SAFETY ALERT SYMBOL

Be Prepared - Get to Know All Operating and Safety Instructions

This is the Safety Alert Symbol. Wherever it appears - in this manual or on safety signs on the machine - you should be alert to potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

LEARN SIGNAL WORDS USED WITH SAFETY ALERT SYMBOL

Words "**CAUTION**," "**WARNING**," and "**DANGER**" used throughout this manual and on labels on machine indicate hazards or unsafe practices. All three statements indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert "Triangle," no matter which signal word appears next to the "Exclamation Point" symbol.

CAUTION!

This word is used on safety messages and safety labels and indicates potential of a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.

WARNING!

This word is used on safety messages and safety labels and indicates potential of a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against a highly unsafe practice.

DANGER!

This word is used on safety messages and safety labels and indicates imminent hazard of a situation that, if not avoided, is very likely to cause death or extremely serious injury. It may also be used to alert against equipment that may explode or detonate if handled or treated carelessly.

Safety precautions are described in SAFETY from page 1-4 on.

DOOSAN cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine. If your unsure about the safety of some procedures, contact a *DOOSAN* distributor.

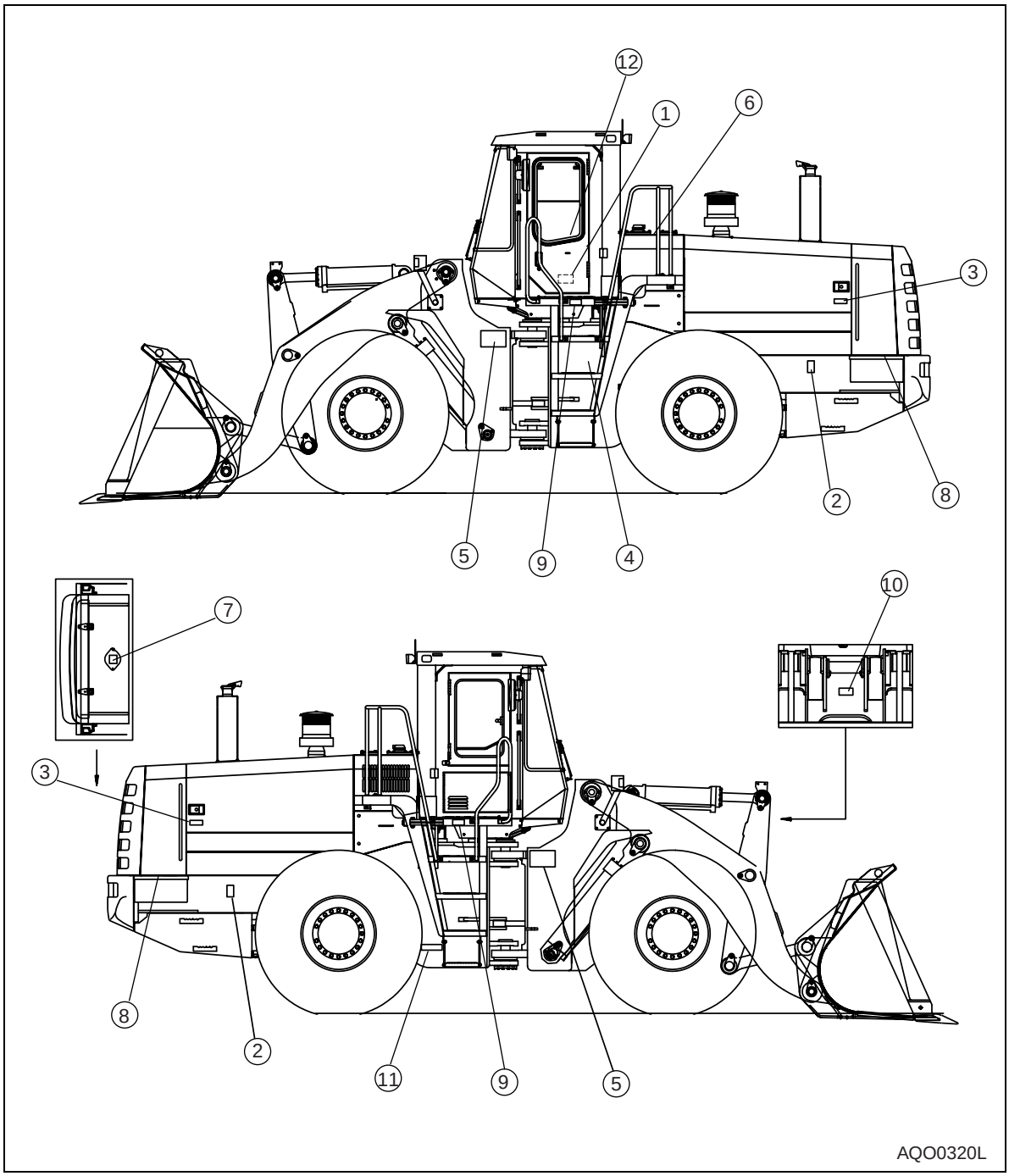

Figure 1 ROPS CANOPY MACHINE WITH CABIN

BREATHING MASKS, EAR PROTECTION MAY BE REQUIRED

Do not forget that some risks to your health may not be immediately apparent. Exhaust gases and noise pollution may not be visible, but these hazards can cause disabling or permanent injuries.

