TM 5-2420-231-10

TECHNICAL MANUAL

OPERATOR'S MANUAL
FOR
TRACTOR, WHEELED, INDUSTRIAL
BACKHOE LOADER (BHL)

NSN 2420-01-532-3399

BHL-10-001A

HEADQUARTERS, DEPARTMENT OF THE ARMY
MARCH 2007

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous material icons used within the Technical Manual (TM). Most of the icons are non-standard, and are included because they appear on the safety decals on the equipment.

FIRST AID

For first aid, refer to FM 4-25.11.

First aid for battery acid exposure:

- Antidote: EXTERNAL – Flush with water.
- Antidote: INTERNAL – Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Do not induce vomiting. **SEEK MEDICAL ATTENTION IMMEDIATELY**.
- Antidote: EYES – Flush with water for 15 minutes. **SEEK MEDICAL ATTENTION IMMEDIATELY.**

EXPLANATION OF STANDARD SAFETY WARNING ICONS

ELECTRICAL – Electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.

HOT AREA – Hand over object radiating heat shows that part is hot and can burn.

EYE PROTECTION – Person with goggles shows that the material will injure the eyes.

HEAVY PARTS – Heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.

HEAVY PARTS – Foot with heavy object on top shows that heavy parts can crush and harm.

WARNING SUMMARY - Continued

EXPLANATION OF BACKHOE LOADER (BHL) SPECIFIC SAFETY WARNING ICONS

FAN – Hand cut by fan shows that fan and other moving parts can cause injury.

TOPPLE – Vehicle falling over shows that vehicle can topple.

FEL – Human figure under Front End Loader (FEL) shows that bucket or other moving parts can cause serious injury or death.

CRUSH – Bucket falling on human figure shows that bucket or other heavy components can cause serious injury or death.

LATCHPIN – Falling bucket shows that if latchpin is not installed, bucket can cause serious injury or death.

HEAT STRESS – Heat fumes rising from human figure show that excessive heat can be dangerous.

EXPLOSION – Rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition or high pressure.

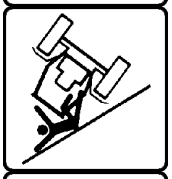
PINCH – Fingers getting cut off shows that moving parts can cause injury.

WARNING SUMMARY - Continued

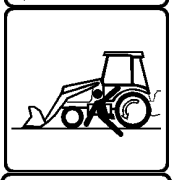
EXPLANATION OF BACKHOE LOADER (BHL) SPECIFIC SAFETY WARNING ICONS - Continued

UNCONTROLLED MOVEMENT – Boom striking person shows that uncontrolled movement of boom or other moving components can cause serious injury or death.

PINCH – Fingers getting cut off shows that moving parts can cause injury.



ROLLOVER – Vehicle on top of human figure shows that vehicle rollover on hillside can cause serious injury or death.



RUNOVER – Vehicle on top of human figure shows an uncontrolled vehicle can cause serious injury or death.

SEAT BELT – Person with seat belt shows that operator must wear seat belt.

GENERAL SAFETY WARNINGS DESCRIPTION

Before Operating The BHL

WARNING

Adjust, secure, and latch seat and fasten seat belt before starting engine. Make sure that you can reach all controls, brakes, and necessary functions. Failure to comply may result in serious injury or death to personnel.

Before starting engine, engage parking brake and shift direction control lever to neutral position. Start and operate the BHL only from operator seat. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION

Before Operating The BHL - Continued

WARNING

Before operating the BHL, make sure service and parking brakes are operable. Failure to comply may result in serious injury or death to personnel.

Lock service brake pedals together when operating on road or with gear selection control lever in 3rd or 4th gear to provide equalized brake action. Failure to comply may result in serious injury or death to personnel.

Do not bypass the BHL neutral-start system. Neutral-start system must be repaired if it malfunctions. Failure to comply may result in serious injury or death to personnel.

Before operating at night, check that all lamps illuminate. Failure to comply may result in serious injury or death to personnel.

Do not start engine until all other personnel are away from the BHL. Failure to comply may result in serious injury or death to personnel.

Operation Of The BHL

WARNING

Operate the BHL in accordance with the instructions in this manual. Failure to comply may result in serious injury or death to personnel. Before using the BHL, make certain that every operator does the following:

- Is instructed in safe and proper use of the BHL.
- Reads and understands manual(s) pertaining to the BHL.
- Reads and understands all safety decals on the BHL.
- Clears area of all other personnel.
- Learns and practices safe use of the BHL controls in safe, clear area before operating the BHL on job site.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Operation Of The BHL - Continued

WARNING

Know and use protective equipment that is to be worn when operating the BHL. Hard hats, protective glasses, protective shoes, gloves, reflector-type vests, respirators, and ear protection are examples of types of equipment that may be required. Failure to comply may result in serious injury or death to personnel.

Always wear seat belt when operating the BHL. Do not permit riders on the BHL. Make sure all protective guards, canopies, doors, etc., are in place and secure. Failure to comply may result in serious injury or death to personnel.

Remove all loose objects stored in the BHL. Avoid loose fitting clothing or jewelry. Failure to comply may result in serious injury or death to personnel.

Observe all gages or warning instruments for proper operation. If any malfunctions are found, shut engine off and remove starter key. Failure to comply may result in serious injury or death to personnel.

If failure that causes loss of control such as steering, service brakes, or engine occurs, shut engine off as quickly as possible. Keep the BHL securely parked until malfunction is corrected or the BHL can be safely towed. Failure to comply may result in serious injury or death to personnel.

Operate and drive the BHL with care and at speed compatible with conditions. Use extra care when operating over rough ground, on slopes, and when turning. Failure to comply may result in serious injury or death to personnel.

Be aware of and avoid all hazards and obstructions such as ditches, underground lines, trees, cliffs, overhead electrical wires, or areas where there is danger of a slide. Never lift loads in excess of capacity. Carry loads in recommended positions for maximum stability. Be aware that job site conditions may change hourly. Failure to comply may result in serious injury or death to personnel.

Always know location of all other personnel in area. Warn them before operating the BHL. Always keep all other personnel away from area. Failure to comply may result in serious injury or death to personnel.

Dust, fog, smoke, etc., can decrease visibility and cause an accident. Stop the BHL or decrease speed until you can see. Failure to comply may result in serious injury or death to personnel.

Do not jump on or off the BHL. Always face the BHL, use hand rails and steps, and use three points of contact to get on or off the BHL. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Operation Of The BHL - Continued

WARNING

If extreme conditions, such as fire, force you to leave the BHL, do not step off the BHL. Jump as far from the BHL as possible with feet together and do not touch ground with hands. Failure to comply may result in serious injury or death to personnel.

Do not use the BHL for any application or purpose other than those described in this TM. Failure to comply may result in serious injury or death to personnel.

Do not engage ride control switch with starter key switch turned to ON or ACC position. FEL lift arms can drop. Failure to comply may result in serious injury or death to personnel.

Always transport the BHL with transport pin in position to lock backhoe boom. Failure to comply may result in serious injury or death to personnel.

If the BHL must travel on public roads, all lights must be in working order and adjusted correctly. Failure to comply may result in serious injury or death to personnel.

Excessive speed can cause loss of control. Failure to comply may result in serious injury or death to personnel.

Lock service brake pedals together when operating on road or with gear selection control lever in 3rd or 4th gear to provide equalized brake application. Failure to comply may result in serious injury or death to personnel.

If the BHL rolls over and seat belt is not fastened, you can be crushed by Rollover Protection Structure (ROPS) or the BHL. Failure to comply may result in serious injury or death to personnel.

Do not attempt to exit the BHL if rollover is imminent. Stay inside the ROPS with seat belt fastened for maximum safety. Failure to comply may result in serious injury or death to personnel.

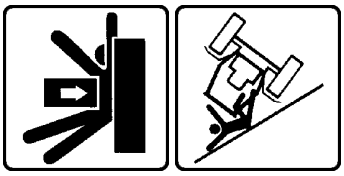
Do not leave the BHL when engine is operating. If external procedures require engine to be operating, have another person help. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Operation Of The BHL - Continued

WARNING



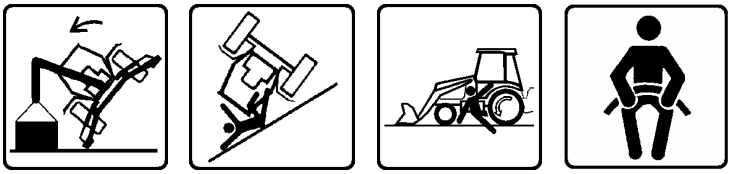
Do not modify ROPS in any manner. Unauthorized modifications such as welding, drilling, cutting, or adding attachments can weaken structure and reduce your protection. Replace ROPS if subjected to rollover or damage. Do not attempt to repair. Failure to comply may result in serious injury or death to personnel.

WARNING

Operating the BHL in hot weather increases risk of heat stress. Heat stress impairs performance and can result in injury. Drink lots of water. Work and rest in shade when possible. Use air conditioning. Failure to comply may result in serious injury or death to personnel.

Operation on Hill

WARNING



Hillside operations can be dangerous. Rain, mud, snow, ice, loose gravel, soft ground, etc., change ground conditions. Exercise care and use good judgment when operating the BHL on hill or ramp. Failure to comply may result in serious injury or death to personnel.

Before operating the BHL on hill, always shift gear selection control lever to lower gear and test service brakes. Do not let the BHL move downhill with direction control lever in neutral position. Do not let engine speed increase greater than 2,500 rpm. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Operation on Hill - Continued

WARNING

Exercise care when using clutch cutout switch while operating the BHL on hill. When clutch cutout switch is pushed, transmission is disengaged from drive wheels. Loss of control may result. Use service brakes to stop the BHL. Failure to comply may result in serious injury or death to personnel.

Do not coast in neutral on hill. Failure to comply may result in serious injury or death to personnel.

Be careful when moving the BHL on hill. The BHL can go out of control and turn over. Always position seat in loader position with seat belt fastened when driving the BHL forward. Always engage parking brake and shift direction control lever to neutral position before operating backhoe. Failure to comply may result in serious injury or death to personnel.

Operating the BHL with full FEL bucket on hill can cause the BHL to roll over. If possible, avoid turning the BHL. Always move forward up hill and always back down hill. Always keep load low for better balance and view of work area. Failure to comply may result in serious injury or death to personnel.

When operating backhoe on hill, use stabilizers to level the BHL and put earth from trench on highest side of trench. Failure to comply may result in serious injury or death to personnel.

Always check service brakes before working on hill. Failure to comply may result in serious injury or death to personnel.

Make sure seat is in normal operating position and seat belt is fastened when moving BHL forward on hill. Loss of control may result. Failure to comply may result in serious injury or death to personnel.

Do not use backhoe bucket to move the BHL on a side slope. The BHL may topple. Failure to comply may result in serious injury or death to personnel.

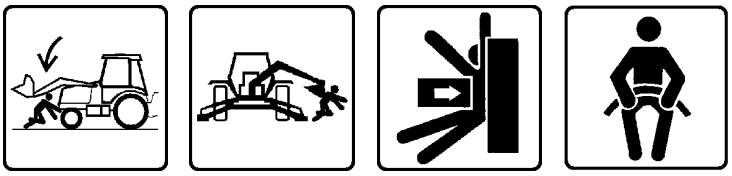
Do not exceed front, aft, or side slopes in excess of 15% on hard firm ground. On ground which is not solid, maximum slopes are less than 15%. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Operation of Backhoe

WARNING



A working backhoe can cause serious injury or death. Before starting, always make sure that all other personnel are away from the backhoe. Failure to comply may result in serious injury or death to personnel.

Before each period of operation, check that each backhoe control functions correctly. Failure to comply may result in serious injury or death to personnel.

Do not dig ground under backhoe stabilizers. The BHL can fall into excavation if bank falls in. Failure to comply may result in serious injury or death to personnel.

Before operating backhoe in area where visibility is reduced, such as next to a building, always install guard rail and warning signs to keep all other personnel away from the BHL. Failure to comply may result in serious injury or death to personnel.

Engage parking brake and shift direction control lever to neutral position before turning seat around to backhoe operating position. Alarm will sound if direction control lever is in forward or reverse position. Failure to comply may result in serious injury or death to personnel.

Lower stabilizers to operating position before lowering backhoe boom and extending dipper. Front of the BHL can raise above ground and cause an accident. Failure to comply may result in serious injury or death to personnel.

When operating backhoe, use hand throttle to control engine speed. **DO NOT USE HAND THROTTLE AS CRUISE CONTROL**. You can have an accident if you use hand throttle for any other operation. Failure to comply may result in serious injury or death to personnel.

The BHL is equipped with two backhoe control function patterns. Check control functions before operating the BHL. Failure to check pattern before operating may result in unexpected boom movement. Failure to comply may result in serious injury or death to personnel.

Position stabilizer pads for maximum stability when not operating backhoe next to a wall, building, etc. Failure to comply may result in serious injury or death to personnel.

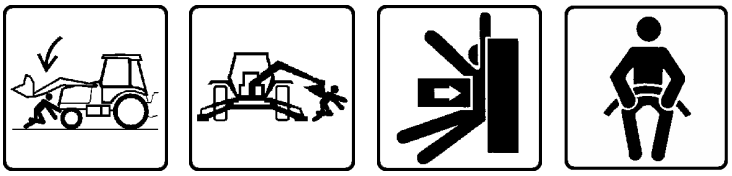
The BHL can become unstable and cause an accident if stabilizers are raised and tires and backhoe bucket are not touching ground. Before raising stabilizers from operating position, move backhoe into transport position and completely retract dipper and raise boom or make sure tires are touching ground and put backhoe bucket on ground. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Operation of Backhoe - Continued

WARNING

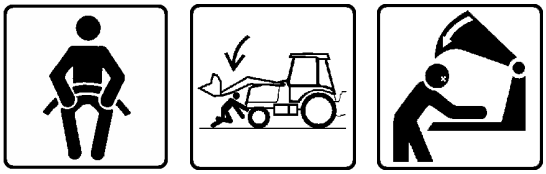


Rear windows can interfere with backhoe control levers. Make sure window adjustments are locked into position before actuating backhoe hydraulics. Accidental actuation could cause unexpected movement of backhoe. Failure to comply may result in serious injury or death to personnel.

De-activate backhoe control system before adjusting windows. Accidental actuation could cause unexpected movement of backhoe. Failure to comply may result in serious injury or death to personnel.

Operation of FEL

WARNING



Manually roll back FEL bucket before lowering. Material can spill out onto personnel. Failure to comply may result in serious injury or death to personnel.

Exercise care when removing FEL bucket. Always position yourself in front of bucket when disconnecting clamshell quick-disconnect hydraulic connectors. Failure to comply may result in serious injury or death to personnel.

Towing The BHL

WARNING

Tow a disabled BHL in accordance with the instructions in this manual. Failure to comply may result in serious injury or death to personnel.

If the BHL is disabled, you must make a judgment if the BHL can be moved safely and without causing damage. If possible, contact Field Maintenance to repair the disabled BHL at the job site. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Towing The BHL - Continued

WARNING

Towing vehicle must be at least as large as the disabled BHL and have sufficient power, weight, and braking capability. The towing vehicle must be able to control both machines for the grade, ground conditions, and distance required. Failure to comply may result in serious injury or death to personnel.

Towing vehicle must have a towing pintle for maximum stability while towing. Failure to comply may result in serious injury or death to personnel.

Tow straps provided in BII are not intended for BHL recovery. Failure to comply may result in serious injury or death to personnel.

Inspect tow straps for broken or missing parts, chafing, or wear before attaching. Check wear identification strips on straps. Failure to comply may result in serious injury or death to personnel.

Do not exceed towing speed of 5 miles per hour (8 km/h) under ideal ground conditions. Adverse ground condition requires slower speed. Failure to comply may result in serious injury or death to personnel.

When BHL is being towed, operator must be in operator's seat, with seat belt fastened, to maintain steering and braking control of the BHL. Failure to comply may result in serious injury or death to personnel.

Do not allow operator on disabled BHL unless it has steering and braking capability. The BHL may break away from tow. Failure to comply may result in serious injury or death to personnel.

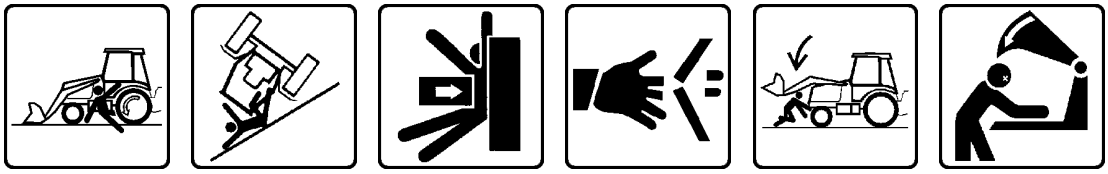
Make sure all necessary personnel nearby are shielded in event towing apparatus might break. Make sure all other personnel are completely out of area. The BHL may break away from tow. Failure to comply may result in serious injury or death to personnel.

Tow straps which have not been properly stowed in a canvas bag may have been damaged by ultraviolet light, and should not be used. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

Lifting With The BHL

WARNING



Make sure person holding handline is away from load. Failure to comply may result in serious injury or death to personnel.

Do not move load over top of personnel. Keep all other personnel away from load. Failure to comply may result in serious injury or death to personnel.

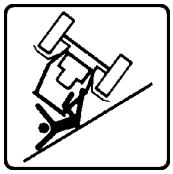
Make sure all other personnel involved are shielded in event lifting apparatus might break. Failure to comply may result in serious injury or death to personnel.

Exercise care when lifting load using the FEL. Do not exceed 7,800 lb (3538 kg) load. Make sure rigging equipment has capacity to lift load and that no personnel are under load. Failure to comply may result in serious injury or death to personnel.

Exercise care when lifting load using the backhoe. Do not exceed lifting capacity limits (WP 0002, Table 5). Make sure rigging equipment has capacity to lift load and that no personnel are under load. Failure to comply may result in serious injury or death to personnel.

Fording

WARNING



Do not enter water at more than walking speed of 5 miles per hour (8 km/h) with an entrance or side slope of more than 15 percent. Failure to comply may result in serious injury or death to personnel.

Do not enter water with current velocity of more than 5 miles per hour (8km/h). This is equivalent to 7 feet (2m) per second. Failure to comply may result in serious injury or death to personnel.

Do not enter water deeper than 20 inches (51 cm), including wave height. Failure to comply may result in serious injury or death to personnel.

Do not enter water that has ice or large debris on surface. Failure to comply may result in serious injury or death to personnel.

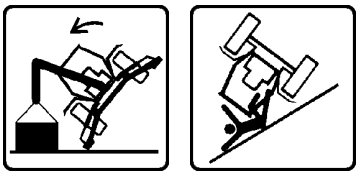
Check stream bottom for firmness and that there are no obstacles. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Parking The BHL

WARNING



Park the BHL on level ground whenever possible and engage parking brake. If the BHL must be parked temporarily on hill, put front of the BHL toward bottom of hill. Make sure the BHL is behind an object that will not move. Failure to comply may result in serious injury or death to personnel.

Before leaving cab, engage parking brake, shift direction control lever to neutral position, lower FEL/backhoe bucket to ground or put in locked position, and shut engine off. Failure to comply may result in serious injury or death to personnel.

Do not leave the BHL when engine is operating. If external procedures require engine to be operating, have another person help. Failure to comply may result in serious injury or death to personnel.

Remove starter key when leaving the BHL parked or unattended. Failure to comply may result in serious injury or death to personnel.

Electrical-High Voltage

WARNING

Avoid high voltage power lines, underground cables, etc. Failure to comply may result in serious injury or death to personnel.

If part of the BHL touches high voltage power, do the following:

- Warn all other personnel to stay away from the BHL.
- If able to break contact, reverse operation that caused contact with high voltage power and move the BHL away from danger area.
- If unable to break contact, stay in the BHL until utility workers de-energize power lines.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Electrical-Batteries

WARNING

When disconnecting battery cables, always disconnect negative (–) battery cable first. When connecting battery cables, always connect negative (–) battery cable last. Failure to comply may result in serious injury or death to personnel.

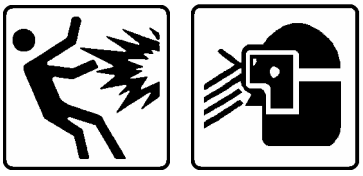
NATO slave receptacle is electrically live at all times and is unfused. NATO slave receptacle is only dead when batteries are fully disconnected. Batteries must be disconnected before performing maintenance on NATO slave receptacle. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Metal jewelry can conduct electricity. Remove metal jewelry when near batteries. Failure to comply may result in serious injury or death to personnel.

Remove all jewelry such as rings, identification tags, or bracelets when using slave cable. If jewelry contacts slave cable or receptacle, arcing can occur. Failure to comply may result in serious injury or death to personnel.

Tires

WARNING



When inflating tires, keep yourself and all other personnel out of danger area. Stand on tread side of tire. Wear face protection. For maximum safety, use correct air pressure and use self-attaching inflation chuck with remote shutoff. Do not overinflate. Tires and rim parts can explode. Failure to comply may result in serious injury or death to personnel.

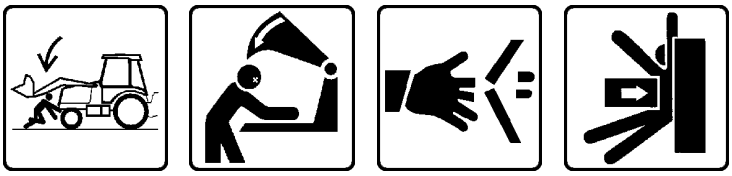
Check air pressure or add air only when tire is mounted on wheel on the BHL or in tire inflation cage. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

Servicing

WARNING



Before servicing the BHL, put **DO NOT OPERATE** tag on starter key switch. Failure to comply may result in serious injury or death to personnel.

When servicing the BHL with FEL raised, always use lift arms safety support strut to lock FEL. Failure to comply may result in serious injury or death to personnel.

When FEL lift arms safety support strut is engaged, always remove or install retaining pin while standing to rear of safety support strut. Failure to comply may result in serious injury or death to personnel.

Close hood carefully. Failure to comply may result in serious injury to personnel.

WARNING

Keep clear of rotating fan and belts. Failure to comply may result in serious injury or death to personnel.

WARNING

Prolonged exposure to bright sunlight produces very hot metal surfaces which will burn flesh on contact. Wear gloves when contacting hot metal surfaces. Wear additional protective clothing as required. Failure to comply may result in serious injury or death to personnel.

Make sure engine is shut off before raising engine hood. Hot metal surfaces are hot and will burn flesh on contact. Exercise care when raising hood and servicing engine. Failure to comply may result in serious injury to personnel.

WARNING SUMMARY - Continued

EXPLANATION OF STANDARD HAZARDOUS MATERIALS ICONS

EYE PROTECTION – Person with goggles shows that the material will injure the eyes.

CHEMICAL – Drops of liquid on hand shows that material will cause burns or irritation to human skin or tissue.

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

FIRE – Flames show that a material may ignite and cause burns.

EXPLANATION OF BHL SPECIFIC HAZARDOUS MATERIALS ICONS

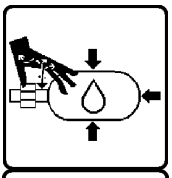
BATTERY – Human figure over exploding battery shows that storage batteries can be dangerous.

HIGH PRESSURE – Hand punctured by liquid shows that high pressure liquids can cause injury.

STEAM – Steam escaping shows that steam or other hot liquids can scald.

WARNING SUMMARY - Continued

EXPLANATION OF BHL SPECIFIC HAZARDOUS MATERIALS ICONS - Continued



PRESSURE – Hand next to pressure vessel shows that high pressure can cause injury.

EXPLOSION – Rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition or high pressure.

HAZARDOUS MATERIALS DESCRIPTION

Exhaust

WARNING

To protect yourself and other personnel, always obey the following rules:

- **DO NOT** operate engine indoors unless you have **SUFFICIENT FRESH AIR VENTILATION**.
- **DO NOT** idle engine for a long time unless there is **SUFFICIENT FRESH AIR VENTILATION**.
- Be alert at all times. Check for odor of exhaust fumes.
- **REMEMBER**: Best defense against exhaust gas poisoning is **SUFFICIENT FRESH AIR VENTILATION**.
- Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get **ALL PERSONNEL** clear of the BHL. Make sure they have lots of fresh air. **KEEP THEM WARM, CALM, AND INACTIVE.** If anyone stops breathing, give artificial respiration. **SEEK MEDICAL ATTENTION IMMEDIATELY**.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION - Continued

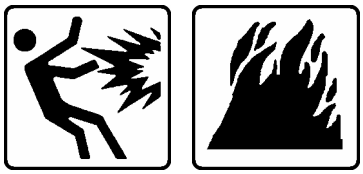
Exhaust - Continued

WARNING

Engine exhaust fumes contain deadly poisonous gases. Severe exposure may result in permanent brain damage or death to personnel.

Exhaust gases are most dangerous in places with poor airflow. Ventilate with positive airflow. Failure to comply may result in serious injury or death to personnel.

WARNING



The BHL is equipped with engine grid heater that will ignite flammable starting fluids. Do not use starting fluid. Fire and explosion may occur. Failure to comply may result in serious injury or death to personnel.

Coolant

WARNING

Hot coolant can spray out if radiator cap is removed rapidly. To remove radiator cap, let system cool; then, slowly remove cap by turning in small increments. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION - Continued

Batteries

WARNING

Battery posts, terminals, and related accessories contain lead and lead compounds. Wash hands after handling. Failure to comply may result in serious injury or death to personnel.

Batteries contain sulfuric acid which causes severe burns. Avoid contact with eyes, skin, or clothing. Always wear eye protection and protective gloves when working near batteries. Failure to comply may result in serious injury or death to personnel.

First aid for battery acid exposure:

- **Antidote: EXTERNAL – Flush with water.**
- **Antidote: INTERNAL – Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Do not induce vomiting. SEEK MEDICAL ATTENTION IMMEDIATELY.**
- **Antidote: EYES – Flush with water for 15 minutes. SEEK MEDICAL ATTENTION IMMEDIATELY.**

Batteries produce explosive gases. Keep sparks, flame, cigars, and cigarettes away. Always wear eye protection and protective gloves when working near batteries. Wash hands after handling. Ventilate when charging or using batteries in enclosed area. Failure to comply may result in serious injury or death to personnel.

When battery electrolyte is frozen, battery can explode if you try to charge battery or if you try to slave start and operate engine. To prevent battery electrolyte from freezing, try to keep battery at full charge. Failure to comply may result in serious injury or death to personnel.

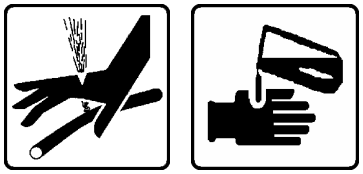
Do not use jumper cables. Use only NATO slave cable and receptacle. Improper use may result in battery explosion or unexpected BHL motion. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION - Continued

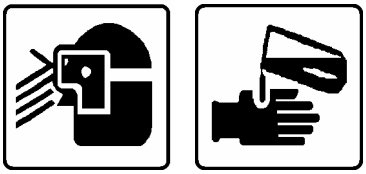
Hydraulic Fluid

WARNING



Make sure hydraulic fluid or grease is not injected into skin. Keep hands and body away from any pressurized leak. Use cardboard or paper to check for leaks. If fluid is injected into skin, **SEEK MEDICAL ATTENTION IMMEDIATELY**. Failure to comply may result in serious injury or death to personnel.

WARNING



Hydraulic fluid may be absorbed through the skin. Wear long sleeves, gloves, and goggles or face shield when handling hydraulic fluid. If hydraulic fluid gets into the eyes, flush eyes immediately with water and seek medical attention. If hydraulic fluid gets on the skin, wash thoroughly with soap and water. Wash hands thoroughly prior to eating or smoking. Failure to comply may result in serious injury to personnel.

Fuel

WARNING

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Avoid contact with eyes, skin, and clothing. Always wear eye protection and protective gloves when working with fuel. Avoid repeated/prolonged contact. Use only in ventilated areas. Keep away from open flames or other sources of ignition. Post **FUEL FLAMMABLE/NO SMOKING** signs around area. Make sure fire extinguisher is available. Failure to comply may result in serious injury or death to personnel.

Do not smoke or permit open flames while fueling or near fueling operations. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION - Continued

Fuel - Continued

WARNING

Hot engine surfaces are sources of ignition. Keep hood closed. Avoid fuel splashes and fuel spills. Do not smoke or use open flame when refueling. Failure to comply can cause flames and possible explosion and may result in damage to equipment and serious injury or death to personnel.

Do not fill fuel tank completely to top. Allow room for expansion. Failure to comply may result in serious injury or death to personnel.

Never remove fuel cap or refuel the BHL with engine operating. Shut off engine. Never allow fuel to spill on hot BHL components. Failure to comply may result in serious injury or death to personnel.

Clean up spilled fuel immediately and dispose of contaminated material per Standing Operating Procedures (SOP). Failure to comply may result in serious injury or death to personnel.

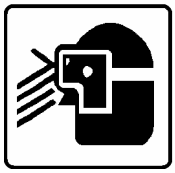
Never use fuel for cleaning purposes. Failure to comply may result in serious injury or death to personnel.

Fuel used in the BHL is flammable. When filling fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply can cause flames and possible explosion and may result in damage to equipment and serious injury or death to personnel.

Do not fill fuel tank while engine is operating. Failure to comply may result in serious injury or death to personnel.

Compressed Air

WARNING



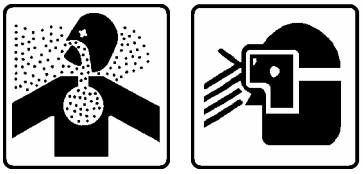
Eye protection is required when cleaning with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi (103 kPa) when using compressed air when cleaning. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION - Continued

Filters

WARNING



If Nuclear, Biological, and Chemical (NBC) exposure is suspected, all air filter media shall be handled by personnel wearing full NBC protective equipment. Failure to comply may result in serious injury or death to personnel.

Removal or installation of cab air filter can cause dirt particles to injure eyes. Eye protection is required. Failure to comply may result in serious injury or death to personnel.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

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

Original ..... 30 March 2007

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 44 AND TOTAL NUMBER OF WORK PACKAGES IS 28, CONSISTING OF THE FOLLOWING:

Page/WP No.	*Change No.
Title	0
a – v	0
A/B blank	0
i – vi	0
Chp 1 Title Page	0
WP 0001 – 0003	0
Chp 2 Title Page	0
WP 0004 – 0017	0
Chp 3 Title Page	0
WP 0018 – 0019	0
Chp 4 Title Page	0
WP 0020 – 0024	0
Chp 5 Title Page	0
WP 0025 – 0028	0
Index-1 – Index-11	0
Index-12 blank	0
Back Cover	0

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

**HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 March 2007**

TECHNICAL MANUAL

OPERATOR'S MANUAL
FOR
TRACTOR, WHEELED, INDUSTRIAL
BACKHOE LOADER (BHL)

NSN 2420-01-532-3399

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is https://aeps,ria.army.mil. The DA Form 2028 is located under the Public Applications section in the AEPS Public Home Page. 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 direct to: AMSTA-LC-LPIT/TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is ROCK-TACOM-TECH-PUBS@conus.army.mil. The Fax number is DSN 793-0726 or Commercial (309) 782-0726.

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

WP Sequence No.
Page No.

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

HOW TO USE THIS MANUAL

This manual contains operator instructions for the Industrial Wheeled Tractor Backhoe Loader (BHL).

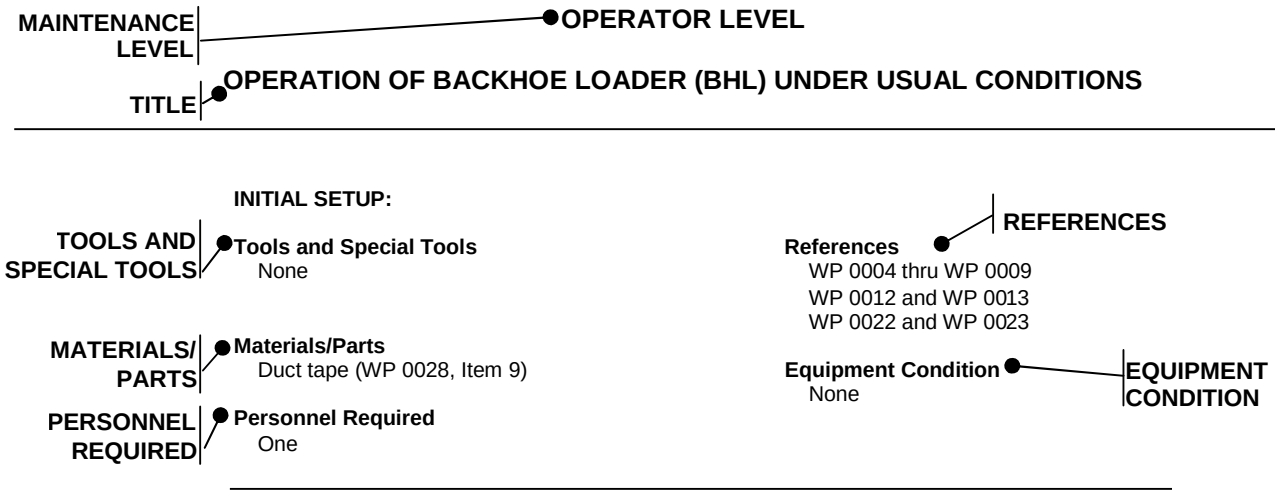
The table of contents will help you understand the organization of the manual and will direct you to the major sections. More detailed segments, such as specific operation instructions, can be located in the index at the end of the manual.

The References work package (WP 0025) provides a listing of other related manuals and publications.

The Expendable and Durable Items List work package (WP 0028) lists supplies to perform operator maintenance.

While performing the procedures in this manual, you may find that you are able to make recommendations that will improve the manual. At the back of this manual, you will find copies of DA Form 2028 which invite you to submit your recommendations.

Read the INITIAL SETUP section carefully before you start any maintenance procedure. Get the tools and supplies listed and the personnel needed.



LEGEND:

MAINTENANCE LEVEL	The level of maintenance authorized to do the procedures.
TITLE	The name of the procedure.
TOOLS AND SPECIAL TOOLS	The tools and equipment needed to do the procedures.
MATERIALS/PARTS	The supplies and parts needed to do the procedures.
PERSONNEL REQUIRED	The personnel needed to do the procedures.
REFERENCES	Other work packages, manuals, and publications needed to do the procedure.
EQUIPMENT CONDITION	The special condition(s) to be performed before starting the procedure.

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION FOR BACKHOE LOADER (BHL)

WORK PACKAGE INDEX

OPERATOR LEVEL

GENERAL INFORMATION

SCOPE

This Technical Manual (TM) contains instructions for operation, operator maintenance, checks and adjustments, theory of operation, troubleshooting, and corrective maintenance for the Industrial Wheeled Tractor Backhoe Loader (BHL).

Type of Manual: Operator, operator maintenance.

Model Number and Equipment Name: Industrial Wheeled Tractor Backhoe Loader (BHL), Part Number 880-M580SM2.

MAINTENANCE FORMS, RECORDS, AND REPORTS

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

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your BHL 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. If you have Internet access, the easiest and fastest way to report problems or suggestions is to go to https://aeps.ria.army.mil/ aepspublic.cfm (scroll down and choose the "Submit Quality Deficiency Report" bar). The Internet form lets you choose to submit an Equipment Improvement Recommendation (EIR), a Product Quality Deficiency Report (PQDR), or a Warranty Claim Action (WCA). You may also submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 via e-mail, regular mail, or facsimile using the addresses/ facsimile numbers specified in DA PAM 738-750, Functional Users Manual for the Army Maintenance Management System (TAMMS). We will send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future systems. Corrosion specifically occurs with metals. It is an electro-chemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically ultraviolet) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. SF 368, Product Quality Deficiency Report, should be submitted to the address specified in DA PAM 738-750, Functional Users Manual for the Army Maintenance Management System (TAMMS).

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

TM 750-244-6 contains demolition procedures for equipment destruction.

PREPARATION FOR STORAGE OR SHIPMENT

The Servicing work package (WP 0023) contains preparation for and removal from storage requirements.

LIST OF ABBREVIATIONS/ACRONYMS

Abbreviation/Acronym	Definition
@	At
#	Number
1st	First
2nd	Second
2WD	Two-Wheel Drive
3rd	Third
4th	Fourth
4WD	Four-Wheel Drive
AAL	Additional Authorization List
ACC	Accessory
AEPS	Army Electronic Support
AR	Army Regulation
BHL	Backhoe Loader
BII	Basic Issue Items
BT	Bottle
BX	Box
CA	Cartridge
CAGEC	Commercial and Government Entity Code
CBR	Chemical, Biological, and Radiological
CCW	Counterclockwise
CN	Carton
COEI	Components of End Item
CPC	Corrosion Prevention and Control
CTA	Common Table of Allowances
CW	Clockwise
D	During
DR	Drum
EA	Each
EIC	End Item Code
EIR	Equipment Improvement Recommendation
F	Follows
FEL	Front End Loader

LIST OF ABBREVIATIONS/ACRONYMS - Continued

Abbreviation/Acronym	Definition
FOPS	Falling Object Protective Structure
GAA	Grease, Automotive and Artillery
GL	Gallon
IDN	Initial Distribution Number
ILLUS	Illustration
JTA	Joint Table of Allowances
MAC	Maintenance Allocation Chart
MTOE	Modified Table of Organization and Equipment
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, and Chemical
NO.	Number
NSN	National Stock Number
PMCS	Preventive Maintenance Checks and Services
PAM	Pamphlet
PQDR	Product Quality Deficiency Report
QTY	Quantity
RECM	Recommended
RL	Roll
ROPS	Rollover Protection Structure
RPSTL	Repair Parts and Special Tools Lists
RQR	Required
SAE	Society of Automotive Engineers
SF	Standard Form
SOP	Standing Operating Procedures
TAMMS	The Army Maintenance Management System
TAMMS – A	The Army Maintenance Management System – Aviation
TDA	Table of Distribution and Allowances
TM	Technical Manual
TOE	Table of Organization and Equipment
TP	Tire Pressure
U/I	Unit of Issue
USEPA	U.S. Environmental Protection Agency
Vdc	Volts, Direct Current
W	Weekly
WCA	Warranty Claim Action
WP	Work Package

END OF WORK PACKAGE

OPERATOR LEVEL

EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The Backhoe Loader (BHL) is a pneumatic tired, diesel engine driven, Two-Wheel Drive/Four-Wheel Drive (2WD/4WD) Front End Loader (FEL)/backhoe used for excavation of small emplacements, material handling, and general construction tasks. The BHL offers the mobility and operational characteristics demanded by modern armed forces. Operational characteristics include the ability to operate at all possible humidity levels, at ambient temperature levels from –25°F to +120°F (–32°C to +49°C), and at altitudes up to 10,000 feet (3,048m).

The BHL consists of a hydraulic FEL bucket and hydraulic backhoe bucket controlled from a Rollover Protective Structure/Falling Object Protective Structure (ROPS/FOPS) cab, which contains all operator controls. The BHL is powered by a 4.5 liter turbocharged diesel engine that operates using DF-1, DF-2, JP-5, and JP-8 fuel. The engine meets U.S. Environmental Protection Agency (USEPA) Tier II requirements. Power is transferred to the wheels by an automatic transmission. Stabilizers are used to stabilize the BHL when operating the backhoe.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Figure 1 shows the location of the major components of the BHL, and Table 1 lists the major components.

Table 1. Major Components.

ITEM	DESCRIPTION OF MAJOR COMPONENTS
FEL	
1	FEL bucket. A 4-in-1 bucket with four configurations: dozer, scraper, loader (standard bucket), and clamshell.
2	FEL bucket cylinders. Provide movement for bucket.
3	FEL lift arms. Provide support and control for bucket.
4	FEL lift arms cylinders. Raise and lower lift arms.
5	FEL lift arms safety support strut. Holds lift arms up in safe servicing/inspection position to prevent accidental lowering of lift arms.
Engine Hood	
6	Protects the engine and related components from dust, rain, and other contaminants. The hood can be raised for access to engine components. The engine is the Case 445T/M2 turbocharged diesel engine. Engine speed is controlled by a foot throttle and by a hand throttle for backhoe use. Fuel is delivered by direct injection. Precise injection timing optimizes the engine's performance for starting, emissions, noise, and fuel consumption.
Engine	
7	Provides power for all BHL functions.
Exhaust Pipe	
8	Directs exhaust away from the cab.
Front Lights	
9	Two hazard/turn lights.
10	Two marker lights.
11	Two 55 Watt halogen driving lights.
12	Two 55 Watt halogen work lights.
13	One blackout light.
Backhoe	
14	Backhoe boom. Allows up and down and side-to-side movement for the backhoe.
15	Backhoe dipper. Allows the backhoe to move up and down.
16	Backhoe bucket. Allows digging and scooping of material.
Stabilizers	
17	One on each side of the BHL, provide stability to the BHL when the backhoe is in operation.
Fuel Tank	
18	Located on the left side of the BHL holds 31.4 gallons (119L) of fuel.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

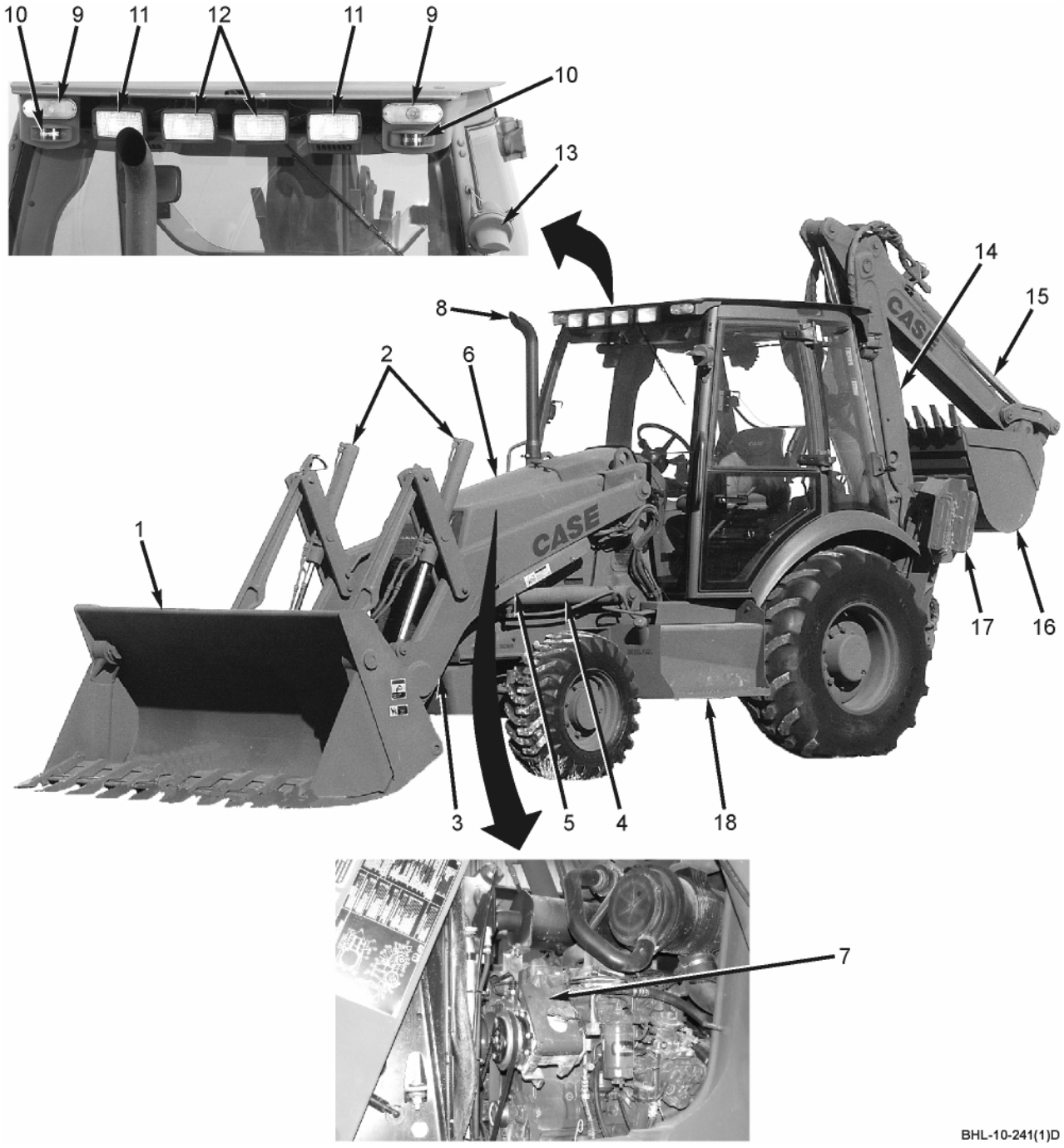


Figure 1. Location of Major Components (Sheet 1 of 2).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

Table 1. Major Components - Continued.

ITEM	DESCRIPTION OF MAJOR COMPONENTS
Rear Lights	
19	Four 55 Watt adjustable halogen work lights.
20	Two hazard/turn lights.
21	Two blackout lights.
ROPS/FOPS Cab	
22	Protects the operator from rollover, falling objects, debris, dust, and rain and contains all the operator controls and instruments. The cab is heated and air-conditioned for operator comfort in various weather conditions.
Decontamination Kit Mount	
23	Located above the battery box, is used to mount decontamination kit.
Hydraulic Tank	
24	Holds reserve hydraulic fluid for the hydraulic system. The entire hydraulic system holds 31.5 gallons (119L) of fluid.
Battery Box	
25	Protects the two 12 volt batteries from the elements.
Tool Box	
26	Provides a place for storage of required operator tools.
NATO Slave Receptacle	
27	Located behind the battery box, is used for 24 Vdc slave starting.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

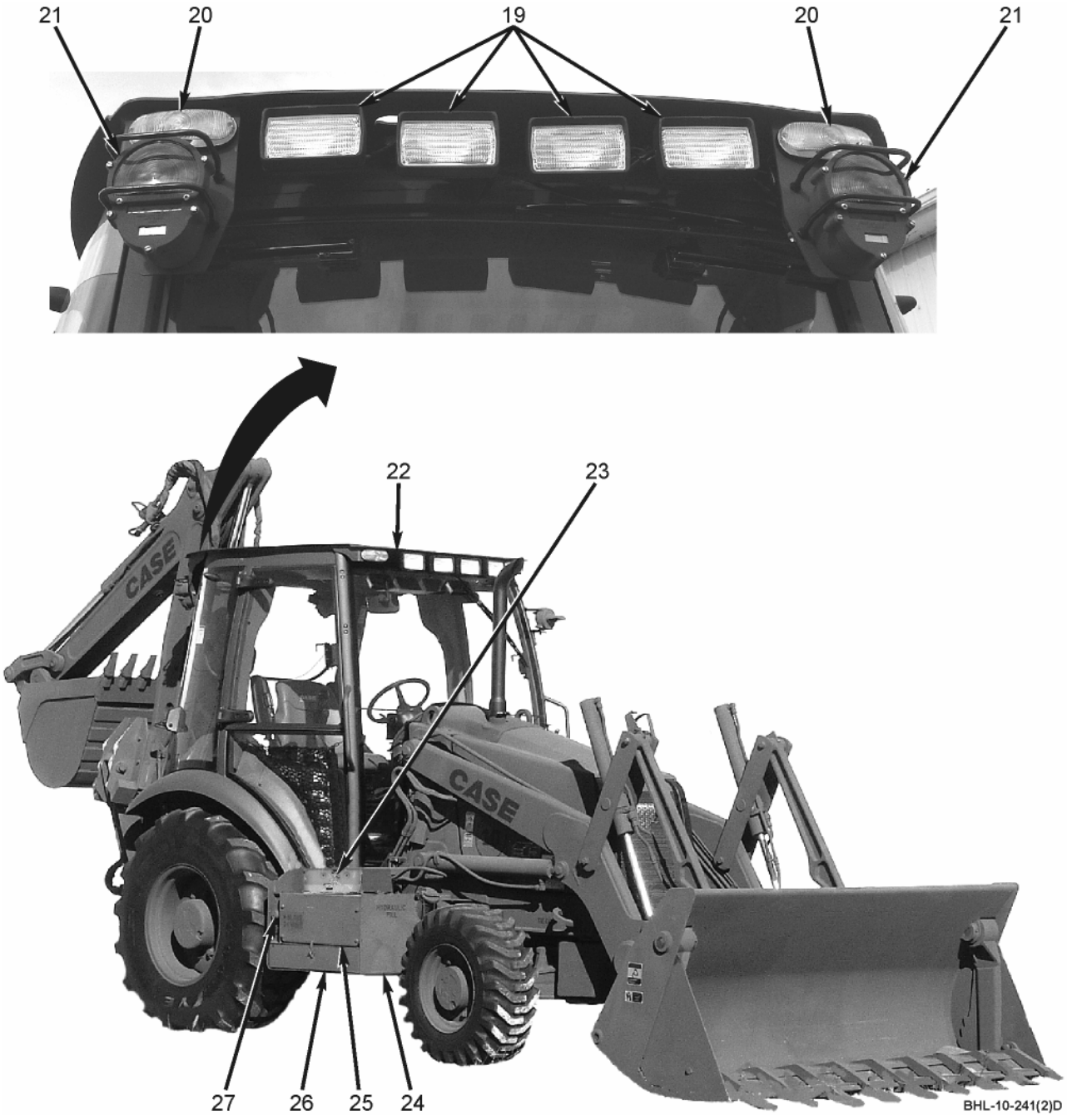


Figure 1. Location of Major Components (Sheet 2 of 2).

EQUIPMENT DATA

BHL Equipment Data

Table 2 lists the BHL equipment data.

Table 2. BHL Equipment Data.

EQUIPMENT	DATA
BHL	PN 880-M580SM2
Overall length (maximum)	34 ft, 4 in. (10.45m)
Width (across tires)	6 ft, 9.4 in. (2.07m)
Height (transport)	10 ft, 10 in. (3.29m)
Weight (wet, includes fuel)	16,868 lb (7,651 kg)
Maximum fording depth	20 in. (51 cm)
Maximum speed	
On road	25.5 mph (41.0 km/h)
Off road	7 mph (11 km/h)
Engine	
Manufacturer	Case
Model	445T/M2
Type	Four cylinder, in-line, four stroke, turbocharged diesel
Bore	4.1 in. 104 mm)
Stroke	5.2 in.(132 mm)
Displacement	273.7 cu. in. (4.485L)
Horsepower (SAE net)	90 hp (68 kW) @ 2,200 rpm
Horsepower (SAE gross)	95 hp (71 kW) @ 2,200 rpm
Torque (net)	289 lb-ft (392 Nm) @ 1,500 rpm
Torque (gross)	294 lb-ft (298 Nm) @ 1,500 rpm
Engine cooling system	
Type	Pressurized radiator and coolant pump
Capacity	19.0 qt (18.0L)
Normal operating temperature	140°F to 230°F (66°C to 110°C)
Engine lubricating system	
Type	Full flow, circulating pressure
Capacity	14.0 qt (13.2L)
Normal operating pressure	10 to 50 psi (70 to 350 kPa)
Fuel system	
Fuel type	DF-1, DF-2, JP5, JP8
Fuel tank capacity	31.4 gal (119L)

EQUIPMENT DATA - Continued

Table 2. BHL Equipment Data - Continued.

EQUIPMENT	DATA
Batteries	Qty 2
Manufacturer	Exide, 6TMF
Type	12 Vdc, calcium/antimony
Discharge rate to 7.2V (@ 0°F (–18°C)	725A, 30 seconds
Reserve capacity	200 minutes
Transmission	
Manufacturer	Clark-Hurth
Model	T16000
Type	4-speed synchromesh with hydraulically actuated clutches
Fluid capacity	22.0 qt (21.0L)
Gear ratios (forward)	
1st	5.491
2nd	3.043
3rd	1.584
4th	0.793
Gear ratios (reverse)	
1st	4.550
2nd	2.522
3rd	1.313
4th	0.657
Hydraulic system fluid capacity (total system)	31.5 gal (119L)
Torque converter ratio	2.63
Travel speeds (@ 2,324 rpm) (manual mode)	
Forward	
1st	3.5 mph (5.7 km/h)
2nd	6.7 mph (10.8 km/h)
3rd	13.5 mph (21.7 km/h)
4th	25.5 mph (41.0 km/h)
Reverse	
1st	4.3 mph (6.9 km/h)
2nd	8.1 mph (13.0 km/h)

EQUIPMENT DATA - Continued

Table 2. BHL Equipment Data - Continued.

EQUIPMENT	DATA
Travel speeds (@ 2,324 rpm) (automatic mode)	
Forward	
1st	3.6 mph (5.0 km/h)
2nd	6.8 mph (10.9 km/h)
3rd	13.7 mph (22.0 km/h)
4th	25.9 mph (41.7 km/h)
Reverse	
1st	4.3 mph (6.9 km/h)
2nd	8.1 mph (13.0 km/h)
Service brakes	Hydraulically actuated, self-adjusting, inboard mounted, wet disc
Parking brake	Mechanically applied with electric activation sensors at each rear brake
Front 4WD axle	
Differential ratio	2.0
Planetary hub ratio	6.0
Total reduction ratio	12.0
Fluid capacity	
Center bowl	5.8 qt (5.5L)
Each wheel end	0.7 qt (0.66L)
Rear axle	
Differential ratio	2.333
Planetary hub ratio	6.923
Total reduction ratio	16.153
Fluid capacity	
Center bowl	15.0 qt (14.2L)
Each wheel end	1.6 qt (1.5L)
Axle loading (at shipping weight)	
Front	6,550 lb (2,971 kg)
Rear	11,250 lb (5,103 kg)
Axle loading (at curb weight)	
Front	6,605 lb (2,996 kg)
Rear	11,245 lb (5,101 kg)
Full throttle speed	2,320 – 2,450 rpm
Low idle speed	850 – 1,000 rpm

EQUIPMENT DATA - Continued

Table 2. BHL Equipment Data - Continued.

EQUIPMENT	DATA
Tires	
Front	12 x 16.5, 8 ply bias, pressure 50 psi (345 kPa)
Rear	19.5 LR x 24 Radial, pressure 32 psi (221 kPa)

BHL Physical Dimensions

Figure 2 shows the BHL dimensions, and Table 3 lists the BHL dimensions.

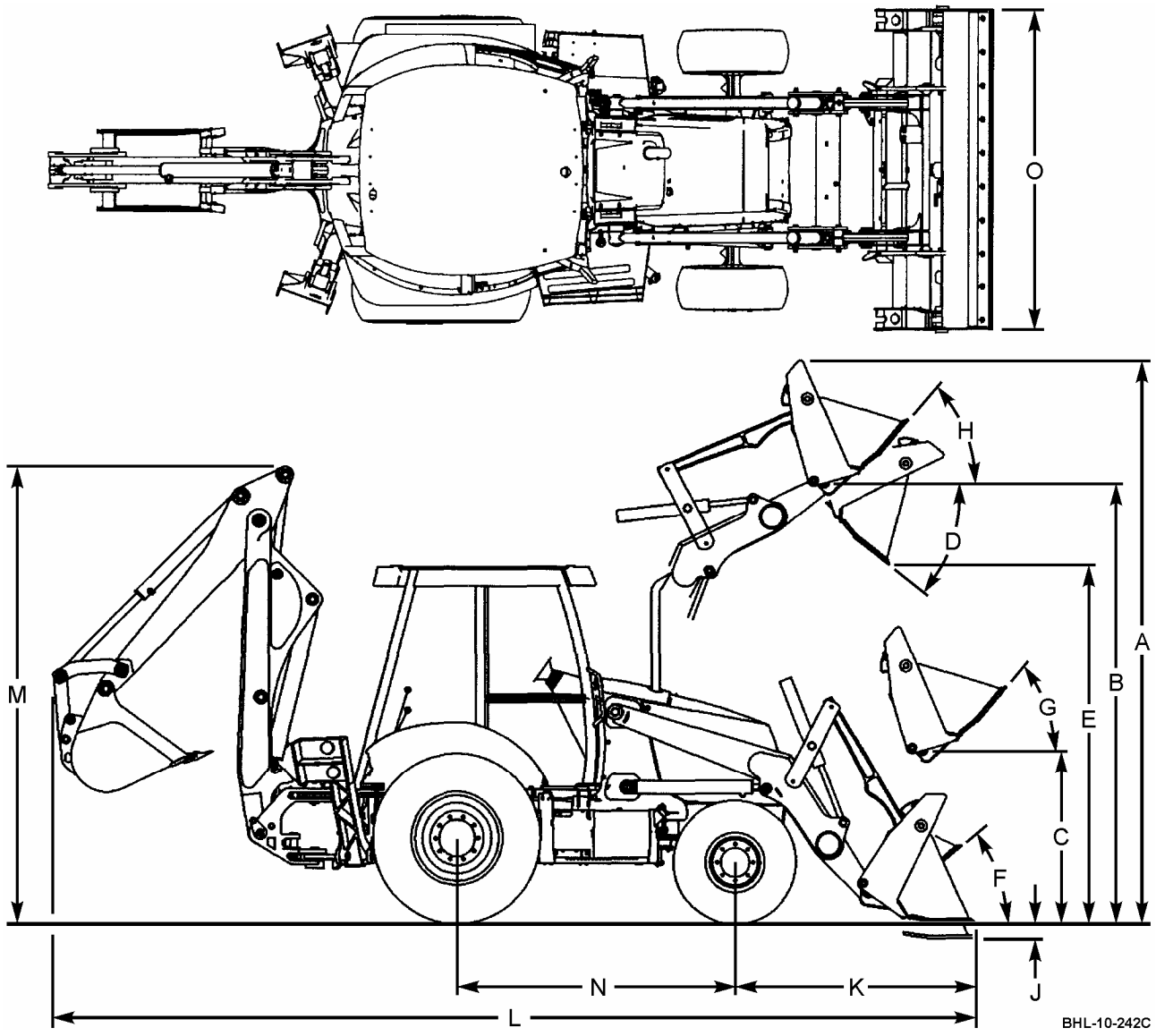


Figure 2. BHL Physical Dimensions.

