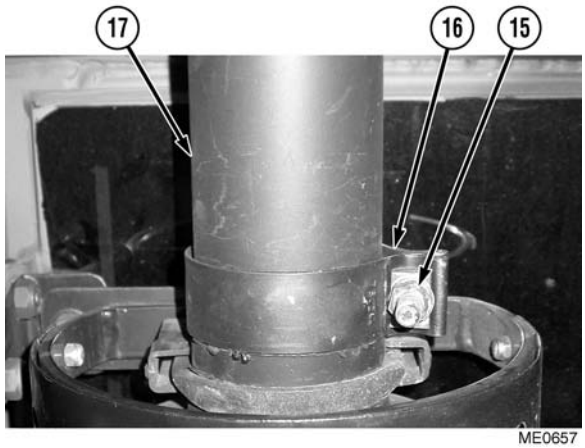
When loading on to a C-130, vehicle must be lined up with aircraft entrance before deflating tires to required pressure. Do not deflate tire pressure below 23 psi (159 kPa). Do not make any sharp turns, and keep vehicle speed below 1.6 mph (2.5 km/h). Failure to comply may result serious injury or death and/or damage to equipment.

(25) Deflate all tires (Para 3-17), including spare tire, to achieve maximum height of 102 in. (2 590 mm).

WARNING

- APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.
- Hot parts can burn personnel. Let hot parts cool before starting work.

(26) Using adjustable wrench, loosen nut (15) on clamp (16) at the top of the muffler.



CAUTION

Ensure that muffler opening is not left exposed to rain after removing exhaust stack. Failure to comply may allow rain to enter the exhaust system, resulting in damage to equipment.

(27) Remove exhaust stack (17).

(28) Stow exhaust stack, tow hitch, backhoe travel stop, radio antenna and base in cab.

(29) Start engine (Para 5-2).

