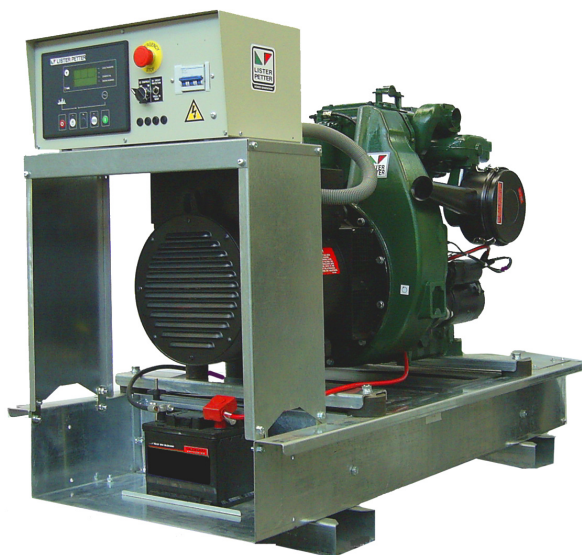




T Series

Generating Set Operators' Handbook



P027-08062

Abbreviations

The following are the abbreviations used in Lister Petter operators' handbooks.

AC	alternating current	HP1	heater plug
AL	battery-charge alternator	HR	heater relay
ASU	automatic control module	LCD	liquid crystal display
BC	battery charger	LED	light-emitting diode
CCR	charge circuit relay	MC	mains contactor
CT1	current transformers	MCB	AC circuit breaker
D1	diode	MFR	mains failure relay
DC	direct current	MOL	mains-on-load lamp
DCCB	DC circuit breaker	OPX	oil pressure sender
DCS	DC control switch	PC	plant contactor
EPB	emergency stop pushbutton	PCR	plant contactor relay
ETX	engine temperature sender	POL	plant-on-load lamp
F1	fuses	SB	starter battery
FCS	fuel control solenoid	SM	starter motor
FD	flywheel diodes	SS	starter solenoid

Statement of Indemnity

The information, specifications, illustrations, instructions and statements contained within this publication are given with our best intentions and are believed to be correct at the time of going to press.

Our policy is one of continued development and we reserve the right to amend any technical information with or without prior notice.

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obtained from tests carried out at the place of manufacture. This Company does not guarantee that the same results will be obtained elsewhere under different conditions.

Parts that have not been approved by the Lister Petter organisation cannot be relied upon for correct material, dimensions or finish. The Company cannot therefore be held responsible for any damage arising from the use of such parts, and the guarantee will be invalidated.

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Model Designation

Genset Model	Engine Type	Engine r/min
HSL8	TR1	1500/1800
HSL15	TR2	1500/1800
HSL24	TR3	1500/1800

1. Introduction

This handbook covers the installation, operation and routine maintenance of generating sets powered by Lister Petter 'TR' Series engines in the following versions:

- Electric Start.
- Automatic Mains Failure (AMF).

Some features and facilities are optional, as indicated in the text. To determine the version of generating set refer to the Plant Number stamped on the nameplate.

Plant Number

A typical example of a Plant Number is: 06 12345 G TR3 22 6

Plant Number Code

Referring to the example number above:

- 06 Year of manufacture code.
- 12345 Consecutive number of genset.
- G Lister Petter diesel genset.
- TR3 Engine model.
- 2 Electric start.

Work should only be carried out if the necessary hand and service tools are available. When the user has insufficient tools, experience or ability to carry out adjustments, maintenance or repairs, this work should not be attempted.

Where accurate measurements or torque values are required they can only be made using calibrated instruments.

Under no circumstances should makeshift tools or equipment be used as their use may adversely affect safe working procedures and operation.

The information, specifications, illustrations, instructions and statements contained within this publication are given with our best intentions and are believed to be correct at the time of going to press.

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Parts that have not been approved by the Lister Petter organisation cannot be relied upon for correct material, dimensions or finish. This Company cannot therefore, be responsible for any damage arising from the use of such parts and the guarantee will be invalidated. When purchasing parts or giving instructions for repairs users should, in their own interests, always specify Genuine Parts and quote the Part Number, Description of the Part and the Plant Number.

For future reference write your plant serial number in the box below.

1. Introduction

Using this Operators Manual

To assist in the use of this handbook each major section title is given at the top of each page.

It is recommended the individual steps contained in the various maintenance or repair operations are followed in the sequence in which they appear.

When a diesel engine is operating or being overhauled there are a number of associated practices which may lead to personal injury or product damage. Your attention is drawn to the symbols shown and described below which are applied throughout this publication.

CAUTION

The caution symbol draws attention to special instructions or procedures, which if not correctly followed, may result in damage to or destruction of equipment.

WARNING

A warning symbol with this type of text draws attention to special instructions or procedures, which if not strictly observed, may result in personal injury.

