Osprey Single Cycle Ur[illegible]ard Displacement Autoclave

[illegible]o:	*UM007*	**Issue No:**	*004*
[illegible]al No:	.....	**Software Ref:**	.....
[illegible]sel Ref:	.....		

[illegible]Of Any Options Fitted:

.....

.....

.....

.....

[illegible]ould be most helpful if you could have the above information available when [illegible]uesting technical advice or after sales service.

C H Perry
Chairman, LTE Scientific Ltd

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1 SAFETY

The main hazard when using the autoclave is the risk of touching a hot surface, particularly when the door is opened, or from residual vessel steam when opening the door at the end of the cycle.

Always wear an overall or laboratory coat that will protect the arms when loading or unloading. When the autoclave is being loaded, suitable hand protection should be used, remembering that the load could be at a temperature of around 100°C if the Thermal Lock Override key has been used. Under this condition there will be residual steam in the vessel, hence use great caution.

When liquid loads in sealed glass containers are being processed, there is a risk of container exploding on opening of the autoclave door. It is recommended that the risk is reduced, by ensuring that the temperature of the containers has fallen to less than 80°C before opening the door.

Take care when moving the autoclave as it is very heavy and could cause serious injury if not handled correctly.
It is vital that the power cable earth (ground), be connected to a suitable protective earth supply.

The autoclave has been designed in accordance with BS.2646. Autoclaves for sterilization in laboratories, and its use shall be inline with the safe use and operation recommendations. Use of the autoclave outside this scope will mean that the protection provided by the equipment may be impaired. Advice should be sort from the manufacturer if the intended use is outside the recommendations of BS.2646.

The Equipment is designed for indoor use only, and will not withstand an external fire without damage. External fire will not however result in a catastrophic failure if the fire has resulted during operation of the autoclave.

The autoclave has a recommended number of sterilization cycles of 13,000 if the continued use of the autoclave after this number is to be considered by the user, a comprehensive inspection and survey should be carried out by a suitably qualified person, to access its condition and suitability.

NOTE; ***In the event of steam escaping from the autoclave which represents a danger to the operator, switch off at the mains isolator and call the LTE Service Centre on – 01457 867 221 extension 144 or 151 as soon as possible.***

2. OVERVIEW

2.1 GENERAL

The Osprey range of autoclaves may be supplied with both horizontal and vertical circular vessels. Regardless of which type or size of machine you have the control system that you will be using to operate with will be the same.

The single cycle control system has two distinct levels of operation-*Operators and Supervisors* mode. The available parameters within the sterilising cycle may be accessed and changed by use of the Supervisors security keyswitch. The operators mode is unrestricted and requires no security access to operate the machine.

Temperature control within the vessel is maintained by reference to a temperature sensor that is located in the drain line.

The liquid crystal display (LCD) will show messages to prompt the supervisor or operator about either the state of the cycle in operation or as an aid when changing the cycle parameters. The keyboard is used to enter information that is required by thesystem, and the progress of the cycle is indicated by the display mimic on the right of the control box. Three additional light emitting diodes (LEDs) show the condition of the door closure and locking systems together with a cycle fail indication.

There are a number of options available on the Osprey and these are:

1. Vessel autofill (Not available on vertical vessels)

2. Drain condensate bottle

3. Drain condensate unit (Not available on vertical vessels)

Abbreviations used in this manual are:

LCD Liquid Crystal Display which is the screen that shows the messages.

LED Light Emitting Diode which is the light source adjacent to the cycle mimic messages.

2.2 OPERATING ENVIRONMENT

- 10 to 40 °C
- Maximum relative humidity 70%
- The autoclave is only for indoor use
- Operation at altitudes below 2500m only is permitted.
- The site must be well ventilated excessive steam from for example inadequate drains will damage the control systems.

2.2.1 Transient overvoltage

While the autoclave complies with IEC 801-4 level 2, operating the machine in a location known to suffer from a high level of fast transient overvoltage may lead to unreliability. If installing a machine close to severe transient sources, the manufacturer should be consulted. Examples of sources of severe conditions are electric arc welding plants and escalator control rooms.

2.2.2 Radiated interference

While the autoclave complies with IEC 801-3 severity 2 and FCC Class A, the machine should not be installed within 50 metres of a permanent radio station. Additionally, do not use a radio telephone directly adjacent to the autoclave. Consult the manufacturer if any high radio frequency interference levels are present.

2.2.3 Electrostatic discharge

Although the autoclave complies with IEC 801-2, when using the machine in hot dry areas with very low relative humidity, electrostatic discharge between the Operator and the autoclave control panel may take place, and may lead to unreliability in use. Take care in such low relative humidity environments to minimise the amount of electrostatic discharge and consult the manufacturer if you are in any doubt.

3. INSTALLATION INSTRUCTIONS

This unit is very heavy and requires a careful and thoughtful approach when moving and installing.

3.1 INSTALLATION AND LEVELLING

Before installation, please ensure that the mains isolator switch will not be obscured by the autoclave and that it is easily accessible in case of a need to shut the machine down in an emergency or for any other reason.

Warning: Do not try to move the autoclave without the proper resources. Position the autoclave on a level floor taking care to leave sufficient space at the back of the machine to allow access for installation of the pipework and electrical connections. Also allow space at the sides of the machine for the machine covers to be removed, and service personnel to gain access to the internal components. The site must provide sufficient ventilation for cooling and steam loss when the door is opened. This is vital.

