

# Hummerbee™



# Operations Manual

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# A SAFE OPERATION

Careful operation is your best insurance against an accident. Read and understand this section carefully before operating the engine. All operators, no matter how much experience they may have had, should read this and other related manuals before operating the engine or any equipment attached to it. It is the owner's obligation to instruct all operators in safe operation.

**Be sure to observe the following for safe operation.**

## OBSERVE SAFETY INSTRUCTIONS

- Read and understand carefully this "OPERATOR'S MANUAL" and "LABELS ON THE ENGINE" before attempting to start and operate the engine.
- Learn how to operate and work safely. Know your equipments and its limitations. Always keep the engine in good condition.
- Before allowing other people to use your engine, explain how to operate and have them read this manual before operation.
- DO NOT modify the engine by yourself. UNAUTHORIZED MODIFICATIONS to the engine may impair the function and/or safety and affect engine life.



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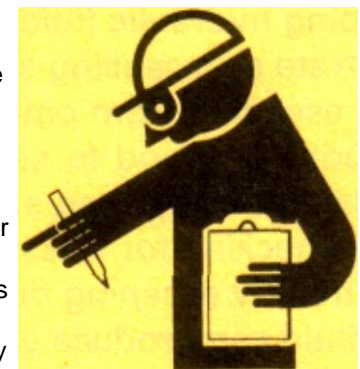
## WEAR SAFETY CLOTHING

- DO NOT wear loose, torn or bulky clothing around the machine that may catch on working controls and projections causing personal injury.
- Use additional safety items, e.g. hard hat, safety protection, gloves, etc., as appropriate or required.
- DO NOT operate machine or any equipment attached to it while under alcohol, medication, or other drugs, or while fatigued.
- DO NOT wear radio or music headphones while operating engine.



## CHECK BEFORE OPERATION & STARTING THE ENGINE

- Be sure to check your machine before operation. If something is wrong with the machine, do not fail to repair it quickly.
- Keep all guards and shields in place before operating your machine. Replace any that are damaged or missing.
- Check to see if there is a safe distance from the machine before starting.
- Always keep the machine at least 6 feet (1 meter) away from buildings and other facilities.
- DO NOT allow children or livestock to approach the machine while the engine is running.
- DO NOT start the engine by shorting across starter terminals. The machine may start in gear and move.
- Know and follow all safe operating procedure before operating your machine.



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## KEEP AROUND THE ENGINE CLEAN

- Be sure to stop the engine before cleaning.
- Keep the engine clean and free of accumulated dirt, grease and trash to avoid a fire. Store flammable fluids away from sparks and fire.
- DO NOT stop the engine without idling; Temperatures around the engine rise suddenly. Keep the engine idling for over about 5 minutes before stopping.



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## SAFE HANDLING OF FUEL AND LUBRICANTS

### —KEEP OFF FIRE—

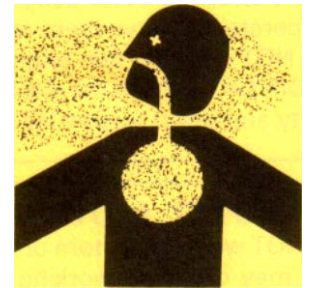
- Always stop the engine before refueling and/or lubricating.
- DO NOT smoke or allow flames or sparks in your working area. Fuel is extremely flammable and explosive under certain conditions.
- Refuel at a well ventilated and open place. When fuel and lubricants are spilled, refuel after letting engine cool off.
- DO NOT mix gasoline or alcohol with diesel fuel. The mixture can cause a fire.



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## EXHAUST GASES & FIRE PREVENTION

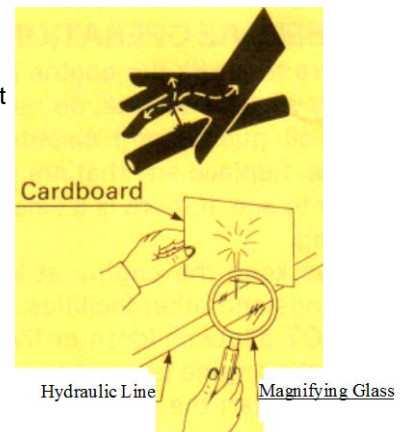
- Engine exhaust fumes can be very harmful if allowed to accumulate. Be sure to run the engine in a well ventilated place and where there are no people or livestock near the engine.
- The exhaust gas from the muffler is very hot. To prevent a fire, do not expose dry grass, mowed grass, oil and any other combustible materials to exhaust gas. Also, keep the engine and muffler clean all the time.
- To avoid a fire, be alert for leaks of flammables from hoses and lines. Be sure to check for leaks from hoses or pipes, such as fuel and hydraulic by following the maintenance check list.
- To avoid a fire, do not short across power cables and wires. Check to see that all power cables and wirings are in good condition. Keep all power connections clean. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.



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## ESCAPING FLUID

- Relieve all pressure in the air, the oil, and the cooling systems before any lines, fittings, or related items are removed or disconnected.
- Be alert for possible pressure when disconnecting any device from a system that utilizes pressure. DO NOT check for pressure leaks with your hand. High pressure oil or fuel can cause personal injury.
- Escaping hydraulic fluid under pressure has sufficient force to penetrate skin causing serious personal injury.
- Fluid escaping from pinholes may be invisible. Use a piece of cardboard or wood to search for suspected leaks: do not use hands and body. Use safety goggles or other eye protection when checking for leaks.
- If injured by escaping fluid, see a medical doctor immediately. This fluid can produce gangrene or severe allergic reaction.



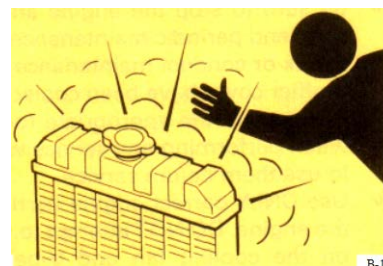
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## CAUTIONS AGAINST BURNS & BATTERY EXPLOSION

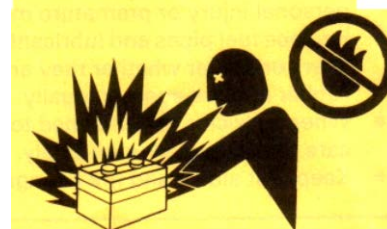
- To avoid burns, be alert for hot components, e.g. muffler, muffler cover, radiator, piping, engine body, coolants, engine oil, etc. during operation and just after the engine has been shut off.
- DO NOT remove the radiator cap while the engine is running or immediately after stopping. Otherwise hot water will spout out from radiator. Wait for more than ten minutes to cool the radiator, before removing the cap.
- Make sure to shut the drain valve of coolant and oil to close pressure cap, to fasten pipe band before operating. If those parts are taken off, or loosen, it will result in serious personal injury.
- The battery presents an explosive hazard. When the battery is being activated, hydrogen and oxygen gases are extremely explosive.
- Do not use or charge the battery if its fluid level stands below the LOWER mark. Otherwise, the component parts may deteriorate earlier than expected, which may shorten the service life or cause an explosion. Immediately, add distilled water until the fluid level is between the UPPER and LOWER levels.
- Keep sparks and open flames away from the battery, especially when charging the battery. DO NOT strike a match near the battery.
- DO NOT check battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.
- DO NOT charge battery if frozen. It can be explosive. When frozen, warm the battery up more than 16°C (61°F).



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B-1503

## HANDS AND BODY AWAY FROM ROTATING PARTS

- Be sure to stop the engine before checking or adjusting belt tension and cooling fan.
- Keep your hands and body away from the rotating parts, such as cooling fan, v-belt, fan drive v-belt pulley or flywheel. Moving parts can cause personal injury.
- DO NOT run the engine with installed safety guards detached. Install safety guards securely during operation.



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## ANTI-FREEZE & DISPOSAL OF FLUIDS

- Anti-freeze contains poison. Wear rubber gloves to avoid personal injury. In case of contact with skin, wash it off immediately.
- DO NOT mix different types of Anti-freeze. The mixture can produce chemical reaction causing harmful substances. Use approved or genuine KUBOTA Anti-freeze.
- Be mindful of the environment and the ecology. Before draining any fluids, find out the correct way of disposing of them. Observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters and batteries.
- When draining fluids from the engine, place some container underneath the engine body.
- DO NOT pour waste onto the grounds, down a drain, or into any water source.



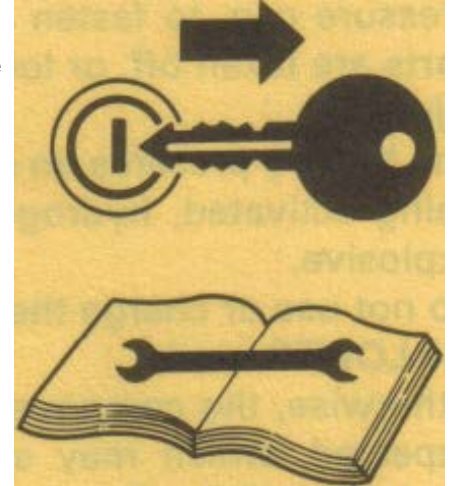
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B-1507

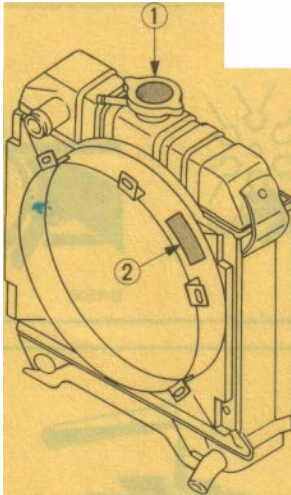


## CONDUCTING SAFETY CHECKS & MAINTENANCE

- When checking engine or servicing, place the machine on wide and level ground. DO NOT work on anything that is supported ONLY by lift jacks or a hoist. Always use blocks or correct stands to support the engine before servicing.
- Detach the battery from the engine before conducting service. Put a "DO NOT OPERATE!" tag in the key switch to avoid accidental starting.
- To avoid sparks from an accidental short circuit always disconnect the battery's ground cable (-) first and connect it last.
- Be sure to stop the engine and remove the key when conducting daily and periodic maintenance, servicing, and cleaning.
- Check or conduct maintenance after the engine, coolant, muffler, or muffler cover have been cooled off completely.
- Always use the appropriate tools and jig-fixture in good condition when performing any service work. Make sure you understand how to use them before service.
- Use ONLY correct engine barring techniques for manually rotating the engine. DO NOT attempt to rotate the engine by pulling or prying on the cooling fan and V-belt. This practice can cause serious personal injury or premature machine damage to the cooling fan.
- Replace fuel pipes and lubricant pipes with their hose clamps every 2 years or earlier whether they are damaged or not. They are made of rubber and are aged gradually.
- When servicing is performed together by two or more persons take care to perform all work safely.
- Keep first aid kit and fire extinguisher handy at all times.