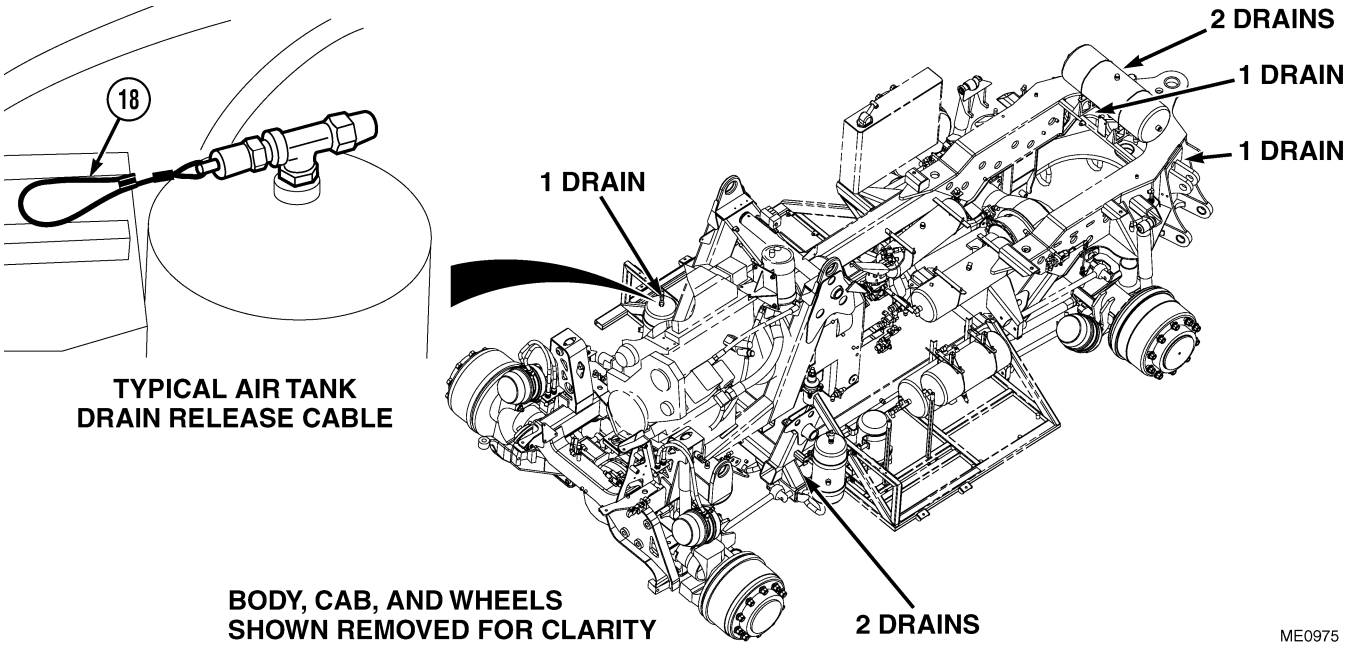
CAUTION

Always use a ground guide to ensure that no part of the IHMEE contacts the aircraft, and do not exceed 1.6 mph (2.5 km/h) during loading. Failure to comply may result in damage to equipment.

(30) Ensure FEL bucket is at least 24 in. (610 mm) above the ground. Drive IHMEE into C-130, ensuring that no part of the IHMEE contacts the aircraft.

(31) Lower backhoe onto soft wood dunnage.

(32) Shut OFF engine (Para 5-2).



WARNING

Do not drain air from a tank with any part of body in air spray path. Skin embolisms and/or debris in eyes can occur from released pressure. Failure to comply may result in injury or death to personnel.

(33) Drain vehicle air system by pulling on seven release cables (18) until all air has been released.

b. Preparation for Operation.

WARNING

APPROVED HEARING PROTECTION MUST BE WORN by operator, passenger, and any personnel within 22 ft. (7 m) of an IHMEE at high idle or within 12 ft. (4 m) of an IHMEE at low idle. Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with TB MED 501. Hearing loss occurs gradually but becomes permanent over time. Failure to comply may cause impairment or loss of hearing.

(1) Start engine (Para 5-2).

CAUTION

Always use a ground guide to ensure that no part of the IHMEE contacts the aircraft, and do not exceed 1.6 mph (2.5 km/h) during unloading. Failure to comply may result in damage to equipment.

(2) Ensure FEL bucket is at least 24 in. (610 mm) above the ground. Drive IHMEE out of C-130, ensuring that no part of the IHMEE contacts the aircraft.

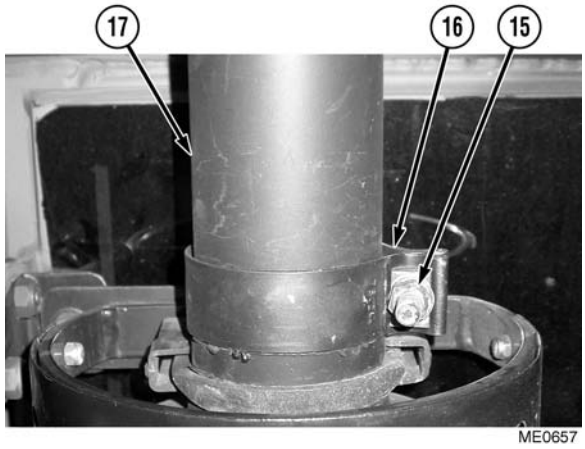
(3) Shut OFF engine (Para 5-2).

WARNING

Hot parts can burn personnel. Let hot parts cool before starting work.

(4) Position exhaust stack (17) inside clamp (16) and tighten nut (15) using adjustable wrench.

(5) Inflate all tires to appropriate pressure (Para 3-17).



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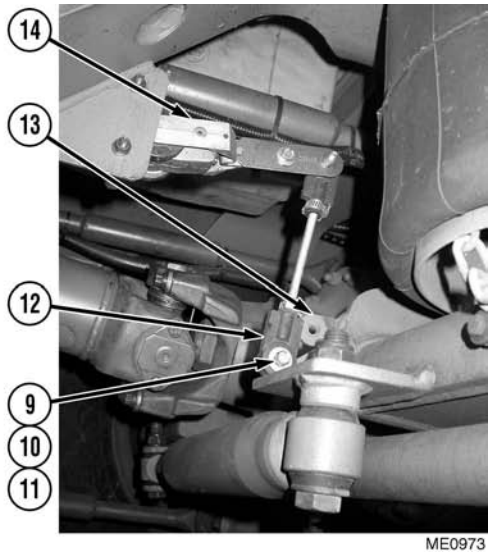