NOTE: *Sound level in closed operator's cab is 78 dB(A). Additional information on machine sound and vibration levels can be found in Shop Manual.*

ASBESTOS DUST HAZARD PREVENTION

Asbestos dust can be HAZARDOUS to your health if it is inhaled.

If you handle materials containing asbestos fibers, follow these guidelines as given below:

- Use an approved respirator.
- Never use compressed air for cleaning.
- Use water for cleaning to keep down the dust.
- Work on the machine or component with the wind at your back whenever possible.
- Always observe any rules and regulations related to the work site and working environment.

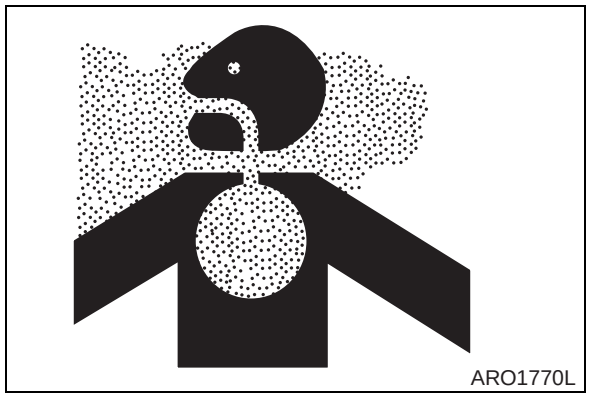

Figure 4

MOUNTING AND DISMOUNTING

Before getting on or off the machine, if there is any oil. grease, or mud on the handrails, steps, or track shoes, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.

Never get on or off a moving machine. In particular, never get on or off a moving machine. These actions may lead to serious injury.

When getting on or off the machine, always face the machine, and maintain a three-point contact (both feet and one hand or one foot and both hands) with the handholds and steps to ensure that you support yourself securely.

Never hold any control levers when getting on or off the machine.

Never get up from operator's seat or leave operator's station and dismount machine if engine is running.

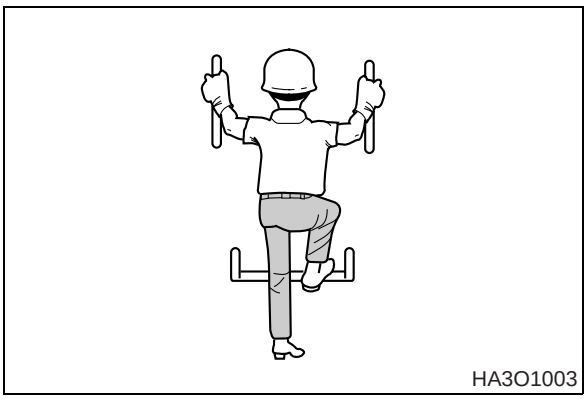

Figure 5

USE WARNING TAG DURING SERVICE

Alert others that service or maintenance is being performed and tag operator's cab controls - and other machine areas if required - with a warning notice.

Warning tags for controls are available from *DOOSAN* distributors; see Figure 25.

Figure 25

CLEAN BEFORE INSPECTION OR MAINTENANCE

Clean the machine before carrying out inspection and maintenance. This prevents dirt from getting into the machine and also ensures safety during maintenance.

If inspection and maintenance are carried out when the machine is dirty, it will become more difficult to locate the problems, and also there is danger that you may get dirt or mud in your eyes or that you may slip and injure yourself.

When washing the machine, do the following;

- Wear shoes with non-slip soles to prevent yourself from slipping and falling on wet places.
- Wear safety glasses and protective clothing when washing the machine with high-pressure steam.
- Take action to prevent touching high-pressure water and cutting your skin or having mud fly into your eyes.
- Do not spray water directly on electrical components (sensors, connector) (1, Figure 26). If water gets into the electrical system, there is danger that it will cause defective operation and malfunction.