## WARNING AND CAUTION LABELS



Stay clear of engine fan and fan belt.



## CARE OF WARNING AND CAUTION LABELS

- (1) Keep warning and caution labels clean and free from obstructing material.
- (2) Clean warning and caution labels with soap and water, dry with a soft cloth.
- (3) Replace damaged or missing warning and caution labels with new labels from your local KUBOTA dealer.
- (4) If a component with warning and caution label(s) affixed is replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replaced component.
- (5) Mount new warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

## Starting Safely

### Pre-start Inspection

#### Inspect machine daily before operation.

- Be sure each safety/protective item is in place and working.
- Check for leaks, loose, missing or damaged parts.
- Keep all operator controls free of debris. Clean foot wear before mounting machine.

**If your inspection uncovers anything that needs repair, replacement, or adjustment report it immediately.**

### Know Your Working Area

- Heavy Traffic
- Location of over head or buried electric or telephone wires and utilities.
- Learn all signals to be used on a job and who is responsible for signaling.
- Learn the condition of any haul roads to be used.
- When operating inside a building know the clearances and weight restrictions on floors and ramps.
- Warn others of Danger. Make sure all by-standers are safely out of the way before starting.

### Starting Procedure

- Sit in operator's seat and adjust it so you can operator all controls.
- Fasten seat belt.
- Familiarize yourself with the controls.
- Make sure the parking brake is applied and all controls are in neutral.
- Clear the area of all by-standers.
- Follow 'Starting the Engine' procedure in Operation Section.

## Perform an Operating Check

- Test the controls and be sure all are working properly.
- Check all gauges and warning lights. Be sure all are working in the normal ranges.
- Listen for trouble. Check out any unusual noises.

## Operate Machine Safely

- Do not abuse equipment
- Do not obstruct your vision with the load when you are traveling
- Use appropriate speed when traveling
- Be alert of hazardous conditions.
- Be aware of obstructions and utility lines
- Know load weight. Do not overload forklift.
- Avoid rough and uneven terrain.

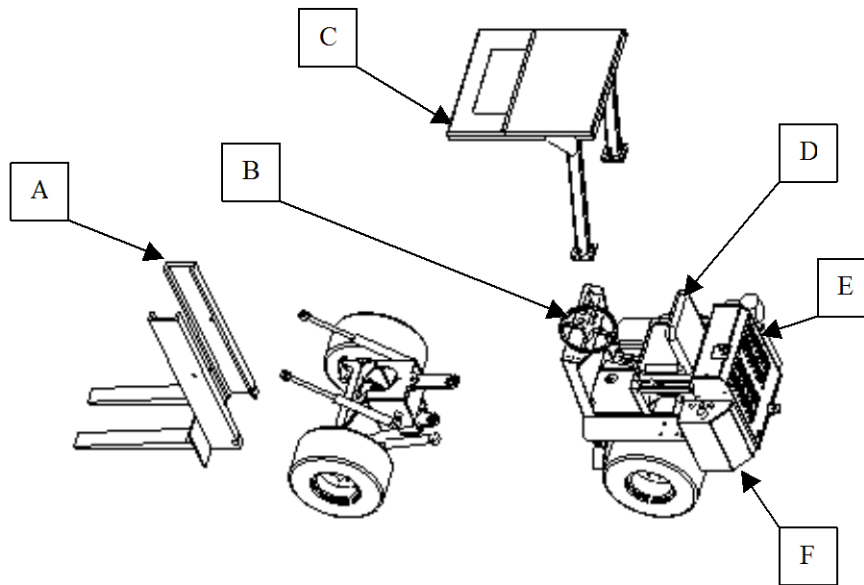
## Park Safely

- Select level ground and park a reasonable distance from other machines.
- Follow correct shut-down procedures.
  - 1) Stop machine and apply parking brake
  - 2) Lower mast to the ground/return engine to idle RPM.
  - 3) Allow hot engine time to cool down
  - 4) Follow 'Stopping the Engine' procedure in Operation Section.
  - 5) Carefully exit machine
  - 6) Remove keys if necessary.

## Always Use Safe Maintenance Practices

- see maintenance section

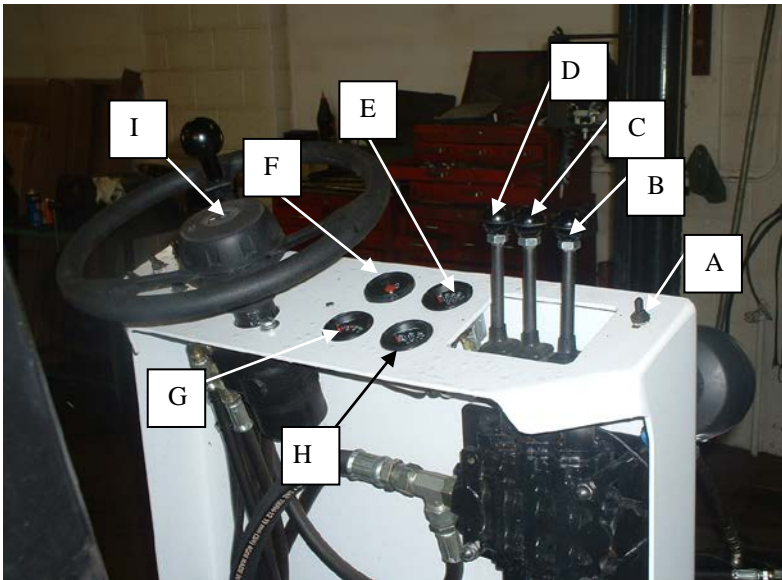
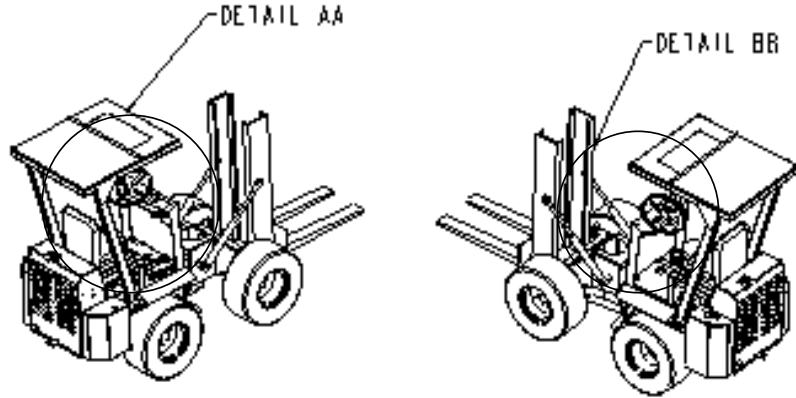
## HUMMERBEE SECTION BREAKDOWN



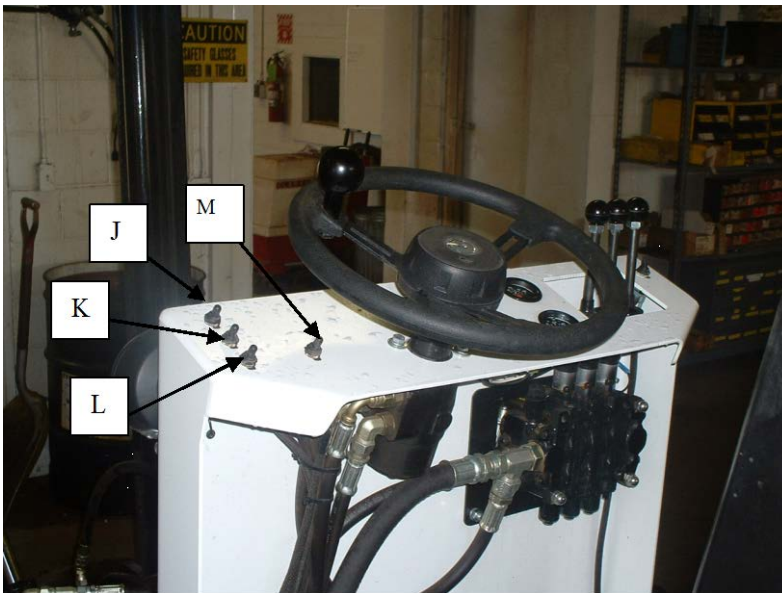
- A ) HUMMERBEE MAST ( P. 2)
- B ) HUMMERBEE INSTRUMENTS & OPERATOR CONTROLS ( P. 3 & 4)
- C ) HUMMERBEE ROPS ASSMEMBLY
- D ) HUMMERBEE SEAT AND HAND CONTROLS ( P. 5)
- E ) HUMMERBEE HYDRAULIC RESERVOIR/SYSTEM (Maintenance - 10)
- F ) HUMMERBEE DESIEL FUEL TANK (7-1/2 GALLONS)



