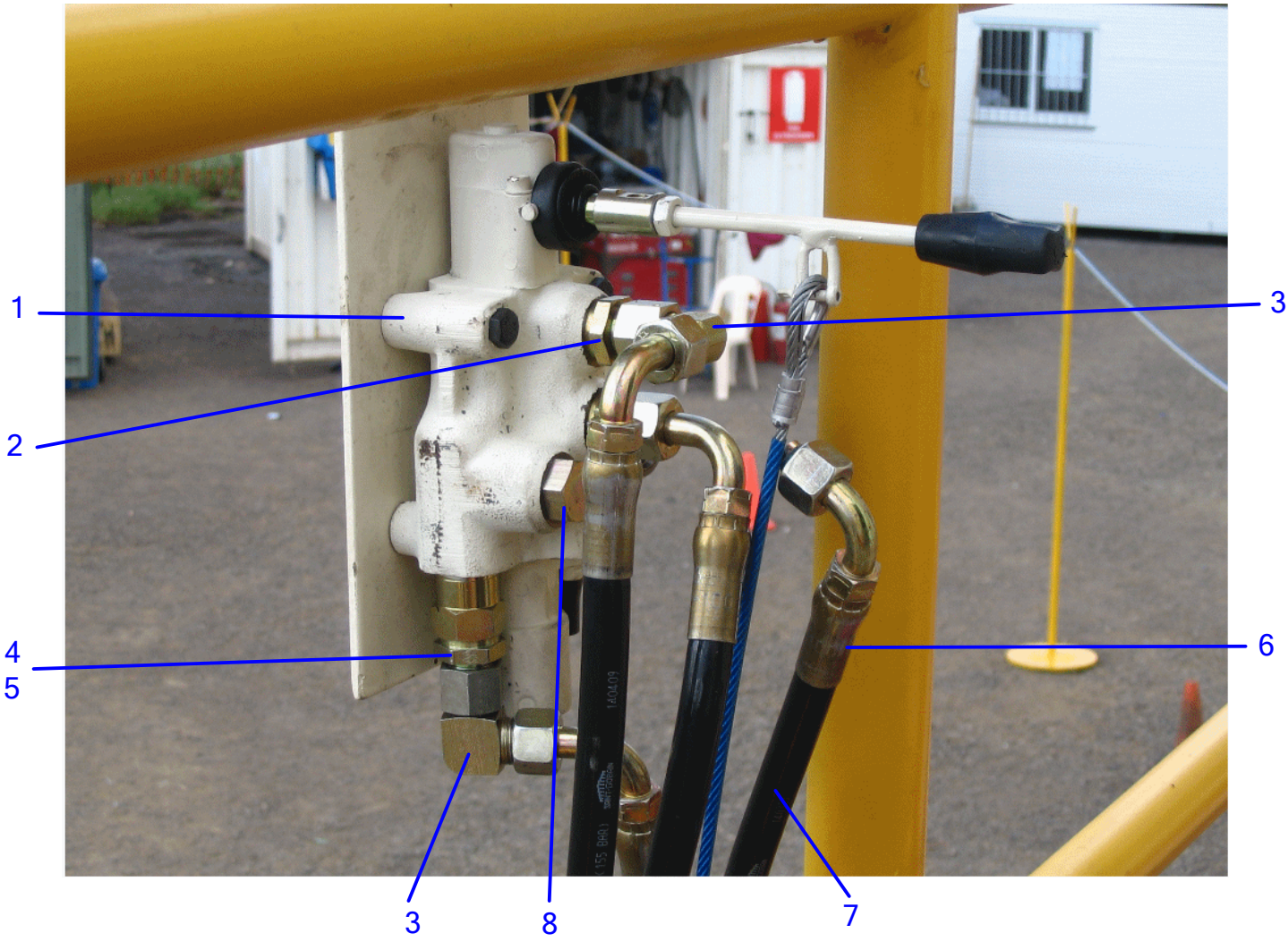
Technical Manual

02-01

FOLDING STAIRCASE HYDRAULICS

0201



05

POSITIVE BATTERY LEAD ISOLATION & STARTER LOCKOUT SYSTEM

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ITEM	QTY	UoM	PART NO	DESCRIPTION	PAGE NO.
1	1		A040035	ISOLATOR	
2	2		A040040	ISOLATOR	

SECTION 2.0 UNIT SPECIFICATION

2.1 MODEL TFC8 - SPLIT SYSTEM EVAPORATOR

This is the split ceiling fan coil (cooling) unit mounted internally within the conditioned space. It incorporates a cooling coil, a heating coil (or electric heating elements, depending on customer requirements), supply air fan assembly and electrical equipment.