WARNING

A WARNING SYMBOL WITH THIS TYPE OF TEXT DRAWS ATTENTION TO SPECIAL INSTRUCTIONS OR PROCEDURES WHICH, IF NOT STRICTLY OBSERVED, MAY RESULT IN SEVERE PERSONAL INJURY, OR LOSS OF LIFE.

Contacting Lister Petter

We are confident that you will obtain excellent safe service from your generating set. To achieve this however it is important that the installation, commissioning and maintenance of the set is undertaken by relevant competent engineers. If in doubt consult your local Lister Petter Gensets distributor.

To obtain advice on any aspect of the ownership of your Lister Petter diesel generating set please contact your local Lister Petter Gensets distributor or the manufacturers:

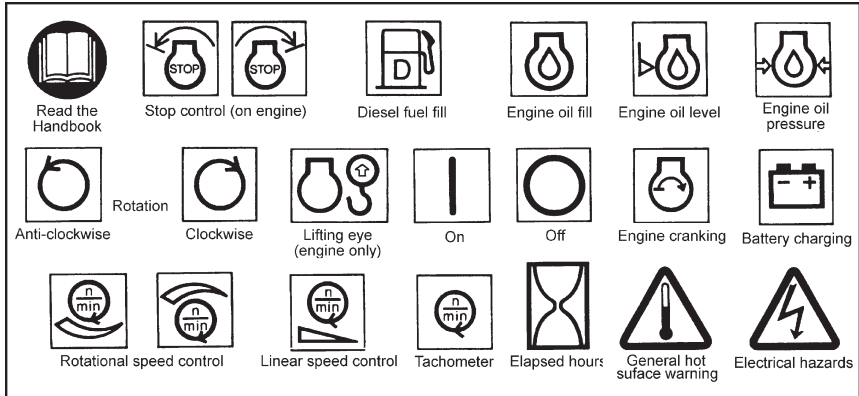
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2. General Information

2.1 Safety Symbols - ISO 8999

This section identifies the ISO 8999 symbols currently used by Lister Petter.



2.1 Safety Precautions

WARNING

Starting and operating any diesel generating set can be dangerous in the hands of untrained people. Operators must read and abide by the instructions contained in this manual as well as the engine and alternator handbooks supplied.

General

- Do **NOT** smoke in the proximity of the generator set.
- If work is to be carried out inside control or contactor cubicles they **MUST** be isolated from both AC and DC supplies.
- Before the first start, and at regular intervals check the fuel and lubricating oil levels. For full details refer to the engine Operators Handbook.

When the Set is Running

- Wear ear defenders.
- Do **NOT** touch any electrical connections.
- Do **NOT** run the set with any covers, or guards, removed or damaged.

When the Set is at Rest

Do **NOT** work on the set before disconnecting the starter battery. Failure to disconnect the battery may allow the set to start up automatically. Always disconnect the negative terminal first, reconnect the negative terminal last and use insulated tools. Do **NOT** touch the exhaust system immediately after the engine has stopped. It will still be very hot.

- Do **NOT** touch any part of the exhaust system.
- Do **NOT** breathe exhaust fumes.

2.3 Nameplates

The plant nameplate defines the output and conditions the generating set was designed for and tested to, by Lister Petter Limited.

The alternator nameplate defines the maximum capabilities of the machine at specific power ratings for the voltage, frequency, connection arrangement, ambient temperature and conditions shown. Where there are differences between the two nameplates, then the Plant Nameplate data should be used for the generating set supplied.

2.4 Preparing the Battery

Batteries that are supplied dry charged can normally be used for operation after filling with battery acid without initial charging. The following procedure should be used to prepare a battery with factory sealed charge.

1. Remove the vent plugs.
2. Fill the individual cells of the battery with sulphuric acid in accordance with VDE 0510 of density 1.280kg/l (for tropical countries 1.230kg/l) up to the maximum acid level mark or 15mm above the upper edge of the plates. The temperature of the battery and acid should be at least 10 °C before filling.
3. Allow batteries to stand for 20 minutes, tilt slightly several times and top up with acid to the correct level if required.
4. Clean and dry the outside of the battery. Thinly coat the terminals with petroleum jelly and fit the vent plugs.
5. Clean the plant connections, thinly coat with petroleum jelly and connect the battery, making sure that the positive cable is connected to the positive terminal of the battery and the negative terminal cable to the negative terminal.

NOTE:

If the battery does not provide an adequate starting performance then it must be recharged.

6. Re-charge the battery at a charge rate of approximately 6A. Discontinue the charging if the acid temperature exceeds 55 °C. The battery is fully charged when the acid density and charging voltage have stopped rising for 2 hours.

7. After charging, check acid level and if required top up with distilled water to the maximum acid level mark or 15 mm above the upper edge of the separators.

8. The battery should be checked within a week to ensure that the specific gravity is uniform throughout the battery and that no cell has a specific gravity below 1.280kg/l. If this is not the case then the battery must be brought back to peak condition as in Notes 6. and 7. opposite.