# HUMMERBEE CONSOLE DETAIL

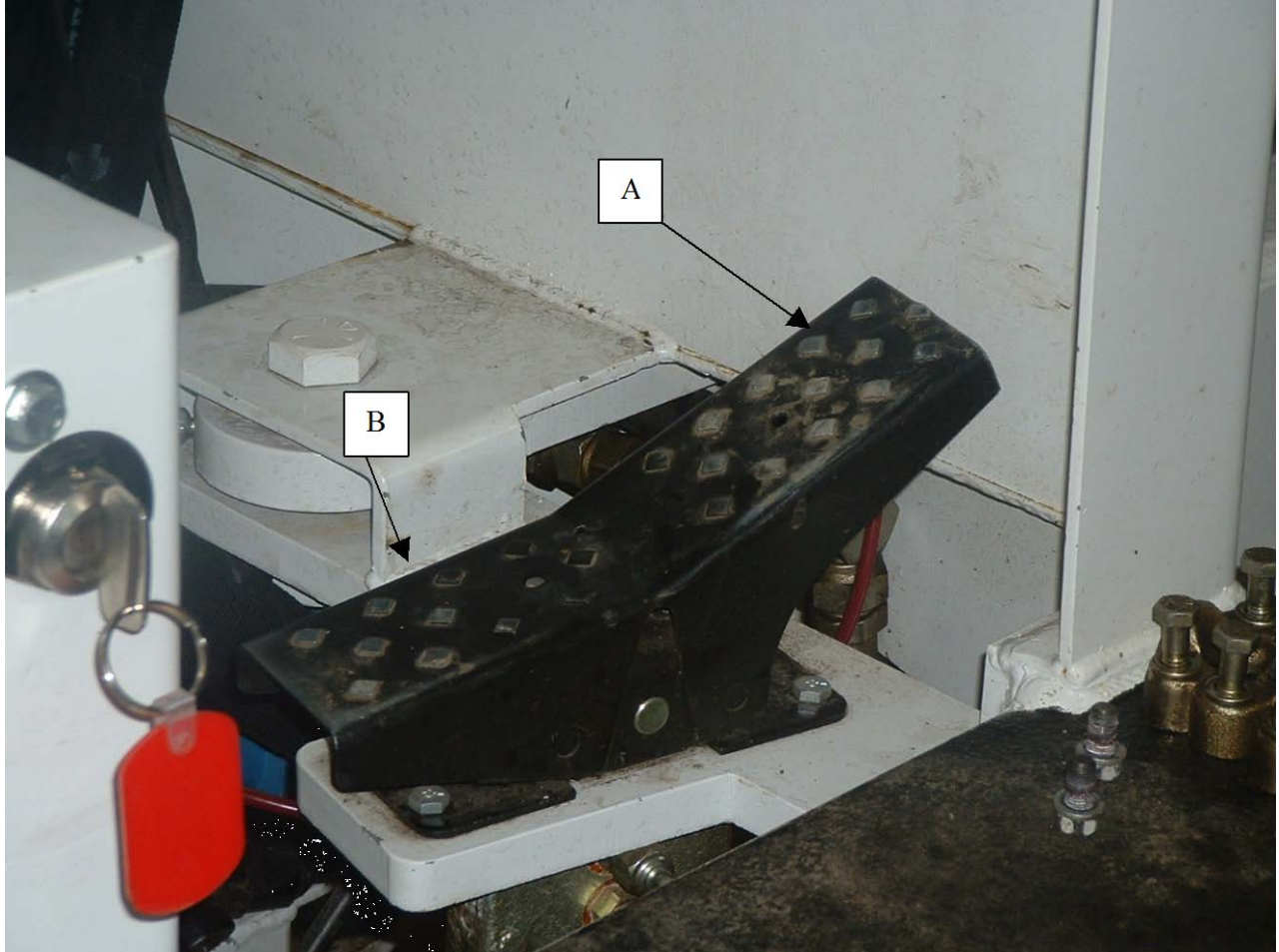


- DETAIL AA
- A. HI/LOW RANGE TOGGLE
  - B. MAST LIFT LEVER
  - C. MAST TILT LEVER
  - D. MAST SIDE SHIFT LEVER
  - E. ENGINE OIL PRESSURE GAUGE
  - F. FUEL GAUGE
  - G. VOLT METER
  - H. ENGINE WATER TEMPERATURE GAUGE
  - I. STEERING WHEEL



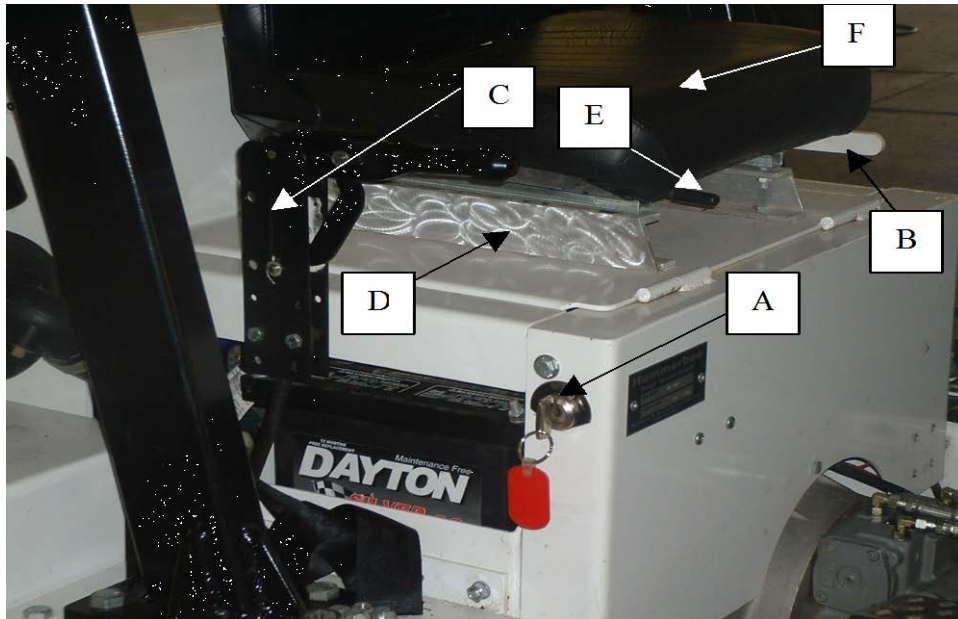
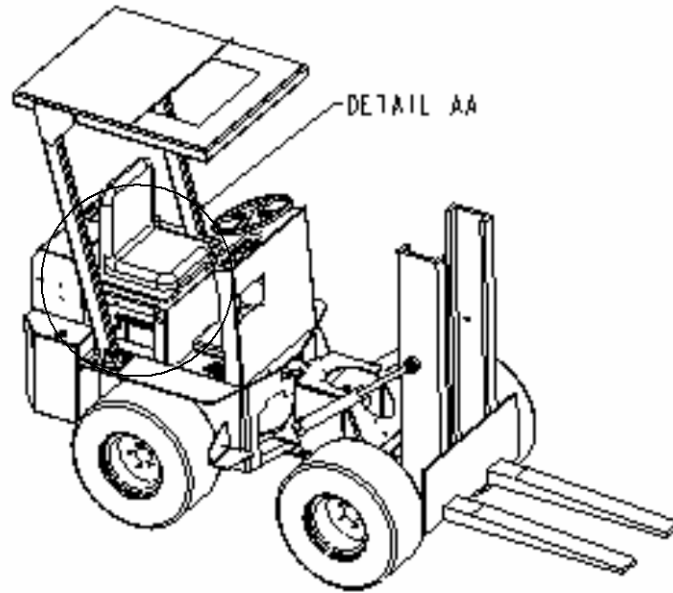
- DETAIL BB
- J. MAST LIGHTS TOGGLE
  - K. FRONT COWL LIGHTS TOGGLE
  - L. REAR LIGHTS TOGGLE
  - M. LOAD CUSION TOGGLE

## HUMMERBEE HYDROSTATIC FOOT PEDAL CONTROL



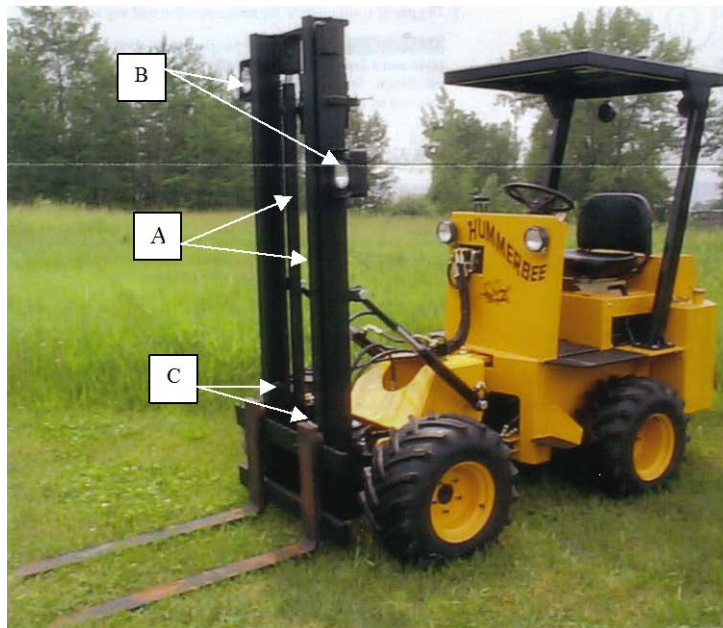
- A. PRESS PEDAL HERE TO INCREASE FORWARD SPEED
- B. PRESS PEDAL HERE TO INCREASE REVERSE SPEED
- C. RELEASE PEDAL TO CENTER POSITION TO STOP

HUMMERBEE CONTROLS DETAIL



- A. IGNITION KEY SWITCH
- B. THROTTLE LEVER
- C. PARKING BRAKE LEVER
- D. (OPTIONAL) 2" SEAT EXTENSIONS
- E. SEAT ADJUSTMENT LEVER
- F. SEAT ASSM'Y

## Mast Information



- (A) *Lifting Chains*
- (B) *Mast Head Lights*
- (C) *Mast Rollers*

Maximum Mast Height: 126" or optional 144"

Lifting Capacity (to Truck bed on level ground): 1,600 - 2,000lbs

***Important:***

- Perform daily checks of mast parts. (chains & rollers) to make sure all are in good working order & free of debris.
- It is recommended to apply chain and cable lube to the mast lifting chains periodically.

