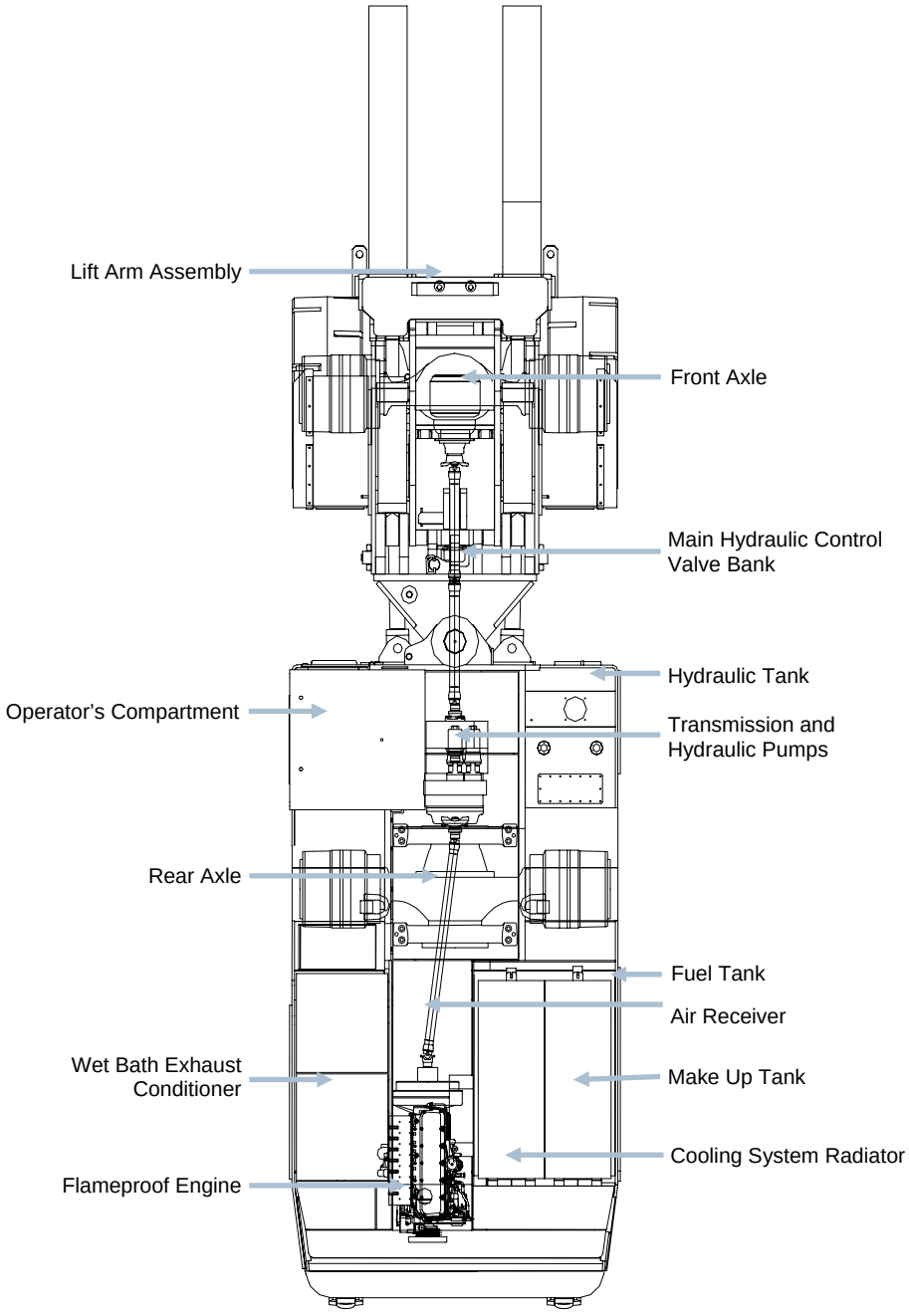
Section **4**

Machine Orientation, Controls and Functions

MACHINE ORIENTATION

BASIC MACHINE LAYOUT

The MH-40 consists of two main sections a front and rear frame. Housed in the front frame is the lift arm assembly, axle and main hydraulic control valve bank. The rear frame houses the transmission and hydraulic pumps, cooling system radiator, flameproof engine package (which utilises a wet bath exhaust conditioner,) the operator's compartment and all the storage reservoirs, (hydraulic, pneumatic, exhaust conditioner make up and fuel tanks).