Use a spirit level to adjust the unit. The autoclave should be set up to give a fall from front to rear.

Levelling is achieved by adjustment of the jacking bolts. Start by adjusting the level in a front to rear direction to give a slight fall to the rear. Next use the jacking bolts to level the unit in the left to right direction.

Fit the stainless steel interlock spigot to the end of the door securing bolt which has the red handle a spanner is provided for this purpose, but please note that this has a left hand thread. The spigot is supplied loose with the other machine accessories. This allows the door to be opened without power being applied to the machine, and eases the installation.

3.2 PIPE CONNECTIONS

Pipe connections to the Osprey will depend on which, if any, options have been ordered.

3.2.1 WATER QUALITY

The amount of scaling of the vessel and heater will depend on the local water quality and hence will depend on location. If the local water quality is poor a supply of softened water will reduce the need for descaling of the vessel and heater elements.

3.2.2 STANDARD DRAIN CONNECTION

In basic form the tube connection that will be required will be 15mm connected to the autoclave drain line. This pipe should be connected to a suitable waste, and **MUST** have a continuous fall to the waste. Under no circumstances should it be teed into any other pipe leading to waste, and the end of the waste pipe must discharge into free air. It must not be submerged in standing water.

3.2.3 AUTOFILL / CONDENSATE OPTION

This option allows the vessel to be filled from a reservoir mounted on the back of the machine. The reservoir inlet connection must be fed from a mains water supply using 15mm tube, or a minimum pressure of 2 bar.

3.2.4 DRAIN CONDENSATE OPTION

The condensate drain must be piped in 22mm tube. The same restrictions apply when installing this drain system as in 3.2.1 above.

3.3 ELECTRICAL CONNECTION

The power supply to which the autoclave is connected must have a protective earth which is known to be in good working condition and of the correct current carrying capacity. Additionally the autoclave must be fed from a switched fused supply located as near to the equipment as possible .

WARNING

Prior to connection , always confirm the supply requirements shown on the autoclave serial plate match the available supply.

MODEL	K W LOAD	No. OF PHASES
Osprey 150 Front loading	7.5kw	1
Osprey 100 Top loading	5.5kw	1
Osprey 70 Front loading	5kw	1
Osprey 50 Top loading	5kw	1
Osprey 40 Front loading	3kw	1
Osprey 24 Front loading	2kw	1

3.4 FITTING THE DOOR INTERLOCK SPIGOT

Osprey 150, 100, 70, 50 and 24 litre

Remove the accessories and locate the door lock interlock spigot. See Appendix A. Fit the spigot into the rear of the red door handle by screwing the spigot into the threaded hole at the rear of the handle. Please note that this is a left hand thread.

WARNING ONCE THIS SPIGOT HAS BEEN FITTED AND THE DOOR HANDLE SCREWED INTO POSITION YOU WILL NOT BE ABLE TO OPEN THE DOOR UNTIL POWER HAS BEEN APPLIED TO THE MACHINE.

3.5 FITTING THE DOOR INTERLOCK SPIGOT

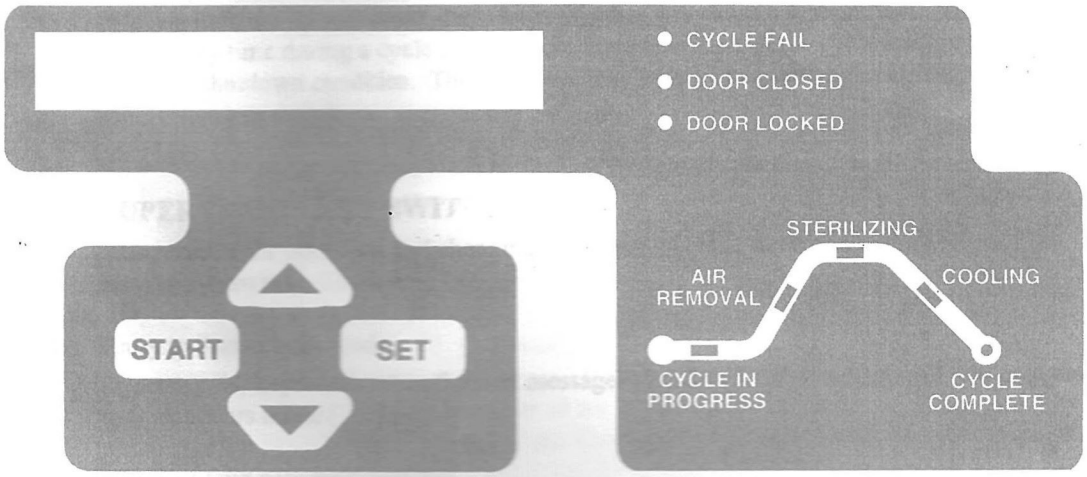
Osprey 40 litre

Remove spring clip from interlock pin.

WARNING ONCE THIS SPIGOT HAS BEEN FITTED AND THE DOOR HANDLE SCREWED INTO POSITION YOU WILL NOT BE ABLE TO OPEN THE DOOR UNTIL POWER HAS BEEN APPLIED TO THE MACHINE.

