Technical Manual

SAFETY LABELS AND INSTRUCTIONS

This manual contains important information affecting the safety of personnel and the equipment being used.

The safety instructions and behavioural rules are intended to protect operators from potentially dangerous situations and assist in the safe operation of the trailer and associated equipment.

The following symbols are used with safety instructions and identify varying degrees of hazardous conditions.

The safety instructions associated with these symbols are to be considered the minimum requirements for effective hazard and operational control.

DANGER

Points in the text marked with this symbol draw attention to immediately impending danger. Possible consequences are very serious or fatal injury.

WARNING

These points contain information on potentially dangerous situations. Possible consequences are very serious or fatal injury.

CAUTION

This symbol draws attention to potentially dangerous situations. Possible consequences are light to moderately serious injury and machine damage.

NOTICE

Points in the text marked with this symbol draw attention to potentially harmful situations. Possible consequences are damage to machine or equipment in immediate vicinity

IMPORTANT

Text marked with this symbol contains useful information associated with the machine and its application.

DRIVE COUPLING GREASE

Shell Stamina RL2 grease is to be only used on the latest engine drive couplings with tapered roller bearings fitted. The distinguishing feature of the drive coupling with these bearings is a conical shaped housing, the other housing has more of a 90° housing with webbing welded to sections.

EXHAUST CONDITIONER MAKE UP TANKS

Clean potable water only is to be used for the make up tank water.

ALWAYS keep head, body and arms inside the operator's compartment at all times.

ALWAYS travel at low speeds in congested areas. Slow down while travelling around corners and sound the horn frequently in areas of limited visibility.

ALWAYS drive carefully, observing all traffic rules and regulations at your colliery and be in full control of the machine at all times.

Travelling at high speeds, on cross grades or articulating the machine with raised loads may cause the machine to become unstable.

ALWAYS follow the correct isolation and tag out procedure before performing any servicing or accessing beneath or on the machine.

ALWAYS operate carefully and in a responsible manner and observe all Manager's Transport Rules.

ALWAYS refer to site JSA and SOP's prior to towing with the machine.

ALWAYS ensure sufficient ventilation is available to dilute exhaust gases. As stated on the machine's compliance plate.

ALWAYS be aware of the hazard sources on the machine:

- Engine coolant pressure
- Engine coolant temperature
- Engine exhaust temperature
- Rotating radiator fan
- Stored hydraulic pressure
- Stored air pressure (Air receiver)
- Engine oil pressure/temperature
- Transmission oil temperature
- Articulation area
- Lift arm area
- Machine mass

ALWAYS use correct boarding and dismounting procedures:

- Check floor.
- Hold on, step down.
- Three points of contact at all times.
- Board using hand holds only, and not the steering wheel.

ALWAYS drive the machine to suit the conditions, report or rectify any holes and ruts that may cause injury or damage to the equipment.

NEVER operate the machine under unsecured roof.

Activity Required	Tick Box 1	2	3	Defects/Comment

6.1 FRAME RELATED - Guards and Covers

Inspect all guards and covers for security, damage and any missing covers/retainers. Repair or replace as required.				

6.2 FRAME RELATED - Fire Extinguisher

Inspect the fire extinguisher mounting/ holding bracket for security, damage and that the extinguisher is easy to remove and secure when clamped in.				
Check the charge pressure indicator, where fitted, is registering within the operable range and appears to be free and operating correctly.				

6.3 FRAME RELATED - Fire Suppression System – If Fitted

Inspect the security of all fittings and components of the fire suppression systems.				
Check the fire suppression bottle for the correct pre-charge. The indicator needle should be in the green zone.				

6.4 FRAME RELATED - Towing Equipment

Check the tow pin and securing chain for damage and replace as required.				

7. OPERATIONAL CHECKS - Safety System

With engine stopped, check operation of Emergency Intake Shut Off valve and reset.				
Check the transmission neutral start valve for correct operation. Select a gear and check if the engine will attempt to start. Repair as required.				
Check the door interlock system for correct operation, moving in 1st gear slow.				
Perform exhaust conditioner low water shutdown est.				
Perform DCS Low Engine Oil Shutdown with Park brake off. When the engine shuts down ensure Park brake applies.				
Note : Machine Not To Be Put In Operation If Safety Systems Are Not Working				

Activity Required	Tick Box 1	2	3	Defects/Comment
5. ELECTRICS, INSTRUMENTS and CONTROLS - Operator's Compartment				
Ensure compartment is clean of all loose materials, coal, dirt etc.				
Inspect the condition of the operators gauges. Check for correct operation : Brake Head Pressure Brake Accumulator Pressure Steering Accumulator Pressure Engine Water Temperature Engine Exhaust Temperature Transmission Temperature Air Pressure Engine Oil Pressure				
Inspect the operators seat for physical damage, including cushions and pads.				
Inspect all control devices (pedals, levers, handles, switches etc) for signs of wear, damage, missing parts and incorrect operation. Repair as required.				
Inspect tilt/lift and implement control valve boots for damage and replace if necessary.				
Check door hinges and latches for correct operation. Repair as required.				
5.1 ELECTRICS, INSTRUMENTS and CONTROLS - Electrical System				
Check Lights for correct operation.				
Check cables, hoses and flameproof joints are secure.				
Check DCS installation for security.				
Check alignment, condition and mounting of alternator, drive coupling and motor.				
6. FRAME RELATED - Canopy				
Check for damage, security of fasteners				
6.1 FRAME RELATED - Guards and Covers				
Inspect all guards and covers for security, damage and any missing covers/retainers. Repair or replace as required.				

Activity Required	Tick Box 1	2	3	Defects/Comment

3. HYDRAULICS

Check the main hydraulic oil level and fill as required. Indicate litres used.				Ref: Spec 3
Ensure the hydraulic filler cap is secure and sealing.				
Check and record the following gauge pressures: Steering Accumulator pressure (2500psi / 17250kPa) Brake Accumulator pressure (2500psi / 17250kPa) Brake Head Pressure (1750psi / 12100kPa)				
Note: Machine Not To Be Operated if Brake Head pressure is below 1750 PSI				
Check the Steering circuit pressure filter indicator, replace filter if required.				BUCYRUS Part No. 501800
Check the Hydraulic Return filter indicator, replace if required				BUCYRUS Part No. 502126

4. PNEUMATICS - Air Receiver

Drain away all condensation from the air receiver vessel.				
Drain air circuit water trap.				
Inspect the circuit and relief valve for damage, leaks and correct operation.				
Replace Air compressor filter.				BUCYRUS Part No. 503715

4.1 PNEUMATICS - Main Isolation Valve

Inspect the 2-way valve for correct operation, leaks and locking mechanism. Replace/repair as required.				

4.2 PNEUMATICS - Horn

Inspect the air horn and its operating valve for correct operation, abnormal noise (bypass), security and any leaks. Ensure the valve is clearly labelled. Repair as required.				

Activity Required	Tick Box 1	2	3	Defects/Comment
1.5 ENGINE - Exhaust System				
Inspect the exhaust pipes and wet bath for security and signs of leaks / damage.				
Check particulate filter and change if necessary.				
1.6 ENGINE - Exhaust Cooling System				
Clean float chamber every week. Drain, remove covers. Flush out, remove exhaust build up around floats and make up valve.				
Clean exhaust chamber. Drain, remove covers. Flush out, remove exhaust build up.				
2. DRIVETRAIN - Transmission				
Inspect the transmission assembly and mounts for oil leaks, looseness, damage and any abnormal vibration, noise and heat (test drive).				
Check transmission breather				
Replace Transmission filter element				2x BUCYRUS Part No. 501471
Check transmission oil level and top up as required. Indicate litres used.				Ref: Spec 2
2.1 DRIVETRAIN - Drive Line				
Inspect all drive shaft, slip joints and CV joints for damage, looseness, wear and contamination build up. Clean / tighten as required.				

SERIAL No.:	PLANT No.:	DATE:

Tick Box ✓

Activity Required	1	2	3	Defects/Comment
Record Hour Meter Reading _____ hrs				
Clean machine completely, pay particular attention to loose material, oil and coal dust.				

1. ENGINE - General

Inspect the complete engine assembly and mounts for damage, any signs of oil, coolant and fuel leaks, looseness and any abnormal vibration, noise and temperature (test drive).				
Drain and refill engine oil				Ref: Spec 1
Replace Engine oil filter				BUCYRUS Part No. 503469
Inspect the engine for the correct oil level. Top up as required. Indicate litres used.				Ref: Spec 1
Check engine breather				
If fitted with Hydraulic throttle, inspect throttle fluid reservoir and fill as required. Indicate litres used				Ref: Spec 3
If fitted with cable throttle, inspect condition of cable.				

1.2 ENGINE - Intake

Check the air filter restriction indicator for signs of filter contamination/blockage.				
Check condition of filter housing.				
Check the Primary air filter element and replace if required.				BUCYRUS Part No. 505090
Check Inner air filter element and replace if required.				BUCYRUS Part No. 505089
Check all fasteners, intake joints and brackets of the Shutdown valve for security and tightness				
Check all other intake joints for security and tightness				
Check all air intake hoses, pipes and fittings for damage, leaks and looseness.				

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Comment:

Inspected By:		Date:	
Checked By:		Date:	

Activity Required	Tick Box 1	2	3	Defects/Comment

6.2 FRAME RELATED - Fire Extinguisher

Inspect the fire extinguisher mounting/ holding bracket for security, damage and that the extinguisher is easy to remove and secure when clamped in.				
Check the charge pressure indicator, where fitted, is registering within the operable range and appears to be free and operating correctly.				

6.3 FRAME RELATED - Fire Suppression System – If Fitted

Inspect the security of all fittings and components of the fire suppression systems.				
Check the fire suppression bottle for the correct pre-charge. The indicator needle should be in the green zone.				