EQUIPMENT DATA - Continued

Table 3. BHL Physical Dimensions.

DIMENSION	DESCRIPTION	DATA
A	Overall operating height – FEL fully raised	14 ft, 3 in. (4.34m)
B	Height to FEL bucket hinge fully raised	11 ft, 2 in. (3.4m)
C	Height to FEL bucket hinge pin	14.6 in. (37.2 cm)
D	FEL dump angle @ full height	45 degrees
E	FEL dump clearance @ full height, 45-degree dump	
	Bucket Bucket clamshell open	8 ft, 11 in. (2.72m) 9 ft, 8 in. (2.95m)
F	FEL bucket rollback @ groundline	40 degrees
G	FEL bucket rollback @ SAE carry	45 degrees
H	FEL bucket rollback @ full height	Adjustable
J	Digging depth below grade with FEL bucket flat	
	Bucket Clamshell open (dozing)	6.8 in. (18.0 cm) 4.1 in. (10.3 cm)
K	Reach from front axle centerline to leading edge of FEL bucket	6 ft, 3 in. (1.91m)
L	Overall transport length	22 ft, 8 in. (6.92m)
	Height to top of canopy	8 ft, 9 in. (2.67m)
	Height to top of cab	8 ft, 10 in. (2.69m)
	Height to top of exhaust pipe	8 ft, 6 in. (2.59m)
	Ground clearance @ backhoe frame	13.7 in. (34.9 cm)
M	Transport height	10 ft, 10 in. (3.29m)
N	Wheelbase	7 ft, 0.5 in. (2.15m)
O	Overall transport width (at FEL bucket)	7 ft, 10 in. (2.39m)
	FEL bucket capacity	1.25 cubic yards (0.96 cubic meter)

EQUIPMENT DATA - Continued

Backhoe Physical Dimensions

Figure 3 shows the Backhoe dimensions, and Table 4 lists the backhoe dimensions.

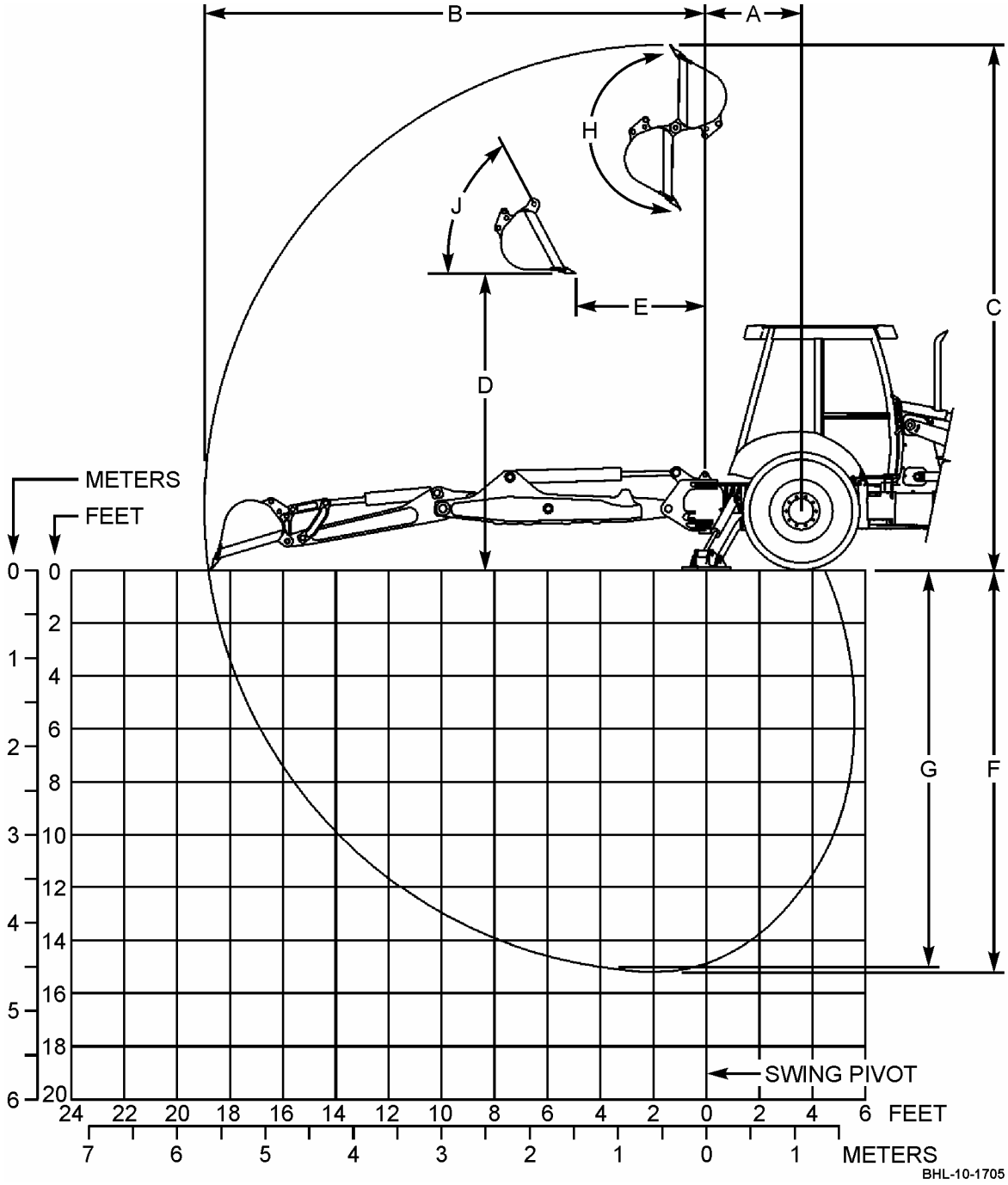


Figure 3. Backhoe Physical Dimensions.

EQUIPMENT DATA - Continued

Table 4. Backhoe Physical Dimensions.

DIMENSION	DESCRIPTION	DATA
A	Swing pivot to rear axle centerline	3 ft, 7 in. (1.09m)
B	Digging radius from swing pivot	17 ft, 10 in. (5.44m)
C	Maximum height	19 ft, 2 in. (5.84m)
D	Loading height	11 ft, 2 in. (3.40m)
	Loading height (dipper cylinder retracted)	10 ft, 3 in. (3.12m)
E	Loading reach	5 ft, 10 in. (1.78m)
	Loading reach (dipper cylinder retracted)	8 ft, 9 in. (2.67m)
F	Dig depth, maximum	14 ft, 4 in. (4.37m)
G	Dig depth	14 ft, 1 in. (4.29m)
H	Bucket rotation	169.7 degrees
J	Bucket angle	60 degrees
	Backhoe bucket capacity	0.28 cubic yard (0.21 cubic meter)

EQUIPMENT DATA - Continued

Backhoe Lifting Capacities

Figure 4 shows the backhoe lifting capacity, and Table 5 lists the backhoe lifting capacity. All measurements are straight to the rear of the BHL. Height is measured to bucket pin.

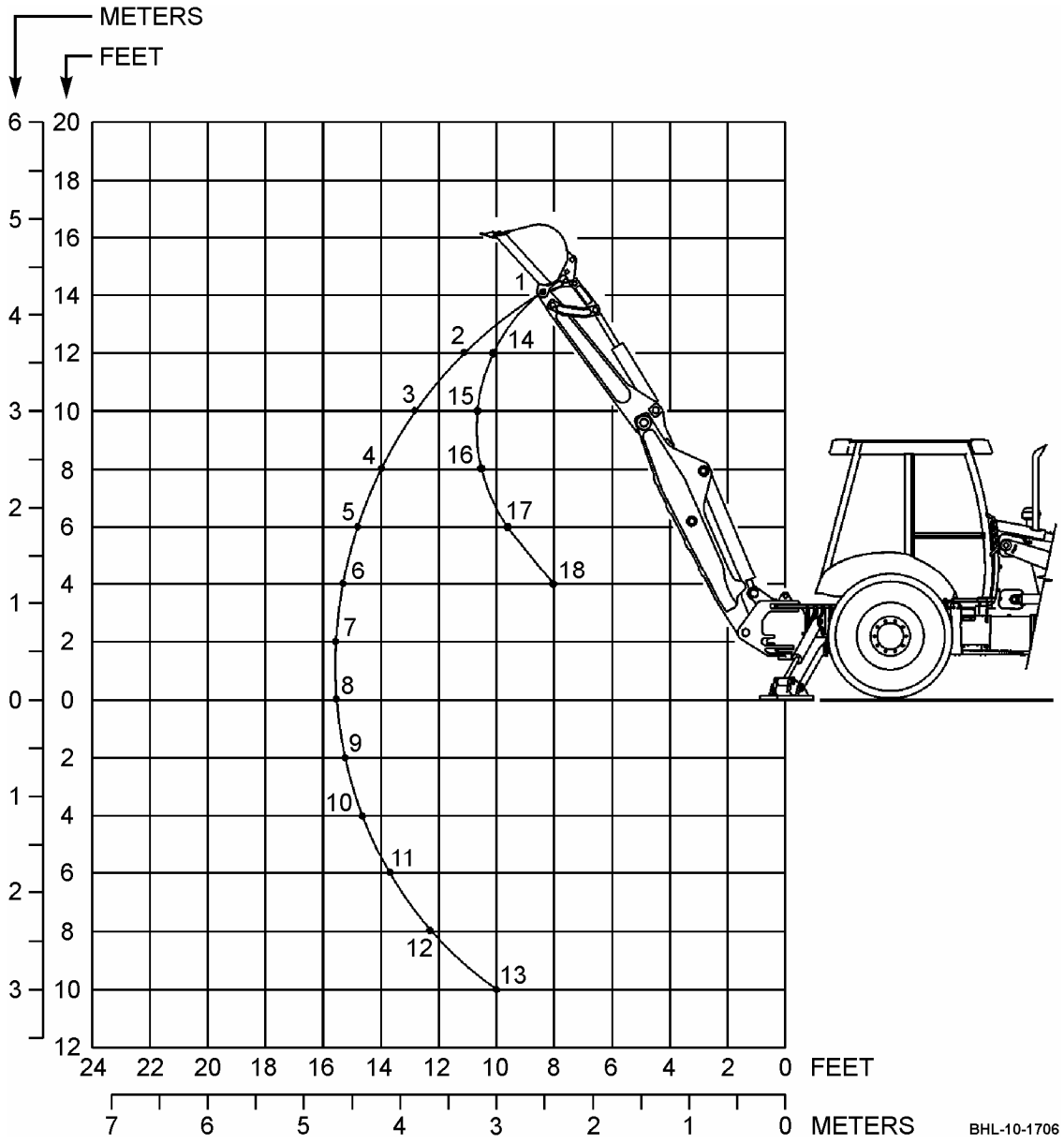


Figure 4. Backhoe Lifting Capacities.

EQUIPMENT DATA - Continued

Table 5. Backhoe Lifting Capacities.

KEY	LIFT	DISTANCE FROM SWING PIVOT	BACKHOE LIFT CAPACITY
	BOOM HEIGHT		
1	+14 ft (4.27m)	8 ft, 7 in. (2.62m)	2,750 lb (1,247 kg)
2	+12 ft (3.66m)	11 ft, 2 in. (3.40m)	3,050 lb (1,383 kg)
3	+10 ft (3.05m)	12 ft, 9 in. (3.84m)	3,100 lb (1,406 kg)
4	+8 ft (2.44m)	13 ft, 11 in. (4.24m)	3,050 lb (1,383 kg)
5	+6 ft (1.83m)	14 ft, 7 in. (4.45m)	3,000 lb (1,361 kg)
6	+4 ft (1.22m)	15 ft, 0 in. (4.57m)	2,900 lb (1,315 kg)
7	+2 ft (0.61m)	15 ft, 1 in. (4.60m)	2,850 lb (1,293 kg)
8	Ground level	14 ft, 11 in. (4.55m)	2,775 lb (1,259 kg)
9	–2 ft (0.61m)	14 ft, 5 in. (4.40m)	2,675 lb (1,213 kg)
10	–4 ft (1.22m)	13 ft, 7 in. (4.14m)	2,600 lb (1,179 kg)
11	–6 ft (1.83m)	12 ft, 4 in. (3.76m)	2,600 lb (1179 kg)
12	–8 ft (2.44m)	10 ft, 5 in. (3.18m)	2,600 lb (1,179 kg)
13	–10 ft (3.05m)	7 ft, 6 in. (2.28m)	2,825 lb (1,281 kg)
	DIPPER		
14	+12 ft (3.66m)	10 ft, 1 in. (3.08m)	4,940 lb (2,241 kg)
15	+10 ft (3.05m)	10 ft, 7 in. (3.23m)	4,650 lb (2,109 kg)
16	+8 ft (2.44m)	10 ft, 6 in. (3.20m)	4,680 lb (2,123 kg)
17	+6 ft (1.83m)	9 ft, 7 in. (2.92m)	5,290 lb (2,400 kg)
18	+4 ft (1.22m)	7 ft, 5 in. (2.25m)	6,610 lb (2,998 kg)

END OF WORK PACKAGE

OPERATOR LEVEL

THEORY OF OPERATION

PRINCIPLES OF OPERATION

The Backhoe Loader (BHL) is designed for moving earthen materials around a construction site, opening up an underground utility site, etc. It has a Front End Loader (FEL) to move material a short distance away from the immediate area or load it into a vehicle for moving to a new, more distant location. It has a backhoe to dig earth and loosen material so it can be moved or excavated. It can dig openings for basements, trenches for drainage tubes, and all general construction excavation. Together, the FEL and backhoe can be used to level or prepare a construction site.

Engine

A diesel engine supplies the power for the drive train to move the BHL. It also drives a large hydraulic pump to provide the hydraulic power for FEL and backhoe operation. The engine has a fuel system and cooling system typical of diesel engines.

Fuel System

The fuel system supplies fuel from the fuel tank through a fuel pump, fuel filters, injector pump, and injectors to the engine. Air is supplied through an air filtration system before entering the engine to be mixed with the fuel.

Cooling System

The cooling system uses a water pump to circulate water through the radiator. A fan behind the radiator pulls air through the radiator core to cool the coolant solution inside the radiator. The coolant is then circulated through the engine to cool the engine. Engine temperature is regulated by a thermostat which controls the coolant flow through the radiator depending on engine temperature.

Transmission

The transmission is mechanically linked to the engine. It is also linked to the front and rear wheels providing Two-Wheel Drive/Four-Wheel Drive (2WD/4WD). The transmission provides several output speeds to move the BHL forward and backward. The transmission output speed is controlled by the transmission gear selection control lever and by engine speed.

Steering System

The steering system allows the operator to turn the front wheels left or right to steer the BHL using the steering wheel. The steering system is powered by the hydraulic pump.

Electrical Power

The engine drives a 24 Vdc alternator to produce the electrical power used on the BHL. Two 12 Vdc batteries in series provide 24 Vdc for starting the engine and for powering the blackout lights. All other lights, controls, and indicators operate on 12 Vdc. The 24 Vdc NATO slave receptacle allows slave starting from or to any other vehicle with a 24 Vdc NATO slave receptacle.

PRINCIPLES OF OPERATION - Continued

Hydraulic Power

The engine drives a hydraulic pump to provide hydraulic power to position the FEL or backhoe in several directions. High hydraulic pressure is supplied to the hydraulic control valves. Low hydraulic pressure called pilot pressure is supplied to the direction control lever, left backhoe control tower, and right backhoe control tower. When the operator activates these controls, pilot pressure is directed to the corresponding hydraulic control valves. Pilot pressure activates hydraulic control valves to allow high pressure hydraulic fluid to extend or retract selected hydraulic cylinders which position the FEL or backhoe.

The FEL can be raised or lowered, tilted up or down, and opened or closed. The backhoe can swing from left to right. The backhoe boom and dipper can be moved away from or toward the BHL. The backhoe dipper can be tilted up or down. A hydraulic accumulator provides dampening for smoother FEL and backhoe operations.

Maximum hydraulic system pressure is regulated to prevent hydraulic hoses and seals from rupturing. Rear backhoe-mounted auxiliary hydraulics allows uni-directional and bi-directional control of auxiliary equipment, such as a hammer or an auger.

END OF WORK PACKAGE

CHAPTER 2

OPERATOR INSTRUCTIONS FOR BACKHOE LOADER (BHL)

WORK PACKAGE INDEX

OPERATOR LEVEL

DESCRIPTION AND USE OF CONTROLS AND INDICATORS FOR RIGHT HAND INSTRUMENT PANEL

INTRODUCTION

This work package contains the right hand instrument panel control and/or indicator illustrations and table. Index numbers on the illustrations are keyed to tabular listings that contain the name, based on the panel markings, and the functional description of the control/indicator. The following index provides a quick reference to the control/indicator figures and tables.

RIGHT HAND INSTRUMENT PANEL

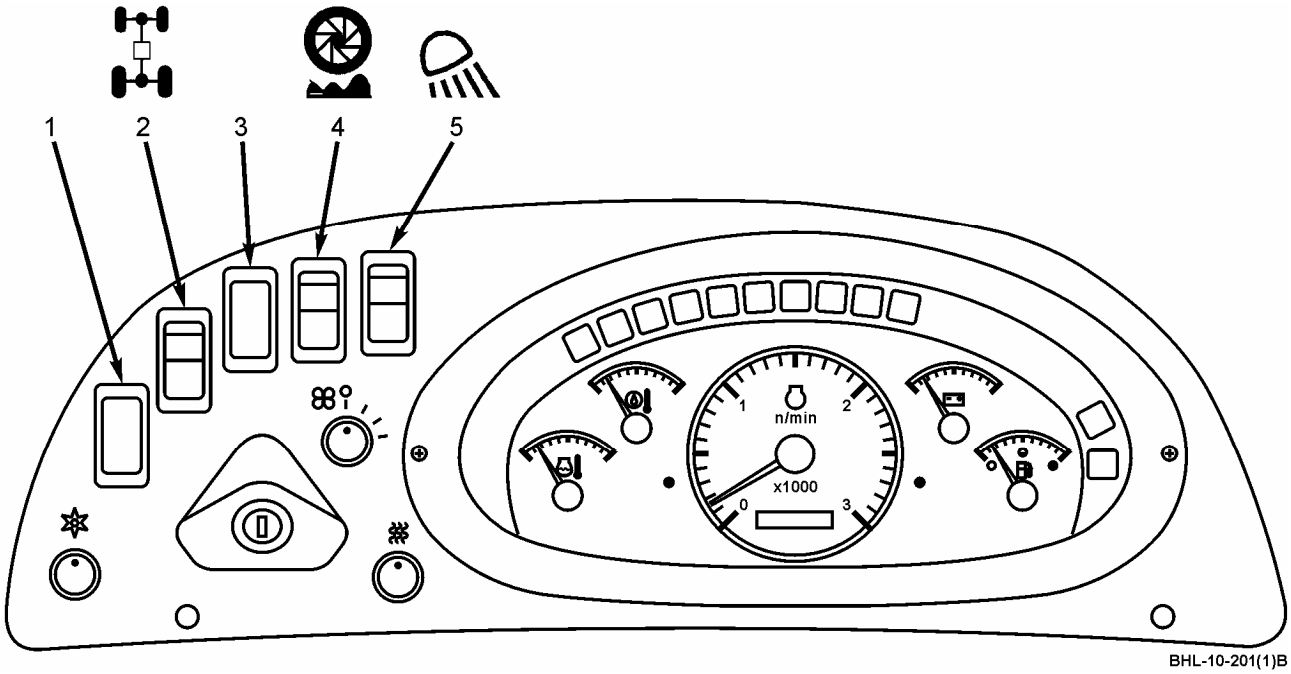


Figure 1. Right Hand Instrument Panel Controls/Indicators (Sheet 1 of 7).

Table 1. Right Hand Instrument Panel Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Not used.	-
2	4WD front axle switch	Push top of rocker switch to engage front drive axle (Four-Wheel Drive (4WD)); green lamp in switch illuminates. Push bottom of rocker switch to disengage front drive axle (Two-Wheel Drive (2WD)).
3	Not used.	-
		WARNING Do not engage ride control switch with starter key switch turned to ON or ACC position. Front End Loader (FEL) lift arms can drop. Failure to comply may result in serious injury or death to personnel.
4	Ride control switch	Reduces fore and aft pitching motion, reduces shock loads to the BHL, increases productivity, and improves operator comfort. To engage, lower FEL bucket to or near ground and push top of rocker switch. Green lamp in switch illuminates. Push bottom of rocker switch to disengage.
5	Rear work lamp switch	Push top of rocker switch to turn lamp on; green lamp in switch illuminates. Push bottom of rocker switch to turn lamp off.

RIGHT HAND INSTRUMENT PANEL - Continued

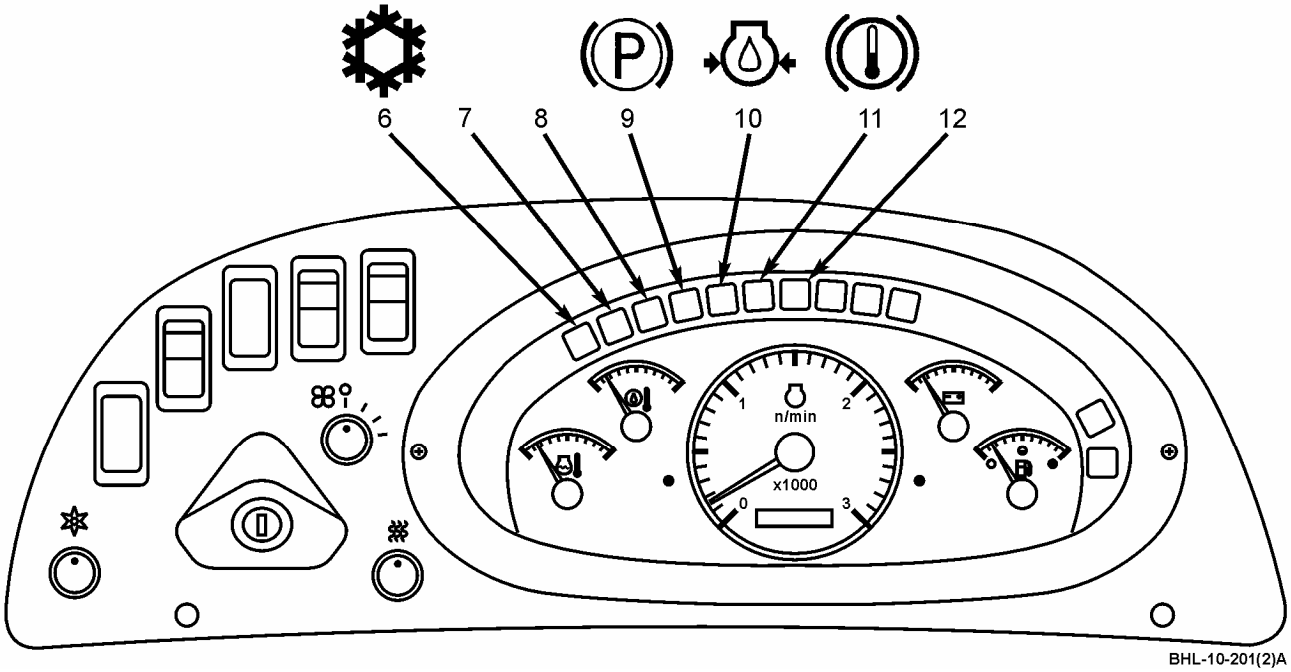


Figure 1. Right Hand Instrument Panel Controls/Indicators (Sheet 2 of 7).

Table 1. Right Hand Instrument Panel Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
6	Air conditioning system pressure indicator lamp	Illuminates when air conditioner has stopped because of too low or too high refrigerant pressures.
7	Not used.	-
8	Not used.	-
9	Parking brake indicator lamp	Illuminates when parking brake is engaged.
		CAUTION If any warning lamps illuminate (KEYS 10 thru 17 below), shut engine off and notify field level maintenance. Failure to comply may result in severe damage to engine.
10	Low engine oil pressure warning lamp	Illuminates when, with engine operating, there is no engine oil pressure or low engine oil pressure. Audible alarm will also sound when this condition exists.
11	Rear axle oil temperature warning lamp	Illuminates when rear axle oil temperature reaches 305°F (152°C).
12	Not used.	-

RIGHT HAND INSTRUMENT PANEL - Continued

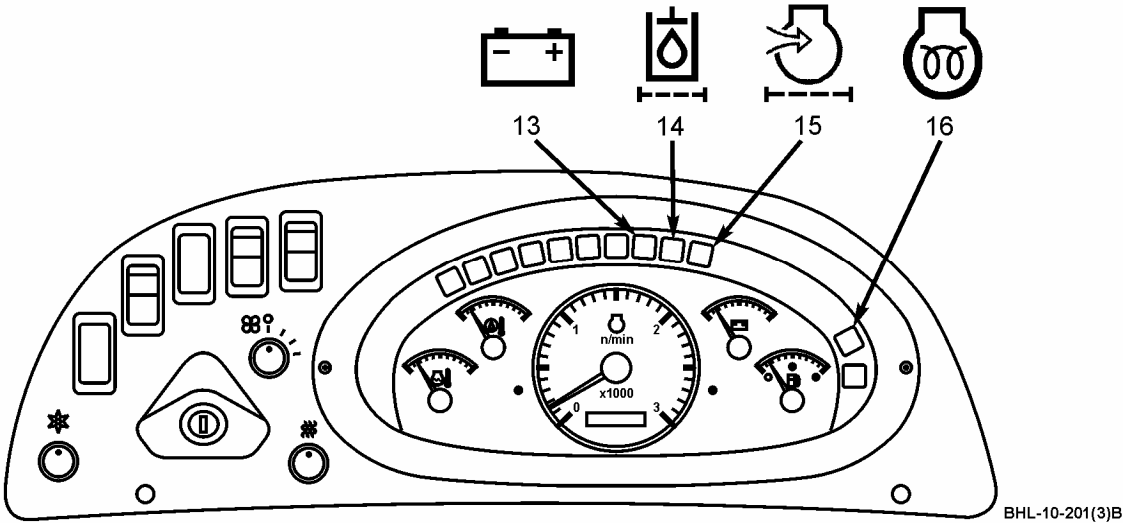


Figure 1. Right Hand Instrument Panel Controls/Indicators (Sheet 3 of 7).

Table 1. Right Hand Instrument Panel Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
		CAUTION If any warning lamps illuminate (KEYS 10 thru 17 below), shut engine off and notify field level maintenance. Failure to comply may result in severe damage to engine.
13	Alternator warning lamp	Illuminates when, with engine operating, alternator is not charging batteries.
14	Hydraulic oil filter warning lamp	Illuminates when, with engine operating and hydraulic fluid at operating temperature, hydraulic filter is restricted and requires service.
15	Air filter restriction warning lamp	Illuminates when, with engine operating, air filter element is restricted and requires service.
		WARNING The BHL is equipped with an engine grid heater that will ignite flammable starting fluids. Do not use starting fluid. Fire and explosion may occur. Failure to comply may result in serious injury or death to personnel.
16	Engine grid heater indicator lamp	Illuminates when starter key switch is turned to ON position and incoming air needs to be preheated due to cold temperatures. Wait until lamp extinguishes before starting engine.

RIGHT HAND INSTRUMENT PANEL - Continued

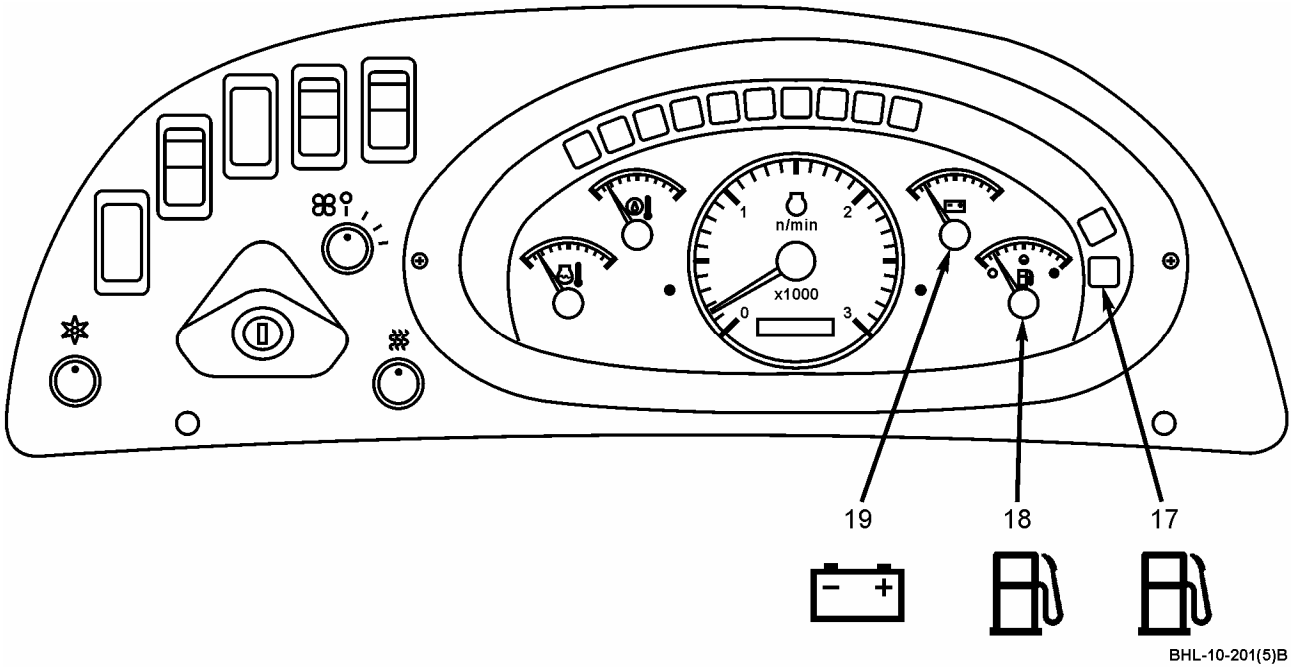


Figure 1. Right Hand Instrument Panel Controls/Indicators (Sheet 4 of 7).

Table 1. Right Hand Instrument Panel Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
17	Low fuel level warning lamp	Illuminates when fuel level is low (below 5 gallons (19L)).
18	Fuel level gage	Indicates amount of fuel in fuel tank. **CAUTION** Do not continue to operate engine with voltmeter gage needle in red area (discharge or overcharge). Notify field level maintenance. Failure to comply may result in damage to batteries. **NOTE** When starter key switch in turned to ON position, voltmeter gage needle will move to bottom of green area. After engine starts, gage needle should move up to upper part of green area.
19	Voltmeter gage	Indicates condition of electrical system. System is normal when, with key switch in ON position, gage needle is in green area of gage (11 to 15.3 volts). If gage needle is in red area, battery charge is too low, alternator in not charging enough, or there is an overcharge condition.

RIGHT HAND INSTRUMENT PANEL - Continued

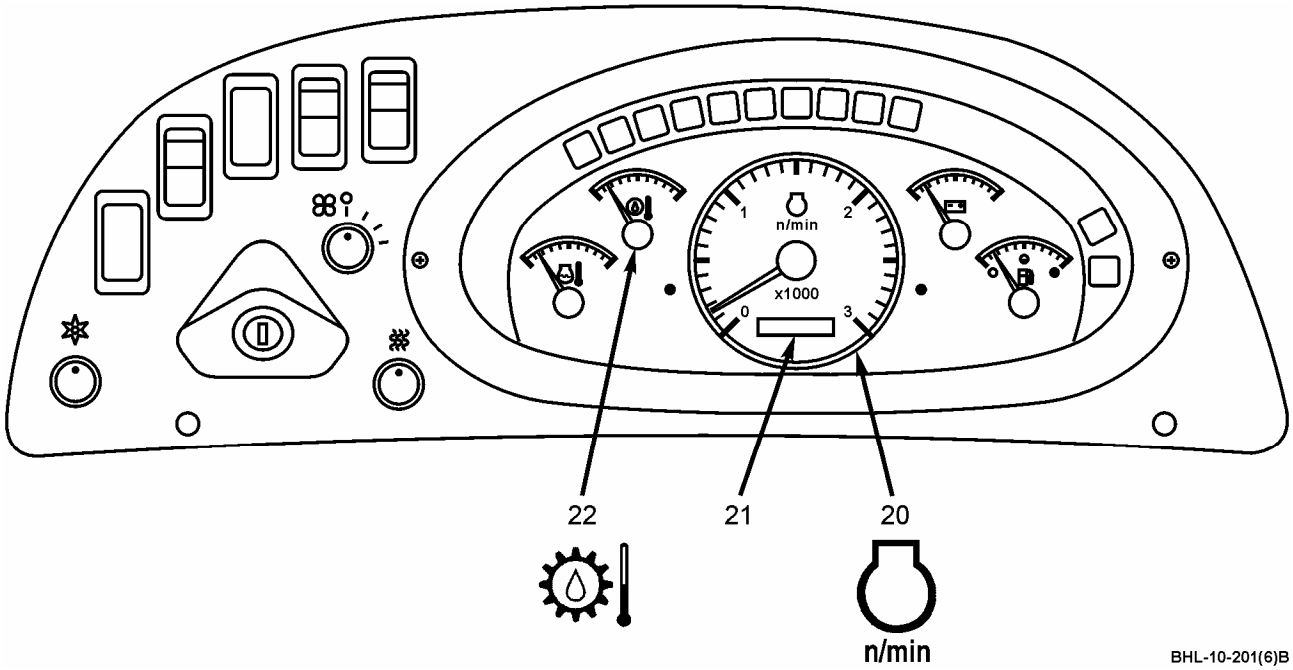


Figure 1. Right Hand Instrument Panel Controls/Indicators (Sheet 5 of 7).

Table 1. Right Hand Instrument Panel Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
20	Tachometer	Indicates engine speed in rpm. Each mark on gage equals 100 rpm. Engine should be operated in green area of gage.
21	Engine hourmeter	Indicates number of hours engine has operated. Far right number indicates tenths of an hour. **CAUTION** Do not continue to operate engine with torque converter oil temperature gage needle in red area. Notify field level maintenance. Failure to comply may result in damage to torque converter.
22	Torque converter oil temperature gage	Indicates torque converter oil temperature. Temperature is normal when gage needle is in green area of gage. If gage needle goes into red area, shift direction control lever to neutral position and operate engine for 30 seconds to 2 minutes at full throttle. If this does not reduce torque converter oil temperature, shut engine off and check for obstruction in radiator or oil cooler.

RIGHT HAND INSTRUMENT PANEL - Continued

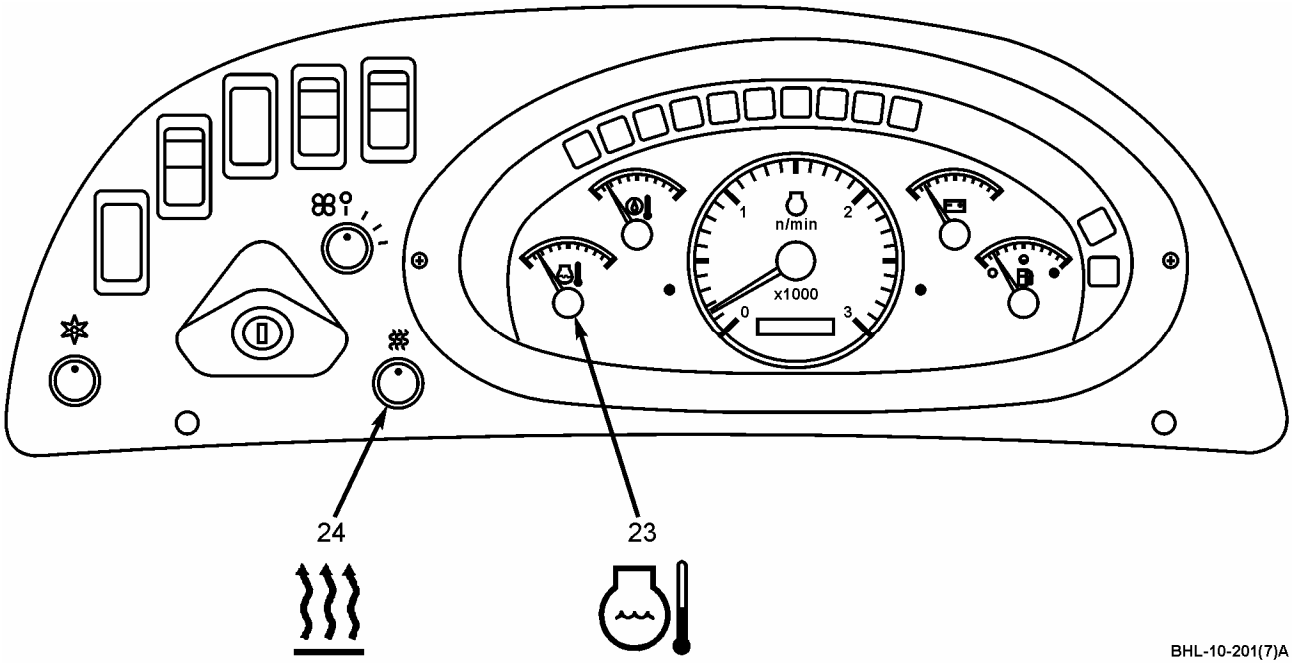


Figure 1. Right Hand Instrument Panel Controls/Indicators (Sheet 6 of 7).

Table 1. Right Hand Instrument Panel Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
		WARNING Hot coolant can spray out if radiator cap is removed rapidly. To remove radiator cap, let system cool; then, slowly remove cap by turning in small increments. Failure to comply may result in serious injury or death to personnel. **CAUTION** Do not continue to operate engine with engine coolant temperature gage needle in red area. Notify field level maintenance. Failure to comply may result in damage to engine.
23	Engine coolant temperature gage	Indicates engine coolant temperature. Temperature is normal when gage needle is in green area of gage. If gage needle goes into red area, audible alarm will sound. Shut engine off, allow to cool, and check cooling system.
24	Heater temperature control switch	Turn heater switch clockwise (CW) to increase temperature in cab; turn heater switch counterclockwise (CCW) to decrease temperature in cab.

RIGHT HAND INSTRUMENT PANEL - Continued

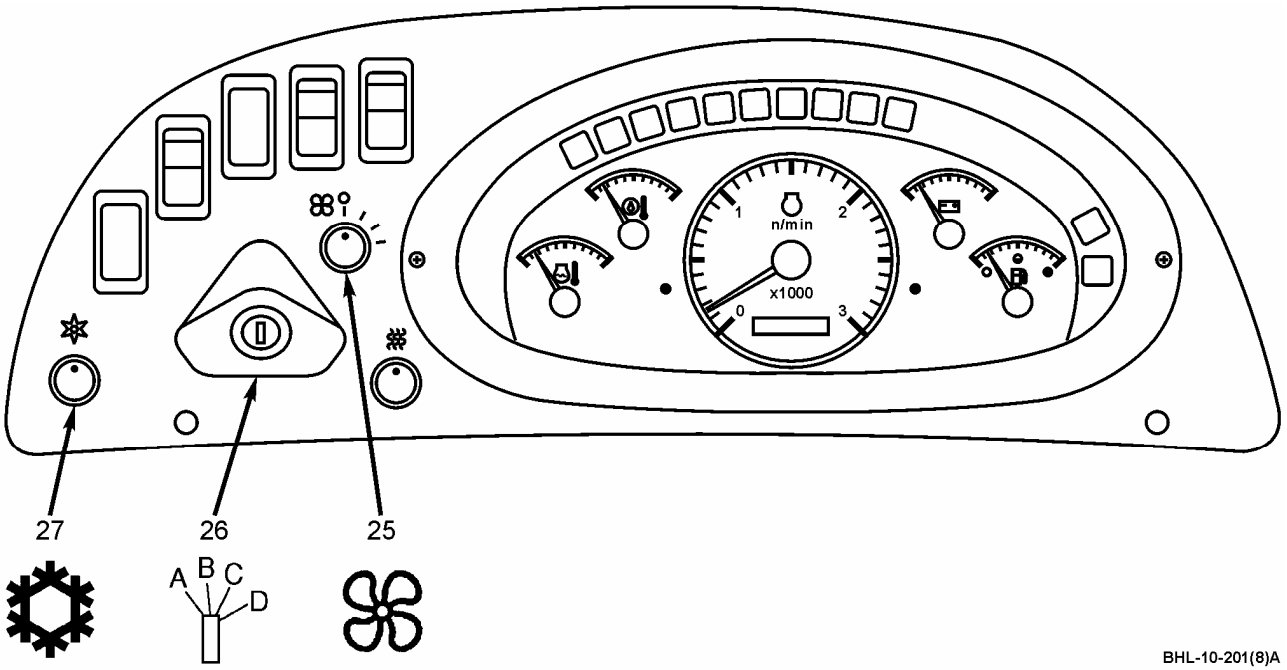


Figure 1. Right Hand Instrument Panel Controls/Indicators (Sheet 7 of 7).

Table 1. Right Hand Instrument Panel Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
25	Blower fan switch	Turn switch to center detent for low fan speed; fully CW for high fan speed; completely CCW to OFF position to stop fan.
26	Starter key switch (4-position)	
	Position A	ACC - Turn key CCW from OFF position to ACC position to provide power to accessories.
	Position B	OFF - Turn key to OFF position to shut engine off.
	Position C	ON - Turn key CW to ON position. Before starting engine, check status of all warning lamps. Use voltmeter gage to check battery condition.
	Position D	START - Turn key completely CW to actuate starter motor. After engine starts, release key, which will automatically return starter key switch to ON position.
		NOTE Air conditioning should produce air approximately 10°F cooler than outside air temperature.
27	Air conditioning temperature switch	Controls air conditioning output temperature. Turn switch CW to decrease temperature in cab; turn switch completely CCW to turn off.

END OF WORK PACKAGE

OPERATOR LEVEL

DESCRIPTION AND USE OF CONTROLS AND INDICATORS FOR FRONT AND LEFT REAR CONSOLES

INTRODUCTION

This work package contains the front and left rear consoles control and/or indicator illustrations and tables. Index numbers on the illustrations are keyed to tabular listings that contain the name, based on the panel markings, and the functional description of the control/indicator. The following index provides a quick reference to the control/indicator figures and tables.

FRONT CONSOLE

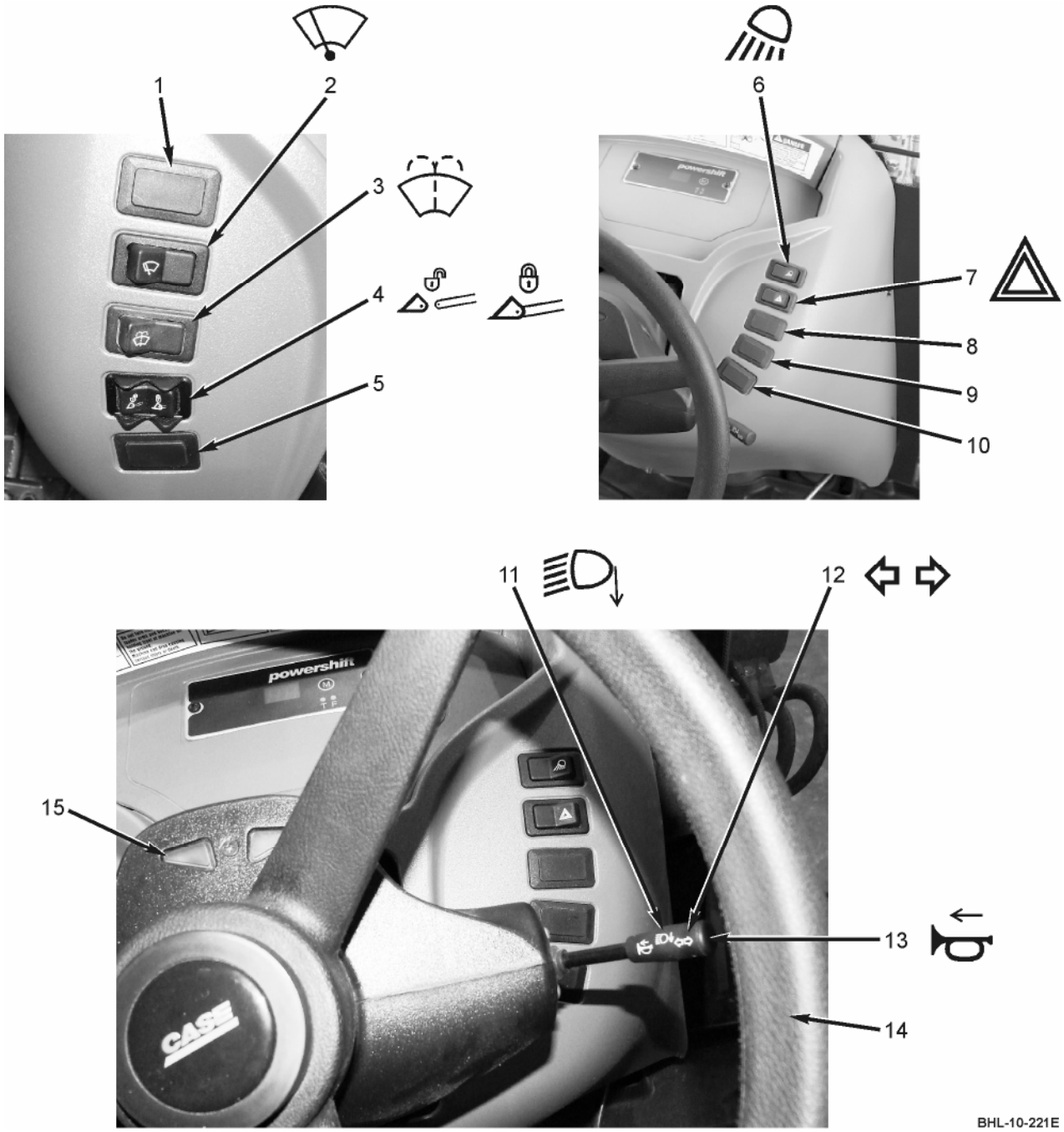


Figure 1. Front Console Controls/Indicators.

FRONT CONSOLE - Continued

Table 1. Front Console Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Not used.	-
2	Front wiper switch (3 position)	Controls front wiper.
	Low	Push left side of rocker switch to first position to turn front wiper to low.
	High	Push left side of rocker switch to second position to turn front wiper to high.
	Off	Push right side of rocker switch to turn front wiper to off.
3	Front windshield washer switch	Push and hold rocker switch to activate front windshield washer; release rocker switch to stop front windshield washer.
4	Front End Loader (FEL) tool carrier switch	Push left side of rocker switch to retract FEL tool carrier lock pins; push right side of rocker switch to extend FEL tool carrier lock pins.
5	Not used.	-
6	Front work lamp switch	Push right side of rocker switch to turn on front work lamps; push opposite end of rocker switch to turn off front work lamps.
7	Flasher lamp switch	Push right side of rocker switch to turn on flashers; push opposite end of rocker switch to turn off flashers.
8	Not used.	-
9	Not used.	-
		CAUTION If the BHL has not been operated for several weeks or engine oil filter has been replaced, prime turbocharger with oil per Priming Turbocharger (WP 0010). Failure to comply may result in damage to turbocharger.
10	Fuel pump solenoid switch.	Momentary rocker switch. Push and hold right side of switch to disengage fuel pump solenoid switch and prevent engine from starting; release switch to engage fuel pump solenoid switch and allow engine to operate.
11	Driving lamp switch (lever)	Push lever forward to turn driving lamps on; pull lever rearward to turn driving lamps off.
12	Turn signal lever	Push lever up to signal left turn; push lever down to signal right turn; move lever to center to stop turn signal.
13	Horn button	Push button to sound horn.
14	Steering wheel	Provides directional control to the BHL.
15	Turn signal indicators	Flash to show turn signal activation (left or right).

LEFT REAR CONSOLE

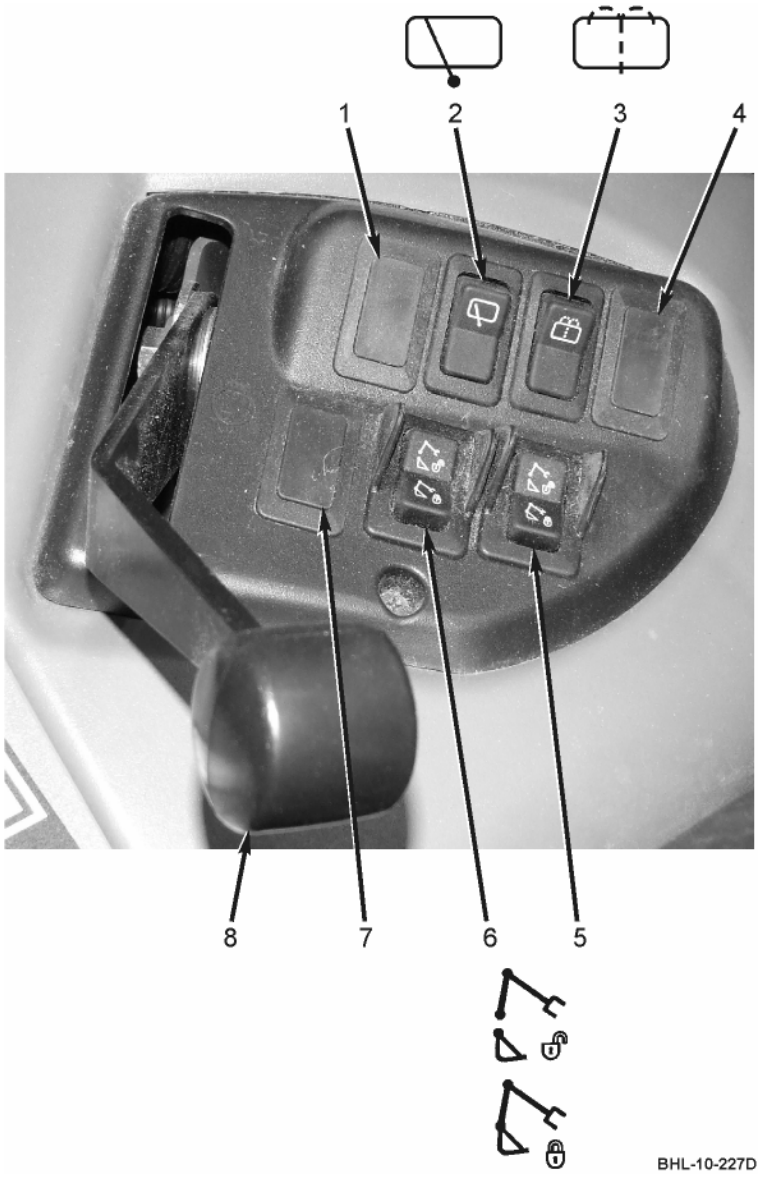


Figure 2. Left Rear Console Controls/Indicators.

LEFT REAR CONSOLE - Continued

Table 2. Left Rear Console Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Not used.	-
2	Rear wiper switch (3 position)	Controls rear wiper.
	Low	Push top of rocker switch to first position to turn rear wiper to low.
	High	Push top of rocker switch to second position to turn rear wiper to high.
	Off	Push bottom of rocker switch to turn rear wiper to off.
3	Rear window washer switch	Push and hold rocker switch to activate rear window washer; release rocker switch to stop rear window washer.
4	Not used.	-
		NOTE Push both backhoe hydraulic quick coupler rocker switches at same time to activate backhoe hydraulic quick coupler lock pins.
5	Backhoe right hydraulic quick coupler switch	Push top of rocker switch to retract backhoe right hydraulic quick coupler lock pin; push bottom of rocker switch to extend backhoe right hydraulic quick coupler lock pin.
6	Backhoe left hydraulic quick coupler switch	Push top of rocker switch to retract backhoe left hydraulic quick coupler lock pin; push bottom of rocker switch to extend backhoe left hydraulic quick coupler lock pin.
7	Not used.	-
8	Rear throttle control	Push hand throttle away from you to increase engine speed; pull hand throttle toward you to decrease engine speed.

END OF WORK PACKAGE

OPERATOR LEVEL

DESCRIPTION AND USE OF CONTROLS AND INDICATORS FOR FRONT END LOADER (FEL) CONTROL LEVER

INTRODUCTION

This work package contains the FEL control lever control and/or indicator illustrations and table. Index numbers on the illustrations are keyed to tabular listings that contain the name, based on the panel markings, and the functional description of the control/indicator. The following index provides a quick reference to the control/indicator figures and tables.

FEL CONTROL LEVER

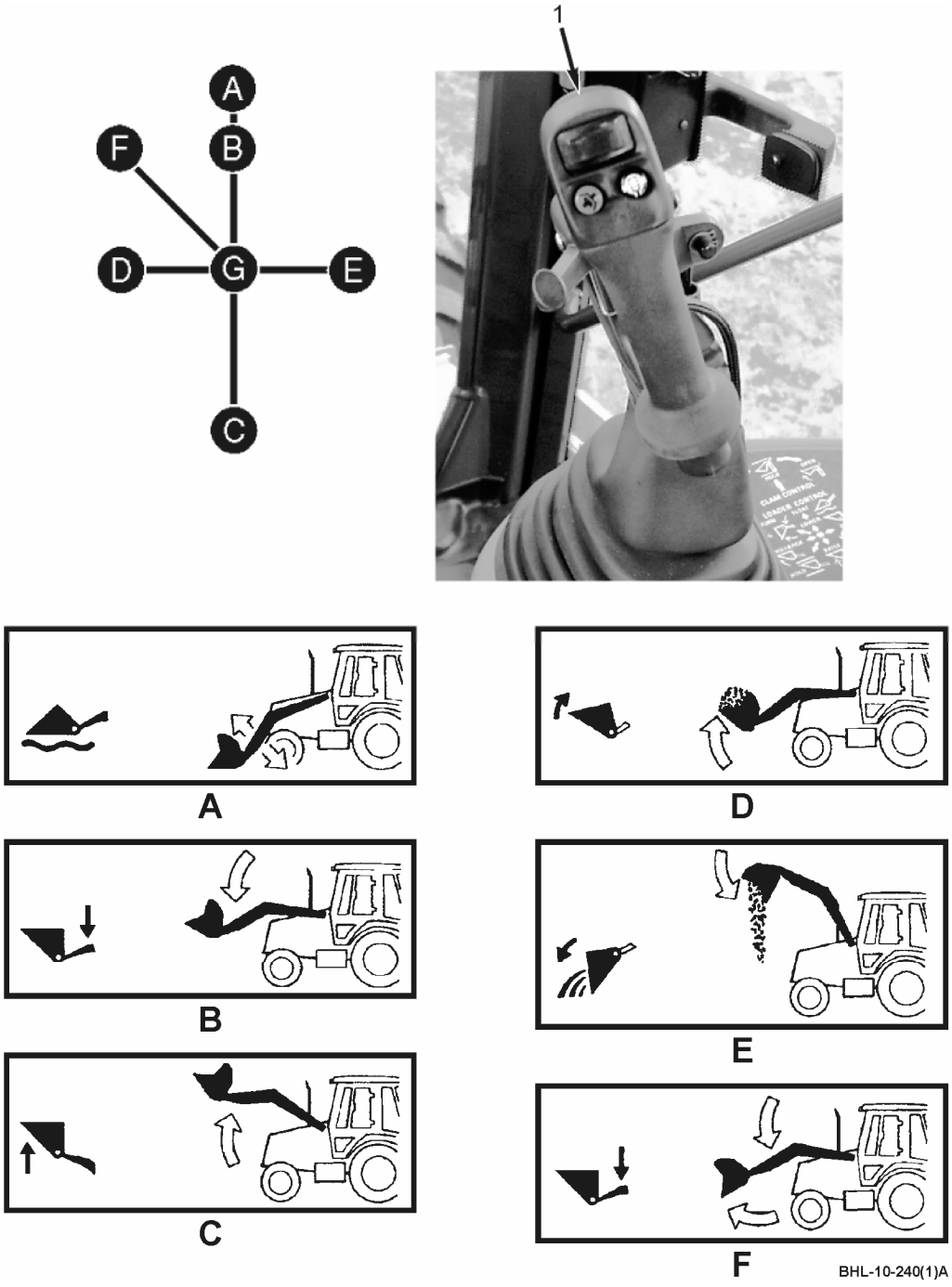


Figure 1. FEL Control Lever Controls/Indicators (Sheet 1 of 3).