## Hummerbee® CAPACITIES & SPECIFICATIONS

Total Weight w/ Liquid Filled Tires: **TURBO Model** - 4,860lbs, **XL Model** – 4,220lbs

Overall Height: **TURBO Model** - 89”, **XL Model** – 87-1/2”  
**Add 10” if equipped with optional 144” Mast**

Overall Length: w/o forks: 97”, with 42” forks – 141”

Ground Clearance: **TURBO Model** - 9”, **XL Model** – 7-1/2”

Wheel Base: 48-1/2”

Frame Oscillation: +-8 degrees

Engine:

**TURBO Model:**

Kubota V1505-TE, 1.5L 4-Cylinder Turbo Charged Diesel  
42Hp @3000RPM, 84.35 FT-LBS @ 2000RPM

**XL Model:**

Kubota V1505, 1.5L 4-Cylinder Diesel  
35Hp @3000RPM, 67 FT-LBS @ 2000RPM

Injection Pump: Bosch MD Type Mini Pump

Alternator: 12V, 360W

Battery: 525C 51-R-60 (5”x10” – 500CCA – 85 Min. Reserve)

Fuel: 7.5 Gallon Fuel Tank No.2-D (ASTM D975)

Lubricant: 1.77 US Gallons  
Above CD Grade (10W-30 or 40 or Equivalent Diesel Grade Oil)

Fuel Filter (Spin-On): #1200-0006

Oil Filter (Spin-On): #1200-0007

Air Filter Outer Element: #1200-0004

Air Filter Inner Element: #1200-0003

In-Line Fuel Filter: #1200-0005

Dry Weight: 251.3 lbs

Coolant: 2 Gallons 50% Anti-Freeze – 50% Pure Water

Hydraulic System:

5.5 Gallon Tank  
ISO-46 or Equivalent Hydraulic Oil  
Hydraulic Oil Filters (Spin-on, Suction):  
Rear Filter (10 Micron): #1200-0001  
Front Filter (20 Micron): #1200-0002



## Hummerbee® CAPACITIES &amp; SPECIFICATIONS (cont.)

Drive Motor:**TURBO Model:**

2 Speed motor w/ hydrostatic foot pedal  
Low Range: 0-6mph, High Range: 0-12mph

**XL Model:**

Single Speed motor w/ mechanical foot pedal  
Travel Speed: 0-10mph

Transfer Case:

1 Quart, 80-90W

Differentials:

Dana 44 w/ limited slip feature in rear end  
3 Quarts, 80-90W with limited Slip Additive

Grease:

Premium Lithium EP Grease or Equivalent

Tires:**TURBO Model:**

Filled w/ RIM GUARD™ (non corrosive ballast)  
Carlisle 29 x 12.50-15 High Floatation

**XL Model:**

Filled w/ RIM GUARD™ (non corrosive ballast)  
Carlisle 26 x 12.00-12 High Floatation

Mast:

**Standard:** Maximum Height: 126"

**Optional Equipment:** Maximum Height: 144"

Maximum Lifting Capacity: 1,600 - 2,000lbs (to truck bed on level ground)

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# Machine Operation

## STARTING THE ENGINE (NORMAL)



**CAUTION**  
To avoid personal injury:

- Do not allow children to approach the machine while the engine is running.
- Do not run the engine on gradients.
- Do not run the engine in an enclosed area. Exhaust gas can cause air pollution and exhaust gas poisoning.
- Keep your hands away from rotating parts (such as fan, pulley, belt, flywheel etc.) during operation.
- Do not operate the machine while under the influence of alcohol or drugs.
- Do not wear loose, torn or bulky clothing around the machine. It may catch on moving parts or controls, leading to the risk of accident. Use additional safety items, e.g. hard hat, safety boots or shoes, eye and hearing protection, gloves, etc., as appropriate or required.
- Do not wear radio or music headphones while operating machine. Check to see if it is safe around the engine before starting.
- Reinstall safeguards and shields securely and clear all maintenance tools when starting the engine after maintenance

### IMPORTANT:

Do not use ether or any starting fluid for starting the engine or a severe damage will occur. When starting the engine after a long storage (of more than 3 months), first set the stop lever to the "STOP" position and then activate the starter for about 10 seconds to allow oil to reach every engine part.

1. Place the speed control lever at more than half throttle.



( 1 ) Speed control lever

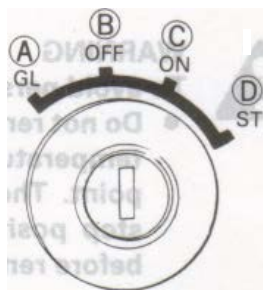
(A) "IDLING" ¼ way up

(B) "START" ½ way up

(C) "STOP" down (as shown)

2. Insert the key into the key switch and turn it "ON".

KTC Switch



- (A) "PREHEATING (GLOW)"
- (B) "SWITCHED OFF"
- (C) "OPERATION"
- (D) "STARTING"

3. Turn the starter switch to the "PREHEATING" position for a few seconds (see chart on right) to allow glow plugs to heat.

4. Turn the key to the "STARTING" position and the engine should start. Release the key immediately when the engine starts.

5. Check to see that the oil pressure lamp and charge lamp are off. If the lamps are »'• still on, immediately stop the engine, and determine the cause.

**NOTE:**

- If the oil pressure lamp should be still on, immediately stop the engine and check;
- If there is enough engine oil.
  - If the engine oil has dirt in it.
  - If the wiring is faulty.

6. Warm up the engine at medium speed without load.

**IMPORTANT:**

- If the glow lamp should redden too quickly or too slowly, immediately ask your KUBOTA dealer to check and repair it.
- If the engine does not catch or start at 10 seconds after the starter switch is set at "STARTING", wait for another 30 seconds and then begin the engine starting sequence again. Do not allow the starter motor to run continuously for more than 20 seconds.

## COLD WEATHER STARTING

If the ambient temperature is below\* -5°C (23°F) and the engine is very cold, start it in the following manner: Take steps (1) through (4) left.

3. Turn the key to "GL (PREHEATING)" position and keep it there for a certain period mentioned below.

**IMPORTANT:**

- Shown below are the standards preheating times for various temperatures. This operation, however, is not required, when the engine is warmed up.

Ambient Temperature	Preheating Time
Above 10°C (50°F)	NO NEED
10°C (50°F) to 5°C (23°F)	Approx. 5 seconds
* Below -5°C (23°F)	Approx. 10 seconds
Limit of Continuous Use	20 seconds

4. Turn the key to "ST (STARTING)" position and the engine should start.

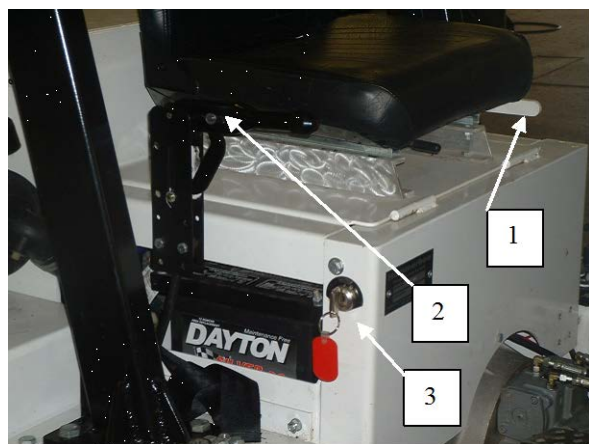
(If the engine fails to start after 10 seconds, turn off the key for 5 to 30 seconds. Then repeat steps (3) and (4).)

**IMPORTANT:**

- Do not allow the starter motor to run continuously for more than 20 seconds.
- Be sure to warm up the engine, not only in winter, but also in warmer seasons. An insufficiently warmed-up engine can shorten its service life.
- When there is a fear of temperature dropping below -15°C (5°F), detach the battery from the machine, and keep it indoors in a safe area to be reinstalled just before the next operation.

## STOPPING THE ENGINE

1. Return the speed control lever to low idle, and run the engine under idling conditions.
2. Switch key to "OFF" position to stop the engine.
3. With the starter switch placed at the "OFF" position, remove the key. (Be sure to apply the parking brake (#2 in diagram below).)



- (1) Speed Control Lever
- (2) Parking Brake Lever
- (3) Key Switch
  - a) "IDLING" ¼ way Up
  - b) "START" ½ way Down
  - c) "STOP" Down (as shown)

### IMPORTANT

If equipped with a turbo-charger, allow the engine to idle for 5 minutes before shutting it off after a full load operation. Failure to do so may lead to turbo-charger trouble.

## CHECKS DURING OPERATION

While running, make the following checks to see that all parts are working correctly.

### Radiator Cooling Water (Coolant)



#### **WARNING** To Avoid Personal Injury:

- Do not remove radiator cap until coolant temperature is well below its boiling point. Then loosen cap slightly to the stop position, to relieve any pressure, before removing cap completely.