6.4 FRAME RELATED - Lubrication

Lubricate the following grease point. Lubricate until grease is purged from the bushes. Articulation Pillow Block Drive line Cylinder Pins Zone Manifolds 3 x Lift cylinder top pivot points 2 x Tilt cylinder pins 6 x Steer cylinder pins 2 x RAS Cradle – Lift arm pivot pins 2 x Pedal pivot points 2 x Radiator pivot points 4 x Diff Pinion Oil Seals 4 x				Ref: Spec 7
Lubricate the engine drive coupling				Ref: Spec 8

6.5 FRAME RELATED - Towing Equipment

Check the tow pin and securing chain for damage and replace as required.				

Activity Required	Tick Box 1	2	3	Defects/Comment
3. HYDRAULICS				
Check the main hydraulic oil level and fill as required. Indicate litres used.				Ref: Spec 3
Ensure the hydraulic filler cap is secure and sealing.				
Replace Main relief pressure: Main relief pressure: 2988psi / 20.6MPa				
Re-seal Accumulators and recharge Accumulator pressures: Accumulator pressures: 900psi / 6.2MPa				
Replace Brake/Steer pump				BUCYRUS Part No. 836126
Replace Service brake valve				BUCYRUS Part No. 500139
Check and record the following gauge pressures: Steering Accumulator pressure (2500psi / 17250kPa) Brake Accumulator pressure (2500psi / 17250kPa) Brake Head Pressure (1750psi / 12100kPa)				
Note: Machine Not To Be Operated if Brake Head pressure is below 1750 PSI				
Replace Brake head hoses and fittings				
Replace Steering circuit pressure filter				BUCYRUS Part No. 501800
Replace Hydraulic Return filter				BUCYRUS Part No. 502126
Replace Alternator Pressure Filter				BUCYRUS Part No. 641114
4. PNEUMATICS - Air Receiver				
Drain away all condensation from the air receiver vessel.				
Drain air circuit water trap.				
Check governor setting.				
Inspect the circuit and relief valve for damage, leaks and correct operation.				
Replace Air compressor filter.				BUCYRUS Part No. 503715
4.1 PNEUMATICS - Main Isolation Valve				
Inspect the 2-way valve for correct operation, leaks and locking mechanism. Replace/repair as required.				

SAFETY PRECAUTIONS

The following safety precautions are not intended to be exhaustive. Safe work practices should be used when servicing or operating heavy machinery.

When the temperature of diesel fuel is elevated, which occurs when fuel is circulated through an operating engine, the following hazards exist:

- Scalding or burns from contact with hot liquid.
- Presence of combustible vapour around the fuel source.

ALWAYS give the engine an opportunity to cool down before performing fuel system servicing.

ALWAYS wear personal protective equipment including safety glasses, gloves and suitable clothing.

ALWAYS perform fuel system servicing in a well ventilated area.

ALWAYS keep naked flames, sparks and other heat sources away from the machine.

ALWAYS clean up any spilled fuel immediately to remove the potential for ignition and slip or fall injuries.

ALWAYS be aware of, and isolate, other forms of energy and pinch points (fan, belts, pulleys) when accessing the engine compartment including pneumatic stored pressure, engine coolant pressure and other heat sources such as engine block and exhaust system components.

ALWAYS avoid oxy-cutting or welding near or onto any unshielded fuel system components.

IMMEDIATELY wash off spilled fuel when exposure to the skin has occurred.

FLUSHING THE LUBRICATION SYSTEM

When the engine lubrication system is contaminated by coolant (ethylene glycol antifreeze solution or water soluble material) the following cleaning procedure is recommended.

Use “Cellosolve” or equivalent solution.

Use extreme care when handling these solvents to avoid serious injury to personnel or damage to finished surfaces. Always consult the Material Safety Data Sheet before use.

1. Drain all engine lubrication oil.
2. Remove and discard the oil filter element and replace.
3. Mix two parts Cellosolve (or equivalent) with one part SAE 10 engine oil and fill the engine crankcase to the correct operating level as indicated on the dipstick.
4. Start and run the engine at fast idle (1000 RPM to 1200 RPM) for 30 minutes to one hour, checking engine oil pressure regularly.
5. Stop the engine and immediately drain the crankcase and filters.
6. Replace the drain plug, fill the engine with SAE 10 oil and run the engine again at fast idle for 10-15 minutes then drain the oil.
7. Remove and replace the oil filter element.
8. Replace the drain plug and fill the engine with the specified grade of oil for normal operation (see Section 1).

Ensure that the source of contamination has been corrected before returning the engine to service.

FAN ASSEMBLY

The hydraulically driven fan assembly provides the necessary air flow through the radiator to remove the heat absorbed by the coolant. (see Section 4 Hydraulic System - Fan Drive).

The fan assembly and blades should be inspected every 250 service hours.

Check fan tip speed with tachometer every 1000 hours (fan speed high idle 2800 RPM).

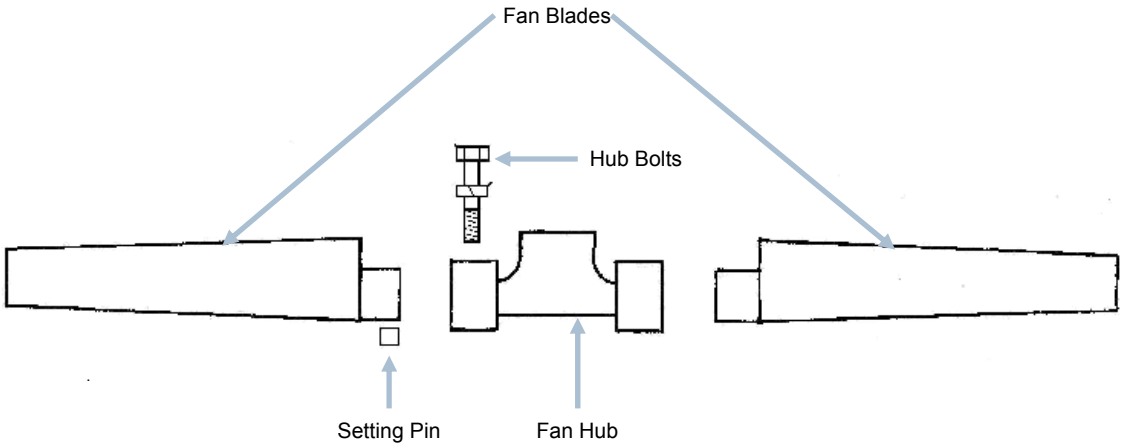
To inspect the fan assembly:

1. Ensure that the engine has had sufficient time to cool and is isolated and tagged as described in Section 1.
2. Check the fan blades for cracks and/or chips and replace or repair the fan if required.

Fan replacement is achieved by the following:

1. Removing the holddown bolts on the radiator.
2. Lift the hinged radiators up, and ensure that the gas struts that hold the radiators in position are in good working order.
3. Remove the four bolts from the transmission oil cooler and remove the cooler.
4. The fan hub mounting bolts are then removed detaching the fan and spacer from the hub, this is then able to be removed.
5. The blades are then replaced as necessary.
6. Ensure the blades are installed with the same pitch setting as the blades that are being replaced.

Replace all fan shrouds, guards and machine covers before returning the machine to service.



EXHAUST CONDITIONER

Exhaust gas is piped from the engine through a water-cooled manifold and downpipe/ purifier to the exhaust conditioner. The exhaust gas then passes through a water barrier which cools it below 70°C. The exhaust then passes through the particulate filter and is directed via the outlet pipe and is dispersed by the radiator fan. Make up water is taken directly via a two-way ball valve to the make up valve and into the low water shutdown chamber. This valve maintains a constant *safe* water level.

The shutdown float is positioned in the low water shutdown chamber in the exhaust conditioner, they will shutdown the engine if the water level in the exhaust conditioner goes below the set level.

WARNING

Wear suitable eye protection, gloves, hearing protection and dust mask when performing maintenance tasks on the exhaust system as particulate matter may be harmful to the respiratory system.

WARNING

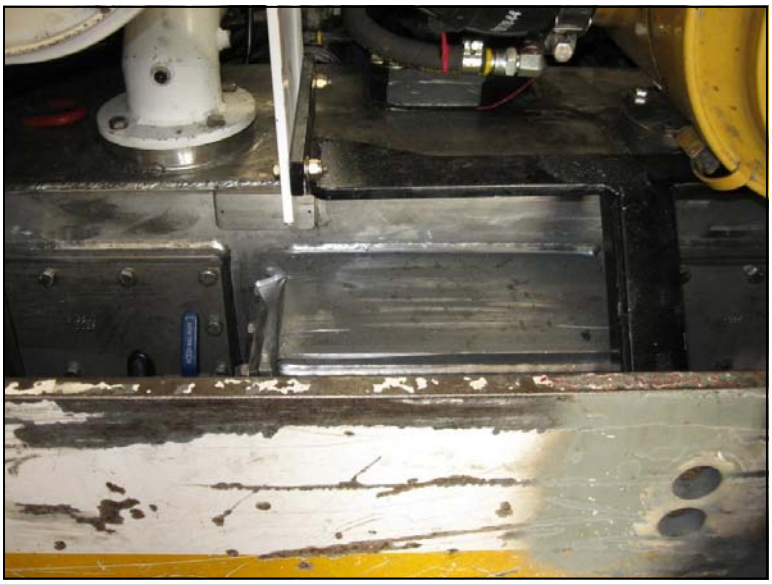
Immediately wash any particulate matter from skin with warm, soapy water.

WARNING

Ensure Mine Manager's Rules are followed and the equipment is correctly isolated and tagged while maintenance tasks are being performed.

