

Cooled Incubators Series 1A, 2, 3 & 4

Programmable Instruction Manual

CONTENTS

Section 1: General Description	Page No.
List of Models	3
General Details	4-6
1.1 Introduction	7
1.2 Construction	7
1.3 Temperature Control	7
1.4 Cooling	7
1.5 Air Flow	7
 Section 2: Initial Examination and Installation	
2.1 Commissioning	8
2.2 Controls	8
2.3 Temperature Controller	9
2.4 Indicator & Control Layout	9
 Section 3: Programming Guide and Examples	
3.0 Function Overview	10
3.1 Getting Started	11
3.2 Program Run Mode	11
3.3 Display Functions	11
3.4 Example Program	12
3.5 Programmer Function Map	13-14
3.6 Function List (Level P) Programmer	15
3.7 Memory Allocation Table	16
3.8 Memory Full Indication	16
3.9 Programming Examples	17
3.10 Quick Programming Guide	18-20
 Section 4: Optional Extras Where Fitted - All Models	
4.0 Interior Illumination	21
4.1 Automatic Defrost	22
4.2 High/Low Alarm Option	22
4.3 Inner Perspex Door	22
4.4 Chart Recorder	23-24
 Section 5: Maintenance & Repair	
5.1 Equipment Ratings	25
5.2 Replacement of Fluorescent Lamps (When Fitted)	25
5.3 Routine Maintenance	25
 Section 6: Guarantee	
6.1 Terms & Conditions for LMS Guarantee	26
6.2 Spares, Servicing & Repairs Contact	27
6.3 Decontamination Notice	28
6.4 Fax Back Guarantee Registration	29
6.5 LMS Services	30
6.6 Application for Servicing	31

Instruction Manual for LMS Cooled Incubators

Series 1A, 2, 3 & 4

Series 1A Models

80NP - 76 litre capacity
120NP - 120 litre capacity
201NP - 201 litre capacity
280NP - 272 litre capacity

Series 2 Models

210NP - 135 litre capacity
220NP - 200 litre capacity
230NP - 290 litre capacity
240NP - 420 litre capacity

Series 3 Models

100NP - 90 litre capacity
200NP - 227 litre capacity
300NP - 290 litre capacity
400NP - 450 litre capacity

Series 4 Models

600NP - 600 litre capacity
1200NP - 1200 litre capacity

We thank you for purchasing a LMS Cooled Incubator, which we trust, will give you many years of satisfactory service.

Manufactured in the United Kingdom using the finest materials and modern production techniques your Cooled Incubator has already undergone extensive testing in our factory.

For correct operation it is essential that you observe the operating and maintenance instructions in this manual.

LMS, established in 1965 and incorporated in 1979, is a company specialising in the manufacture and servicing of laboratory equipment, trading principally in the United Kingdom and Europe as well as throughout the world.

The business is structured into two main sectors:

- Specialist **Manufacture** of temperature controlled cabinets
- Established third party **Service, Maintenance & UKAS Accreditations**

Manufacture

Specialist manufacture of temperature controlled cabinets with an extensive range of applications for the testing of products, cultures, plant and insect life etc. over a wide and closely controlled temperature range.

The design of the purpose built Cooled Incubator facilitates the addition of optional extras to provide greater flexibility for individual use, making it suitable for a wide range of applications including: -

Study of plants and insects	Tissue Culture
Seed germination and vernalisation	Sample storage
Fruit Fly culture	Immunology
Product shelf life tests	Microbiology tests

Service & Maintenance

LMS Limited is an independent third party servicing company which, for over 40 years, has been providing laboratory engineering services to a wide range of organisations, covering most makes and types of laboratory equipment and instruments. The broad customer base covers such diverse operations as: the water industry, commercial, public health and research laboratories, hospitals, the dairy, food and drink industries, large and small dental, chiropody and veterinary surgeries etc. LMS Limited is also accredited by UKAS to provide on site accreditation on the majority of its calibration service.

Among the services provide are: -

Periodic service and safety inspections	Emergency breakdown cover
Calibration services to traceable standards	Preparation for insurance inspection

UKAS Accreditation (covering: temperature, humidity, rotation, speed and timing)

For a free no obligation quotation for any of the above please complete the details on the application for Service page and fax to:

**LMS LTD
On
01732 450127**

EXPLANATION OF SYMBOLS USED



Electrical Earthing Point



Electrical Hazard Warning
(Mains Electrical Supply Within)

AUX. CIRCUIT

Exhibited where an internal power socket is fitted

REFRIGERATION

Refrigeration Isolation Switch

AUTO DEFROST

Auto Defrost On/Off Switch



Weee Label

MODEL _____
SER. No. _____
TEL. LMS 01732 451866

Serial Number Label

MODEL No.
SERIAL No.
SUPPLY VOLTS: 220-240v 50HZ
FUSE RATING TYPE: F10A
MAX LOAD: 7AMPS
REFRIGERANT:
GRAMMES:



LMS LTD
SEVENOAKS, KENT



Serial Number Plate

General Safety Instructions

The physical and chemical properties of your load should be carefully considered with regard to the effect this may have on the LMS Cooled Incubator. They are **not** internally sparkfree or explosion proof. Therefore solvents and/or chemicals which may form a flammable mixture together with air are unsuitable for these cabinets; otherwise considerable damage can occur.

Transportation

Series 1A & 2 If these cabinets have to be carried it is recommended that at least 2 people assist and that gloves should be used on all occasions. The cabinet should be kept upright.

Series 3 & 4: These cabinets are supplied on pallets and it is recommended that these are moved by pallet truck or fork lift by competent persons, including someone to assist in stabilising the load. The cabinet should be kept upright.

Serial Number Plate

The Serial Number Plate contains the year of manufacture, in the following format: -

xxxx/12xx = year of manufacture 2012

Section 1

1.1 **INTRODUCTION**

The LMS programmable option for Cooled Incubators is controlled by a powerful versatile programmable controller which is designed to offer the highest functionality and will enable the user to set up and run a complex process relying upon the LMS reputation for accurate temperature control.

The programmer function is able to control applications needing set point changes over time. Examples of this are ramp changes where a gradual rate of change can be set or step changes which are instantaneous. These can be separated by soak periods during which the process is held at a constant value. Each individual time interval of the program, or segment, together with its associated moving set point value, can be stored as a unique program.

At the end of a sequence, a program can be arranged to repeat (or loop), either a specified number of cycles, or continuously.

For safety reasons, three modes of recovery from power failure are available. These automatically re-start the program from the beginning, continue it from where it stopped or hold it, waiting for the user to re-start.

Of course the controller can also be set manually for quick and easy single set point temperatures if required.

1.2 **CONSTRUCTION**

The outer casing of all models in Series 1A, 2 and 3 is of sheet steel finished in white stoved enamel. Models in Series 1A have an internal liner of white pre-coated Aluminium. The internal liner of models in Series 2 is of a high impact vacuum formed plastic with a minimum of crevices, and all corners are radiused. Models in Series 3 have an unobstructed working space fabricated from brushed stainless steel complete with multi position plastic moulded shelf supports, which allow the three white plastic coated steel shelves to be randomly positioned to suit individual requirements. Series 4 models have both a stainless steel exterior and interior and are supplied with 5 stainless steel shelves (model 600) and 10 stainless steel shelves (model 1200).