FEL CONTROL LEVER - Continued

Table 1. FEL Control Lever Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Lift arms and bucket control lever	Controls lift arms and bucket.
	Position A	FLOAT - Push lever forward past detent. Bucket can follow level of ground without lever movement.
	Position B	LOWER - Moves bucket down.
	Position C	RAISE - Moves bucket up.
	Position D	ROLL BACK - Rolls bucket back.
	Position E	DUMP - Dumps bucket.
	Position F	RETURN-TO-DIG - After bucket is dumped, move lever to ROLLBACK and FLOAT. When bucket is at height selected, pull lever back to HOLD.
	Position G	NEUTRAL - Lift arms and bucket stop moving. When released, lever will return to HOLD automatically. Manually move lever from FLOAT to HOLD.

FEL CONTROL LEVER - Continued

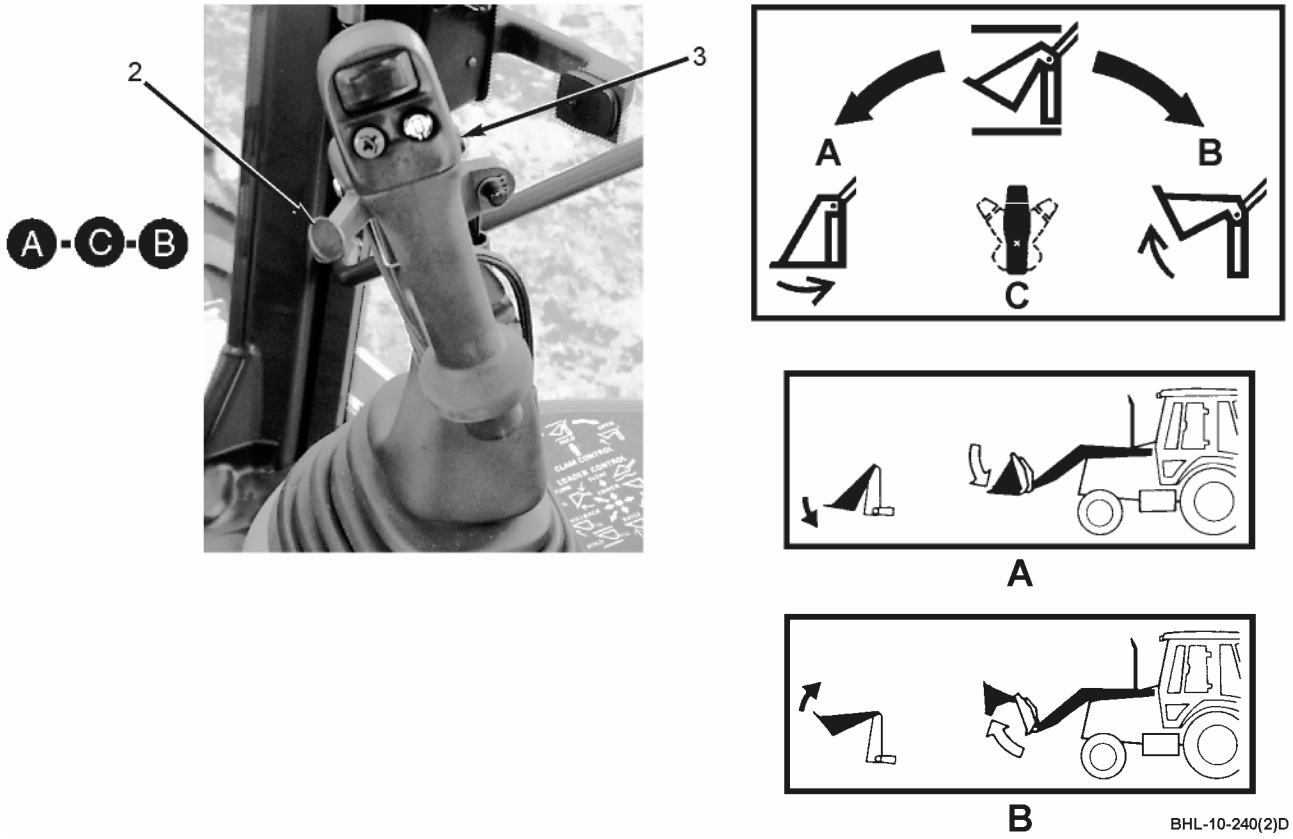


Figure 1. FEL Control Lever Controls/Indicators (Sheet 2 of 3).

Table 1. FEL Control Lever Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE Keep clamshell lockout control in locked position when clamshell is not in use.
2	Clamshell lockout control	Push thumb control down to unlock clamshell lockout control; pull thumb control up to lock clamshell lockout control.
3	Clamshell control handle	Controls clamshell.
	Position A	CLAMSHELL OPEN - Pivot pistol grip handle to left.
	Position B	CLAMSHELL CLOSED - Pivot pistol grip handle to right.
	Position C	HOLD – NEUTRAL – When released, lever will return to HOLD automatically.

FEL CONTROL LEVER - Continued

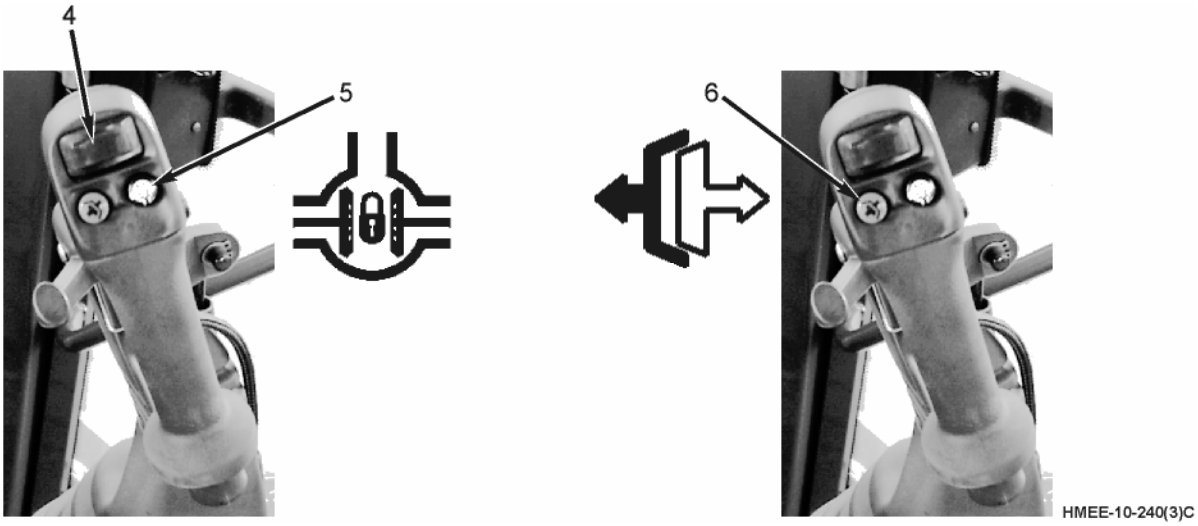


Figure 1. FEL Control Lever Controls/Indicators (Sheet 3 of 3).

FEL CONTROL LEVER - Continued

Table 1. FEL Control Lever Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE There are two kickdown switches. Kickdown switches (KEY 4 below or WP 0008, KEY 3) can be used to move transmission mode from manual to automatic and back to manual. With transmission in neutral position and either kickdown switch engaged, transmission will go from manual mode to automatic mode and AU will be displayed on display screen. When transmission goes from automatic mode to manual mode, SL will be displayed on display screen. On startup, transmission will be in automatic mode. Speed of the BHL has no effect on selection.
4	Transmission kickdown switch (on FEL control lever)	Momentary rocker switch used to change automatically from 2nd gear to 1st gear, when in manual mode, to increase digging force. Press switch once to downshift from 2nd gear to 1st gear. Press switch again to shift back to 2nd gear. If switch has been pressed to downshift to 1st gear, changing direction from forward to reverse will shift transmission to 2nd gear reverse. Changing directions back to forward will shift transmission into 2nd gear forward.
		CAUTION Before engaging differential lock switch, make sure neither rear wheel is spinning freely. Failure to comply may result in damage to differential.
		NOTE Differential lock will release automatically when load is removed.
5	Differential lock switch	Press and hold switch to engage lock; release switch to disengage lock.
6	Clutch cutout switch	Push and hold switch to disengage transmission from drive wheels and allow engine to increase speed and supply more hydraulic fluid for greater power and faster control reaction time. The BHL can move freely, so brakes should be used to stop the BHL. Release switch to engage transmission to drive wheels and allow engine to reduce speed and supply less hydraulic fluid.

END OF WORK PACKAGE

OPERATOR LEVEL

DESCRIPTION AND USE OF CONTROLS AND INDICATORS FOR LEFT AND RIGHT BACKHOE CONTROL TOWERS

INTRODUCTION

This work package contains the left and right backhoe control towers control and/or indicator illustrations and tables. Index numbers on the illustrations are keyed to tabular listings that contain the name, based on the panel markings, and the functional description of the control/indicator. The following index provides a quick reference to the control/indicator figures and tables.

LEFT BACKHOE CONTROL TOWER

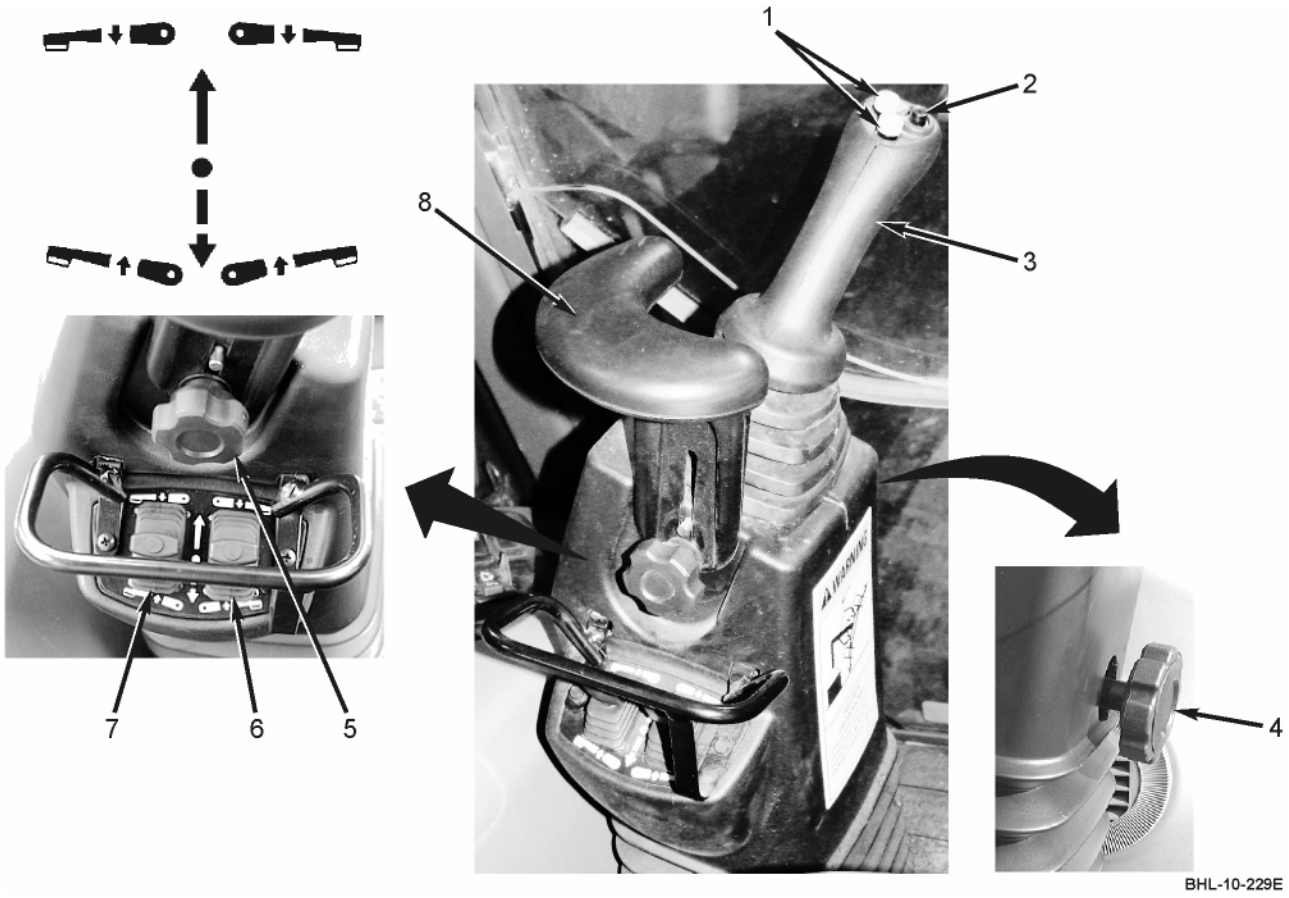


Figure 1. Left Backhoe Control Tower Controls/Indicators.

LEFT BACKHOE CONTROL TOWER - Continued

Table 1. Left Backhoe Control Tower Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE Bi-directional auxiliary hydraulic switches operate only when auxiliary hydraulic equipment is installed.
1	Bi-directional auxiliary hydraulic switches	Control operation of optional auxiliary hydraulic equipment connected to backhoe boom.
2	Horn button	Push button to activate horn; release button to stop horn.
3	Left backhoe control lever	Controls backhoe functions for boom and swing (pattern 1) (Figure 3) or dipper and swing (pattern 2) (Figure 4).
4	Tower tip adjustment knob	Located on backhoe side of tower. Turn knob counterclockwise (CCW) and tip upper part of tower into desired position; turn knob clockwise (CW) to lock position.
5	Left wrist rest adjustment knob	Turn knob CCW to loosen wrist rest; adjust wrist rest; turn CW to tighten wrist rest.
		NOTE Auto Up feature allows operator to automatically bring stabilizers (left or right) up to transport position without holding switch in position. For Auto Up feature, pull switch all the way rearward momentarily past detent position. Release switch and stabilizer will automatically raise to full transport position. Push switch in either direction to cancel Auto Up.
6	Right stabilizer switch	Pull switch rearward to bring right stabilizer up; push switch forward to lower stabilizer.
7	Left stabilizer switch	Pull switch rearward to bring left stabilizer up; push switch forward to lower stabilizer.
8	Adjustable wrist rest	Supports operator's wrist during backhoe operation to prevent fatigue.

RIGHT BACKHOE CONTROL TOWER

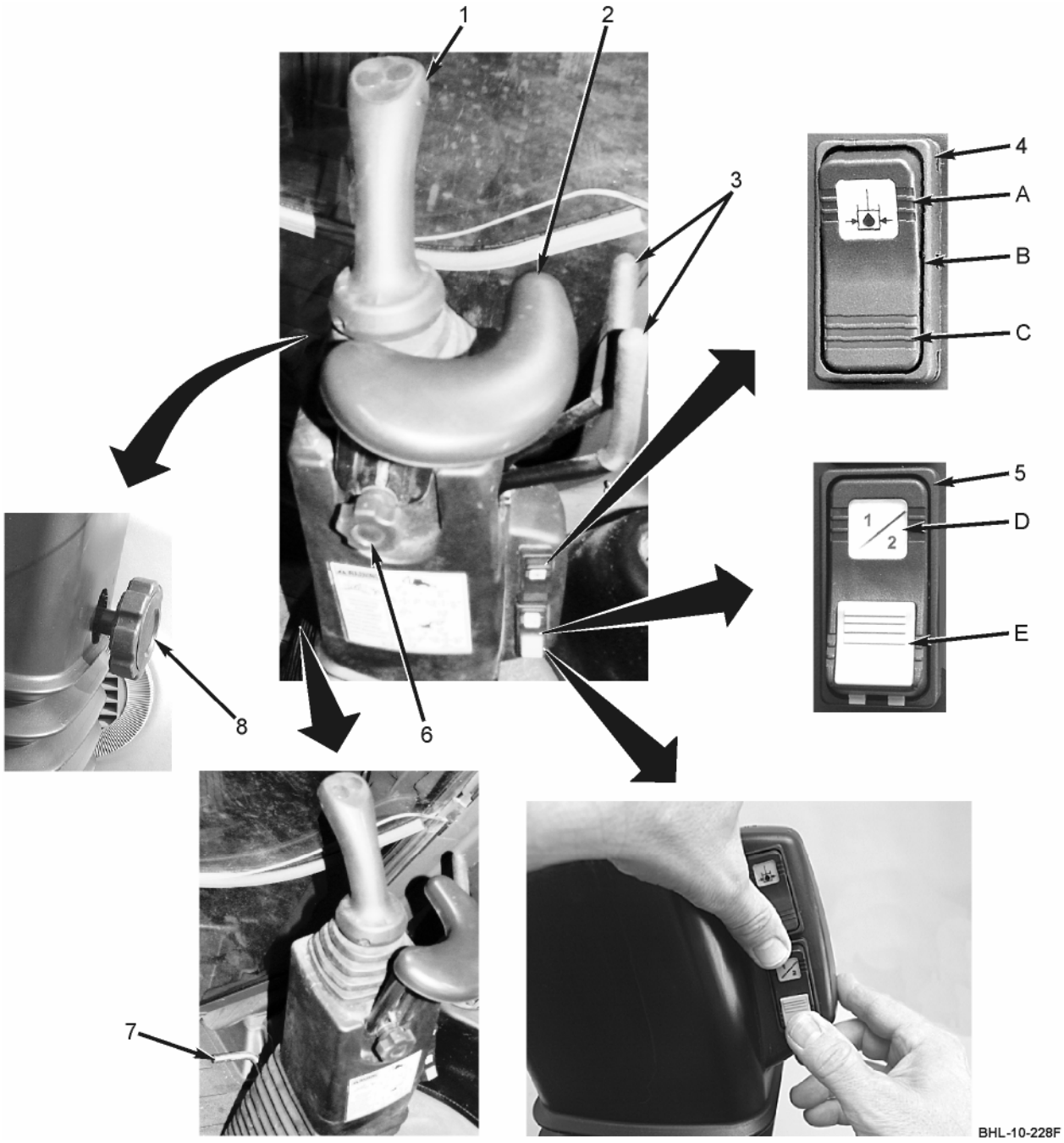


Figure 2. Right Backhoe Control Tower Controls/Indicators.

RIGHT BACKHOE CONTROL TOWER - Continued

Table 2. Right Backhoe Control Tower Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Right backhoe control lever	Controls backhoe functions for dipper and bucket (pattern 1) (Figure 3) or boom and bucket (pattern 2) (Figure 4).
2	Adjustable wrist rest	Supports operator's wrist during backhoe operation to prevent fatigue.
3	Tower fore and aft control handles	Squeeze handles together to adjust left and right towers fore and aft; release handles to hold position.
		NOTE When turning pilot control switch to on position, there may be a delay of less than 1/2 second before being able to operate stabilizers or bi-directional auxiliary equipment. If operator attempts to operate any of these functions sooner than 1/2 second delay, functions will not operate again until pilot control switch is cycled off and on.
4	Pilot control switch (3 position)	Used to activate/de-activate backhoe controls.
	Position A	Enable - Momentary position; activates all backhoe functions; illuminates when activated.
	Position B	On - Allows only stabilizers to operate.
	Position C	Off - Shuts off backhoe controls.
		NOTE It is necessary to use two hands to change control patterns. This safety feature prevents accidental switching of patterns.
5	Backhoe control pattern switch (2 position)	Used to select backhoe pattern 1 (Figure 3) or pattern 2 (Figure 4).
	Orange locking tab (E) Lock release (D)	To change switch positions, push orange locking tab up toward center of switch to release lock.
6	Right wrist rest adjustment knob	Turn knob CCW to adjust wrist rest, turn knob CW to tighten wrist rest.
7	Boom latch release pedal	Push pedal to release boom latch.
8	Tower tip adjustment knob	Located on backhoe side of tower. Turn knob CCW and tip upper part of tower into desired position; turn knob CW to lock position.

BACKHOE CONTROL LEVERS PATTERN 1

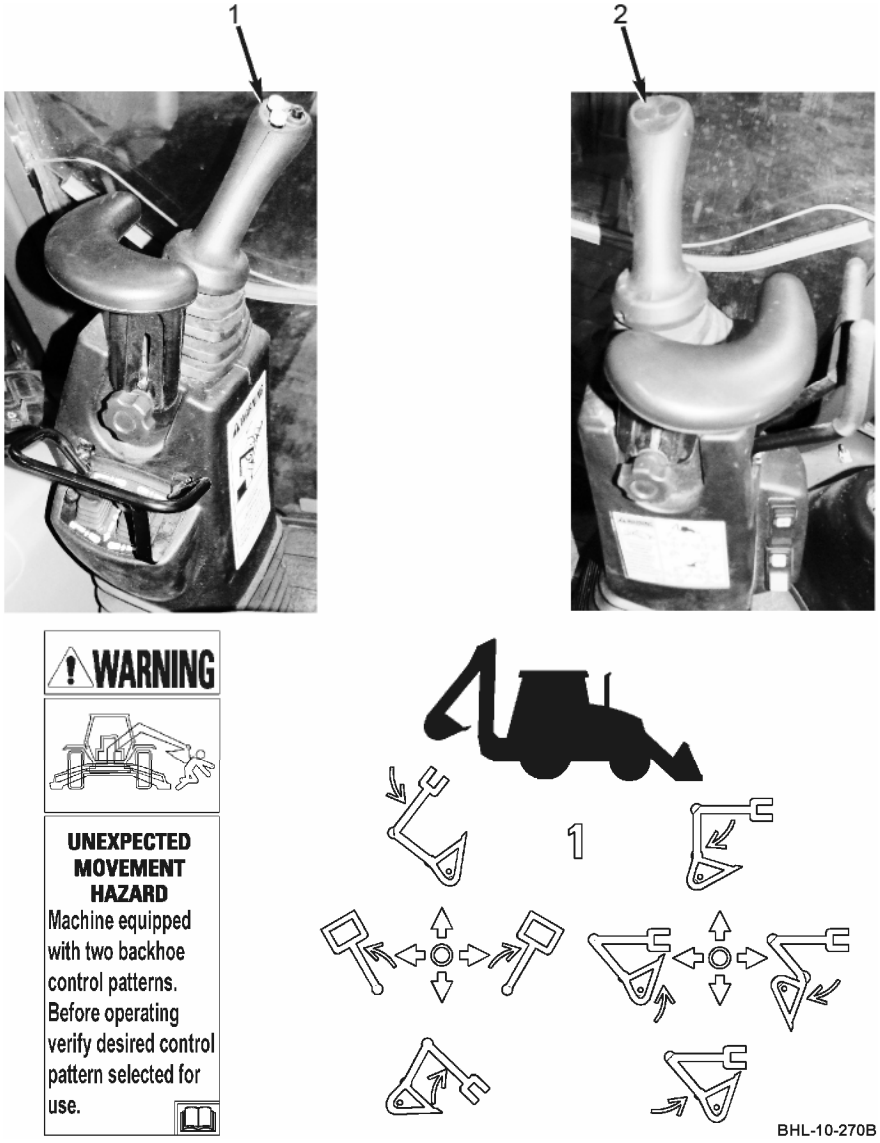


Figure 3. Backhoe Control Levers Pattern 1.

Table 3. Backhoe Control Levers Pattern 1 Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Left backhoe control lever	Boom and swing pattern allows movement of boom up and down and left and right as indicated.
2	Right backhoe control lever	Dipper and bucket pattern allows movement of dipper in and out and bucket in and out as indicated.

BACKHOE CONTROL LEVERS PATTERN 2

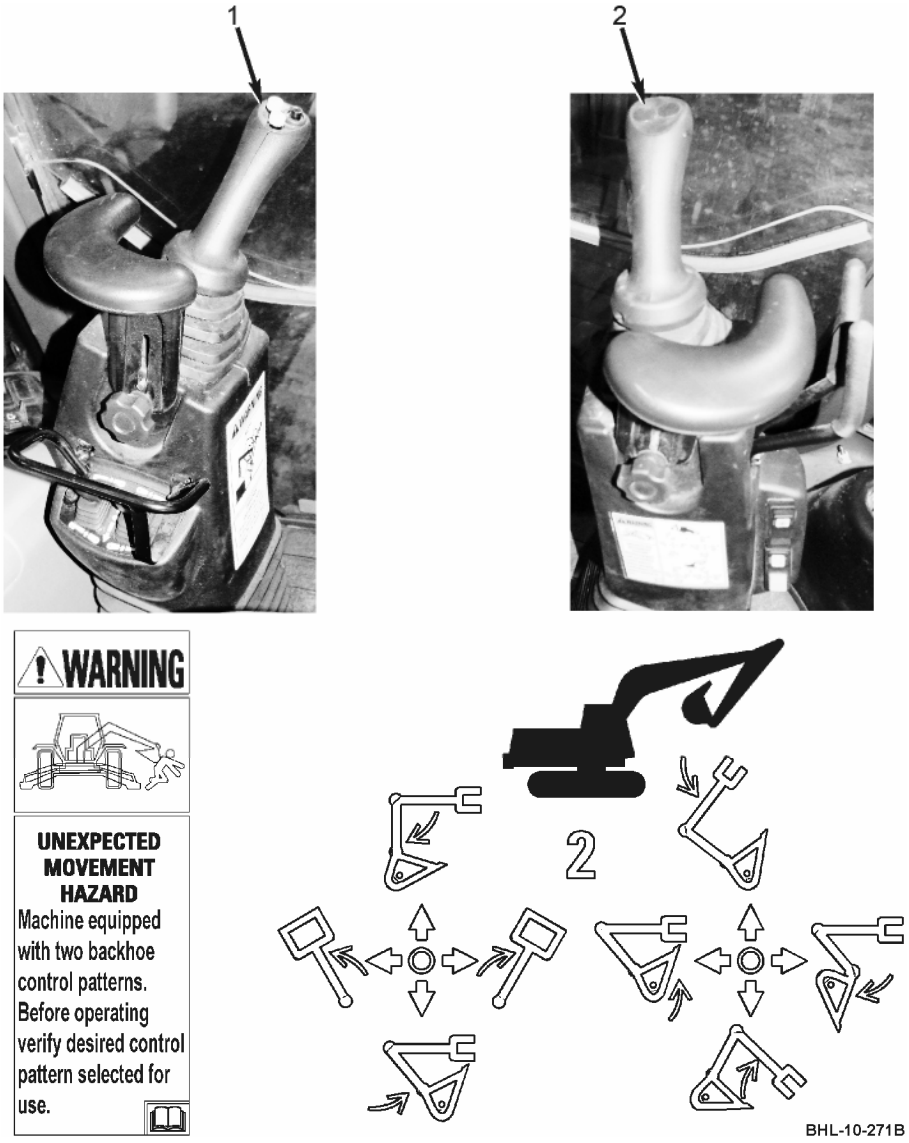


Figure 4. Backhoe Control Levers Pattern 2.

Table 4. Backhoe Control Levers Pattern 2 Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Left backhoe control lever	Dipper and swing pattern allows movement of dipper in and out and boom left and right as indicated.
2	Right backhoe control lever	Boom and bucket pattern allows movement of boom up and down and bucket in and out as indicated.

END OF WORK PACKAGE

OPERATOR LEVEL

DESCRIPTION AND USE OF CONTROLS AND INDICATORS FOR TRANSMISSION AND DISPLAY SCREEN

INTRODUCTION

This work package contains the transmission and display screen control and/or indicator illustrations and tables. Index numbers on the illustrations are keyed to tabular listings that contain the name, based on the panel markings, and the functional description of the control/indicator. The following index provides a quick reference to the control/indicator figures and tables.

TRANSMISSION

Figure 1. Transmission Controls/Indicators (Sheet 1 of 2).

Table 1. Transmission Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Direction control lever	Lever controls travel direction of the BHL. Center position N is neutral. To travel forward in 1st, 2nd, 3rd, or 4th gear, lift lever and push all the way forward toward F position. To travel in reverse in 1st or 2nd gear, lift lever and pull completely rearward toward R position.
2	Gear selection control lever	Used to select gears (1, 2, 3, 4). Rotate lever handgrip to aline number, which corresponds to each gear, with indicator mark on lever.
	Manual transmission mode	The BHL will stay in selected gear until selection is changed. Gear change can be made without stopping the BHL.
	Position 1	1st gear (forward or reverse).
	Position 2	2nd gear (forward or reverse).
	Position 3	3rd gear (forward only).
	Position 4	4th gear (forward only).
	Automatic transmission mode	The BHL will reach maximum gear selected by gear selection control lever.
	Position 1	No automatic shifting; transmission will remain in 1st gear.
	Position 2	No automatic shifting; transmission will remain in 2nd gear.
	Position 3	Automatic shifting between 2nd and 3rd gears.
	Position 4	Automatic shifting between 2nd, 3rd, and 4th gears.

TRANSMISSION - Continued

Figure 1. Transmission Controls/Indicators (Sheet 2 of 2).

Table 1. Transmission Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE There are two kickdown switches. Kickdown switches (KEY 3 below or WP 0006, KEY 4) can be used to move transmission mode from manual to automatic and back to manual. With transmission in neutral position and either kickdown switch engaged, transmission will go from manual mode to automatic mode and AU will be displayed on display screen. When transmission goes from automatic mode to manual mode, SL will be displayed on display screen. On startup, transmission will be in automatic mode. Speed of the BHL has no effect on selection.
3	Transmission kickdown switch (on gear selection control lever)	Pushbutton switch used, when in manual mode, to change automatically from 2nd gear to 1st gear to increase digging force. Press button once to downshift from 2nd gear to 1st gear. Press button again to shift back to 2nd gear. If button has been pressed to downshift to 1st gear, changing direction from forward to reverse will shift transmission to 2nd gear reverse. Changing directions from reverse to forward will shift transmission into 2nd gear forward.

DISPLAY SCREEN

Figure 2. Display Screen Controls/Indicators (Sheet 1 of 4).

Table 2. Display Screen Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Display screen	Displays GA momentarily upon startup to indicate self test. Displays direction control lever position (F, N, R), gear selection control lever position (1, 2, 3, 4), and vehicle speed (km/h). (Below 10 km/h, speed is displayed with 0.1 km/h resolution.)
2	Mode selection button M	Used to select mode displayed on display screen. Press and release button until desired mode is displayed on display screen.
3	Indicator lamp F (reset mode indicator lamp)	Illuminates momentarily upon startup as module goes through self-test. **CAUTION** If indicator lamp T blinks, Sd will be displayed on display screen. Move to safe location, shut engine off, and notify field level maintenance. Failure to comply may result in damage to transmission.
4	Indicator lamp T (test mode and fault indicator lamp)	Blinks to indicate failure in transmission electrical circuit. Press and hold mode selection button M until failure code is displayed. (Failure code is to be provided to field level maintenance personnel.)

DISPLAY SCREEN - Continued

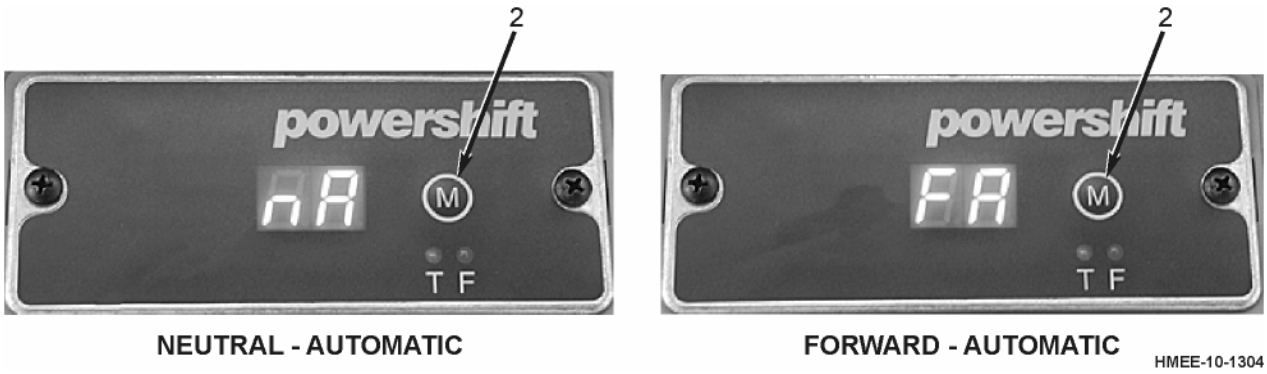


Figure 2. Display Screen Controls/Indicators (Sheet 2 of 4).

Table 2. Display Screen Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
	Automatic transmission mode	Automatic transmission mode operates as follows: **NOTE** At startup, transmission will be in automatic mode. a. Left side of display screen displays position of direction control lever (Figure 1). Neutral is indicated by n. b. When direction control lever (Figure 1) is shifted to F (forward position, left side of display screen displays F. When direction control is shifted to R (reverse) position, left side of display screen displays r. c. Right side of display screen displays transmission mode. Automatic is indicated by A. d. Transmission range is selected by rotating gear selection control lever (Figure 1) to desired gear (1, 2, 3, 4). Right side of display screen will continue to display A (automatic).

DISPLAY SCREEN - Continued

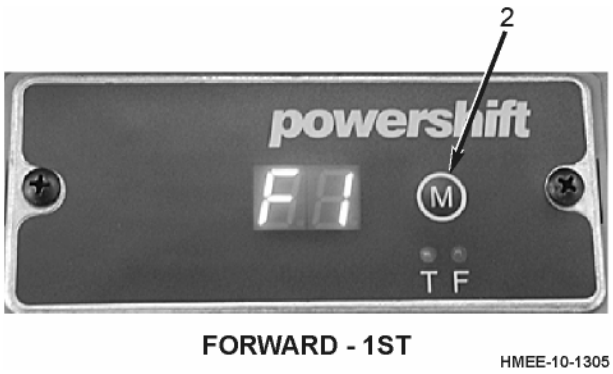


Figure 2. Display Screen Controls/Indicators (Sheet 3 of 4).

Table 2. Display Screen Controls/Indicators - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
	Manual transmission mode	Manual transmission mode operates as follows: a. Press and release mode selection button M (KEY 2 above) until display screen displays SL (shift lever). or Shift direction control lever to N (neutral) position and press kickdown switch (Table 1, KEY 3 or WP 0006, KEY 4). b. Left side of display screen displays n. c. Left side of display screen displays direction control lever position (F, N, R); right side of display screen displays gear selection control lever position (1, 2, 3, 4).

DISPLAY SCREEN - Continued

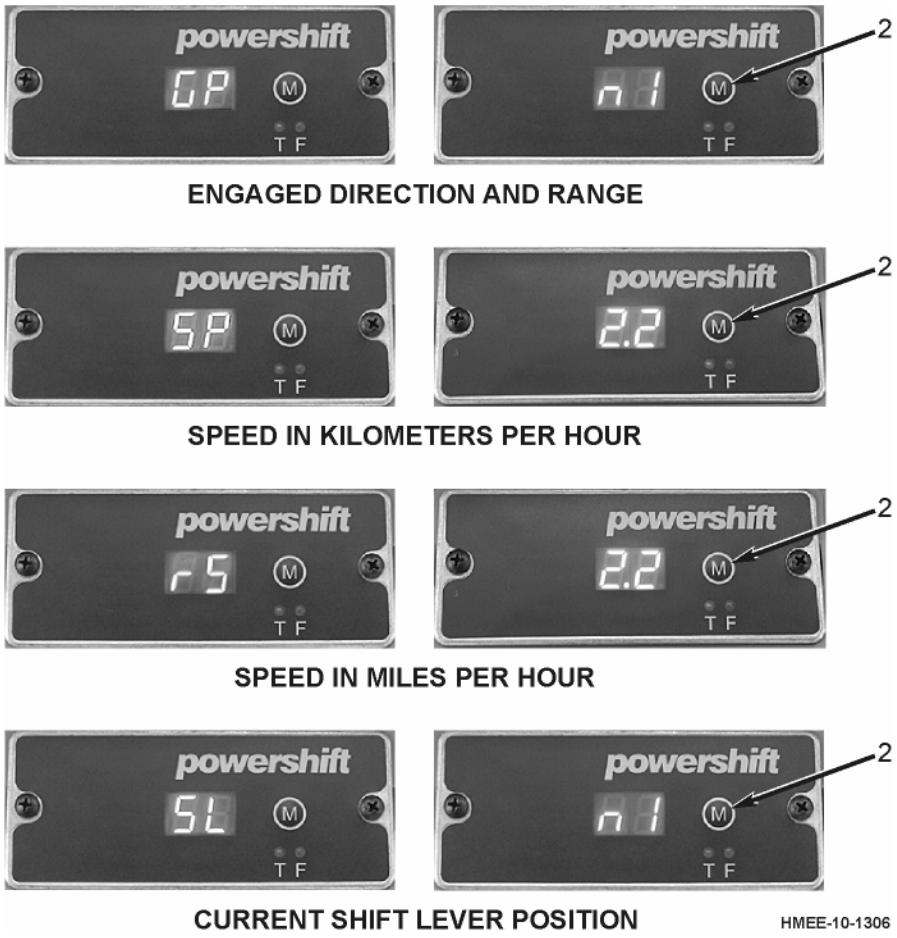


Figure 2. Display Screen Controls/Indicators (Sheet 4 of 4).

Table 2. Display Screen Controls/Indicator - Continued.

KEY	CONTROL/INDICATOR	FUNCTION
	Display modes	a. Press mode selection button M (KEY 2 above) to change display mode. Press and hold button down to view display mode; release button to display data. b. Display modes available: Engaged direction and range (GP). Speed in kilometers per hour (SP). Speed in miles per hour (rS). Current shift lever position (SL).

END OF WORK PACKAGE

OPERATOR LEVEL

DESCRIPTION AND USE OF CONTROLS AND INDICATORS FOR MISCELLANEOUS CAB ITEMS

INTRODUCTION

This work package contains the miscellaneous cab items control and/or indicator illustrations and tables. Index numbers on the illustrations are keyed to tabular listings that contain the name, based on the panel markings, and the functional description of the control/indicator. The following index provides a quick reference to the control/indicator figures and tables.

FOOT PEDALS

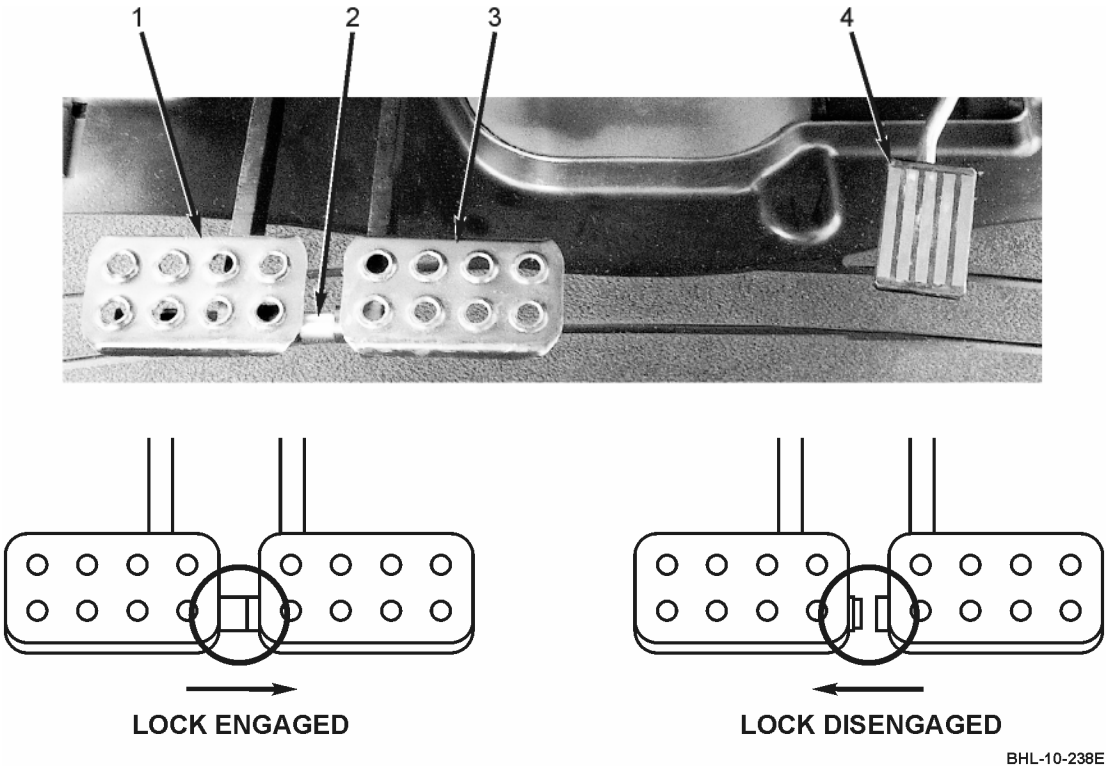


Figure 1. Foot Pedals Controls/Indicators.

Table 1. Foot Pedals Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		WARNING Service brake pedals must remain locked together unless using brake pedals to assist steering limited clearance conditions. Once steering assist maneuver is complete, return pedals to locked position. Failure to comply may result in damage to equipment or serious injury or death to personnel.
1	Left brake pedal	Push pedal to help turn the BHL left at low speed (with brake pedal lock disengaged).
2	Brake pedal lock lever	Used to apply left and right brakes simultaneously for travel on roads. Move lever up and slide locking pin all the way right to engage lock; move lever up and slide locking pin all the way left to disengage lock.
3	Right brake pedal	Push pedal to help turn BHL right at low speed (with brake pedal lock disengaged).
4	Foot throttle	Push throttle down to increase engine speed; release throttle to decrease engine speed.

PARKING BRAKE

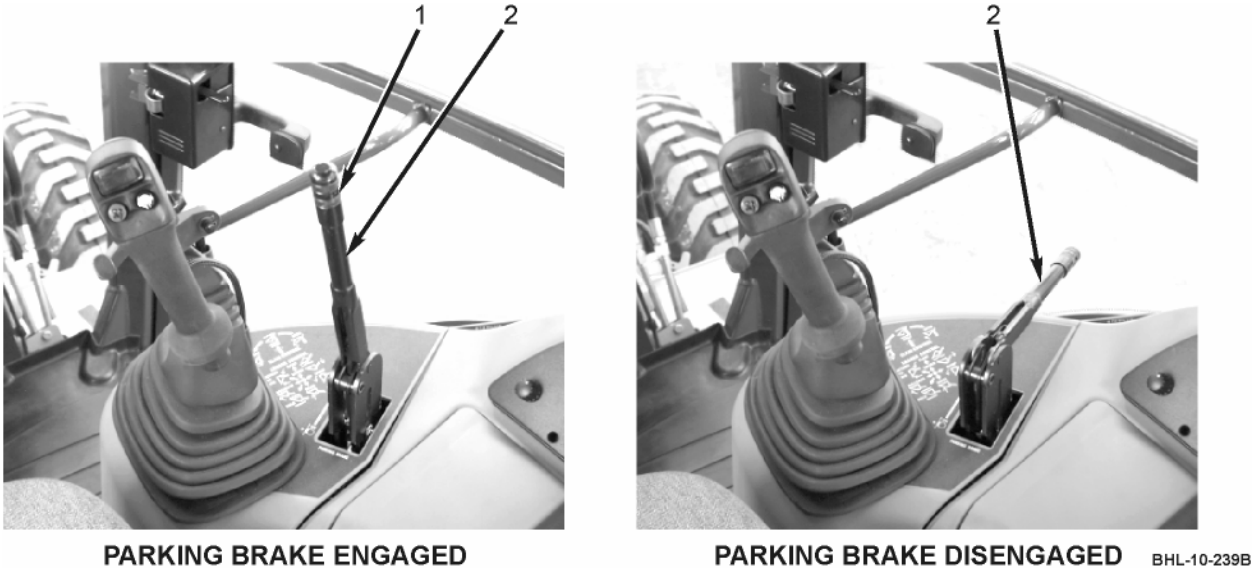


Figure 2. Parking Brake Controls/Indicators.

Table 2. Parking Brake Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE Adjust tension with parking brake disengaged.
1	Tension adjuster	Rotate adjuster clockwise (CW) to increase tension; rotate adjuster counterclockwise (CCW) to decrease tension.
		CAUTION Do not drive the BHL with parking brake engaged. Failure to comply may result in damage to parking brake.
		NOTE Warning alarm will sound if direction control lever is shifted into forward or reverse while parking brake is engaged.
2	Parking brake handle	Pull brake handle back to engage; push brake handle forward to disengage.

SEAT

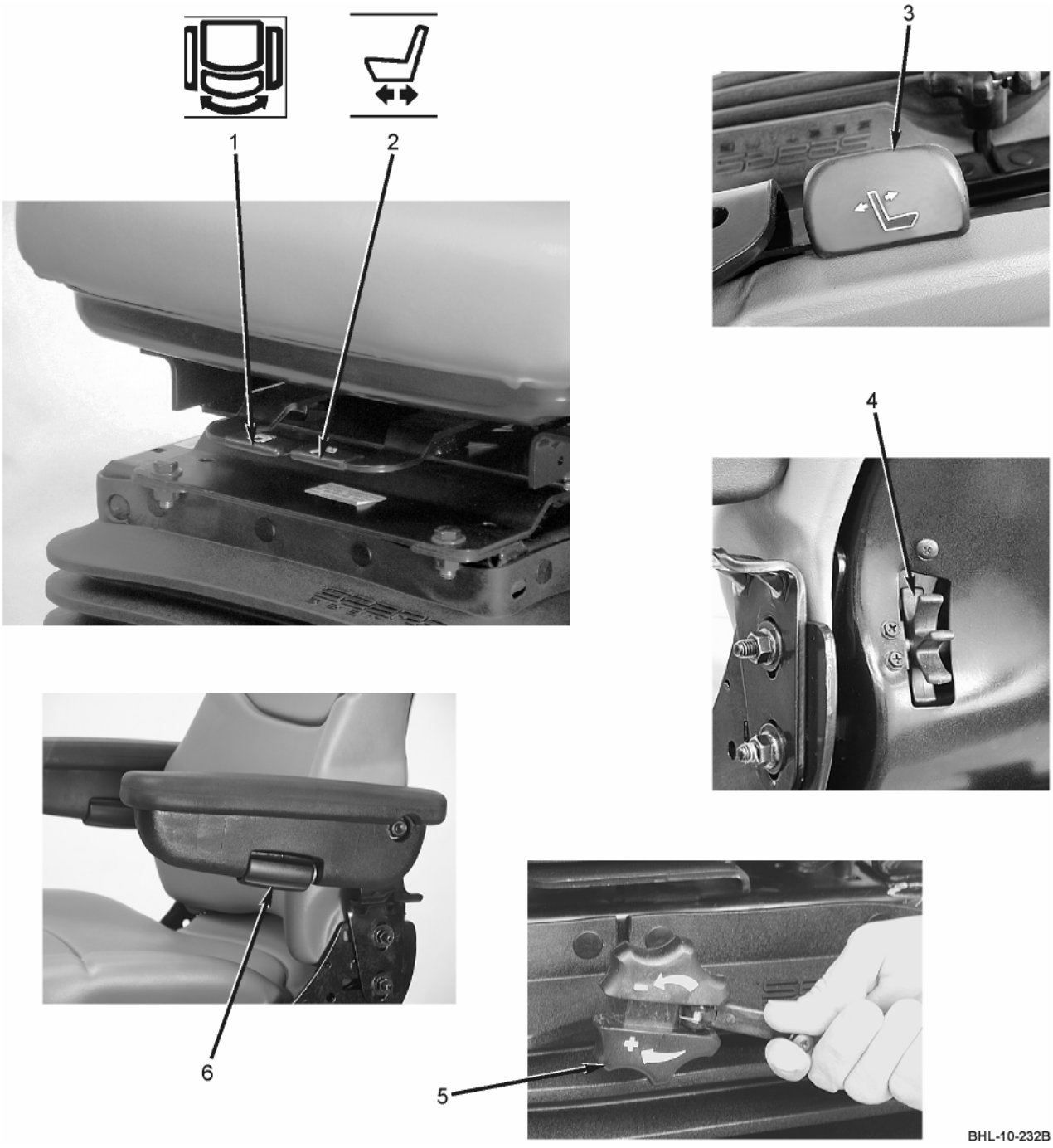


Figure 3. Seat Controls/Indicators.

SEAT - Continued

Table 3. Seat Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE Audible alarm will sound if seat is rotated from driving position with direction control lever in forward or reverse position.
	Audible alarm seat test	Perform test as follows: a. Park the BHL on level ground. b. With operator sitting in seat, seat in driving position, and seat belt fastened, start engine. c. Engage and hold service brakes. d. Shift direction control lever to forward position and turn seat approximately 15 to 20 degrees. Alarm will sound. Return seat to driving position. e. Shift direction control lever to reverse position and turn seat approximately 15 to 20 degrees. Alarm will sound. Backup alarm will also sound.
1	Swivel control lever	Lift lever to rotate from normal driving position to backhoe operation position or from backhoe operation position to normal driving position; release lever to lock seat into position.
2	Forward/rearward control lever	Lift lever to move seat forward or rearward; release lever to lock seat into position.
3	Backrest tilt adjustment control lever	Located on left side of seat. While sitting on seat, raise lever and tilt seat backrest until comfortable; release lever to lock backrest into position.
4	Lumbar adjustment control wheel	Located on left rear of seat. Turn wheel down or CW to increase lumbar support; turn wheel up or CCW to decrease lumbar support.
5	Weight adjustment control knob	Use handcrank to turn knob CW to increase seat firmness; use handcrank to turn knob CCW to decrease seat firmness.
6	Armrest adjustment control knob	Turn knob (on each side of seat) CW to raise armrest; turn knob CCW to lower armrest. Armrests may be folded up completely to give operator more arm room.

SEAT BELT

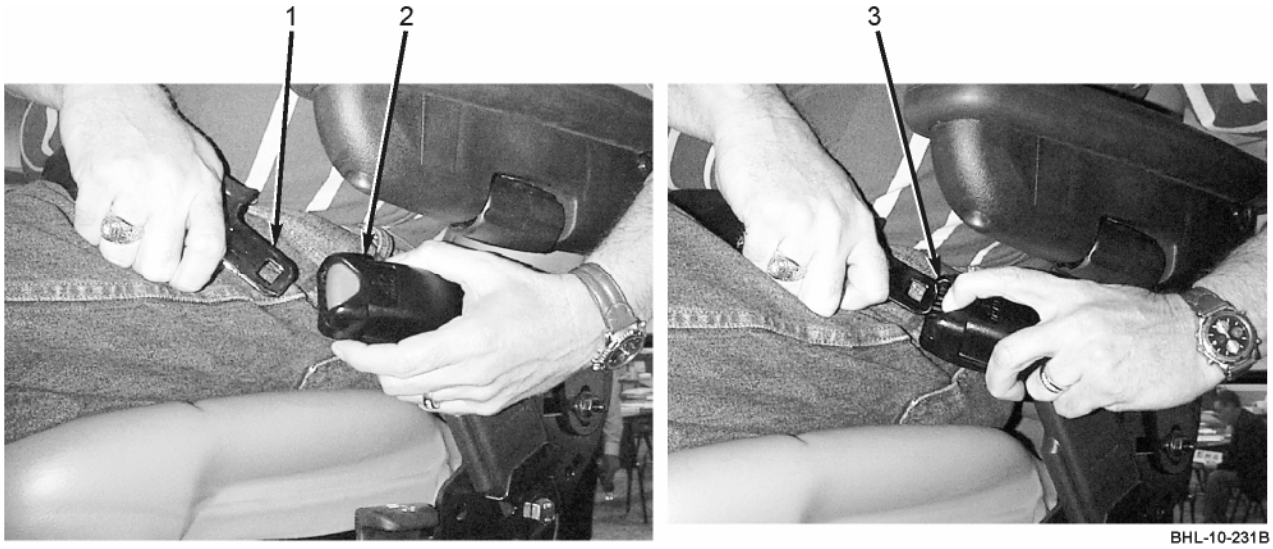


Figure 4. Seat Belt Controls/Indicators.

Table 4. Seat Belt Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		WARNING Always fasten seat belt before operating the BHL. Failure to comply may result in serious injury or death to personnel.
1	Seat belt end	Connects to buckle.
2	Left-hand buckle	Stationary connector.
3	Button	Release end from buckle. Push seat belt end into left-hand buckle to fasten seat belt; push button on left-hand buckle to release seat belt.

CAB AIR LOUVERS

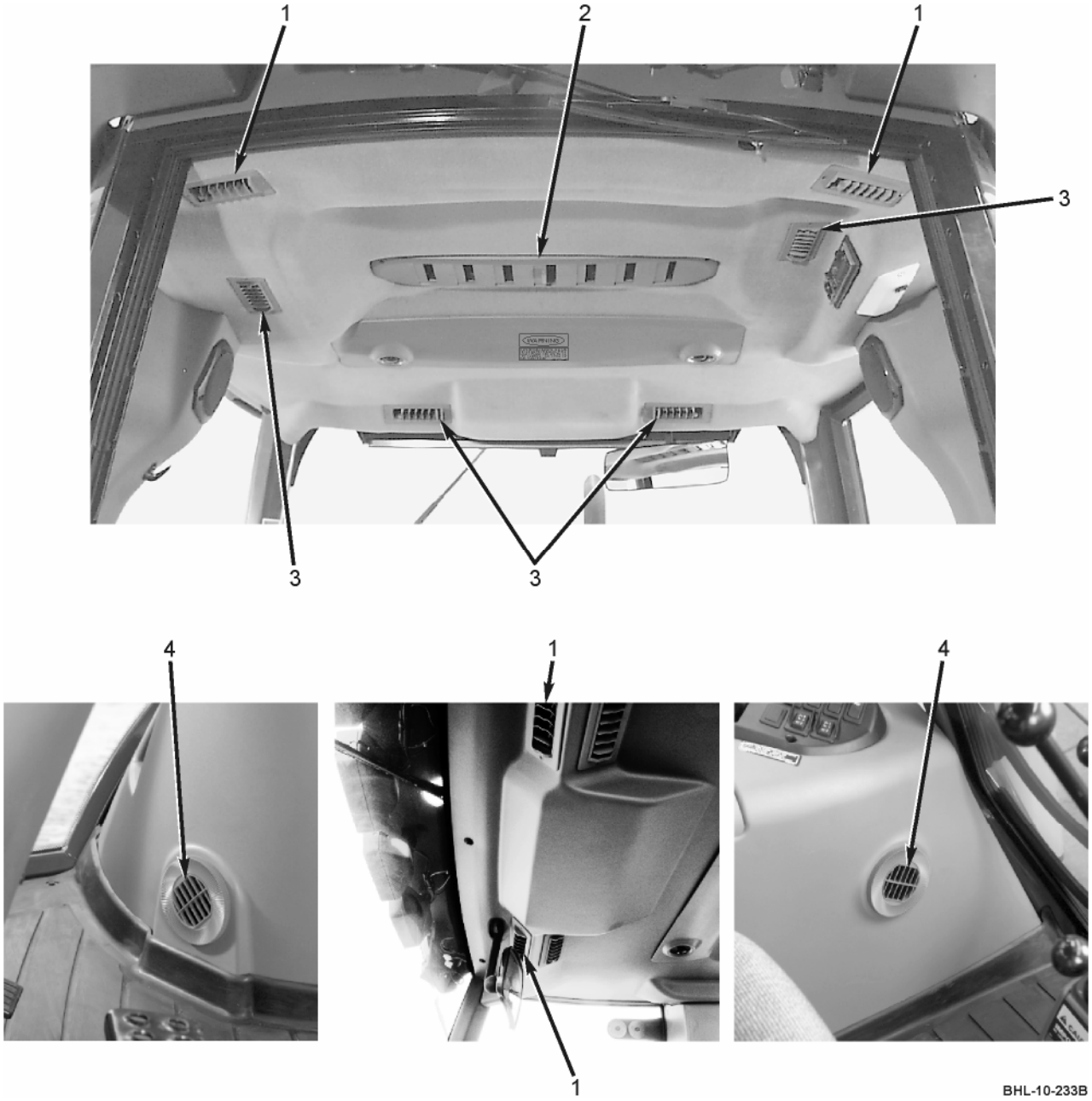


Figure 5. Cab Air Louvers Controls/Indicators.