Tropical Rates

Tropical rates apply to those countries or areas where the average temperature of any month of the year exceeds 27 °C (80 °F). This definition includes India, Pakistan, South China, Iraq, Turkeyin-Asia, Africa (excluding Cape Town), Australasia (excluding Melbourne and New Zealand), Mexico, Brazil and South America (excluding Argentina).

The Care of Batteries

1. Never allow the battery to stand for long periods in the discharged state. Always recharge the battery promptly.
2. Check the electrolyte level at regular intervals and adjust by adding distilled or de-ionized water.

WARNING

Do not use impure water or so called 'Improving agents'.

3. Keep the top of the battery clean and dry. Inspect the terminals and if necessary clean and coat with petroleum jelly.
4. Do not allow metal objects to short circuit the cells. Take special care when using spanners near a battery.

2.5 Site Installation

WARNING

All installation work should be undertaken by a competent professional engineer.

1. Foundations must be of solid construction (usually concrete), with adequate load bearing capabilities. If in doubt, consult a Structural Engineer.
The baseframe must be securely fixed to a level and solid foundation to limit the level of vibration to the baseframe and cubicle assemblies.

Distortion of the fabricated baseframe must not occur when tightening down the foundation bolts. Packing shims should be used to ensure there are no irregularities occurring between the baseframe and the foundations. 1. Foundations must be of solid construction (usually concrete), with adequate load bearing capabilities. If in doubt, consult a Structural Engineer. The baseframe must be securely fixed to a level and solid foundation to limit the level of vibration to the baseframe and cubicle assemblies.

Distortion of the fabricated baseframe must not occur when tightening down the foundation bolts. Packing shims should be used to ensure there are no irregularities occurring between the baseframe and the foundations.

2. Separate floor trenches must be provided for fuel pipework and cabling. It is not good practice to run both in the same trench (when applicable).

3. When the installation is indoors, ensure that combustion and cooling air inlets and hot air outlets are provided with adequate ventilation. Heat from the engine must be expelled from the building, otherwise the engine can be damaged due to overheating.

4. Exhaust fumes are dangerous. Ensure that the fumes are taken to the outside of the buildings and cannot return.

5. The bulk storage of fuel oil should be stored in outside buildings if possible.

6. Check that fire precautions are adequate and that the installer provides appropriate warning notices to ensure the safety of all personnel with regard to all aspects of generating set operation.

7. Only lift the set by means of the identified lifting points using certified lifting equipment with spreaders as appropriate.

- a. Open and housed sets - holes in the baseplate corners for lifting bars.
- b. Housed set - centre point lift (option).

NEVER lift the set by the engine or alternator lifting eyes.

2.6 Wiring and Commissioning

WARNING

All wiring installation, connecting up and commissioning of the generating set should be carried out by a competent electrical engineer

1. It is the responsibility of the installer to ensure that the generating set is adequately earthed to a low resistance earthing rod or earth plate.

2. Ensure that the battery connections are secure. Make the final battery connection only when everything is ready for the "first start", connecting negative battery terminal last. Ensure that the battery is fully charged and serviceable and check that the engine has the correct quantity of the correct lubricating oil. (See the Engine Operators Handbook).

3. Before starting, the operator should read section "2.2 Safety Precautions".

3. The Control Module

3.1 The Control Module



Figure 3.1.1 Control Module

The control module is used to start and stop the engine, either manually or automatically and to indicate operational status and fault conditions.

Front panel mounted push buttons provide Automatic, Manual, Start, Stop/Reset and Display Scroll facilities.

It monitors various engine and generator parameters. Under out of limit conditions it will either show a warning alarm or shut the engine down, indicated by a LCD symbol and LED display.

3.2 Controls and Indicators



Figure 3.2.1 Control Module
The LED display shows the selected parameter code and function as indicated by the icon.

Code	Function
1	Automatic moad selection
2	Manual mode selection
3	Start under manual control
4	Stop/Reset - this will clear any alarm condition or stop the engine if it is running
5	Display scroll button - used to step through measured parameters
6	Common alarm LED: Steady red - warning Flashing red - shutdown
7	Plant running LED
8	Connect to load LED
9	LCD display - measured parameters and Warning/Shutdown systems.
10	LCD auxiliary display

3. Control Module

3.3 Display

Metering facilities are shown on the LCD display. The following parameters are displayed in sequence by using the scroll button

- Generator volts: L1-N, L2-N, L3-N
- Generator volts: L1-L2, L2-L3, L3-L1
- Generator current: L1, L2, L3
- Alternator frequency (Hz).
- Engine speed (r/min).
- Battery voltage (V dc).
- Engine running time (hours).

3.4 Alarm/Fault Indication and Protection

Multiple alarm channels are provided to monitor for the conditions listed below.

In the event of a warning, or shutdown, the appropriate symbol will be displayed; refer to the table on the next page.

3.4.1 Warning Alarm

These are non-critical conditions.