When the engine overheats and hot coolant overflows through the radiator and hoses, stop the engine immediately and make the following checks to determine the cause of trouble:

### Check Items

1. Check to see if there is any coolant leak;
2. Check to see if there is any obstacle around the cooling air inlet or outlet;
3. Check to see if there is any dirt or dust between radiator fins and tube;
4. Check to see if the fan belt is too loose;
5. Check to see if radiator water pipe is clogged;
6. Check to see if anti-freeze is mixed to a 50/50% mix of water and anti-freeze.

### Oil pressure gauge

Check gauge periodically. If oil pressure drops below safe level during operation or does not come back up even after the engine is accelerated more than 1000rpm, immediately stop the engine and check the following:

1. Engine oil level.
2. Contact A&O Forklift for assistance.

## Fuel



### CAUTION

To avoid personal injury:

- Fluid escaping from pinholes may be invisible. Do not use hands to search for suspected leaks; Use a piece of cardboard or wood, instead. If injured by escaping fluid, see a medical doctor at once. This fluid can produce gangrene or a severe allergic reaction.
- Check any leaks from fuel pipes or fuel injection pipes. Use eye protection when checking for leaks.

Be careful not to empty the fuel tank. Otherwise air may enter the fuel system, requiring fuel system bleeding.

(See "FUEL" in MAINTENANCE Section).

### Color of exhaust

While the engine is run within the rated output range:

- The color of exhaust remains colorless.
- If the output slightly exceeds the rated level, exhaust may become a little colored with the output level kept constant.
- If the engine is run continuously with dark exhaust emission, it may lead to trouble with the engine.

### Immediately stop the engine if;

- The engine suddenly slow down or accelerates.
- Unusual noises suddenly appear.
- Exhaust fumes suddenly become very dark.
- The oil pressure is too low or the water temperature is too high.

## REVERSED ENGINE REVOLUTION AND REMEDIES



### CAUTION

To avoid personal injury:

- Reversed engine operation can make the machine reverse and run it backwards. It may lead to serious trouble.
- Reversed engine operation may make exhaust gas gush out into the intake side and ignite the air cleaner; it could catch fire.

Reversed engine revolution must be stopped immediately since engine oil circulation is cut quickly, leading to serious trouble.

### How to tell when the engine starts running backwards

1. Lubricating oil pressure drops sharply. Oil pressure warning light, if used, will light.
2. Since the intake and exhaust sides are reversed, the sound of the engine changes, and exhaust gas will come out of the air cleaner.
3. A louder knocking sound will be heard when the engine starts running backwards.

### Remedies

1. Immediately set the engine stop lever to the "STOP" position to stop the engine.
2. After stopping the engine, check the air cleaner, intake rubber tube and other parts and replace parts as needed.

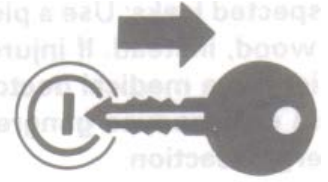


# MAINTENANCE

**CAUTION**

To avoid personal injury:

- Be sure to conduct daily checks, periodic maintenance, refueling or cleaning on a level surface with the engine shut off and remove the key.
- Before allowing other people to use your engine, explain how to operate, and have them read this manual before operation.
- When cleaning any parts, do not use gasoline but use regular cleanser.
- Always use proper tools that are in good condition. Make sure you understand how to use them before performing any service work.
- When installing, be sure to tighten all bolts lest they should be loose. Tighten the bolts by the specified torque.
- Do not put any tools on the battery or battery terminals may short out. Severe burns or fire could result. Detach the battery from the engine before maintenance, fiinmn ensia snigne
- Do not touch muffler or exhaust pipes while they are hot; severe burns could result.



## SERVICE INTERVALS

Observe the following for service and maintenance.

The lubricating oil change intervals listed in the table below are for Classes CF, CE and CD lubricating oils of API classification, with a low-sulfur fuel in use. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals than recommended in the table below depending on the operating condition.

Interval	Item	Ref. Page		
Every day	Grease Articulating joints, Check tires, check fuel and oil levels	M11		
Every 50 hours	Check of fuel pipes and clamp bands, grease all wear points & universals	M13		@
See NOTE:	Change of engine oil	M6-7	O	
Every 100 hours	Cleaning of air cleaner element	M11	*1	@
	Cleaning of fuel filter	M5-6		
	Check of battery electrolyte level			
	Check of fan belt tightness	M12		
Every 200 hours	Check of radiator hoses and clamp bands			
	Replacement of oil filter cartridge	M7-8	O	
	Check of intake air line	–		@
Every 400 hours	Replacement of fuel filter cartridge	M5-6		@
Every 500 hours	Removal of sediment in fuel tank	–		
	Cleaning of water jacket (radiator interior)			
	Replacement of fan belt	M 10		
	Replacement of hydraulic oil filters			
Every one or two months	Recharging of battery			
	Replacement of air cleaner element	M11	*2	@
	Check for damage in electric wiring & check differential oil level/quality	M13		
Every 800 hours	Check of valve clearance			
Every 1500 hours	Check of fuel injection nozzle injection pressure	–	*3	@
Every 3000 hours	Check of turbo charger	–	*3	@
	Check of injection pump	–	*3	@
	Check of fuel injection timer	–	*3	@
Every two years	Change of radiator coolant (L.L.C.)	M8-9		
	Replacement of battery			
	Replacement of radiator hoses and clamp bands			
	Replacement of fuel pipes and clamp bands		*3	@
	Replacement of intake air line	–	*4	@

## IMPORTANT

- The jobs indicated by O must be done after the first 50 hours of operation.
  - \*1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.
  - \*2 After 6 times of cleaning.
  - \*3 Consult A&O Forklift for this service.
  - \*4 Replace only if necessary.
- When the battery is used for less than 100 hours in a year, check its electrolyte yearly, (for refillable battery's only)
- The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S. EPA non-road emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction. Please see the Warranty Statement in detail.

**NOTE:**

- Changing interval of engine oil depends on the conditions below.

Models	Oil pan depth	
	Above 125 mm (4.9 in.)	% below 101 mm (4.0 in.)
All models	200 Hrs	150 Hrs
Initial	50 hrs	

101 mm oil pan depth is optional.

Standard replacement interval

- API service classification: above CD grade
- Ambient temperature: below 35 °C (95 °F)

**NOTE:**

**Lubricating oil**

With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low-sulfur fuel on on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the CF, CD, or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.

**Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.**

O : Recommendable      X : Not Recommendable

Lubricating oil class	Fuel		Remarks
	Low Sulfur	High Sulfur	
CF	O	O	TBN>=10
CF-4	O	X	
CG-4	O	X	

# PERIODIC SERVICE

## FUEL

### Fuel Level Check and Refueling

1. Check to see that the fuel level is above the lower limit of the fuel level gauge.
2. If the fuel is too low, add fuel to the upper limit. Do Not Overfill!

No.2-D is a distillate fuel oil of lower volatility for engines in industrial and heavy mobile service. (SAE J313JUN87) Grade of Diesel Fuel Oil According to ASTM D975

Fuel is flammable and can be dangerous. You should handle fuel with care.



#### CAUTION

To avoid personal injury:

- Do not mix gasoline or alcohol with diesel fuel. This mixture can cause an explosion.
- Be careful not to spill fuel during refueling. If fuel should spill, wipe it off at once, or it may cause a fire.
- Do not fail to stop the engine before refueling. Keep the engine away from the fire.
- Be sure to stop the engine while refueling or bleeding and when cleaning or changing fuel filter or fuel pipes. Do not smoke when working around the battery or when refueling.
- Check the above fuel systems at a well ventilated and wide place.
- When fuel and lubricant are spilled, refuel after letting the engine cool off.
- Always keep spilled fuel and lubricant away from engine.

Flash Point, °r	Water and Sediment,	Carbon Residue	Ash, weight					
	volume %	percent Residuum, %	%					
Min	Max	Max	Max					
52 (125)	0.05	0.35	0.01					
Distillation Temperatures, °C (°F)		Viscosity Kinematic cSt or mm <sup>2</sup> /s at 40°C		Viscosity Sayboit, SUS at 100°F		Sulfur, weight	Copper strip Corrosion	Cetane Num-
90% Point	Min	Max	Min	Max	Min	Max	Max	Min
282 (540)	338 (640)	1.9	4.1	32.6	40.1	0.50	No.3	40

The cetane number is required not to be less than 45.

#### IMPORTANT:

- Be sure to use a strainer when filling the fuel tank, or dirt or sand in the fuel may cause trouble in the fuel injection pump.
- For fuel, always use diesel fuel. You are required not to use alternative fuel, because its quality is unknown or it may be inferior in quality. Kerosene, which is very low in cetane rating, adversely affects the engine. Diesel fuel differs in grades depending on the temperature.
- Be careful not to let the fuel tank become empty, or air can enter the fuel system, necessitating bleeding before next engine start.

## Air bleeding the fuel system

### CAUTION

To avoid personal injury:

- Do not bleed a hot engine as this could cause fuel to spill onto a hot exhaust manifold creating a danger of fire.

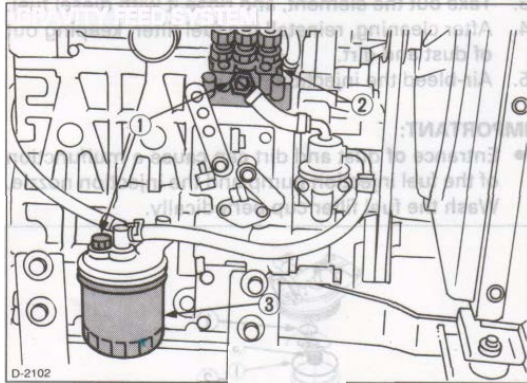
Air bleeding of the fuel system is required if:

- After the fuel filter and pipes have been detached and refitted;
- After the fuel tank has become empty; or
- Before the engine is to be used after a long storage.