WARNING

Allow sufficient time for the exhaust items to cool prior to performing maintenance tasks on the exhaust conditioner assembly.



Exhaust Conditioner

ENGINE SYSTEM TROUBLESHOOTING

The following Engine System Troubleshooting Guide is intended to provide basic guidance for analysing poor engine performance and determining probable causes. This guide is not intended to be exhaustive as particular engine tuning and adjustments, such as exhaust valve adjustment, fuel injector timing, governor adjustment and fuel modulator setting are only intended to be performed by Caterpillar representatives.

Tampering with the engine governor and fuel injector settings will result in adverse engine performance and may void the conditions for which the engine system has been certified such as operating temperature and exhaust emissions.

Symptom	Probable cause	Caused by	Remedy
Excessive crankcase pressure.	Cylinder blow-by.	Cylinder head gasket leaking.	Consult Bucyrus for analysis.
		Piston or liner damage.	Consult Bucyrus for analysis.
		Piston rings worn or broken.	Consult Bucyrus for analysis.
	Breather restriction.	Obstruction or damage to engine oil breather.	Remove breather and clean out or replace as required.
	Excessive exhaust back pressure.	Restriction in exhaust system.	Clean exhaust system.
Abnormal quantity of black or grey exhaust.	Incompletely burned fuel.	Restricted air inlet to the cylinders.	Inspect, clean or replace air cleaner filter (Section 2). Inspect, clean or replace inlet flame trap (Section 2). Clean exhaust system.
	Excessive fuel or irregular fuel distribution.	Improperly timed injectors.	Consult Bucyrus for analysis.
		Improper fuel specification used.	Verify fuel specification (Section 1).
Blue exhaust smoke present.	Lubricating oil not burned in cylinder (blown through cylinder during scavenging period).	Internal lubricating oil leaks.	See high lubricating oil consumption symptom. Consult Bucyrus for analysis.
Engine hard starting.	Engine will not rotate.	Faulty pneumatic start circuit.	See Section 7.
		Internal engine seizure (if engine can not be hand cranked at least one revolution).	Consult Bucyrus for analysis

SAFETY PRECAUTIONS

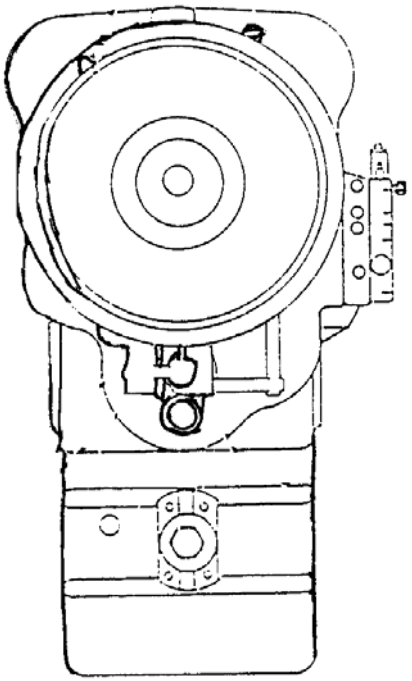
The following safety precautions are not intended to be exhaustive. Safe work practices should be used when servicing or operating heavy machinery.

ALWAYS give the transmission an opportunity to cool down before servicing.

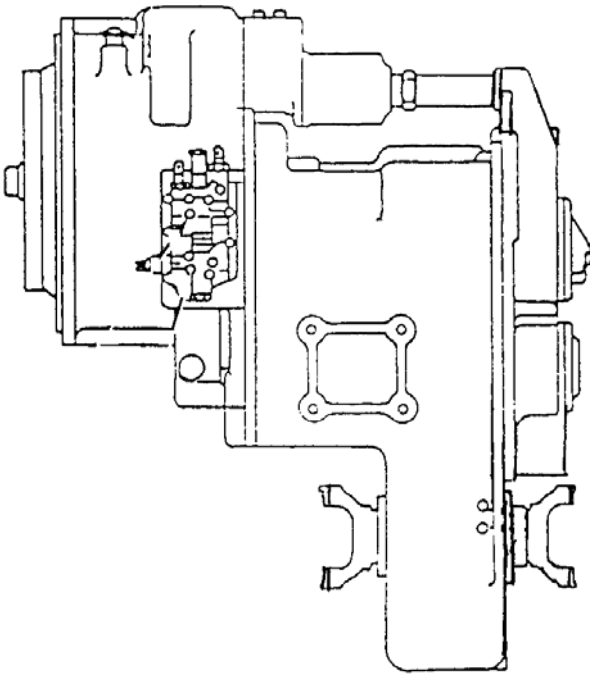
ALWAYS wear personal protective equipment including safety glasses, gloves and suitable clothing.

ALWAYS clean up any spilled oil immediately to remove the potential for slip, trip or fall injuries.

ALWAYS be aware of, and isolate, other forms of energy and pinch points (fan, belts, pulleys and drive lines) when accessing the engine compartment including pneumatic stored pressure, engine coolant pressure and other heat sources such as engine block and exhaust system components.



FRONT VIEW



SIDE VIEW

CHECKING/FILLING THE PLANETARY WHEEL END OIL LEVEL

Care and Maintenance

The planetary wheel end oil levels should be checked and topped up if required every 250 service hours.

To check the oil level of the planetary wheel ends:

1. Run the machine for approximately five minutes to heat the oil.
2. Park the machine on flat, level ground. The wheel end should be orientated as per the label on its outside face.
3. Allow it to stand for a minimum of five minutes. Doing this will allow the oil to drain back to its normal level.

The machine will have to be driven forward or backward to achieve the correct orientation for each wheel end.

4. Isolate and tag as described in Section 1.
5. Locate the planetary wheel end filler plugs on the outside face of the planet carriers. If necessary clean the areas to minimise the possibility of any contaminants getting into the system. When the level is measured in the wheel ends the oil fill plugs should be in the 3 o'clock position. Move the machine either forward or reverse to achieve this.
6. Allow five minutes settling time then remove the oil filler plug.
7. The oil levels should be to the bottom of the filler hole. If not, fill up with the lubricant specified in Section 1.
8. Allow a few minutes for the lubricant to attain its level as it flows through the various internal compartments and recheck the levels on each wheel end. Add lubricant if necessary.
9. Reinstall the filler plug, ensure o-ring is in good condition (replace as necessary).

The self-contained liquid cooled brake system uses the same lube as the axle centre section and wheel ends. There are no seals between the spindles and wheel hubs. Oil that lubricates the differential and planetary wheel ends also lubricates and cools the brake assembly. The oil level is the same height as the planet and axle centre and the brake may be filled and the oil level checked at the planet carrier assembly or planet carrier cover.

WHEEL AND TYRE ASSEMBLIES

GENERAL DESCRIPTION

There are three different combinations of wheel and tyre assemblies available. See Section 1 - Specifications for wheel assembly options.

SAFETY PRECAUTIONS

The following safety precautions are not intended to be exhaustive. Safe work practices should be used when servicing or operating heavy machinery.

ALWAYS wear personal protective equipment including safety glasses, gloves and suitable clothing.

ALWAYS allow sufficient time for the engine, cooling system, and exhaust system sufficient time to cool before commencing work as burns may result with contact with hot surfaces.

ALWAYS fit the articulation lock before removing/installing the tyre/wheel assemblies.

ALWAYS ensure the area around the machine is safe. For example do not change the wheel against a rib to prevent the possibility of being pinned.

ALWAYS be aware of, and isolate, other forms of energy and pinch points (fan, belts, pulleys) when accessing the engine compartment including pneumatic stored pressure, engine coolant pressure and other heat sources such as engine block and exhaust system components.

NEVER access underneath the machine unless the machine has been isolated and tagged as appropriate and the wheels have been chocked.

REMOVAL

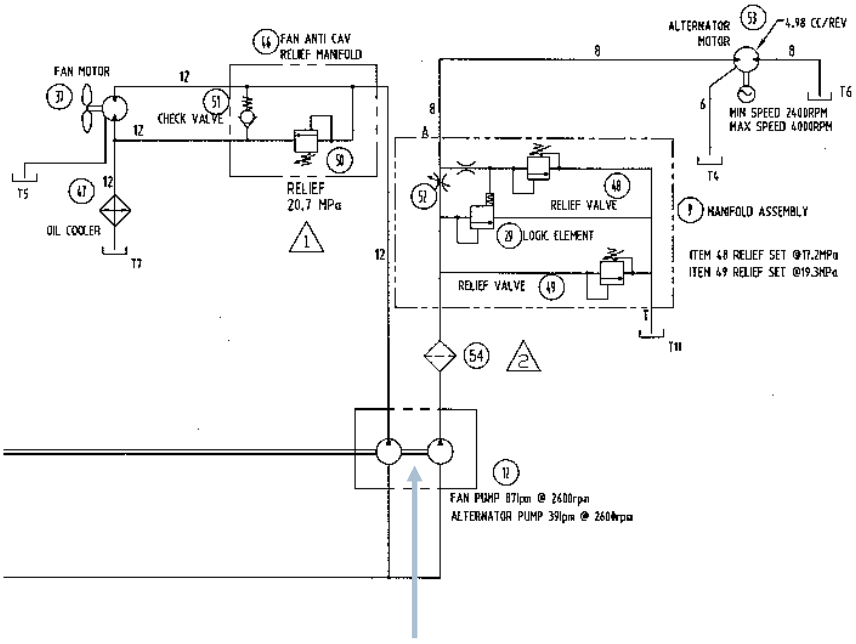
To remove the wheel and tyre assemblies perform the following:

1. Remove any attachments and lower the lift arms to the ground
2. Park the machine on flat, level ground. Ensure the machine is in a straight line.
3. Ensure that the engine has had sufficient time to cool and is isolated and tagged as described in Section 1.
4. Check that both the steering and brake pressure gauges in the operator's compartment are reading zero pressure.
5. Raise the wheel to be changed with a suitable rated device (e.g. chain block, hydraulic jack, air bag, etc). See diagram for the suitable lifting and support points for the machine's chassis.
6. Place the machine on suitable stands or blocks that will allow the removal of the wheel.
7. Remove the 19 wheel nuts and remove the wheel assembly from the wheel end.
8. Using suitable lifting equipment, remove the wheel assembly. If the wheel is difficult to remove, insert ¾" UNC jacking bolts into the three threaded holes around the wheel rim. The threaded holes are on the same PCD as the holes for the wheel studs. Evenly screw the bolts in to *jack* the wheel away from the wheel end.