Foam insulation is used, to ensure maximum insulation against external ambient temperature.

All ranges of LMS cooled incubators incorporate both a door lock and magnetic gasket with all control features being set into a control panel and positioned so as to minimise the risk of accidental alteration.

1.3 **TEMPERATURE CONTROL**

The temperature control method utilises a programmable controller offering digital selection and readout of temperature. See section 2.3 for operation.

1.4 **COOLING**

Cooling is provided by a hermetically sealed refrigeration system. All LMS Cooled Incubators comply with the latest CFC-free regulations.

1.5 **AIR FLOW**

A full air flow system is used. The airflow being at low velocity but high volume.

Section 2

INITIAL EXAMINATION AND INSTALLATION

2.1 **COMMISSIONING**

- 2.1.0 Please check the Tip N Tell indicator on the packaging to ensure the instrument as not been tipped or laid down. If the blue beads are showing in the top half of the indicator please refer to LMS Ltd.
- 2.1.1 Remove all packing materials.
- 2.1.2 Check for signs of external damage (this MUST be reported immediately to the Carrier and Supplier).
- 2.1.3 After the cooled incubator has been sited please **allow 24 hours before switching on.**
- 2.1.4 Check that the electrical supply details on the information Rating Plate, which is fitted to the rear panel, are in accordance with the available electrical supply. If correct please use the mains lead supplied, which you will find inside the cabinet with the user manual.
- 2.1.5 All cooled incubators are supplied with a 3 pin moulded plug, which if not suitable may be replaced by an electrician or other competent person. Connect conductors as follows: BROWN to live, BLUE to neutral, GREEN/YELLOW to earth.
- 2.1.6 Position the cooled incubator so that approximately 100mm of free space exists around the cooled incubator.
- 2.1.7 Adjust levelling foot or feet (depending on model) so that the cooled incubator is sited firmly. Lockable castors (where fitted) MUST be locked.
- 2.1.8 On Series 3 and 4 please ensure that the refrigeration switch, which is fitted on the rear panel on the right hand side, is in the ON position (down).
- 2.1.9 On Series 4 place the defrost tray in the rails provided underneath the cabinet.

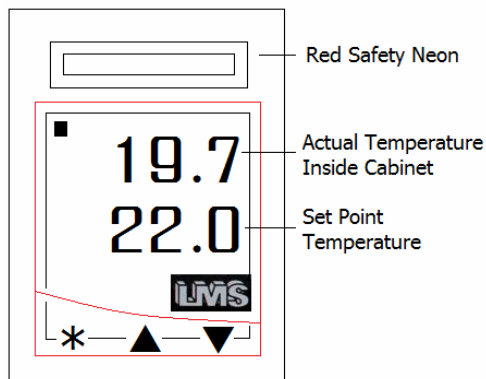
2.2. **CONTROLS** – Common to All Models

2.2.1 Fuse

On Series 1A, 2 and 3 all models are fitted with an IEC fused socket, on Series 4 a 1.25" TYPE F cartridge fuse in a screw fitting carrier, both are located on the rear of the control compartment adjacent to the Serial Number plate on which the fuse value is indicated.

2.2.2 Non-Adjustable Overheat Protection Device

This device is fitted within the air mixing chamber to safeguard the cooled incubator should a fault condition of overheating develop. Operation of this device will be indicated by the Red 'safety' neon light on the front panel being illuminated. In the event of this happening the cooled incubator must be switched off until the reason for the fault condition is established and the fault itself is rectified.

TEMPERATURE CONTROLLER**LMS Programmable Controller**

The Digital Controller has been factory tuned for optimum performance. To obtain a manual set point temperature press and hold the * button and press either the ▲ or ▼ buttons as required, ▲ to increase temperature, ▼ to decrease. When the desired set point temperature is achieved, release the * button. The first line of the controller shows the actual temperature in the chamber and will soon start to change to the new set point.

[For full programming instructions please refer to 'Section 3' or use our quick programming guide at the end of Section 3.](#)

2.4 **INDICATOR & CONTROL LAYOUT****Series 1A, 2 and 3**

The Red 'safety' neon only illuminates when an over temperature fault condition occurs – see Section 2.2.2.

The Temperature Controller display will be continuously illuminated whilst the cooled incubator is connected to a mains electrical supply.

Series 4

The Red 'safety' neon only illuminates when an over temperature fault condition occurs – see Section 2.2.2.

The Green neon light and Temperature Controller display will be continuously illuminated whilst the cooled incubator is connected to a mains electricity supply.

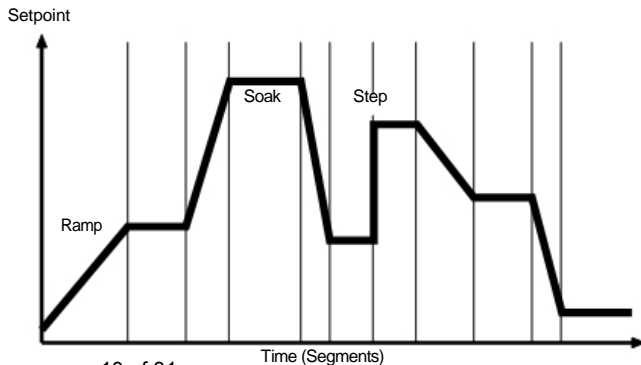
Section 3 PROGRAMMER

INDEX

Function overview	B.1
Getting started	B.2
Program run mode	B.3
Display functions	B.4
Example program	B.5
Function map	B.6
Function list	B.7
Memory allocation table	B.8
Memory full indicator	B.9
Programming example	B.10
Program edit example	B.11

3.0 FUNCTION OVERVIEW

The Programmer function in Level P enables the instrument to control applications needing **Setpoint** changes over time. Examples of this are **Ramp** changes where a gradual **Rate** of change can be set, or **Step** changes which are instantaneous. These can be separated by **Soak** periods during which the process is held at a constant value. Each individual time interval of the program or **Segment**, together with its associated moving setpoint value can be stored as a unique **Program** and for example be represented by the diagram below.



In addition to those settings that determine the segment profile, it is also necessary to set **program start** values, together with the preferred **ramp rate time units** for each individual program.

At the end of a sequence, a Program can be arranged to repeat (**Loop**), either a specified number of **Cycles**, or continuously. Only one **Loop** can be included in a **Program**. When the program is running, the **Display** indicates progress through the sequence of segments, and can additionally be interrogated for further segment information.

It is also possible to **CALL** an already existing program as a sub program that can be inserted as a segment of another program.

To speed up **Program** configuration, several **Edit** functions have been provided so that individual **Segments** and **Programs** may be **Deleted** or **Inserted**, and an entire **Program** may be **Copied** and then **Pasted** into another that it will replace.