### [PROCEDURE ®] (gravity feed fuel tanks only)

1. Fill the fuel tank to the fullest extent. Open the fuel filter lever.
2. Loosen air vent plug of the fuel filter a few turns.
3. Screw back the plug when bubbles do not come up any more.
4. Open the air vent plug on top of the fuel injection pump.
5. Retighten the plug when bubbles do not come up any more.

### GRAVITY FEED SYSTEM



- (1) Air vent plug
- (2) Injection pump
- (3) Fuel filter

### [PROCEDURE®]

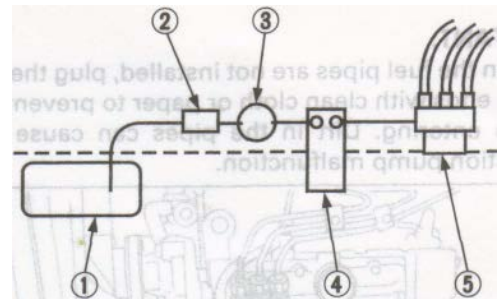
#### (fuel tanks lower than injection pump)

1. For fuel tanks that are lower than the injection pump. The fuel system must be pressurized by the fuel system electric fuel pump.
2. If an electric fuel pump is not used, you must manually actuate the pump by lever to bleed.
3. The primary fuel filter (j) must be on the pressure side of the pump if the fuel tank is lower than the injection pump.
4. To bleed follow (2) through (5) above. (PROCEDURE (§))

### IMPORTANT:

- Tighten air vent plug of the fuel injection pump except when bleeding, or it may stop the engine suddenly.

### TANK BELOW INJECTION PUMP SYSTEM



- ( 1 1 Fuel tank below injection pump 12) Pre-filter "1
- (3) Electric or Mechanical pump
- (4) Main Filter
- (5) Injection pump



## Checking the fuel pipes

### CAUTION

#### To avoid personal injury:

- Check or replace the fuel pipes after stopping the engine. Broken fuel pipes cause fires.

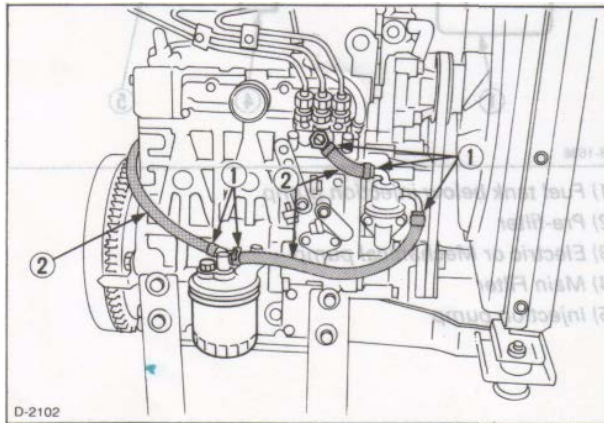
Check the fuel pipes every 50 hours of operation.

When if:

1. If the clamp band is loose, apply oil to the screw of the band, and tighten the band securely.
2. If the fuel pipes, made of rubber, become worn out, replace them and the clamp bands every two years.
3. If the fuel pipes and clamp bands are found worn or damaged before two years' time, replace or repair them at once.
4. After replacement of the pipes and bands, air-bleed the fuel system.

### IMPORTANT:

- When the fuel pipes are not installed, plug them at both ends with clean cloth or paper to prevent dirt from entering. Dirt in the pipes can cause fuel injection pump malfunction.



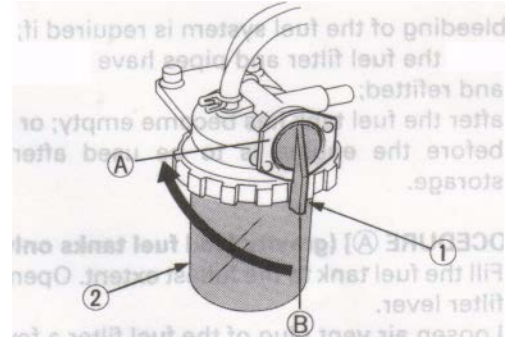
(1) Clamp band

(2) Fuel pipe

## Changing the fuel filter

Every 400 hours of operation, change the fuel filter in a clean place to prevent dust intrusion.

Fuel Shut-off on filter base pictured below, not needed on Hummerbee due to fuel tank being below filter base.



1. Spin-off old fuel filter.
2. Fill new filter with clean diesel fuel.
3. Install the new fuel filter, keeping out dust and dirt.
4. Air-bleed the injection pump.

### IMPORTANT:

- Entrance of dust and dirt can cause a malfunction of the fuel injection pump and the injection nozzle.

### Fuel filter replacement cont.

**IMPORTANT:**

- Replace the fuel filter periodically to prevent wear of the fuel injection pump plunger or the injection nozzle, due to dirt in the fuel.

### In-Line Fuel Filter

**Important: replace periodically**

**Caution:**

Entrance of dust and dirt can cause malfunction of the fuel injection pump.



(1) in-line filter #2010-0004

### ENGINE OIL

**CAUTION**

To avoid personal injury:

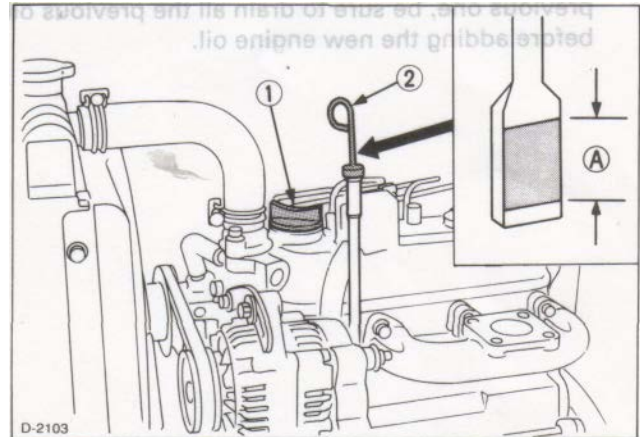
- Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.
- Do not touch muffler or exhaust pipes while they are hot; severe burns could result. Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.
- Contact with engine oil can damage your skin. Put on gloves when using engine oil. If you come in contact with engine oil, wash it off immediately.

**NOTE:**

Be sure to inspect the engine, locating it on a level place. If placed on gradients accurately, oil quantity may not be measured.

### Checking oil level and adding engine oil

1. Check the engine oil level before starting or more than 5 minutes after stopping the engine.
2. Remove the oil level gauge, wipe it clean and reinstall it.
3. Take the oil level gauge out again, and check the oil level.
4. If the oil level is too low, remove the oil filler plug and add new oil to the prescribed level.
5. After adding oil, wait more than 5 minutes and check the oil level again. It takes some time for the oil to drain down to the oil pan.



- (1) Oil filler plug [Lower end of oil level gauge]  
 (2) Oil level gauge (A) Engine oil level within this range is proper.

### Engine oil quantity

Model	Quantity
D905-E, D1005-E, D1105-E	5.1 L (1.35 U.S. gals.)
V1205-E, V1305-E, V1505-E	6.01 (1.59 U.S. gals.)
V1205-TE, V1505-TE	6.7 L (1.77 U.S.gals.)

Oil quantities shown are for standard oil pans.

**IMPORTANT:**

- Engine oil should be MIL-L-2104C or have properties of API classification CD grades or higher.
- Change the type of engine oil according to the ambient temperature.

above 25°C (77°C)	SAE 30 or SAE 10W-30 or 40
0 to 25°C (32 to 77°F)	SAE 20 or SAE 10W-30 or 40
below 0°C (32°F)	SAE 10W or SAE 10W-30 or 40

When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.

## Changing engine oil

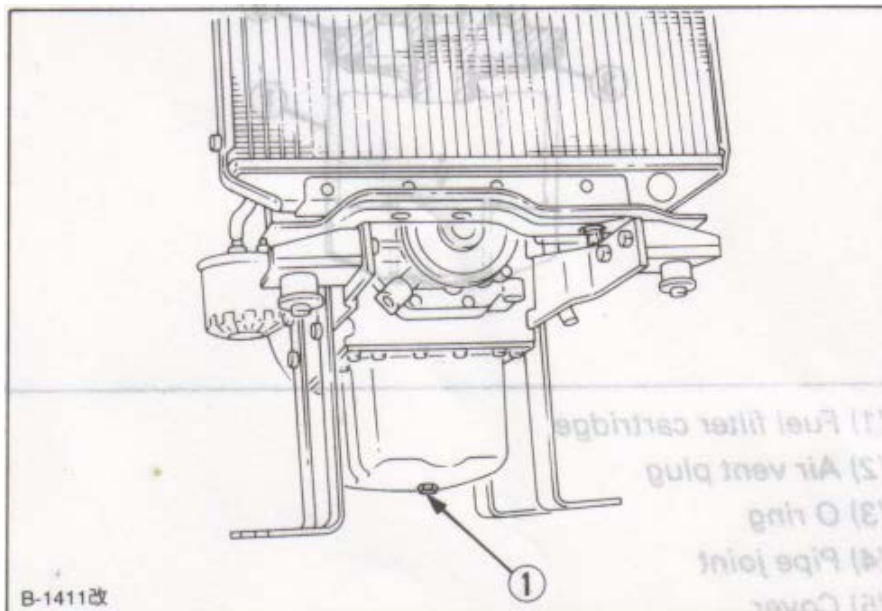


### CAUTION

To avoid personal injury:

- **Be sure to stop the engine before draining engine oil.**
- **When draining engine oil, place some container underneath the engine and dispose it according to local regulations.**
- **Do not drain oil after running the engine. Allow engine to cool down sufficiently.**

1. Change oil after the initial 50 hours of operation and every 200 hours thereafter.
2. Remove the drain plug at the bottom of the engine and drain all the old oil. Oil will drain easier when it is warm.
3. Add new engine oil up to the upper limit of the oil level gauge.