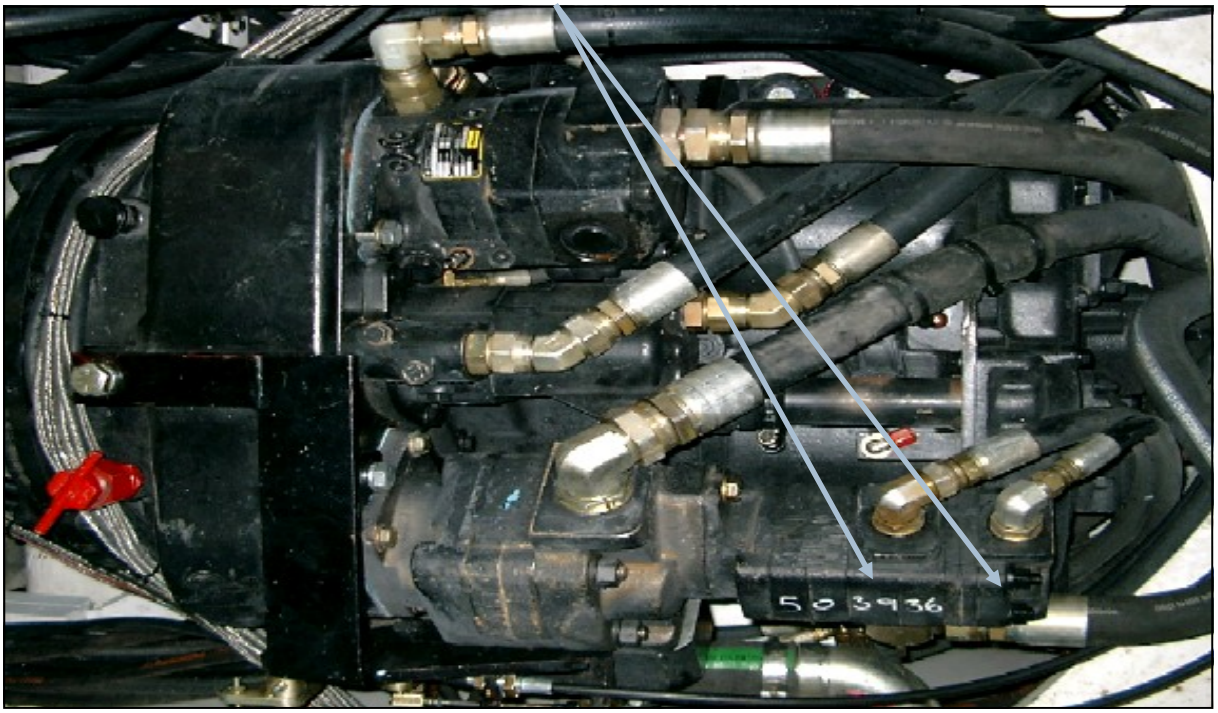
AUXILIARY HYDRAULIC PUMPS

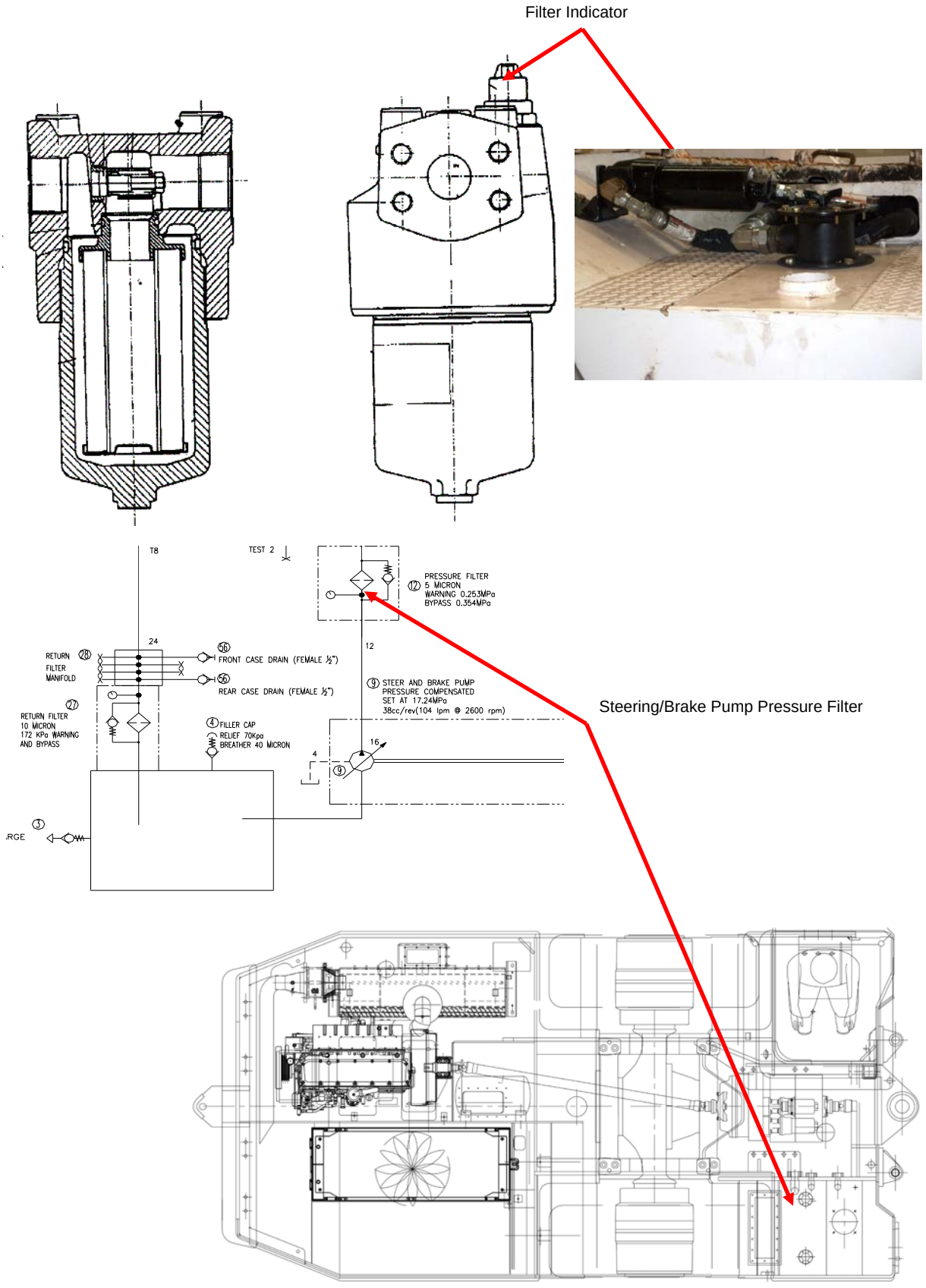
The auxiliary pumps are fixed displacement gear pumps piggybacked using the same suction line supply.

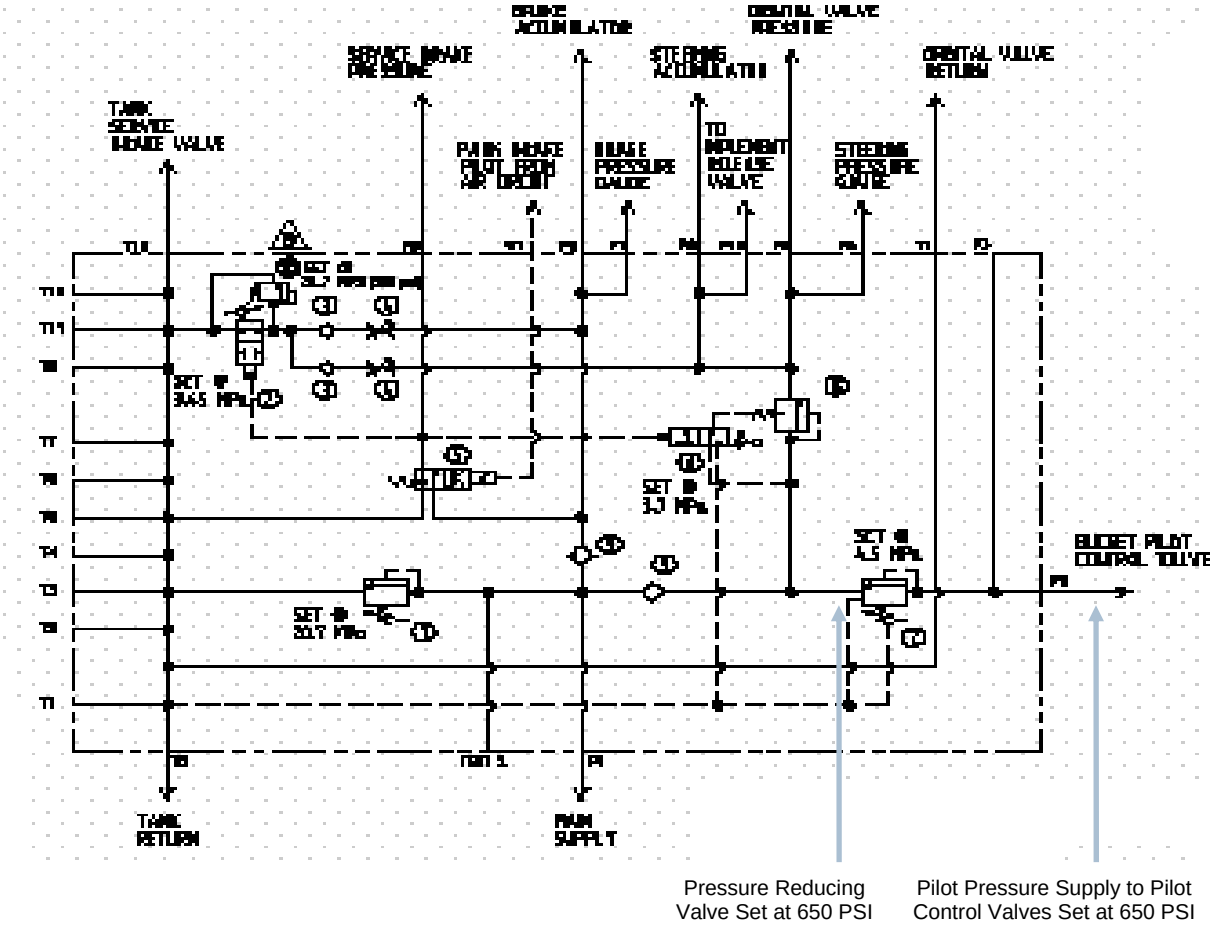
The first section supplies the fan motor and is fitted with an inline relief valve set at 17.2 MPa and priority valve. The second section supplies the alternator drive motor and is fitted with an inline relief valve set at 17.2 MPa and priority valve at 19 lpm.