4. KEYBOARD, DISPLAY AND SUPERVISORS KEY SWITCH

fig 4.0.1



4.1 PUSH BUTTON SWITCHES

There are four push buttons available to enter information into the control system.

4.1.1 SET

This key is used most often in Supervisors mode to enter any temperature or time parameters into the system memory.

4.1.2 START

Used to start the cycle and when requested by the display to confirm certain conditions.

4.1.3 UP / DOWN ARROW

These two buttons are used to increase or decrease parameter values within Supervisors mode.

4.1.4 CYCLE FAIL Light Emitting Diode (LED)

This will illuminate in the event of any fault condition that is detected by the system.

4.1.5 DOOR CLOSED LED

When the door is closed and all four of the door handle bolts are screwed tightly into position this LED will be on. If any one of the door handles are loosened the LED will be off.

4.1.6 DOOR LOCKED LED

If illuminated this LED will indicate that the door lock is in position on the red doorbolt.

4.1.7 CYCLE IN PROGRESS LED

This will remain on from the moment the cycle has started until completion of the cycle when safe load temperature is achieved.

4.1.8 STERILIZING LED

Again this LED will illuminate throughout the count down period of the holding time.

4.1.9 COOLING LED

When the system is either cooling to zero vessel pressure or cooling to safe load temperature this LED will be on.

4.1.10 CYCLE COMPLETE LED

Once safe load temperature has been reached at the end of a sterilising cycle this LED will illuminate.

4.1.11 SYSTEM RESET

Pressing both the up and down arrow keys together will cause a system reset. This may be done at any time during a cycle and will terminate operation of the cycle leaving the machine in a safe, shutdown condition. The autoclave may only be restarted by operating the supervisors key switch.

4.2 SUPERVISORS KEY SWITCH

This restricts the operation and changing of certain machine functions to the holder of the security keyswitch. These are:

4.2.1 Entry to Supervisors mode

Operating the keyswitch when the start messages (7.2.2 to 7.2.5) are displayed will gain entry to Supervisors mode (section 6)

4.2.2 Machine fault acknowledgement

If any of the fault conditions dealt with in section 8 occur, the system will notallow a re-start until the supervisors keyswitch is operated to acknowledge the fault.

SAFETY WARNING **AT THIS TIME THE INDICATED FAULT MUST BE INVESTIGATED AND ANY LOAD THAT WAS IN THE AUTOCLAVE AT THE TIME OF THE FAULT MUST BE TREATED AS NON STERILE.**

4.2.3 Thermal lock override

The Supervisor may gain early entry to the autoclave during cooling, after zero vessel pressure is achieved, by operating the Supervisors keyswitch. This will unlock the door before the programmed value of safe load temperature is reached. BE VERY CAREFUL NOT TO BURN YOURSELF ON THE STEAM THAT WILL BE RELEASED FROM THE VESSEL UNDER THESE CONDITIONS.

5. OPERATING THE AUTOCLAVE

5.1 GETTING STARTED QUICKLY

The autoclave control system will have been delivered with the sterilisingcycle parameters set to the following values:

Purge time	5 minutes
Sterilising temperature	121°C
Holding time	10 minutes
Safe load temperature	90°C
Cooling method	Forced

Providing you do not wish to change any of the cycle parametersshown above, you can use this section of the manual to get started quickly, however you**MUST** read the section on both safety and installation before starting.

Switch on the power to the machine, wait for 5 seconds for the system to initialise then check that the door locked LED is NOT illuminated. If the optional autofill is fitted, check that the mains water supply to the machine is turned on.

Unscrew the four door bolts anticlockwise, THE BLACK ONES FIRST AND THE RED HANDLE BOLT LAST. If the red handle bolt is not the last to be opened serious damage will result.

Fill the vessel, ideally with distilled or softened water, either by hand or, if the autofill option is fitted, by pressing and holding the water fill switch. The vessel should be filled tothe top of the weir plate on horizontal Ospreys or to the underside of the heater cover plate on the vertical Osprey.

Close the door and turn the RED door bolt clockwise until tight. The remaining three black door bolts may now be screwed clockwise until tight. Check that the door closed LED is illuminated. Double check all door bolts for tightness.

Check that the optional drain condensate plastic bottle (if fitted) is not full, if it is, empty it before starting a cycle.

Press START and, assuming the vessel water level is correct, press start again and the cycle will begin.

Once the cycle has started you should watch the proceedings to familiarise yourself with the operation of the machine. While the cycle is progressing, use the time to study the remaining sections of this manual.

5.2 SOME USEFUL TIPS

5.2.1 When choosing cycle parameter values remember that the system operates with a single temperature detection system located in the drain line, and this means that the sterilising parameters will be strictly load dependent. Hence when the drain temperature achieves the programmed value, the temperature of the load will not be known and the size and type of load will affect what temperature is achieved by the load during the sterilising period. This means that when the drain line achieves the sterilising temperature and starts the holding timer the load will not necessarily have achieved the same temperature and, depending on the size and type of load ,is likely to be at a lower temperature than the drain line. Hence when choosing your cycle parameters you must be certain that your times and temperatures will allow for the possible delay in the load in question achieving the correct sterilising temperature. You should seriously consider carrying out load validations to confirm the correct cycle parameters for any load that you are working with.