- If the battery charger fails, 'Charge Fail' will be indicated in the auxiliary display. The set will not shutdown.

3.4.2 Shutdowns

These are latching and stop the generator.

The 'Shutdown Alarm' and the appropriate icon symbol will be displayed flashing.

• Fail to Start

If the engine does not start after a maximum of 3 attempts the 'Fail to Start' symbol will be displayed.

• Low Oil Pressure

If the pressure drops below the pre-set level the engine will shutdown and the 'Low Oil Pressure' symbol will be displayed.

• High Engine Temperature

If the engine coolant temperature rises above the pre-set level the engine will shutdown and the 'High Coolant Temperature' symbol will be displayed.

• Overspeed

If the engine speed exceeds the pre-set point the engine will shutdown and the 'Overspeed' symbol will be displayed.

• Underspeed

If the engine speed falls below the pre-set point the engine will shutdown and the 'Underspeed' symbol will be displayed.






















• Emergency Stop

If the emergency stop button is pressed, a controlled shutdown of the generator will occur and the 'Emergency Stop' symbol will be displayed. The generator cannot be restarted until the emergency stop button has been reset.

3.4.3 Resetting the Shutdown Condition

When the fault condition has been rectified, press the 'Stop/Reset' push button to reset the module.

3.5 LCD Display Symbols

			L1-N Phase - Neutral
Shutdown alarm	Auxiliary Alarm Warning or Shutdown	Auxiliary indication	L2-N Phase - Neutral
			L3-N Phase - Neutral
Warning alarm	AC	Start (Manual mode)	BAR Pressure
			Hz Frequency
High coolant temperature	DC	Stop/Reset	PSI Pressure
			RPM Speed
Low oil pressure	Scroll	Manual	L1 Phase
			L2 Phase
Charge fail	Hours run		L3 Phase
		L1-L2 Phase - Phase	V Voltage
Overspeed	Emergency stop	L2-L3 Phase - Phase	A Amperes
		L3-L1 Phase - Phase	*F Temperature
Underspeed	Electrical trip		*C Temperature
			
Fail to start (over crank)	Common alarm		

4. Electric Start Sets

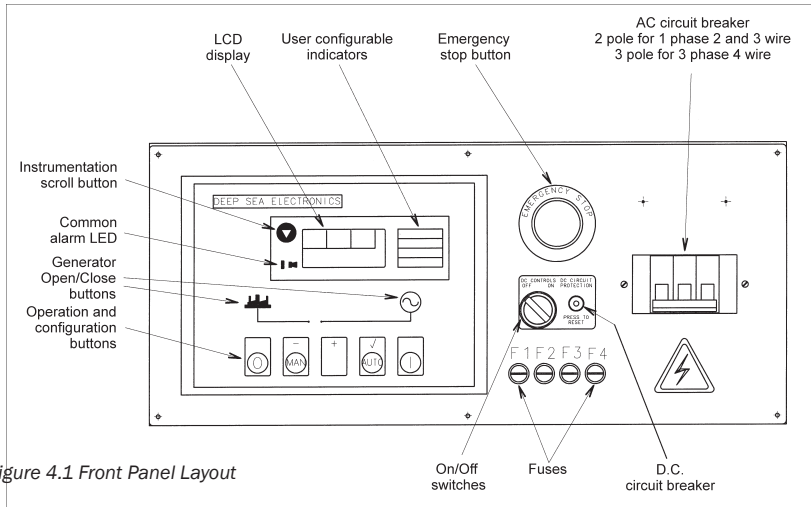


Figure 4.1 Front Panel Layout

4.1 Features

Electric Start sets have the following features:

- Lister Petter air cooled engine close coupled to a brushless alternator.
- Fabricated steel baseframe with anti-vibration mountings.
- Starter battery and leads.
- 12 volt starter motor and solenoid.
- Energised to run fuel solenoid.
- Oil, air and fuel filters.
- Fuel lift pump.
- Integral fuel tank (8hour run)
- Integral silencer

4.2 Electric Start System

- Set mounted control system containing:
 - Automatic engine control module.
 - Emergency stop pushbutton
 - DC control switch.
 - Battery supply DC circuit breaker.
 - 2, 3 or 4 pole AC circuit breaker.
 - AC instrumentation protection fuses.
 - Current transformers.
 - Automatic battery charger.
 - Terminal connection points for the following remote input and output circuits:
 - Emergency stop.
 - Shutdown alarm.
 - Start and stop from remote switch.
 - Load transfer.

4.3 Emergency Stop

An emergency stop button is fitted to the control cubicle.

On housed sets, an additional emergency stop button is fitted externally on the housing.

Operation of an emergency stop device will initiate a controlled shutdown. The condition will be indicated on the display accompanied by a flashing red LED.

Any attempt to restart the set will be prevented until the emergency stop device has been reset.

4.4 Manual Control

This section describes manual control and operation of the generating set.