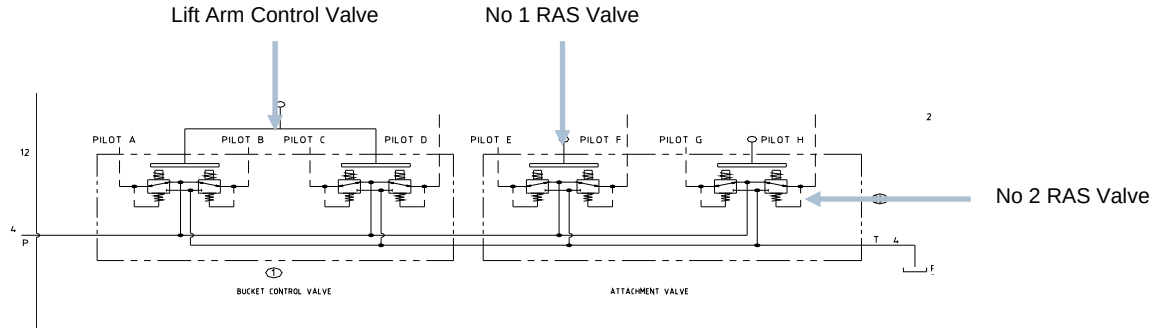


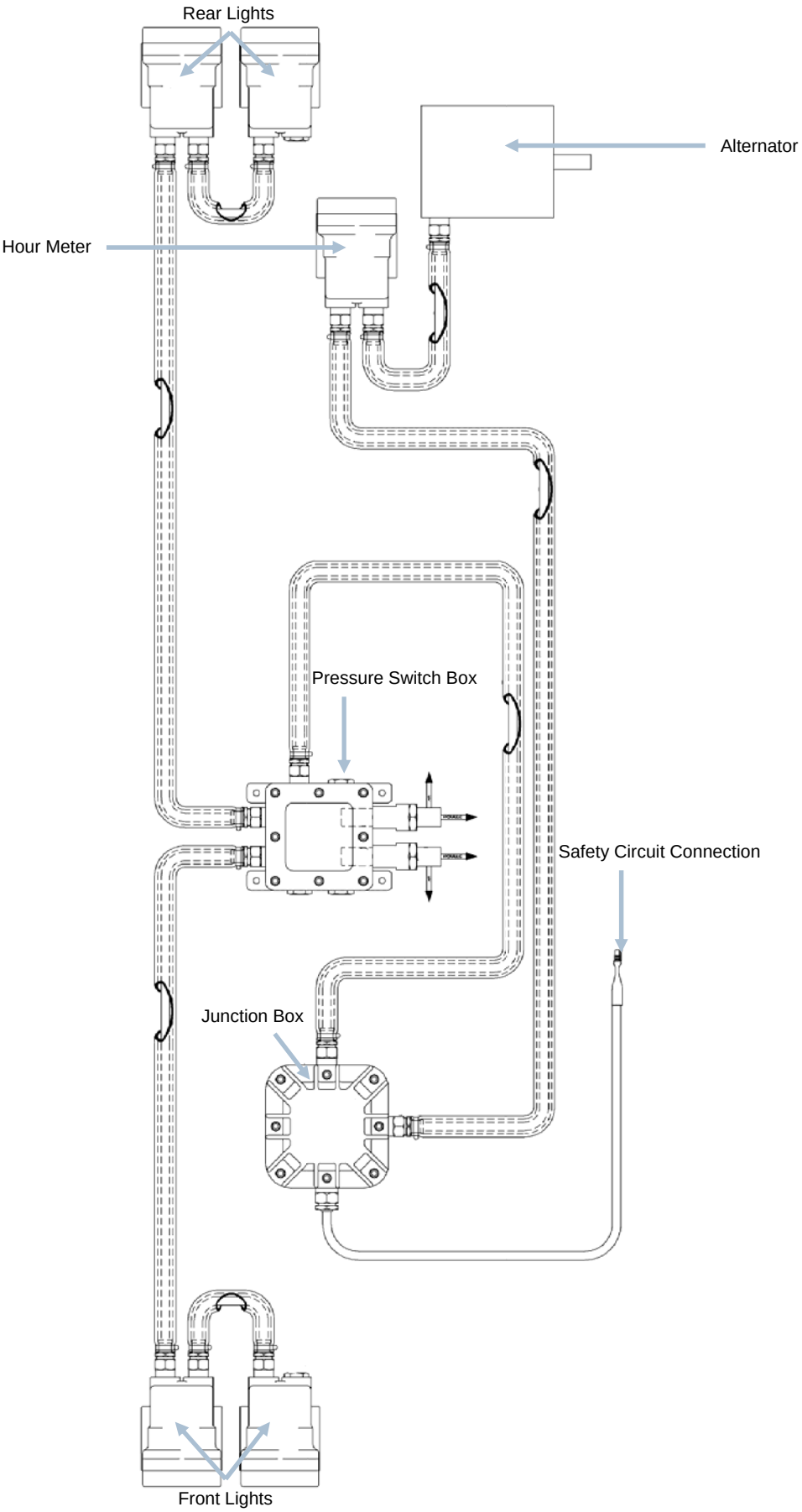
Auxiliary Pumps




Filter Indicator
T8
TEST 2
PRESSURE FILTER
5 MICRON
WARNING 0.253MPa
BYPASS 0.354MPa
12
24
RETURN
FILTER
MANIFOLD
FRONT CASE DRAIN (FEMALE ½")
REAR CASE DRAIN (FEMALE ½")
STEER AND BRAKE PUMP
PRESSURE COMPENSATED
SET AT 17.24MPa
38cc/rev(104 lpm @ 2600 rpm)
RETURN FILTER
10 MICRON
172 KPa WARNING
AND BYPASS
FILLER CAP
RELIEF 70Kpa
BREATHER 40 MICRON
16
4
Steering/Brake Pump Pressure Filter


TANK SERVICE BRAKE VALVE
PARK BRAKE PILOT FROM AIR CIRCUIT
BRAKE PRESSURE GAUGE
TO IMPLEMENT ISOLATE VALVE
STEERING PRESSURE GAUGE
ORBITAL VALVE RETURN
SET @ 3.45 MPa
SET @ 3.17 MPa
SET @ 4.5 MPa
BUCKET PILOT CONTROL VALVE
TANK RETURN
PUMP SUPPLY
Pressure Reducing Valve Set at 650 PSI
Pilot Pressure Supply to Pilot Control Valves Set at 650 PSI


Lift Arm Control Valve
No 1 RAS Valve
PILOT A
PILOT B
PILOT C
PILOT D
PILOT E
PILOT F
PILOT G
PILOT H
No 2 RAS Valve
BUCKET CONTROL VALVE
ATTACHMENT VALVE



Alternator, Lights and Hour Meter General Arrangement

ELECTRONIC SHUTDOWN SYSTEM

GENERAL DESCRIPTION

Refer to separate section for detail of the Bucyrus Diesel Control System

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 RAS back plate 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.

DO NOT operate the machine if the oil temperature is above 121°C.

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 electronic shutdown system should shutdown the engine at 100°C.

Left Hand Side Operator's Panel

Engine Coolant Level Sensor

Exhaust Gas Temperature Sensor

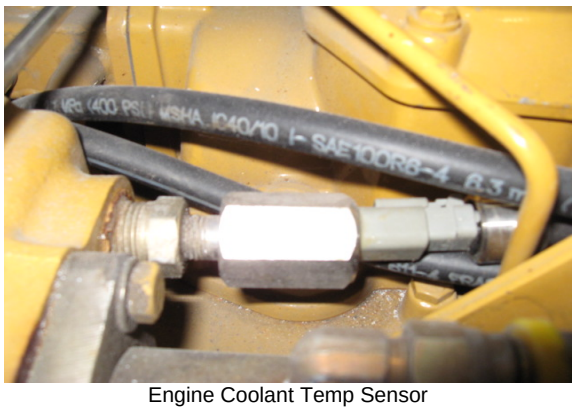
The exhaust gas temperature sensor is set to shut the engine when the temperature reaches 70°C. When the exhaust temperature rises to 70°C at the exhaust outlet the valve will open exhausting air pressure from the safety system, thus the fuel shutdown cylinder will close the fuel rack, this closes of fuel the supply and shuts the engine down. There is only one sensor located in the gas path at the end of the outlet pipe.