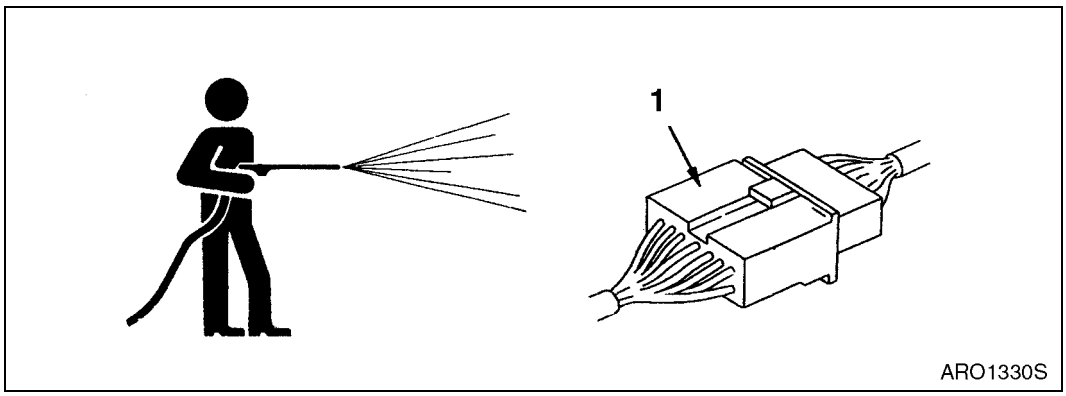

Figure 26

Pick up any tools or hammers that are laying in the work place, wipe up any grease or oil or any other slippery substances, and clean the area to make it possible to carry out the operation in safety. If the work place is left untidy, you may trip or slip and suffer injury.

OPERATING CONTROLS

"Operating Controls" section presented here consists of the following groups:

Each group is explained with a point location drawing or photo and a brief description of each control, switch, gauge or valve.

Indicator lights work in addition to the gauges on the instrument panel. The operator should monitor machine pressure on the instrument panel along with indicator lights. These lights will only give the operator an indication that there is a problem.

⚠ WARNING!

Warning lights. When any one or more of the warning lights on the control console come "ON," immediately stop operation and shutdown unit. Investigate and correct problem before proceeding with operation.

A transmission neutral lever lock is in base of transmission lever. This neutral lever lock prevents the transmission lever from being moved out of "NEUTRAL."

N "NEUTRAL LOCK" position. Prevents lever from being moved out of "NEUTRAL."

D "DRIVE" position. Allows lever to be moved from "NEUTRAL" to "FORWARD and REVERSE."

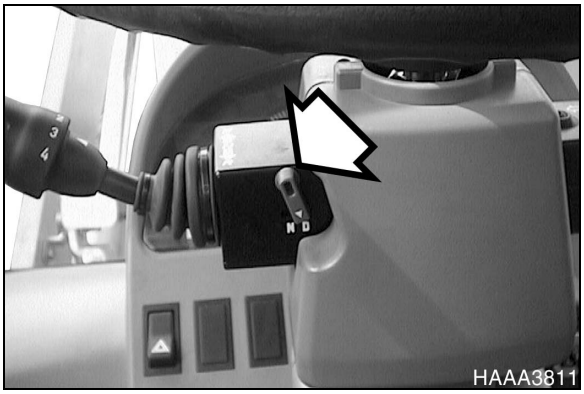

Figure 16

⚠ CAUTION!

"LOCK" transmission lever. When ever machine is parked, "LOCK" transmission lever in "NEUTRAL" to prevent accidental machine movement.

10. FRONT INSTRUMENT PANEL

See “Front Instrument panel” on page 2-12.

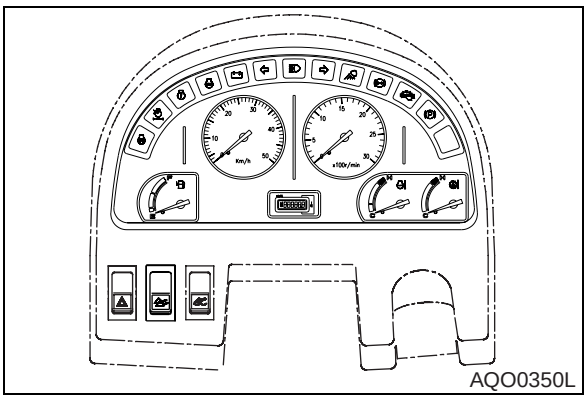

Figure 17

11. TRANSMISSION DISPLAY

See “Transmission Display” on page 2-21.

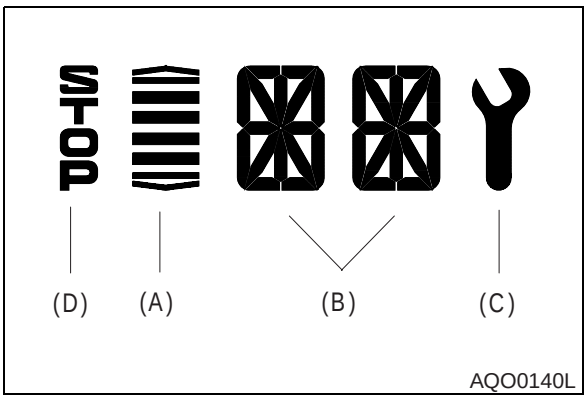

Figure 18

8. REAR WIPER SWITCH

O. In this position, this switch turns "OFF" windshield wiper mounted on rear windshield of operator's cab.

I. In this position, windshield washer fluid sprays onto the rear windshield while running the rear wiper. When released, the switch returns to the "O" position.