CAB AIR LOUVERS - Continued

Table 5. Cab Air Louvers Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE During some conditions, ice may form on air-conditioning core. Ice can be caused by operating at low blower speed and maximum cold setting of temperature switch. It is best to operate at medium or high blower speed and center range of temperature switch. If ice blocks core, turn temperature switch to off position and run blower at high speed. Ice can also form as a result of a restricted air filter in cab.
1	Defrost louvers	Two louvers are located in front of cab and two are located in rear of cab. Move two bars in each defrost louver to center position to stop airflow; move two bars to outward position to start airflow.
2	Recirculation grill	Used for recirculation of cab air. Close grill for overpressure of cab; open grill for maximum heat or maximum cooling.
3	Main louvers	Used to direct airflow.
4	Cab lower vents	Used to direct airflow. Located in lower right front and lower right rear area of cab. For maximum airflow, close defrost, recirculation, and main louvers.

DOME LAMP

Figure 6. Dome Lamp Controls/Indicators.

Table 6. Dome Lamp Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Dome lamp switch (3 position)	Controls dome lamp.
	Auto on (forward position)	Lamp illuminates when door is opened; lamp extinguishes when door is closed.
	Off (center position)	Lamp remains off.
	On (rear position)	Lamp remains on.

CAB LATCHES

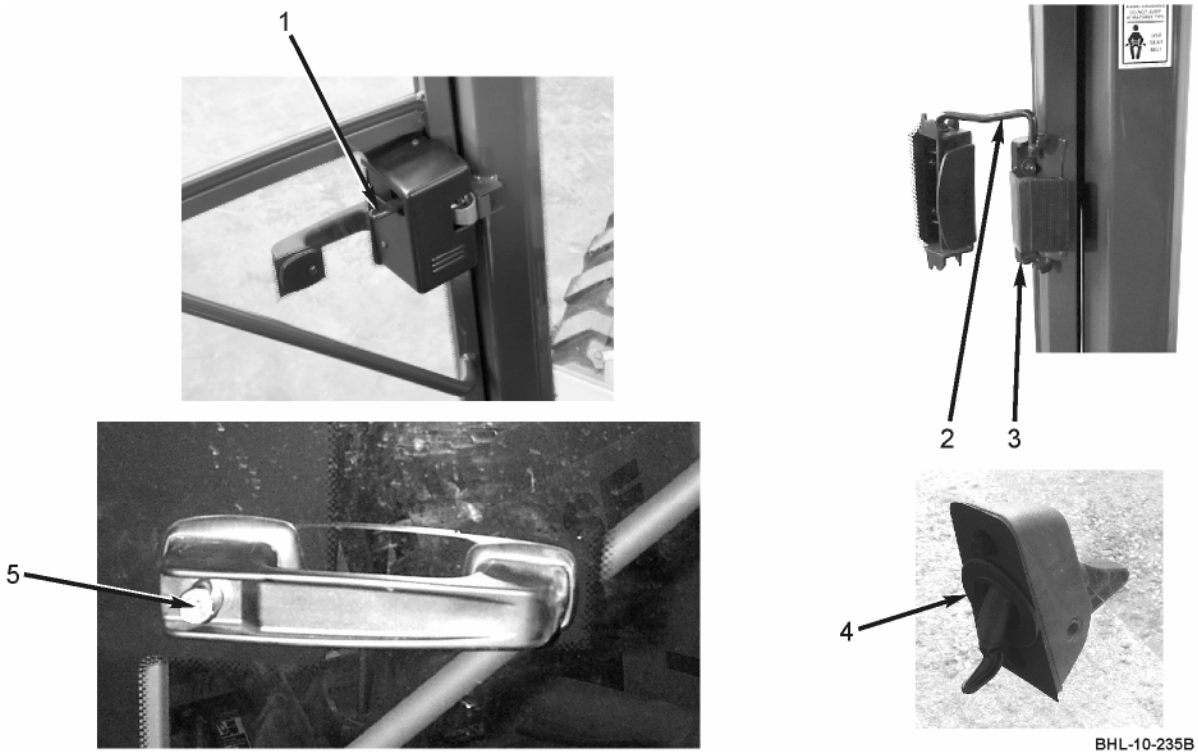


Figure 7. Cab Latches Controls/Indicators.

Table 7. Cab Latches Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Door latch (interior)	Pull up to open door. **CAUTION** Do not transport the BHL at highway speeds with side windows in partially open position. Do not attempt to open or close side windows while BHL is in motion. BHL must be stopped, direction control lever in neutral, and parking brake engaged. Failure to comply may result in damage to side windows.
2	Window vent position latch	Holds side windows in partially opened position. Return windows to stowed position when not in use.
3	Window latch and handle	Push in tabs to release and open side windows.
4	Window retainer/release	Secures side windows in full open position. Push side window into retainer to secure open. Lift handle (inside cab) to release window to return to closed position.
5	Door latch (exterior)	Push button to open door.

REAR WINDOWS

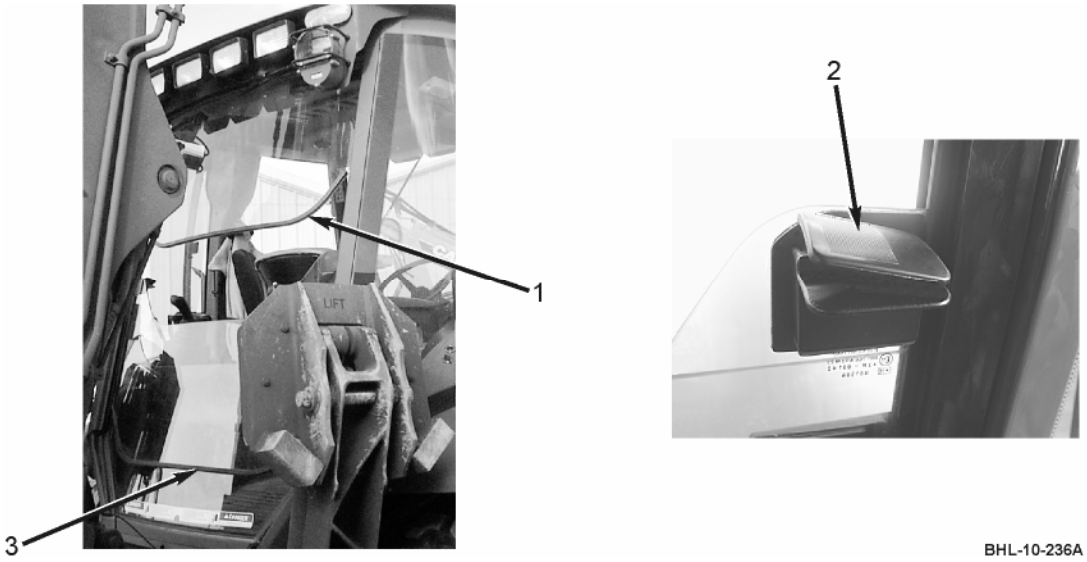


Figure 8. Rear Windows Controls/Indicators.

Table 8. Rear Windows Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		WARNING De-activate backhoe control system before adjusting rear windows. Accidental actuation of controls could cause unexpected movement of backhoe. Failure to comply may result in serious injury or death to personnel.
1	Top rear window	Can be positioned in multiple positions, up or down.
2	Rear window handles and latches (2 on each top and middle rear window)	Press the two handles to raise rear windows and latch in place. Release handles when windows are in desired position.
3	Middle rear window	Can be positioned in multiple positions, up or down.

MISCELLANEOUS CAB ITEMS

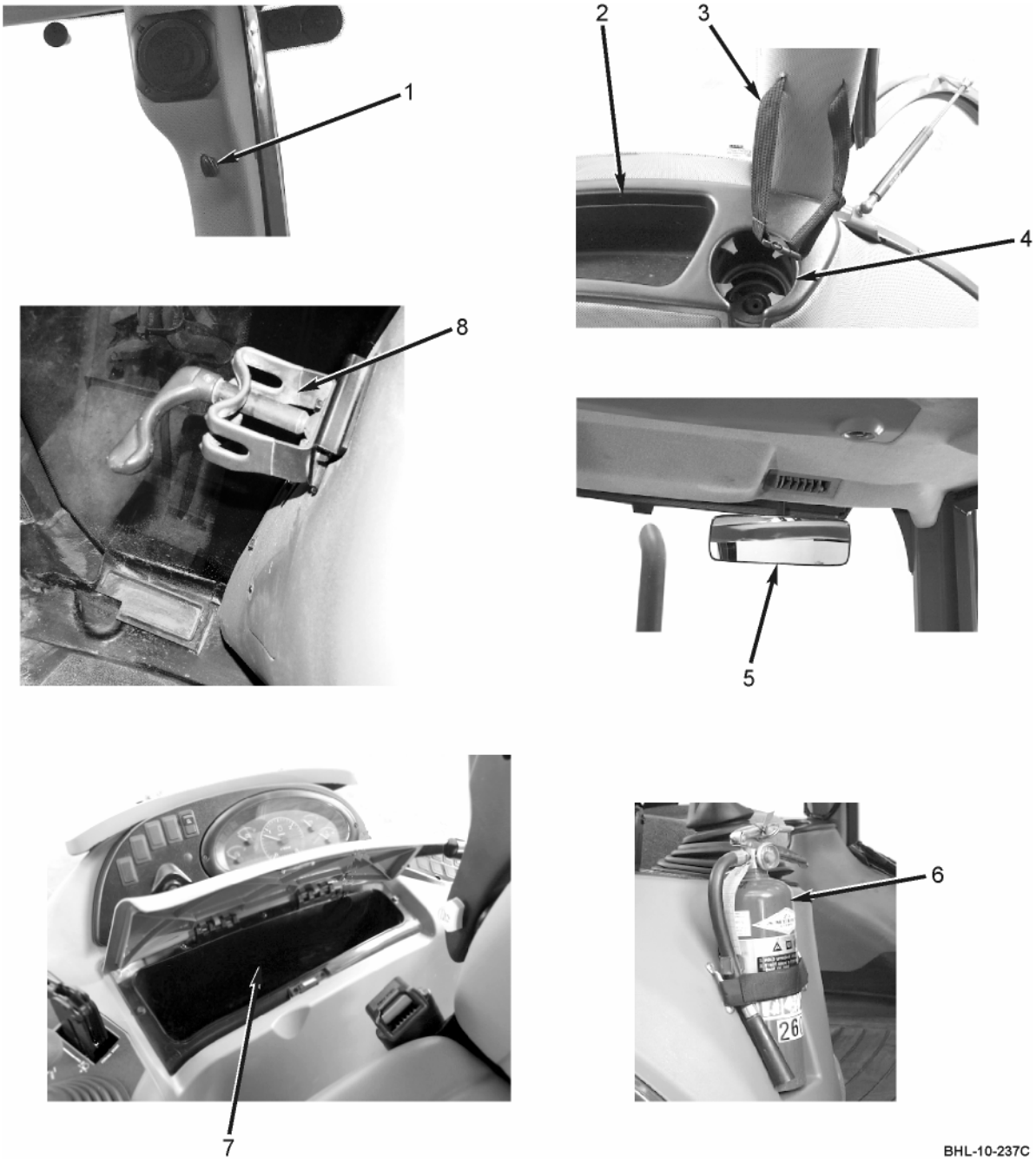


Figure 9. Miscellaneous Cab Items Controls/Indicators.

MISCELLANEOUS CAB ITEMS - Continued

Table 9. Miscellaneous Cab Items Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		CAUTION Do not hang items heavier than 20 pounds (9 kg) on coat hook. Failure to comply may result in damage to equipment.
1	Coat hook	Used to hang clothing out of the way.
2	Miscellaneous compartment	Used for small miscellaneous items.
3	Tether strap	Secures bottom of clothing hung on coat hook.
4	Cup holder	Used to hold drinking cup.
5	Rear view mirror	When operator is facing forward, rear view mirror is used to view objects behind the BHL.
6	Fire extinguisher	Used to control small fire.
7	Technical Manual (TM) storage box	Used to store operator TM, 10 mm wrench, and tire pressure gage.
8	Rifle rack	Used to secure M16A2 rifle or M4 carbine.

LIGHT CONTROL SWITCH

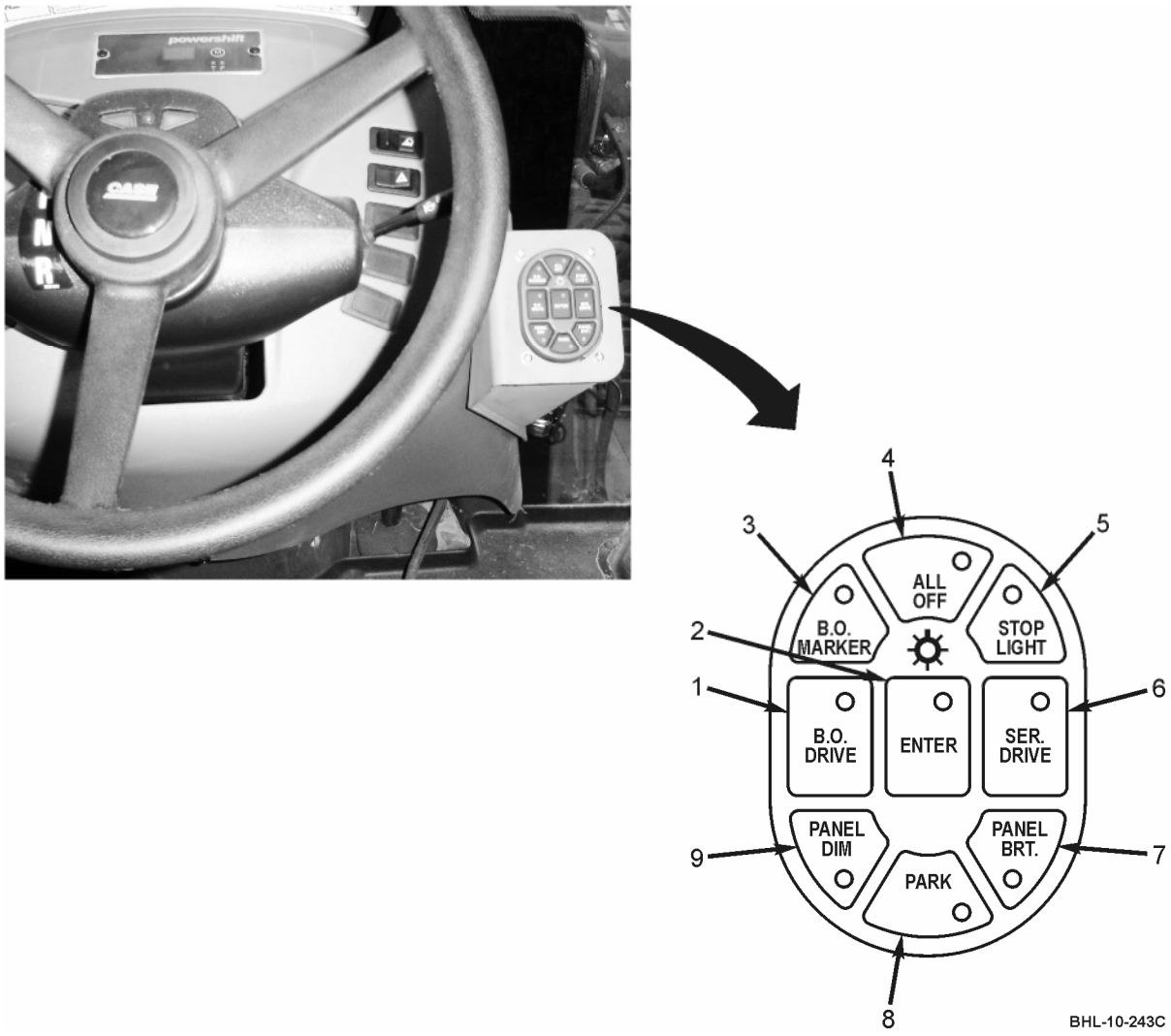


Figure 10. Light Control Switch Controls/Indicators.

LIGHT CONTROL SWITCH - Continued

Table 10. Light Control Switch Controls/Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
		NOTE All light control switch keys are push-on momentary keys. When key is pushed, key will flash blue once. ENTER key must then be pushed within 5 seconds, or switch will revert to previous setting. Active key is illuminated in blue. Amber backlight is for keypad illumination only.
1	B.O. DRIVE key	Allows blackout drive light, blackout taillights, and blackout stop lights to operate. All other lights, horn, and audible alarms are disabled.
2	ENTER key	Must be pressed within 5 seconds after selecting a function key to allow function to operate.
3	B.O. MARKER	Allows blackout taillights and blackout stop lights to operate. All other lights, horn, and audible alarms are disabled.
4	ALL OFF key	Turns all lights off. Switch will turn off after 20 seconds. Only instrument panel warning lights operate. Horn and audible alarms do not operate.
5	STOP LIGHT key	With driving light switch on, allow service driving lights, turn signals, service stop lights, front and rear work lights, service taillights, hazard flasher, horn, dome light, and audible alarms to operate.
6	SER. DRIVE key	With driving light switch on, allow service driving lights, turn signals, service stop lights, front and rear work lights, service taillights, hazard flasher, horn, dome light, and audible alarms to operate.
7	PANEL BRT. key	Sets all panel lights to full intensity.
8	PARK key	With driving light switch on, allow service driving lights, turn signals, service stop lights, front and rear work lights, service taillights, hazard flasher, horn, dome light, and audible alarms to operate.
9	PANEL DIM key	Sets all panel lights to half intensity.

AUDIBLE ALARMS

Table 11. Audible Alarms.

KEY	CONTROL/INDICATOR	FUNCTION
Not shown	Audible alarms	**NOTE** Audible alarms are disabled when light control switch is set to B.O. DRIVE, B.O. MARKER, ALL OFF. Alarms will sound for following conditions: a. Engine oil pressure is low. b. Engine coolant temperature is high. c. Parking brake is engaged and direction control lever is in forward position or reverse position. d. Seat is turned away from driving position and direction control lever is in forward position or reverse position. e. Direction control lever is in reverse position.

END OF WORK PACKAGE

OPERATOR LEVEL

OPERATION OF BACKHOE LOADER (BHL) UNDER USUAL CONDITIONS

INITIAL SETUP:

Tools and Special Tools
None

Materials/Parts
Duct tape (WP 0028, Item 18)

Personnel Required
Two

References
WP 0004 thru WP 0009
WP 0012 and WP 0013
WP 0022 and WP 0023

Equipment Condition
None

BHL OPERATING PROCEDURES

Breaking In The BHL

NOTE

Before operating the BHL, perform all “Before” Preventive Maintenance Checks and Services (PMCS) (WP 0022).

Upon receipt of the BHL or after engine rebuild/replacement, observe following break-in precautions during first 20 hours of operation.

a. Operate the BHL under Usual Conditions for first 8 hours.

b. Do not operate engine hard at stall speeds (wheels slowly turning or stopped and engine operating at full throttle).

c. Keep engine at normal operating temperature (engine coolant temperature gage in green area).

d. Do not operate engine at idle speeds for more than 10 minutes.

BHL OPERATING PROCEDURES - Continued

Starting Engine

WARNING

Do not jump on or off the BHL. Always face the BHL, use handrails and steps, and use three points of contact to get onto or off the BHL. Failure to comply may result in serious injury or death to personnel.

CAUTION

If the BHL has not been operated for several weeks or engine oil filter has been replaced, prime turbocharger with oil per Priming Turbocharger procedure below. Failure to comply may result in damage to turbocharger.

NOTE

If engine fails to start after two attempts, allow battery to recover for 4 to 5 minutes before repeating starting procedure (steps 6 thru 10 below).

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Make sure seat is in normal driving position.
2. Adjust seat and fasten seat belt.
3. Engage parking brake.
4. Shift direction control lever to neutral position.
5. Make sure engine hand throttle is in idle position.
6. Turn starter key switch to ON position.

NOTE

If operating in blackout conditions, do not set light control switch to SER. DRIVE position. Start engine, then set switch to appropriate setting.

7. Set light control switch to SER. DRIVE position. Audible alarm will sound.

NOTE

If engine grid heater indicator lamp illuminates, wait until lamp extinguishes before engaging starter motor.

8. Make sure low engine oil pressure warning lamp and alternator warning lamp illuminate.
9. Make sure air filter restriction warning lamp and hydraulic oil filter warning lamp momentarily illuminate.

BHL OPERATING PROCEDURES - Continued

CAUTION

If engine starts and stops, do not actuate starter motor again until starter motor stops turning. Failure to comply may result in damage to starter motor.

Do not actuate starter motor more than 30 seconds at one time. Let starter motor cool for 2 minutes before actuating again. While starter motor is actuated, white or black smoke must be seen at exhaust pipe. If no smoke is seen, check fuel supply. Failure to comply may result in damage to starter motor.

If audible alarm continues after several seconds, shut down engine and notify maintenance. Failure to comply may result in damage to engine.

10. Push foot throttle 1/4 down and turn starter key switch to START position.

11. After engine starts, low engine oil pressure audible alarm should cease. Alternator and oil pressure warning lamps should extinguish. Check instrument panel to make sure instrument readings are normal.

12. Operate engine at 1,000 rpm until coolant temperature is warm (engine coolant temperature gage in green range) before moving the BHL.

Priming Turbocharger

CAUTION

If the BHL has not been operated for several weeks or engine oil filter has been replaced, prime turbocharger with oil per Priming Turbocharger procedure below. Failure to comply may result in damage to turbocharger.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Engage parking brake.

2. Shift direction control lever to neutral position.

3. Push and hold right side of fuel pump solenoid switch (Figure 1, Item 1) to disengage fuel pump and prevent engine from starting.

4. From operator seat, turn starter key switch to START position and actuate starter motor for 10 seconds; then turn starter key switch to OFF position.

5. Release fuel pump solenoid switch (Figure 1, Item 1) to engage injection pump solenoid.

6. Follow Starting Engine procedures to start engine.

BHL OPERATING PROCEDURES - Continued

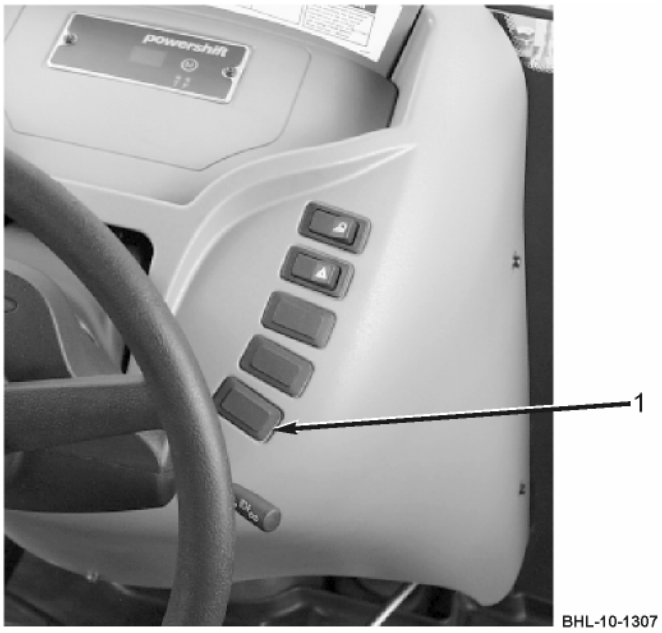


Figure 1. Fuel Pump Solenoid Switch.

Parking The BHL And Shutting Engine Off

WARNING

Park the BHL on level ground whenever possible and engage parking brake. If the BHL must be parked temporarily on hill, put front of the BHL toward bottom of hill. Make sure the BHL is behind object that will not move. Failure to comply may result in serious injury or death to personnel.

Do not jump on or off the BHL. Always face the BHL, use handrails and steps, and use three points of contact to get onto or off the BHL. Failure to comply may result in serious injury or death to personnel.

BHL OPERATING PROCEDURES - Continued

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Park the BHL on level ground.
2. Lower Front End Loader (FEL) bucket to ground.
3. Engage parking brake and shift direction control lever to neutral position.

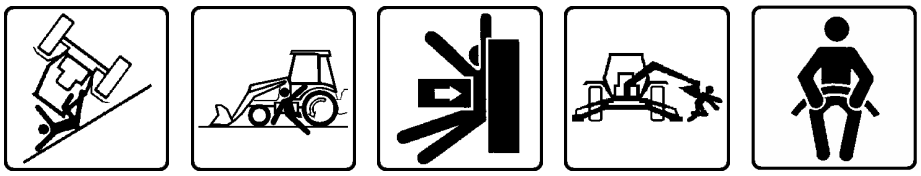
CAUTION

Do not shut engine off at rpm higher than idle. Failure to comply may result in damage to turbocharger.

4. Operate engine at idle speed for 2 minutes or more if engine has been operating at full load so engine parts cool evenly.
5. Move backhoe into transport position or lower backhoe bucket to ground (WP 00012).
6. Turn starter key switch to OFF position to shut engine off.
7. Remove starter key.
8. Perform “After” PMCS (WP 0022).

Preparing The BHL For Operation

WARNING



Do not start engine until all other personnel are completely out of area. Failure to comply may result in serious injury or death to personnel.

Before operating the BHL, make sure service and parking brakes are operable. Failure to comply may result in serious injury or death to personnel.

Lock service brake pedals together when operating on road or with the gear selection control lever in 3rd or 4th gear to provide equalized brake action. Failure to comply may result in serious injury or death to personnel.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Adjust seat for most comfort; then fasten seat belt.

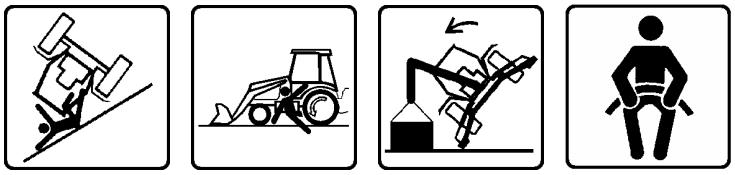
BHL OPERATING PROCEDURES - Continued

2. Make sure service brakes can be fully operated while sitting with seat belt fastened.
3. Start engine.
4. Decrease engine speed to idle when engine is warm and perform the following:
    a. Check instrument panel to make sure instrument readings are normal.
    b. Make sure backhoe is in transport position and stabilizers are raised.
    c. Raise FEL about 2 feet (0.6m) above ground and roll bucket back against stops.
    d. Test parking brake in open area on hard level surface as follows:
        (1) Shift gear selection control lever to 3rd gear.
        (2) Engage parking brake and shift direction control lever to forward position.
        (3) Increase engine speed to 1,500 rpm. The BHL must not move.
        (4) Adjust parking brake if the BHL moves (WP 0023).
5. Disengage parking brake and test service brakes in open area on hard level surface as follows:
    a. Make sure service brake pedals are locked together.
    b. Shift gear selection control lever to forward 2nd gear and disengage parking brake.
    c. Shift direction control lever to forward position and increase engine speed to full throttle.
    d. When the BHL is moving at full speed in 2nd gear, push service brakes and stop the BHL. The BHL must stop smoothly and brake pedal effort must feel firm.
    e. Notify field level maintenance for repair if required.
6. The BHL is now ready for operation.
7. Monitor “During” PMCS procedures.

BHL OPERATING PROCEDURES - Continued

Operating The BHL On Hill

WARNING



Hillside operations can be dangerous. Rain, mud, snow, ice, loose gravel, soft ground, etc., change ground conditions. Exercise care and use good judgment when operating the BHL on hill or ramp. Failure to comply may result in serious injury or death to personnel.

Do not exceed front, aft, or side slopes in excess of 15% on hard firm ground. On ground which is not solid, maximum slopes are less than 15%. Failure to comply may result in serious injury or death to personnel.

Excessive speed may result in loss of control. Do not coast. Failure to comply may result in serious injury or death to personnel.

Do not move the BHL downhill with direction control lever in neutral position or engine speeds greater than 2,500 rpm. Loss of control may result. Failure to comply may result in serious injury or death to personnel.

Always check service and parking brakes before working on hill. Failure to comply may result in serious injury or death to personnel.

Before operating the BHL on hill, always shift gear selection control lever to lower gear and test brakes. Do not let the BHL move downhill with direction control lever in neutral position. Do not let engine speed increase greater than 2,500 rpm. Exercise care when using clutch cutout switch when digging with the BHL on hill. Failure to comply may result in serious injury or death to personnel.

Be careful when moving the BHL forward on hill. The BHL can go out of control and turn over. Always position seat in loader position with seat belt fastened when driving the BHL forward. Always engage parking brake and shift direction control lever to neutral position before operating backhoe. Failure to comply may result in serious injury or death to personnel.

Exercise care when using clutch cutout switch while operating the BHL on hill. When clutch cutout switch is pushed, transmission is disengaged from drive wheels. Loss of control may result. Use service brakes to stop the BHL. Failure to comply may result in serious injury or death to personnel.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Make sure transmission is in manual mode.
2. Operate the BHL in lower gears.

BHL OPERATING PROCEDURES - Continued

3. Keep engine speed below 2,500 rpm.

4. Avoid operating on front, aft, or side slopes in excess of 15% on hard firm ground (Figure 2). On ground which is not solid, maximum slopes are less than 15%.

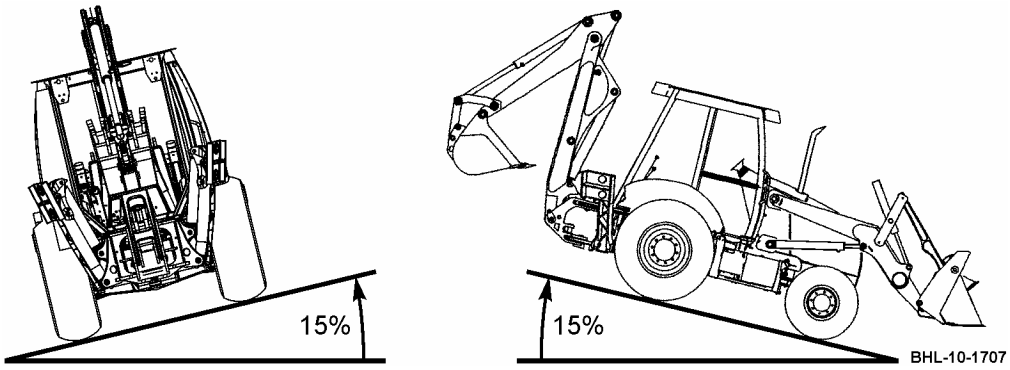
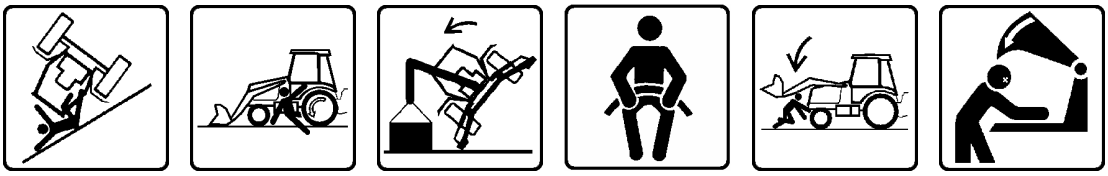


Figure 2. Operating on a Hill.

Loading The BHL Onto Trailer

WARNING



The BHL can slip and fall from trailer or ramp. Make sure trailer and ramp are not slippery. Remove all oil, grease, ice, etc. Carefully move the BHL onto trailer with the BHL centered on trailer and ramp. Make sure the BHL is properly secured. Failure to comply may result in serious injury or death to personnel.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

Refer to unit standing operating procedures (SOP) for detailed guidance.

1. Fasten seat belt.

2. Start engine.

3. Make sure backhoe is in transport position and that swing lock pin is installed (WP 0012).

BHL OPERATING PROCEDURES - Continued

4. Raise FEL as required to clear obstacles.
5. Shift gear selection control lever to 1st gear and slowly drive the BHL onto trailer. Stop BHL.
6. Lower FEL bucket.
7. Engage parking brake and shift direction control lever to neutral position.
8. Take backhoe out of transport position (WP 0012).
9. Lower backhoe bucket.
10. Shut engine off and remove starter key.
11. When exhaust pipe is cool, tape exhaust opening with duct tape.

CAUTION

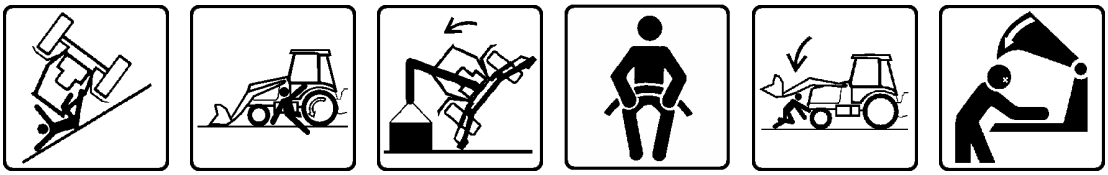
Make sure all cab windows are closed and latched. Failure to comply may result in wind pressure damage to window glass or latches.

12. Close and latch all cab windows.

BHL OPERATING PROCEDURES - Continued

Unloading The BHL Off Trailer

WARNING



The BHL can slip and fall from trailer or ramp. Make sure trailer and ramp are not slippery. Remove all oil, grease, ice, etc. Carefully move the BHL off trailer with the BHL centered on trailer and ramp. Failure to comply may result in serious injury or death to personnel.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

Refer to unit SOP for detailed procedure.

1. Make sure chains and load binders securing the BHL to trailer are removed.
2. Make sure chocks are removed from the BHL front and rear wheels.
3. Remove tape from exhaust pipe.
4. Fasten seat belt and start engine.
5. Make sure backhoe is in transport position and that swing lock pin is installed (WP 0012).
6. Raise FEL bucket to clear obstacles.
7. Shift direction control lever to appropriate position.
8. Shift gear selection control lever to 1st gear.
9. Disengage parking brake and slowly drive the BHL off trailer.

END OF WORK PACKAGE

OPERATOR LEVEL

OPERATION OF FRONT END LOADER (FEL) UNDER USUAL CONDITIONS

INITIAL SETUP:

Tools and Special Tools
None

References
WP 0004 thru WP 0009

Materials/Parts
Wiping rag (WP 0028, Item 16)

Equipment Condition
None

Personnel Required
Two

FEL OPERATING PROCEDURES

Operating FEL Bucket

WARNING

Manually roll back FEL bucket before lowering. Material can spill out onto personnel. Failure to comply may result in serious injury or death to personnel.

Do not exceed front, aft, or side slopes in excess of 15% on hard firm ground. On ground which is not solid, maximum slopes are less than 15%. Failure to comply may result in serious injury or death to personnel.

Operating the Backhoe Loader (BHL) with full FEL bucket on hill can cause the BHL to roll over. If possible, avoid turning the BHL on hill. Always move forward up hill and always backward down hill. Always keep load low for better balance and view of work area. Failure to comply may result in serious injury or death to personnel.

Avoid contact with high voltage overhead power lines, buried power lines, or buried cables. Keep all parts of the BHL at least 15 feet (4.6m) away from power sources. Failure to comply may result in serious injury or death to personnel.

Exercise care when using clutch cutout switch while operating the BHL on hill. When clutch cutout switch is pushed, transmission is disengaged from drive wheels. Loss of control may result. Use service brakes to stop the BHL. Failure to comply may result in serious injury or death to personnel.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. On level ground with the BHL not moving, push and hold clutch cutout switch (Figure 1, Item 1) to allow engine speed to increase and to supply more hydraulic fluid for FEL power and faster control reaction time.

FEL OPERATING PROCEDURES - Continued

Figure 1. Clutch Cutout Switch.

NOTE

4-in-1 FEL bucket indicators are located on right side of FEL bucket. Bucket position indicator (Figure 2, Item 1) shows correct bucket angle when bucket is used as dozer, scraper, loader (standard bucket), or clamshell. Clamshell depth indicator (Figure 2, Item 2) is used when bucket is in scraper position. Bucket opening or depth of cut is shown as 0 to 4 inches (0 to 102 mm).

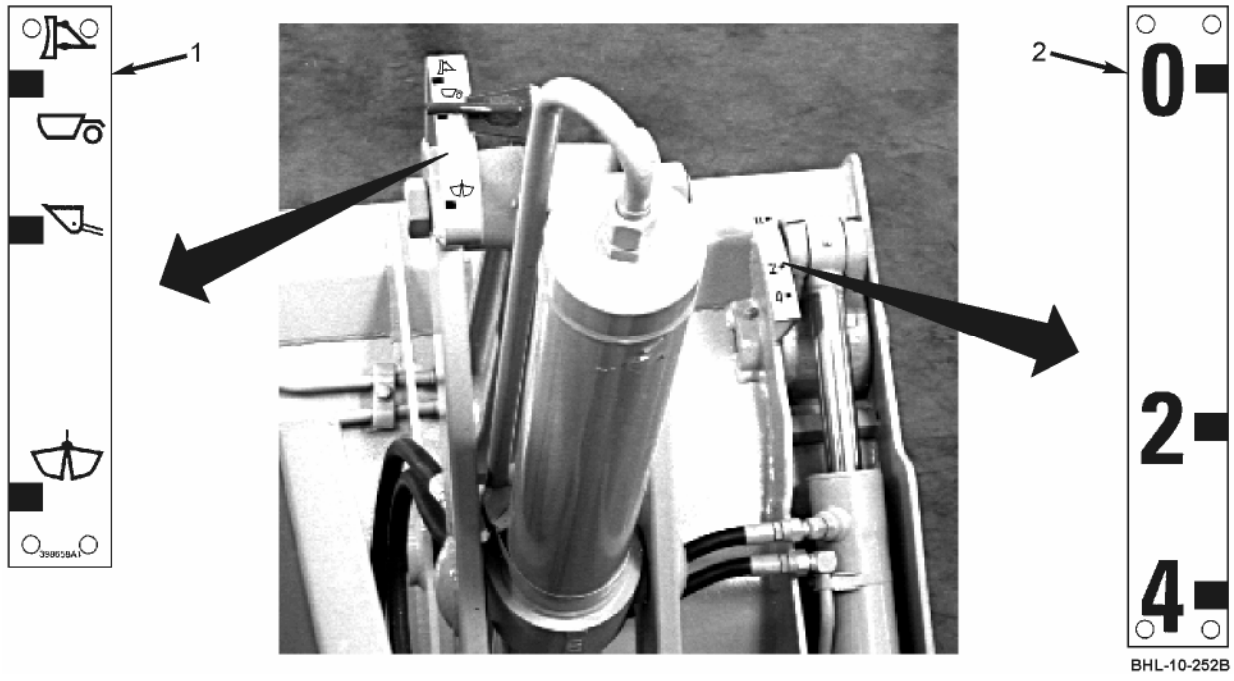


Figure 2. 4-in-1 FEL Bucket Indicators.

FEL OPERATING PROCEDURES - Continued

2. Push down on clamshell lockout thumb control (Figure 1, Item 2) to unlock clamshell lockout control.
3. Position FEL bucket 1 foot (0.3 m) above ground and tilt bucket to desired position (dozer, scraper, loader (standard bucket), or clamshell) (Figure 3).
4. Place FEL bucket in dozer position (Figure 3) so clamshell is wide open.
5. Tilt FEL bucket to scraper position (Figure 3) and open clamshell to desired depth of cut.
6. Close clamshell to loader position (standard bucket) (Figure 3) and lift up on clamshell lockout thumb control to lock clamshell lockout control.
7. Push down on clamshell lockout thumb control to unlock clamshell lockout control and place FEL bucket in clamshell position (Figure 3), position bucket over material, and open clamshell completely.

NOTE

FEL lift arms will continue to lower until bucket reaches ground or until lift arms and bucket control lever is manually pivoted to NEUTRAL (HOLD).

8. Use RETURN-TO-DIG position on FEL control lever to position bucket for another dig cycle.

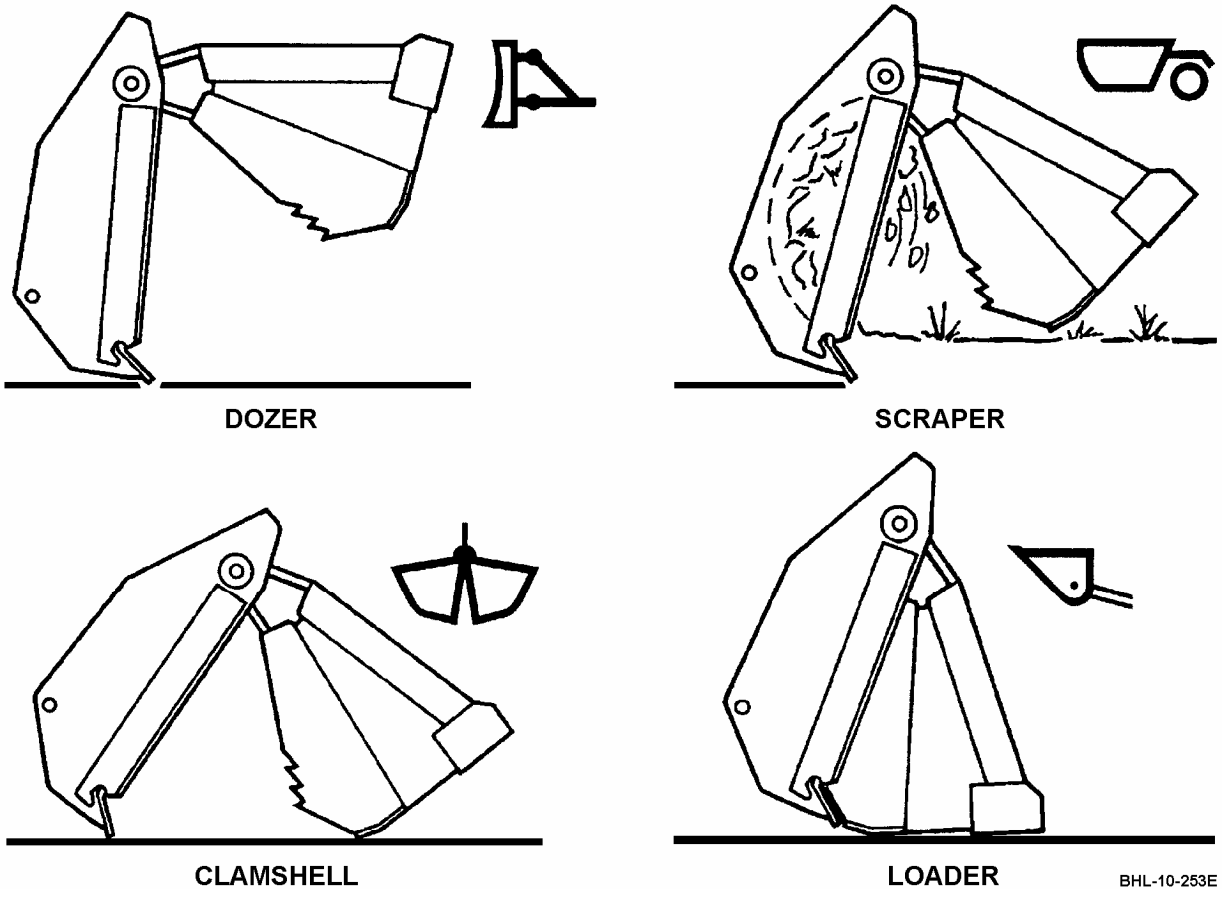


Figure 3. 4-in-1 FEL Bucket Operation.

FEL OPERATING PROCEDURES - Continued

Lifting With FEL

WARNING

Exercise care when lifting load using the BHL as crane. Do not exceed 7,800 lb (3538 kg) load. Make sure rigging equipment has capacity to lift load and that no personnel are under load. Failure to comply may result in serious injury or death to personnel.

1. Rotate FEL bucket forward.
2. Attach load to FEL lifting points (Figure 4, Item 1).
3. Slowly and carefully lift and move load.

Figure 4. FEL Lifting Points.

FEL OPERATING PROCEDURES - Continued

Removing FEL Bucket

WARNING

Exercise care when removing FEL bucket. Be sure FEL bucket is flat on ground and hydraulic pressure is released. Failure to comply may result in serious injury or death to personnel.

NOTE

FEL tool carrier allows operator to change bucket without using special tools or additional personnel.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Dump material from FEL bucket.
2. Park the BHL on level ground. Lower FEL bucket flat on ground, and move backhoe into transport position.
3. Engage parking brake.
4. Shift direction control lever to neutral position.
5. Shut engine off.
6. Toggle clamshell control pistol grip handle to release hydraulic pressure.
7. Disconnect removable quick-disconnect hydraulic connector (Figure 5, Item 1) by rotating knurled barrel either direction 90° until notch (Figure 5, Item 3) in knurled barrel is alined with pin (Figure 5, Item 4) on installed connector (Figure 5, Item 3). Slide knurled barrel and pull off removable quick-disconnect hydraulic connector (Figure 5, Item 1). Repeat for second removable quick-disconnect hydraulic connector.
8. Connect both removable quick-disconnect hydraulic connectors (Figure 5, Item 1) together.
9. Place both removable quick-disconnect hydraulic connectors (Figure 5, Item 1) on top and forward of FEL bucket.
10. Start engine.
11. Push and hold left side of FEL tool carrier switch (Figure 5, Item 5) to retract both tool carrier lock pins (Figure 5, Item 8).
12. Raise FEL bucket maximum 1 to 2 inches (25.4 to 50.8 mm) off ground and slowly rotate top of bucket outward until both tool carrier lock pins (Figure 5, Item 8) are clear of bucket mounting bores.
13. Carefully lower FEL bucket to ground while rotating top of tool carrier outward.

FEL OPERATING PROCEDURES - Continued

14. Back the BHL away from FEL bucket when both upper mounting pins (Figure 5, Item 7) are free from bucket upper mounting hooks (Figure 5, Item 6).

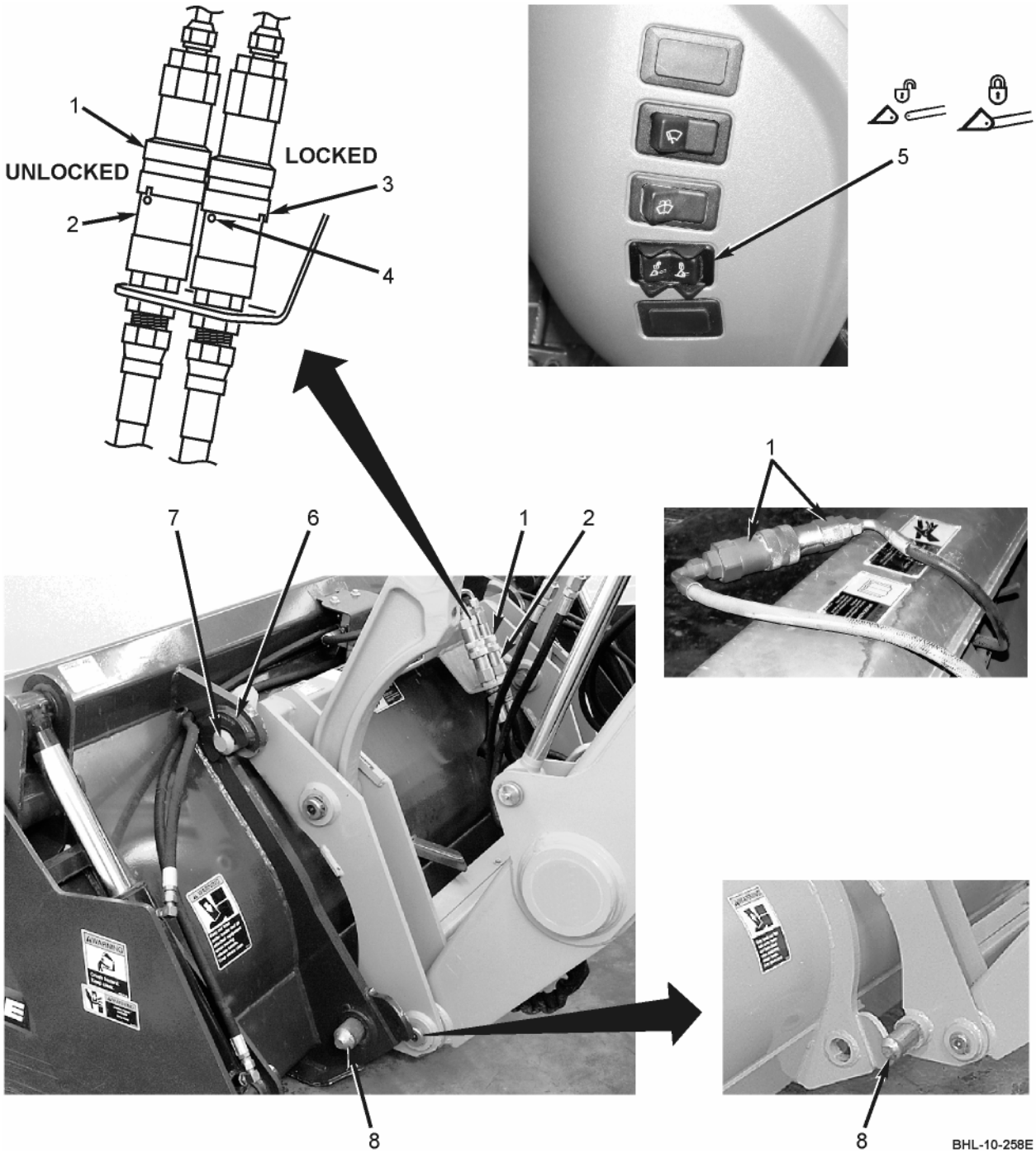


Figure 5. FEL Bucket Removal/Installation.

FEL OPERATING PROCEDURES - Continued

Installing FEL Bucket

WARNING

Exercise care when installing FEL bucket. Always position yourself in front of bucket when connecting clamshell quick-disconnect hydraulic connectors. Failure to comply may result in serious injury or death to personnel.

CAUTION

Both removable clamshell quick-disconnect hydraulic connectors must be placed on top and forward of FEL bucket. Failure to comply may result in damage to connectors.

NOTE

FEL hydraulic quick coupler allows operator to change bucket without using special tools or additional personnel.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Place both removable quick-disconnect hydraulic connectors (Figure 5, Item 1) on top and forward of FEL bucket.
2. From operator seat, start engine.
3. Tilt FEL hydraulic quick coupler forward and engage both upper mounting pins (Figure 5, Item 7) in bucket upper mounting hooks (Figure 5, Item 6).
4. Move the BHL forward several inches to make sure FEL bucket is fully engaged.
5. Push and hold left side of FEL tool carrier switch (Figure 5, Item 5) to retract both tool carrier lock pins (Figure 5, Item 8).
6. Raise FEL lift arms and rotate tool carrier rearward until both tool carrier lock pins (Figure 5, Item 8) are alined with bucket lower mounting bores.
7. Push and hold right side of FEL tool carrier switch (Figure 5, Item 5) to extend both tool carrier lock pins (Figure 5, Item 8) in bucket mounting bores.

FEL OPERATING PROCEDURES - Continued

8. Visually confirm that FEL bucket is secured by both tool carrier pins (Figure 5, Item 8) and both mounting pins (Figure 5, Item 7).

9. Lower FEL to ground.

10. Shut engine off.

11. Toggle clamshell control pistol grip handle to release hydraulic pressure.

12. Remove caps from installed quick-disconnect hydraulic connectors (Figure 5, Items 1 and 2).

13. Separate removable quick-disconnect hydraulic connectors (Figure 5, Items 1 and 2).

NOTE

Clamshell quick-disconnect hydraulic connectors are different sizes; connectors cannot be installed incorrectly.

14. Clean all connectors with clean wiping rag.

15. Aline one pair (removable and installed) quick-disconnect hydraulic connectors (Figure 5, Items 1 and 2) and do the following:

    a. Aline notch (Figure 5, Item 3) in knurled barrel with pin (Figure 5, Item 4) on installed quick-disconnect hydraulic connector (Figure 5, Item 2).

    b. Push removable clamshell quick-disconnect hydraulic connector (Figure 5, Item 1) onto installed quick-disconnect hydraulic connector (Figure 5, Item 2) until it snaps into place.

    c. Rotate knurled barrel clockwise (CW) 90 degrees to lock into place.

16. Repeat step 14 above for other pair (removable and installed) quick-disconnect hydraulic connectors (Figure 5, Items 1 and 2).

END OF WORK PACKAGE

OPERATOR LEVEL

OPERATION OF BACKHOE UNDER USUAL CONDITIONS

INITIAL SETUP:

Tools and Special Tools
None

Materials/Parts
Clevis (WP 0026, Item 4)

Personnel Required
One

References
WP 0004 thru WP 0009
WP 0002, Table 5

Equipment Condition
None

BACKHOE OPERATING PROCEDURES

Preparing Backhoe For Operation

WARNING

Before each period of operation, check that each backhoe control functions correctly. Failure to comply may result in serious injury or death to personnel.

Engage parking brake and shift direction control lever to neutral position before turning operator seat to backhoe position. Failure to comply may result in serious injury or death to personnel.

Do not dig ground under backhoe stabilizers. The Backhoe Loader (BHL) can fall into excavation if bank falls in. Failure to comply may result in serious injury or death to personnel.

When operating backhoe on hill, use stabilizers to level the BHL and put earth from trench on highest side of trench. Failure to comply may result in serious injury or death to personnel.

Avoid contact with high voltage overhead power lines, buried power lines, or buried cables. Keep all parts of the BHL at least 15 feet (4.6m) away from power sources. Failure to comply may result in serious injury or death to personnel.

CAUTION

Exercise care when swinging backhoe completely to the side. In some positions, backhoe can contact stabilizers. Failure to comply may result in damage to stabilizers.

BACKHOE OPERATING PROCEDURES - Continued

NOTE

Backhoe will dig more material in less time when smooth, short dig cycle is used. Keep each dig cycle smooth.

Forcing backhoe bucket to dig a load that is too large will cause hydraulic stall. Main relief valve of hydraulic system will make noise when hydraulic stall occurs. Hydraulic stall will cause cycle times to be longer, hydraulic fluid temperature to increase, and fuel consumption to increase.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Engage parking brake.
2. Shift direction control lever to neutral position.
3. Start engine.

NOTE

If required, position bottom of backhoe bucket flat on ground to avoid digging into surface such as soft blacktop.

4. Dump material from Front End Loader (FEL) bucket and lower bucket to ground.
5. Using FEL loader controls, lower bucket to raise front wheels approximately 2 inches (5 cm) off ground.
6. Push bottom of ride control switch to off position.
7. Rotate seat to backhoe position.
8. Push top of pilot control switch to on position.
9. Lower stabilizers to waist high.
10. Push bottom of pilot control switch to off position.
11. Shut engine off.

BACKHOE OPERATING PROCEDURES - Continued

NOTE

Use flipover stabilizer pad rubber side down for solid surfaces; use metal side down for soft surfaces.

12. If necessary, set flipover stabilizer pads as follows (Figure 1):

    a. Remove retaining pin (Figure 1, Item 1) and pin (Figure 1, Item 2) on each stabilizer pad (Figure 1, Item 3).

    b. Flip stabilizer pads (Figure 1, Item 3) and install pins (Figure 1, Item 2) and retaining pins (Figure 1, Item 1).