CONTROL LOCATIONS

COMPARTMENT DOOR

The compartment door must be closed and locked after entering the compartment before the park brake button can be released and the declutch cylinder deactivated.

Never use the door to apply the park brake. Always manually apply by pressing the park brake button and ensure the brake head pressure gauge reads *zero*. The steering pressure will automatically bleed down, never assume the steering pressure has bled down unless the steering pressure gauge reads *zero*.

When the door is open the machine cannot be operated, as the park brake will be on and the transmission will be declutched. There is a roller cam valve in the door lock that needs to be activated to release the park brake. Also the brake system pressure is dumped with the door open. The engine will run with the door open.

Compartment Door Assembly

Door Interlock Valve

TRANSMISSION GEAR CONTROL LEVER

The transmission gear control lever has four positions, *first, second, third* and *fourth*. Shifting to a higher or lower speed may be made at full engine RPM.

NOTICE

The transmission in the machine is modulated. This prevents severe shocks being transmitted through the drive train when the transmission is shifted between gears.

TRANSMISSION DIRECTIONAL CONTROL LEVER

A directional control lever controls the transmission. This lever has three positions, *forward, neutral* and reverse. The engine should be at low idle when the transmission is shifted from the *neutral* position to either *forward* or *reverse* direction.

NOTICE

The transmission must be placed in the *neutral* position for the starter motor to engage when starting the engine.

WARNING

If the engine starts when the transmission is not in neutral, the machine should be tagged out of service until the problem is rectified.

Transmission Gear Control Lever

Transmission Directional Control Lever

Transmission Controls

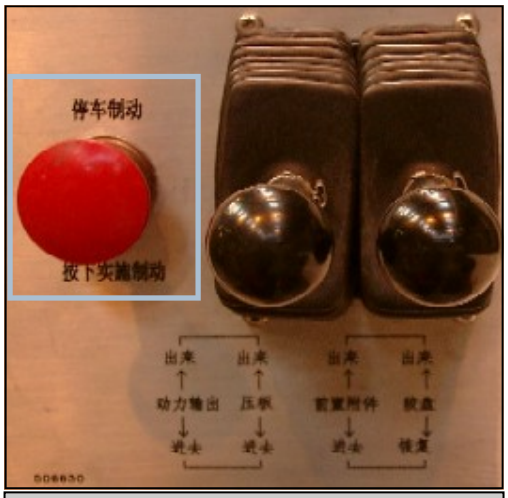
PARK BRAKE BUTTON

The park brake button has two positions and it is held in the release position by pilot air pressure. By pushing the button inwards, the park brake is applied, and by pulling the button out the park brake will be released. The park brake cannot be released until the system pressure is sufficient to overcome the spring force of the brake control, it also will not release unless the door is closed (there is a interlock valve inside the door lock which needs to be activated to release the park brake).

If the engine shuts down the park brake will *automatically apply* itself by dumping the pilot air pressure via the low engine oil pressure valve. The *brake head pressure gauge must read zero* when the brake is applied.

Never use the door interlock to actuate the park brake when exiting the machine. If there is a malfunction on the door interlock system, the park brake could possibly not apply when exiting the machine and the machine could run away resulting in serious damage or injury.

The park brake must be applied for the starter motor to engage whenever an engine start is required.



Park Brake Button

Brake Head Pressure Gauge

FOUR-WAY JOYSTICK CONTROL LEVER

This lever has five positions, *tilt back*, *tilt forward*, *lift*, *lower* and *hold*. Pushing the lever to the *right* tilts the lift arms back for loading and tramming. Pulling the lever to the *left* tilts the lift arms down for unloading. Pushing the *forward* lowers the lift arms. Pulling the lever *back* raises the lift arms. The lever is spring centred to the *hold* position.