II. In this position, this switch turns "ON" windshield wiper mounted on rear windshield of operator's cab.

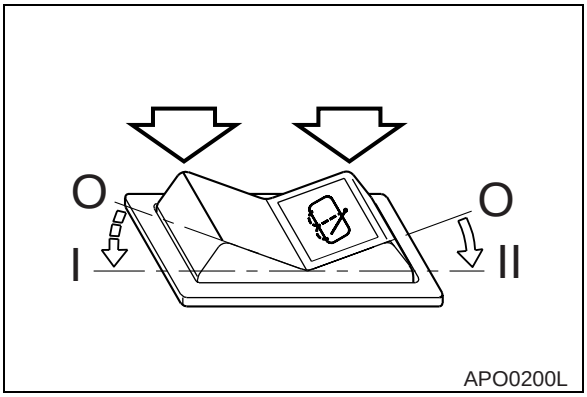

Figure 57

⚠ CAUTION!

The washer pump can be damaged if it is activated while there is no fluid in the tank. The fluid level should be regularly checked and refilled if necessary.

Using soap or other solvents instead of the recommended washer fluid may damage the wiper blades and the paint finish.

Only use recommended washer fluid or equivalent.

9. ALTERNATE TORQUE SWITCH (ECONOMIC MODE)

This alternate torque switch allows the operator to switch between 100% throttle torque curves and about an 80% derated torque curve. This improves operating fuel efficiency in loaded versus unloaded conditions.

O. In this position torque switch is set to the "OFF" position, and 100% torque is permitted.

I. In this position, torque switch is turned "ON," which limits engine torque to 80% of maximum.

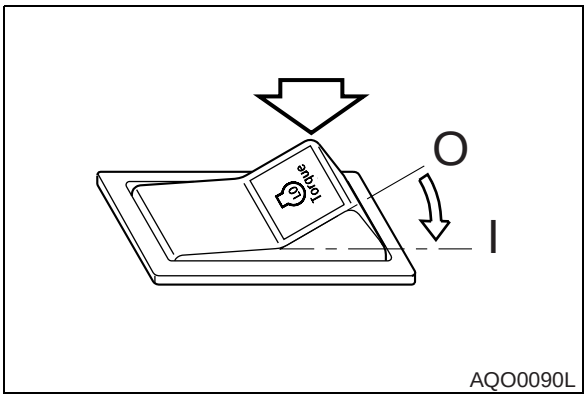

Figure 58

18. PARKING BRAKE SWITCH

O. In this position, the parking brake is "RELEASED" and the monitor light on the front instrument panel turns "OFF."

I. In this position, the parking brake is "APPLIED" and the monitor light on the front instrument panel comes "ON." This brake can also be used as an emergency brake.

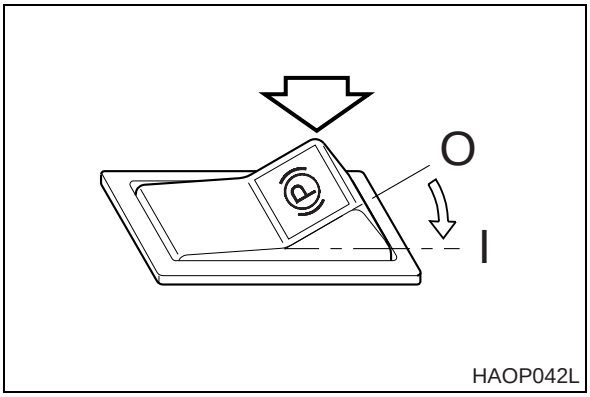

Figure 66

⚠ WARNING!

Set the parking brake switch in the "I" (APPLIED) position before leaving the loader. Make sure to "APPLY" the parking brake switch before trying to start the loader.

⚠ CAUTION!

Do not use this parking brake to brake the loader, except in an emergency; otherwise, it might cause premature wear or damage of the brake.

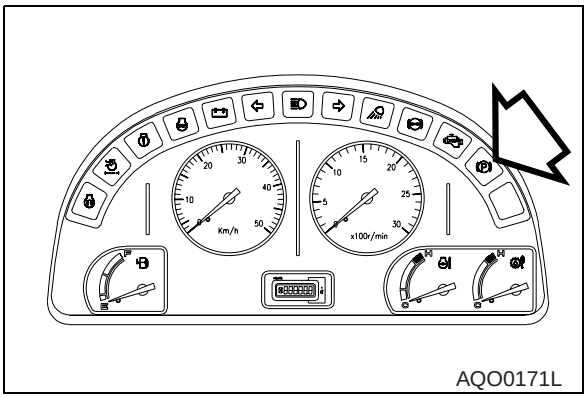

Figure 67

8. ELECTRIC BOX

Under the seat are two pullout trays that contain relays for unit. See “Fuse Box/ Relay” on page 2-50.