5.2.2 Don't try to "beat" the keyboard. When you become familiar with the system and know what the next displayed instruction will be, it's easy to try to key in the answer before the display has asked you the question! The control system will not take information from the keyboard until the message appears on the display.

5.2.3 NEVER overfill the vessel with too large a load as this will block the steam pipe outlets from the pressure vessel and sterilising conditions will never be achieved.

5.2.4 Always keep the spare supervisors security key in a safe place. Never leave a key in the lock as this will allow access to cycle parameters with any changesmade by unauthorised staff allowing the possibility of a non sterile load.

6 . SUPERVISORS MODE

6.1 GENERAL

Supervisors mode allows the following parameters to be changed :

Purge time

Sterilising temperature

Holding time

Safe load temperature

Cooling method

SAFETY NOTE **BEFORE ADJUSTING THESE PARAMETERS PLEASE BE SURE TO REFLECT ON THE POINTS RAISED IN SECTION 5.2.1.**

6.2 ENTERING SUPERVISORS MODE

You can enter Supervisors mode before the start of a cycle when the display is alternating between the start messages.

fig 6.2.1

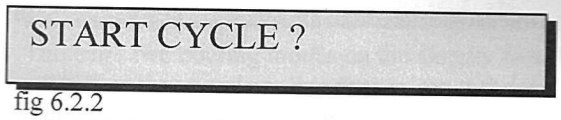


fig 6.2.2

fig 6.2.3

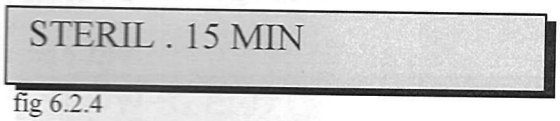


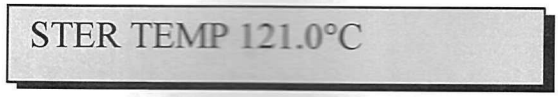
fig 6.2.4

When the above messages are being displayed turn the Supervisors keyswitch clockwise. When the display changes to that in fig 6.2.5 release the key which will return to the off position automatically.

fig 6.2.5

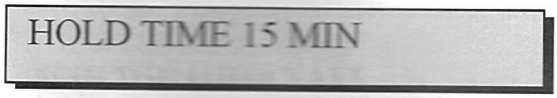
You can now increase or decrease the purge time by pressing the up or down arrow keys. When the adjustment is complete, press the SET key. If you do not wish to change the value simply press SET and this will retain the original value. The next display will be:

fig 6.2.6



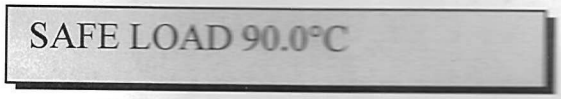
Again this sterilising temperature may be adjusted with the arrow keys followed by pressing SET. The display will change to:

fig 6.2.7



Adjust if required and press SET. The next message will be:

fig 6.2.8



Again adjust if required and press SET. The display will change to:

fig 6.2.9

There are two cooling modes on the Osprey forced and slow bleed cooling. Forced cooling will allow the vessel cooling fans to run at the end of the sterilising cycle until the safe load temperature is reached. Slow bleed cooling will allow the autoclave to cool naturally without the use of fans, again until the safe load temperature is reached.

If you want to use the forced cooling mode press ENTER and the LCD will show fig 6.2.11. If you want to change the cooling mode press the up arrow key and the display will give:

fig 6.2.10

You can press the up arrow key again to change back to forced cooling or press ENTER to accept the slow bleed method .The displayed message will then be:

fig 6.2.11

If you are happy with the parameters that you have programmed then pressing START will return you to the start messages at fig 6.2.1. If you want to go through the parameter change routine again press SET and this will return you to fig 6.2.5.

7. OPERATORS MODE

7.1 GENERAL

Operating the Osprey autoclave is very straightforward with quick and easy prompts appearing on the display screen.

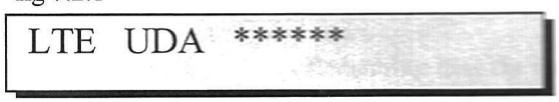
The following description assumes that the cycle parameters have been correctly programmed in Supervisors mode .and the autoclave has been properly installed.

7.2 USING THE AUTOCLAVE

Never try to open the autoclave door with the electrical power off, as the door will be locked and you will cause damage to the door locking mechanism by trying to force it open.

Switch the power on and check that the display is illuminated and contains the following message:

fig 7.2.1



The ****** shown above will, on production machines, be replaced by six numbes. These numbers represent the software issue number of your autoclave.

After a short period the display will change to the following alternating messages :

fig 7.2.2

fig 7.2.3

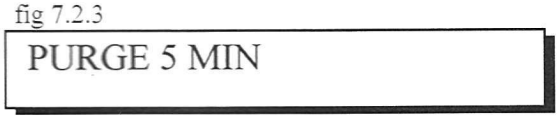
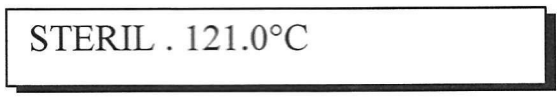


fig 7.2.4

fig 7.2.5



The above parameters are shown as an example.

Check that the door locked LED is NOT illuminated. If the optional autofill is fitted, check that the mains water supply to the machine is turned on.