The unit has also been designed with a remote control panel for ease of accessibility and safety for the cabin operator(s). Also remotely mounted are the heater hot water solenoid valve and fresh air pressuriser. The pressuriser is not supplied with this unit as standard.

2.2 MODEL TCF8 - SPLIT SYSTEM CONDENSER

This is the split, floor mounted forced draft condenser which is designed to be matched with the TFC8 evaporator unit. It has no electrical controls except for safety pressure switches.

2.3 PRESSURISER SYSTEM

This is the fresh air pressuriser/filtration unit. It can be mounted external to the operator's cabin for stand alone use or coupled to the TFC8 with ducting when required. The three (3) stage particulate filtration system provides forced fresh air into an operator cabin to raise the internal air pressure, thereby eliminating ingress of external dust.

2.4 ELECTRICAL COMPONENTS

2.4.1 MOTOR (EFM, CFM, PFM)

All motors are totally enclosed with fully sealed stainless steel shafts and heavy duty ball bearings. The EFM and CFM motors are fitted with easily accessed externally serviceable brushes.

2.4.2 ELECTRONIC THERMOSTAT

This thermostat has been specifically developed for use in severe conditions of dust, moisture and vibration. The electronic thermostat is filled with epoxy resin and is not a repairable item.

Both return air and de-ice probes are provided within the TFC8 evaporator unit. The return air temperature is adjusted via the potentiometer (POT) and has a nominal set-point range between 18^{o}C to 28^{o}C. The de-ice is fixed at zero (0^{o}C) for maximum coil performance and protection.

6. Ensure that there is no loop in the suction line which will trap oil and thus starve the compressor, and ensure that there is always a positive drop to the compressor, allowing all the oil to return back to the compressor sump.

7. Wherever possible, along the hose run, protective steel cover panels should be fitted to ensure that the refrigerant and hot water hoses are suitably protected against damage.

4.4.2 HEATER HOT WATER HOSES

1. Guidelines for installation of hot water hoses are basically as previously laid down for the refrigerant hoses. Before proceeding, it will be necessary to drain the cooling system to a suitable level that will allow the fitment of hot water hose fittings onto the engine.

   Note: If the cooling system contains special protective additives, be sure to save and return the coolant that has been drained.

2. The two in-line hot water taps, MUST be fitted onto the engine to allow for isolation of the hot water heating system when required. Hot water is usually tapped off the outlet pressure side of the water pump and returned to the suction side of the water pump, thermostat housing or some other convenient location on the engine block. Using the necessary adaptors, and a suitable thread tape or sealing compound, fit the taps to these two locations.

3. Using the hose clips supplied, connect the hot water hoses to the barbed fittings on the unit and then to the taps on the engine.

   Note: Before commencing a heating system check, ensure that the air conditioner cannot be operated by disconnecting the compressor clutch wire.

4. Refill the radiator to the correct level and start the machine. Ensure that the two taps on the engine are both turned on and that the unit is switched to heat and thermostat to warmer.

5. Operating the Main Control Switch in the FANS mode, select LOW FANS. Check for leaks at all connections. Efficient circulation of water will be indicated by a temperature increase in both heater hoses. Check for heated supply air entering cabin.

6. Turn off engine and Main Control Switch. Reconnect compressor clutch wire and refill radiator as necessary.

SECTION 6.0 ROUTINE MAINTENANCE PROCEDURES

6.1 MAINTENANCE SCHEDULE

To ensure dependable efficient operation, all air conditioning units, whether packaged or split systems, require a certain amount of Preventative Maintenance to be carried out at regular intervals between services. These regular inspections will ensure that the unit is always operating at peak efficiency and will provide early warning of potential problems, which if left unattended, may incur costly machine down-time.

It is strongly recommended that an annual service programme be implemented. This full unit service should be carried out once a year, generally just prior to the beginning of the warmer season. This service should only be carried out by a qualified refrigeration mechanic and should involve a full function test of the complete system, as well as checking of component settings.

The following is a suggested maintenance schedule for all units -

6.1.1 DAILY INSPECTION

COMPONENT/SYSTEM	INSPECTION REQUIRED
Fresh air and return air filters.	Check for cleanliness and deterioration.
Refrigeration/heating hoses.	Check for damage or deterioration.
Compressor clutch drive belt.	Check for correct tension and deterioration.
Fresh air filtration.	Check pre-cleaner for damage or deterioration.

6.1.2 MONTHLY INSPECTION

COMPONENT/SYSTEM	INSPECTION REQUIRED
Condenser coil.	Check for cleanliness.
Evaporator coil.	Check for cleanliness.
Condenser fan motor.	Clean motor with dry compressed air.
Compressor clutch.	Check clutch mounting screws and electrical connections. Check for excessive noise during operation.