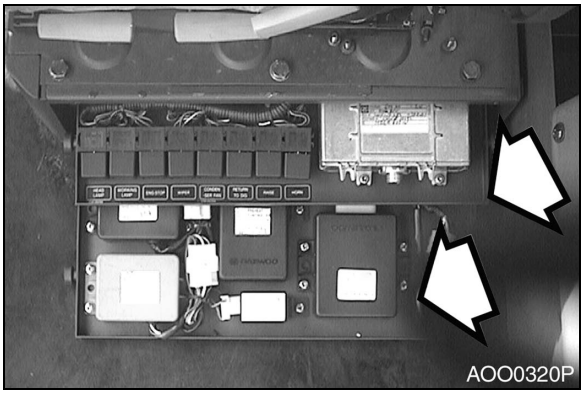

Figure 76

9. FUSE BOX TWO

Fuse box two is just above the windshield washer fluid tank. For a detailed explanation of fuses see “Fuse Box/Relay” on page 2-50.

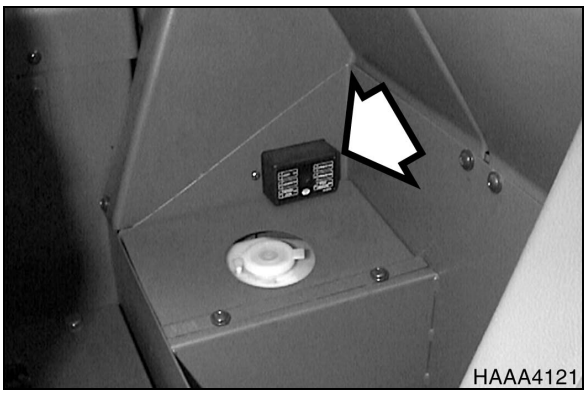

Figure 77

10. FUSE BOX ONE

The fuse box is at the rear side of right control stand. For a detailed explanation of fuses see “Fuse Box/Relay” on page 2-50.