Exhaust Gas Temperature Sensors

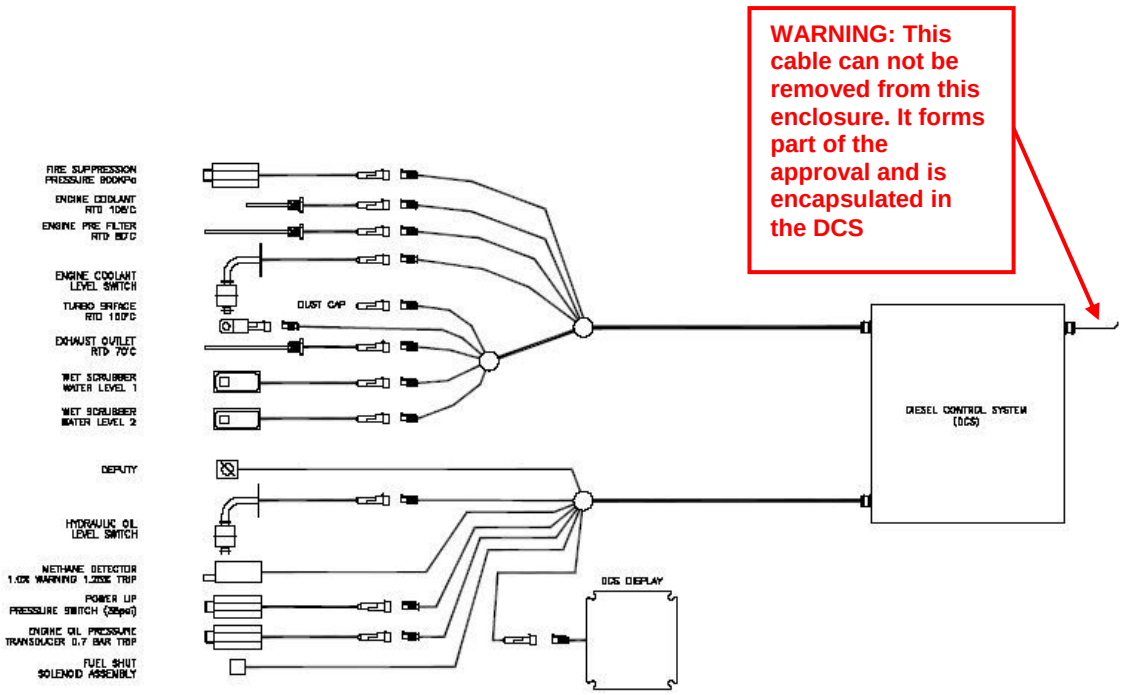
Engine Coolant Temperature Sensor

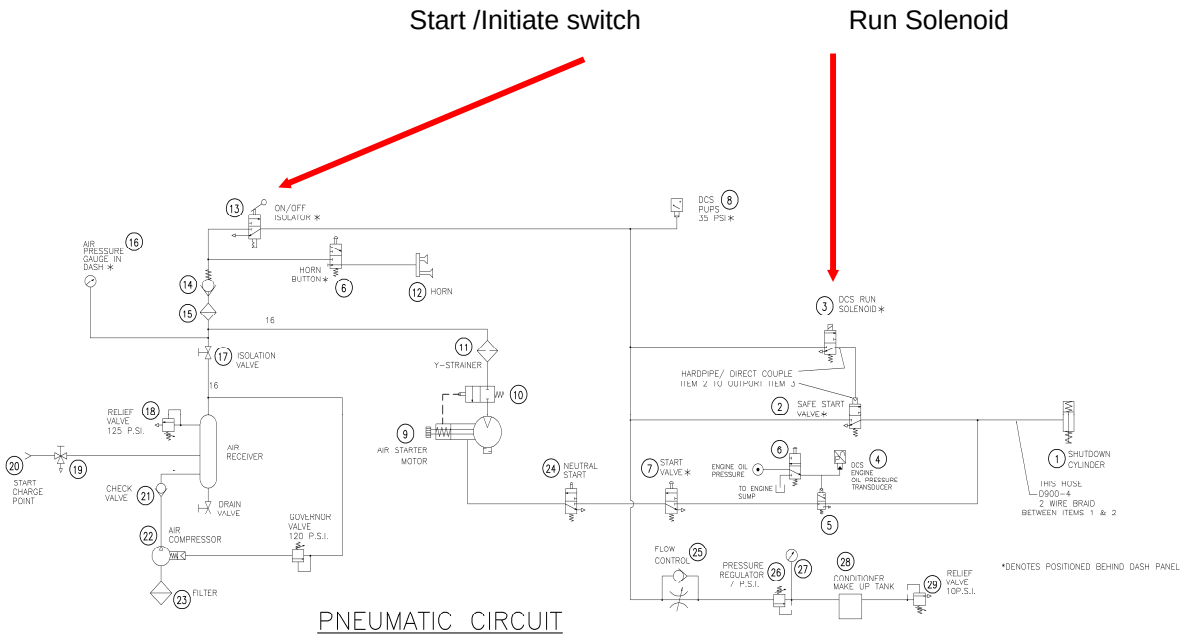
The coolant temperature sensor is set at 105°C, the sensor monitors the engine coolant temperature.

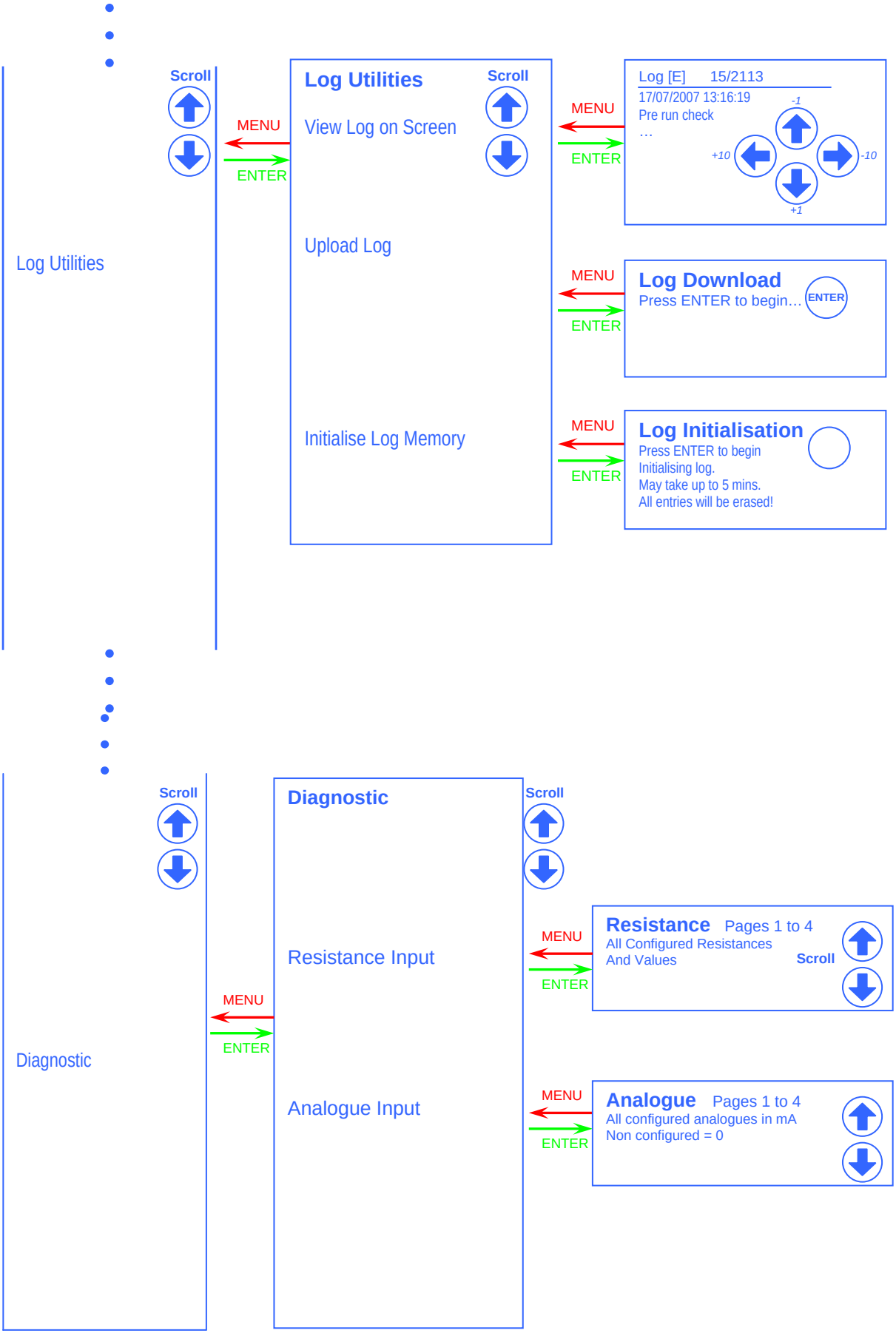
When the engine coolant temperature rises above 105°C the sensor will stop power to the solenoid valve. This valve will open exhausting air pressure from the system thus the fuel shutdown cylinder will close the fuel rack. This closes of fuel to the engine and shuts the engine down.