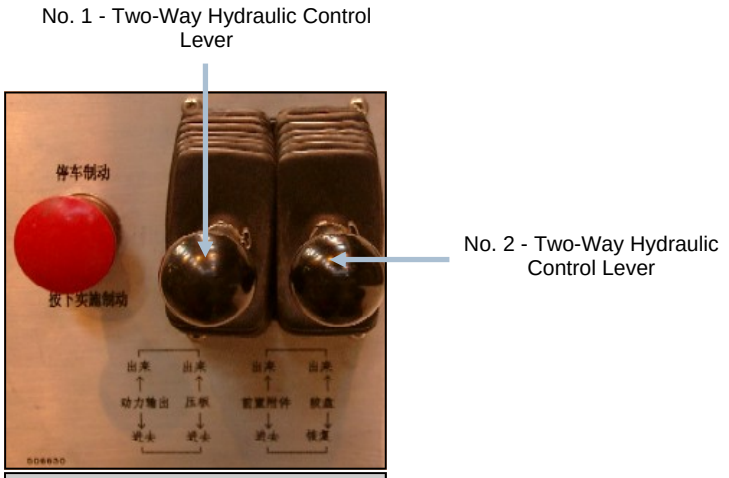
Two functions may be engaged at the same time by pushing the four-way joystick control lever at 45° in the direction of the two required functions.

NO. 1 - TWO-WAY HYDRAULIC CONTROL LEVER

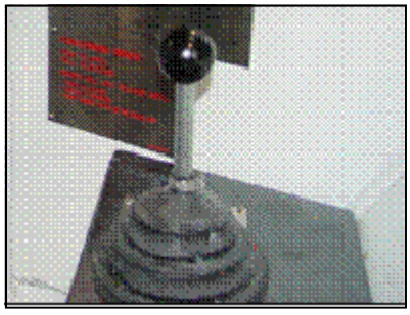
There are two hydraulic two-way control levers fitted to the machine. The first lever closest to the operator is used to auxiliary hydraulic power take off fitted to the rear of the machine. This lever has three positions, *up, down* and *hold.* The lever is spring centred to the *hold* position.

NO. 2 - TWO-WAY HYDRAULIC CONTROL LEVER

The second lever, furthest from the operator, is used to control the winch. This lever has three positions, *up, down* and *hold*. When operating the winch, the *down* position winches the rope in and pulling the lever up winds the winch rope out. The lever is spring centred to the *hold* position.



Two-Way Control Levers



Four-Way Joystick Control Lever

OPERATOR'S SEAT

On the operator's seat the *height, backrest tilt* and *seat suspension* are all adjustable. The controls for these functions are beside the seat.

ACCELERATOR PEDAL

The accelerator pedal is connected to the engine fuel pump governor via a hydraulic slave and master cylinder system. When the accelerator pedal is depressed the engine speed increases. The accelerator pedal is spring returned so that when pedal pressure is removed, the engine returns to low idle.

Always keep the operator's compartment clean. Dirt, etc. can build up under the accelerator pedal restricting its movement.

BRAKE PEDAL

The brake pedal when depressed applies the brakes on the front and rear axles. There are four liquid-cooled Posi-Stop brakes located internally in each axle. Whenever possible use the engine compression to slow the machine on a grade or decline by selecting a lower gear and driving the machine using engine revs.

Do not ride the brakes while tramming the machine.

If the engine should stall, the machine is fitted with fail-safe brake system that will fully apply the brakes. The operator can apply the brakes at any time following an engine stall to immediately bring the machine to a controlled stop.

Always keep the operator's compartment clean. Dirt, etc. can build up under the brake pedal restricting its movement.

STEERING WHEEL

The steering wheel controls the flow of hydraulic oil to the steering cylinder via an orbital steering valve. As the cylinder strokes, the machine articulates to the *left* or to the *right*.

Turning the wheel *anti-clockwise* articulates the machine towards the operator. This effectively turns the machine to the *left* in the forward direction (lift arms end).

Turning the wheel *clockwise* articulates the machine away from the operator. This effectively turns the machine to the *right* in the forward direction (lift arms end).

The machine will turn in the opposite directions when travelling in forward and reverse. Operator training and familiarity with shield hauler operation is important to ensure that collisions are avoided.