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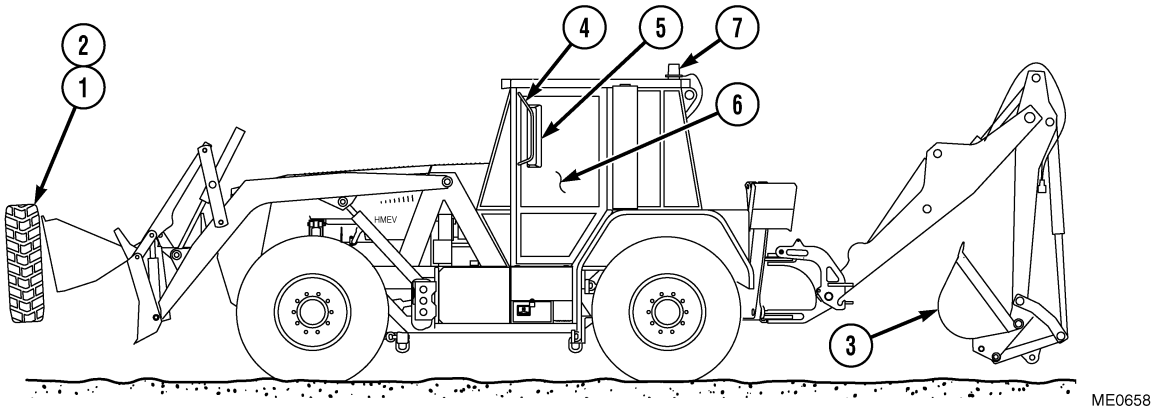
(6) Remove cable ties securing ride level valve linkage (12) to ride level valve body (14).

(7) Using adjustable wrench, ratchet and 10 mm socket, remove nut (9), washer (10), and bolt (11) and ride level valve linkage (12).

(8) Install bolt (11), washer (10), nut (9), and ride level valve linkage (12) to axle bracket (13). Tighten nut.

(9) Repeat Steps (6) through (8) for remaining three wheels.

(10) Turn air bag valve (8) on at each air bag.



(11) Install radio antenna and base.

(12) Move warning beacon (7) to top of cab (6).

(13) Remove spare tire (1) and carrier (2) from FEL 4-in-1 bucket.

(14) Attach spare tire (1) and carrier (2) to backhoe bucket (3) (Para 8-6).

(15) Install tow hitch (Para 7-4).

(16) Position side mirrors (5) by holding frame (4) and pulling mirror (5) until it is adjusted for driving.

(17) Place vehicle in travel mode (Para 5-11).

(18) Ensure suspension mode selected is appropriate for the task to be performed (Para 5-3).