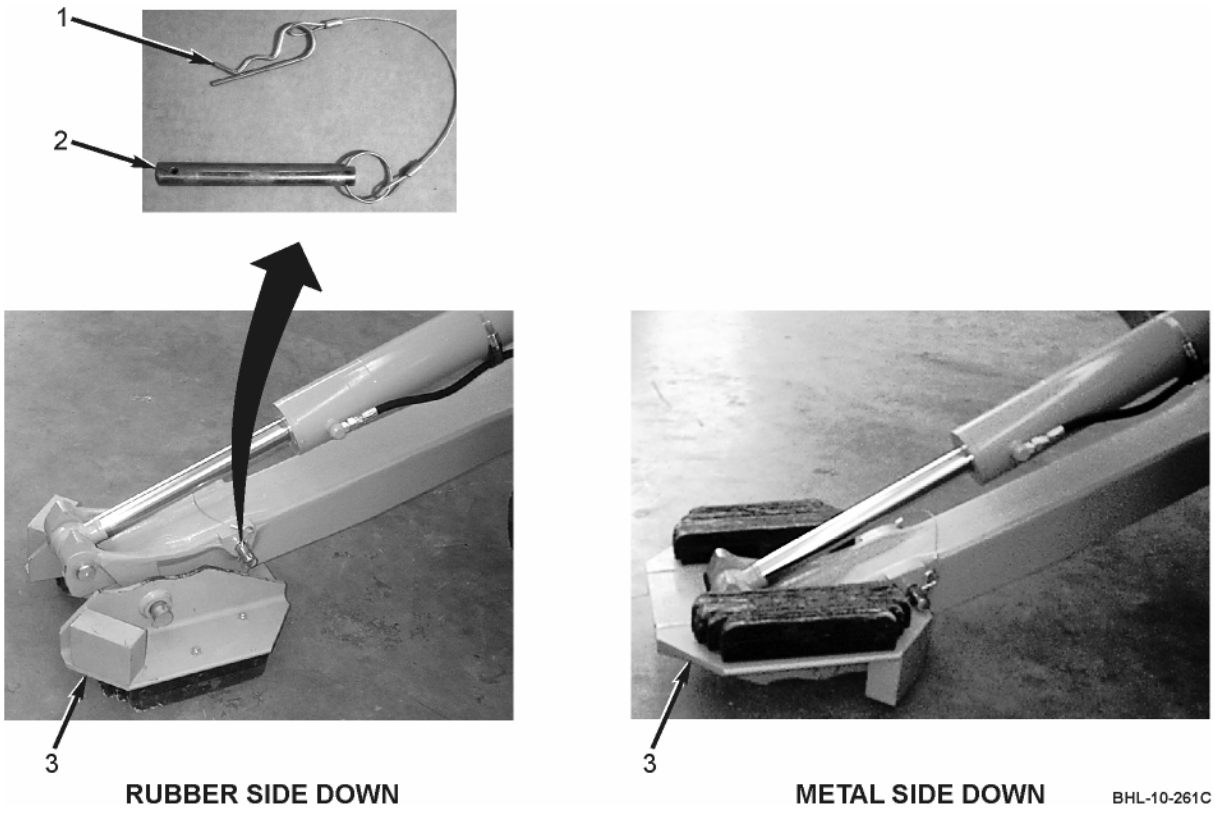
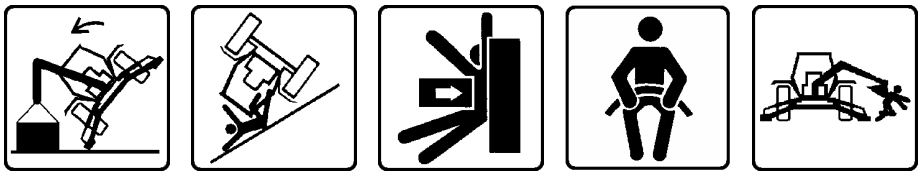


Figure 1. Flipover Stabilizer Pads.

BACKHOE OPERATING PROCEDURES - Continued

WARNING



Rear windows can interfere with left and right backhoe control levers. Make sure window adjustments are locked into position before actuating backhoe hydraulics. Failure to comply may result in serious injury or death to personnel.

13. Lower rear windows.
14. Remove swing lock pin (Figure 2, Item 1) from transport position and place in storage position.
15. Adjust backhoe control towers, adjust seat, and fasten seat belt.
16. Start engine.
17. Push top of pilot control switch to enable position.
18. Adjust engine rpm as required.

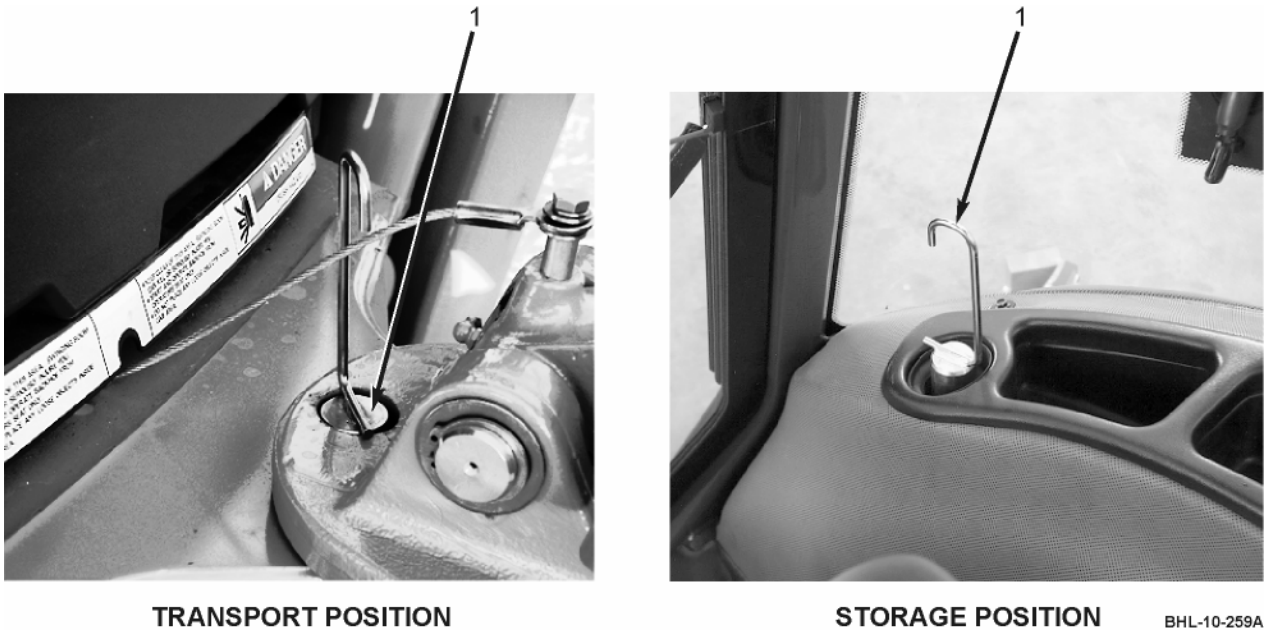


Figure 2. Swing Lock Pin.

BACKHOE OPERATING PROCEDURES - Continued

WARNING

Lower stabilizers to operating position before lowering backhoe boom and extending dipper. Front of the BHL can raise above ground and cause an accident. Failure to comply may result in serious injury or death to personnel.

Position stabilizer pads for maximum stability when not operating backhoe next to a wall, building, etc. Failure to comply may result in serious injury or death to personnel.

The BHL can become unstable and cause an accident if stabilizers are raised and tires and backhoe bucket are not touching ground. Before raising stabilizers from operating position, move backhoe into transport position and completely retract dipper and raise boom or make sure tires are touching ground and put backhoe bucket on ground. Failure to comply may result in serious injury or death to personnel.

19. Lower stabilizers to ground; then, use stabilizers to raise rear wheels several inches off ground.

20. Disengage parking brake.

NOTE

Two backhoe control patterns are available. Pattern 1 allows boom and swing control with left backhoe control lever and dipper and bucket control with right backhoe control lever. Pattern 2 allows dipper and swing control with left backhoe control lever and boom and bucket control with right backhoe control lever.

21. Select desired control pattern (WP 0007).

22. Push down on backhoe boom latch release and at same time push backhoe control lever (pattern 1 or pattern 2) forward to move boom forward to overcenter position.

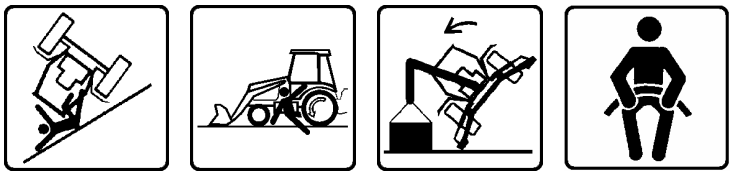
23. When backhoe boom reaches overcenter position, pull backhoe control lever rearward to continue boom movement forward. Return backhoe control to center position.

24. Backhoe is now in operating position.

BACKHOE OPERATING PROCEDURES - Continued

25. If preparing to operate on a slope, observe the following warnings:

WARNING



Hillside operations can be dangerous. Rain, mud, snow, ice, loose gravel, soft ground, etc., change ground conditions. Exercise care and good judgment when operating on a hill or ramp. Failure to comply may result in serious injury or death to personnel.

Do not exceed front, aft, or side slopes in excess of 15% on hard firm ground. On ground which is not solid, maximum slopes are less than 15%. Failure to comply may result in serious injury or death to personnel.

Make sure seat is in normal operating position and seat belt is fastened when moving BHL forward on hill. Loss of control may result. Failure to comply may result in serious injury or death to personnel.

Before operating backhoe, always engage parking brake and shift direction control lever to neutral position. Failure to comply may result in serious injury or death to personnel.

Excessive speed can cause loss of control. Do not coast in neutral. Failure to comply may result in serious injury or death to personnel.

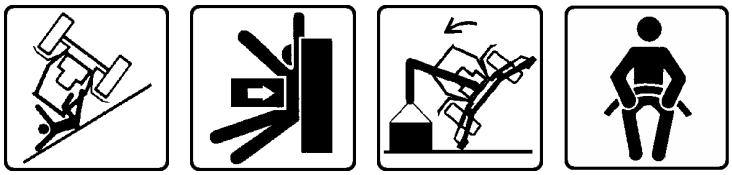
Do not move the BHL downhill when direction control lever is in neutral position. Loss of control may result. Failure to comply may result in serious injury or death to personnel.

Always check service brakes before working on hill. Failure to comply may result in serious injury or death to personnel.

BACKHOE OPERATING PROCEDURES - Continued

Digging With Backhoe

WARNING



Before operating backhoe, make sure all other personnel are away from danger area (Figure 3). Failure to comply may result in serious injury or death to personnel.

Before operating backhoe in area where visibility is reduced, such as next to a building, always install guard rail and warning signs to keep all other personnel away from the BHL. Failure to comply may result in serious injury or death to personnel.

CAUTION

Do not backfill trench with backhoe by swinging bucket against soil. Failure to comply may result in damage to backhoe.

Exercise care when swinging backhoe completely to the side. In some positions, backhoe can contact stabilizers. Failure to comply may result in damage to stabilizers.

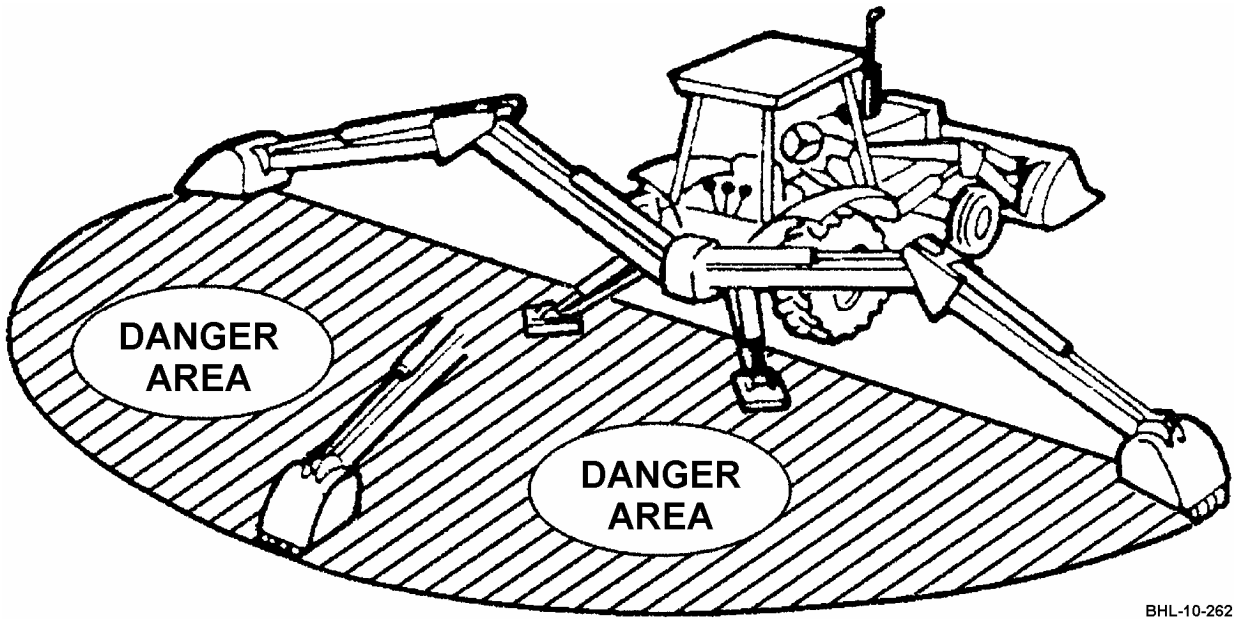


Figure 3. Danger Area.

BACKHOE OPERATING PROCEDURES - Continued

1. Fill backhoe bucket by manipulating dipper and boom.
2. Keep bottom of backhoe bucket parallel with cut (Figure 4).
3. Let backhoe bucket teeth and cutting edge cut through ground like a knife blade. Type of material that is being excavated determines depth of cut.

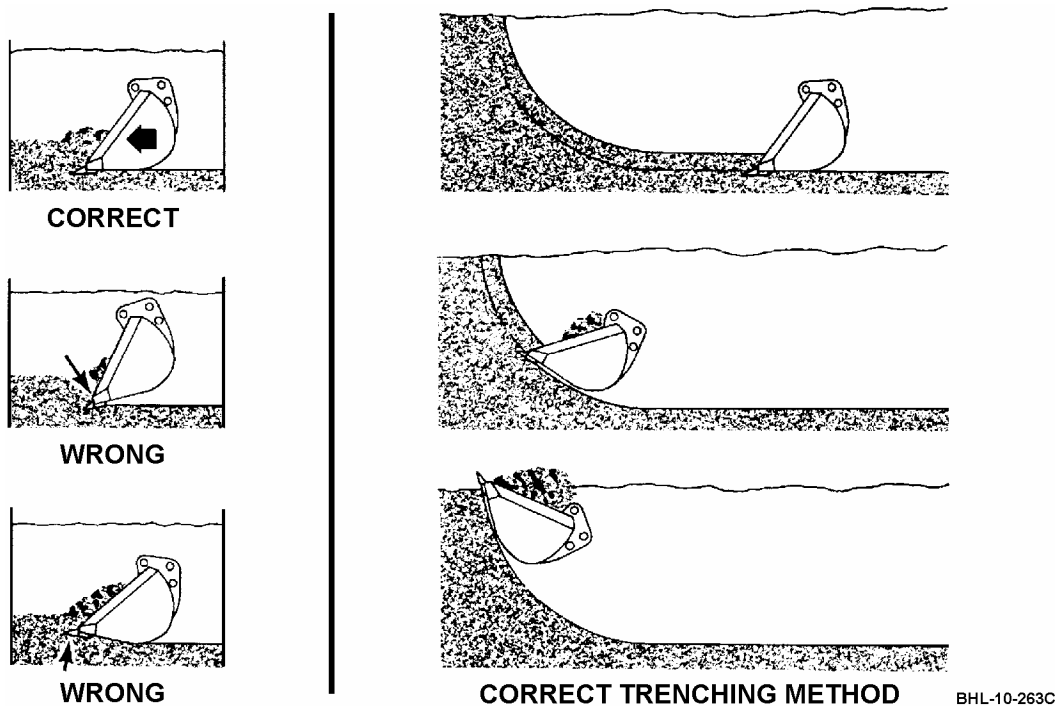
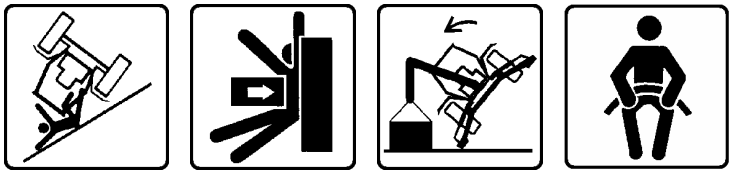


Figure 4. Backhoe Digging.

BACKHOE OPERATING PROCEDURES - Continued

Moving The BHL Away From Excavation Site On Level Ground Using Backhoe

WARNING



Do not use backhoe bucket to move the BHL on a side slope. The BHL may topple. Failure to comply may result in serious injury or death to personnel.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Make sure front wheels are straight forward.
2. Decrease engine speed to 1,200 rpm.
3. Raise backhoe boom and retract dipper.
4. Move backhoe boom as required to put bucket teeth on firm ground.
5. Lower backhoe bucket to ground (Figure 5).
6. Raise stabilizers and FEL bucket about 1 foot (30 cm) above ground.
7. Use backhoe boom and dipper to move the BHL away from excavation. Move backhoe dipper out slowly and at same time lower boom.
8. At new position, lower stabilizers and FEL bucket to ground and level the BHL.

Figure 5. Moving the BHL Using Backhoe.

BACKHOE OPERATING PROCEDURES - Continued

Configuring Backhoe To Transport Position

CAUTION

Configure backhoe to transport position before using FEL or before moving the BHL on road or highway. Failure to comply may cause damage to backhoe.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Use swing controls and put backhoe bucket straight behind the BHL. Make sure swing lock holes are alined.

2. Use hand throttle and set engine speed at approximately 1,200 rpm.

3. Retract backhoe dipper and curl in bucket.

NOTE

Two backhoe control patterns are available. Pattern 1 allows boom and swing control with left backhoe control lever and dipper and bucket control with right backhoe control lever. Pattern 2 allows dipper and swing control with left backhoe control lever and boom and bucket control with right backhoe control lever.

4. Pull backhoe control lever (pattern 1 or pattern 2) rearward to move backhoe boom to rearward (toward operator).

NOTE

Backhoe boom latch (Figure 6, Item 2) will automatically engage.

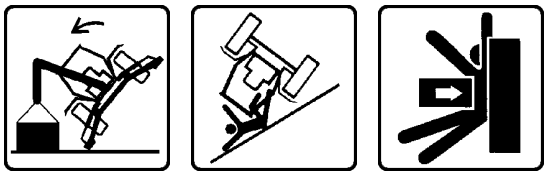
5. When backhoe boom reaches overcenter position, push backhoe control lever forward so boom continues rearward to boom stop. Return backhoe control lever to center position.

Figure 6. Backhoe Boom Latch.

BACKHOE OPERATING PROCEDURES - Continued

6. Decrease engine speed to idle.
7. Engage parking brake.
8. Raise stabilizers.
9. Push bottom of pilot control switch to off position.

WARNING

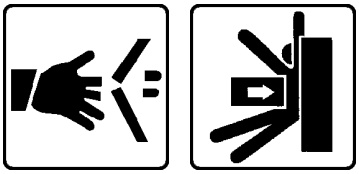


Rear windows can interfere with backhoe control levers. Make sure window adjustments are locked into position before actuating backhoe hydraulics. Failure to comply may result in serious injury or death to personnel.

10. Open rear windows.
11. Install swing lock pin (Figure 6, Item 1).
12. Shut engine off.
13. Backhoe is now in transport position.

Lifting With Backhoe

WARNING



Use only clevis as described in this procedure when lifting loads. Sling can come out of quick coupler and load can fall. Failure to comply may result in serious injury or death to personnel.

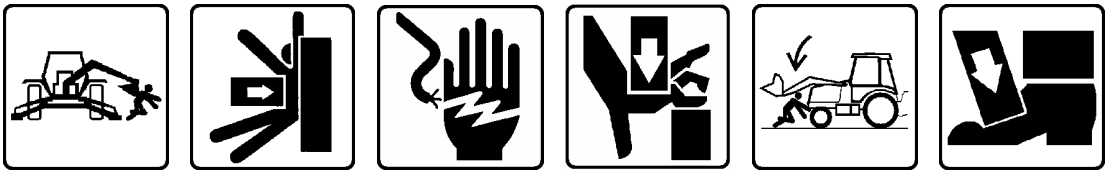
Make sure rigging equipment has capacity to lift and move loads. Always check rigging equipment each day for damaged or missing parts. Make sure all other personnel are away from load as it is being moved. Failure to comply may result in serious injury or death to personnel.

Backhoe is not a crane. Exercise care when lifting load with backhoe. Do not exceed rated load capacity. Refer to WP 0002, Table 5, Backhoe Lifting Capacities, before lifting load with backhoe. Failure to comply may result in serious injury or death to personnel.

1. Install clevis (Figure 7, Item 2) in backhoe lifting eye (Figure 7, Item 1).
2. Attach safety approved (rated at the load to be lifted) sling, cable, or chain to clevis (Figure 7, Item 2).

BACKHOE OPERATING PROCEDURES - Continued

WARNING



Always know location of all other personnel in your working area. Failure to comply may result in serious injury or death to personnel.

Be aware of and avoid all hazards and obstructions such as ditches, underground lines, trees, cliffs, overhead electrical wires, or areas where there is danger of a slide. Never lift loads in excess of capacity. Be aware that job site conditions may change on an hourly basis. Failure to comply may result in serious injury or death to personnel.

NOTE

Make sure the BHL is parked on level ground. If ground is soft, put wide pads (for example, sturdy wood boards) under each stabilizer pad, with rubber side down.

3. Lower FEL bucket to ground.

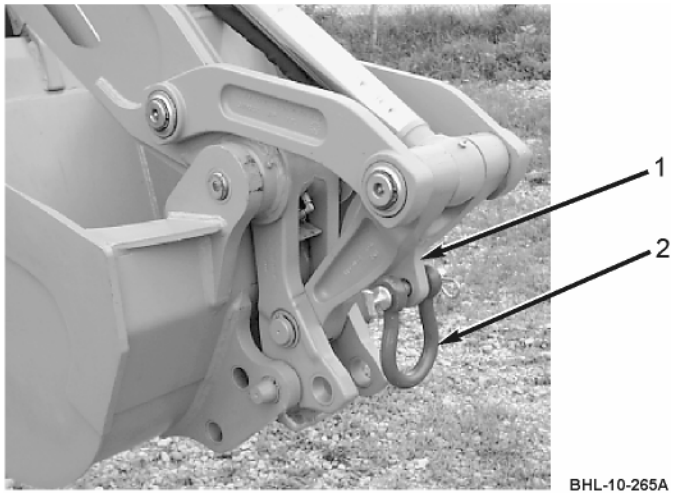


Figure 7. Backhoe Lifting Eye.

BACKHOE OPERATING PROCEDURES - Continued

4. Lower stabilizers and raise the BHL so that both rear tires are about 1 to 2 inches (2.5 to 5 cm) above ground.

WARNING

Make sure person holding handline is away from load. Failure to comply may result in serious injury or death to personnel.

5. Connect handline to load before starting.

6. Test load stability before moving load as follows:

   a. Position the BHL close to load.

   b. Use safety approved (rated at the load to be lifted) sling, cable, or chain to fasten load to clevis (Figure 7, Item 2) at end of backhoe dipper at lifting eye (Figure 7, Item 1).

   c. Use backhoe to lift load 1 to 2 inches (2.5 to 5 cm) above ground.

   d. Keep engine rpm as required for load.

   e. Slowly swing load to one side.

   f. Lower load to ground if one of the stabilizers lifts off ground or there is indication that stability of the BHL is reduced.

WARNING

Do not move load over top of personnel. Keep all other personnel away from load. Failure to comply may result in serious injury or death to personnel.

Do not exceed rated load capacity for the BHL. Failure to comply may result in damage to the BHL or serious jury to personnel.

7. Move load slowly and place in new location.

BACKHOE OPERATING PROCEDURES - Continued

Removing Backhoe Bucket

WARNING

Do not leave the BHL when engine is operating. If external procedures require engine to be operating, have another person help. Failure to comply may result in serious injury or death to personnel.

Make sure all other personnel are away from the BHL. Failure to comply may result in serious injury or death to personnel.

NOTE

Backhoe hydraulic quick coupler allows operator to change backhoe bucket without using special tools or additional personnel.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Park the BHL on level ground and lower FEL bucket to ground.
2. Lower stabilizers to ground and level the BHL.
3. Position backhoe bucket toward left or right of the BHL approximately 30 degrees (Figure 8).
4. Rotate backhoe bucket out halfway (boom and dipper approximately 90 degrees to each other) and lower bucket to ground (Figure 8).

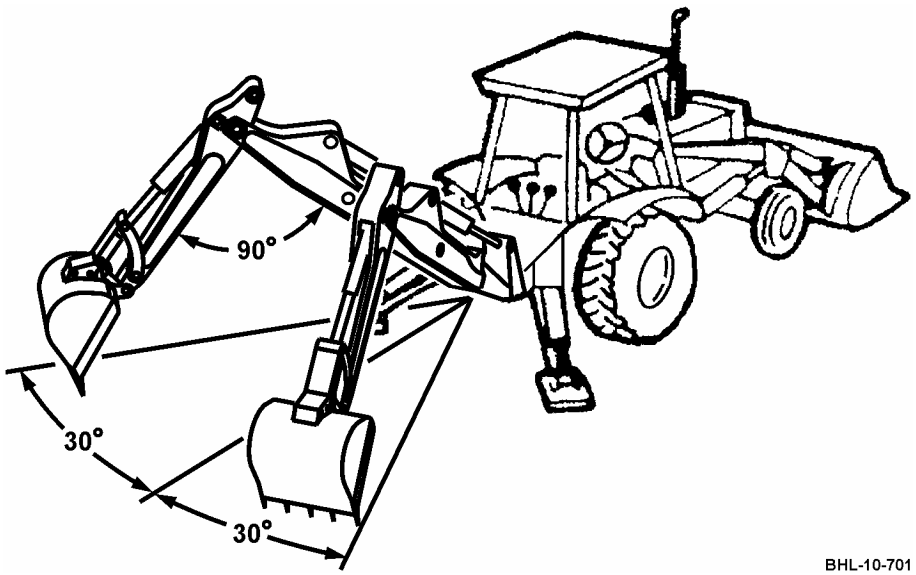


Figure 8. Backhoe Bucket, Boom, and Dipper.

BACKHOE OPERATING PROCEDURES - Continued

NOTE

Left and right backhoe hydraulic quick coupler switches must be pushed at same time to activate quick coupler.

5. Push top of both backhoe hydraulic quick coupler switches (Figure 9, Items 1 and 2) to retract both hydraulic quick coupler lock pins (Figure 9, Item 3).

6. While holding down top of both backhoe hydraulic quick coupler switches (Figure 9, Items 1 and 2), extend bucket cylinder to rotate quick coupler out of bucket.

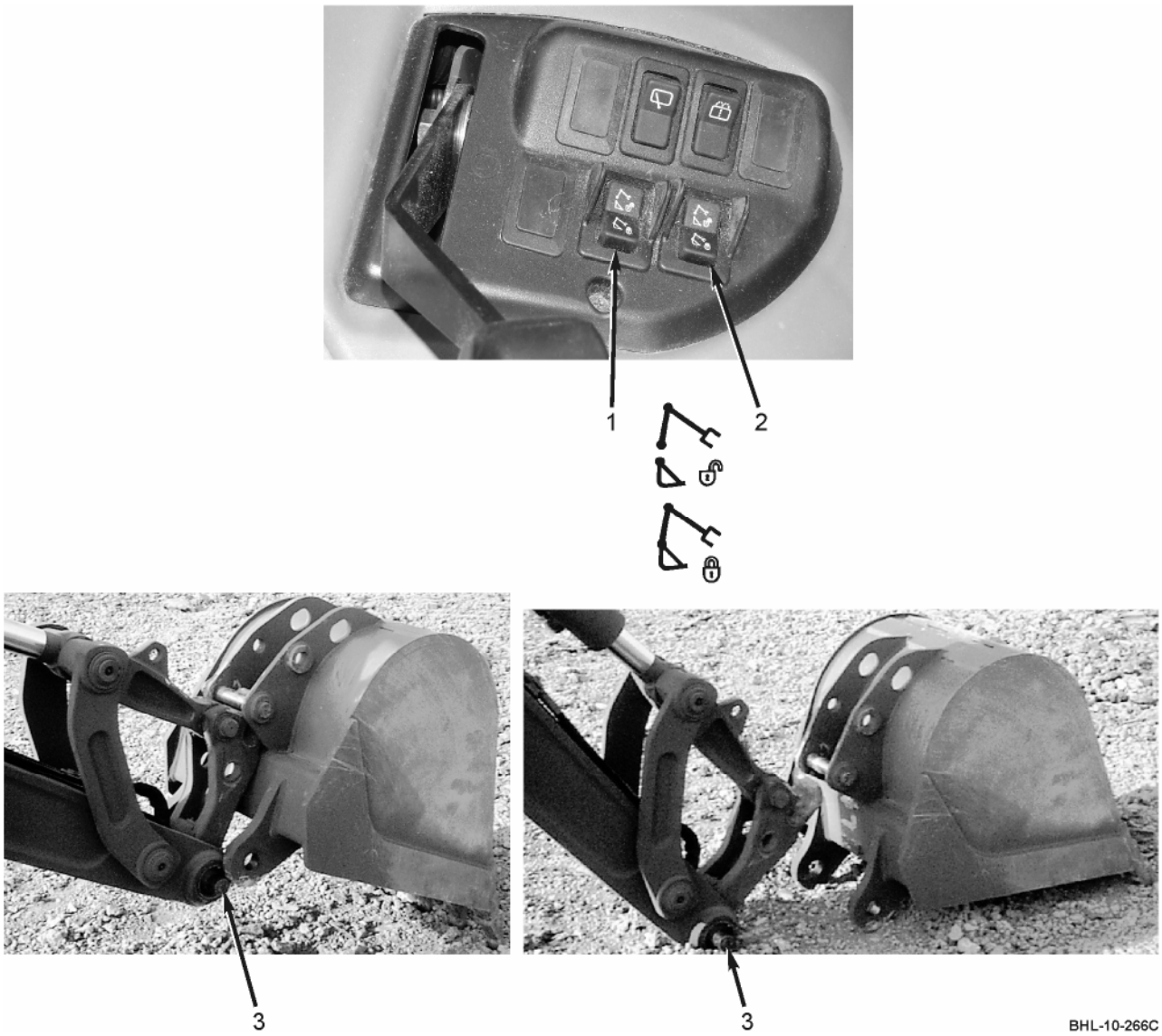


Figure 9. Backhoe Bucket Removal.

BACKHOE OPERATING PROCEDURES - Continued

Installing Backhoe Bucket

WARNING

Do not leave the BHL when engine is operating. If external procedures require engine to be operating, have another person help. Failure to comply may result in serious injury or death to personnel.

Make sure all other personnel are away from the BHL. Failure to comply may result in serious injury or death to personnel.

CAUTION

Do not use backhoe boom to move the BHL unless bucket is attached. Damage to hydraulic quick coupler may result.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Move backhoe into position to pick up bucket, with bucket off to left or right of the BHL approximately 30 degrees and with boom and dipper approximately 90 degrees to each other (Figure 8).

2. Retract backhoe bucket cylinder to engage bucket into hydraulic quick coupler.

NOTE

Left and right backhoe hydraulic quick coupler switches must be pushed at same time to activate quick coupler.

3. Push top of both backhoe hydraulic quick coupler switches (Figure 10, Items 1 and 2) to retract both hydraulic quick coupler pins (Figure 10, Item 4).

4. While holding down top of both backhoe hydraulic quick coupler switches (Figure 10, Items 1 and 2), lift backhoe bucket to allow hook (Figure 10, Item 3) to rotate into locking position.

5. Push bottom of both backhoe hydraulic quick coupler switches (Figure 10, Items 1 and 2) to extend both hydraulic quick coupler lock pins (Figure 10, Item 4).

6. Visually check that backhoe hydraulic quick coupler lock pins (Figure 10, Item 4) are fully extended into bucket ears before operating.

BACKHOE OPERATING PROCEDURES - Continued

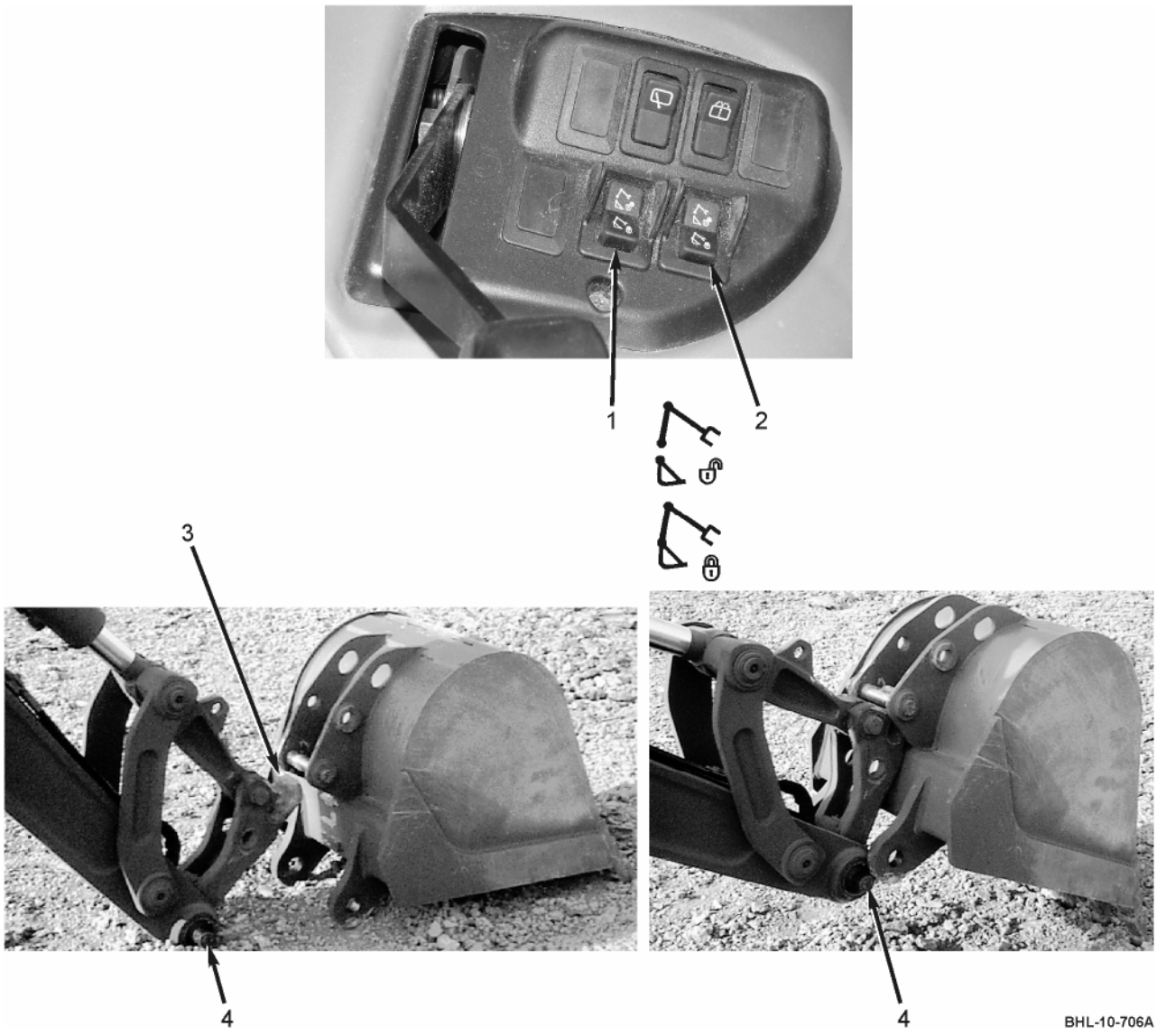


Figure 10. Backhoe Bucket Installation.

END OF WORK PACKAGE

OPERATOR LEVEL

DECALS AND OPERATION INSTRUCTION PLATES

INITIAL SETUP:

Tools and Special Tools
None

References
None

Materials/Parts
None

Equipment Condition
None

Personnel Required
One

INTRODUCTION

The Backhoe Loader (BHL) decals and operation instruction plates are shown in Figure 1.

DECALS AND OPERATION INSTRUCTION PLATES

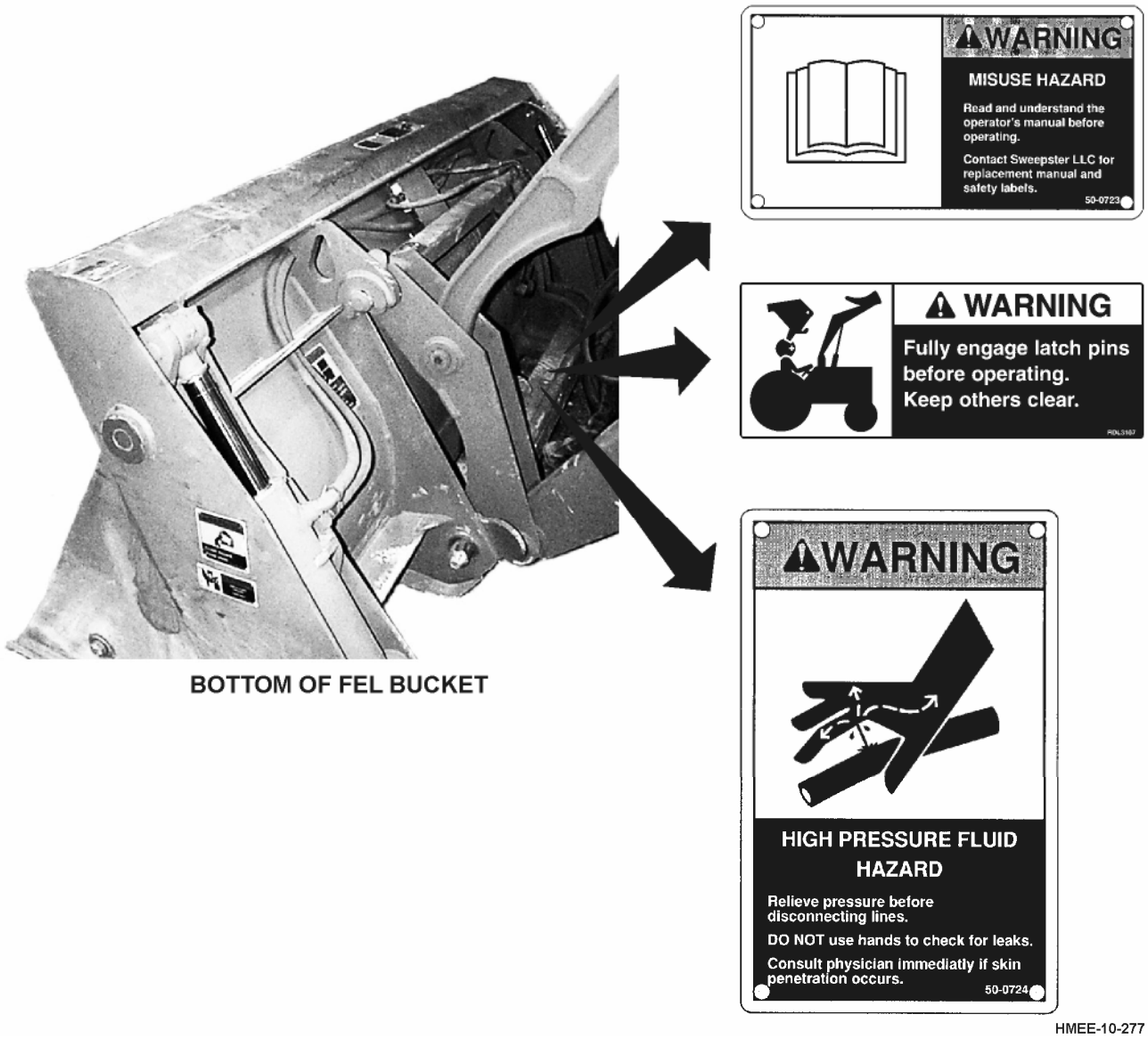


Figure 1. Decals and Operation Instruction Plates (Sheet 1 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

Figure 1. Decals and Operation Instruction Plates (Sheet 2 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

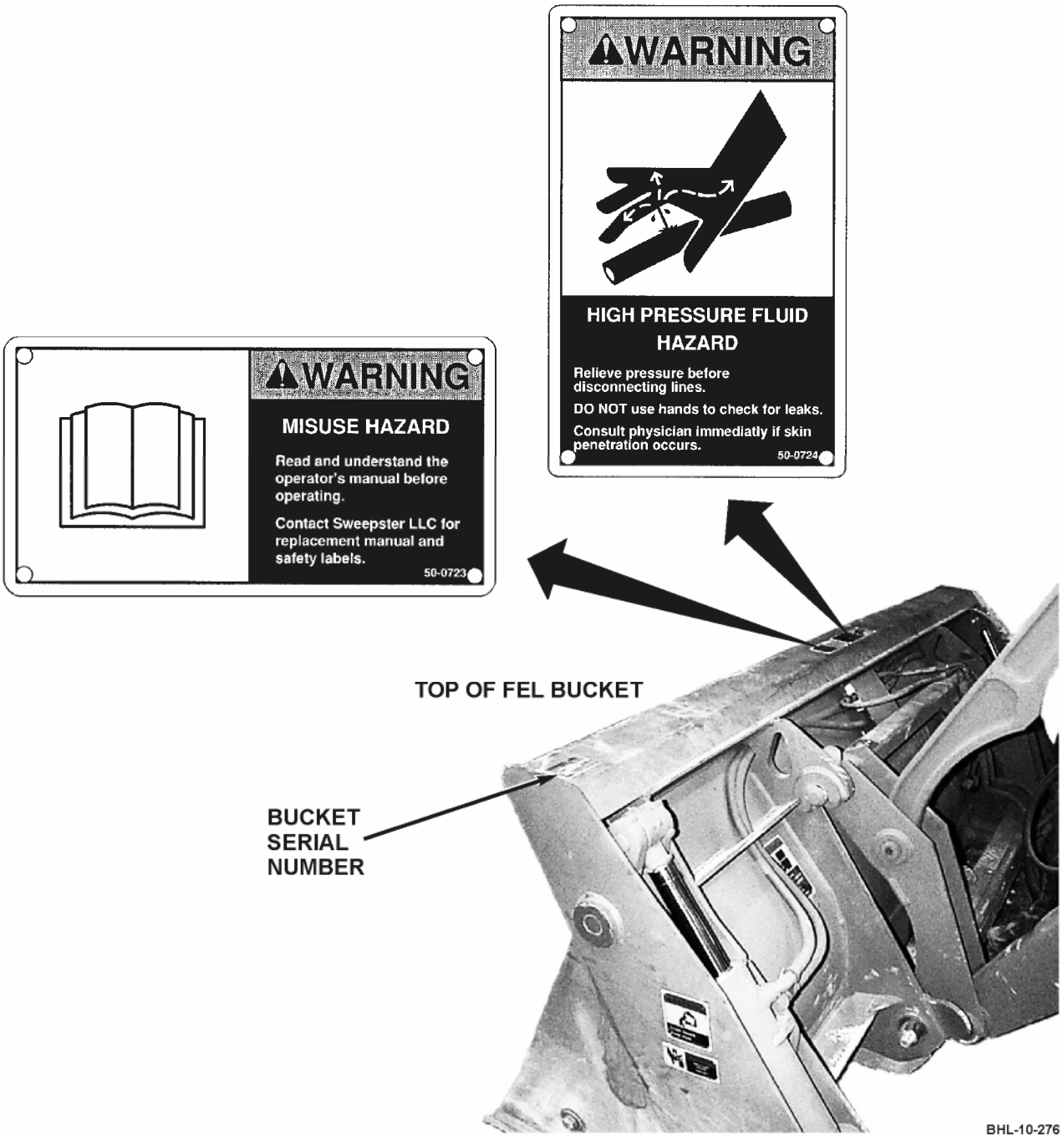


Figure 1. Decals and Operation Instruction Plates (Sheet 3 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

Figure 1. Decals and Operation Instruction Plates (Sheet 4 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

Figure 1. Decals and Operation Instruction Plates (Sheet 5 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

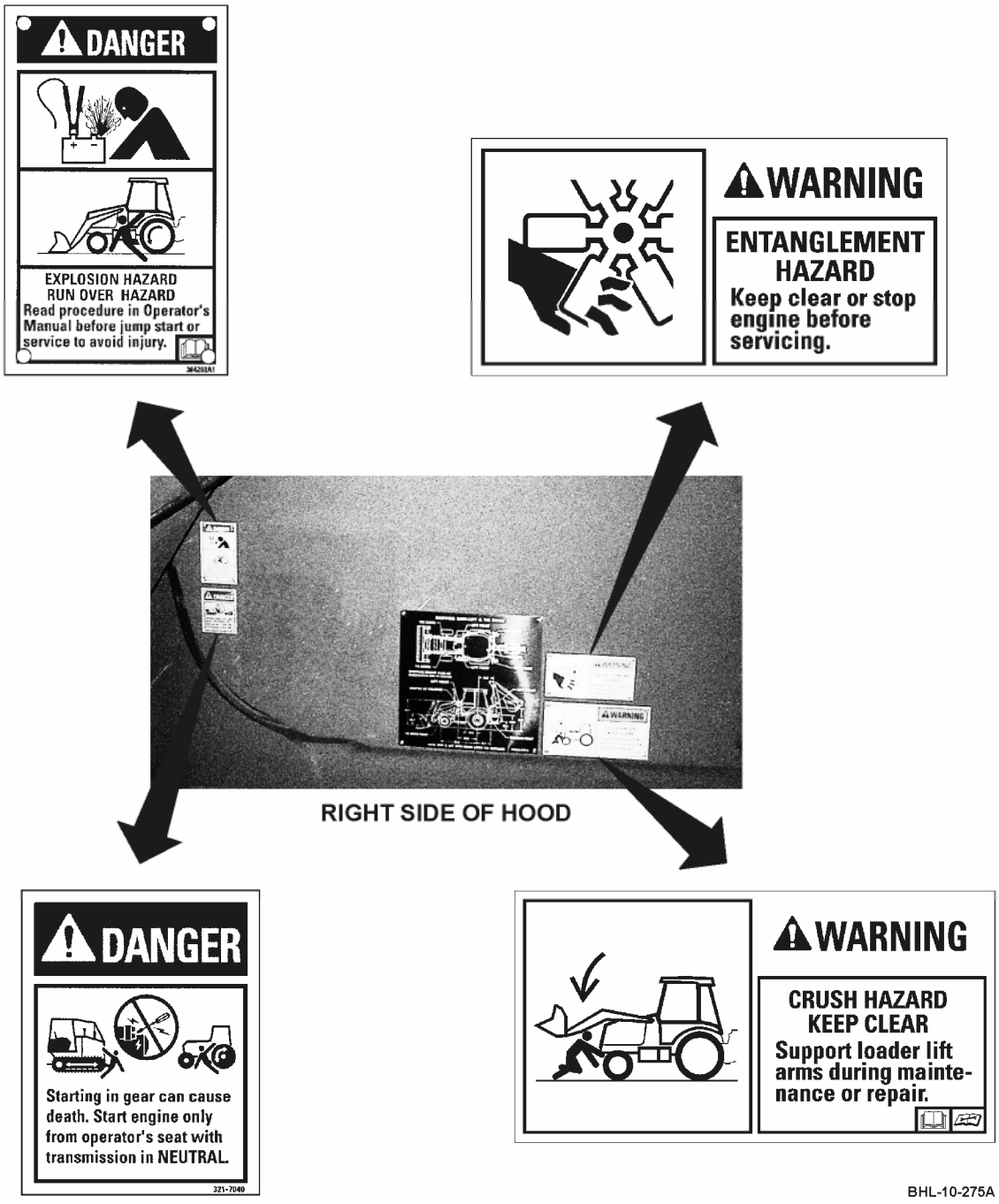


Figure 1. Decals and Operation Instruction Plates (Sheet 6 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

Figure 1. Decals and Operation Instruction Plates (Sheet 7 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

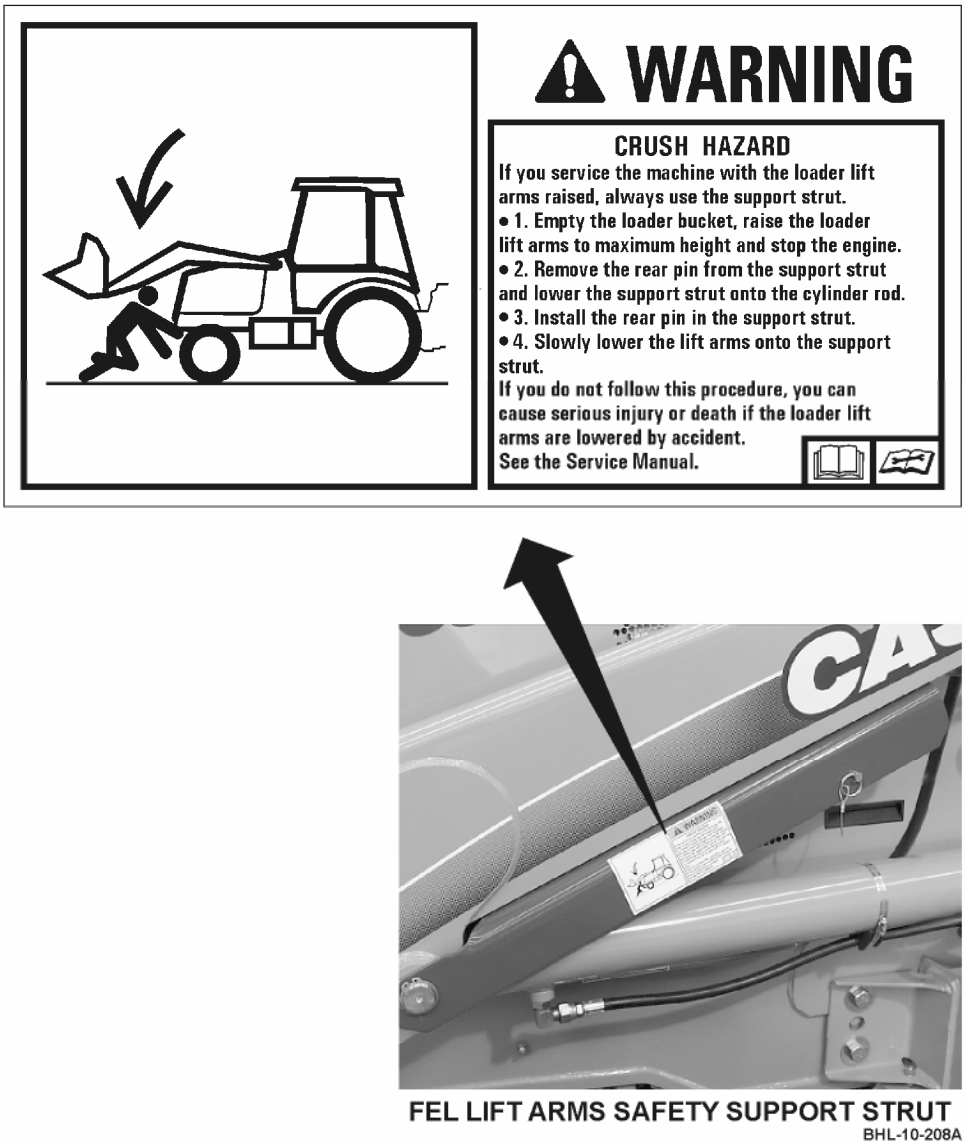


Figure 1. Decals and Operation Instruction Plates (Sheet 8 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

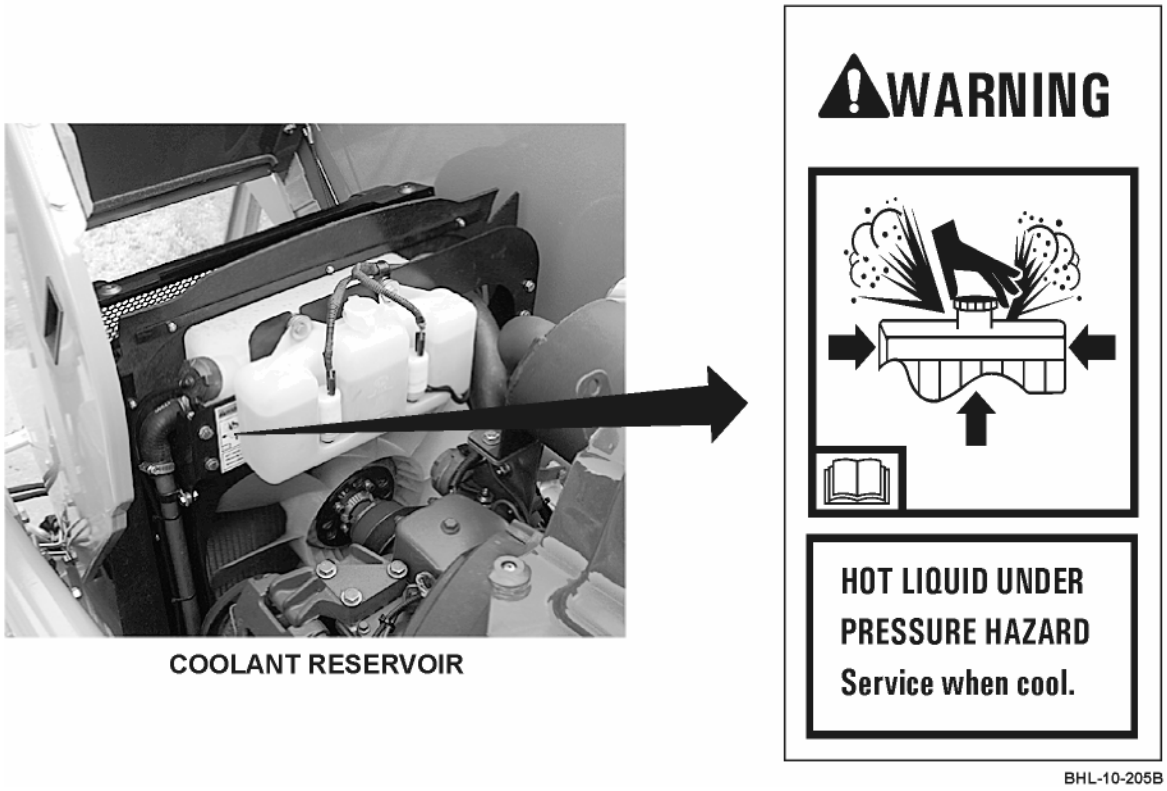
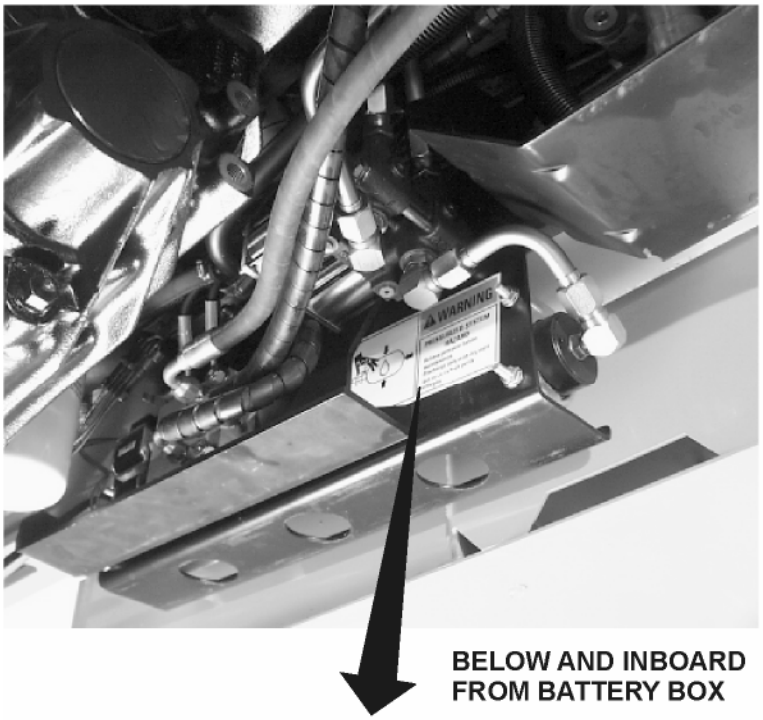
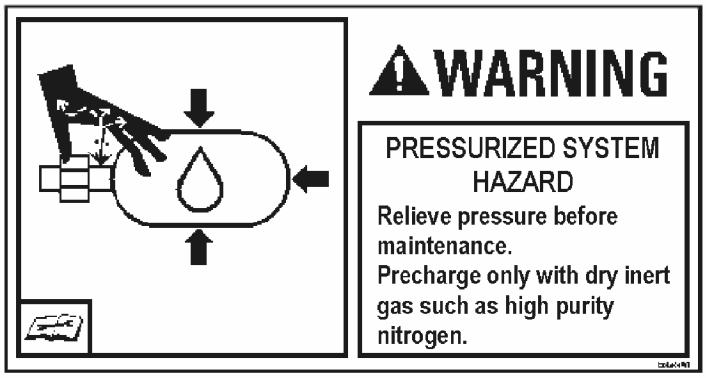


Figure 1. Decals and Operation Instruction Plates (Sheet 9 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued





BHL-10-214A

Figure 1. Decals and Operation Instruction Plates (Sheet 10 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