To open the door unscrew the four door bolts anticlockwise, THE BLACK ONES FIRST AND THE RED HANDLE BOLT LAST. If the red handle bolt is not the last to be opened serious damage will result.

Fill the vessel, ideally with distilled or softened water, either by hand or, if the autofill option is fitted, by pressing and holding the water fill switch. The vessel should be filled to the top of the weir plate on horizontal Ospreys or to the underside of the heater cover plate on the vertical Osprey.

WARNING - IT IS VITAL THAT THERE IS SUFFICIENT WATER IN THE CHAMBER WHEN THE CYCLE IS STARTED. FAILURE TO DO THIS WILL CAUSE THE CYCLE TO FAIL AND POSSIBLY DAMAGE THE MACHINE.

Place the load for sterilisation into the vessel.

WARNING - LTE RECOMMEND USING ONLY LTE SUPPLIED AUTOCLAVE FURNITURE. IF SOLID BASED BASKETS OR BOXES ARE USED, THESE MUST BE USED WITH LIDS TO PREVENT TOO MUCH WATER BEING CAPTURED AND PREVENTED FROM RETURNING TO THE RESERVOIR.

WARNING - NEVER PUT TOO LARGE A LOAD INTO THE VESSEL AS THIS WILL BLOCK THE STEAM OUTLET PIPES AND STOP THE CORRECT STERILIZING CONDITIONS FROM BEING ACHIEVED. THIS IS A HIGHLY DANGEROUS CONDITION.

SAFETY NOTE **Remember that the system operates with a single temperature detection system located in the drain line, and this means that the sterilising parameters will be strictly load dependent. Hence when the drain temperature achieves the programmed value, the temperature of the load will not be known and the size and type of load will affect what temperature is achieved by the load during the sterilising period. This means that when the drain line achieves the sterilising temperature and starts the holding timer the load has not necessarily achieved the same temperature and, depending on the size and type of load, is likely to be at a lower temperature than the drain line. Hence when choosing your cycle parameters you must be certain that your times and temperatures will allow for the possible delay in the load under sterilisation achieving the correct sterilising temperature. You should seriously consider carrying out load validations to confirm the best cycle parameters for the load in question.**

Close the door and turn the RED door bolt clockwise until tight. The remaining three black door bolts may now be screwed clockwise until tight. Check that the door closed LED is illuminated. Double check the tightness of all four bolts.

Check that the optional drain condensate plastic bottle (if fitted) is not full, if it is empty it before starting a cycle.

Press START and fig 7.2.6 will be displayed. Assuming the vessel water level is correct, press start again and the cycle will begin. The display will show FIG 7.2.7.

fig 7.2.6

VESSEL WATER OK?

fig 7.2.7

The heating process will now begin and the display will show the temperature as in fig 7.2.7 and the Cycle in Progress LED will illuminate. When the drain temperature reaches 80.0°C the purge timer will commence operation and the Air Removal LED will turn on. During this period the vessel is having all the air pushed from it and replaced by steam. Two alternating messages will be displayed, the first showing the countdown of the purge timer and the second the drain temperature as follows:

fig 7.2.8

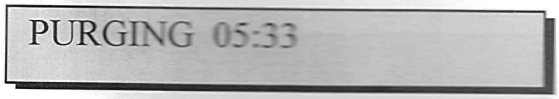


fig 7.2.9

When the purge timer has reached zero the Air Removal LED will turn off and the autoclave will now heat to its programmed sterilising temperature. The vessel pressure will increase in line with the rising temperature and the LCD message will alternate between the following two displays:

fig 7.2.10

fig 7.2.11

When the drain temperature reaches the programmed value the Sterilising LED will illuminate and the holding timer will commence operation. The display will be split between the following two messages which will give the current drain temperature together with a count down of the holding time.

fig 7.2.12

fig 7.2.13

When the holding time reaches zero the Sterilising LED will turn off, the Cooling LED will turn on and the machine will start to cool to zero vessel pressure. The two alternating displays will be:

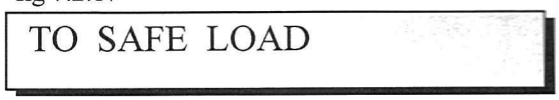
fig 7.2.14

fig 7.2.15

Either forced or slow bleed cooling (depending on the programmed value) will now start and when zero vessel pressure is detected the displays will change to:

fig 7.2.16

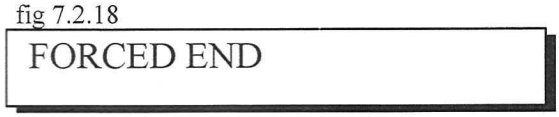
fig 7.2.17



✓ OK To here

Should you wish to gain entry to the vessel before the safe load temperature has been reached you may use the thermal lock override facility via the Supervisors security keyswitch. After zero pressure has been established operation of the Supervisors keyswitch will override the programmed safe load temperature and unlock the door. The display will briefly show:

fig 7.2.18

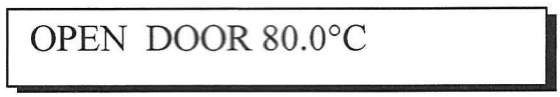


Followed by fig 7.2.19.