For safety reasons, three modes of recovery from a power failure are available. These either automatically **Re-start** the Program from the beginning, **Continue** it from where it stopped, or **Hold** it waiting for a user re-start.

Either one or both of the two auxiliary outputs can be configured as **Event** outputs. Engaging the **Holdback** feature will temporarily halt Setpoint ramping to allow the process temperature to catch up should it deviate by more than a pre-set amount during a **Ramp** segment.

To afford maximum programming flexibility, memory is allocated dynamically, and not pre-allocated. This allows the user the freedom to configure a small number of long programs or a larger number of shorter ones, up to the permitted maximum of 126 Segments per program, and a limit of 31 Programs. Should these limits be exceeded, or the Programmer memory become fully used, the display will read **ProG FULL**. Programs can be planned using the **Memory Allocation Table** which details the memory requirements of individual segment types. During configuration a check can be kept on memory usage by interrogating the **USEd** feature of the display to give an instant reading of 'percentage memory used'.

Finally, once a program has been configured, it can be run from the **run off/on/hold** controls in Level P, and in addition a quick access **run/hold** toggle is directly available from the front panel.

The Programmer **Functions List** describes the full range of available **Settings** for each **Programmer Function** together with their display mnemonic. The instrument is supplied with a suite of **Factory Settings** for each **Function**. These are shown in bold type.

The Functions Map illustrates the relationship between the **Functions** and their **Settings** and provides a guide to the **Keying Operations** required to navigate around the menu when configuring or running a Program.

3.1 GETTING STARTED (PROGRAMMER)

New users should take a short time to study the following before starting to configure the first program, and may wish to take on board the following tips and suggestions.

Program Mode Exit switch (ProG/Auto) Program Level 4.

This standard feature of the instrument causes automatic exit from program mode after sixty seconds of Key inactivity. It is highly recommended that this setting be disabled and changed to **ProG/StAy** to ensure that adequate time is available for making unfamiliar adjustments.

Program Parameter List

Listing the required **Program Settings** and **Parameter Values** segment by segment beside each **Setting/Segment Number**, and **Program Display Mnemonic** will reduce the risk of programming mistakes during the learning period.

Memorise Basic Key Functions

Please become familiar with the following Menu Navigation principles

Hold both s and t for three seconds to enter or exit Program Mode.

Key either s or t to view Functions (follow horizontal arrows).

Key either Qs or Qt to view or change settings (follow vertical arrows).

Key Q and **hold for three seconds** to confirm Edit Functions.

Note: Factory Settings appear in the lower display in each of the **Functions** illustrated in the **Function Map**.

Program configuration

When the PROGRAMMER function is entered at **LEVL P**, the Programmer is automatically presented in Configuration Mode, and the instrument display can be used to access and adjust the various **FUNCTIONS**.

3.2 Program Run Mode

To run a Program from **LEVL P**,

Press s once, then use Qs to select the required program number from the **PROG** list.

Press s again once then use Qs to select the run/on option.

Press ts and hold for three seconds to exit configuration mode and run the program.

Run/Hold Toggle Feature

Press Qt and hold for 3 seconds to **hold** the program.

Press Qt again and hold for 3 seconds to **run** the program.

Note: Level P is 'read only' while a program is active.

To run a stopped program again press and hold the Qt to toggle RUN ON/OFF/ON again.

3.3 DISPLAY FUNCTIONS

Once the program is running, the display automatically tracks the progress of the program as it indexes through it's sequence of segments. When it concludes it's final instruction, the upper display alternates **StoP** with the **Process Value** and the lower display reverts to the instrument **SP1 Setpoint**.

RAMP

The upper display alternates between **SPr** and the moving **Process Value** while the lower display shows **Target Setpoint**. If **Holdback** is activated, the decimal point in the lower right corner of the upper display will be illuminated.

SOAK

The upper display alternates between **SoAK** and the **Process Value**. The lower display reads the **Target Setpoint** of the current segment.

STEP (not displayed)

As this involves an instantaneous change of the **Target Setpoint**, this segment occupies zero time and the program immediately moves to the next segment. The lower display then registers the new **Target Setpoint**, with the upper display alternating in either **SPr** or **SoAK** mode according to the segment configuration.

HOLD

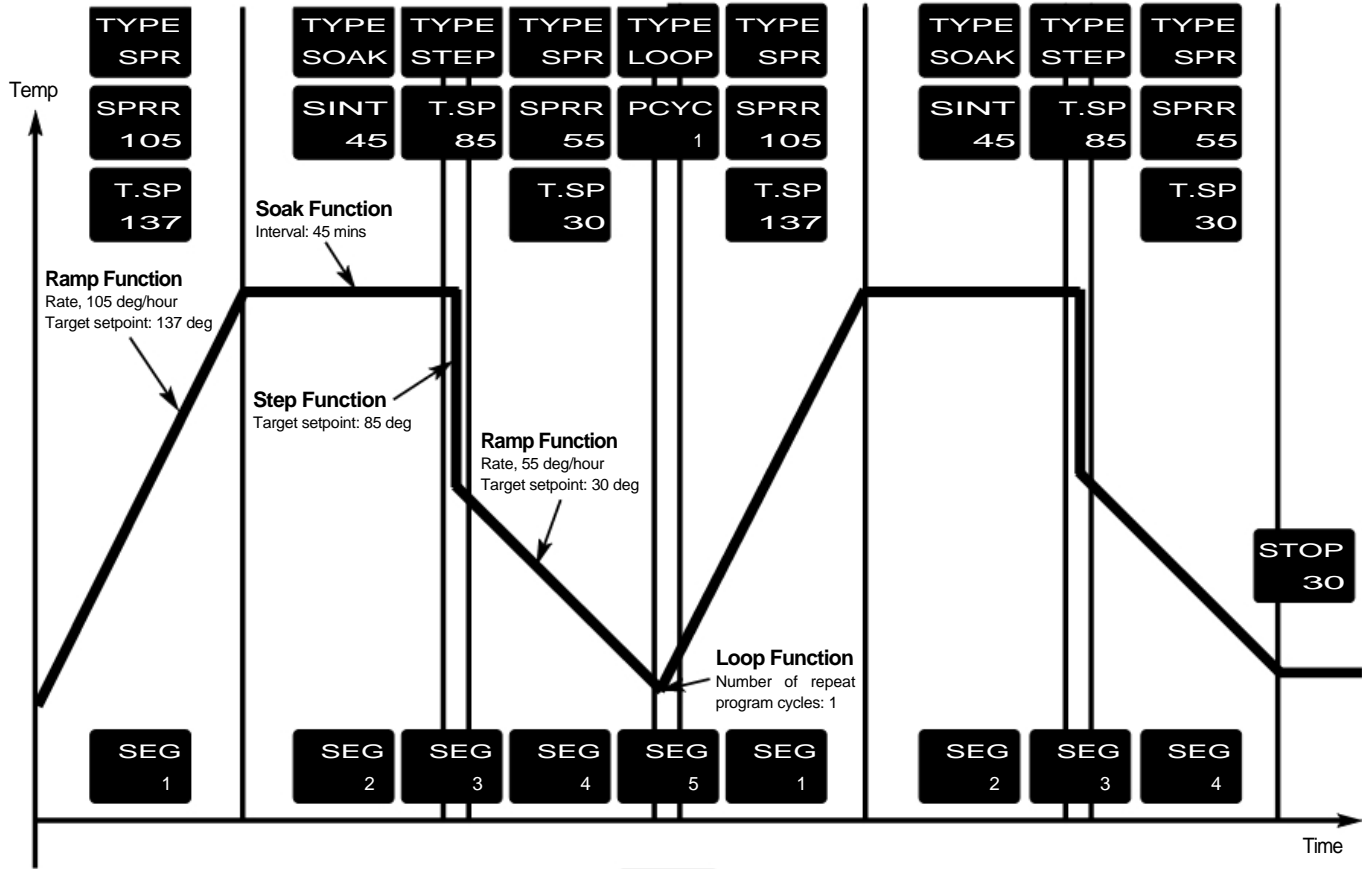
If the program is paused in **HOLD**, the upper display alternates between **hoLd** and the **Process Value**, while the lower display indicates the **Target Setpoint** of the current segment.