Starting

1. Ensure the AC circuit breaker is in the 'OFF' position before starting.
2. Turn the DC control switch to the 'ON' position.
3. Press the 'MANUAL' mode button on the control module.
An LED indicator by the side of the button will illuminate.
4. Press the 'START' button on the control module.
5. The generating set will start and run up to speed and voltage.
6. When 'PLANT RUNNING' LED illuminates the set can be connected to the load circuit by closing the AC circuit breaker.

4. Electric Start Sets

Monitoring the Generating Set

Electrical outputs and engine conditions can be monitored on the control module display by successive operation of the "SCROLL" button; refer to "3.3 Display".

Stopping

1. Open the AC circuit breaker to disconnect the load circuits.
2. Press the 'STOP' button on the control module.
3. After a 1 minute cooling down period the engine will shutdown and come to rest.
4. If the generating set is not going to be used again for more than 8 hours, the DC control switch should be turned to the 'OFF' position.

Alarm and Fault Conditions

During the running period the engine control module monitors the set for the alarm and shutdown faults detailed in "3.4 Alarm/Fault Indication and Protection". A 12V DC signal for remote indication of a shutdown alarm can be taken across terminals B3(+) and B4(-).

AC Circuit Breaker Trip

If the AC circuit breaker trips, investigate and rectify the cause then wait 2 minutes before reclosing it. The set will continue to run.

4.5 Automatic Control

This section describes the automatic control and operation of the generating set.

A remote switch or contact has to be connected across terminals B5 and B6. The contact is arranged to close to start and run the set and open to stop it.

A 12V DC signal for remote indication of plant available (load transfer) can be taken across terminals B7(+) and B8(-).

Starting

1. Turn the DC control switch to the 'ON' position.
2. Press the 'AUTO' pushbutton on the control module.

An LED indicator by the side of the button will illuminate.

3. On closure of the remote contact and after a short delay, the set will start and run up to speed and voltage.
4. When the set is ready, "LOAD TRANSFER" will be indicated on the "AUXILIARY" display and the 12V DC signal is available at B7 and B8. At this point the load can be connected to the generating set. An LED indicator by the side of the button will illuminate.

Monitoring the Generating Set

Electrical outputs and engine conditions can be monitored on the control module display by successive operation of the "SCROLL" button; refer to "3.3 Display".

Stopping

1. Disconnect the load from the generating set.
2. Open the remote contact.
3. After a 1 minute cooling down period the engine will shutdown and come to rest.
4. If the generating set is not going to be used again for more than 8 hours the DC control switch should be turned to the 'OFF' position.

Alarm and Fault Conditions

During the running period the engine control module monitors the set for the alarm and shutdown faults detailed in "3.4 Alarm/Fault Indication and Protection".

AC Circuit Breaker Trip

If the AC circuit breaker trips, investigate and rectify the cause then wait 2 minutes before reclosing it. The set will continue to run.

4.6 Emergency Hand Start

If you have purchased the hand start option with your electric start set, the following procedure should be followed to start the set by hand.

WARNING

Always use the correct Lister Petter starting handle which has been designed for the engine. Ensure that there are no burrs on it and lightly oil that part of the engine which fits into the engine. Do not attempt to start the engine if the starting handle is damaged or dirty

A non-limited kick-back handle, or limited kickback handle system may be fitted to the engine.

The two types of handle are not interchangeable and care must be taken to ensure the correct handle is retained with the engine.

1. Disconnect the battery.
2. Ensure the AC circuit breaker is in the 'OFF' position.
3. Operate the fuel solenoid linkage by hand and fix this in position with the locking latch; (see 'Figure 4.2').
4. Turn the DC control switch to the 'OFF' position.
5. Refer to the engine Operators Handbook for the hand starting procedure.

WARNING

Always completely remove the handle when the engine has fired.

6. Close the AC circuit breaker when the engine is up to speed, stable and the output voltage is correct.

4.6.1 Stopping

1. Switch the circuit breaker to the 'OFF' position.
2. Allow the set to run on no load for 1 minute to cool down.
3. Release the fuel solenoid locking latch. The arm should spring return to the 'STOP' position. The engine will now come to rest.

CAUTION

Under this mode the failure circuits are in -operative

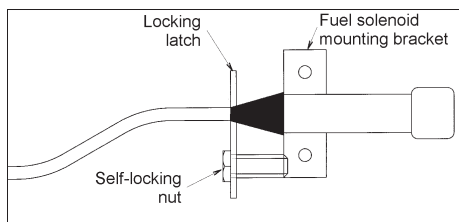


Figure 4.2 Fuel Control Solenoid Latch Lock

5. Automatic Mains Failure Sets

5.1 Features

Automatic Mains Failure (AMF) sets have the following features:

- Lister Petter air cooled engine close coupled to a brushless alternator.
- Fabricated steel baseframe with anti-vibration mountings.
- Starter battery and leads.
- 12 volt starter motor and solenoid.
- Energised to run fuel solenoid.
- Oil, air and fuel filters.
- Fuel lift pump.
- Integral fuel tank (8 hour run).
- Integral silencer.