Engine Coolant Temp Sensor

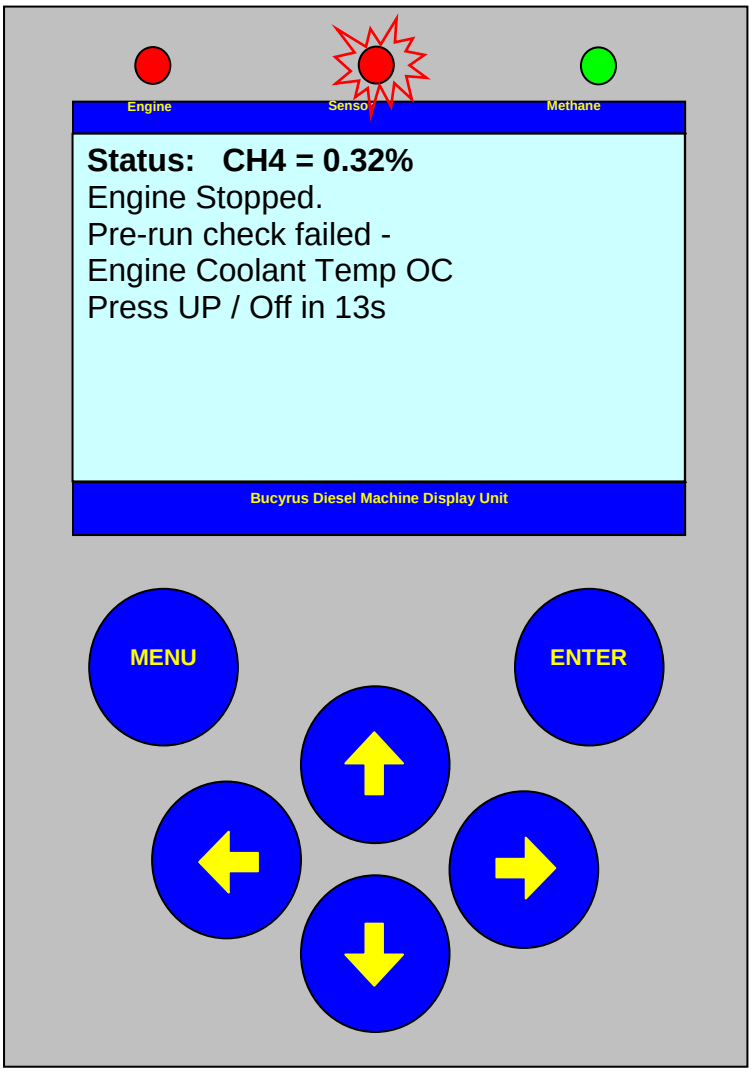

WARNING: This cable can not be removed from this enclosure. It forms part of the approval and is encapsulated in the DCS
FIRE SUPPRESSION PRESSURE 8000KPa
ENGINE COOLANT RTD 105°C
ENGINE PRE FILTER RTD 80°C
ENGINE COOLANT LEVEL SWITCH
TURBO SURFACE RTD 180°C
EXHAUST OUTLET RTD 70°C
WET SCRUBBER WATER LEVEL 1
WET SCRUBBER WATER LEVEL 2
DEPUTY
HYDRAULIC OIL LEVEL SWITCH
METHANE DETECTOR 1.0% WARNING 1.25% TRIP
POWER UP PRESSURE SWITCH (35psi)
ENGINE OIL PRESSURE TRANSDUCER 0.7 BAR TRIP
FUEL SHUT SOLENOID ASSEMBLY
DUST CAP
DIESEL CONTROL SYSTEM (DCS)
DCS DISPLAY


Start /Initiate switch
Run Solenoid
ON/OFF ISOLATOR *
DCS PUPS 35 PSI *
AIR PRESSURE GAUGE IN DASH *
HORN BUTTON *
HORN
DCS RUN SOLENOID *
ISOLATION VALVE
Y-STRAINER
HARDPIPE/ DIRECT COUPLE ITEM 2 TO OUTPORT ITEM 3
SAFE START VALVE *
RELIEF VALVE 125 P.S.I.
AIR RECEIVER
AIR STARTER MOTOR
NEUTRAL START
START VALVE *
ENGINE OIL PRESSURE
TO ENGINE SUMP
DCS ENGINE OIL PRESSURE TRANSDUCER
SHUTDOWN CYLINDER
THIS HOSE D900-4 2 WIRE BRAID BETWEEN ITEMS 1 & 2
START CHARGE POINT
CHECK VALVE
DRAIN VALVE
AIR COMPRESSOR
GOVERNOR VALVE 120 P.S.I.
FILTER
FLOW CONTROL
PRESSURE REGULATOR / P.S.I.
CONDITIONER MAKE UP TANK
RELIEF VALVE 10P.S.I.
*DENOTES POSITIONED BEHIND DASH PANEL
PNEUMATIC CIRCUIT


Log Utilities
Scroll
MENU
ENTER
Log Utilities
View Log on Screen
Upload Log
Initialise Log Memory
Scroll
Log [E] 15/2113
17/07/2007 13:16:19
Pre run check
…
-1
+10
-10
+1
Log Download
Press ENTER to begin…
ENTER
Log Initialisation
Press ENTER to begin
Initialising log.
May take up to 5 mins.
All entries will be erased!
Diagnostic
Resistance Input
Analogue Input
Resistance Pages 1 to 4
All Configured Resistances
And Values
Analogue Pages 1 to 4
All configured analogues in mA
Non configured = 0

Engine Stopped - Pre-Run Check Failed

- This screen may be displayed if the pre-run check fails, and is not resolved within the time allowed. The machine may no longer be started until the up key is pressed, or the system shuts itself down and is restarted.
- See Pre-Run Check screen for list of failure reasons.



FITTING AND REMOVAL OF LIFT ARM LOCK

To fit the lift arm lock:

1. Remove any attachments from the RAS back plate.
2. Chock the wheels.
3. Fit the articulation lock (Section 1).
4. Raise the lift arm until the locking pin holes are clear and the pin can be placed in the location points.
5. Remove the lock pins from storage locations and install in the aligned holes on the lift arm.
6. Note that the pin is to be fully inserted into the holes.
7. Lower the lift arms slightly to take the weight on the lock pin.
8. It is now safe to work under the lift arm.

To remove the lift arm lock:

1. Remove the lock pin from the locating holes and secure in their respective storage locations.
2. Lower the lift arms to the ground.

The lift arms on this machine can cause fatal crush injuries if extreme caution is not observed. NEVER access or perform work under the lift arms unless the engine has been shutdown, the articulation lock fitted, the park brake applied, the attachment has been removed and the lift arms have been supported in the raised position.

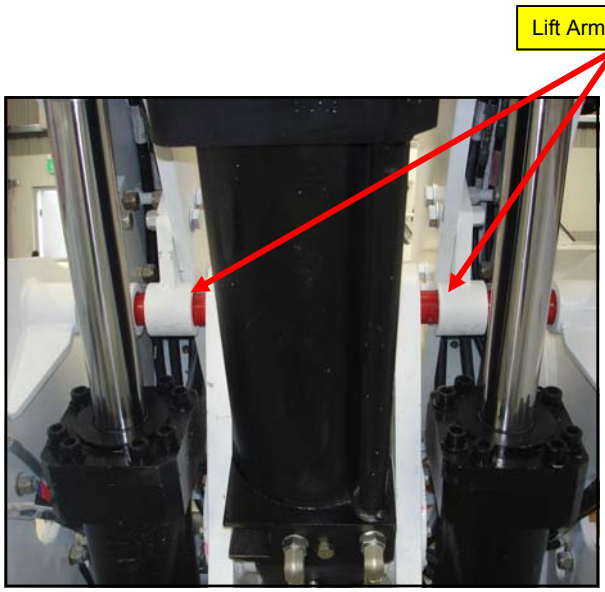


Figure 5.7.1.1 - Lift Arm Locks Installed

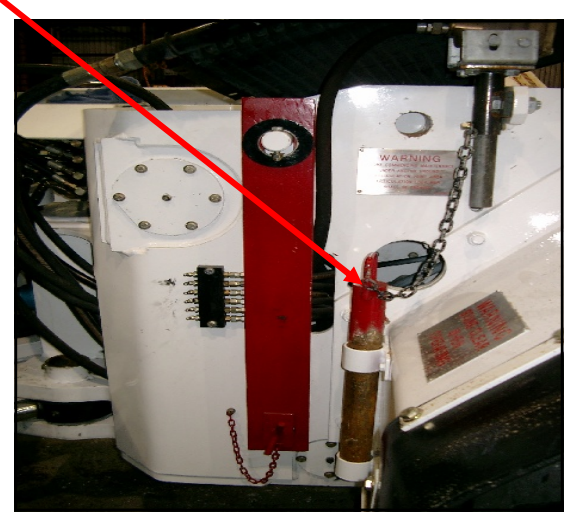


Figure 5.7.1.2 - Storage Position on Both Front Guards

COVERS

The rear frame is fitted with various sized covers, doors and grills all of these are an integral part of the machine and should be kept in good working order. This will help protect personnel from accidental injury and the machine components from damage.

Each cover on the top of the machine is fitted with one or more gas struts and are pinned.

Care and Maintenance

Daily:

Visually inspect covers, doors and grills for any structural damage.

Servicing

Weekly:

1. Check the bolts and pins for security.
2. Check gas strut for security and leaks.

STARTER MOTOR

The engine starter motor is a pneumatic driven motor mounted on the engine flywheel housing. When air pressure is delivered to the starter motor a drive pinion on the motor shaft engages with the teeth on the engine flywheel ring gear to crank the engine.