User Displays

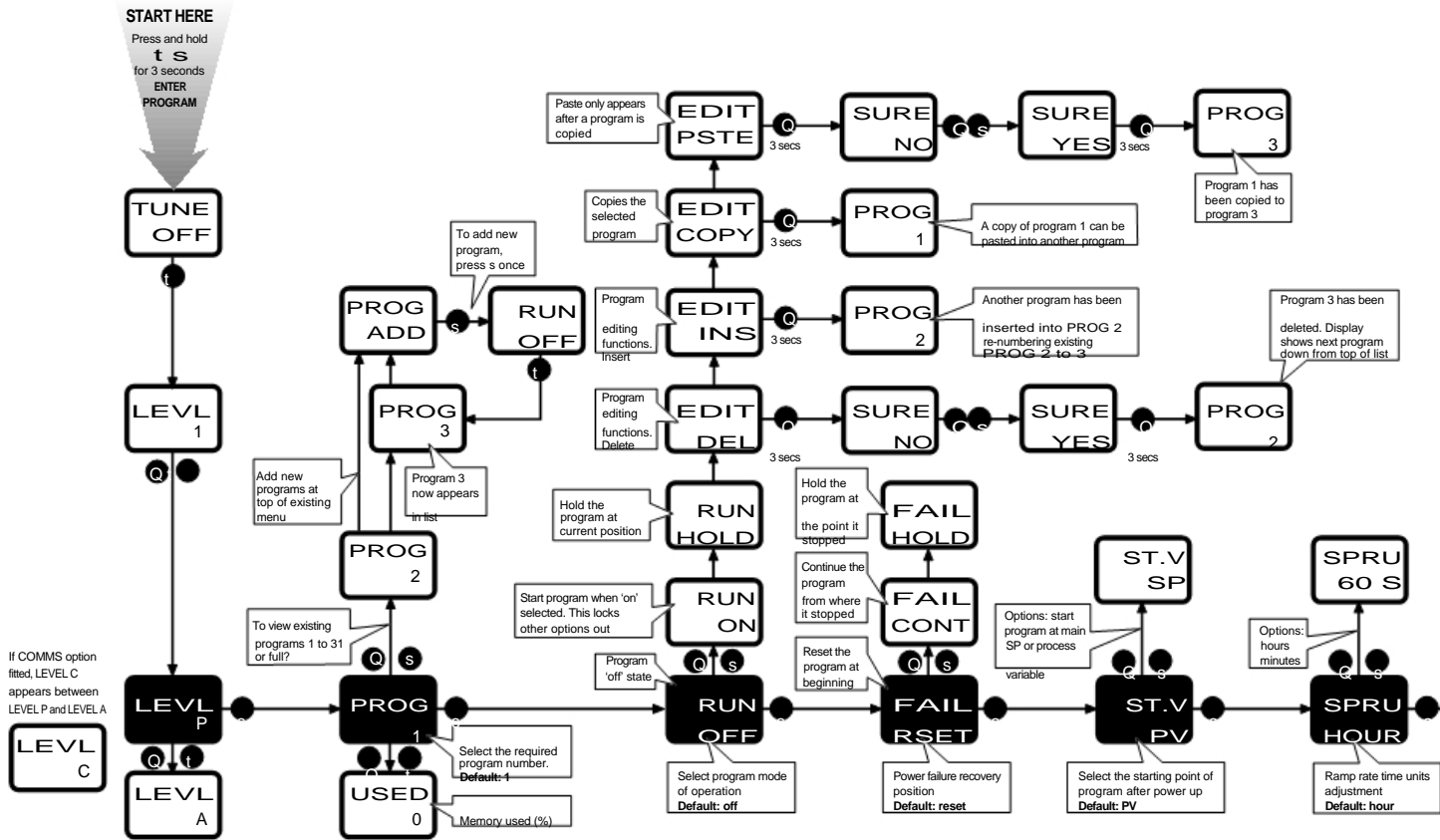
With the program running, a further display function is available at any time.