5.2 Automatic Start and Transfer System

• Set mounted control system containing: Automatic engine control module.

Emergency stop button.

DC control switch.

Battery supply DC circuit breaker.

Automatic battery charger.

2, 3 or 4 pole AC circuit breaker.

AC instrumentation protection fuses.

Current transformers.

Terminal connection points for the following remote input and output circuits:

Emergency stop.

Shutdown signal.

Control contact input.

Load transfer signal.

Battery charger supply and controls.

• A wall mounting automatic transfer cubicle containing:

Mechanically and electrically interlocked plant and mains contactors.

Mains failure sensing relay.

Plant/mains on load indicator lamps.

AC protection fuses.

DC control relay.

Terminal blocks for power and auxiliary circuits.

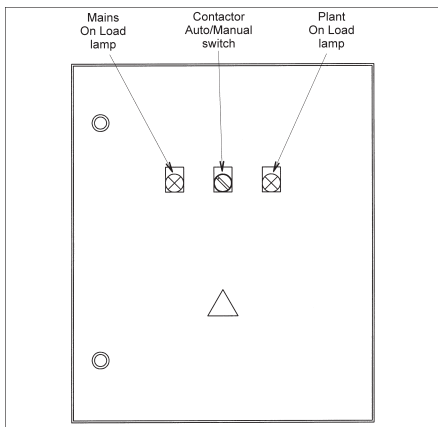


Figure 5.1 Change-over Contactor Cubicle

5.3 Emergency Stop

An emergency stop button is fitted to the control cubicle.

On housed sets, an additional emergency stop button is fitted externally on the housing.

Operation of the emergency stop button will initiate a controlled shutdown.

The condition will be indicated on the display.

Any attempt to restart the set will be prevented until the emergency stop device has been reset.

5.4 Automatic Operation

WARNING

*Automatic sets can start without warning.
Keep clear of the set at all times.*

1. Turn the DC control switch to the 'ON' position.
2. Press the 'AUTO' pushbutton on the control module.
An LED indicator by the side of the button will illuminate.

Mains (Utility) Failure

On receipt of a mains failure condition there is a 10 second start delay, after which the set will start and run up to speed and voltage.

When the set is ready the change-over contactor operates to isolate the mains (utilities) circuit and then transfers the load circuit on to the generator. During this operation the mains on load lamp is extinguished and the plant on load lamp is illuminated.

Monitoring the Generating Set

Electrical outputs and engine conditions can be monitored on the control module display by successive operation of the "SCROLL" button; refer to "3.3 Display".

Mains (Utility) Returns

The mains (utility) supply must remain healthy for 5 minutes before the load circuit is transferred back from the set to it. At the end of this time the plant on load lamp is extinguished and the mains on load lamp is illuminated.

The set will continue to run for a further 1 minute on no load to allow for engine cooling.

Alarm and Fault Conditions

During the running period the engine control module monitors the set for the alarm and shutdown faults detailed in "3.4 Alarm/Fault Indication and Protection".

AC Circuit Breaker Trip

If the AC circuit breaker trips, investigate and rectify the cause then wait 2 minutes before reclosing it. The set will continue to run.

5.5 Manual Operation

Starting

1. Turn the DC control switch to the 'ON' position.
2. Press the 'MANUAL' mode button on the control module. An LED indicator by the side of the button will illuminate.
3. Press the 'START' button on the control module.

The generating set will start and run up to speed and voltage.

The set will then automatically connect to the load circuit if the mains (utility) supply has failed. Otherwise it will run off-load.

Stopping

1. Press the 'STOP' button on the control module.

After a 1 minute cooling down period the engine will shut down and come to rest.

Mains (Utility) Failure

If the mains (utility) supply fails while under 'MANUAL' control, the set will connect automatically to the load circuit.

On mains (utility) return, the set will continue to run on load until the 'AUTO' button is pressed.

After a 5 minute delay the load will then be transferred back to the mains supply.

The set will continue running on no load for the 1 minute cooling period.

If the 'STOP' button on the control module is pressed, before the mains returns, then the set is immediately disconnected from the load and will shutdown.

5.6 Emergency Hand Start

If you have purchased the hand start option with your A.M.F. set, the following procedure should be followed to start the set by hand.

WARNING

Always use the correct Lister Petter starting handle which has been designed for the engine. Ensure that there are no burrs on it and lightly oil that part of the handle which fits into the engine. Do not attempt to start the engine if the starting handle is damaged or dirty.

A non-limited kick-back handle, or limited kickback handle system may be fitted to the engine.

The two types of handle are not interchangeable and care must be taken to ensure the correct handle is retained with the engine.

1. Disconnect the starter battery.
2. Ensure the contactor control switch in the contactor cubicle is in the 'AUTO' position.
3. Operate the fuel solenoid linkage by hand and fix this in position with the locking latch; (see 'Figure 4.2').