SECTION 7.0 FAULT DIAGNOSIS

7.1 FAULT ANALYSIS CHARTS

The following flow charts are included as an aid in trouble shooting the air conditioning system.
In many cases, a problem that causes an air conditioning system to malfunction requires little time to check out and repair. These possible causes should be the first to be examined and corrected.
Use the flow charts, in conjunction with the gauge set to determine the cause of the problem and then carry out the remedy prescribed.
As a general guide to correct system performance, a table is included to show the acceptable discharge and suction gauge pressures against the ambient temperature during unit operation, (refer Table 7.1.1). To use the table proceed as follows:

1. Run engine at approximately 2000 r.p.m.
2. Set air conditioning fan speed switch to "HIGH FAN".
3. Set mode switch to “COOL” position, and thermostat to “COOLER” position.
4. Record ambient temperature.
5. Check pressure in table against applicable ambient temperature.

TABLE 7.1.1

TEMP (^{O}C)	COMPRESSOR DISCHARGE PRESSURE (kPa)	COMPRESSOR SUCTION PRESSURE (kPa)
16	850 - 1200	20 - 100
21	1050 - 1750	20 - 100
27	1250 - 1900	20 - 100
32	1400 - 2150	30 - 150
38	1600 - 2300	30 - 200
43	1900 - 2500	30 - 250

The refrigerant sight glass incorporated in the top of the receiver drier, can be a valuable aid in quickly determining the cause of a system malfunction. For correct interpretation of sight glass indications, the following table has been included, refer Table 7.1.2.

7.3 FAULT DIAGNOSIS FOR ELECTRONIC THERMOSTAT Cont'd

TEST	REASON
Power present at P1.1 in LO-MED-HI (Note - P1.1 refers to terminal No. 1)	Ensures power supply to thermostat
Continuity between P1.5 and earth.	Ensures circuit to earth.
No continuity between P1.7 and earth.	
No power at P1.6 and P1.8.	Power on potentiometer (POT) control lead will blow thermostat.
Switch to COOL, connect wire No. 9 of thermostat to earth. Clutch should activate.	Checks cooling operation
Switch to HEAT, connect P1.2 to earth. Heater solenoid should activate.	Checks heating operation.

7.3.3 FAULT FINDING

COMPLAINT	POSSIBLE CAUSE	REMEDY
Continuously operates in cooling.	Potentiometer control lead open circuit. Internal contacts welded closed.	Repair lead. Check wiring, find fault and replace.
Continuously operates in heating.	Temperature probe lead open circuit. Internal contacts welded closed.	Replace thermostat. Check wiring, find fault and replace.
Thermostat inactive	Circuit breaker tripped.	Check wiring, find fault and reset circuit breaker.
Coil ices up.	De-ice probe incorrectly placed.	Place in sensor tube attached to U-Tubes of evaporator coil.
Unit lacks capacity.	Return air probe in de-ice probe location.	Place in air stream of return air.
Works in HEAT mode but not in COOL .	Probes overheated (+150^{o}C)	Replace thermostat.

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TRAINING SEAT

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ITEM	QTY	UoM	PART NO	DESCRIPTION	PAGE NO.
1	1		A080104	SEAT	
2	1		1709815	SEAT BELT	
3	1		A090203	BASE	
4	10		0063314	BOLT	
5	20		0063701	WASHER	
6	10		0521794	NUT	

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MAIN CONTROL VALVE WALKWAY

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ITEM	QTY	UoM	PART NO	DESCRIPTION	PAGE NO.
1	1		A090674	WALKWAY	
2	2		A090675	SIDE PLATE	
3	4		0056661	M10 x 30 BOLTS	
4	4		0530811	M10 WASHERS	

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FUEL SHUT OFF VALVE

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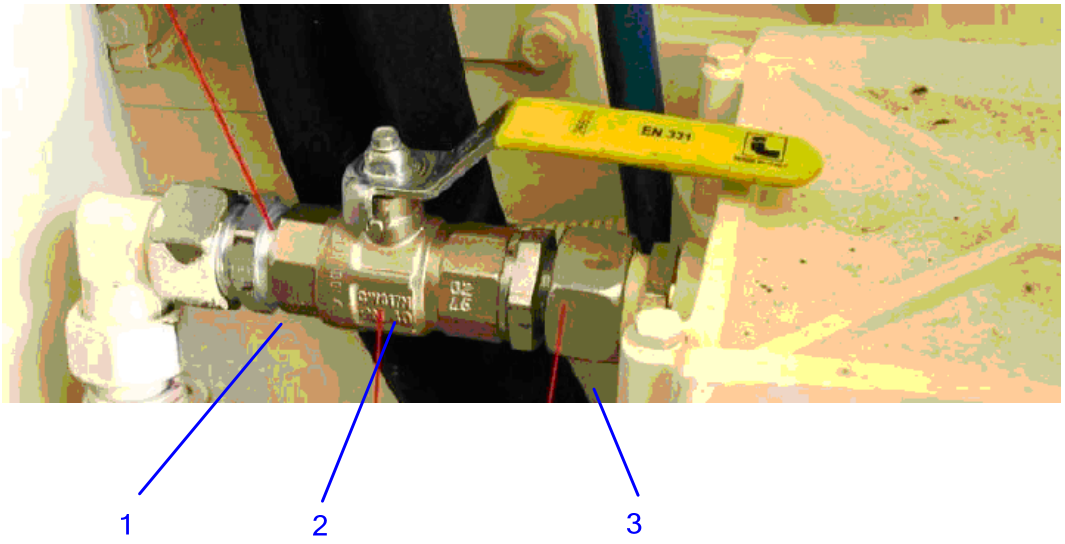