END OF TASK

APPENDIX F
STOWAGE AND SIGN GUIDE

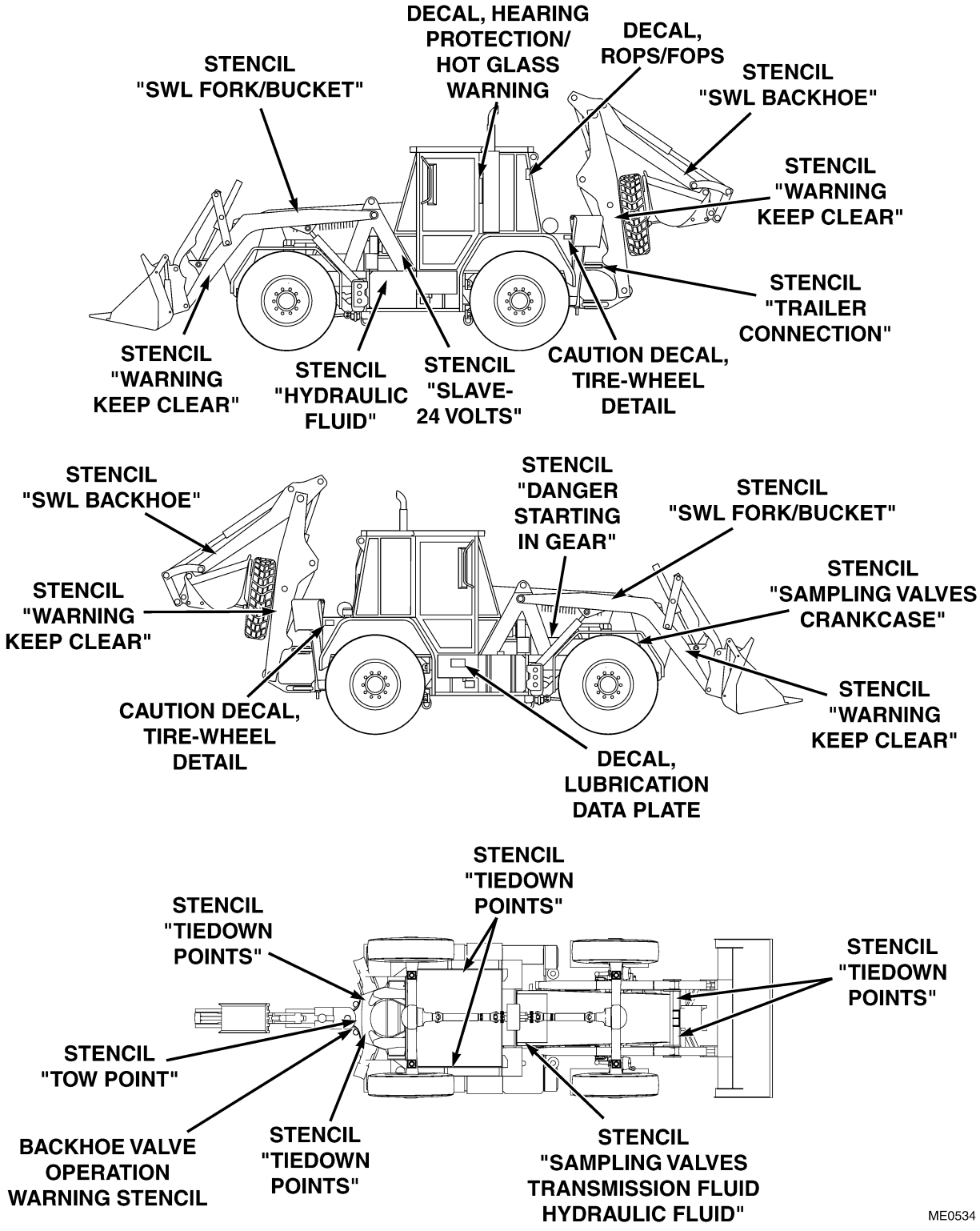
F-1. SCOPE.

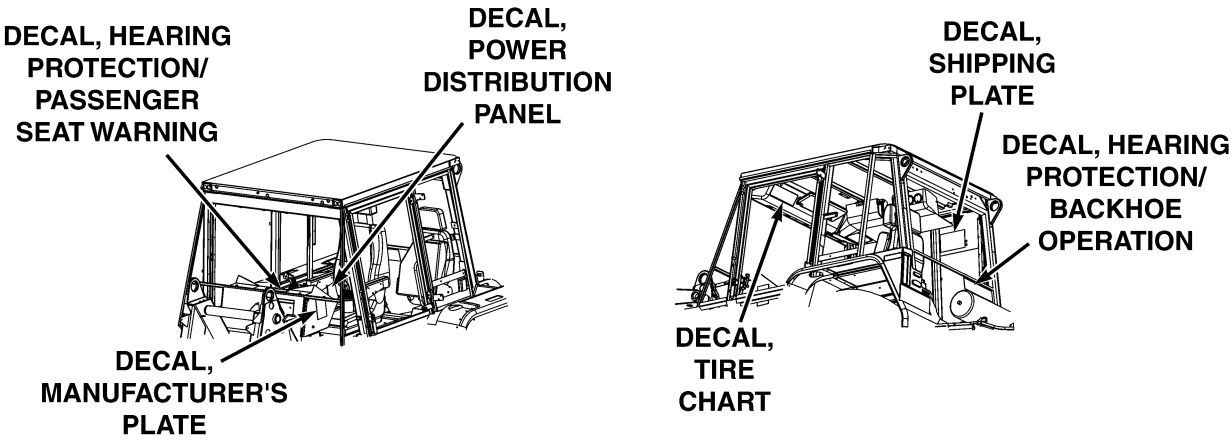
This appendix shows locations for data plates, decals, and stencils that are required to be in place on the High Mobility Engineer Excavator (IHMEE).