(1) Oil drain plug

## Replacing the Oil Filter Cartridge

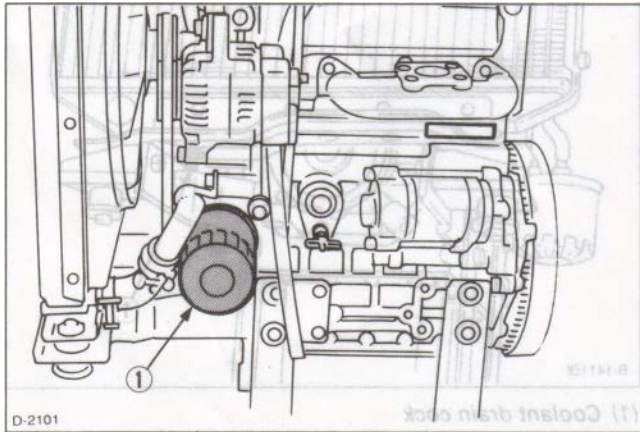


### CAUTION

To avoid personal injury:

- Be sure to stop the engine before changing the oil filter cartridge.
- Allow engine to cool down sufficiently, oil can be hot and cause burns.

1. Replace the oil filter cartridge after the initial 50 hours of operation and every 200 hours thereafter.
2. Remove the old oil filter cartridge with a filter wrench.
3. Apply a film of oil to the gasket for the new cartridge.
4. Screw in the cartridge by hand. When the gasket contacts the seal surface, tighten the cartridge enough by hand. Because, if you tighten the cartridge with a wrench, it will be tightened too *much*.



(1) Oil filter cartridge,  
 ^Remove with a filter  
 wrench (Tighten with your  
 hand)

5. After the new cartridge has been replaced, the engine oil level normally decreases a little. Thus, run the engine for a while and check for oil leaks through the seal before checking the engine oil level. Add oil if necessary.

### NOTE:

- Wipe off any oil sticking to the machine completely.

## RADIATOR

Coolant will last for one day's work if filled all the way up before operation. Make it a rule to check the coolant level before every operation.



### WARNING

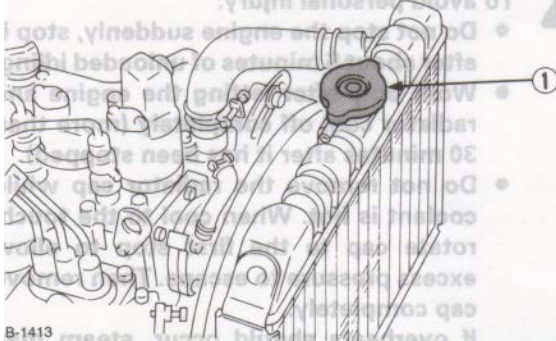
To avoid personal injury:

- Do not stop the engine suddenly; stop it after about 5 minutes of unloaded idling.
- Work only after letting the engine and radiator cool off completely (more than 30 minutes after it has been stopped).
- Do not remove the radiator cap while coolant is hot. When cool to the touch, rotate cap to the first stop to allow excess pressure to escape. Then remove cap completely. If overheating should occur, steam may gush out from the radiator or reserve tank; severe burns could result.



### Checking coolant level, adding coolant

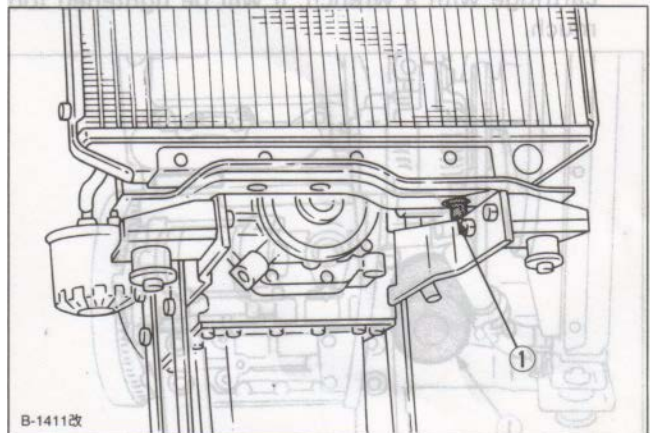
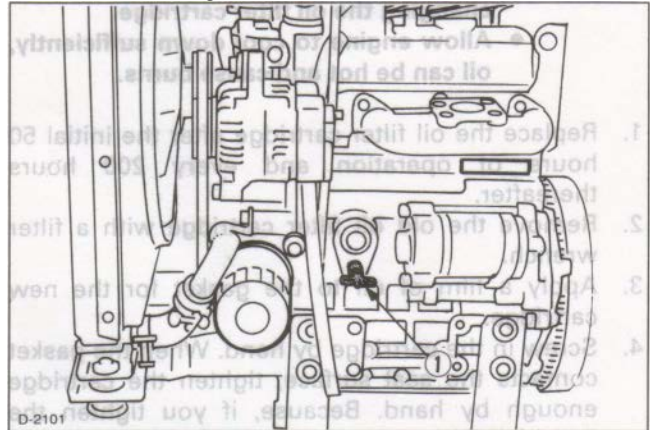
1. Remove the radiator cap after the engine has completely cooled, and check to see that coolant reaches the supply port.



(1) Radiator pressure cap

Additional coolant recovery tank located on back of battery box. Fill to appropriate coolant level line.

2. Check to see that two drain cocks; one is at the crankcase side and the other is at the lower part of the radiator as figures below.



(1) Coolant drain cock

#### IMPORTANT:

- If the radiator cap has to be removed, follow the caution and securely retighten the cap.
- If coolant should leak, contact A&O Forklift for assistance.
- Make sure that muddy or sea water does not enter the radiator.
- Use clean, fresh water and 50% anti-freeze
- Be sure to close the radiator cap securely. If the cap is loose or improperly closed, coolant may leak out and decrease quickly.



## Hydraulic Filter Replacement

### CAUTION:

To avoid personal injury:

- Avoid skin contact with hydraulic oil.
- Be sure to shut-off engine and apply parking brake.

If hydraulic oil is to be reused, be sure to use a clean container to catch oil when draining the tank & system

Use only ISO-46 or equivalent oil.

### Important:

- Dirt & dust can damage hydraulic components.
- Perform maintenance in a clean place.

To change filters:

1. After engine is shut-off, parking brake is applied, and all systems have cooled, drain the hydraulic tank and remove spin-on filters.

### Important:

**Tank must be drained prior to filters being removed. If not, oil will drain back out the hydraulic filter heads when filters are removed.**

2. Install new filters (#1200-0001 & 1200-0002).  
Filter 1200-0001 is located closest to fan  
Filter 1200-0002 is located closest to foot pedal.
3. Install tank drain plug, and fill tank (5-1/2 gallons)
4. Start engine and run hydraulic system.
5. Shut-off engine and check hydraulic oil level and add as needed  
(~6 gallons total)

### IMPORTANT:

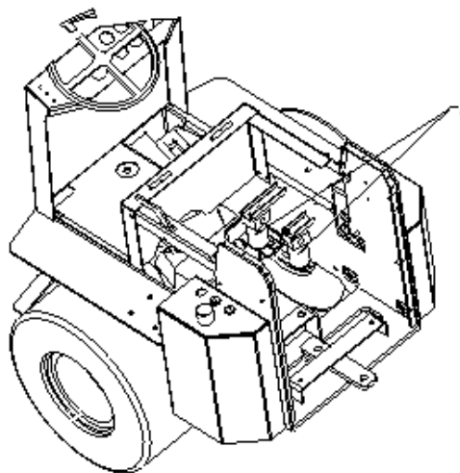
- Discard oil and filters in an environmentally safe manner.

## Hydraulic Filter Replacement Intervals

### Important:

- Hydraulic filters must be changed after the first 250hrs of use and every 500 hrs thereafter.
- Check hydraulic oil and replace as necessary.

(A) Hyd. Filters



## Grease Articulating Joints

### CAUTION

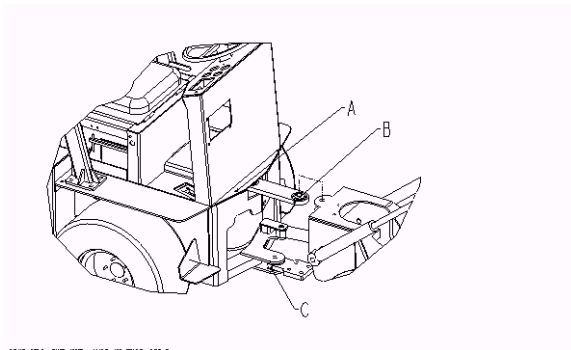
To avoid personal injury:

- **Place unit on level surface, engage parking brake, shut off engine and remove key.**

Grease all (3) joint locations daily as required. Using only Premium Lithium EP grease.