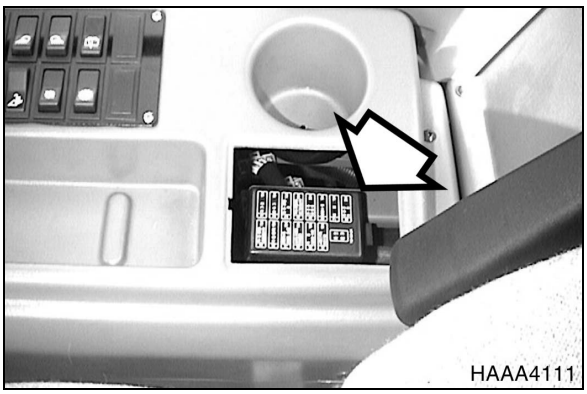

Figure 78

B. Used to direct air flow to lower portion of operator's cab.

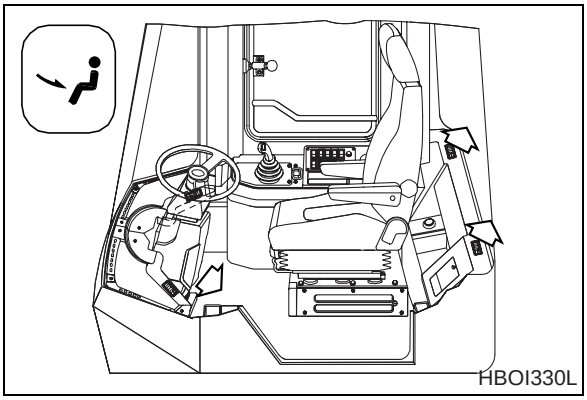

Figure 85

C. Used to direct air flow for defrosting front window of operator's cab.

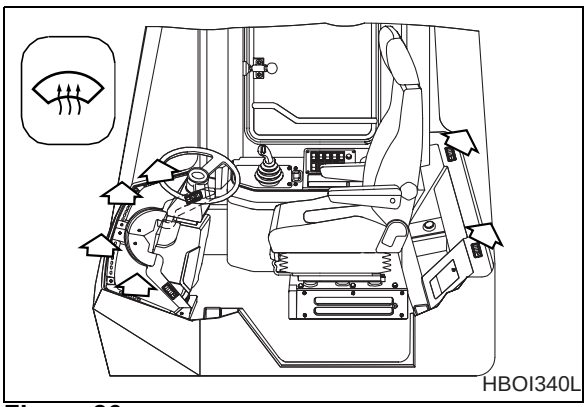

Figure 86

5. VENTILATION SELECTION SWITCH

A. "A" Switch - Draws fresh air into operator's compartment.

B. "B" Switch - Recirculates air within the operator's compartment. Used to rapidly reduce condensation on windows.

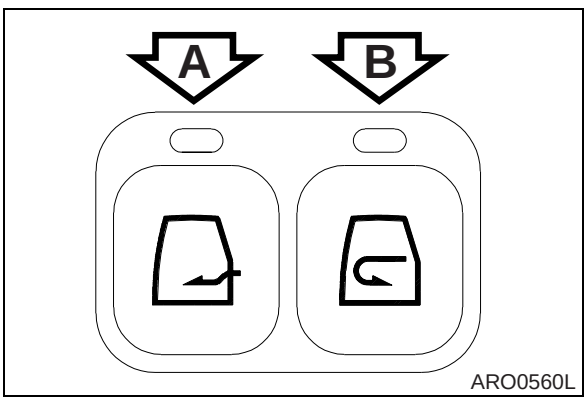

Figure 87

MEMORY FUNCTION OF USED MODE

The air conditioner panel has a memory function. When the starter switch is turned "OFF" the settings for the panel will be stored. When the machine is started, the last setting will be used.

GREASE STEERING CYLINDER ROD AND BASE ENDS

1. Steering cylinder rods, 2 locations, one on each side of machine.

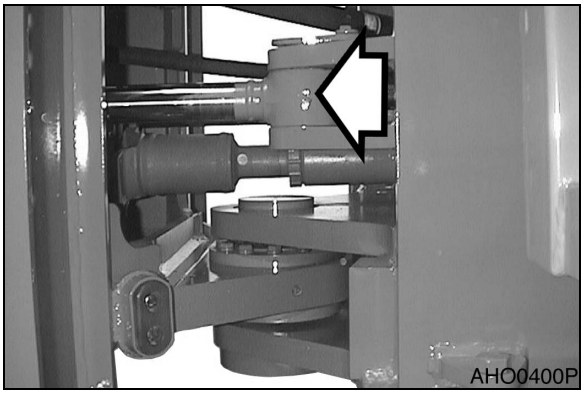

Figure 40

2. Steering cylinder head ends, 2 locations. Use remote grease fittings mounted on frame.

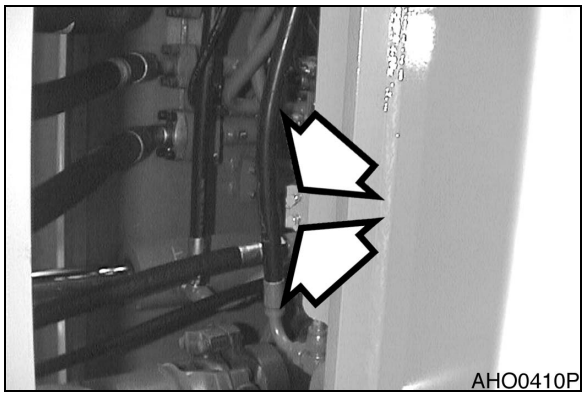

Figure 41

GREASE UPPER AND LOWER CENTER PINS

1. Center pins, upper (Figure 42) and lower (Figure 43). Two locations on each side of machine.

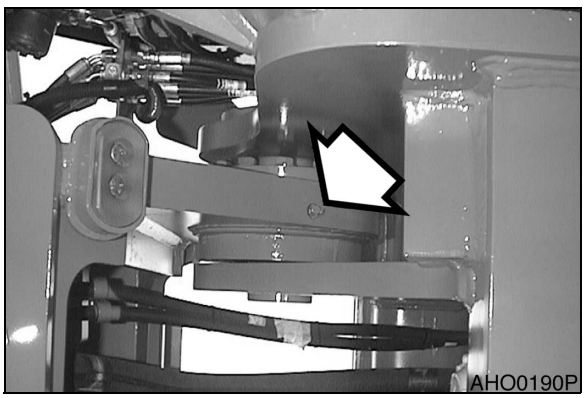

Figure 42

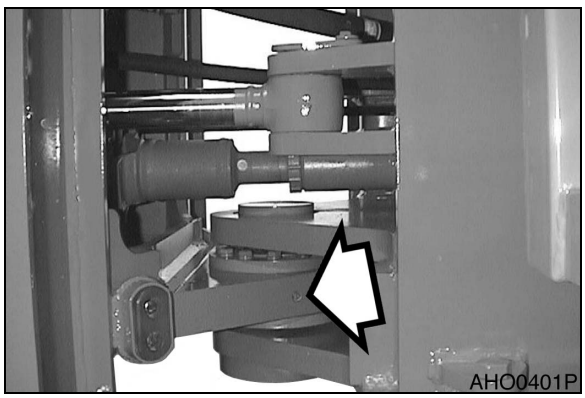

Figure 43

CHANGE ENGINE OIL AND FILTER (INITIAL)

NOTE: *Engine oil and filter must be changed after first 50 hours of operation to comply with new machine break-in requirements. After first change, oil and filter should be changed every 250 hours. Follow procedure under 250 hour maintenance interval (See page 4-30).*

⚠ WARNING!