SAFETY NOTE **IF USING THE SUPERVISORS KEYSWITCH THE VESSEL INTERIOR WILL BE VERY HOT WHEN THE DOOR IS OPENED AND LARGE AMOUNTS OF STEAM WILL BE RELEASED. YOU MUST TAKE GREAT CARE.**

If you do not use the thermal lock override the cooling will continue until the programmed value of safe load temperature is achieved. At this point a short audible warning will sound, and the door unlock solenoid will operate, the display will show:

fig 7.2.19



Unscrew the three black door handles first and the red door handle last.
Once the door has been opened the display will change to the start up message as shown in fig 7.2.2

The load may now be removed from the vessel. Take great care toavoid any contact with hot surfaces or residual steam that may burn or scald.

NOTE On horizontal Osprey models a drip tray is fitted below the vessel door. The drip tray may be emptied by removing the plastic tube from the retaining clip adjacent to theright hand side of the tray and draining into a suitable container.

8. ERROR MESSAGES

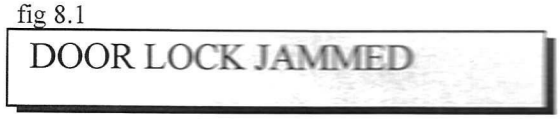
SAFETY NOTE. SHOULD ANY OF THE FOLLOWING FAULTS OCCUR THE VESSEL LOAD MUST BE PRESUMED TO BE NON STERILE.

8.1 DOOR LOCK FAILURE

The autoclave door is secured by an electrically operated door lock, and its position is monitored to check that it has operated correctly. These checks are done at the start of a cycle, when the door lock should drop into the locked position, and at the end of a cycle when the door lock should move into the unlocked position.

If either of these states are not correctly achieved a failure will be declared. Should a fault occur at the beginning or end of a cycle the audible alarm will sound, the red cycle fail LED will illuminate and the following message will be displayed:

fig 8.1



To acknowledge the fault the supervisors keyswitch must be operated and the display will change to the start message fig 7.2.2.

In the event of a fault, you must check the condition of the Door Locked LED before trying to open the door, or damage to the lock assembly will result. This LED will be off when in the unlocked position.

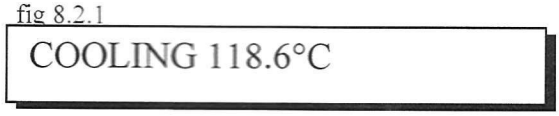
THE REASON FOR THE PROBLEM MUST BE INVESTIGATED.

8.2 LOW DRAIN TEMPERATURE DURING STERILIZING

For this condition to occur the drain temperature during sterilising must have fallen more than 2°C below the sterilising temperature for 10 consecutive seconds. In the event of such a fault the cycle will be terminated and cooling will commence.

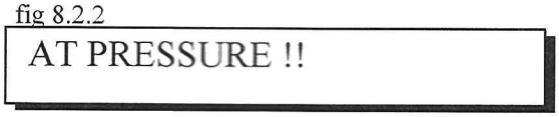
During the cooling period the Cycle Fail LED will illuminate, the cooling LED will flash and, while pressure is in the vessel, the audible alarm will sound intermittently. Throughout this period the display will show:

fig 8.2.1



And will alternate with:

fig 8.2.2



When vessel pressure reaches zero the messages will change to:

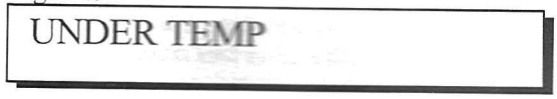
fig 8.2.3

And alternate with:

fig 8.2.4

The Cooling LED will continue to flash until the default safe load temperature of 80°C is reached. At 80°C the display will display the fault condition:

fig 8.2.5



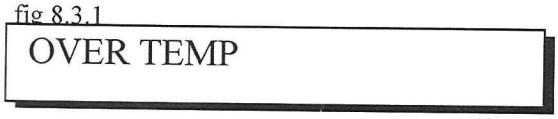
The audible alarm will sound continuously until the Supervisors keyswitch is operated, and the display will then return to the start message.

THE REASON FOR THE PROBLEM MUST BE INVESTIGATED.

8.3 HIGH DRAIN TEMPERATURE DURING STERILIZING

This condition indicates that the drain temperature has exceeded the sterilising temperature by 5°C or more for 5 consecutive seconds, and will terminate cycle operation. The cooling messages shown above from 8.2.1 to 8.2.5 will appear together with the same LED dsplays. but when default safe load temperature of 80°C has been achieved the displayed message will be:

fig 8.3.1



The alarm will sound and the Supervisors keyswitch must be operated to acknowledge the fault.

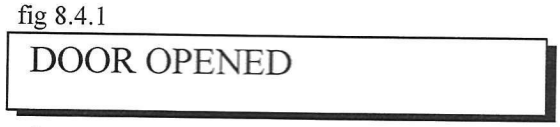
THE REASON FOR THE **PROBLEM MUST BE INVESTIGATED.**

8.4 VESSEL DOOR OPENING DURING A CYCLE

If the control system detects that a door handle bolt has opened during a cycle, the cycle will be terminated. Cycle Fail LED will be on and, if vessel pressure is present, the alarm will sound intermittently.

Again the same cooling messages and LED indications used in figs 8.2.1 to 8.2.5 will be displayed. When the default safe load temperature reaches 80°C the display will indicate the fault:

fig 8.4.1



The Supervisors keyswitch must be operated to acknowledge the fault. The reason for the problem must be investigated.