If the engine should stall, the machine is fitted with a system that will dump the steering pressure. The operator can steer the machine via a 6 litre back up accumulator at any time following an engine stall to immediately bring the machine to a safe controlled stop.

If the door is opened or the park brake is applied, the machine is fitted with fail-safe steering system that will immediately dump the steering system pressure. This is to protect the operator or personnel from being crushed in the articulation area. Steering cannot be used until the door is shut and latched and the park brake button pulled out to the released position.

Steering Wheel

BRAKE HEAD PRESSURE GAUGE

This gauge shows the service and park brake system's brake head pressure. Operators should periodically check this gauge. The gauge will read *zero* pressure when the brakes are fully applied via the service and/or park brake controls.

If the operator's foot is off the brake pedal and the park brake is released, the indicated pressure shall be a minimum of 12000 kPa (1750 psi). If the pressure is below this it is likely that the brakes are dragging. The machine shall not be operated with dragging brakes as fire or brake failure may result. Immediately report the problem to service personnel.

Observe that the brake head pressure is on *zero* after applying the park brake.

BRAKE ACCUMULATOR PRESSURE GAUGE

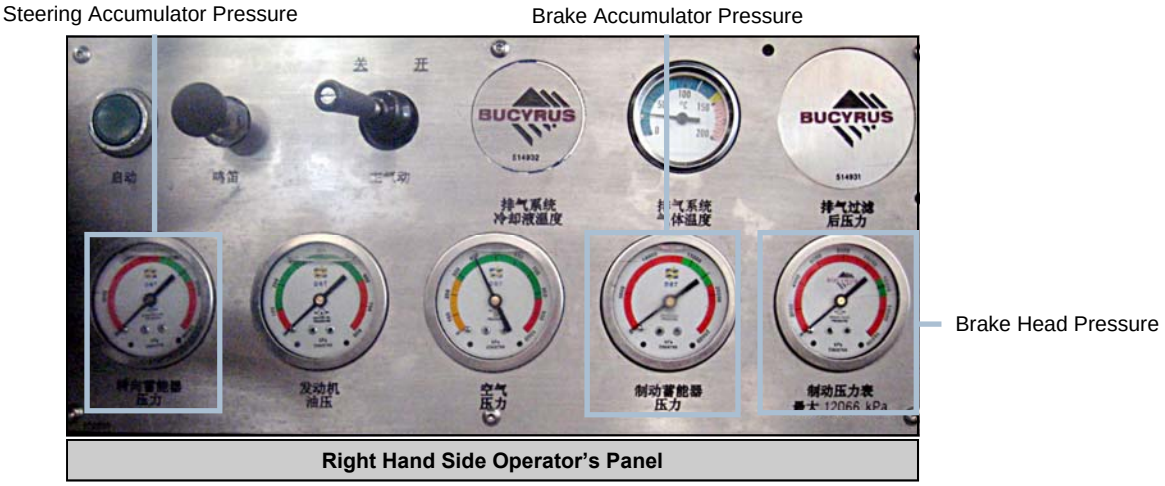
This gauge indicates the service and park brake system's accumulated pressure. Normal operating system pressure is 17200 kPa (2500 psi).

Do not operate the machine if the brake accumulator pressure gauge is less than 17200 kPa (2500 psi). Immediately report the problem to service personnel.

STEERING ACCUMULATOR PRESSURE GAUGE

This gauge indicates the steering system's accumulated pressure. Normal operating system pressure is 17200 kPa (2500 psi).

If the pressure constantly drops below or will not hold 17200 kPa (2500 psi), steering may become difficult. The machine should not be operated and the problem shall be reported immediately to service personnel.



Right Hand Side Operator's Panel

ENGINE START BUTTON

Depressing the engine start button engages the starter motor to start the engine. The engine start button will not activate the starter motor unless:

1. The transmission is in *neutral*.
2. The park brake is applied.
3. The diesel control system shows no fault.
4. The on/off toggle switch is *on*.
5. Sufficient air is in the receiver and air valve is turned on.

Depress the accelerator pedal ⅓ before a start to ensure sufficient fuel is available. Immediately remove finger from the engine start button when the engine fires.