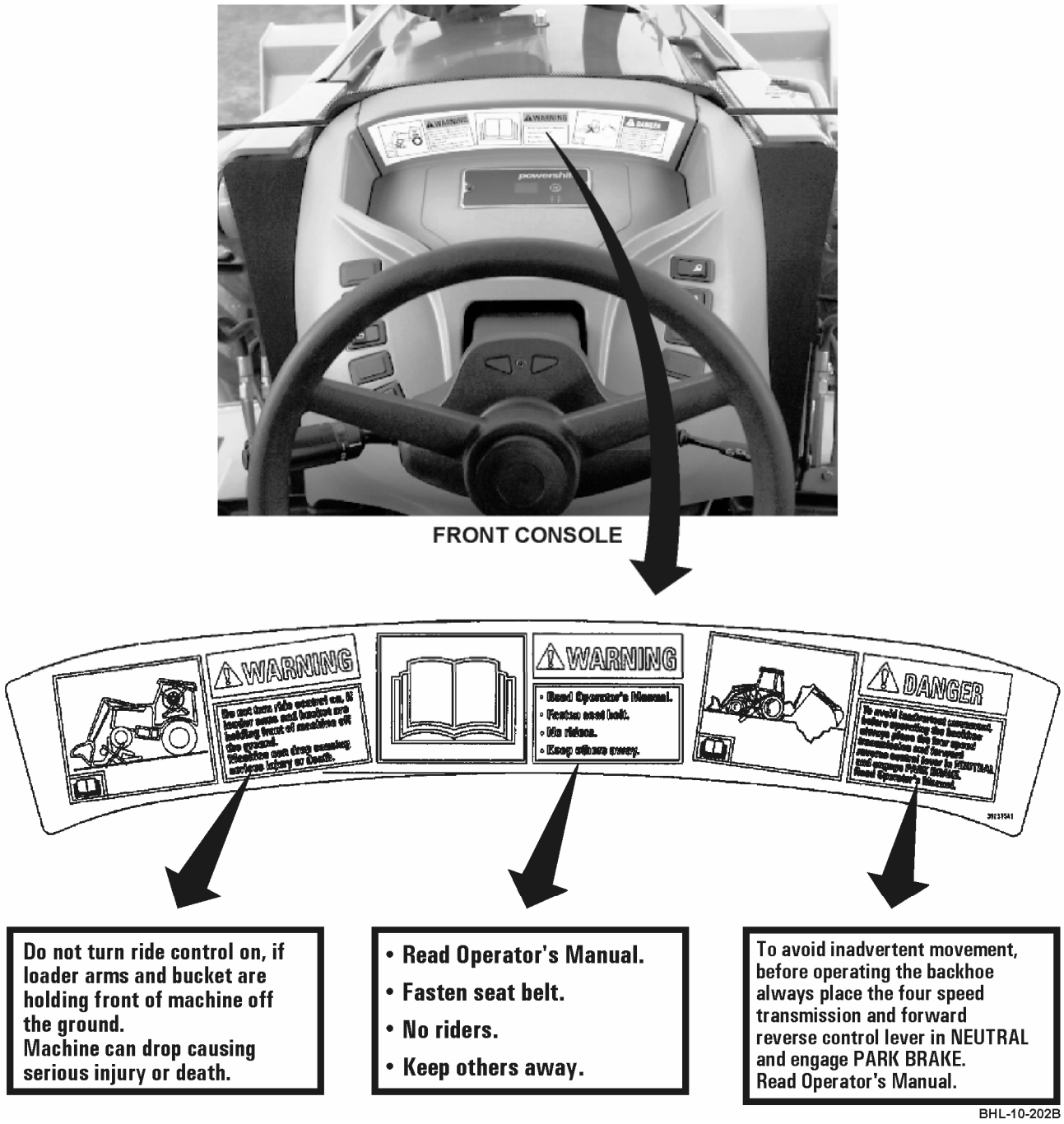


Figure 1. Decals and Operation Instruction Plates (Sheet 11 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

Figure 1. Decals and Operation Instruction Plates (Sheet 12 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

RIGHT BACKHOE CONTROL TOWER

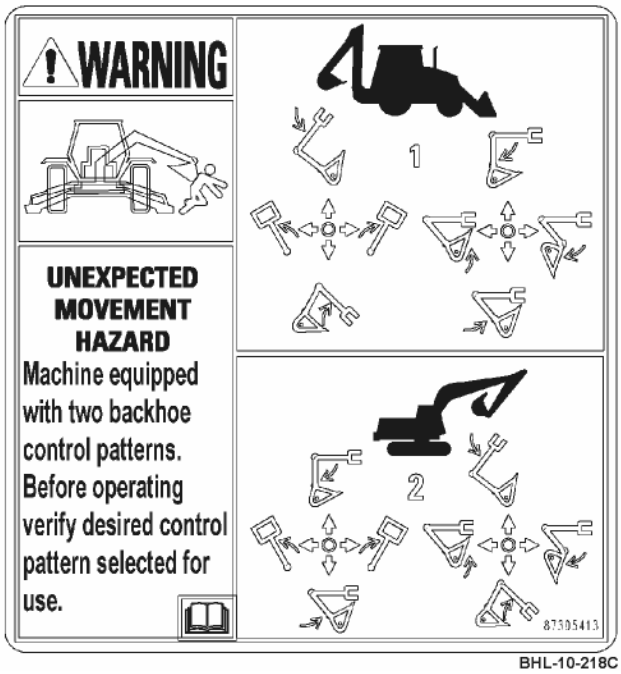


Figure 1. Decals and Operation Instruction Plates (Sheet 13 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

Figure 1. Decals and Operation Instruction Plates (Sheet 14 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

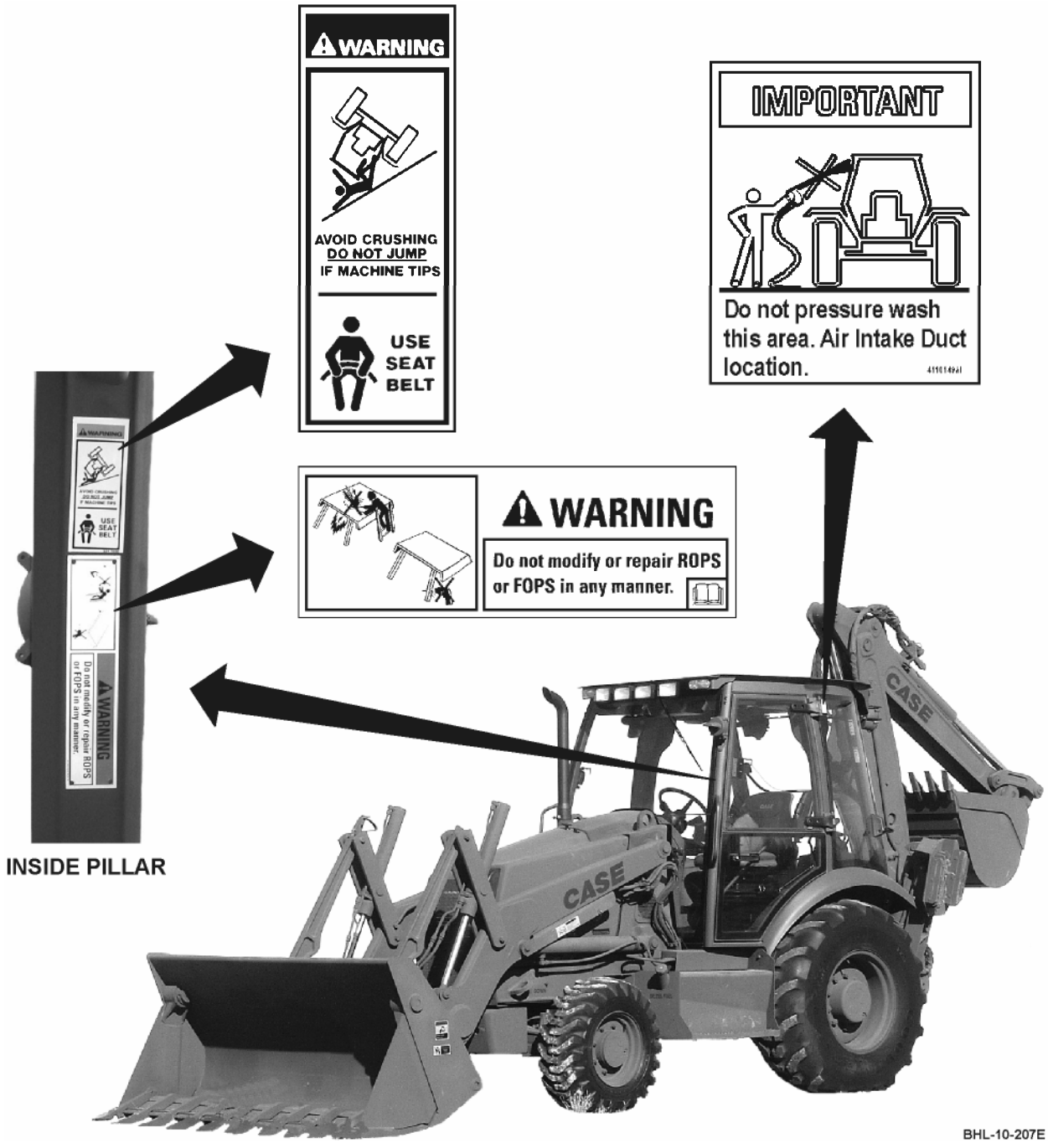


Figure 1. Decals and Operation Instruction Plates (Sheet 15 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

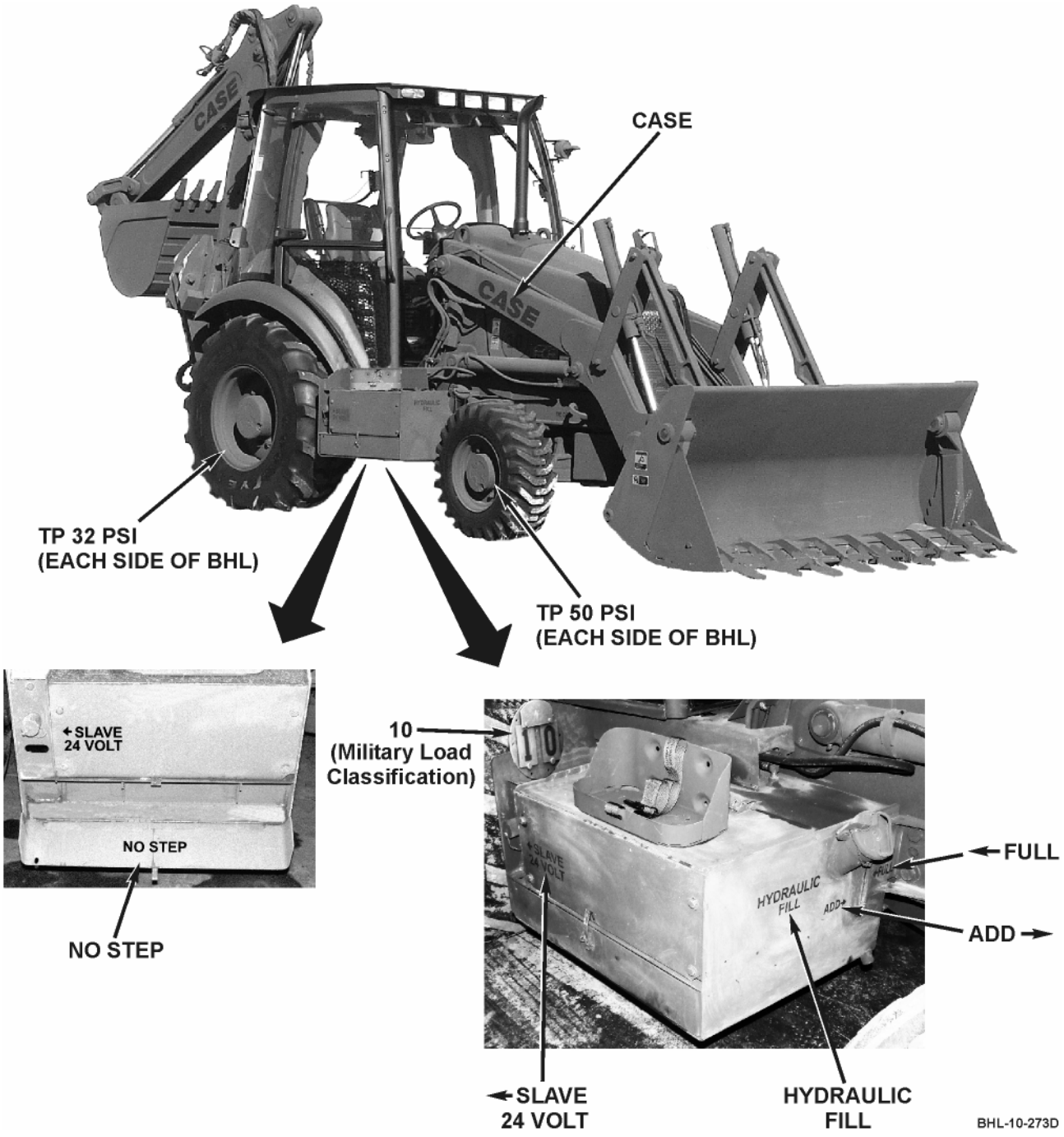


Figure 1. Decals and Operation Instruction Plates (Sheet 16 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

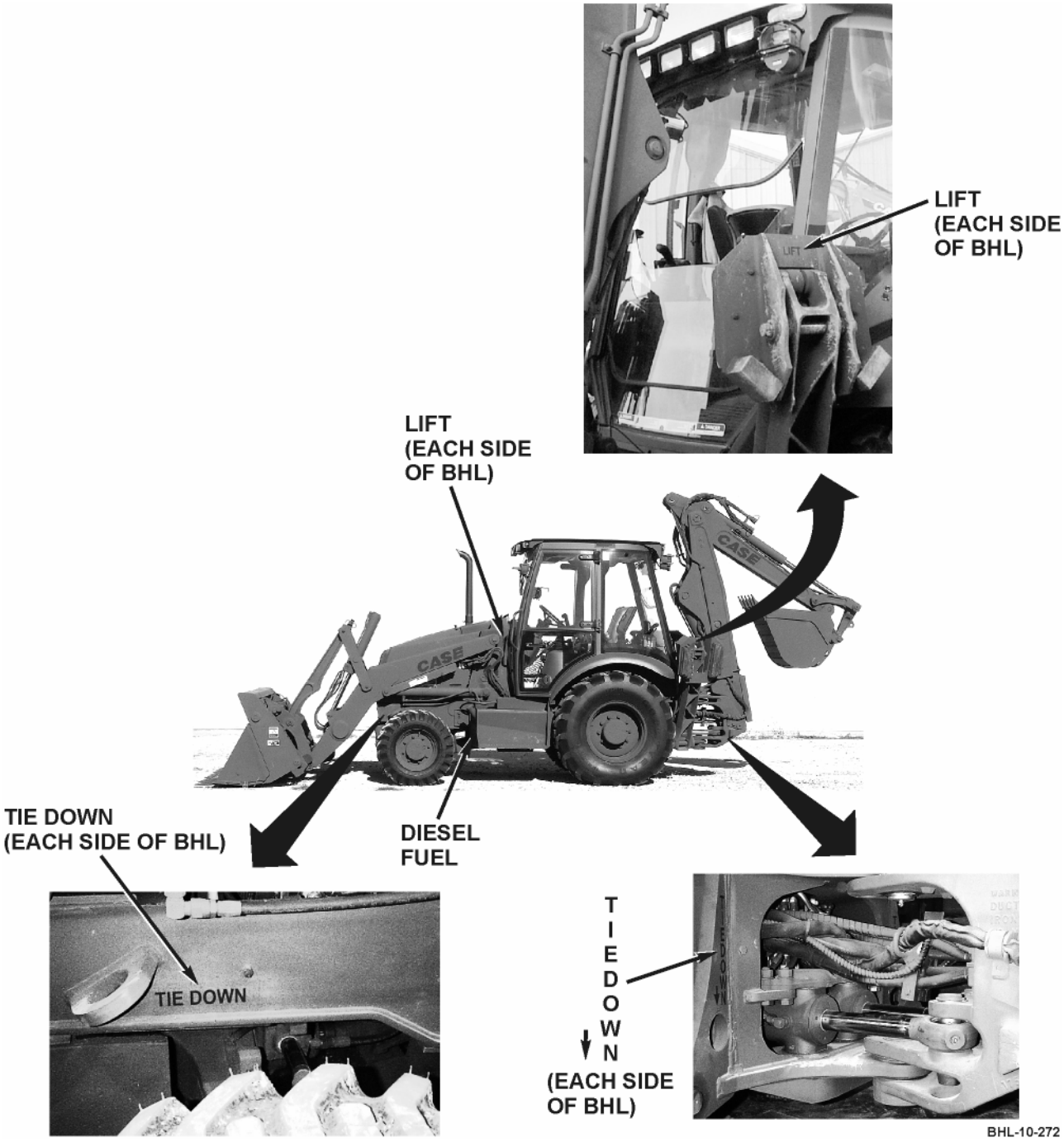


Figure 1. Decals and Operation Instruction Plates (Sheet 17 of 18).

DECALS AND OPERATION INSTRUCTION PLATES - Continued

Figure 1. Decals and Operation Instruction Plates (Sheet 18 of 18).

END OF WORK PACKAGE

OPERATOR LEVEL

OPERATION OF AUXILIARY EQUIPMENT

INITIAL SETUP:

Tools and Special Tools
None

References
WP 0007

Materials/Parts
None

Equipment Condition
None

Personnel Required
One

OPERATION OF AUXILIARY EQUIPMENT

WARNING

For the Backhoe Loader (BHL) attachments, read manufacturer's instructions before attaching hydraulic lines to avoid incorrect connection. Failure to comply may result in damage to attachment or serious injury to personnel.

Three hydraulic lines are provided on backhoe dipper to attach auxiliary equipment. Two bi-directional self-sealing quick-disconnect connectors (Figure 1, Items 2 and 3) are used with bi-directional attachments. One uni-directional self-sealing quick-disconnect connector (Figure 1, Item 1) is used with uni-directional attachment. Bi-directional auxiliary hydraulic switches (Figure 1, Item 4) on left backhoe control tower provide control operation for auxiliary hydraulic equipment (WP 0007).

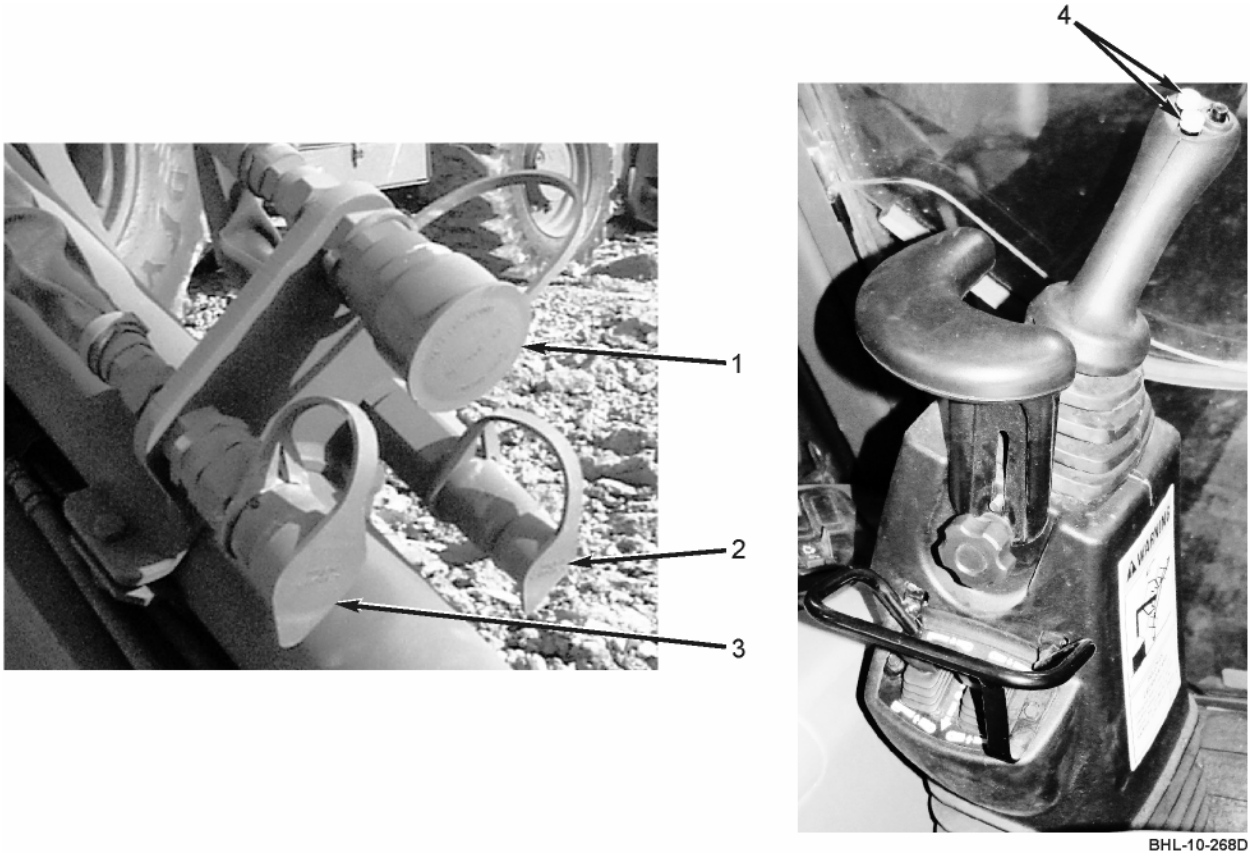


Figure 1. Backhoe Auxiliary Hydraulic Lines.

END OF WORK PACKAGE

OPERATOR LEVEL

OPERATION UNDER UNUSUAL CONDITIONS

INITIAL SETUP:

Tools and Special Tools
None

Materials/Parts
Detergent (WP 0028, Item 3)
Wiping rag (WP 0028, Item 16)
Tow strap (WP 0026, Item 11) (2)

Personnel Required
One

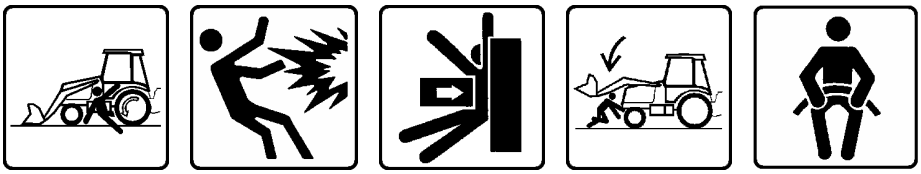
References
WP 0004 thru WP 0010
WP 0022 thru WP 0024

Equipment Condition
None

UNUSUAL ENVIRONMENT/WEATHER

Cold Weather Operation

WARNING



Do not jump on or off the Backhoe Loader (BHL). Always face the BHL, use handrails and steps, and use three points of contact to get onto or off the BHL. Failure to comply may result in serious injury or death to personnel.

The BHL is equipped with engine grid heater that will ignite flammable starting fluids. Do not use starting fluids. Fire and explosion may occur. Failure to comply may result in serious injury or death to personnel.

CAUTION

If the BHL has not been operated for several weeks or engine oil filter has been replaced, prime turbocharger with oil (WP 0010). Failure to comply may result in damage to turbocharger.

NOTE

Open throttle fully when starting cold engine at temperatures below 29°F (–1°C).

If operator does not crank engine within 30 seconds after engine grid heater indicator lamp extinguishes, starting procedure must be started over.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Engage parking brake.
2. Make sure seat is in normal driving position.
3. Adjust seat and fasten seat belt.
4. Shift direction control lever to neutral position.
5. Make sure engine hand throttle is in idle position.
6. Set light control switch to STOP LIGHT position.
7. Turn starter key switch to ON position and make sure the following instrument panel indicator and warning lamps illuminate: engine grid heater, low engine oil pressure, alternator, air filter restriction, and hydraulic oil filter.

UNUSUAL ENVIRONMENT/WEATHER - Continued

8. Wait for engine grid heater indicator lamp to extinguish.

CAUTION

If engine starts and stops, do not actuate starter motor again until starter motor stops turning. Failure to comply may result in damage to starter motor.

Do not actuate starter motor more than 30 seconds at one time. Let starter motor cool for 2 minutes before actuating again. While starter motor is actuated, white or black smoke must be seen at exhaust pipe. If no smoke is seen, check fuel supply. Failure to comply may result in damage to starter motor.

NOTE

If engine fails to start after two attempts, allow battery to recover for 4 to 5 minutes before repeating starting procedure (steps 7 thru 10 above).

9. Turn starter key switch to START position for a maximum of 30 seconds and hold until engine starts.
10. Release starter key switch.
11. If engine does not start after maximum of 30 seconds of cranking, wait 2 minutes and repeat starting procedure (steps 7 thru 10 above).
12. After engine starts, check instrument panel to make sure instrument readings are normal.
13. Operate engine at 1,000 rpm until coolant temperature is warm (engine coolant temperature gage in green range) before moving the BHL.
14. Actuate Front End Loader (FEL) or backhoe controls for approximately 10 minutes and until all cylinders work smoothly and hydraulic oil is at operating temperature.
15. Before operation, move the BHL slowly in low gear.

UNUSUAL ENVIRONMENT/WEATHER - Continued

Hot Weather Operation

WARNING

Operating vehicle in hot weather increases risk of heat stress. Heat stress impairs performance. Drink lots of water. Work and rest in shade when possible. Use air conditioning. Failure to comply may result in serious injury or death to personnel.

Prolonged exposure to bright sunlight produces very hot metal surfaces which will burn flesh on contact. Wear gloves when contacting hot metal surfaces. Wear additional protective clothing as required. Failure to comply may result in serious injury or death to personnel.

CAUTION

Mold, mildew, and fungus grow very quickly on glass, rubber, and leather surfaces in hot, humid weather. Keep all glass, rubber, and leather surfaces clean and dry in hot humid weather. Failure to comply may result in damage to these materials.

Hot, dry weather usually creates a great deal of dust. Pay extra attention to filters and radiator. Make sure they do not become clogged. Lubrication may have to be performed more often (WP 0022). Failure to comply may result in damage to equipment.

1. Keep coolant at correct level in coolant reservoir and radiator (WP 0023).
2. Use correct solution of antifreeze and water in cooling system (WP 0023).
3. Request field level maintenance test radiator cap before seasonal hot weather begins and replace as required.
4. Clean dirt and debris from radiator and engine area (WP 0024).
5. Check condition of alternator and air conditioning belts (WP 0022).
6. Use lubricants of correct viscosity (WP 0022).

UNUSUAL ENVIRONMENT/WEATHER - Continued

Soft Or Muddy Area Operation

CAUTION

Do not engage differential lock when the BHL is turning or when one rear wheel is rotating faster than the other rear wheel. Engage differential lock only when the BHL is moving in straight direction. Failure to comply may result in damage to rear axle.

NOTE

The differential lock should only be used temporarily to move the BHL through a soft or muddy area. The differential lock will disengage automatically when the torque is released from the machine.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Make sure the BHL is moving straight ahead and that rear wheels are rotating at same speed.

2. Push down differential lock switch (Figure 1, Item 1) and keep switch pushed down while the BHL moves through soft or muddy area.

3. Release differential lock switch (Figure 1, Item 1) after the BHL has moved through area and keep engine speed below 2,500 rpm.

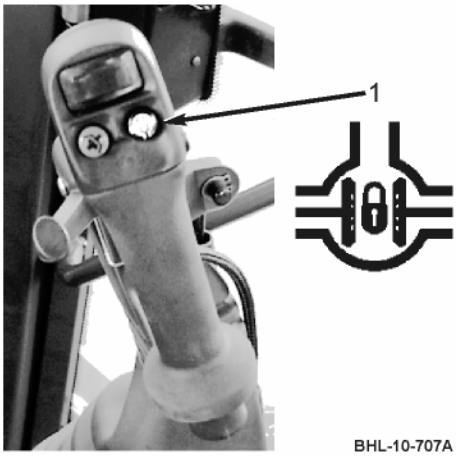
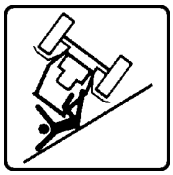


Figure 1. Differential Lock Switch.

FORDING

WARNING



Do not enter water at more than walking speed of 5 miles per hour (8 km/h) with an entrance and exit slope of more than 15 percent. Failure to comply may result in serious injury or death to personnel.

Do not enter water with current velocity of more than 5 miles per hour (8km/h). This is equivalent to 7 feet (2m) per second. Failure to comply may result in serious injury or death to personnel.

Do not enter water deeper than 20 inches (51 cm), including wave height (Figure 2). Failure to comply may result in serious injury or death to personnel.

Do not enter water that has ice or large debris on surface. Failure to comply may result in serious injury or death to personnel.

Check stream bottom for firmness and that there are no obstacles. Failure to comply may result in serious injury or death to personnel.

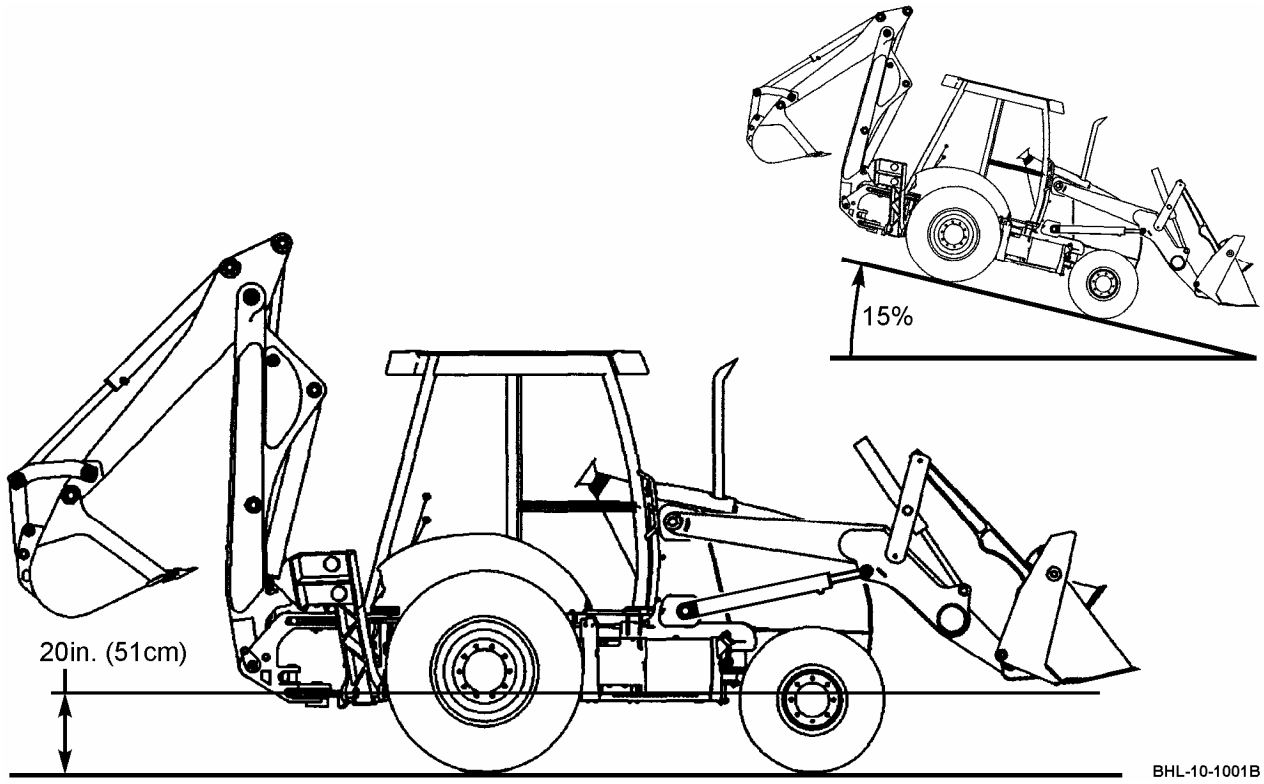


Figure 2. Fording.

FORDING - Continued

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Check both entry and exit slopes for maximum angles of 15 percent.
2. Check that water velocity is no more than 5 miles per hour (8 km/h). This is equivalent to 7 feet (2m) per second.
3. Check bottom of stream to make sure that it is firm enough to support the BHL and that it is free of underwater obstacles.
4. Set 4WD switch (Figure 3, Item 1) to Four-Wheel Drive (4WD) position.
5. Enter water at no more than 5 miles per hour (8 km/h) and maintain an even speed.
6. When clear of stream and on level terrain, make several gradual stops to clear water from service brakes and to be sure brakes work properly.
7. As soon as possible, open tool box, make sure it has drained properly, and dry off the tools with wiping rag to prevent rust or deterioration.
8. After fording, lubricate front and rear drive shaft slip splines (WP 0022).

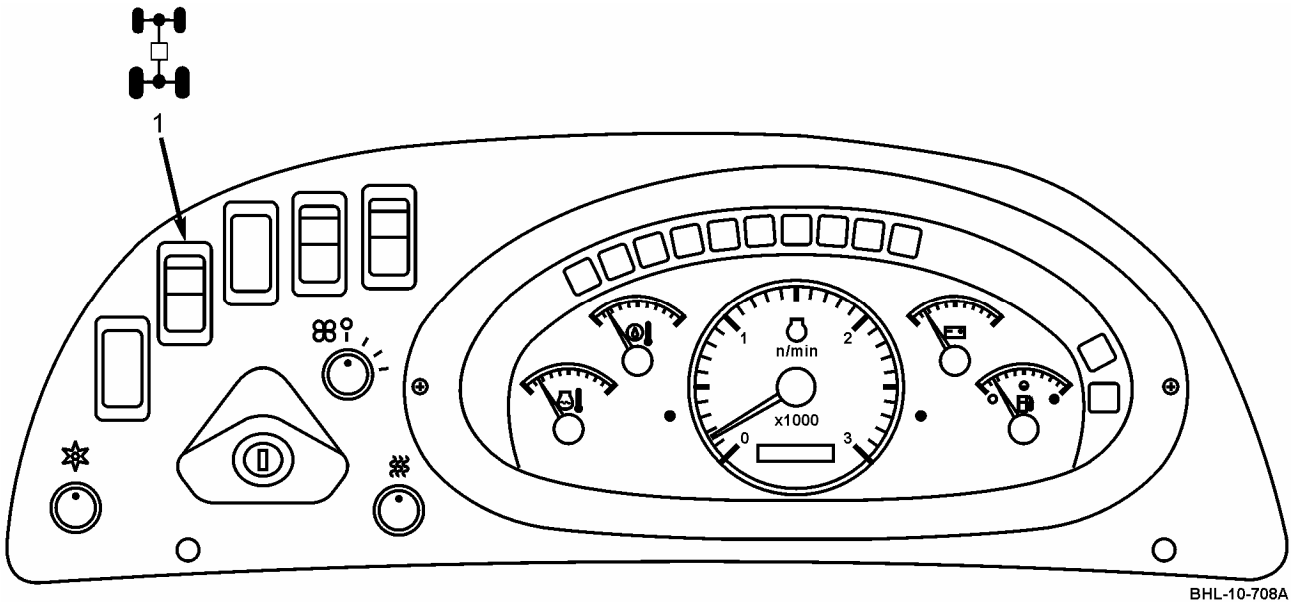


Figure 3. 4WD Switch.

DEGRADED OPERATION

Slave Starting Operation

WARNING

NATO slave receptacle is electrically live at all times and is unfused. NATO slave receptacle is only dead when batteries are fully disconnected. Disconnect batteries before performing maintenance on NATO slave receptacle. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Do not attempt to jump start or charge battery when electrolyte is frozen. Battery could explode. Failure to comply may result in serious injury or death to personnel.

Batteries produce explosive gases. Keep sparks, flame, cigars, and cigarettes away. Ventilate when charging or using in enclosed area. Always wear eye protection and protective gloves when working near batteries. Failure to comply may result in serious injury or death to personnel.

Remove all jewelry such as rings, identification tags, or bracelets when using slave cable. If jewelry contacts slave cable or receptacle, arcing can occur. Failure to comply may result in serious injury or death to personnel.

CAUTION

Do not allow vehicles to touch while slave-starting. Failure to comply may result in damage to equipment.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Position slave vehicle and disabled BHL close enough for cable hookup.
2. Shut slave vehicle engine off.

CAUTION

Make sure all electrical switches in both vehicles are turned to off position. Failure to comply may result in damage to equipment.

3. Turn all electrical switches on both vehicles to off position.
4. Remove NATO slave receptacle covers (Figure 4, Item 1) from disabled BHL and slaving vehicle.

DEGRADED OPERATION - Continued

CAUTION

Use twisting motion when installing NATO slave cable to receptacle. Do not forcefully push cable onto receptacle. Failure to comply may result in damage to receptacle mount.

5. Connect NATO slave cable to slave receptacle of both vehicles.
6. Start slave vehicle engine.
7. Start disabled BHL engine (WP 0010).

CAUTION

Use twisting motion when disconnecting NATO slave cable from receptacle. Do not forcefully pull cable from receptacle. Failure to comply may result in damage to receptacle mount.

8. After disabled BHL engine starts, disconnect NATO slave cable from both vehicles.

NOTE

Apply detergent to inside of NATO slave receptacle covers before installing to aid in future maintenance.

9. Install NATO slave receptacle covers (Figure 4, Item 1) onto both vehicles.

Figure 4. NATO Slave Receptacle.

DEGRADED OPERATION - Continued

Towing Disabled BHL

WARNING

Tow a disabled BHL in accordance with the instructions in this manual. Failure to comply may result in serious injury or death to personnel.

If the BHL is disabled, you must make a judgment if the BHL can be moved safely and without causing damage. If possible, contact Field Maintenance to repair the disabled BHL at the job site. Failure to comply may result in serious injury or death to personnel.

Towing vehicle must be at least as large as the disabled BHL and have sufficient power, weight, and braking capability. The towing vehicle must be able to control both machines for the grade, ground conditions, and distance required. Failure to comply may result in serious injury or death to personnel.

Towing vehicle must have a towing pintle for maximum stability while towing. Failure to comply may result in serious injury or death to personnel.

Make sure tow straps have proper capacity to move the BHL safely. Failure to comply may result in serious injury or death to personnel.

Inspect tow straps for broken or missing parts, chafing, or wear before attaching. Check wear identification strips on straps. Failure to comply may result in serious injury or death to personnel.

Do not exceed towing speed of 5 miles per hour (8 km/h) under ideal ground conditions. Adverse ground condition requires slower speed. Failure to comply may result in serious injury or death to personnel.

When BHL is being towed, operator must be in operator's seat, with seat belt fastened, to maintain steering and braking control of the BHL. Failure to comply may result in serious injury or death to personnel.

Do not allow operator on disabled BHL unless it has steering and braking capability. The BHL may break away from tow. Failure to comply may result in serious injury or death to personnel.

Make sure all necessary personnel nearby are shielded in event towing apparatus might break. Make sure all other personnel are completely out of area. The BHL may break away from tow. Failure to comply may result in serious injury or death to personnel.

Tow straps which have not been properly stowed in a canvas bag may have been damaged by ultraviolet light, and should not be used. Failure to comply may result in serious injury or death to personnel.

DEGRADED OPERATION - Continued

CAUTION

If the FEL, backhoe, or stabilizers cannot be raised, contact Field Maintenance for BHL recovery. Failure to comply may result in damage to equipment.

Do not attempt to start engine by towing the BHL. Failure to comply may result in damage to equipment.

Only tow the BHL far enough to reach safe repair location or onto trailer. Do not tow more than one mile (1.6 km). Failure to comply may result in damage to equipment.

Tow straps should be attached only to the front tiedown brackets, or if necessary, to each side of the front axle. Do not allow the tow straps to contact the steering linkages. Failure to comply may result in damage to equipment.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Inspect both tow straps as follows:
   a. Check straps for holes, cuts, snags, or embedded particles.
   b. Check for broken or worn stitching.
   c. Check for excessive wear, knots, or damage to the loop eyes.
   d. Check that red thread is not visible in the strap webbing.
   e. Check for evidence of excessive ultraviolet light exposure, including bleaching of the strap color, increased brittleness of the material, or surface abrasions in areas not normally in contact with the BHL or towing vehicle.
   f. Do not use tow straps if any of the above conditions are found.
2. Engage parking brake.
3. Shift direction control lever to neutral position.
4. Set 4WD switch to neutral position.
5. On uneven ground, block front and rear wheels with wheel chocks.
6. Start engine. Raise FEL, backhoe, and stabilizers off ground, into transport position. Shut engine off.

DEGRADED OPERATION - Continued

7. Attach tow straps to the disabled BHL only at the front tiedown brackets (Figure 5, Item 1), or if necessary, to each side of the front axle (Figure 5, Item 2). Do not allow the towing attachments to contact the steering linkages (Figure 5, Item 3). Attach to towing pintle on towing vehicle.

8. Start engine. Remove wheel chocks and disengage parking brake. Use towing vehicle to slowly take out slack in towing attachments.

9. Confirm disabled BHL has braking and steering capability. Leave disabled BHL engine running, if possible. The BHL is now ready to be towed.

10. Tow disabled BHL at maximum speed of 5 miles per hour (8 km/h) under ideal ground conditions for no more than one mile (1.6 km).

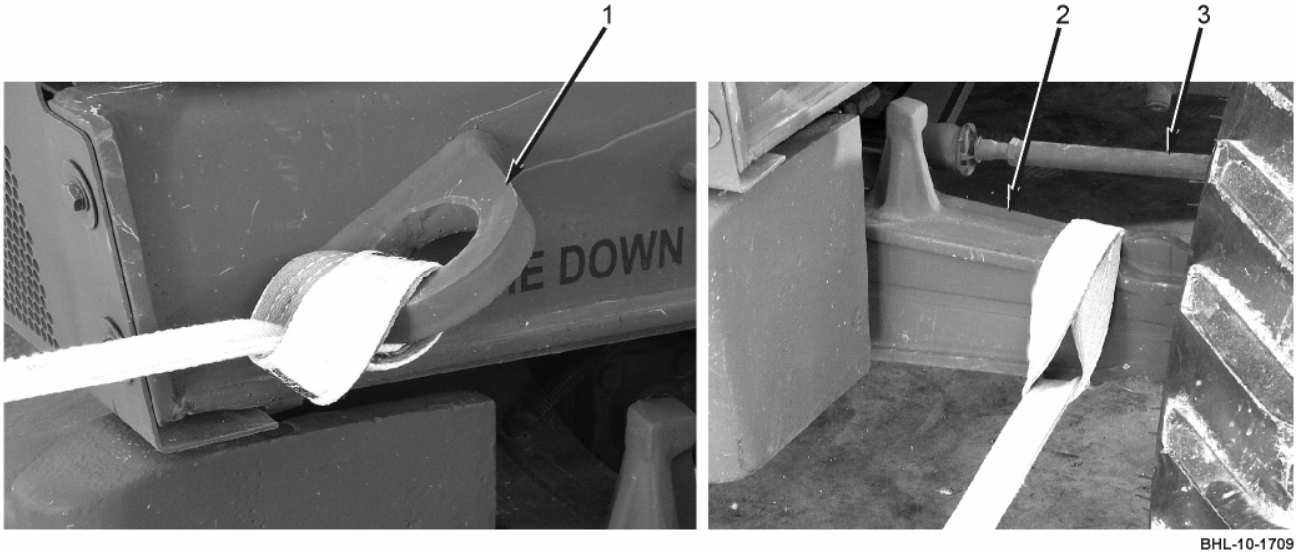


Figure 5. Towing the BHL.

END OF WORK PACKAGE

OPERATOR LEVEL

STOWAGE AND DECAL/DATA PLATE GUIDE

INTRODUCTION

This work package illustrates the locations for the Backhoe Loader (BHL) equipment stowage and decals and data plates. Detailed information on each decal/data plate is also provided.

STOWAGE GUIDE

There is no stowage guide required for the BHL.

DECAL/DATA PLATE GUIDE

The BHL equipment data plate locations are shown in Figure 1. Specific requirements for each item are also shown.

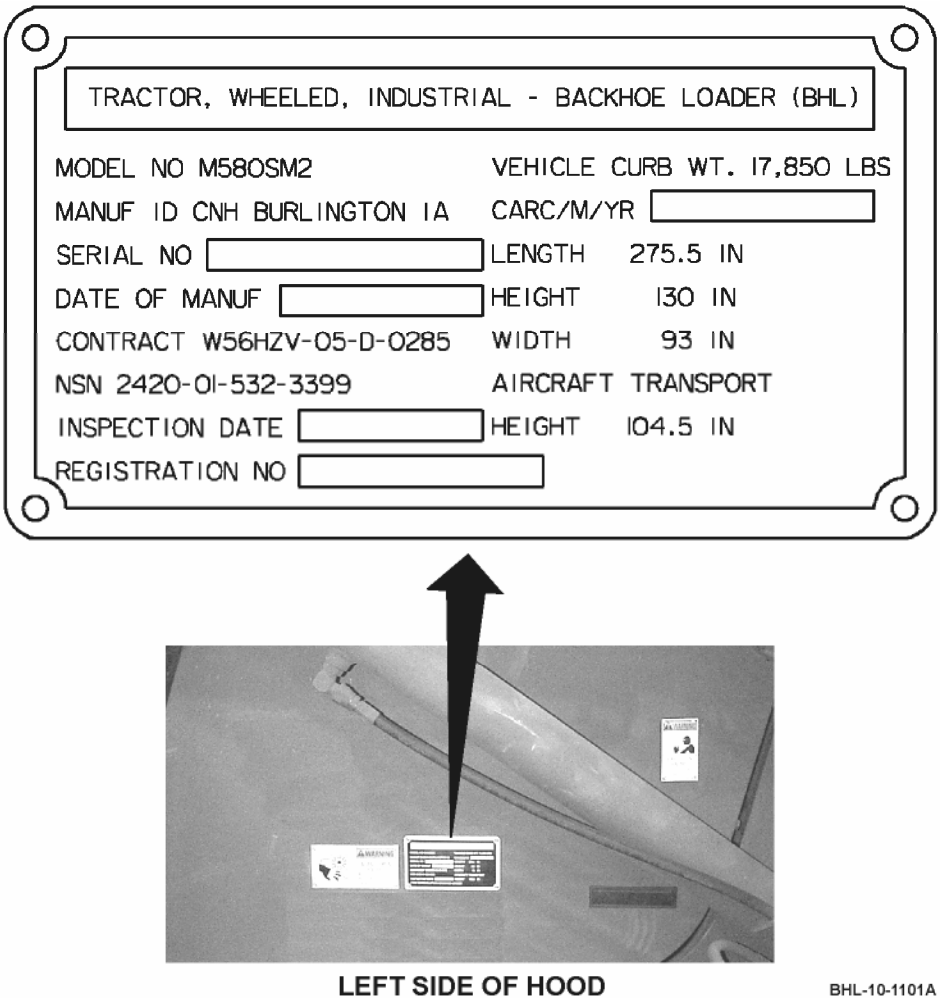
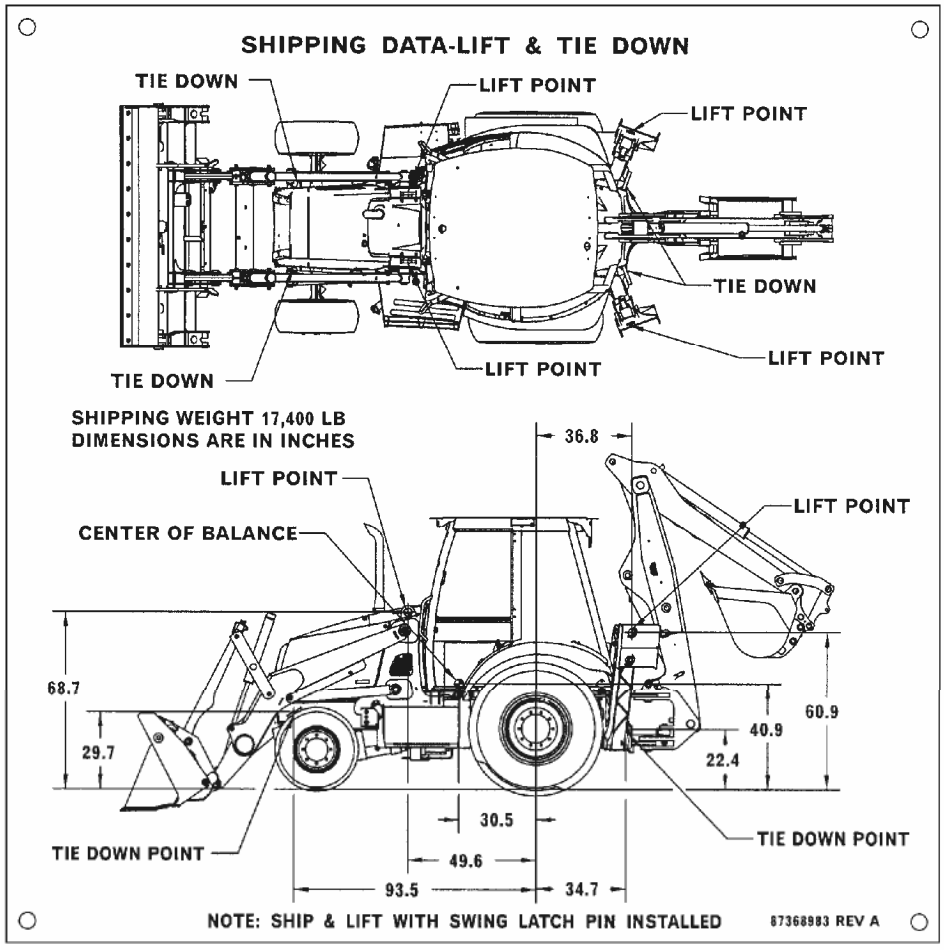
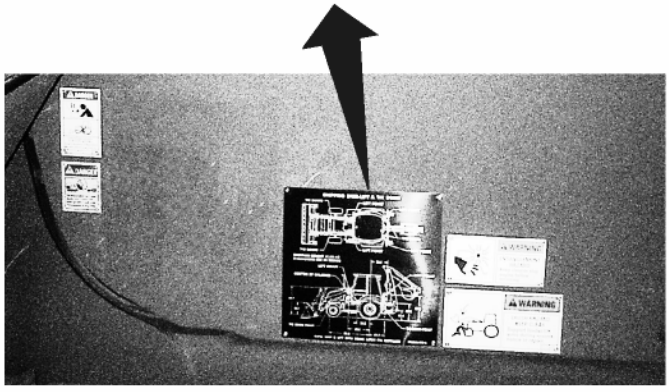


Figure 1. Data Plate Locations (Sheet 1 of 2).

DECAL/DATA PLATE GUIDE - Continued





RIGHT SIDE OF HOOD BHL-10-1102B

Figure 1. Data Plate Locations (Sheet 2 of 2).

END OF WORK PACKAGE

OPERATOR LEVEL

ON-VEHICLE EQUIPMENT LOADING PLAN

INTRODUCTION

This work package illustrates/lists user equipment and its location on the Backhoe Loader (BHL).

ILLUSTRATED LOADING PLAN LIST

The BHL equipment loading locations are shown in Figure 1, and equipment is listed in Table 1.

Figure 1. Loading Plan Locations.

ILLUSTRATED LOADING PLAN LIST - Continued

Table 1. Loading Plan List.

ITEM NO.	ITEM NAME
1	Tool bag (stowed behind cargo net)
2	18-foot tow straps (2 ea) (stowed in tool bag)
	CAUTION Do not stow items with sharp edges in cargo net. Sharp edges will damage side windows.
3	Cargo net (inside right window)
4	Fire extinguisher (to right of operator seat)
5	Following items located in Technical Manual (TM) storage box (below instrument panel): Cotton duck case Operator's manual, TM 5-2420-231-10 Tire pressure gage
6	Following items located in tool box: Clevis Grease gun adapter Hand lubricating gun with grease cartridge
7	Decontamination kit (mounted in decontamination bracket)
8	Rifle mounting bracket for M16A2 rifle or M4 carbine (mounted forward of door)

END OF WORK PACKAGE

CHAPTER 3

TROUBLESHOOTING PROCEDURES FOR BACKHOE LOADER (BHL)

WORK PACKAGE INDEX

OPERATOR LEVEL

TROUBLESHOOTING INDEX

TROUBLESHOOTING INDEX

Malfunction/Symptom **Work Package and Page No.**

ENGINE

STEERING

BRAKES

TRANSMISSION

HYDRAULICS

FRONT END LOADER (FEL)

BACKHOE

TROUBLESHOOTING INDEX - Continued

Malfunction/Symptom **Work Package and Page No.**

END OF WORK PACKAGE

OPERATOR LEVEL

TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools
None

Materials/Parts
None

Personnel Required
Two

References
WP 0004 thru WP 0010
WP 0015
WP 0023 and WP 0024

Equipment Condition
None

INTRODUCTION

This work package contains troubleshooting information with a list of symptoms, malfunctions, tests/inspections, and corrective actions required to return the Backhoe Loader (BHL) to normal operation (Table 1). The tests/inspections and corrective actions should be performed in the order listed. If the first corrective action step is normal, proceed to the next step. The corrective actions will refer to either a work package in this manual or to field level maintenance. Troubleshooting procedures in this manual cannot list all possible malfunctions or tests/inspections required for corrective action. If a symptom/malfunction is not listed or is not corrected by the listed corrective action, notify field level maintenance.

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

TROUBLESHOOTING PROCEDURES

Table 1. Troubleshooting Procedures.

SYMPTOM	MALFUNCTION	CORRECTIVE ACTION:
ENGINE		
1. Engine does not crank.	1. Direction control lever not in neutral position.	Shift direction control lever to neutral position.
	2. Battery weak or faulty.	a. With starter key switch in ON position, check voltmeter gage. Needle should be in green range (11 to 15.3 volts). If needle is not in green range, go to step b below. b. Check exterior lights for indication of sufficient battery power. If lights are dim, go to step c below. **WARNING** Batteries produce explosive gases. Keep sparks, flames, cigars, and cigarettes away from batteries. Ventilate when charging or using in enclosed area. Wear eye protection and protective gloves when working near batteries. Wash hands after handling. Failure to comply may result in serious injury or death to personnel. Metal jewelry can conduct electricity. Remove metal jewelry when near batteries. Failure to comply may result in serious injury or death to personnel. c. Check battery connections for looseness, damage, or corrosion. If any of these conditions exist, notify field level maintenance. d. Slave-start the BHL (WP 0015). e. If problem persists, notify field level maintenance.
2. Engine cranks but does not start.	1. Faulty engine grid heater (cold weather only).	Check if engine grid heater indicator lamp fails to illuminate or does not extinguish (WP 0015). If conditions exist, notify field level maintenance.

TROUBLESHOOTING PROCEDURES - Continued

Table 1. Troubleshooting Procedures - Continued.

SYMPTOM	MALFUNCTION	CORRECTIVE ACTION:
ENGINE - Continued		
2. Engine cranks but does not start - Continued.	2. Fuel system clogged or moisture in fuel.	Check for sediment or water in fuel filter and remove as required (WP 0023).
	3. No fuel in tank.	Refuel.
	4. Air filter clogged.	Check air filter restriction warning lamp. If illuminated, notify field level maintenance.
3. Engine cuts out or lacks power.	1. Air filter clogged.	Check air filter restriction warning lamp. If illuminated, notify field level maintenance.
	2. Idle rpm too low (should be 850 to 1,000 rpm).	Check idle rpm. If too low, notify field level maintenance.
	3. Fuel system clogged or moisture in fuel.	Check for sediment or water in fuel filter and remove as required (WP 0023).
4. Engine overheats.	1. Low engine oil pressure.	Check low engine oil pressure warning lamp. If illuminated, shut engine off immediately and notify field level maintenance. **WARNING** Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi (103 kPa) when using compressed air. Failure to comply may result in serious injury or death to personnel.
	2. Debris blocking radiator fins.	Clean radiator from inside engine compartment with low pressure air blown toward front of the BHL.
	3. Coolant level low.	Check coolant level and add as required (WP 0023).
	4. Engine oil level low.	Check engine oil level and add as required (WP 0023).

TROUBLESHOOTING PROCEDURES - Continued

Table 1. Troubleshooting Procedures - Continued.