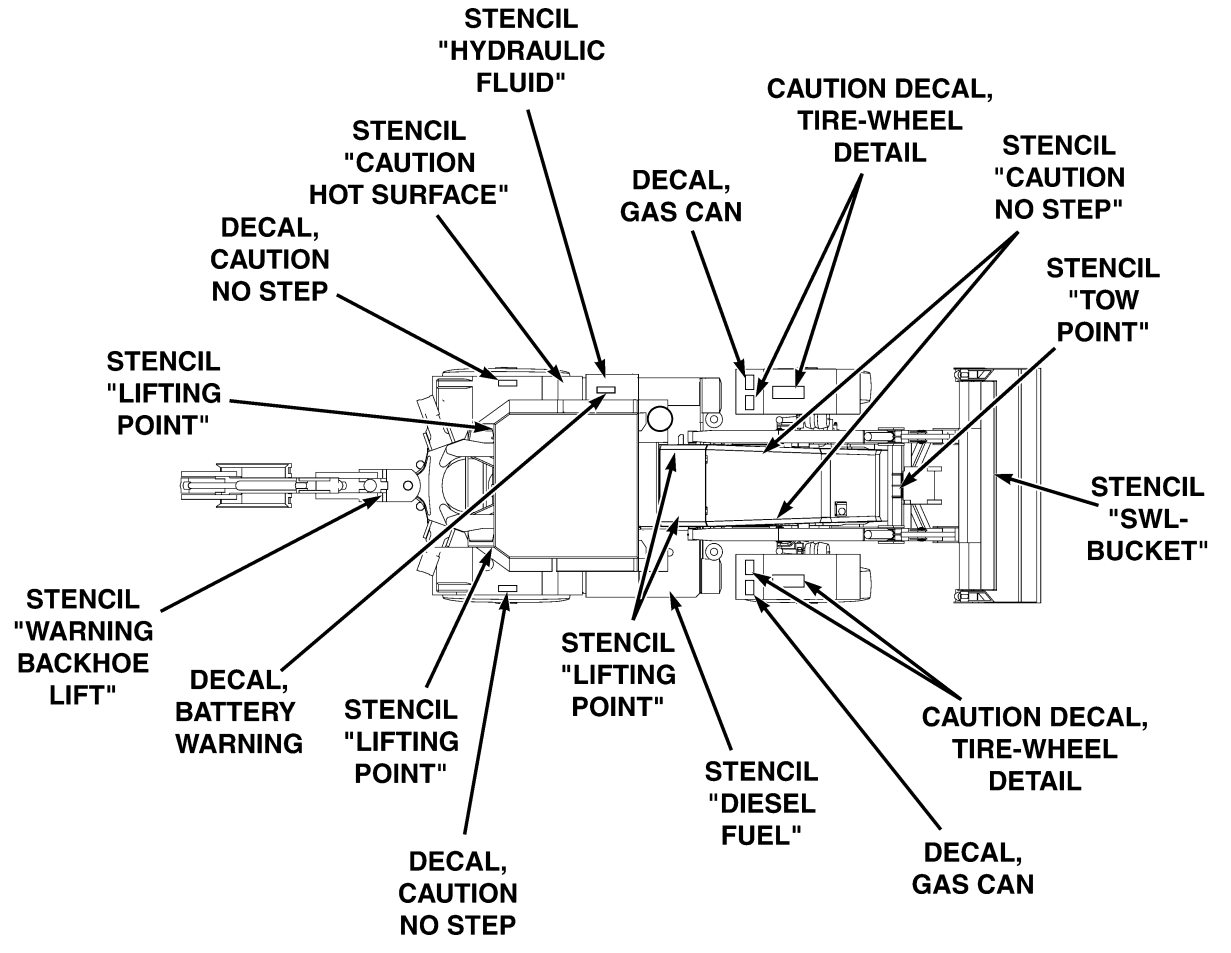
F-2. GENERAL.