OIL RESERVE AND OIL BURN SYSTEMS

BENEFITS

- Doubles engine oil capacity
- Maintains correct oil level and temperature
- Insurance and unmanned equipment
- Extends oil drain periods (less downtime)
- Guards against overfilling of engine oil
- Early warning system for engine oil loss
- Simplifies daily maintenance
- Disposal of waste oil (oil burn only)

OPERATION - OIL RESERVE SYSTEM

Oil reserve systems are designed to maintain a constant running oil level throughout all types of conditions, as well as extending oil changed to 500 hours intervals.

With an oil burn system, filter changes are only required, oil is monitored through Scheduled Oil Sampling (SOS) ensuring clean oil is in the system, throughout the service life of the engine.

XLF Venture Combo filters have been introduced to extend filter life to in excess of 500 hours and can be used on both systems. Standard engine filters must be changed at 250 hour intervals. (See section on XLF Venturi Combo oil filters, Page 4)

The reserve system works by circulating oil between a remote mounted tank and the engine sump by using two electrically driven pumps mounted on the reserve tank. The first pump (Pump 1) runs continuously, withdrawing oil from the sump via a tube set at the correct operating oil level. When oil is above the bottom of this tube, Pump 1 removes oil from the sump and delivers it to the reserve tank. Once the oil level drops enough for Pump 1 to start withdrawing air, the second pump (Pump 2) cuts in and returns oil from the reserve tank to the sump. The oil level now rises until Pump 1 is no longer withdrawing air, and once again starts to withdraw oil. Pump 2 now cuts out until Pump 1 starts to draw air again. This process is repeated constantly, circulating oil between the sump and the tank, as well as maintaining a close running oil level. The operation of the pumps and oil level is monitored by a LED light mounted in the cab.

TROUBLESHOOTING

OIL RESERVE SYSTEM

1. Check engine oil is at static full level and oil reserve system is full.

2. Jump oil pressure switch to activate pump
   If electric pump or LED light is dead, check battery voltage at pumping unit terminals
   If there is no voltage, the unit has an electrical fault.
   If there is power, check operation of pumps.

3. Check Pump 1 (withdrawal pump)
   Loosen outlet line (tank return oil line), this line should have a pulsating flow oil, and the LED will be in the Solid Mode.
   If no oil is present, there is a problem with Pump 1.
   if oil is present, check operation of Pump 2.

4. Pump 2 is triggered by admitting air into the inlet side of Pump 1.
   Remove oil supply (sump withdrawal line) from Pump 1 to induce this.
   Pump 2 should begin to deliver oil after this step, check this by removing Pump 2 outlet hose (return oil line to sump). The LED light will now be pulsating (blinking)
   If there is no oil coming out of this line, there is a problem with Pump 2.

BLENDING PUMPS (OIL BURN SYSTEM)

1. In the power box, jump terminals POS IN to PR SW, this will run the system without requiring engine operation. Ensure oil pressure switch is jumped first to supply power to control box.

2. Disconnect oil line from the outlet of the oil metering pump, which enters HF-6603 filter. This should be pumping oil. If not, check the stainer and suction line of the pump for a fault; eg. obstruction. If satisfactory continue onto Step 3. If not, there is a problem with the pump.

3. Disconnect the return line from the blend pump which returns to the intake side of the primary fuel filter (engine). This should be pumping a blended oil/fuel mixture. Make sure the engine fuel system is primed to ensure this.

   If there is no oil in the fuel, check for blocked filter, condition of check valve or a blockage in the outlet line of the oil metering pump.

   If no fuel is being pumped out, check the feed line of the reserve fuel pump for a blockage. If this is satisfactory, the reserve fuel pump is at fault.

NOTE: Check operation of the reserve pumps on the oil burn system the same as for regular reserve systems.