AIR PRESSURE GAUGE

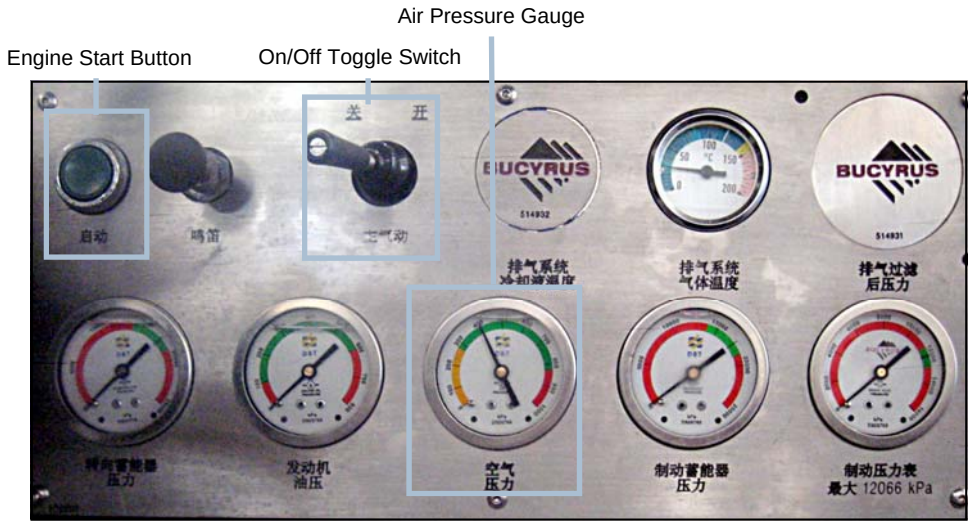
This gauge indicates the air pressure in the air receiver. Normal air pressure is set at 760 kPa-860 kPa (110 psi -125 psi).

The main air isolation valve is mounted in the engine compartment. Turn this valve *on* before entering the machine. The gauge will read *zero* when the valve is shut.

ON/OFF TOGGLE SWITCH

The on/off toggle switch controls the supply of pilot air pressure to the air pressure switch on the diesel control system, which allows air to pilot the start motor.

1. To start the engine, place the on/off toggle switch in the *on* position.
2. To shutdown the engine place the on/off toggle switch in the *off* position.



Right Hand Side Operator's Panel

TRANSMISSION OIL TEMPERATURE GAUGE

This gauge indicates the oil temperature in the transmission and torque converter. Normal oil temperature is between 82°C-93°C.

If the temperature should rise above 121°C, carry out the following procedure:

1. Bring the machine to a halt, lower the lift arms to the ground and apply the park brake.
2. Put the transmission in *neutral* and rev the engine to about ½ speed.

Observe the temperature gauge for about two minutes. If the temperature does not begin to fall within two minutes, shutdown the machine and do not attempt to operate it until corrective action has been taken. Immediately report the problem to service personnel.

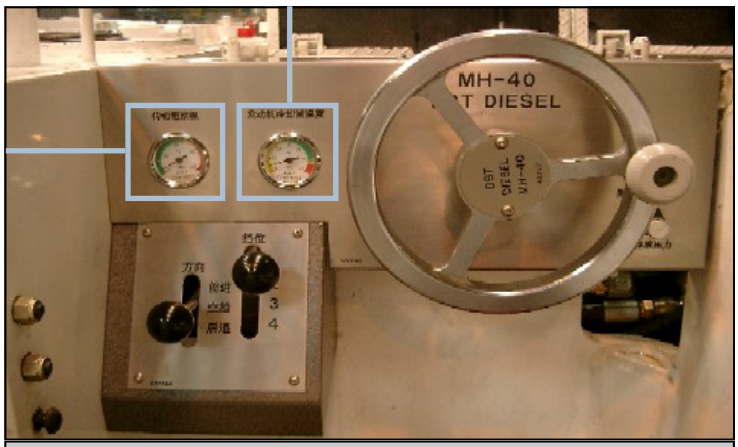
Do not operate the machine if the oil temperature is above 121°C.