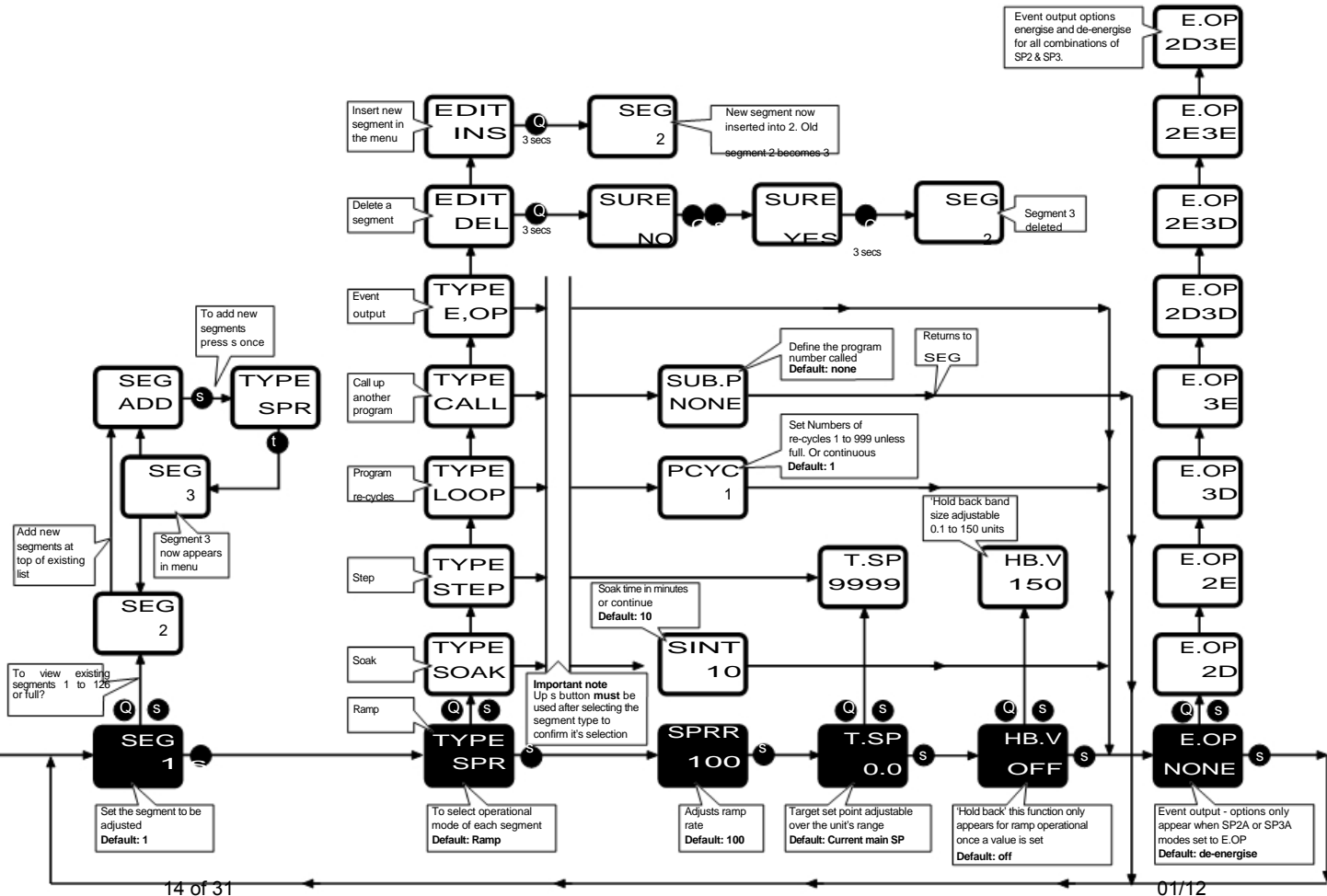
Press and hold Q	Display shows Program Number
Also press s once	Display shows Segment Number
Press s again	Display shows number of loops completed if a loop function has been set.
Press s again	Upper display reads t.SP Lower display shows moving Ramp setpoint
Or if in Soak Segment	Upper display reads Sint (Soak interval) Lower display reads remaining Soak time
Release Q	To return display to Program Run mode

3.4 EXAMPLE PROGRAM



3.5 PROGRAMMER FUNCTION MAP





3.6 FUNCTION LIST (LEVEL P) PROGRAMMER

LEVEL P EVL P

Access Level P from Level 1. Press and hold Q t

Function	Settings [Factory settings] shown in brackets
Press s or t to change	Press Q s or Q t to change
ProG Program number	[1] Add new programs (1 to 31)
run Run Program	[oFF] Program not running on Run program hoLd Pause program Edit dEL Delete program v Edit inS Insert new program Edit CoPy Copy another program Edit PStE Paste copied program
Fail Power failure recovery mode	[rSEt] Reset to program start Cont Continue from interruption hoLd Hold at interruption (User re-start)
St.V Program start value	[PV] Process value SP Setpoint value
SPru Ramp rate time units	[hour] Ramp rate adjust in hours 60 s Ramp rate adjust in minutes
SEG Segment number	[1] Add new segments (1 to 126) k

Function	Sub-functions	Settings [Factory settings] shown in brackets
Press s or t to change	Press Q s or Q t to change	
Type Define segment type	SPr	Ramp to next target setpoint [100] Setpoint ramp rate Units per hour/minute (0-9990) (as set at SPru above)
	t.SP	(Segment target setpoint) adjustable over instrument's configured range
	hb.u	Hold back [oFF] sets the permitted band size for the measured value to deviate from the ramp setpoint before the program is 'held back' waiting for the measured value to catch up. (0.1 to 150 units)
	SoAK	Hold setpoint for pre-set time [10]
	Sint	Soak time, adjust in minutes (cont.-1440) x 0.1
	StEP	Step to new target setpoint (Set tSP as above)
	LooP	Re-cycle program
	PCYC	[1] Set number of program loops up to 999, or continuous loop k
	CALL	Call up another program by number to import into this program
	Sub.P	(nonE) Number of Program called at Call above
	Edit dEL	Delete segment v
	Edit inS	Insert new segment

Function	Settings [Factory settings] shown in brackets
	Press s or t to change Press Q s or Q t to change
E.oP	Event output [nonE] Function can be applied to each segment independently to trigger an output at the start of that segment for the duration of that segment. Setting blocked unless either or both outputs SP2A or SP3A have been configured as an Event Output in Level 2 or Level A respectively.
	2d SP2A de-energised to mark event
	2E SP2A energised to mark event
	3d SP3A de-energised to mark event
	3E SP3A energised to mark event
	2d.3d SP2A and SP3A de-energised to mark event
	2E.3d SP2A energised SP3A de-energised to mark event
	2E.3E SP2A and SP3A energised to mark event
	2d.3E SP2A de-energised SP3A energised to mark event

To Return to:

LEVL P Press and hold t

To Read % Programmer memory used:

USEd Press Q and t together in LEVL P / ProG 1
1-100%

3.7 Memory Allocation Table

Segment type	Memory required
Ramp	4 Bytes
Ramp with Holdback	5 Bytes
Soak	2 Bytes
Step	3 Bytes
Loops (1-3)	1 Byte
Loops (4+)	2 Bytes
Call	1 Byte
Event Output	1 Byte
Program Header	1 Byte

Maximum capacity: 351 Bytes
31 Programs
126 Segments

Examples:

1. 1 program of 58 Ramps and 58 Soaks	349 Bytes
2. 4 programs of 14 Ramps and 14 Soaks	340 Bytes
3. 31 programs of 2 Ramps and 1 Soak	341 Bytes
4. 2 programs of 10 Ramps, 10 Soaks, 2 Steps and 1 loop	136 Bytes

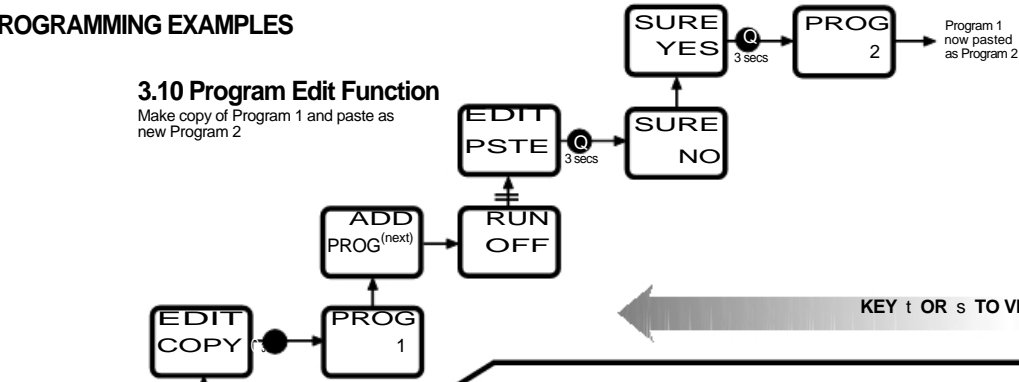
3.8 Memory Full Indication

Should the programmer memory capacity be reached during program configuration, the display will show 'FULL'