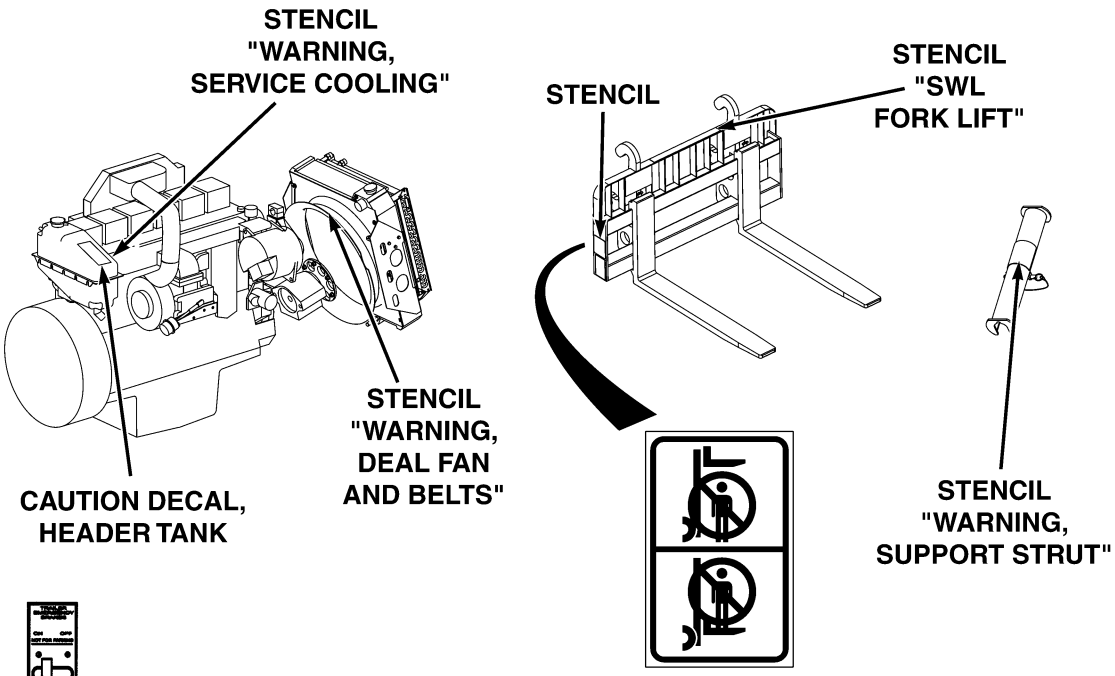
This appendix shows the locations for data plates, decals, and stencils that are required to be in place on the (IHMEE). These signs and stencils contain warning, cautions, or other information needed to operate the vehicle safely. The stowage locations of all Basic Issue Items (BII), Components of End Item (COEI), and Additional Authorized List (AAL) are also provided.

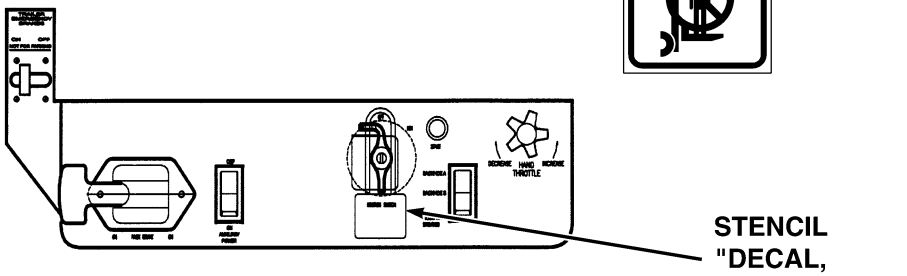
F-3. SIGN GUIDE.