8.5 TEMPERATURE SENSOR FAILURE

Should the drain temperature sensor fail the cycle will cease operation and the system will move into cooling mode. The temperature displayed will be avery high number, and you can identify what type of failure the temperature sensor has suffered by checking the display. Should the displayed temperature be 500°C the sensor is short circuit. Should the displayed temperature be about 380°C the sensor is open circuit.

8.6 OPERATION OF THE OVERTEMPERATURE LAMP

If this lamp operates, power will be removed from the heater by the operation of a manually re settable over temperature cut out. The reason for the condition (most likely lack of water in the vessel) must first be investigated.

Prior to resetting the overtemperature cut out, isolate the machine from its power source. Next locate the cut out, which will be identified with a label, and press the spring loaded reset pin.

Note that the overtemperature cut out system is totally independent of the control system, and for an overtemperature fault the control system must be reset (see 4.1.11).

8.7 POWER SUPPLY FAILURE DURING A CYCLE

Should the electrical supply to the autoclave be interrupted when a cycle is in progress the system will, once power is restored, check for both pressure in the vessel and a drain temperature higher than 80°C and make the autoclave safe if required by cooling. When a safe pressure and temperature is achieved the red Cycle Fail LED will illuminate and the display will show:

fig 8.7.1

The Supervisors key switch must be operated to acknowledge the fault.

8.8 OTHER ERROR MESSAGES

If either of the following messages appear this will indicate a possible electronic fault:

fig 8.8.1

fig 8.8.2

Please contact LTE service for advice.

9. MAINTENANCE PROCEDURES

Before attempting to service the autoclave, isolate it from the mains power supply. Only suitably skilled people should carry out maintenance or repair work on this machine.

At the heart of the autoclave is a pressure vessel whose design, manufacture, operation and servicing are closely controlled by pressure vessel regulations. You must ensure you comply with the inspection and maintenance regulations that apply in your area.

9.1 VESSEL CLEANING AND DESCALING

This should be carried out weekly. The vessel interior should be kept clean and free from debris. The amount of scaling of the vessel and heater will depend on the water quality used, and hence will vary depending on location. Ideally using distilled or softened water will minimise the number of times descaling is required. The service schedule calls for descaling annually, but if this weekly inspection shows a rapid build up of scale the descaling should take place as required.

Additionally check the door gasket is free from cuts and tears and regularly cleaned with a damp cloth. Finally make sure the front drip tray is clean and free from debris

9.2 ACCIDENTAL SPILLAGE OF AGAR

If during autoclave operation Agar spillage occurs, thorough cleaning of the spillage is vital otherwise the pipework will become blocked. This should be carried out whilst the autoclave is still warm to avoid the agar becoming solidified.

9.3 MONTHLY SERVICE

Check the over pressure relief valve movable pin for free operation by checking the pin for free travel. Access to this valve requires the removal of the autoclave panels.

Smear the threads of the door handle bolts with a high temperature grease.

Check the condition of the door gasket and clean with a damp cloth to remove any particles.

Drain the water reservoir of all water and replenish with fresh water. (Manual Fill Models Only)

9.4 ANNUAL SERVICE

In addition to the monthly service carry out the following:

- Clean and descale the vessel interior.
- Using a calibrated temperature recorder check operation of the machine temperature channels and recalibrate if required.
- Run a cycle with the sterilising temperature set to 140°C and check for correct operation of the over pressure relief valve. As soon as the valve has exhausted press both arrow keys together on the control panel to reset the system and allow the machine to cool.
- Carry out pressure vessel inspection, testing and certification as required by the local authorities in the area of operation.

10. AFTER SALES SERVICES

10.1 GENERAL

10.1.1 LTE Scientific Ltd has a nationwide team of Service Engineers, supported by service specialists based at our headquarters near Oldham. We pride ourselves on both the quality and speed of response we offer.

10.1.2 Before requesting any type of after sales service please obtain the serial number of the equipment.

10.1.3 Before commencing any repair or maintenance work it is the customers' responsibility to ensure that the product is free from contamination that would be hazardous to the health of our Service personnel.

This is a requirement of the Health & Safety at Work Act of 1974 and to meet our mutual responsibilities we will request you to complete a Safety Clearance Certificate prior to commencement of work.

10.2 WARRANTY

10.2.1 UK

Your product is warranted against the defects in materials and workmanship for 12 months from date of shipment.

10.2.2 Overseas

Your product will be warranted by LTE's distributor company.

10.2.3 Limitations

Warranty cover will not apply to defects arising from:

- Improper use by the user
- Unauthorised modifications
- Operation of the products in unfavourable environments- see section 2.2

Full details of warranty conditions are contained in our Conditions of Sale- a copy of which is available on request.

10.3 MAINTENANCE SERVICE CONTRACTS

Regular servicing of the product will ensure it achieves maximum performance and provides years of uninterrupted service.

We recommend that you take out a Preventative Maintenance Contract upon installation. This can include multiple unit contracts, regular calibration checks, all tailor made to suit your own specific requirements. LTE maintenance is cost effective, convenient and flexible to suit your needs.

10.4 OTHER SERVICE OPTIONS

10.4.1 LTE offer a complete repair service including repair on-site or of felt more appropriate, the product can be returned to our factory for repair.