3.9 PROGRAMMING EXAMPLES

3.10 Program Edit Function

Make copy of Program 1 and paste as new Program 2



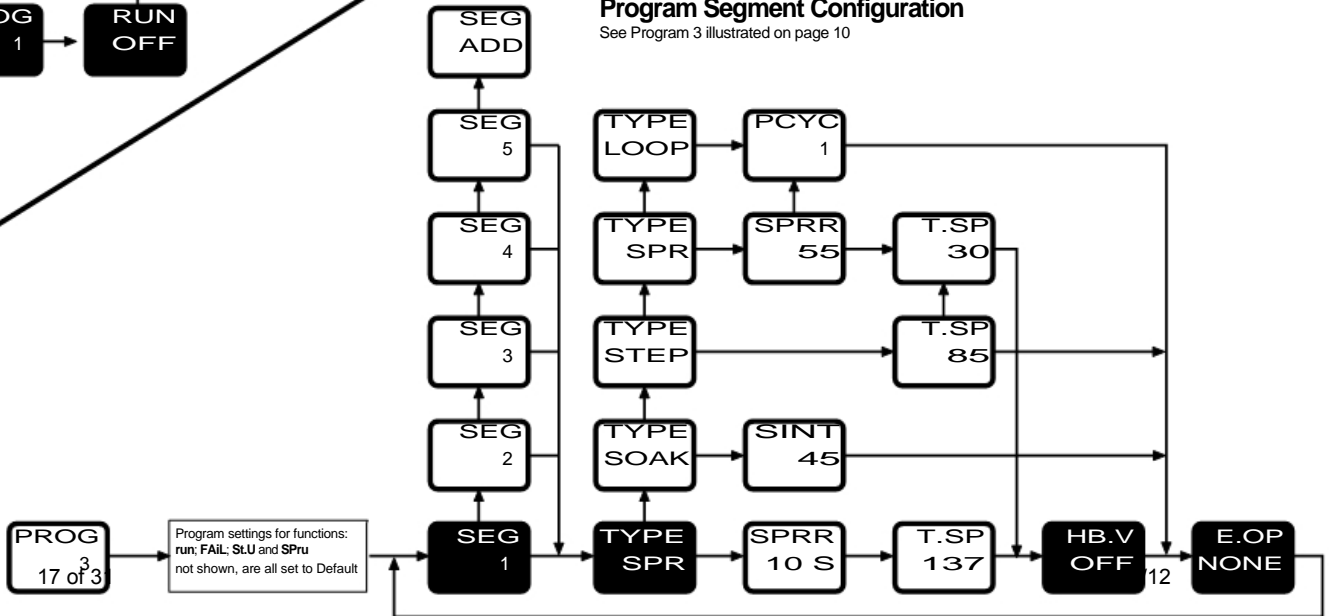
KEY

↑ Arrows drawn thus signify several key operations

Programmer functions shown as white characters on black background have Default settings

Program Segment Configuration

See Program 3 illustrated on page 10



KEY * ▼ OR * ▲ TOGETHER TO VIEW OR CHANGE SETTINGS

Quick Programming Guide

DUAL TEMPERATURE CYCLING WITH LIGHTS ON

In this program we will set the first temperature at 25°C for a period of twelve hours with the lights on and the second temperature of 15°C for a period of twelve hours with the lights off. This program will also run continuously.

Press and hold both ▲ and ▼ buttons for 3 seconds

Display will read **LEUL**
P

Press ▲ button, display reads **Prog**
Add

Press ▲ button until display reads **Stu**
Pu

Press and hold * and press ▲, display reads **Stu**
SP

Press ▲ button until display reads **SEG**
Add

Press ▲ button until display reads **type**
SPR

Press and hold * and press ▲ button until display reads **type**
Step

Press ▲ button until display reads **t.SP**
0.0 (current Set temp.)

Press and hold * and press either ▲ or ▼ button until set-point is reached
25°C

Press ▲ button until display reads **EOP**
3D

Press and hold * and press ▲ until display reads **EOP**
3E

Press ▲ button, display reads **SEG**
1

Press and hold * and press ▲ button, display reads **SEG**
Add

Press ▲ button, display reads **type**
SPR

Press and hold * and press ▲ button until display reads **type**
SOAK

Press ▲ button, display reads **si.nt**
10.0

Press and hold * and press ▲ or ▼ button to change time in minutes you wish
program to run, display reads **si.nt**
720

Press ▲ button, display reads **EOP**
3D

Press and hold * and press ▲ button, display reads **EOP**
3E

Press ▲ button, display reads **SEG**
2

Press and hold * and press ▲ button, display reads **SEG**
Add

Press ▲ button, display reads **type**
SPR

Press and hold * and press ▲ button until display reads **type**
Step

Press ▲ button, display reads **t.SP**
0.0 (current set-point)

Press and hold * and press either ▲ or ▼ button until set-point is reached
15°C

Press ▲ button, display reads **EOP**
3E

Press and hold * and press ▲ button until display reads **EOP**
3D

Press ▲ button, display reads **SEG**
3

Press and hold * and press ▲ button, display reads **SEG**
Add

Press ▲ button, display reads **type**
SPR

Press and hold * and press ▲ button until display reads **type**
SOAK

Press ▲ button, display reads **si.nt**
10.0

Press and hold * and press ▲ or ▼ button to change time in minutes you wish program to run, display reads **si.nt**

720

Press ▲ button, display reads **EOP**

3D

Press ▲ button, display reads **SEG**

4

Press and hold * and press ▲ button, display reads **SEG**

Add

Press ▲ button, display reads **type**

SPR

Press and hold * and press ▲ button until display reads **type**

LOOP

Press ▲ button, display reads **PCYC**

1

Press and hold * and press ▼ button until display reads **PCYC**

Cont

Press ▲ button, display reads **EOP**

3D

Press ▲ button until display reads **SEG**

5

Press and hold both the ▲ and ▼ buttons together for 3 seconds to finish the programming. The display will return to show Actual and Set-point temperatures.