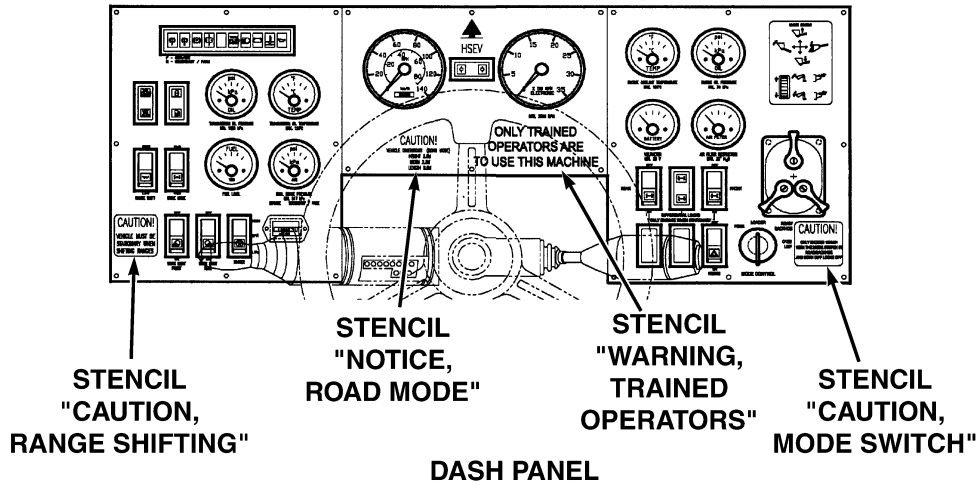

DECAL, HEARING PROTECTION/ PASSENGER SEAT WARNING
DECAL, POWER DISTRIBUTION PANEL
DECAL, MANUFACTURER'S PLATE
DECAL, SHIPPING PLATE
DECAL, HEARING PROTECTION/ BACKHOE OPERATION
DECAL, TIRE CHART


STENCIL "HYDRAULIC FLUID"
CAUTION DECAL, TIRE-WHEEL DETAIL
STENCIL "CAUTION HOT SURFACE"
DECAL, GAS CAN
STENCIL "CAUTION NO STEP"
DECAL, CAUTION NO STEP
STENCIL "TOW POINT"
STENCIL "LIFTING POINT"
STENCIL "SWL-BUCKET"
STENCIL "WARNING BACKHOE LIFT"
DECAL, BATTERY WARNING
STENCIL "LIFTING POINT"
STENCIL "LIFTING POINT"
CAUTION DECAL, TIRE-WHEEL DETAIL
STENCIL "DIESEL FUEL"
DECAL, CAUTION NO STEP
DECAL, GAS CAN
ME0533





SIDE PANEL



DASH PANEL

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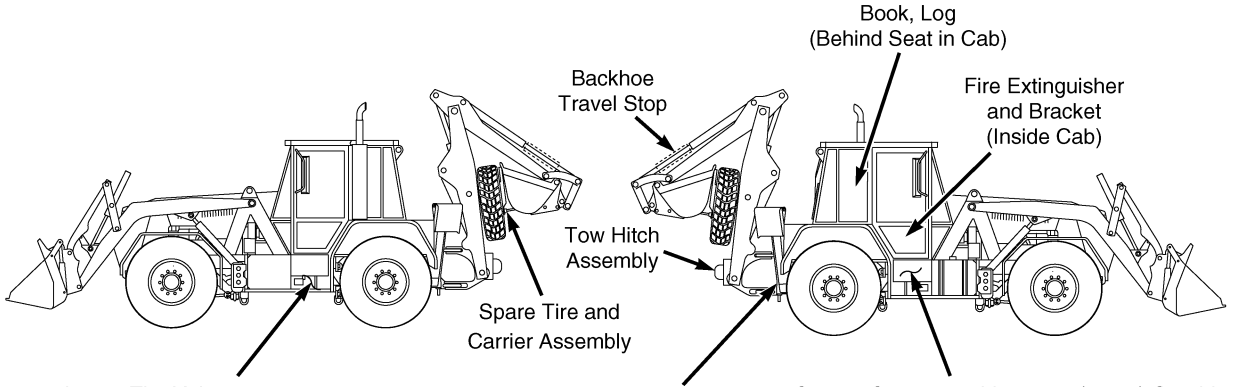
F-4. STOWAGE GUIDE.