Transmission temperature can be affected by incorrect gear selection for the load being carried and or the road conditions.

ENGINE COOLANT TEMPERATURE GAUGE

This shows the coolant temperature circulating through the engine, exhaust and radiator systems. Normal operating temperature is between 82°C-95°C. The engine should not be operated under heavy load until it has time to warm up approximately five minutes. The engine must also be shut off and cooled when the coolant level is to be topped up.

Shut off the engine immediately if the coolant temperature gauge goes above 105°C. The diesel control system will give an alarm at 100°C and should shutdown the engine at 105°C.



Left Hand Side Operator's Panel

HORN BUTTON

Pushing this button sounds the air horns.

NOTICE

It is good operating procedure to sound the horn 2-3 seconds before an engine start or whenever approaching blind intersection.

Right Hand Side Operator's Panel

EMERGENCY FUEL SHUT OFF VALVE

This valve is located after the fuel filter/water separator. Closing this valve will stop the flow of fuel to the engine. This provides a second means of shutting down the engine should the on/off toggle switch fail.

Emergency Fuel Shut Off Valve

ENGINE SERVICE HOUR METER

This electric meter is mounted on the off driver's side at the rear of the machine.

Use the hour meter to determine servicing intervals.

Engine Hour Meter

AIR CLEANER SERVICE INDICATOR

The air cleaner service indicator is located at the air cleaner and indicates the condition of the air cleaner element. When the service indicator is in the *red* zone, the air cleaner elements should be removed and serviced.

Air Cleaner Indicator

Air Cleaner and Indicator

EXHAUST OUTLET GAS TEMPERATURE GAUGE

This shows the exhaust gas temperature entering the mine atmosphere from the exhaust outlet.. The machine will shutdown if this temperature exceeds 140°C.

ENGINE OIL PRESSURE GAUGE

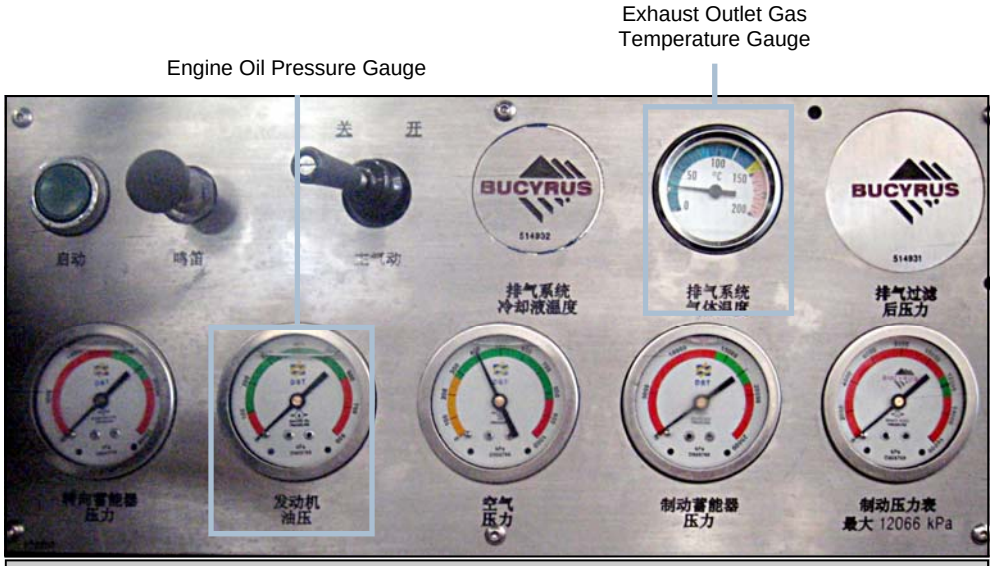
This gauge indicates the engine lubricating oil pressure. Normal pressure is between 210 kPa-550 kPa (30 psi-80 psi) at rated RPM.

CAUTION

Shut off the engine if the oil pressure drops and stays below 70 kPa (10 psi). The diesel control system should shutdown the engine at 70 kPa (10psi).