Servicing

A silencer mounted on the exhaust port of the starter motor is used to minimise starter motor noise emission. The silencer is basically a wire gauze type muffler. Over time the muffler may become clogged with foreign material which will reduce starting efficiency. The silencer should be removed and cleaned every 1000 service hours.

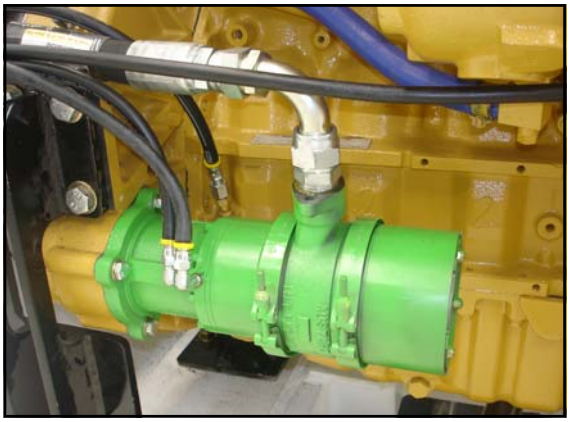
To remove and clean the starter motor silencer:

1. Ensure that the engine has had sufficient time to cool and is isolated and tagged as described in Section 1.
2. Isolate the pneumatic system using the main air isolation valve located at the air receiver.
3. Locate the starter motor silencer at the starter motor exhaust port.
4. Remove the silencer by unscrewing the three bolts at the rear of the starter motor.
5. Clean the silencer with clean fuel oil and allow to dry.
6. Replace the silencer and check for free air flow by activating the starter motor.

Failure of the starter motor to crank the engine could be caused by a faulty starter motor. In this case the starter motor will need to be removed for inspection and overhaul or otherwise replaced.

To remove and install the starter motor:

1. Ensure that the engine has had sufficient time to cool and is isolated and tagged as described in Section 1.
2. Isolate the pneumatic system using the main air isolation valve located at the air receiver.
3. Locate the starter motor at the bottom of the engine block at the flywheel housing.
4. Disconnect the air supply hose from the start relay valve and the two pilot hoses to the starter motor. Plug the hose ends to avoid contamination.
5. Remove the three bolts and lock washers that secure it to the flywheel housing.
6. Pull the motor forward of the flywheel housing and remove.
7. Installation is the reverse procedure.



Starter Motor Assembly

SPADE LIP EJECTOR BUCKET

Various size ejector buckets are available, all with common operation and servicing requirements. Two double acting hydraulic cylinders actuated from the PTO lines on both sides of the lift arm assembly operate a hinged ejector plate for material discharge.

Specifications:

Unladen Mass:	3696 kg
Capacity:	4.5 m^3
Width:	2700 mm
Height:	1528 mm
Length:	2350 mm

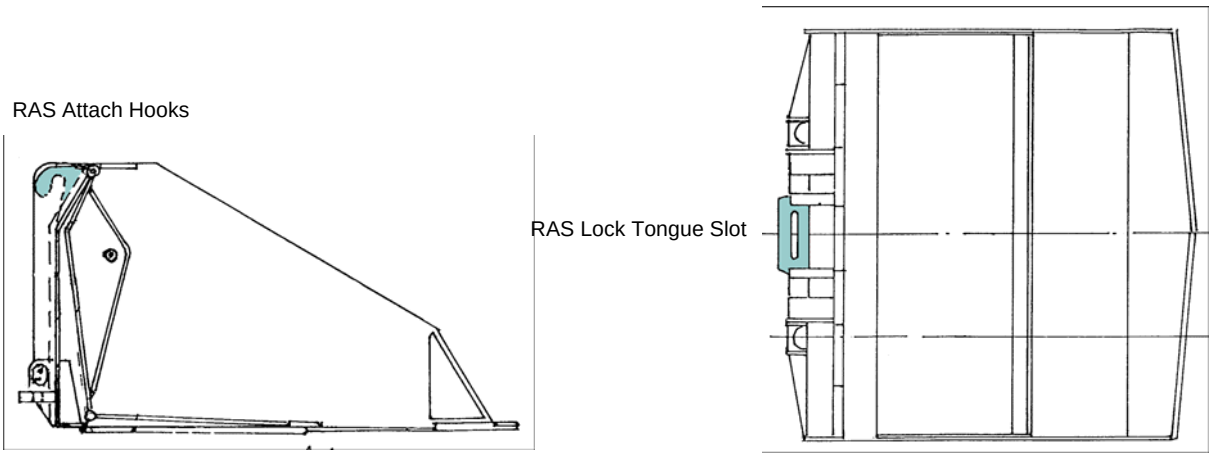
Servicing

Every time the ejector bucket is to be attached to the machine a visual inspection should be carried out to ensure that the locking and retention components are in good condition.

1. Check the bucket RAS attach hooks for damage.
2. Check the RAS lock tongue slot for damage or excessive wear.
3. Check the bucket back plate welds for signs of cracking.
4. After the bucket has been attached to the machine check that the RAS lock tongue is fully engaged in the bucket lock tongue slot.
5. Disconnect the driver's side PTO lines from the RAS lock tongue and connect the to the push plate.
6. Extend and retract the push plate and check for free plate operation, cylinder pivot wear and hydraulic system leaks.
7. Grease the eject cylinder bottom pivot points.

It is recommended that non-destructive structural integrity testing be carried out annually on the RAS lock tongue slot, the RAS attach hooks and associated welds. Three step part dye penetrate testing is recommended.

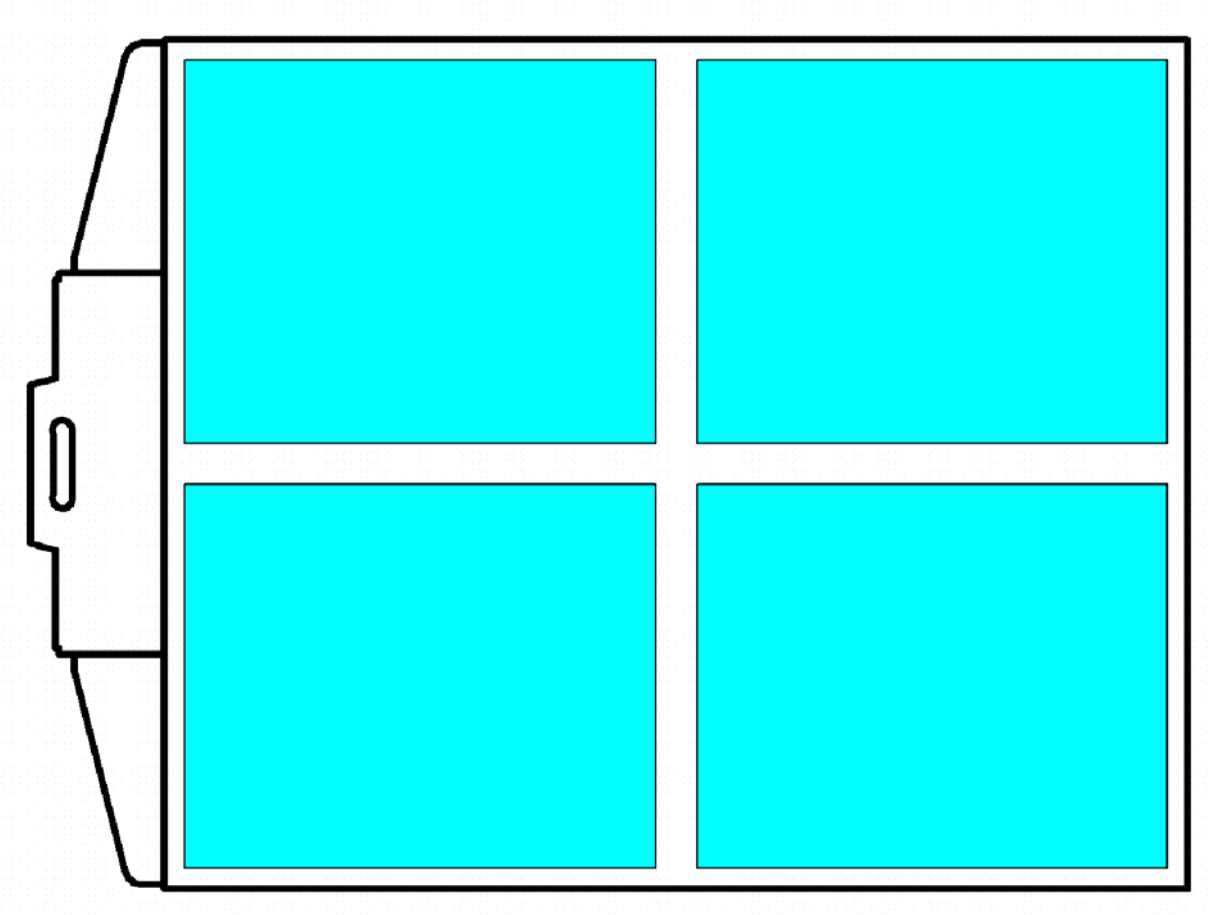
1. Thoroughly clean and degrease the lock tongue slot plate, RAS attach hooks and associated welds and allow to dry.
2. Apply the three step non-destructive test as per the manufacturer's recommendations.
3. Record or mark any suspect areas and have the repair carried out promptly.



Spade Lip Type Ejector Bucket Attachment

This lifting device shall:

- Only be used by trained and authorised operators.
- Not lift more than the rated laden safe working load.
- Not be operated on grades more than 1:8 (side to side).
- Not to exceed the maximum laden tramming speed of one kph.
- Carry the loads as close as possible to the ground at all times.



WARNING

Maximum load to be carried in the materials pod is 6700 kg, the load is to be evenly distributed over four pallets as shown in diagram above.

WARNING

Cut outs are to be used for tie down points only, not to be used for lifting or towing.