Exchange filter after waiting for engine to cool. Be careful of fire hazards. Do not smoke.

1. Locate fuel filter inside engine compartment.
2. Position a small container under fuel filter. Drain filter by opening drain valve on bottom of filter.
3. Unscrew fuel filter from head assembly. Discard fuel filter.

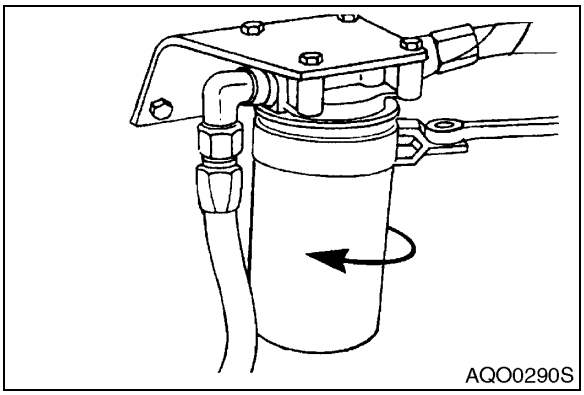

Figure 60

4. Cleaning filter head.

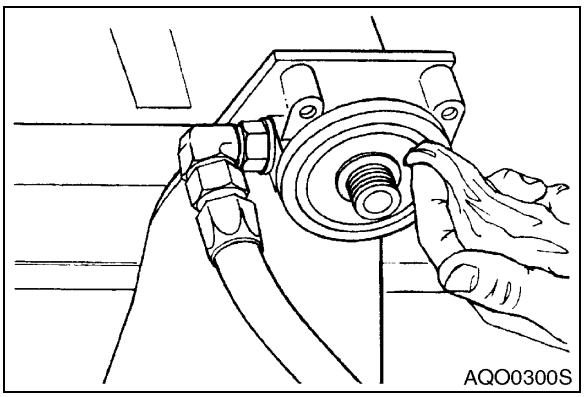

Figure 61

5. Install new fuel filter. Screw filter on head until gasket contacts head, turn filter 1/3-1/2 turn more.

   NOTE: *Coat fuel filter gasket with fuel.*

   NOTE: *Fill fuel filter with clean fuel. This will help reduce fuel system priming.*

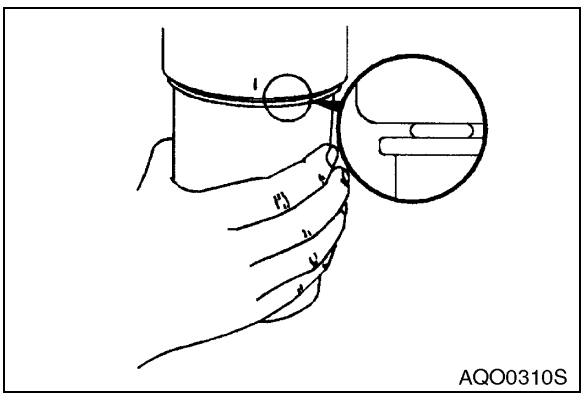

Figure 62

6. Start engine. After engine has run for a couple of minutes, shutdown engine and lock for leaks.

   If engine does not start, fuel system may need priming. Prime fuel system using the following procedure:

   A. Loosen plug on top of fuel filter head.

   B. Unscrew and pump the hand operated primer pump near fuel injection pump. Pump primer until fuel is present at plug hole in fuel filter head.

CHECK HYDRAULIC PRESSURES

Hydraulic pressures for most systems can be check by using the remote test ports shown in Figure 93.

Port Number	Description
1	Main Pump Pressure
2	Transmission System Pressure
3	Brake Charge Pressure
4	Pilot Control Valve Lever (Joystick) Activation Pressure

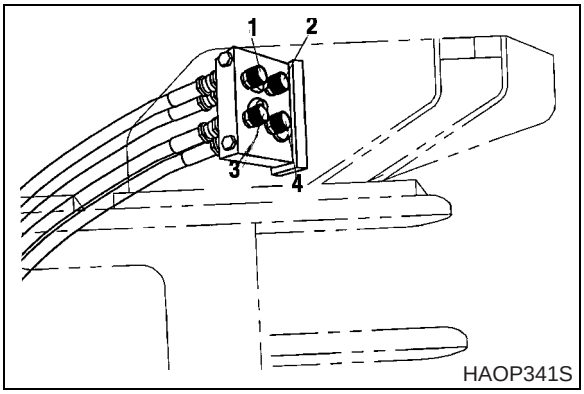

Figure 93

MAIN PUMP PRESSURE

1. Attach gauge to (Port 1, Figure 94)
2. Relief cartridge for main pump must open at 200^{+5} kg/cm^2 ($2{,}918^{+70}$ psi).