SYMPTOM	MALFUNCTION	CORRECTIVE ACTION:
ENGINE - Continued		
4. Engine overheats - Continued.	5. Alternator or air conditioning belt slack (can easily be moved by hand), worn, or frayed.	a. Check for excessive slack in belts. If slack, notify field level maintenance. b. Check for loose, worn, or frayed belts. If conditions exist, notify field level maintenance. **CAUTION** Shut engine off immediately. Failure to comply may result in damage to equipment.
5. Engine is operating but with abnormal noise.	1. Fuel system clogged or moisture in fuel.	Check for sediment or water in fuel filter and remove as required (WP 0023).
	2. Engine oil level low.	a. Check engine oil level and add as required (WP 0023). b. If problem persists, notify field level maintenance.
6. Engine produces excessive black or grey smoke.	1. Air filter clogged.	Check air filter restriction warning lamp. If illuminated, notify field level maintenance.
	2. Engine oil overfilled.	Check engine oil for overfilling. If overfilled, notify field level maintenance.
7. Engine produces excessive blue smoke.	Engine oil overfilled.	Check engine oil for overfilling (WP 0023). If overfilled, notify field level maintenance.
8. Engine produces excessive white smoke.	Coolant level low.	a. Check engine coolant level and add as required (WP 0023). b. If problem persists, notify field level maintenance.
STEERING		
Steering is difficult.	Steering reservoir fluid level low.	Check reservoir fluid level. If low, notify field level maintenance.

TROUBLESHOOTING PROCEDURES - Continued

Table 1. Troubleshooting Procedures - Continued.

SYMPTOM	MALFUNCTION	CORRECTIVE ACTION:
BRAKES		**WARNING** Before operating the BHL, make sure service and parking brakes are operable (WP 0010). Failure to comply may result in serious injury or death to personnel.
1. Braking is not even.	Foot pedal lock pin not properly engaged.	Fully engage foot pedal lock pin.
2. Parking brake does not hold.	Parking brake out of adjustment.	Adjust parking brake (WP 0023).
3. All other brake problems.	All other brake problems.	Notify field level maintenance.
TRANSMISSION		
Transmission does not shift properly or slips.	1. Kickdown switches do not select manual/automatic mode.	Operate kickdown switches to select manual mode or automatic mode.
	2. Transmission fluid level low.	a. Check transmission fluid level and add as required (WP 0023). b. If problem persists, notify field level maintenance.
HYDRAULICS		
1. Hydraulics action erratic.	Hydraulic fluid level low/system leaking.	a. Check for leaks or low hydraulic fluid level and add as required (WP 0023). b. If hydraulic system is leaking, notify field level maintenance.
2. Hydraulic oil filter warning lamp illuminates.	Filter clogged.	Notify field level maintenance.
FRONT END LOADER (FEL)		
1. FEL does not operate.	1. Fuse burned out.	Check fuse (WP 0023). If faulty, notify field level maintenance.
	2. Hydraulic pressure low.	Check hydraulic oil filter warning lamp. If illuminated, notify field level maintenance.
	3. Hydraulic fluid level low.	a. Check for leaks or low hydraulic fluid level and add as required (WP 0023). b. If hydraulic system is leaking, notify field level maintenance.
2. FEL action erratic.	1. Engine cold (more noticeable in cold weather).	Allow engine to warm up properly.
	2. Hydraulics cold (more noticeable in cold weather).	Allow FEL hydraulics to warm up properly by easy, gradual exercise of controls.

TROUBLESHOOTING PROCEDURES - Continued

Table 1. Troubleshooting Procedures - Continued.

SYMPTOM	MALFUNCTION	CORRECTIVE ACTION:
FRONT END LOADER (FEL) - Continued		
2. FEL action erratic - Continued.	3. Hydraulic fluid level low.	a. Check for leaks or low hydraulic fluid level and add as required (WP 0023). b. If hydraulic system is leaking, notify field level maintenance.
BACKHOE		
1. Backhoe does not operate.	1. Fuse burned out.	Check fuse (WP 0023). If faulty, notify field level maintenance.
	2. Hydraulic pressure low.	Check hydraulic oil filter warning lamp. If illuminated, notify field level maintenance.
	3. Hydraulic fluid level low.	a. Check for leaks or low hydraulic fluid level and add as required (WP 0023). b. If hydraulic system is leaking, notify field level maintenance.
2. Backhoe action erratic.	1. Engine cold (more noticeable in cold weather).	Allow engine to warm up properly.
	2. Hydraulics cold (more noticeable in cold weather).	Allow backhoe hydraulics to warm up properly by easy, gradual exercise of controls.
	3. Hydraulic fluid level low.	a. Check for leaks or low hydraulic fluid level and add as required (WP 0023). b. If hydraulic system is leaking, notify field level maintenance.
COOLING SYSTEM		
Cooling system overheats.	1. Coolant level low.	Check coolant level and add as required (WP 0023).
	2. Debris blocking radiator.	Clean debris from radiator (WP 0024).
	3. Alternator belt slipping.	Check belt. If slipping, notify field level maintenance.

TROUBLESHOOTING PROCEDURES - Continued

Table 1. Troubleshooting Procedures - Continued.

SYMPTOM	MALFUNCTION	CORRECTIVE ACTION:
ELECTRICAL SYSTEM		
1. Any lights do not operate.	Fuse burned out.	Check fuse (WP 0023). If faulty, notify field level maintenance.
2. All lights dim with engine shut off.	1. Battery charge low.	If BHL will not start, attempt to slave-start the BHL (WP 0015) and allow battery to charge. Monitor voltmeter gage for reading in normal range.
	2. Battery cables corroded/loose.	Check for corroded/loose battery cables. If corroded/loose, notify field level maintenance.
3. All lights dim with engine operating.	Alternator belt slipping.	a. Check voltmeter gage. Needle should be in green range (11 to 15.3 volts). b. If needle is not in green range, notify field level maintenance.
AIR CONDITIONER		
Air is not cool.	1. Controls not set properly.	a. Turn heater switch fully counter-clockwise (CCW). b. Turn air conditioning temperature switch fully clockwise (CW). c. Open recirculation grill.
	2. Cab air filter clogged.	Clean air filter (WP 0023).
	3. Air conditioning condenser (located forward of radiator) clogged.	Clean condenser (WP 0024).

END OF WORK PACKAGE

CHAPTER 4

MAINTENANCE INSTRUCTIONS FOR BACKHOE LOADER (BHL)

WORK PACKAGE INDEX

OPERATOR LEVEL

SERVICE UPON RECEIPT

INITIAL SETUP:

Tools and Special Tools
None

Materials/Parts
Cleaning compound (WP 0028, Item 2)
Wiping rag (WP 0028, Item 16)

Personnel Required
One

References
WP 0022
DA Form 5988-E
DA PAM 738-750
DD Form 1397
DD Form 314
SF 361
SF 368

Equipment Condition
None

SERVICE UPON RECEIPT OF MATERIEL

1. Read and follow all instructions on DD Form 1397 attached to conspicuous part of the Backhoe Loader (BHL).

WARNING

Wear protective clothing and gloves when removing packing materials and protective coatings. Failure to comply may result in serious injury or death to personnel.

2. Remove metal strapping, plywood, tapes, seals, and wrappings, if necessary.

3. Remove rust preventive compound from coated exterior parts with cleaning compound and wiping rag.

4. Inspect equipment for damage incurred during shipment. If equipment has been damaged, report damage on SF 361, Transportation Discrepancy Report.

5. Check equipment against packing slip to see if shipment is complete. Report all discrepancies per applicable service instructions (DA PAM 738-750).

6. Check to see if equipment has been modified.

PRELIMINARY CHECKS AND ADJUSTMENT OF EQUIPMENT

1. Inspect equipment for possible damage incurred during shipment. If equipment has been damaged, report damage on SF 368, Product Quality Deficiency Report.

2. Check equipment against packing slip to see if shipment is complete. Report all differences using procedure given in DA PAM 738-750.

PRELIMINARY CHECKS AND ADJUSTMENT OF EQUIPMENT - Continued

3. Perform Preventive Maintenance Checks and Services (PMCS) (WP 0022).

4. Request field level maintenance perform initial services.

5. Schedule next PMCS on DD Form 314, Preventive Maintenance Schedule and Record.

6. Report all deficiencies on DA Form 5988-E, Equipment Inspection and Maintenance Worksheet (automated), if deficiencies appear to involve unsatisfactory design.

END OF WORK PACKAGE

OPERATOR LEVEL

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

INTRODUCTION

PMCS are performed to keep the Backhoe Loader (BHL) in operating condition. Inspect the BHL within specified intervals so defects are found and corrected or problems are reported before any serious damage or failure occurs. Do the PMCS as shown in the PMCS table (WP 0022). Pay attention to WARNINGs, CAUTIONs, and NOTEs. A WARNING means someone could be hurt. A CAUTION means equipment could be damaged. A NOTE is used to highlight essential procedures, conditions, or statements, or convey important instructional data to the user.

NOTE

Designated intervals are performed under usual operating conditions. PMCS intervals must be performed more frequently when operating under unusual conditions.

1. Always perform preventive maintenance in the same order so it gets to be a habit.

2. Tools included with the BHL are to be used when doing the PMCS. Wiping rags (WP 0028, Item 17) are needed to remove dirt or grease.

3. If you find something wrong when performing the PMCS, fix it if you can, using troubleshooting procedures (WP 0019) and/or maintenance procedures.

4. If something appears to be wrong and you cannot repair it, write it down on your DA Form 5988-E. If you find something seriously wrong, report it to field level maintenance as soon as possible.

5. Item numbers in column 1 of the PMCS table indicate the PMCS sequence. Use these item numbers for the TM number column on DA Form 5988-E.

6. Information in column 5 of the PMCS table lists conditions that make the equipment not ready/available. Write up items not repaired on DA Form 5988-E for field level maintenance. For further information on how to use these forms, see DA PAM 738-750.

CORROSION PREVENTION AND CONTROL (CPC)

CPC of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future systems. 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. 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.

INSPECTION

Look for signs of a problem or trouble. You can feel, smell, hear, or see many problems. Be alert when in or around the BHL.

Inspect the BHL to see if items are in good condition. Are they correctly assembled, stowed, and secured; excessively worn, leaking, or corroded; or properly lubricated? Correct any problems found or notify field level maintenance.

There are some common items to check all over the BHL. These include the following:

1. Dirt, grease, oil, and debris: They only get in the way and may cover up a serious problem. Keep the equipment clean. Clean as you work and as needed. Use cleaning compound (WP 0028, Item 2) and a wiping rag (WP 0028, Item 17) to clean metal surfaces. Use soap and water to clean rubber, plastic, or glass.

2. Bolts, clamps, nuts, and screws: Continuously check for looseness. Look for chipped paint, bare metal, rust, or corrosion around bolt and screw heads and nuts. Notify field level maintenance when you find them loose.

3. Welds: Many items on the BHL are welded. To check these welds, look for chipped paint, rust, corrosion, or gaps. When these conditions exist, notify field level maintenance on DA Form 5988-E.

WARNING

Battery posts, terminals, and related accessories contain lead and lead compounds. Wash hands after handling. Failure to comply may result in serious injury or death to personnel.

Batteries contain sulfuric acid which causes severe burns. Avoid contact with eyes, skin, or clothing. Always wear eye protection and protective gloves when working near batteries. Failure to comply may result in serious injury or death to personnel.

4. Electrical wires, connectors, and harnesses: Tighten loose connectors. Look for cracked or broken insulation, bare wires, and broken connectors.

INSPECTION - Continued

WARNING

Make sure hydraulic fluid or grease is not injected into skin. Keep hands and body away from any pressurized leak. Use cardboard or paper to check for leaks. If fluid is injected into skin, **SEEK MEDICAL ATTENTION IMMEDIATELY**. Failure to comply may result in serious injury or death to personnel.

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Avoid contact with eyes, skin, and clothing. Always wear eye protection and protective gloves when working with fuel. Avoid repeated/prolonged contact. Use only in ventilated areas. Keep away from open flames or other sources of ignition. Post **FUEL FLAMMABLE/NO SMOKING** signs around area. Make sure fire extinguisher is available. Failure to comply may result in serious injury or death to personnel.

5. Hoses and fluid lines: Check hoses and fluid lines for wear, damage, and leaks. Check for cuts, abrasion, or exposed wire braid on hoses. Ensure clamps and fittings are tight.

6. Hinges: Check hinges for security and operation.

7. Data plates: Check data, caution, and warning plates for security and legibility.

8. Cylinders: Check for scoring, pitting, scratches, rust, or other damage.

WARRANTY HARDTIME STATEMENT

For equipment under manufacturer's warranty, hardtime oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions (such as longer-than-usual operating hours, extended idling periods, extreme dust).

FLUID LEAKAGE

It is necessary for you to know how fluid leakage affects the status of the BHL. The following are types/classes of leakage you need to know to be able to determine the status of the BHL. Learn these leakage definitions and remember – when in doubt, notify your supervisor.

CAUTION

Equipment operation is allowed with minor leakage's (Class I or II), except for fuel which is not allowed any leakage. Consideration must be given to fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. Failure to comply may result in damage to equipment.

When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS.

FLUID LEAKAGE - Continued

Class III leaks should be reported immediately to your supervisor.

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

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

(3) Class III – Leakage of fluid great enough to form drops that fall from item being checked/inspected.

PMCS COLUMN DESCRIPTIONS

ITEM NO. – Lists order in which PMCS should be performed; also used as a source of item numbers for the TM number column on DA Form 5988-E when recording results of PMCS.

INTERVAL – Indicates when each check is to be performed.

ITEM TO BE CHECKED OR SERVICED – Lists item to be checked or serviced.

PROCEDURE – Provides brief description of procedure as well as any information required to accomplish each check or service.

EQUIPMENT NOT READY/AVAILABLE IF – Lists condition in which the BHL should not be operated or accepted.

END OF WORK PACKAGE

OPERATOR LEVEL

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS), INCLUDING LUBRICATION INSTRUCTIONS

INITIAL SETUP:

Tools and Special Tools
None

Materials/Parts
Antifreeze (WP 0028, Item 1)
Automotive grease (WP 0028, Item 9)
Diesel/turbine fuel (WP 0028, Items 4 thru 7)
Engine lubricating oil (WP 0028, Items 12 thru 15)
Hydraulic fluid (WP 0028, Item 10)
Transmission fluid (WP 0028, Item 11)
Windshield washer solvent (WP 0028, Item 17)
Wiping rag (WP 0028, Item 16)

Personnel Required
Two (for checking external lights)

References
WP 0004 thru WP 0012
WP 0023 and WP 0024
WP 0026, Table 2

Equipment Condition
BHL parked on level ground (WP 0010)
FEL bucket lowered to ground (WP 0010)
Backhoe in transport position (WP 0010)
Parking brake engaged (WP 0010)
Engine shut off (WP 0010)

PMCS

NOTE

There are no mandatory replacement parts required for these PMCS procedures.

Figure 1 shows the general sequence in which the PMCS is performed which will help to complete the Before, During, and After PMCS. Table 1 contains the PMCS procedures.

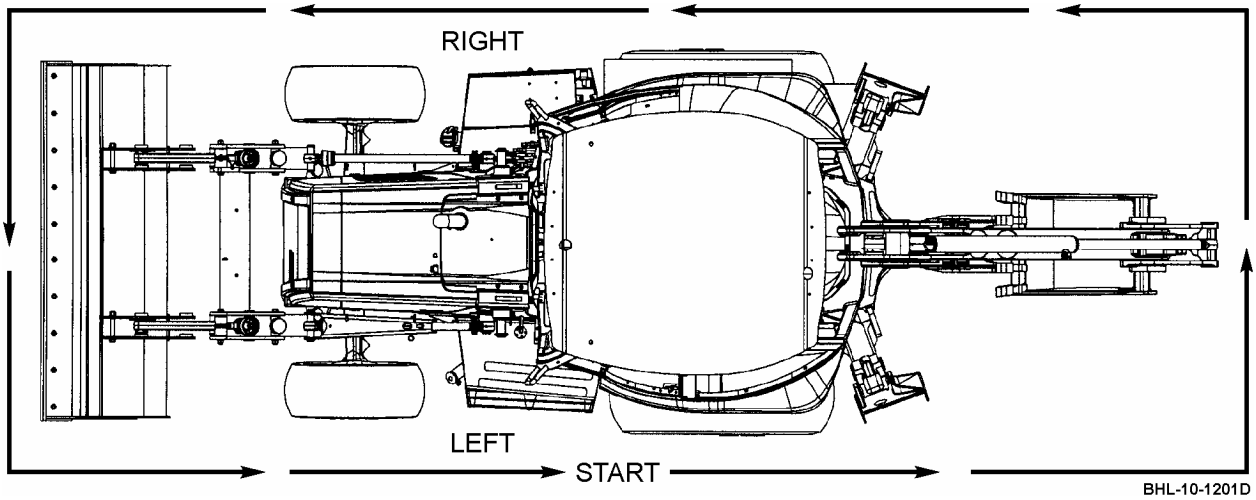


Figure 1. PMCS Walkaround Diagram.

PMCS - Continued

Table 1. PMCS.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Before	Backhoe Loader (BHL) exterior	Check underneath the BHL for signs of fluid leaks (fuel, oil, transmission fluid, hydraulic fluid, or coolant).	Any fuel leaks or Class III leakage of oil, transmission fluid, hydraulic fluid, or coolant.
2	Before	Left rear tire and wheel	1. Check tire for uneven or excessive wear, large cuts, other damage, or low pressure (below 32 psi (220 kPa)).	Tire has excessive damage or wear, low pressure, or does not hold air.
			2. Check wheel for damage.	Wheel damaged.
3	Before	Right rear tire and wheel	1. Check tire for uneven or excessive wear, large cuts, other damage, or low pressure (below 32 psi (220 kPa)).	Tire has excessive damage or wear, low pressure, or does not hold air.
			2. Check wheel for damage.	Wheel damaged.
4	Before	Hydraulic tank	1. Check for hydraulic fluid between ADD and FULL marks on sight gage and add hydraulic fluid as required (WP 0023).	Hydraulic fluid level low.
			2. Check for leaks.	Class III leaks.
5	Before	Right front tire and wheel	1. Check tire for uneven or excessive wear, large cuts, other damage, or low pressure (50 psi (345 kPa)).	Tire has excessive damage or wear, low pressure, or does not hold air.
			2. Check wheel for damage.	Wheel damaged.
			3. Check steering cylinder for damage.	Steering cylinder damaged.
6	Before	Left front tire and wheel	1. Check tire for uneven or excessive wear, large cuts, other damage, or low pressure (below 50 psi (345 kPa)).	Tire has excessive damage or wear, low pressure, or does not hold air.
			2. Check wheel for damage.	Wheel damaged.
			3. Check steering cylinder for damage.	Steering cylinder damaged.

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	Before	Engine oil	1. Unlatch and raise hood and check oil level and add oil as required (WP 0023).	Oil level low.
			2. Check for leaks.	Class III leaks.
8	Before	Cooling system	1. Check coolant level (WP 0023).	Coolant level low.
			2. Check for leaks.	Class III leaks.
9	Before	Engine	1. Check overall engine for general condition, leaks, and loose components.	Engine/parts damaged, corroded, missing, or loose.
			2. Close and latch hood.	
			3. Check that hood closes slowly and does not slam closed.	Hood slams closed.
10	Before	Seat and seat belt	Check condition of seat and seat belt.	Seat or seat belt damaged.
11	Before	Fire extinguisher	Check fire extinguisher for condition. Check gage for indication in green range. Check that expiration date has not passed.	Fire extinguisher missing or damaged. Gage not in green range. Expiration date passed.
12	Before	Mirror and glass	Check all glass and mirror for damage.	Any damage which will degrade visibility for safe operation.
13	Before	Lights, gages, warning indicators, and audible alarms	1. Perform all light checks in accordance with WP 0009.	Any lights necessary for operation not operating properly.
			2. Start engine and monitor all gages, warning indicators, horn, and audible alarms for proper operation (WP 0004 thru WP 0009).	a. Any gages unreadable or not functioning properly.
				b. Any warning indicators or audible alarms not operating properly.

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
14	Before	Heat and air conditioning	Check for operation as required (WP 0004). **WARNING** Before operating the BHL, make sure service and parking brakes are operable (WP 0010). Failure to comply may result in serious injury or death to personnel.	Heat or air conditioning not operating properly.
15	Before	Service brakes/ parking brake	1. Check service brakes (WP 0010).	Brake pedals soft or travel to floor.
			2. Check parking brake (WP 0010) and adjust if necessary (WP 0023).	Parking brake cannot be adjusted to hold the BHL.
16	Before	Reverse alarm	Check reverse alarm operation (WP 0009).	Alarm does not operate properly.
17	During	Accelerator and hand throttle	Check for proper operation.	Accelerator or hand throttle cannot be easily controlled.
18	During	Engine	Listen for any unusual engine noises or vibrations during normal operation.	Any unusual engine noises or vibrations.
19	During	Transmission	When engine has warmed up to normal operating temperature and with brakes applied, shift direction control level through all positions and check that transmission is smooth and does not slip.	Transmission erratic or slips in any position.
20	During	Steering	Operate steering and check for unusual noise, binding, stiffness, or difficulty in turning.	Any unusual noise, binding, stiffness, or difficulty in turning.
21	During	Front End Loader (FEL) and backhoe operation	Check FEL and backhoe for proper operation.	Any stiffness, binding, unusual noise, or jerky operation.

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
22	After	BHL exterior	While performing the After PMCS, check the following:	
			1. Check underneath the BHL for signs of fluid leaks (fuel, oil, transmission fluid, hydraulic fluid, or coolant).	Any fuel leaks or Class III leaks of oil, transmission fluid, hydraulic fluid, or coolant.
			2. Check tires, FEL bucket, lift arms, stabilizers, backhoe, boom, and dipper for general condition, damage, or missing parts.	Any defect that would prevent operation.
			3. Check cylinders and hoses for chafing and leaks.	Class III leaks.
23	After	FEL lift arms safety support strut	Check safety support strut for damage or missing parts.	Safety support strut damaged or missing parts.
			WARNING When engine is operating, metal surfaces are hot and will burn flesh on contact. Wear protective gloves and exercise care when checking transmission fluid. Failure to comply may result in serious injury or death to personnel.	
24	After	Transmission fluid	1. Start engine.	
			2. Check fuel gage for sufficient fuel for mission.	
			3. Unlatch and raise hood.	
			4. Check transmission fluid and add fluid as required (WP 0023).	Transmission fluid level low.
			5. Shut engine off.	

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			WARNING When engine has been operating, metal surfaces are hot and will burn flesh on contact. Make sure engine has been allowed to cool before making engine checks. Failure to comply may result in serious injury or death to personnel.	
25	After	Cooling system reservoir/windshield washer reservoir	1. Check coolant reservoir level is between HOT MAX and COLD MIN marks, and add coolant mixture as required (WP 0023).	Coolant level low.
			2. Check for leaks, damage, or loose mounting.	Class III leaks.
			3. Check radiator for clogging by dirt and debris and clean as required (WP 0024).	Radiator damaged or clogged by dirt or debris.
			4. Check windshield washer reservoir level and add solvent as required (WP 0023).	Solvent level low.
26	After	Fan and belts	1. Check condition of fan.	Fan damaged.
			2. Check alternator and air conditioning belts for tension and condition.	Belts loose, damaged, or excessively worn.
27	After	Engine air filter	1. Check hoses and fittings for damage. Hoses should be pliable.	Hoses or fittings damaged. Hoses brittle or cracked.
			2. Check air filter body for damage or corrosion.	Air filter body damaged or corroded.
28	After	Exhaust system and turbocharger	1. Check turbocharger, exhaust pipe and muffler for corrosion, damage, leaks, or missing parts.	Exhaust pipe or muffler corroded or missing parts.
			2. Close and latch hood.	

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			WARNING	
				
			Before starting, always make sure that all other personnel are away from the backhoe. Failure to comply may result in serious injury or death to personnel. Lower stabilizers to operating position before lowering backhoe boom and extending dipper. Front of the BHL can raise above ground and cause an accident. Failure to comply may result in serious injury or death to personnel.	
			NOTE Prior to continuing the After PMCS, do the following: 1. Start engine and raise FEL lift arms. 2. Configure the clamshell open and dozer and clamshell cutting edges on ground. 3. Lower stabilizers. 4. Disengage swing and transport lock and extend backhoe boom and dipper and curl bucket inward. 5. Lower backhoe bucket to ground and shut engine off. 6. Toggle FEL controls to relieve hydraulic pressure.	
29	After	Left stabilizer	Check for damage and loose or missing parts.	Any defect that would prevent operation.
30	After	Left side of backhoe swing post	1. Check for damage, loose or missing parts, and secure mounting.	Any defect that would prevent operation.
			2. Check hoses for chafing and leaks.	Class III leaks.
31	After	Left side of backhoe boom, dipper, and hoses	1. Check for damage, loose or missing parts, and secure mounting.	Any defect that would prevent operation.
			2. Check hoses for chafing and leaks.	Class III leaks.

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
32	After	Backhoe bucket	1. Check for damage, loose or missing parts, and secure mounting. **NOTE** Use scale on inside back cover of this manual as a guide when checking backhoe bucket teeth measurement.	Any defect that would prevent operation.
			2. Check teeth and cutting edges. If tooth measurement from back to front tip is 3.5 inches (8.9 cm) or less, notify field level maintenance to replace teeth.	Any backhoe bucket teeth less than 3.5 inches (8.9 cm) long.
33	After	Right side of backhoe boom, dipper, and hoses	1. Check for damage, loose or missing parts, and secure mounting.	Any defect that would prevent operation.
			2. Check hoses for chafing and leaks.	Class III leaks.
34	After	Right side of backhoe swing post	1. Check for damage, loose or missing parts, and secure mounting.	Any defect that would prevent operation.
			2. Check hoses for chafing and leaks.	Class III leaks.
35	After	Right stabilizer	Check for damage and loose or missing parts.	Any defect that would prevent operation.
36	After	Rear lights/ windshield wiper	1. Check for damage, loose or missing parts, and secure mounting.	Any lights necessary for night operation damaged or missing.
			2. Check wiper blade for cracks or tears.	Blade damaged.

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			WARNING NATO slave receptacle is electrically live at all times and is unfused. NATO slave receptacle is only dead when batteries are fully disconnected. Disconnect batteries before performing maintenance on NATO slave receptacle. Failure to comply may result in serious injury or death to personnel.	
37	After	NATO slave receptacle	Check for cracked or broken receptacle or other damage.	NATO slave receptacle cracked or broken.
38	After	Battery box/tool box	1. Check battery box and tool box for cracks, corrosion, or missing hardware.	Major structural damage.
			2. Check tool box for presence and condition of tools (WP 0026, Table 2).	Required tools missing or unserviceable.
			WARNING Batteries produce explosive gases. Keep sparks, flames, cigars, and cigarettes away from batteries. Ventilate when charging or using in enclosed area. Wear eye protection and protective gloves when working near batteries. Wash hands after handling. Failure to comply may result in serious injury or death to personnel. Metal jewelry can conduct electricity. Remove metal jewelry when near batteries. Failure to comply may result in serious injury or death to personnel.	
39	After	Batteries	1. Check for damage or leaks.	Batteries damaged or leaking.
			2. Check battery cables and mounting hardware for tightness and corrosion.	a. Cables damaged or cannot be tightened. b. Corrosion cannot be removed.

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
40	After	FEL bucket	1. Check for damage, loose or missing parts, and secure mounting.	Any defect that would prevent operation.
			NOTE Use scale on inside back cover of this manual as a guide when checking FEL bucket teeth and cutting edge measurement.	
			2. Check teeth (WP 0023). If tooth measurement from back to front tip is 3.5 inches (8.9 cm) or less, notify field level maintenance to replace teeth.	Any FEL bucket teeth less than 3.5 inches (8.9 cm) long.
			3. Check cutting edges (WP 0023). If any cutting edge measurement is 1 inch (2.5 cm) or less, notify field level maintenance to reverse or replace cutting edge.	Any cutting edge 1 inch (2.5 cm) or less.
			4. Check hoses for chafing and leaks.	Class III leaks.
41	After	FEL lift arms, cylinders, and hoses	1. Check for damage, loose or missing parts, and secure mounting.	Any defect that would prevent operation.
			2. Check cylinders and hoses for chafing and leaks.	Class III leaks.
42	After	Front lights/wind-shield wiper	1. Check for damage, loose or missing parts, and secure mounting.	Any lights necessary for night operation damaged or missing.
			2. Check wiper blade for cracks or tears.	Blade damaged.
43	After	Fuel tank	Check for damage that would cause leaks.	Any fuel leaks or potential fuel leaks.

PMCS - Continued

Table 1. PMCS - Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
44	After	BHL	1. Perform daily lubrication per Lubrication Instructions that follow (Tables 2 thru 4). 2. After completing lubrication, start engine. 3. Park vehicle and shut engine off in accordance with WP 0010.	Daily lubrication not performed.
45	After	Two tow straps (stowed in bag behind cargo net)	Check that both straps are stowed in bag.	Straps not properly stowed in bag.
46	Weekly or 50 hours	Two tow straps (stowed in bag behind cargo net)	Check straps for signs of chafing, tearing, wear, abrasion, or red threads visible (WP 0015).	Deterioration that would prevent safe use.
47	Weekly or 50 hours	Fuel filter	Check fuel filter for water or sediment and clean as required (WP 0023).	Excessive water or sediment in fuel filter.

LUBRICATION INSTRUCTIONS

These lubrication instructions are for operator (C) maintenance. Lubrication intervals (on-condition or hard time) are based on normal operation. Lubricate more frequently during constant use, and less during inactive periods. The task-hour specified is the time needed to do all the services prescribed for a particular interval. Use correct grade of lubricant for seasonal temperature expected. The lubrication interval and symbol is listed below:

D – Daily or 10 hours M – Monthly

Before starting your lubrication, do the following:

Always	Never
a. Use Lubrication Instructions as your guide.	a. Use wrong type/grade lubricant.
b. Use correct type/grade lubricant.	b. Use too much lubricant.
c. Clean area where lubricant is to be applied to prevent buildup of dirt, grit, and contaminants.	c. Apply lubricant to dirty components.

1. Clean grease fittings before lubricating with grease gun.
2. Add grease through grease fitting until clean grease comes out of component; then, wipe off excess.
3. Authorized grease is automotive grease. Authorized fuel, engine lubricating oil, antifreeze, windshield washer solvent, transmission fluid, and hydraulic fluid are listed in the Servicing work package (WP 0023).

FEL Grease Fittings

FEL grease fittings are listed in Table 2 and shown in Figure 2.

Table 2. FEL Grease Fittings.

ITEM NO.	INTERVAL	COMPONENT	NO. OF PLACES	LUBRICANT
1	D	Lift arms pivot	4 (2 each side)	Grease
2	D	Lift cylinder closed end	4 (2 each side)	Grease
3	D	Lift cylinder rod end	2 (1 each side)	Grease
4	D	Bucket cylinder trunnion	2 (1 each side)	Grease
5	D	Bucket link	2 (1 each side)	Grease
6	D	Bucket cylinder rod end	2 (1 each side)	Grease
7	D	Bucket pivot	4 (2 each side)	Grease
8	D	4-in-1 bucket clamshell cylinder rod end	2 (1 each side)	Grease
9	D	4-in-1 bucket clamshell cylinder and pivot	2 (1 each side)	Grease
10	D	4-in-1 bucket clamshell cylinder closed end	2 (1 each side)	Grease
11	D	FEL tool carrier lock pins	2 (1 each side)	Grease

LUBRICATION INSTRUCTIONS - Continued

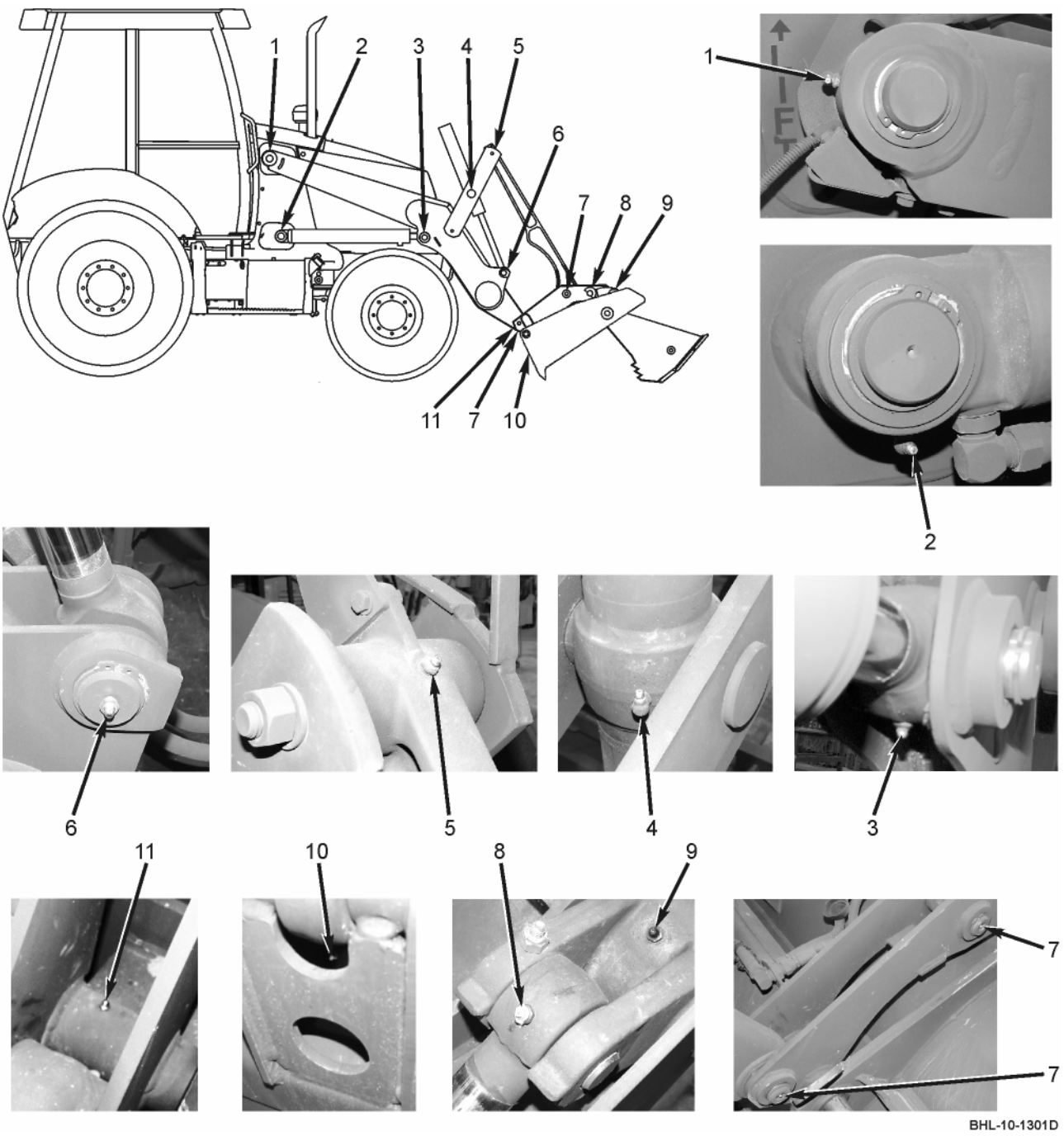


Figure 2. FEL Grease Fittings.

LUBRICATION INSTRUCTIONS - Continued

Backhoe Grease Fittings

Backhoe grease fittings are listed in Table 3 and shown in Figure 3.

Table 3. Backhoe Grease Fittings.

ITEM NO.	INTERVAL	COMPONENT	NO. OF PLACES	LUBRICANT
1	D	Trunnion	4 (2 each side)	Grease
2	D	Stabilizer cylinder closed end	2 (1 each side)	Grease
3	D	Boom release	1	Grease
4	D	Boom cylinder rod end	1	Grease
5	D	Upper swing pivot	1	Grease
6	D	Lower swing pivot	1	Grease
7	D	Swing cylinder rod end	2 (1 each side)	Grease
8	D	Boom pivot	2 (1 each side)	Grease
9	D	Dipper cylinder closed end	1	Grease
10	D	Boom cylinder closed end	1	Grease
11	D	Dipper cylinder rod end	1	Grease
12	D	Bucket cylinder closed end	1	Grease
13	D	Dipper pivot	2 (1 each side)	Grease
14	D	Bucker cylinder rod end	1	Grease
15	D	Bucket links	4 (2 each side)	Grease
16	D	Bucket link	1	Grease
17	D	Bucket pivot	2 (1 each side)	Grease

LUBRICATION INSTRUCTIONS - Continued

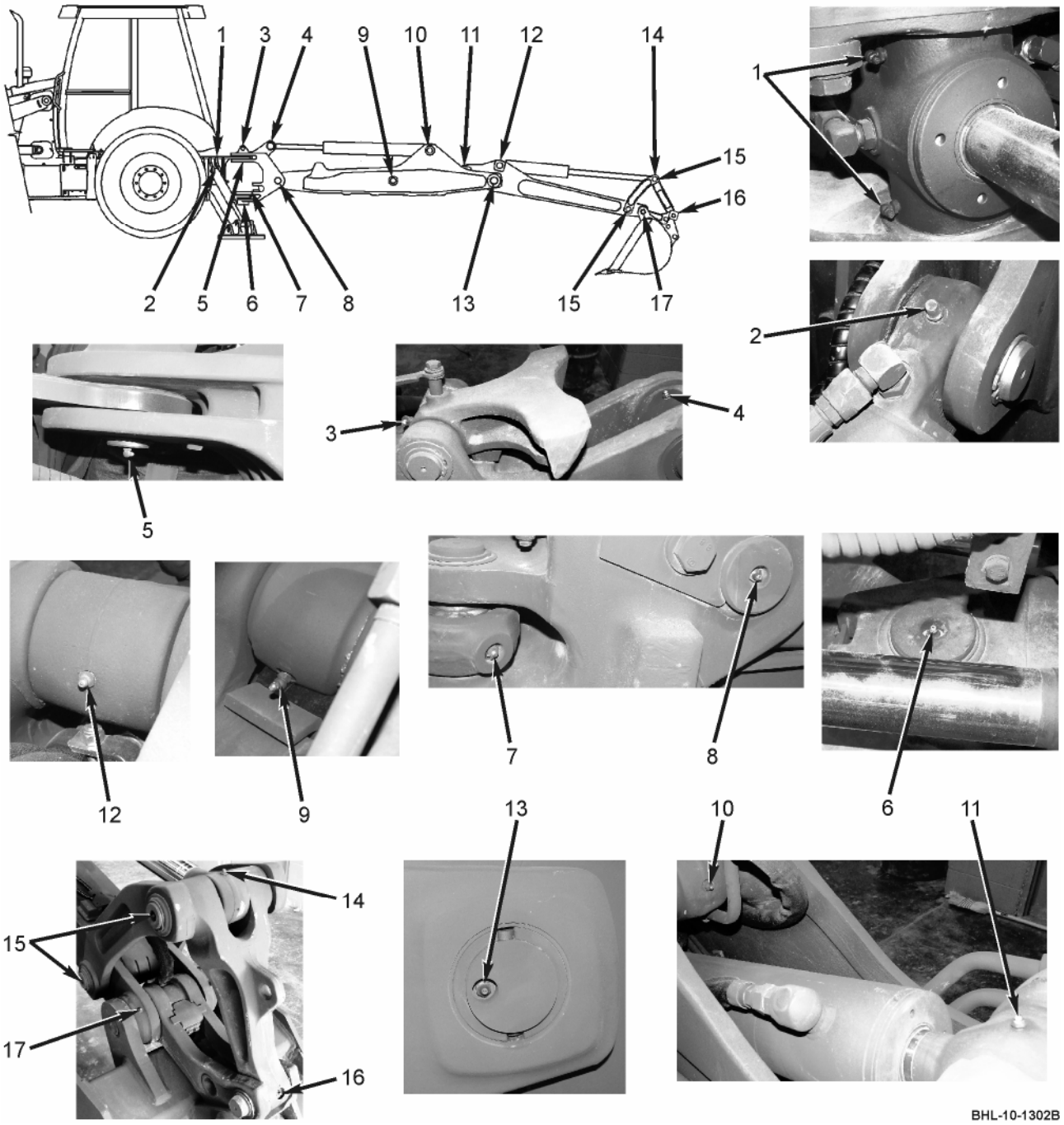


Figure 3. Backhoe Grease Fittings.

LUBRICATION INSTRUCTIONS - Continued

BHL Grease Fittings

The BHL grease fittings are listed in Table 4 and shown in Figure 4.

Table 4. BHL Grease Fittings.

ITEM NO.	INTERVAL	COMPONENT	NO. OF PLACES	LUBRICANT
1	D	Front axle pivot remote grease fitting	1	Grease
2	D	Upper and lower king pins	4 (2 each side)	Grease
3	M	Front slip spline	1	Grease
4	M	Rear slip spline	1	Grease

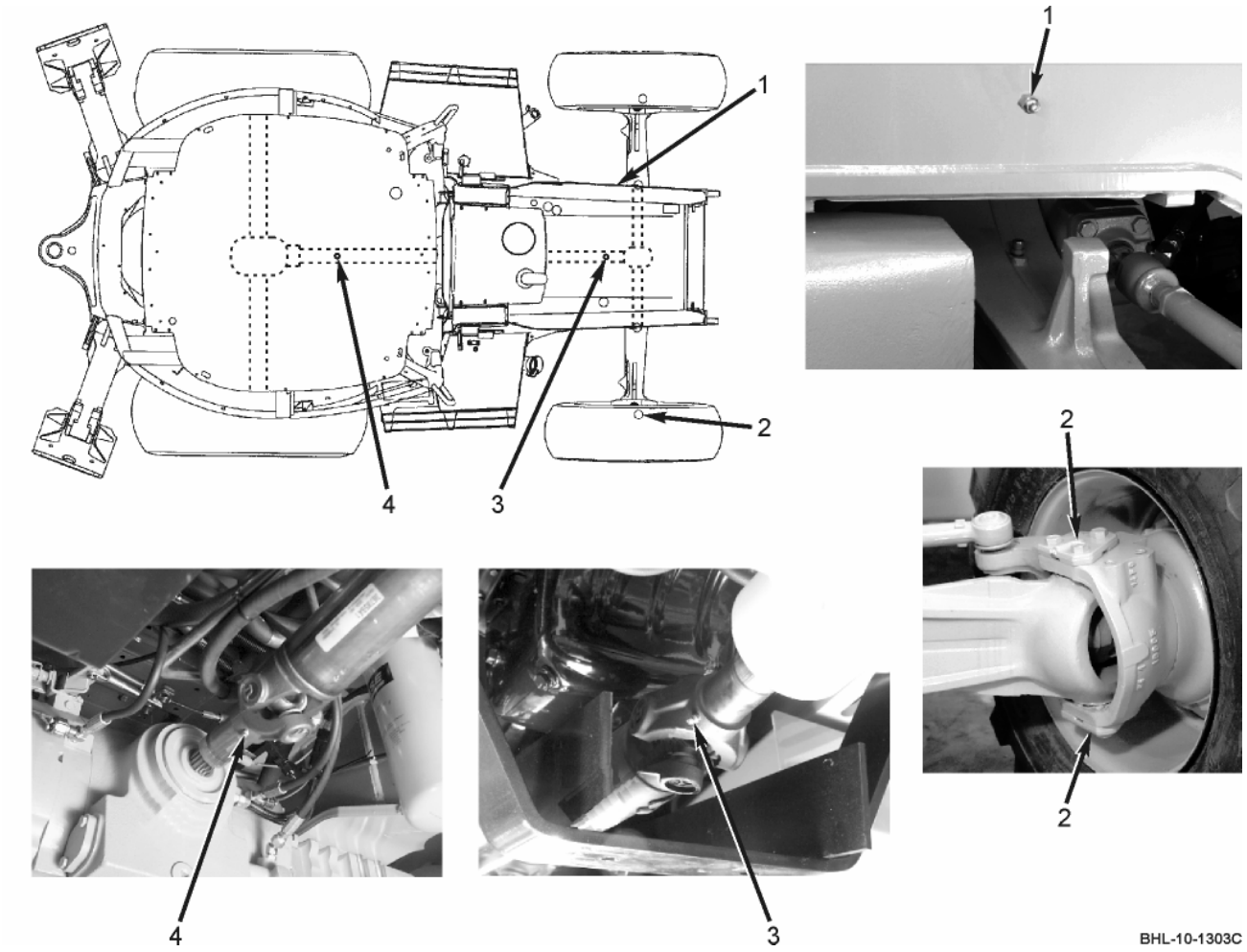


Figure 4. BHL Grease Fittings.

END OF WORK PACKAGE

OPERATOR LEVEL

SERVICING

INITIAL SETUP:

Tools and Special Tools
Tire pressure gage (WP 0026, Item 5)

Materials/Parts
Antifreeze (WP 0028, Item 1)
Cleaning compound (WP 0028, Item 2)
Diesel/turbine fuel (WP 0028, Items 4 thru 7)
Duct tape (WP 0028, Item 18)
Engine lubricating oil (WP 0028, Items 12 thru 15)
Hydraulic fluid (WP 0028, Item 10)
Transmission fluid (WP 0028, Item 11)
Windshield washer solvent (WP 0028, Item 17)
Wiping rag (WP 0028, Item 16)

Personnel Required
One

References
WP 0004 thru WP 0012
WP 0022
WP 0024

Equipment Condition
BHL parked on level ground (WP 0010)
FEL bucket lowered to ground (WP 0010)
Backhoe in transport position (WP 0010)
Stabilizers raised (WP 0010)
Parking brake engaged (WP 0010)
Engine shut off (WP 0010)

INTRODUCTION

This work package contains servicing procedures. The following index provides a quick reference to the servicing procedures and pages.

Servicing Procedure **Page No.**

SERVICING PROCEDURES

FEL Lift Arms Safety Support Strut Engagement

WARNING

When servicing the Backhoe Loader (BHL) with Front End Loader (FEL) bucket raised, always use lift arms safety support strut to lock bucket. Failure to comply may result in serious injury or death to personnel.

When FEL lift arms safety support strut is raised, always remove or install retaining pin while standing to rear of safety support strut. Failure to comply may result in serious injury or death to personnel.

1. Engage parking brake.
2. Start engine.
3. Dump material from FEL bucket (WP 0006).
4. Raise FEL lift arms to maximum height (WP 0006).
5. Shut engine off.
6. Remove retaining pin (Figure 1, Item 1) from pin (Figure 1, Item 2).
7. Remove pin (Figure 1, Item 2) from safety support strut (Figure 1, Item 3).
8. Lower FEL lift arms safety support strut (Figure 1, Item 3) onto cylinder rod (Figure 1, Item 4).
9. Stand to rear of FEL lift arms safety support strut, insert pin (Figure 1, Item 2) into safety support strut (Figure 1, Item 3), and install retaining pin (Figure 1, Item 1).
10. From operator seat, slowly lower FEL onto FEL lift arms safety support strut (Figure 1, Item 3).

SERVICING PROCEDURES - Continued

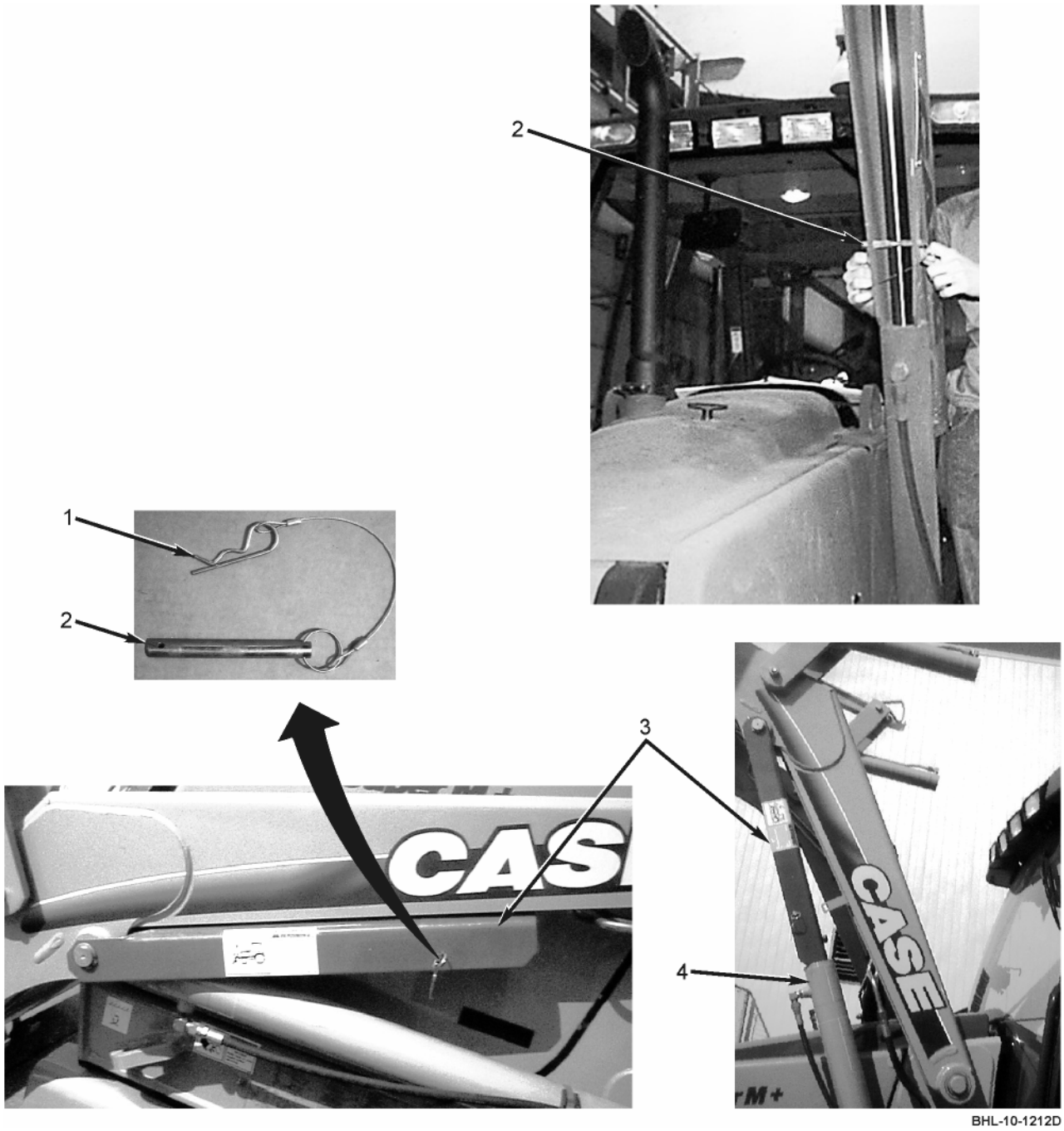


Figure 1. FEL Lift Arms Safety Support Strut Engagement/Disengagement.

SERVICING PROCEDURES - Continued

FEL Lift Arms Safety Support Strut Disengagement

1. From operator seat, start engine, raise FEL lift arms slightly, and shut engine off.
2. Remove retaining pin (Figure 1, Item 1) and pin (Figure 1, Item 2) from FEL lift arms safety support strut (Figure 1, Item 3).
3. Hold FEL lift arms safety support strut (Figure 1, Item 3) in stow position and install pin (Figure 1, Item 2) and retaining pin (Figure 1, Item 1).
4. From operator seat, slowly lower FEL lift arms to ground.
5. Shut engine off.

Engine Hood Raising/Closing

Raising Engine Hood. To raise engine hood, proceed as follows:

WARNING

Make sure engine is shut off before raising engine hood. Hot metal surfaces will burn flesh on contact. Exercise care when raising hood and servicing engine. Failure to comply may result in serious injury to personnel.

1. Engage parking brake.
2. Stand on left side of the BHL and turn handle (Figure 2, Item 1) on top of engine hood counterclockwise (CCW) to release hood.
3. Use lift handle (Figure 2, Item 2) on side of engine hood and raise hood and rotate forward.

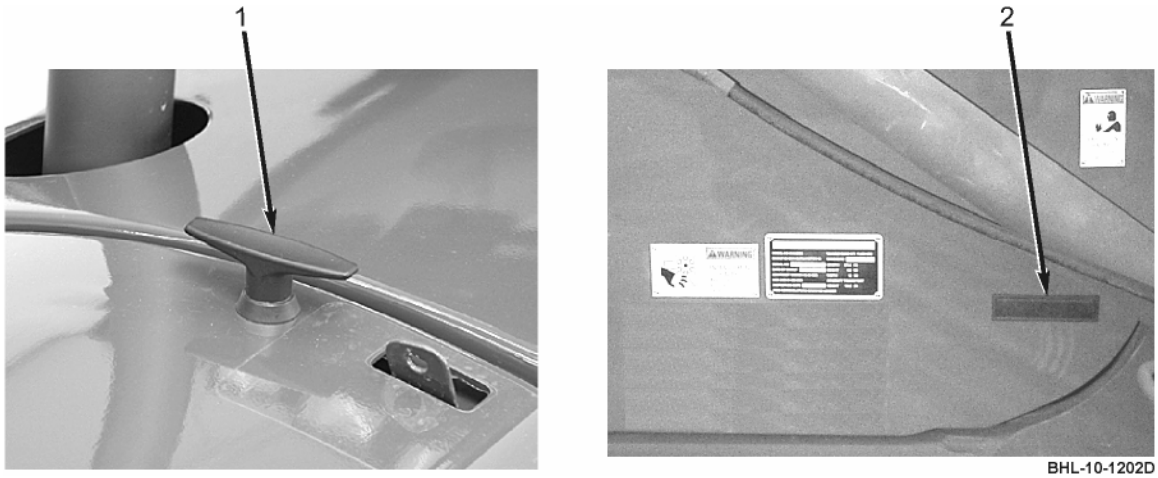


Figure 2. Engine Hood Raising/Closing.

SERVICING PROCEDURES - Continued

Closing Engine Hood. To close engine hood, proceed as follows:

WARNING

Close hood carefully. Failure to comply may result in serious injury to personnel.

CAUTION

Always close engine hood before moving the BHL. Failure to comply may result in damage to engine hood parts.

1. Stand on left side of the BHL and lower engine hood.
2. Turn handle (Figure 2, Item 1) clockwise (CW) to latch engine hood.

Fuel Tank Level Check

NOTE

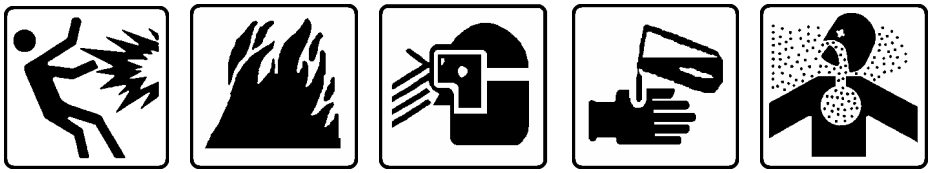
Fill fuel tank at end of each day. A full tank will prevent water condensation.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Park the BHL on level ground.
2. Engage parking brake.
3. Check fuel tank level by reading fuel gage on right side of instrument panel.
4. Fuel low level indicator lamp will illuminate with 5 gallons or less of fuel in tank.

SERVICING PROCEDURES - Continued

WARNING



Fuel used in the BHL is flammable. When filling fuel tank, maintain metal-to-metal contact between filler nozzle and fuel tank opening to eliminate static electrical discharge. Failure to comply can cause flames and possible explosion and may result in damage to equipment and serious injury or death to personnel.

Hot engine surfaces are possible sources of ignition. When hot refueling, avoid fuel splashes and fuel spills. Do not smoke or use open flame when refueling. Failure to comply can cause flames and possible explosion and may result in damage to equipment and serious injury or death to personnel.

Do not fill fuel tank completely to top. Allow room for expansion. Failure to comply may result in serious injury or death to personnel.

Do not fill fuel tank while engine is operating. Failure to comply may result in serious injury or death to personnel.

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Avoid contact with eyes, skin, and clothing. Always wear eye protection and protective gloves when working with fuel. Avoid repeated/prolonged contact. Use only in ventilated areas. Keep away from open flames or other sources of ignition. Post **FUEL FLAMMABLE/NO SMOKING** signs around area. Make sure fire extinguisher is available. Failure to comply may result in serious injury or death to personnel.

5. Fill fuel tank as follows:

   a. Shut engine off and remove fuel cap (Figure 3, Item 1) from fuel tank.

   b. Select correct grade of fuel (Table 1).

   c. Add fuel to within 1 inch (2.54 cm) from top of fuel tank.

   d. Install fuel cap (Figure 3, Item 1) onto fuel tank.

6. Clean up spills with cleaning compound and wiping rag. Dispose of used rags per unit Standing Operating Procedures (SOP).

SERVICING PROCEDURES - Continued

Figure 3. Fuel Tank.

Table 1. Fuel Grade Selection Chart.