- Adapter, Tire Valve, 6-10 mm
- Breaker Bar, 1/2-in. drive
- Breaker Bar, 3/4-in. drive
- Handle Assembly, Wheel Nut Torque
- Kit, First Aid
- Lifting Chain Assembly 1,984 lb. (900 kg)
- Ratchet, 1/2-in. drive
- Shackle (2)
- Socket, 1-1/16 in., (Axle Hub)
- Socket, 10 mm, (Backhoe Valve Guard and Engine Access Panel)
- Socket, 15 mm, (Firewall Cover)
- Socket, 18 mm, (Belly Plates)
- Socket, 30 mm, (Spare Tire Mount)
- Socket, 33 mm, (Wheel Nuts)
- Tire Gauge and Hose Assembly
- Wrench, Allen, 4 mm (Firewall Cover)
- Warning Device, Automotive
- Grease Gun Assembly 14 oz. (400 g) Cartridge
- Hammer, Ball Peen 1-1/2 lb. (680 kg)
- Hydraulic Valve Manual Override Tool
- Jack, 5-Ton
- Jack Base Plate, Assembly
- Maintenance Arm, Front-End Loader (FEL)
- Pliers, Circlip
- Pliers, Combination
- Punch, Pin 1/4 in. (6 mm)
- Screwdriver, Phillips Tip 6 in. (150 mm)
- Screwdriver, Standard Blade 6 in. (150 mm)
- Screwdriver, Standard Blade 12 in. (300 mm)
- Wrench, Adjustable 12 in. (300 mm)

NO STOWAGE PROVISIONS ARE MADE FOR THE FOLLOWING ITEMS:

- Adapter, 1-¾ in. (44 mm) square post
- Adapter, 2 in (51 mm) round post
- Adapter, 2 in. (51 mm) square post
- Adapter, 2-¼ in. (57 mm) square post
- Alarm Unit, Chemical Agent Automatic Alarm
- Axe, Single Bit
- Bracket Assembly, Pioneer Tools
- Bushing, Rubber, FEL 4-in-1 Bucket Tooth (2)
- Cable, Slave, NATO
- Decontaminating Apparatus
- Detector Unit, Chemical Agent Automatic Alarm
- File, Flat
- Gauge, Depth
- Gloves, Men's and Women's
- Handle, Mattock Pick
- Kit, File Guide
- Mattock, Pick Type, 5lb. (2.3 kg)
- Pallet Forks 4,410 lb. (2,000 kg)
- Pin, Retaining, Backhoe Bucket Tooth (2)
- Pin, Retaining, FEL 4-in-1 Bucket Tooth (2)
- Pounder, Picket, Hydraulic
- Saw, Chain, 15-in.
- Shovel, D-Handle, Round
- Tooth, Backhoe Bucket (2)
- Tooth, FEL 4-in-1 Bucket (2)
- Tooth, FEL Ripper (2)
- Wrench, Combination
- Wrench, Impact, Pneumatic

ME0358

ALPHABETICAL INDEX

By Order of the Secretary of the Army:

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

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army

0315502

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

PUBLICATION/FORM NUMBER	DATE	Title
TM 5-2420-230-10	01 oct 2003	Operator's Manual for Interim High-Mobility Engineer Excavator (IHMEE)

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON *(Provide exact wording of recommended changes, if possible.)*
		2-115	**(14)(d)**			**"Push down inner boom control lever (6) to retract outer boom cylinder completely" should read "Push down outer boom control lever (6) to retract outer boom cylinder completely"**

** Reference to line numbers within the paragraph or subparagraph.*

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

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

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TM 5-2420-230-10	01 OCT 2003	Operator's Manual for Interim High-Mobility Engineer Excavator (IHMEE)

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

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more blank space is needed.)*

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

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USAPPC V3.00

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

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

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

WEIGHTS

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

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

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

TEMPERATURE

5/9 ($^oF - 32$) = ^oC
212^o Fahrenheit is equivalent to 100^o Celsius
90^o Fahrenheit is equivalent to 32.2^o Celsius
32^o Fahrenheit is equivalent to 0^o Celsius
9/5 C^o + 32) = F^o

APPROXIMATE CONVERSION FACTORS

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

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