To Run Program

Press both ▲ and ▼ buttons together for 3 seconds, display reads **LEUL**

P

Press ▲ button until display reads **run**

Off

Press and hold * and press ▲ button, display reads **run**

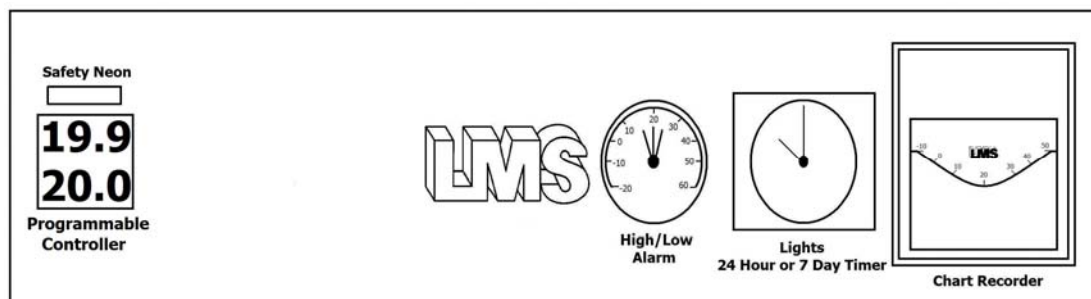
On

Press both ▲ and ▼ buttons together for 3 seconds. The program will now run

Section 4

OPTIONAL EXTRAS WHERE FITTED ALL NON PROGRAMMABLE MODELS

Control Panel



4.0 INTERIOR ILLUMINATION

The interior illumination in these models is either controlled by the programmable controller, a 24 hour timer or 7 day timer depending on the item fitted to the control panel.

Where no timer is fitted the controller will need to be programmed for temperature, time and lights on/off. Please refer to Section 3 or the quick programming guide.

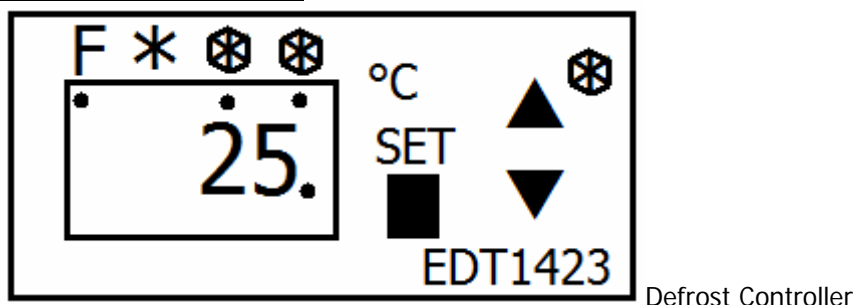
Models fitted with a 24 hour or 7 day time clock, require the segments to be adjusted, by pulling outwards or pushing in according to requirements. Each small segment represents 10 minutes on a 24 hour clock and 1 hour on a 7 day clock.

To set the time initially, the clock hands should be turned clockwise only.

Warning: Do Not Turn Hands Anti-Clockwise, as this may damage the clock

When internal illumination switches on during the course of a cycle a slight rise in cabinet air temperature may be experienced. Where shelf lights are fitted, the rise will be more pronounced.

4.1 AUTOMATIC DEFROST



Defrost Controller

On Series 3, and optionally on Series 1A and 2, the cabinet is set to defrost every 6 hours, however the defrost controller will sense whether this is required or not. This controller is factory set for optimum use and is locked for protection against misuse. The defrost will give a slight rise in air temperature. If this rise should create any problems the defrost can be over-ridden by the defrost isolator switch on the rear of the back panel. On Series 4 the defrost occurs 4 times every 24 hours; duration is controlled by the ice build up internally.

Please note that this controller will always display the figure 25 which is not to do with any temperature setting, this is merely a function setting.

On Series 1A, 2 and Series 3 cabinets, any defrost water drains away to a tray mounted on the compressor. On Series 4 cabinets the water drains into a tray (supplied) which must be fitted in the special tracks mounted underneath the cooled incubator during installation. On all models this water evaporates harmlessly away.

4.2 HIGH/LOW ALARM OPTION

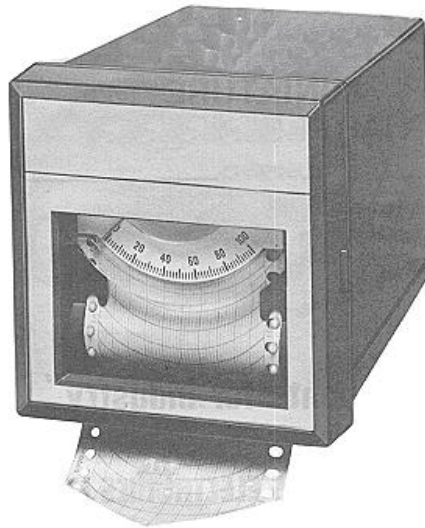
The high/low alarm is a manually adjusted alarm option fitted to the instrument's front panel. When fitted, this instrument supplements the digital control on the control panel with a contact thermometer, having a 'Red' upper limit pointer and a 'Green' lower limit pointer. This unit, being electro-mechanical, is not dependent on the normal control electronics and therefore will take over control in an emergency situation and maintain some form of control however coarse.

In the event of an alarm condition, the following action will be taken:
An audible alarm will sound and a secondary safety system will be activated, preventing the cooled incubator temperature from rising above or falling below the set alarm limits.

To set up, ensure the pointer is wound well up in the case of the Red and down in the case of the Green. Set the control temperature by means of the digital controller and allow the incubator to stabilise at the required control point. Once this is achieved the pointers may be realigned as close as required to the set point after making due allowances for contingencies such as door opening etc.

4.3 INNER PERSPEX DOOR

On incubators fitted with this feature and depending on the temperature difference between the inner working chamber and the space between the inner and outer doors, some slight distortion may occur to the Perspex door.



4.4 **LMS CHART RECORDER**

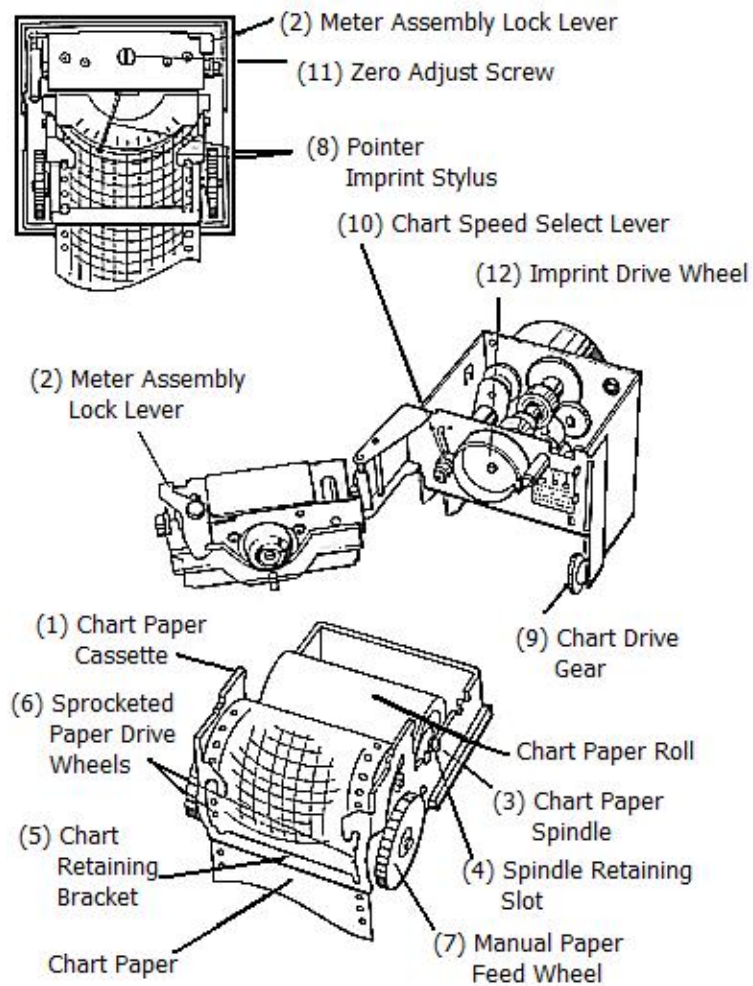
Chart Paper Loading (see instruction below and illustration on the following page)