CAUTION

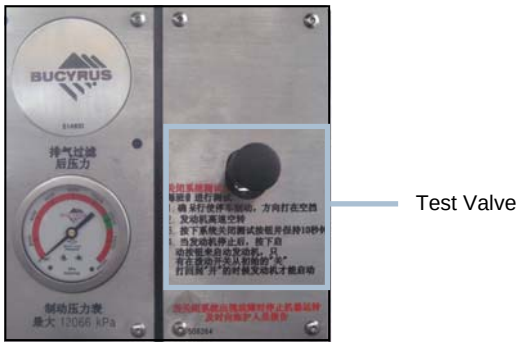
Do not run the engine with low oil pressure, as engine damage will result. Immediately report the problem to service personnel.



Right Hand Side Operator's Panel

SHUTDOWN SYSTEM TEST VALVE

The test valve is used to check the integrity of the Fail-Safe Shutdown System. This test should be carried out on a daily basis as part of the*10 Hour Daily Off Line Mechanical Inspection.* (Refer to Section 8 - Post Start Checks).



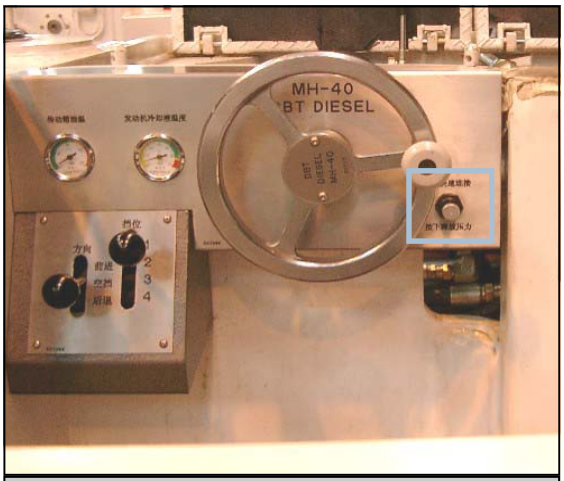
ENGINE FUEL PRIMER PUMP

If the engine fuel system has been run dry or serviced, the fuel system should be primed via manual activation of the hand fuel primer pump. The pump is located adjacent to the fuel water separator in the engine compartment. Normally no priming is required to start the engine.

Engine Fuel Primer Pump

ATTACHMENT QUICK CONNECTS BUTTON

This button releases all of the pressure in the PTO lines to allow the couplings to be easily released. To release the pressure, release both of the two-way control levers to the hold position and press in the pressure release button for two seconds.

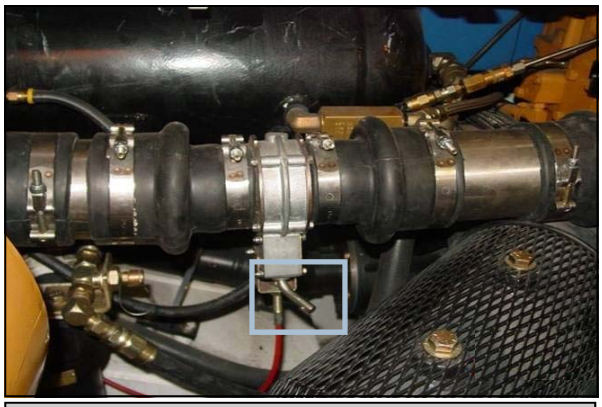


Attachment Quick Connects Button

EMERGENCY INTAKE SHUT OFF VALVE

This valve is used in the event that the machine fails to shutdown under normal circumstances as stated in Section 8. *Closing this valve will stop the flow of air to the engine*. This provides a second means of shutting down the engine should the on/off toggle switch fail.

Emergency Intake Shut Off Valve Stop Button



Emergency Intake Shut Off Valve Reset Lever

The valve is activated from the operator's compartment by a stop button which is pushed, once activated and the engine shuts down the valve will need to be reset before restarting. Ensure that the stop button has been pulled out and there is a reset lever down on the main body of the valve that will rotate and latch into the operating position. If the valve has not been reset the engine will not start. When the valve has been reset the engine can be started.

WARNING

If the emergency intake shutoff valve has been activated, the restarting of the engine should be done in compliance with the relevant regulations and Manager's Rules.

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