WARNING

Always completely remove the handle when the engine has fired.

4. Turn the DC control switch to the 'OFF' position.
5. Refer to the engine Operators Handbook for the hand starting procedure.

5.6.1 Connecting to the Load

Once the generating set is up to speed, stable and the output voltage is correct, turn the control contactor switch to the 'MANUAL' position, which will connect the generator to the load circuits.

5.6.2 Stopping

1. Return the contactor control switch to the 'AUTO' position.,
2. Allow the set to run on no load for 1 minute to cool down.
3. Release the fuel solenoid locking latch. The arm should spring return to the 'STOP' position.

The engine will now come to rest.

WARNING

Battery electrolyte is corrosive and batteries should be handled with care. Do not splash electrolyte on your skin and wear protective clothing.

6. Hand Start Sets

6.1 Features

Hand start sets have the following features:

- Lister Petter air cooled engine close coupled to a brushless alternator.
- Fabricated steel base frame with anti-vibration mountings.
- Oil, air and fuel filters.
- Fuel lift pump.
- Integral fuel tank (8 hour run).
- Integral silencer.
- Starting handle.

6.2 Hand Start Cubicle

Set mounted cubicle containing:
Combined digital voltmeter, ammeter, frequency meter and running hours recorder, 2, 3 or 4 pole AC circuit breaker.

AC instrumentation protection fuses.
Current transformers.

6.3 Hand Start Set Operation

A non-limited kick-back handle, or limited kickback handle system may be fitted to the engine.

The two types of handle are not interchangeable and care must be taken to ensure the correct handle is retained with the engine.

Before starting refer to the starting precautions in the engine operators handbook.

1. Ensure the AC circuit breaker is in the 'OFF' position.
2. Refer to the engine Operators Handbook for the hand starting procedure.
3. Close the AC circuit breaker when the engine is up to speed, stable and the output voltage is correct.

6.3.1 Monitoring the Output of the Set The multi-function meter provides indication of the voltage, current, frequency and hours run.

The 2 front buttons can be used to scroll up and down through the displayed parameters

6.3.2 Stopping

1. Switch the circuit breaker to the 'OFF' position.
2. Allow the set to run on no load for 1 minute to cool down.
3. Turn the engine control lever clockwise to the 'STOP' position and hold it there until the engine comes to rest.

⚠ CAUTION

Never stop the engine by operating the decompressor lever or valve damage may occur

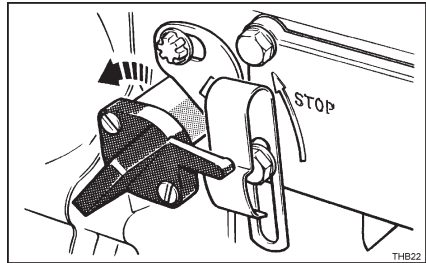
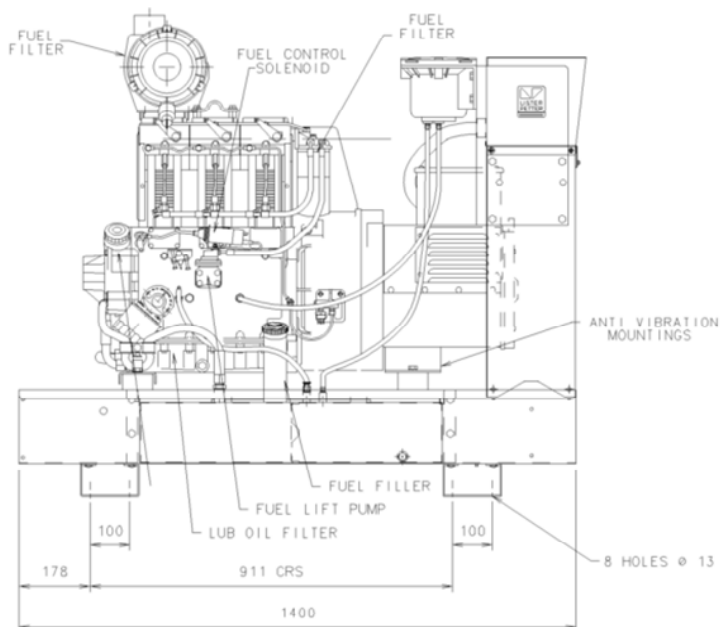


Figure 6.1 Engine Control

7. Long Run Sets



7.1 Features

Long run sets have the following standard features:

- Available in either Electric start and AMF control systems.
- Fabricated steel base frame with anti vibration mountings
- Lister-Petter air cooled engine close coupled to a brushless alternator
- 55 litre steel fabricated lube oil tank (in place of standard fuel tank)
- Starter battery and leads
- 12 volt starter motor and solenoid
- Inspection cover for lube tank for ease of access and cleaning
- Heavy duty fuel agglomerator
- Heavy Duty oil filter
- 7" Air Cleaner
- High Performance Oil bypass filter
- Bulk Head fittings for "external" fuel

7.2 Long Run Sets Commissioning

7.2.1. Ensure the 55 litre lube tank contains 20 litres of running oil.

Generator sets manufactured at Lister-Petter will come as standard with 20 litres of running oil.