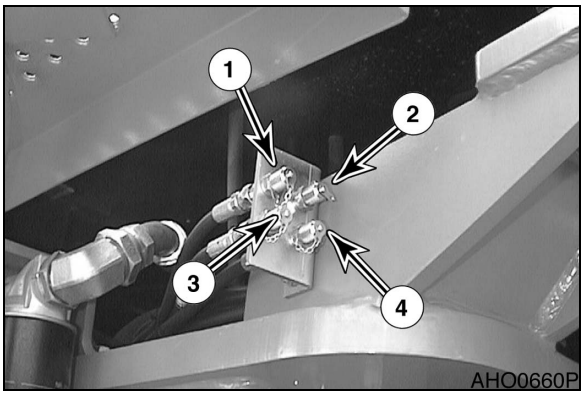

Figure 94

3. Adjust screw on relief valve cartridge (1, Figure 95). Loosen lock nut and turn screw clockwise to raise relief pressure. Turn screw counterclockwise to lower relief pressure.

   Tighten lock nut after pressure has been adjusted.

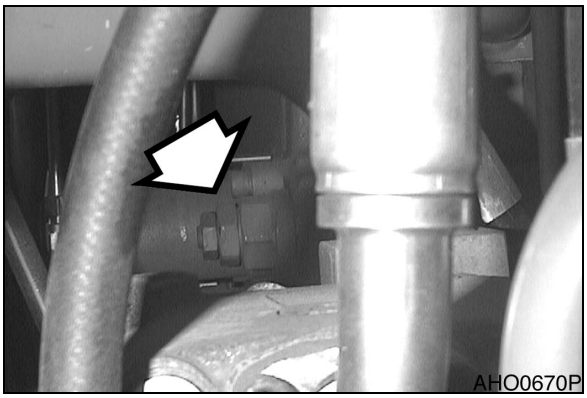

Figure 95

ENGINE

Problem	Possible Causes	Remedies
Starter does not operate	Blown fuse	Replace fuse
	Low battery power	Charge battery
	Poor terminal contact	Clean and tighten connections
	Starter switch failed	Replace switch
	Starter relay failed	Replace relay
	Starter control failed	Replace controller
	Wiring harness faulty	Replace harness
	Battery relay failed	Replace relay
Starter engages, engine does not start	Blown fuse	Replace fuse
	Fuel gelled in cold weather	Replace fuel
	Fuel filters plugged	Replace filters
	Water or dirt in fuel system	Clean system and add new fuel
	Air in fuel system	Purge air from system
	Engine stop control failed	Replace stop control
	Engine stop relay failed	Replace relay
Engine starts, runs only at low speed or shuts down	Engine oil viscosity incorrect	Change oil
	Clogged or dirty fuel injectors	Clean injectors
	Fuel filters plugged	Replace filters
	Engine stop motor cable out of adjustment	Readjust
	Engine speed control cable out of adjustment	Readjust
Engine knocks, runs unevenly or surges	Low engine oil	Refill
	Plugged air intake system	Clean system and replace filter
	Injection pump out of adjustment	Contact your *DOOSAN* dealer
	Plugged fuel filter	Replace fuel filter
	Water or dirt in fuel system	Clean system and add new fuel
	Clogged or dirty fuel injectors	Clean injectors

MATERIAL	LOW WEIGHT OR DENSITY 1,100 KG/M^3 (1,850 LB/YD^3), OR LESS	MEDIUM WEIGHT OR DENSITY 1,600 KG/M^3 (2,700 LB/YD^3), OR LESS	HIGH WEIGHT OR DENSITY 2,000 KG/M^3 (3,370 LB/YD^3), OR LESS
Salt	929 kg/m^3 (1,566 lb/yd^3)	----------	----------
Snow, light density	529 kg/m^3 (891 lb/yd^3)	----------	----------
Sand, DRY, loose	----------	1,522 kg/m^3 (2,565 lb/yd^3)	----------
Sand, WET, packed	----------	----------	1,922 kg/m^3 (3,240 lb/yd^3)
Shale, broken	----------	1,362 kg/m^3 (2,295 lb/yd^3)	----------
Sulphur, broken	529 kg/m^3 (1,620 lb/yd^3)	----------	----------

IMPORTANT

Weights are approximations of estimated average volume and mass. Exposure to rain, snow or ground water; settling or compaction due to overhead weight and chemical or industrial processing or changes due to thermal or chemical transformations could all increase value of weights listed in table.