10.5 SPARE PARTS

DOOR GASKET	150L HORIZONTAL	1000017
DOOR GASKET	100L VERTICAL	302/0620/10

10.5.1 If other spares are required please describe the part and most importantly quote the autoclave serial number.

10.6 OVERSEAS SERVICE

For customers outside the UK we are always available to try to help if you have a problem, however, we would recommend that you contact the company from whom you bought the product. Don't forget to quote the Serial Number.

10.7 CONTACT DETAILS

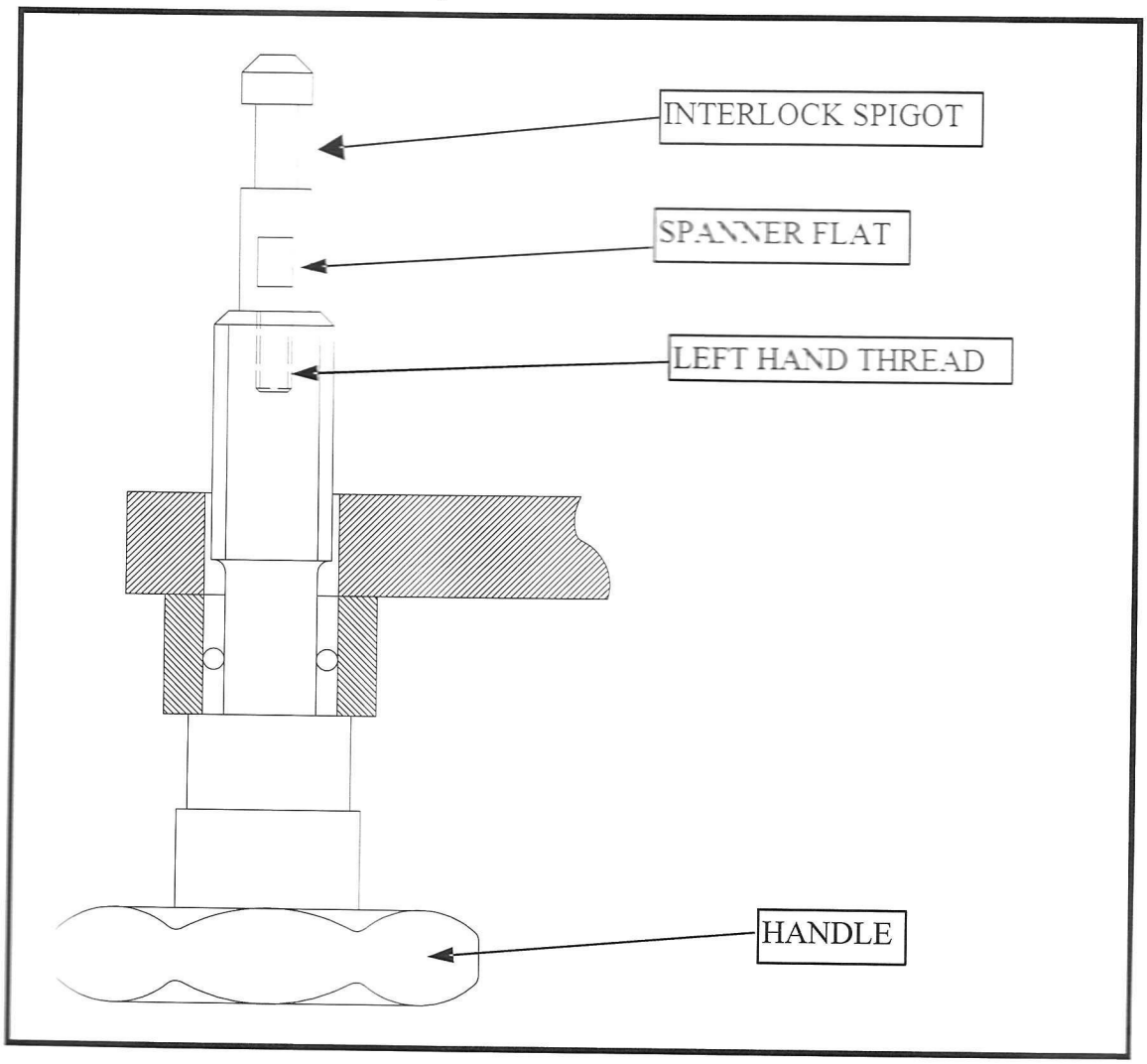
Should you need to contact us here at LTE. for any reason, please do not hesitate to call us as we will be only too happy to help.

LTE SCIENTIFIC LTD
GREENBRIDGE LANE
GREENFIELD
OLDHAM
ENGLAND
OL3 7EN

TEL : 01457 876221
FAX : 01457 870131
Email info@lte-scientific.co.uk

APPENDIX A

INTERLOCK SPIGOT FITTING DETAILS



DECLARATION OF CONFORMITY

PRODUCT .....

CATALOGUE NUMBER .....

SERIAL NUMBER .....

"We declare that the above CE marked product conforms with the following EU Directives."

EMC Directive - 89/336/EEC as amended by Directive 92/31/EEC.
Low Voltage Directive - 73/23/EEC

C H Perry, Chairman

LTE Scientific Ltd, Greenfield Lane, Greenfield, Oldham. OL3 7EN