AMBIENT TEMP	Degrees F	-50	-25	-15	0	+5	+15	+20	+30	+40	+70	+90	+110	+120
	Degrees C	-46	-32	-26	-18	-15	-9	-7	-1	+4	+21	+32	+38	+49
A-A-52557 DF-1			━	━	━	━	━	━						
A-A-52557 DF-2								━	━	━	━	━	━	━
MIL-PFR-5624 JP-5		━	━	━	━	━	━	━	━	━	━	━	━	━
MIL-T-83133 JP-8		━	━	━	━	━	━	━	━	━	━	━	━	━

SERVICING PROCEDURES - Continued

Water And Sediment In Fuel System Check

WARNING

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Avoid contact with eyes, skin, and clothing. Always wear eye protection and protective gloves when working with fuel. Avoid repeated/prolonged contact. Use only in ventilated areas. Keep away from open flames or other sources of ignition. Post **FUEL FLAMMABLE/NO SMOKING** signs around area. Make sure fire extinguisher is available. Failure to comply may result in serious injury or death to personnel.

NOTE

Check fuel filter every 50 hours or each week.

1. Engage parking brake.
2. Raise engine hood.
3. On left side of the BHL, hold suitable container under fuel filter and loosen drain valve (Figure 4, Item 1).
4. If fuel does not flow, notify field level maintenance.
5. If water or sediment is found, notify field level maintenance.
6. Close drain valve (Figure 4, Item 1).
7. Clean up spills with wiping rag.
8. Close engine hood.
9. Dispose of waste fuel per unit SOP.

SERVICING PROCEDURES - Continued

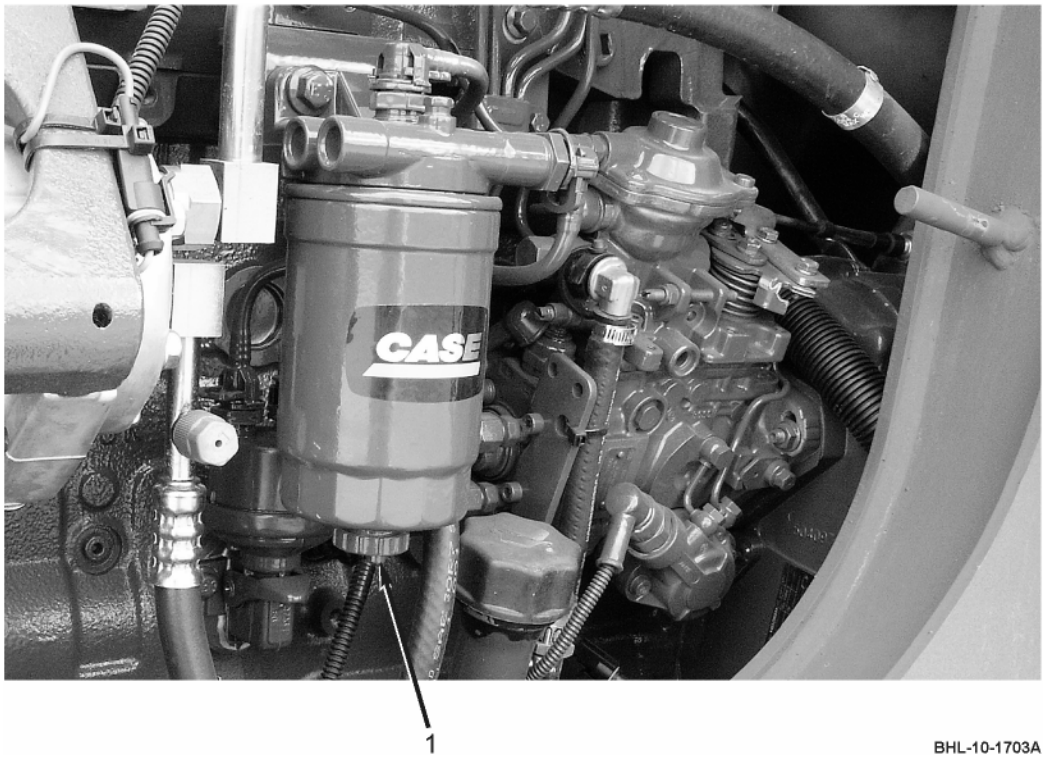


Figure 4. Sediment Check.

Hydraulic Fluid Level Check

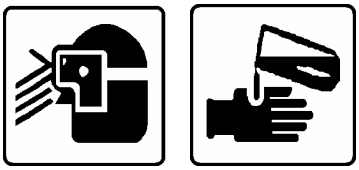
1. Park the BHL on level ground.
2. Engage parking brake.
3. Shift direction control lever to neutral position.
4. Lower FEL bucket to ground and move backhoe into transport position (WP 0010).
5. Stop engine.
6. Let BHL cool down for 15 minutes before checking hydraulic fluid.

SERVICING PROCEDURES - Continued

7. Hydraulic reservoir is full when hydraulic fluid covers half of sight gage window (Figure 5, Item 2) (at FULL mark).

8. Hydraulic reservoir requires servicing when fluid level in sight gage window is at ADD level or below.

WARNING



Hydraulic fluid may be absorbed through the skin. Wear long sleeves, gloves, and goggles or face shield when handling hydraulic fluid. If hydraulic fluid gets into the eyes, flush eyes immediately with water and seek medical attention. If hydraulic fluid gets on the skin, wash thoroughly with soap and water. Wash hands thoroughly prior to eating or smoking. Failure to comply may result in serious injury to personnel.

9. Press, twist CCW, and remove cap (Figure 5, Item 1) from hydraulic tank and add hydraulic fluid as required (WP 0028, Item 10).

10. Press and twist cap (Figure 5, Item 1) CW onto hydraulic tank.

11. Clean up spills with wiping rag. Dispose of used rags per unit SOP.

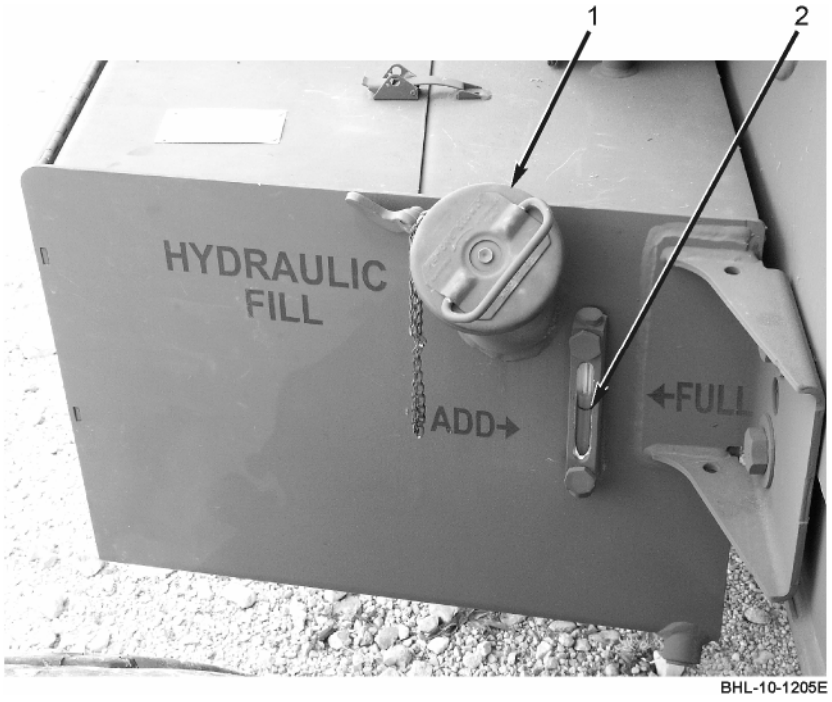


Figure 5. Hydraulic Tank.

SERVICING PROCEDURES - Continued

Transmission Fluid Level Check

WARNING

Hot metal surfaces will burn flesh on contact. Exercise care when raising hood and servicing engine. Failure to comply may result in serious injury or death to personnel.

Keep clear of rotating fan and belts. Failure to comply may result in serious injury or death to personnel.

CAUTION

Do not permit dirt, dust, or grit to enter transmission oil dipstick tube. Transmission fluid may become contaminated. Failure to comply may result in damage to transmission.

Do not overfill transmission. Failure to comply may result in damage to transmission.

1. Park the BHL on level ground.
2. Engage parking brake and shift direction control lever to neutral position.
3. Raise engine hood.
4. From operator seat, start engine.
5. On left side of the BHL, remove transmission dipstick (Figure 6, Item 1), wipe clean with wiping rag, and insert dipstick fully into tube. Then, remove.

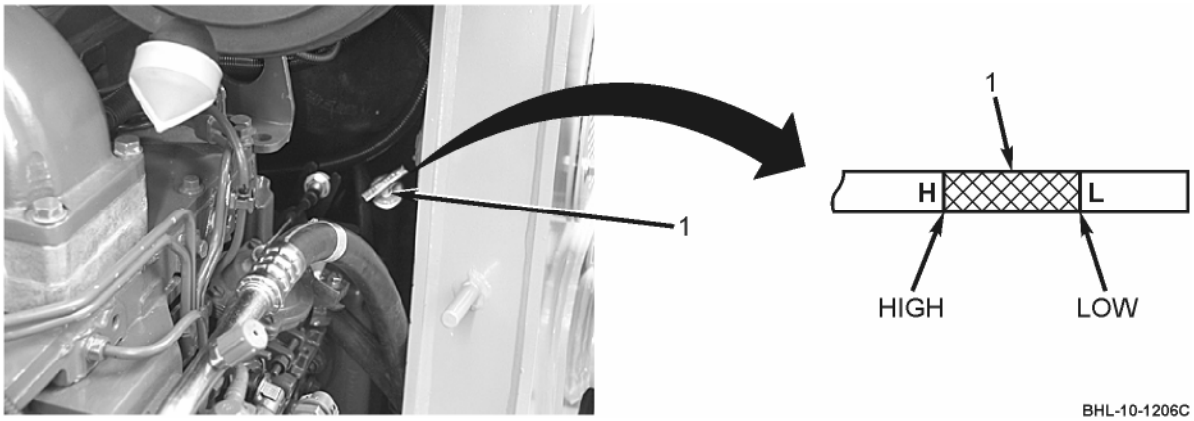


Figure 6. Transmission Dipstick.

SERVICING PROCEDURES - Continued

NOTE

Transmission fluid level must be between LOW and HIGH marks on dipstick.

One quart of transmission fluid will move level from LOW to HIGH mark.

6. If transmission fluid level is at LOW mark or below, shut engine off and add fluid as required until fluid level is at HIGH mark.
7. Start engine and recheck transmission fluid level.
8. Shut engine off.
9. Clean up spills with cleaning compound and wiping rag. Dispose of used rags per unit SOP.
10. Close engine hood.

Coolant Fluid Level Check

WARNING

Make sure engine is shut off before raising engine hood. Hot metal surfaces will burn flesh on contact. Exercise care when raising hood and servicing engine. Failure to comply may result in serious injury or death to personnel.

Keep clear of rotating fan and belts. Failure to comply may result in serious injury or death to personnel.

NOTE

Check coolant level when coolant is cold and with engine shut off.

Coolant fluid level must be between ADD and FULL marks on reservoir.

1. Park the BHL on level ground.
2. Engage parking brake and shift direction control lever to neutral position.
3. Shut engine off.

SERVICING PROCEDURES - Continued

4. Raise engine hood.
5. If coolant fluid level is at COLD MIN mark or below, add fluid as required until fluid level is at HOT MAX mark.
6. Remove cap (Figure 7, Item 1) from coolant reservoir and add antifreeze mixture of 50% antifreeze and 50% water.
7. Install cap (Figure 7, Item 1) onto coolant reservoir.
8. Clean up spills with wiping rag. Dispose of used rags per unit SOP.
9. Close engine hood.

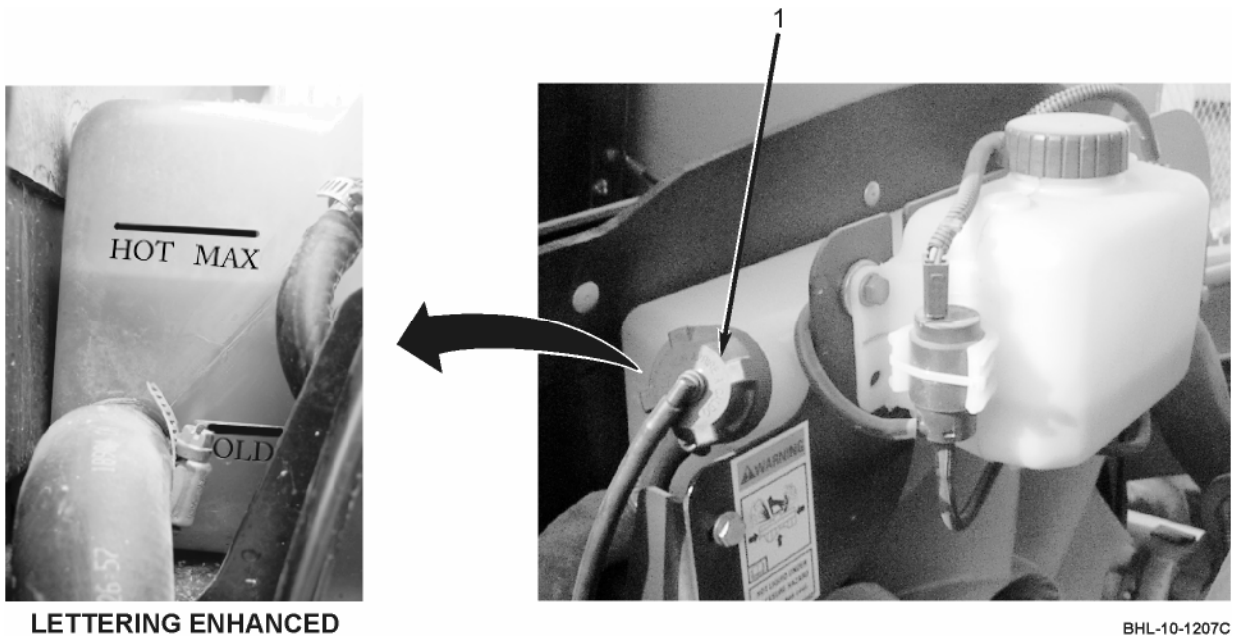
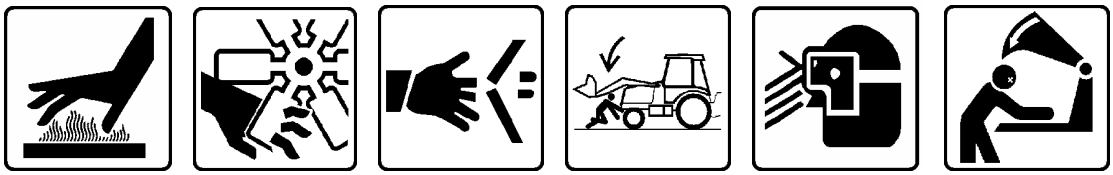


Figure 7. Coolant Reservoir.

SERVICING PROCEDURES - Continued

Windshield Washer Solvent Level Check

WARNING



Make sure engine is shut off before raising engine hood. Hot metal surfaces will burn flesh on contact. Exercise care when raising hood and servicing engine. Failure to comply may result in serious injury or death to personnel.

Keep clear of rotating fan and belts. Failure to comply may result in serious injury or death to personnel.

1. Park the BHL on level ground.
2. Engage parking brake and shift direction control lever to neutral position.
3. Shut engine off.
4. Raise engine hood.
5. Remove cap (Figure 8, Item 1) from windshield washer reservoir.
6. Fill windshield reservoir with windshield washer solvent (WP 0028, Item 17).
7. Install cap (Figure 8, Item 1) onto windshield washer reservoir.
8. Clean up spills with wiping rag. Dispose of used rags per unit SOP.
9. Close engine hood.

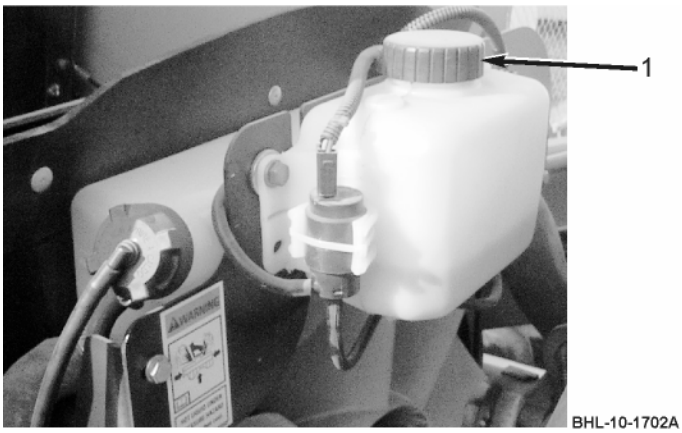


Figure 8. Windshield Washer Reservoir.

SERVICING PROCEDURES - Continued

Parking Brake Adjustment

CAUTION

Do not move the BHL with parking brake engaged. Failure to comply may result in damage to parking brake.

1. Apply service brakes.
2. Disengage parking brake by pushing parking brake handle (Figure 9, Item 1) forward.
3. Rotate tension adjuster (Figure 9, Item 2) CW two or three turns.
4. Pull parking brake handle (Figure 9, Item 1) back. If brake handle cannot be pulled back, release handle and rotate tension adjuster (Figure 9, Item 2) CCW one or two turns. Then, pull brake handle back.
5. Start engine.
6. Move direction control lever in forward position, and service brakes applied, engage parking brake.
7. Release service brake pedals and check that parking brake holds the BHL in place.
8. If parking brake does not hold, notify field level maintenance.

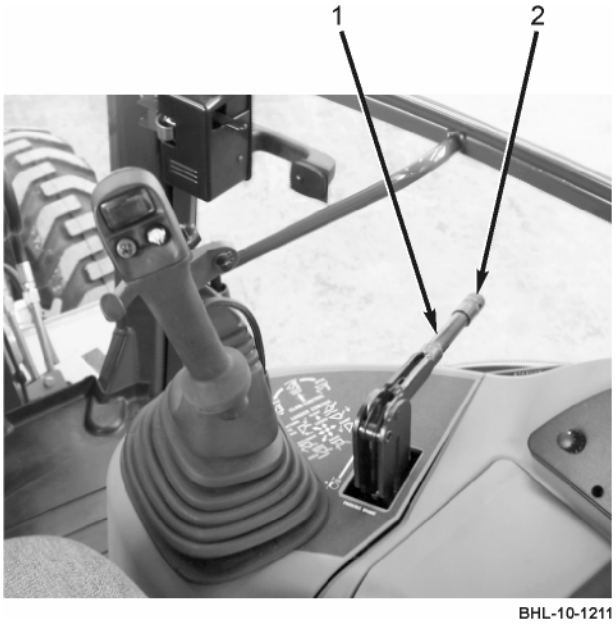
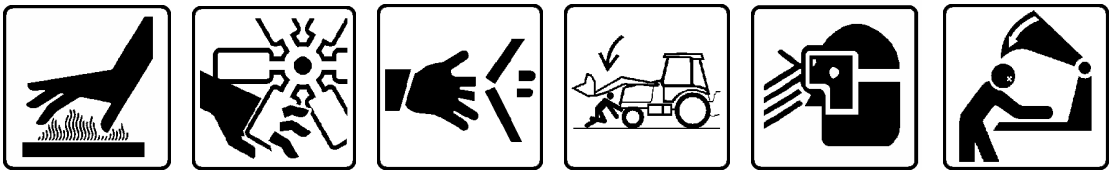


Figure 9. Parking Brake.

SERVICING PROCEDURES - Continued

Engine Oil Level Check

WARNING



Make sure engine is shut off before raising engine hood. Hot metal surfaces will burn flesh on contact. Exercise care when raising hood and servicing engine. Failure to comply may result in serious injury or death to personnel.

Keep clear of rotating fan and belts. Failure to comply may result in serious injury or death to personnel.

1. Park the BHL on level ground.
2. Engage parking brake and shift direction control lever to neutral position.
3. Shut engine off.
4. Raise engine hood.
5. On left side of the BHL, remove oil dipstick (Figure 10, Item 1), wipe clean, and insert dipstick fully into tube. Then, remove.

NOTE

Check engine oil level with engine shut off.

Engine oil fluid level must be between ADD and FULL marks on dipstick.

Two quarts of engine oil will move level from ADD to FULL mark.

6. If engine oil level is at ADD mark or below, select proper grade of oil. Refer to Table 2. Ensure unit SOP is followed. Unscrew oil fill cap (Figure 10, Item 2) CCW and add oil as required until oil level is at FULL mark.
7. Install oil fill cap (Figure 10, Item 2) and turn CW.
8. Clean up spills with cleaning compound and wiping rag. Dispose of used rags per unit SOP.
9. Close engine hood.

SERVICING PROCEDURES - Continued

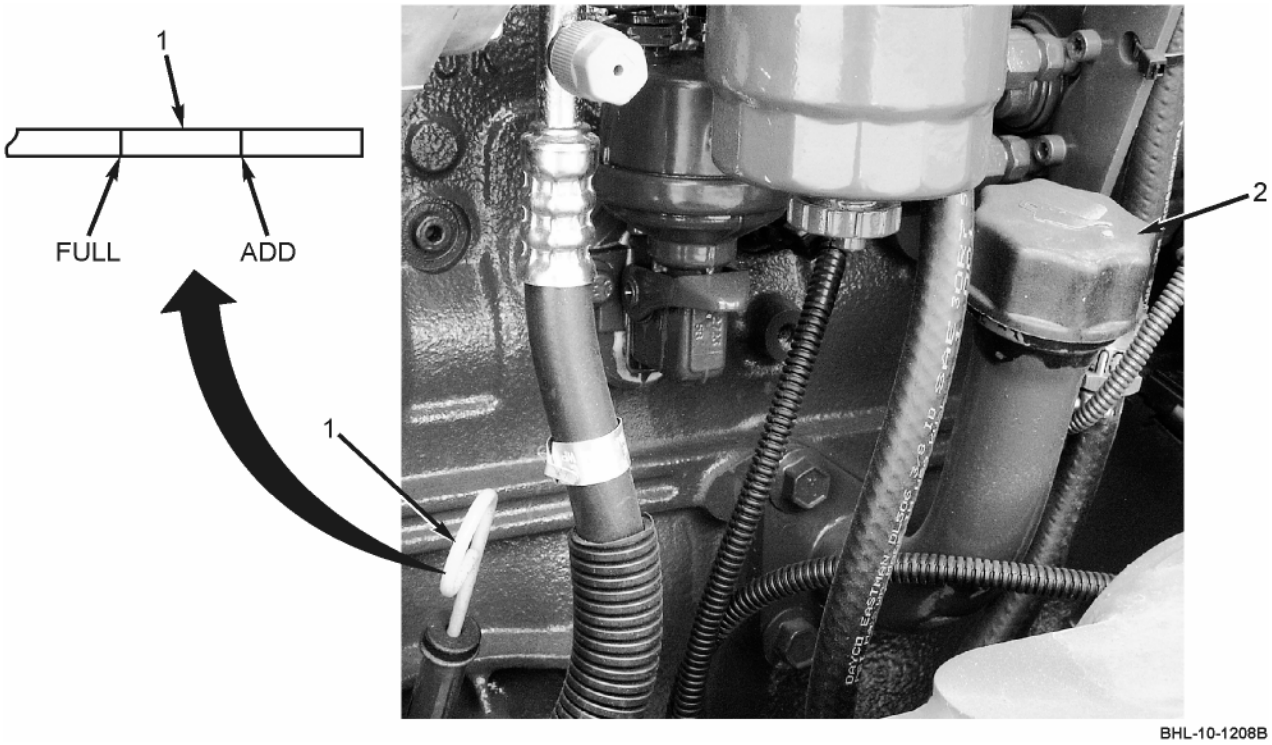


Figure 10. Engine Oil Dipstick and Fill Cap.

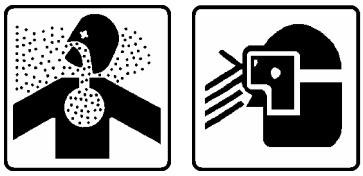
Table 2. Engine Oil Grade Selection Chart.

AMBIENT TEMPERATURE	Degrees F / Degrees C	-50 / -46	-30 / -34	-10 / -23	+10 / -12	+30 / -1	+50 / 10	+70 / 21	+90 / 32	+110 / 43	+130 / 54
MIL-PRF-46167 OEA		━	━	━	━	━	━				
MIL-PRF-2104 OE/HDO-30						━	━	━	━	━	
MIL-PRF-2104 OE/HDO-40						━	━	━	━	━	━
MIL-PRF-2104 OE/HDO-15/40					━	━	━	━	━	━	━

SERVICING PROCEDURES - Continued

Cab Air Filter Service

WARNING



If Nuclear, Biological, and Chemical (NBC) exposure is suspected, all air filter media shall be handled by personnel wearing full NBC protective equipment. Failure to comply may result in serious injury or death to personnel.

Removal or installation of cab air filter can cause dirt particles to injure eyes. Eye protection is required. Failure to comply may result in serious injury or death to personnel.

1. Engage parking brake.

NOTE

Tray and filter will fall if not supported.

2. Hold tray in position and unscrew two knobs (Figure 11, Item 1) securing tray (Figure 11, Item 2) to cab headliner.
3. Carefully remove tray (Figure 11, Item 2) and filter (Figure 11, Item 3).
4. Remove filter (Figure 11, Item 3) from tray (Figure 11, Item 2).
5. Wipe filter area with wiping rag.
6. Outside of cab, tap filter (Figure 11, Item 3) gently to knock off loose dirt.
7. If filter is damaged, notify field level maintenance.

NOTE

Install filter with airflow arrow pointing toward front of BHL.

8. Install the cleaned filter (Figure 11, Item 3) into tray (Figure 11, Item 2).
9. Install tray (Figure 11, Item 2) and filter (Figure 11, Item 3) into cab headliner.
10. Secure tray (Figure 11, Item 2) to cab headliner with two knobs (Figure 11, Item 1).

SERVICING PROCEDURES - Continued

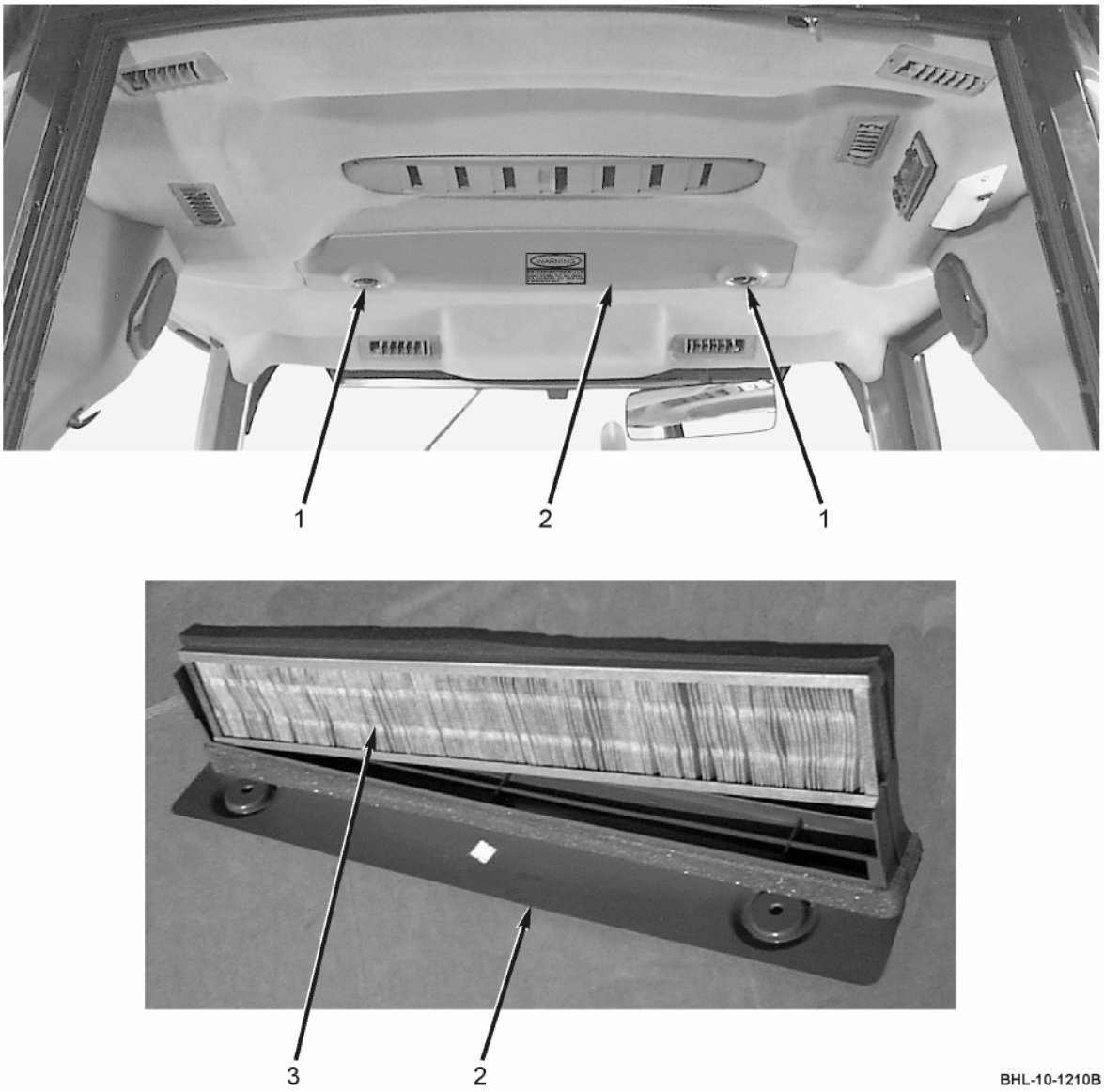


Figure 11. Cab Air Filter.

SERVICING PROCEDURES - Continued

Fire Extinguisher Service

1. Open latch (Figure 12, Item 2) and remove fire extinguisher if required.
2. Check tag on fire extinguisher (Figure 12, Item 1) for expiration date.
3. Check gage on fire extinguisher (Figure 12, Item 1) for indication in green range. If not in green range, replace fire extinguisher.
4. Install and secure fire extinguisher (Figure 12, Item 1).

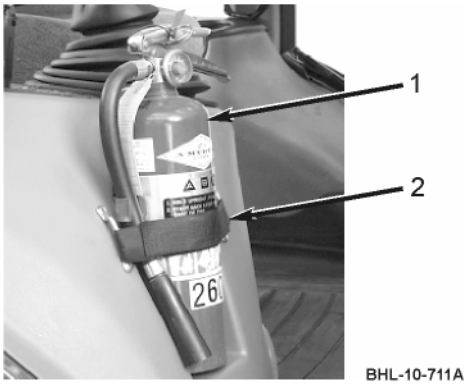
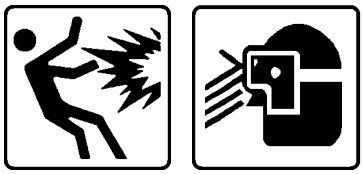


Figure 12. Fire Extinguisher.

Tire Pressure Check

WARNING



When tire service is necessary, notify field level maintenance. Failure to comply may result in serious injury or death to personnel.

When inflating tires, keep yourself and all other other personnel out of danger area. Stand on tread side of tire. Wear face protection. Use correct air pressure and use self-attaching inflation chuck with remote shutoff. Do not overinflate. Tires and rim parts can explode. Failure to comply may result in serious injury or death to personnel.

Check air pressure or add air only when tire is mounted on wheel on the BHL or in tire inflation cage. Failure to comply may result in serious injury or death to personnel.

NOTE

Check tires when cold, before any operation.

1. Engage parking brake.

SERVICING PROCEDURES - Continued

2. Remove protective cap.
3. Use tire pressure gage and check front and rear tires for proper inflation (32 psi (220 kPa) on rear tires and 50 psi (345 kPa) on front tires). If pressure is low, do steps 4 thru 8 below.
4. Connect air hose (Figure 13, Item 2) with self-locking air chuck to valve (Figure 13, Item 1) on tire.
5. Connect remote shutoff valve (Figure 13, Item 3) to air source.
6. Stand behind tire tread and inflate tire to correct pressure.
7. Disconnect remote shutoff valve (Figure 13, Item 3).
8. Disconnect air hose (Figure 13, Item 2).
9. Install protective cap.

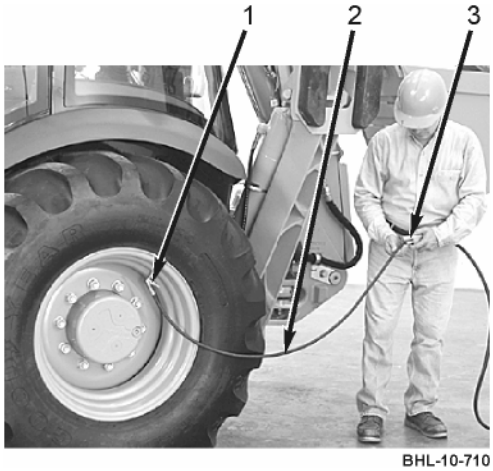


Figure 13. Tire Pressure.

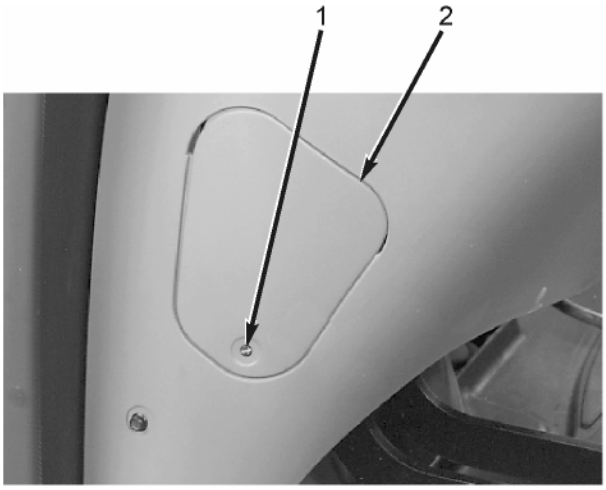
Fuse Replacement

NOTE

Fuses which burn out often may indicate an electrical problem. Notify field level maintenance.

1. Engage parking brake.
2. Turn key switch off.
3. Loosen screw (Figure 14, Item 1) and remove cover (Figure 14, Item 2).
4. Use fuse location decal (Figure 14, Item 3) to determine location of suspect fuse.
5. Remove suspect fuse and check for burned area (indicates need for replacement).
6. If burned out fuse is found, notify field level maintenance and install in proper location.
7. Install cover (Figure 14, Item 2) and secure with screw (Figure 14, Item 1).

SERVICING PROCEDURES - Continued



FUSES			87423410
SPARE	----	----	----
SPARE	POWER OUTLET 30A	----	PILOT CONTROLS BH AUX (OPT) 15AMP
FRONT WORK LIGHTS 20A	POWER OUTLET 30A	AIR SUSP. SEAT-AIR COMP. (OPT) 20A	RETURN TO DIG 10A
REAR WORK LIGHTS 20A	SPARE	SPARE	DRIVING LIGHTS 15A
FUEL SHUTOFF 10A	BLOWER 25A	DOME LIGHT 10A	ROTATING BEACON (OPT) 10A
INSTRUMENTS ALARM SYS. 10A	SIGNAL LIGHTS 15A	HORN 10A	4WD (OPT) 10A
STARTING TRAMSMISSION CONTROL 10A	RADIO, RIDE CONTROL, HAND AUX HYD'S 15A	RADIO (BATT) (OPT) 10A	WIPERS 15A

BHL-10-703

Figure 14. Fuse Replacement.

SERVICING PROCEDURES - Continued

Preparation For 30 Day Storage

NOTE

If the BHL is to be stored for up to 30 days, park the BHL inside building. If building is not available, park the BHL on level ground in dry area on planks and cover with waterproof covering, if available.

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Wash the BHL (WP 0024).
2. Lubricate the BHL (WP 0022).
3. Position backhoe in transport position (WP 0012).
4. Rotate backhoe bucket to open position to prevent accumulation of rain water or snow.
5. Raise FEL and dump bucket. Lower FEL to ground (WP 0011).
6. Engage parking brake.
7. Switch off engine and remove key.
8. From operator seat, toggle FEL and backhoe controls to relieve hydraulic pressure.
9. When engine is cool, cover exhaust pipe opening with duct tape.
10. Close and secure all windows and doors.

Removal From 30 Day Storage

NOTE

For description and use of operator controls and indicators, refer to WP 0004 thru WP 0009.

1. Remove duct tape from exhaust pipe opening.
2. Perform PMCS procedures.
3. Clean windshield.
4. Prime turbocharger (WP 0010).
5. Start engine.
6. Allow BHL to run at 1,000 rpm 2 – 3 minutes while monitoring all warning lights and gages.
7. Raise FEL and rotate bucket to transport position. Check for correct operation of the FEL and all FEL controls (WP 0011).

SERVICING PROCEDURES - Continued

8. Remove backhoe from transport position and check for correct operation of the backhoe and all backhoe controls (WP 0012).

9. Release parking brake and slowly operate the BHL, checking that all controls function correctly.

FEL Bucket Teeth and Cutting Edges Measurement

1. Park the BHL on level ground. Close clamshell and position bucket flat on ground.

2. Engage parking brake.

3. Shift direction control lever to neutral position.

4. Shut engine off.

5. Toggle FEL controls to relieve hydraulic pressure.

WARNING

Exercise care when measuring FEL bucket. Be sure FEL bucket is flat on ground, clamshell is closed, and hydraulic pressure is relieved. Failure to comply may result in serious injury or death to personnel.

NOTE

Loader cutting edge and clamshell cutting edge can be reversed one time before replacement is required.

6. Measure bucket teeth (Dimension A, Figure 15). If measurement is 3.5 inches (8.9 cm) or less, notify field level maintenance to replace teeth.

7. Measure clamshell cutting edge on each side of bucket (Dimension B, Figure 15). If measurement is 1 inch (2.5 cm) or less, notify field level maintenance to reverse or replace cutting edge.

8. Measure dozer cutting edge on each side of bucket (Dimension C, Figure 15). If measurement is 1 inch (2.5 cm) or less, notify field level maintenance to replace cutting edge.

9. Measure loader cutting edge on each side of bucket (Dimension D, Figure 15). If measurement is 1 inch (2.5 cm) or less, notify field level maintenance to reverse or replace cutting edge.

SERVICING PROCEDURES - Continued

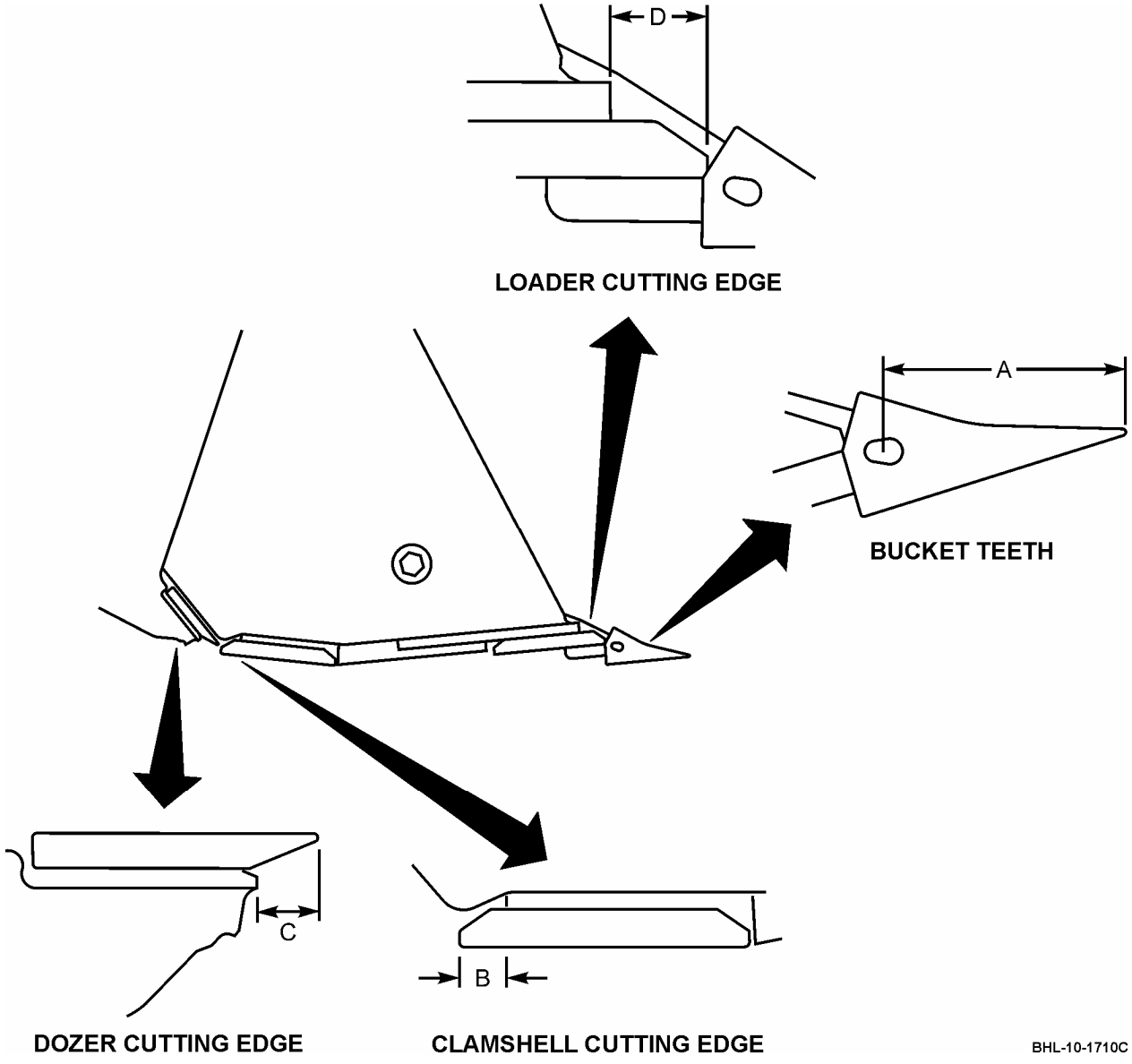


Figure 15. FEL Bucket Teeth and Cutting Edges Measurement.

END OF WORK PACKAGE

OPERATOR LEVEL

CLEANING

INITIAL SETUP:

Tools and Special Tools
None

References
None

Materials/Parts
Detergent (WP 0028, Item 3)
Wiping rag (WP 0028, Item 16)

Equipment Condition
Engine shut off (WP 0010)

Personnel Required
One

CLEANING PROCEDURES

Operator cleaning procedures must be performed on a regular basis. Dirt and foreign material are a constant threat to satisfactory operation and maintenance.

1. Keep hands free of any accumulation of grease which can collect dust, dirt, and grit.

CAUTION

Do not wash the Backhoe Loader (BHL) or rubber or electrical components with cleaning compounds, mineral spirits, or high-pressure washing apparatus. Failure to comply may result in serious damage to decals or materials.

Do not wash glass areas or upper areas of cab with high-pressure water. Failure to comply may result in serious damage to glass or cab air filter system.

2. Clean inner and outer surfaces of the BHL with water and detergent and allow to air dry.

3. Remove grease and accumulated deposits with wiping rag.

WARNING

Eye protection is required when working with compressed air. Compressed air can propel particles at high velocity and injure eyes. Do not exceed 15 psi (103 kPa) when using compressed air. Failure to comply may result in serious injury or death to personnel.

4. Clean debris from outside of radiator, oil cooler (located behind radiator), or air-conditioning condenser (located forward of radiator) with low pressure air. For most effective cleaning, direct airstream forward from inside engine compartment.

END OF WORK PACKAGE

CHAPTER 5

SUPPORTING INFORMATION FOR BACKHOE LOADER (BHL)

WORK PACKAGE INDEX

OPERATOR LEVEL

REFERENCES

SCOPE

This work package lists all field manuals, forms, technical bulletins, technical manuals, miscellaneous publications, and military standards and specifications for use with the Backhoe Loader (BHL).

FIELD MANUALS

FM 3-3	Chemical and Biological Contamination Avoidance
FM 3-5	NBC Decontamination
FM 4-25.11	First Aid
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to –65°)
FM 21-305	Manual for Wheeled Vehicle Driver
FM 31-70	Basic Cold Weather Manual
FM 31-71	Northern Operations
FM 90-6	Mountain Operations

FORMS

DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2062	Hand Receipt
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2408	Equipment Log Assembly (Records)
DA Form 2408-9	Equipment Control Record
DA Form 2408-20	Oil Analysis Log
DA Form 5988-E	Equipment Inspection and Maintenance Worksheet
DD Form 314	Preventive Maintenance Schedule and Record
DD Form 518	Accident-Identification Card
DD Form 1397	Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and Spare Engines
SF 91	Motor Vehicle Accident Report
SF 361	Transportation Discrepancy Report
SF 368	Product Quality Deficiency Report

TECHNICAL BULLETINS

TB 43-0213	Corrosion Prevention and Control

TECHNICAL MANUALS

TM 750-244-6	Procedures for Destruction of Tank-Automotive Materiel to Prevent Enemy Use

MISCELLANEOUS PUBLICATIONS

AR 700-138	Army Logistics Readiness and Sustainment
AR 735-11-2	Reporting of Supply Discrepancies
CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-909	Field and Garrison Furnishings and Equipment
CTA 50-970	Expendable Items (Except Medical, Class V Repair Parts, and Heraldic Items)
DA PAM 25-30	Consolidated Index of Army Publications and Blank Forms
DA PAM 738-750	Functional Users Manual for The Army Maintenance Management System (TAMMS)
DA PAM 738-751	Functional Users Manual for The Army Maintenance Management System – Aviation (TAMMS – A)

MILITARY STANDARDS AND SPECIFICATIONS

A-A-52557	Fuel Oil, Diesel
A-A-52624	Antifreeze
MIL-DTL-83133	Turbine Fuels, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST
MIL-L-46167	Lubricating Oil, Internal Combustion Engine, Arctic
MIL-PRF-2104	Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
MIL-PRF-2105	Gear Oil
MIL-PRF-83282	Hydraulic Fluid
MIL-STD-913	Requirements for the Certification of Sling Loaded Military Equipment for External Transportation by Department of Defense Helicopters

END OF WORK PACKAGE

OPERATOR LEVEL

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

INTRODUCTION

Scope

This work package lists COEI and BII for the Backhoe Loader (BHL) to help you inventory items for safe and efficient operation of the equipment.

General

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

Components of End Item (COEI). This list is for information purposes only and is not authority to requisition replacements. These items are part of the BHL. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Basic Issue Items (BII). These essential items are required to place the BHL in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the BHL during operation and when it is transferred between property accounts. Listing these items is your authority to request/ requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

Explanation Of Columns In The COEI List And BII List

Column (1) Illus Number. Gives you the number of the item illustrated.

Column (2) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (3) Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (4) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (5) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) Qty Rqr. Indicates the quantity required.

COEI LIST

Table 1. Components of End Item List.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER (NSN)	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
		NOT APPLICABLE.			

BII LIST

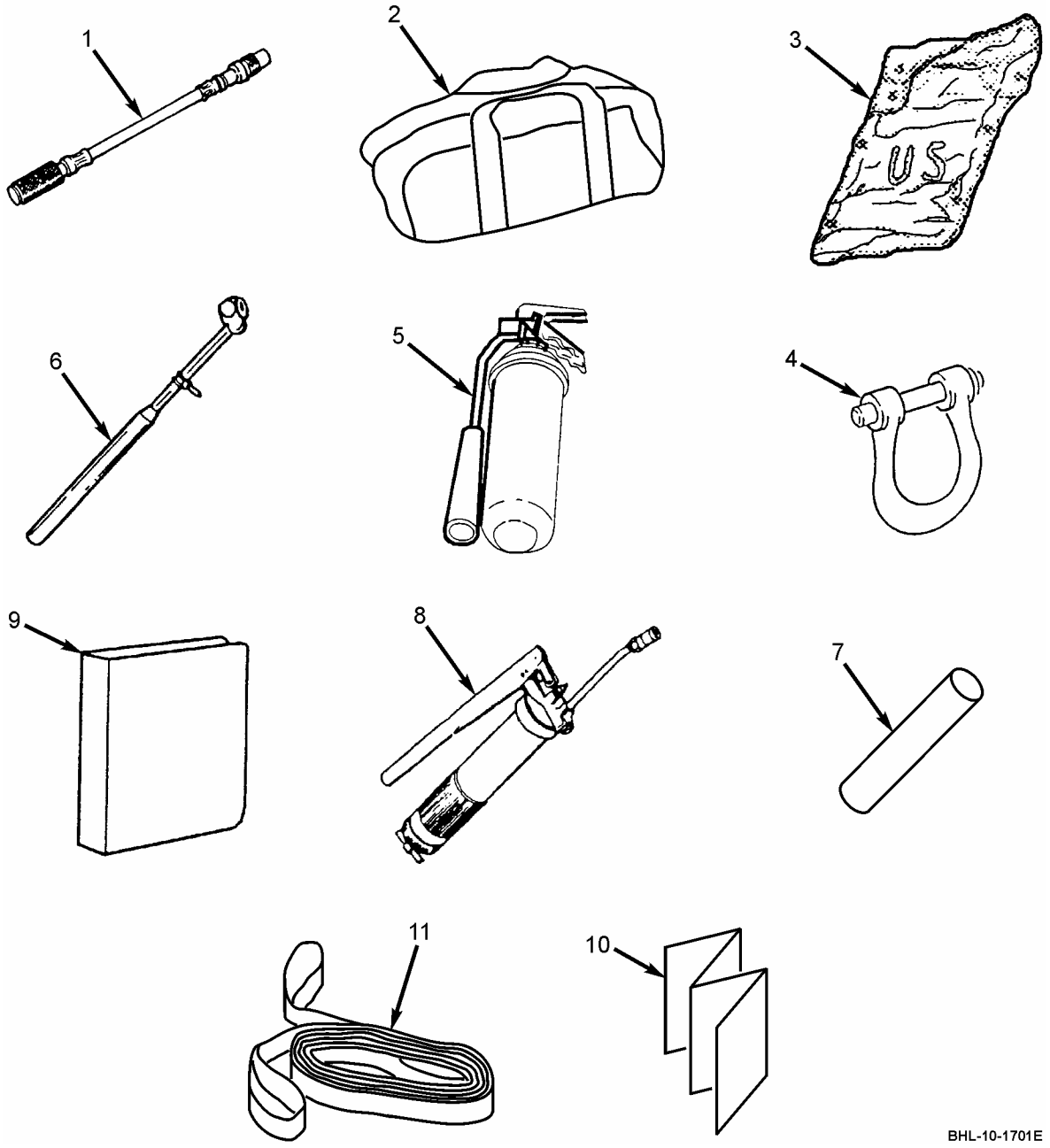


Figure 1. Basic Issue Items.

BII LIST - Continued

Table 2. Basic Issue Items List.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER (NSN)	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	4930-00-288-1511	ADAPTER, GREASE GUN: coupling, flex (in tool box) G6/(0AYB6)	-	EA	1
2	5140-00-473-6256	BAG, TOOL (behind cargo net) 11655979/(19207)	-	EA	1
3	7520-00-559-9618	CASE, COTTON DUCK (in TM storage box) MIL-C-11743/(81349)	-	EA	1
4	4030-01-251-7677	CLEVIS, (in tool box) 8966T52/(39428)		EA	1
5	4210-00-889-2221	EXTINGUISHER, FIRE: dry chemical (to right of operator seat) CS4210-0009CEFN/(16236)	-	EA	1
6	4910-00-204-3170	GAGE, TIRE PRESSURE, (in Technical Manual (TM) storage box) 5469P2/(39428)	-	EA	1
7	9150-00-935-4018	GREASE, AUTOMOTIVE (in lubricating gun) MIL-G-21164/(81349)	-	CA	1
8	4930-00-253-2478	LUBRICATING GUN, HAND (in tool box) 1142/(1PL57)	-	EA	1
9	-	OPERATOR'S MANUAL (in TM storage box) TM 5-2420-231-10	-	EA	1
10	5340-01-539-6879	SHEET, TECHNICAL (in TM storage box) 87364088/(10988)	-	EA	1
11	5340-01-539-6864	STRAP, TOW (in tool bag) TS292X216/(0KCY2)	-	EA	2

END OF WORK PACKAGE

OPERATOR LEVEL

ADDITIONAL AUTHORIZATION LIST (AAL)

INTRODUCTION

Scope

This work package lists additional items you are authorized for the support of the Backhoe Loader (BHL).

General

This list identifies items that do not have to accompany the BHL and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

Explanation Of Columns In The AAL

Column (1) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (2) Description,), Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (3) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (4) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

Column (5) Qty Recm. Indicates the quantity recommended.

AAL

Table 1. Additional Authorization List.

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/(CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
	NOT APPLICABLE.			

END OF WORK PACKAGE

OPERATOR LEVEL

EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION

Scope

This work package lists expendable and durable items that you will need to operate and maintain the Backhoe Loader (BHL). This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except: Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment, or CTA 8-100, Army Medical Department Expendable/ Durable Items.

Explanation Of Columns In The Expandable And Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., “Use antifreeze (WP 0023, Item 1).”).

Column (2) Level. This column includes the lowest level of maintenance that requires the listed item (C = Operator/Crew).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

EXPENDABLE AND DURABLE ITEMS LIST

Table 1. Expendable and Durable Items List.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
1	C	6850-00-664-1403	Antifreeze, 1 gallon A-A-52624/(58536)	GL
2	C	7930-01-306-8369	Cleaning compound, simple green, 1 gallon 13005/(1Z575)	BX
3	C	7930-00-282-9699	Detergent, general purpose MIL-D-16791/(81349)	GL
4	C	9140-00-286-5286	Fuel, diesel, DF-1, bulk A-A-52557/58536)	GL
5	C	9140-00-286-5294	Fuel, diesel, DF-2, bulk AA-52557/(58536)	GL
6	C	9130-00-272-2379	Fuel, turbine, aviation, JP5, 55 gallon MIL-PRF-5624/(58536)	DR
7	C	5130-01-031-5816	Fuel, turbine, aviation, JP8, bulk MIL-T-83133/(81349)	GL
8	C	9150-01-035-5391	Gear oil, 75W, 55 gallon drum MIL-PRF-2105/(81349)	DR
9	C	9150-00-935-4018	Grease, molybdenum disulfide, 14 oz. cartridge MIL-G-21164/(81349)	CA
10	C	9150-01-525-3539	Hydraulic fluid, lubricating oil, 5W-40, 1 quart can MIL-PRF-2104/(81349)	CN
11	C	9150-01-114-9968	Hydraulic fluid, transmission, 55 gallon drum Dexron III/(24617)	DR
12	C	9150-01-402-4478	Oil, lubricating, internal combustion engine, arctic, OEA, 1 quart MIL-L-46167/(81349)	CN
13	C	9150-01-152-4117	Oil, lubricating, internal combustion engine, OE/HDO-15/40, 1 quart MIL-PRF-2104/(81349)	CN
14	C	9150-00-186-6681	Oil, lubricating, internal combustion engine, OE/HDO-30, 1 quart MIL-PRF-2104/(81349)	CN

EXPENDABLE AND DURABLE ITEMS LIST - Continued

Table 1. Expendable and Durable Items List - Continued.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
15	C	9150-00-405-2987	Oil, lubricating, internal combustion engine, OE/HDO-40, 1 quart MIL-PRF-2104/(81349)	CN
16	C	7920-00-205-3571	Rag, wiping, cotton and cotton synthetic DDD-R-0030, Grade B/(81348)	BX
17	C	2540-00-077-0521	Solvent, windshield washer WA30D/(60703)	BT
18	C	5640-00-103-2254	Tape, duct 1791K70/(89428)	RL

END OF WORK PACKAGE

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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	**DATE**
TO: (*Forward to proponent of publication or form) (Include ZIP Code)* AMSTA-LC-LPIT/TECH PUBS, TACOM-RI 1 Rock Island Arsenal, Rock Island, IL 61299-7630	**FROM:** *(Activity and location) (Include ZIP Code)*	

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

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 5-2420-231-10	30 March 2007	Operator's Manual for Industrial Wheeled Tractor Backhoe Loader (BHL)

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible.)

** Reference to line numbers within the paragraph or subparagraph.*

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

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

PART II – REPAIR PARTS AND SPECIAL TOOLS LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER	DATE	TITLE

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

PART III – REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

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

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DA FORM 2028, FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED. **USAPPC V3.00**

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

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USAPPC V3.00

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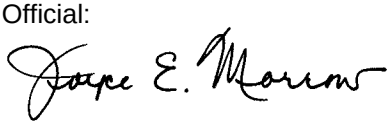
By Order of the Secretary of the Army:

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

Official:



JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army

0616305

DISTRIBUTION: To be distributed in accordance with the initial distribution number (IDN) 256905, requirements for TM 5-2420-231-10.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

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

WEIGHTS

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

LIQUID MEASURE

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

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

TEMPERATURE

$5/9\ (^{o}F - 32) = {}^{o}C$
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	2.741
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