If the set arrives without this oil then the following oil is recommended;

- Naturally aspirated engines: API CC or CD 15W40.

7.2.2. Connect a suitable fuel supply and run the leak-off back to tank.

7.2.3. Fill the cooling system with coolant concentrate. A mix of 50% protects the system from damage and corrosion under all operating conditions. Ensure that the radiator level is full right up to and into the filler neck. Unless the cooling system is totally full the expansion bottle system will not operate correctly. The radiator is fitted with a twin seal closed system filler cap. Fill the expansion bottle to the level marked.

7.2.4. Connect the unit to a suitable load bank to ensure that the unit can operate at 75% of its rated load.

7.2.5. To ensure that the engine oil system is primed prior to starting the engine, motor the engine with the fuel control solenoid de-energised for 15 seconds.

The engine may then be started.

7.2.6. Once the engine has obtained operating speed apply 75% load and run for 100hrs.

This exercise is essential to ensure that the engine is run in prior to commissioning. It also necessary as this will reduce the future risk of problems linked to light-load running

7.2.7. On completion of the 100 hrs:

- Drain the oil tank and then refill with 55litres of new lubricating oil as specified in 1. above.
- Renew the engine-mounted oil filter. (The bypass filter element does not need replacing at this time.)
- Check the coolant level and top up if necessary.
- Check all connections to ensure the integrity of the system.

NOTE;

Running hours (2000) are based on the following parameters:

- Engine is maintained in good operational condition.
- Engine installation is correct and well ventilated.
- Oil consumption does not exceed 0.5% of the fuel consumption.
- Fuel is clean and to the correct specification, BSS2869 Class A1.
- Engine has an adequate supply of clean combustion air (In dusty operating conditions additional air filtration may be necessary).
- Average running load of the unit does not drop below 40% of its rated load

8. Routine Maintenance

WARNING

Only qualified engineers should attempt any maintenance or adjustments . Refer to '2.1 Safety Symbols' and '2.2 Safety Precautions'

8.1 General

On a regular basis, check and replenish if necessary:

a. The fuel level.

b. The lubricating oil level.

Refer to the engine Operators Handbook, P027-08265, for capacities and specifications.

8.2 Diesel Engine

Refer to the engine Operators Handbook, P027-08265, supplied with the set for details of routine maintenance to be carried out after prescribed periods.

8.3 Alternator

No routine maintenance by the user is required to be undertaken nor should be attempted.

The alternator manufacturers manual is provided for use by specialised personnel only, employed to undertake maintenance work on the alternator.

8.4 Battery

Keep terminals and connections free from corrosion, coat with Petroleum Jelly or other suitable protective.

Also refer to '2.4 Preparing the Battery'.

WARNING

Battery electrolyte is corrosive and batteries should be handled with care. Do not splash electrolyte on your skin and wear protective clothing.

9. Fault Finding and Replacement Parts

9.1 Fault Finding

WARNING

Fault finding and rectification should only be undertaken by competent professional engineers.

Diesel Engine

The engine Operators Handbook supplied with the set suggests possible causes for the most common faults for the guidance of specialised diesel engine maintenance engineers.

Alternator

The alternator manual supplied with the set suggests possible causes for the most common faults for the guidance of specialised electrical engineers.

Electrical System

In the case of a suspected fault employ a qualified professional electrical engineer to resolve the fault. The wiring diagrams contained in this manual are for use by specialised electrical engineers only.

9.2 Replacement Parts

Source of Supply

Replacement parts are available from the worldwide network of Lister Petter Diesel Gen Sets distributors. For the name and address of the distributor nearest you contact the manufacturer:

Lister Petter Limited,
Dursley,
Gloucestershire GL11 4HS
England.
Tel: +44 (0)1453 544141
Fax: +44 (0)1453 546732
E-mail: gensets@lister-petter.co.uk
<http://www.lister-petter.co.uk>

Always use Genuine Parts supplied by Lister Petter through their distribution network.

Use of non-genuine parts can damage your set and WILL invalidate the manufacturers warranty.

IMPORTANT

YOUR DISTRIBUTOR WILL NEED TO KNOW THE GENERATING SET TYPE AND PLANT NUMBER STAMPED ON THE GENERATING SET NAMEPLATE TO ENSURE THE CORRECT PARTS ARE SUPPLIED.

Engine Parts

A Master Parts Manual, P027-08030 is available from Lister Petter or your local distributor.

Alternator Parts

Please consult Lister Petter.

Cubicle Parts

Please consult Lister Petter.

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

**T Generating Set Operators' Handbook, P027-08062, edition 6
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UK

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