1. Remove front bezel by simultaneously pressing the retaining catches on each side.
2. To gain access to the chart paper cassette (1). First unlock the meter assembly by moving the locking lever (2) to the left and hinge outwards. Remove cassette by gripping firmly and pulling forward.
3. To load chart paper. First fit spindle (3) into new roll of chart paper. Clip roll into spindle retaining slots (4) on the cassette with the paper unrolling from the bottom. With the chart retaining bracket (5) lifted, feed the paper onto the sprocketed paper driving wheels (6). Close chart retaining bracket (5) and check paper feed by operating the manual feed wheel (7).
4. Replace cassette to engage chart drive gear (9) and close hinged meter assembly ensuring that the locking lever (2) latches closed.

Caution: Take care not to damage the meter pointer or imprint stylus when closing the meter assembly.

Operation (see figure below)

Load chart paper as previously described. If required, the meter pointer/stylus (8) can be set to mechanical zero, with power off, by carefully turning the zero adjustment screw (11)



Note that the stylus may not move freely if the recorder is in the imprint section of its operating cycle with the stylus pressed against the chart paper. In this case the recorder chart motor should be operated for a few seconds until the imprint pressure is released, or the imprint drive wheel (12) can be manually rotated. The chart paper can be manually advanced by operating the manual paper feeding wheel (7) to set the desired zero time position.

Section 5

MAINTENANCE & REPAIR

5.1 EQUIPMENT RATINGS

220/240V AC, 50 Hz. Up to 11 amps max. (see rating plate for details). The cooled incubator is designed to operate in an environment from +10°C to +30°C with a relative humidity from 5 - 85% RH non-condensing. Correct functionality of the cooled incubator or its safety features cannot be guaranteed if it is used outside these ratings.

5.2 REPLACEMENT OF FLUORESCENT LAMPS (WHEN FITTED)

This must be carried out with the mains power switched off and by a competent person or engineer. Replacement lamps must be of the same size, wattage and voltage as originals.

5.3 ROUTINE MAINTENANCE

It is recommended that the cooled incubator be inspected annually by a competent service engineer. The exterior and interior surfaces can be maintained in as new condition using standard non-abrasive or non-corrosive cleaners. Solvent based cleaners must not be used. Switch off during all cleaning operations. Allow drying before switching on. On Series 3 and 4 cabinets, the condenser should be brushed clean every six months.

A complete defrost is recommended periodically depending on application

To effect a defrost complete the following: -

- A. Switch off the cooled incubator at the mains switch.
- B. Allow the cooled incubator's interior to attain ambient temperature by opening the door.
- C. If necessary, to speed up defrosting, start a heating cycle by setting the temperature to 35°C and turning the refrigeration off.
- D. Allow the cabinet to completely dry-out inside before re-using (the process usually takes 24 hrs).
- E. **Please ensure that the cabinet door remains open during this process.**

Section 6

TERMS AND CONDITIONS FOR LMS GUARANTEE

- 6.1.1 Damage on delivery must be reported in writing immediately to LMS.
- 6.1.2 Equipment must be installed as per instructions.
- 6.1.3 Equipment must be used, serviced and maintained as per instructions.
- 6.1.4 Equipment must not be modified electronically or in relation to the refrigeration/air flow system unless LMS agreement is obtained.
- 6.1.5 Equipment malfunction under the terms of the guarantee must be reported to LMS.
- 6.1.6 LMS reserves the right to repair or replace damaged on delivery or malfunctioning equipment.
- 6.1.7 If it is found subsequently that the purchaser of the equipment was responsible for the damage/malfunction a charge will be made by LMS including any carriage charges.
- 6.1.8 If it is necessary to return equipment to LMS, the equipment must be packaged so as to prevent any damage and have a decontamination certificate (see 6.3) showing that the incubator has been made safe.
- 6.1.9 Guarantee is for 2 years and cannot be passed on to a subsequent equipment owner.
- 6.1.10 To register for the 2 year Guarantee please complete and return the enclosed Guarantee Card or the fax back form in this manual.

In all cases please quote the following details: -

Model

Serial No.

These details may be obtained from the Serial Number plate on the back of the instrument.

FOR SPARES, SERVICING AND REPAIRS

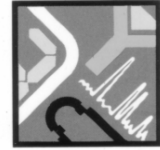
6.2 Please contact:

LMS Ltd.
The Modern Forge
Amherst Hill
Riverhead
Sevenoaks
Kent
TN13 2EL

Tel. 01732 451866
Fax. 01732 450127
Email: sales@lms.ltd.uk
www.lms.ltd.uk

DECONTAMINATION

Before you call the service engineer



B L W A

Before the service engineer arrives or you return the instrument for service

- 1** Has the system been in contact with any:
- 1.** hazardous chemicals
 - 2.** biological hazards
 - 3.** radiological hazards

If the answer to any of the above is YES, or if you are unsure of the answer, the system **MUST** be decontaminated/disinfected according to the manufacturers/suppliers protocol before the engineer will work on the system.

If the problem with the system does not allow full or even partial decontamination, written precautions should be available for the engineer to follow until decontamination can be effected?

- 2** Has a Decontamination/Permit to Work form been completed?

Before work commences on site

- 3** Is the Authorised Officer or a Senior member of staff available to advise the engineer and sign off the jobsheet?
- 4** Are the following available:

visitors laboratory coat	disinfectant
gloves	hand wash basin
eye protection	safety shower

These are your legal responsibilities under the Health & Safety at Work Act.

Produced by the BLWA Service Managers Group

6.4

Fax Back Guarantee Registration

To qualify for the 2nd year guarantee please fax this form duly completed to

01732 450127

Name:

Address:

Tel No:

Contact Name:

Date Purchased:

Model No:

Serial No:

6.5

LMS Limited is an independent third party servicing company which, for over 40 years, has been providing laboratory engineering services to a wide range of organisations, covering most makes and types of laboratory equipment.

Among the services provided are:

- Periodic service and safety inspection.
- Calibration services to traceable standards.
- Emergency breakdown cover.
- Preparation for insurance inspection.
- UKAS Accreditation (covering: temperature, humidity, rotation, speed and timing).

For a free no obligation quotation for any of the above services please complete the details on the following page and fax to:

LMS LTD
On
01732 450127