*Note: If unable to get center articulation to take grease properly, it may be helpful to jack up rear of machine.*

Articulating Joint Grease Locations



- |  |
|--|
| (A) Top Back Joint<br>(B) Top Front Joint<br>(C) Lower Joint |
|--|

## Air Filter

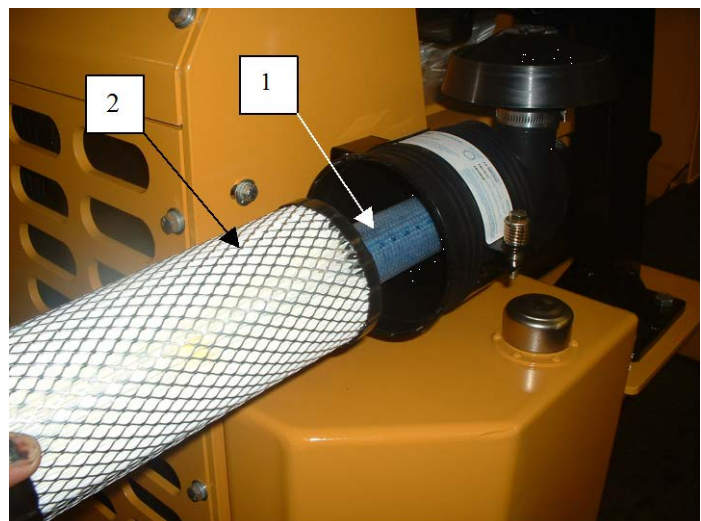
Since the air cleaner employed on this machine is a dry type, never apply oil to it.

1. Open the evacuator valve once a week under ordinary conditions, or daily when used in a dusty place.
2. Wipe the inside of the air cleaner with a clean cloth if it is dirty or wet.
3. Replace the outer & inner elements every year.

### IMPORTANT:

- Make sure wing nut for the element is tight enough. If it is loose, dust & dirt may be sucked in, damaging engine &/or causing premature engine wear.

Air Filters:



(1) Inner Air filter #1200-0003

(2) Outer Air filter #1200-0004

## ELECTRIC WIRING



**CAUTION**  
To avoid personal injury:

- Shorting of electric cable or wiring may cause a fire.
- Check to see if electric cables and wiring are swollen, hardened or cracked.
- Keep dust and water away from all power connections.
- Loose wiring terminal parts, make bad connections. Be sure to repair them before starting the engine.

Damaged wiring reduces the capacity of electrical parts. Change or repair damaged wiring immediately.

## FAN BELT

### Adjusting Fan Belt Tension



**CAUTION**  
To avoid personal injury:

- Be sure to stop the engine and remove the key before checking the belt tension.
- Be sure to reinstall the detached safety shield after maintenance or checking.

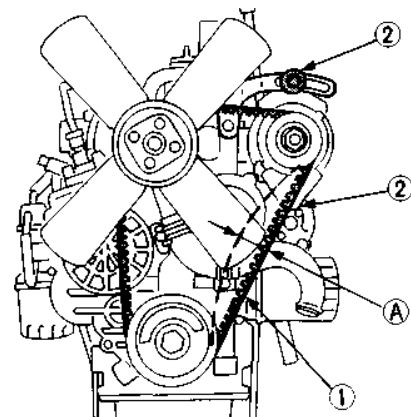
Proper fan belt tension :

A deflection of between 7 to 9 mm (0.28 to 0.35 in.) when the belt is pressed in the middle of the span.

1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.
4. Replace fan belt if it is damaged.

**IMPORTANT:**

- If belt is loosen or damaged and the fan is damaged, it could result in overheats or insufficient charging.
- Correct or replace belt.



(1) Fan belt  
(2) Bolt and nut

(A) 7 to 9 mm (0.28 to 0.35 in.)  
(under load of 10 kgf (22.11bs))

## Drive System Lubrication

**CAUTION:**

To avoid personal injury:

- Avoid skin contact with oil.
- Be sure to shut-off engine and apply parking brake.

Use only 80-90W oil in transfer case & differentials.

Rear Differential (Under Engine) requires Limited Slip Additive. (See A&O Forklift for details)

Use only Premium Lithium EP Grease in universals.

**Important:**

Dirt & dust can damage components. Perform maintenance in a clean place.

**IMPORTANT:**

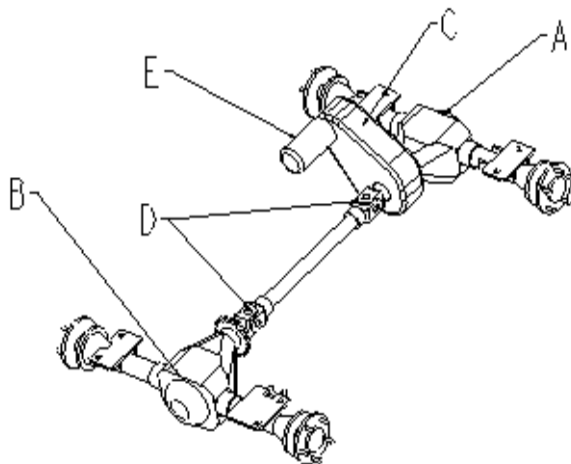
- Discard oil in an environmentally safe manner.

## Lubrication Intervals

**Important:**

Grease universals and drive shaft every 50hrs.

Check deferential oil monthly.



- (A) REAR DIFFERENTIAL
- (B) FRONT DIFFERENTIAL
- (C) TRANSFER CASE
- (D) DRIVE SHAFT
- (E) HYDRAULIC DRIVE MOTOR

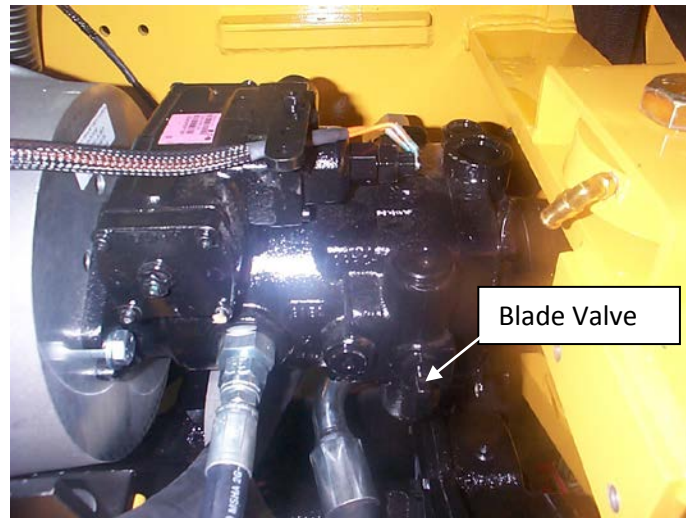
All Hummerbee Forklifts, serial numbers 1439 and older were equipped with a shift lever on the transfer case.

To tow machines with this option, follow these instructions.

- 1.) Remove hair pin clips from shift lever on transfer case.
- 2.) Move shift lever toward rear of machine for free towing.

**Caution: Use this mode only to trailer or garage a disabled machine. When towing in this mode the machine is freewheeling and can coast out of control.**

## XL TOWING



- 1.) Turn flat sided blade valve  $\frac{1}{4}$  turn until straight up and down.
- 2.) Blade valve is located on the right side of hydrostatic pump below large port with allen head plug.
- 3.) Blade valve is non hexagonal, use a  $\frac{1}{4}$ " open end wrench or a small crescent wrench to turn knob.

Machine is now safe to tow in either direction.

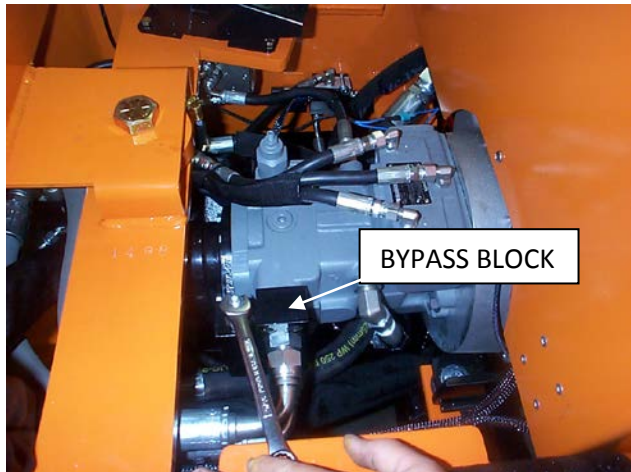
**Caution: Use this mode only to trailer or garage a disabled machine. When towing in this mode the machine is freewheeling and can coast out of control.**

## TOWING OF MACHINE (TURBO'S AFTER S/N 1440)

Remove floor pan.

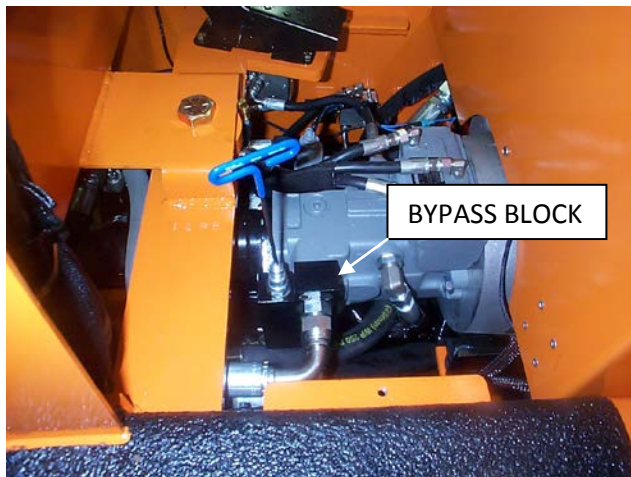
Locate bypass block, (black steel block on left side of hydrostat)

Loosen jam nut on cartridge valve, (as shown) turning the nut counter clockwise.



Turn center allen screw counter clockwise until the screw stops.

This allows fluid to circulate freely inside of motor only.



Machine is now safe to tow in either direction.

**Caution: Use this mode to trailer or garage a disabled machine. When towing in this mode the machine is freewheeling and can coast out of control.**



*Manufactured by:*

**Apiaries & Orchard Forklift, Inc.**

**7948 N. Sheridan Rd.**

**Edmore, MI 48829**

**800-943-8677**

**hummer@hummerbee.com**

**www.hummerbee.com**