LIFEPULSE 20 & 22 Series

OPERATING MANUAL

PART NO. 920 003

Covering the following models:

LP20, LP20/B, LP20/T, LP20/T/B, LP20/2T, LP20/2T/B
LP22, LP22/B, LP22/T, LP22/T/B, LP22/2T, LP22/2T/B

CE
0120

Model No:
Serial No:

Issue: 3
Date: March 1999

QUALITY, RELIABILITY AND SAFETY

This equipment has been manufactured using quality components and designed to operate safely and reliably. HME Limited can accept responsibility only if the following conditions are observed.

1. The equipment is used in accordance with the instructions for use provided by HME Limited.

2. The equipment is used in a building whose electrical installations conform to the standards specified by the country in which the building is situated.

3. If the integrity of the protective earth conductor arrangement is in doubt, the equipment should be operated from its internal electrical power source.

4 All modifications and repairs to the equipment are carried out by service engineers, agents or hospital technicians authorised by HME Limited.

CE MARKING

This equipment carries a CE mark but this is only fully valid if it is used in conjunction with cables and other accessories approved by HME Ltd.

Your local HME agent is:

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Cautions

Note	The following are descriptions of general hazards and unsafe practices that could result in death, severe injury or product damage. Specific warnings and cautions not appearing in this section are found throughout the manual.
Possible Fire or Explosion	A possible explosion hazard exists if used in the presence of flammable anaesthetics. Explosion or fire can result.
Possible Safety Hazard	Do not mount the equipment directly above the patient. Place the equipment in a location where it cannot harm the patient should it fall from its shelf or other mount.
Possible Electrical Hazard	Do not operate the equipment using damaged cables and wires, or loose snap fittings, which may cause interference or loss of signal. Perform frequent electrical and visual inspections on cables and wires.
Possible Shock or Fire Hazard	Do not immerse any portion of the instrument in water. Fluid spills may damage the instrument's electrical components.
Possible Equipment Damage	Do not sterilise this product. Sterilisation environments can cause severe damage. Do not autoclave or gas sterilise accessories unless manufacturer instructions clearly approve it.
Possible Safety Risk	Do not substitute accessories. Use only recommended accessories listed in this manual. Substitution may cause the instrument to work improperly. The correct accessories are shielded to prevent conductive parts of the electrodes contacting other conductive parts or earth. No action should be taken which permits this to happen.
Warning	When several equipments of various origins are interconnected, the summation of leakage currents may constitute a hazard.
Warning	The accuracy of the readings obtained from this equipment may be affected by the presence of a pacemaker or by cardiac arrhythmia.

PORTABLE SINGLE TRACE CARDIAC MONITOR
LIFEPULSE 20/22

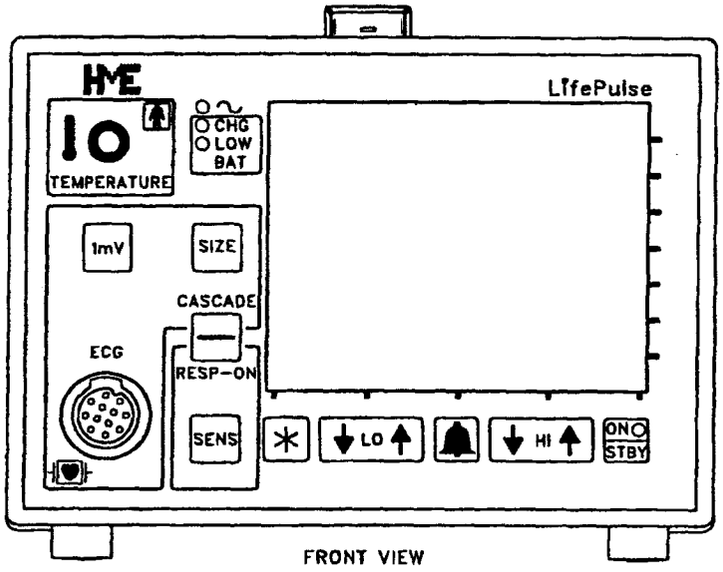
OPERATING MANUAL

CONTENTS

1. INTRODUCTION

The LifePulse 20/22 is a portable lightweight dual trace cardiac monitor, powered directly from the mains supply or by the optional built in rechargeable battery pack (LP 20/22/B). The monitor comprises a dual trace non-fade display, with digital heart rate, QRS indicator, low and high heart rate alarm levels, respiration rate (on the LP22) and (as an option), temperature displayed on the tube face. Pacemaker and lead-off indication will be displayed if the appropriate condition occurs.
Protection is provided to prevent patient burning when this equipment is used with high frequency surgical equipment.
The patient input is fully isolated, ECG pickup is obtained via conventional electrodes and a standard 3 way patient cable.

1.1 Front Panel



FRONT VIEW

1.2 Front Panel Operated Controls

1.2.1 Monitor Section

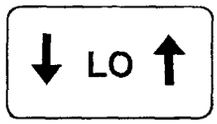
1mV — 1mV calibration pulse

SIZE — 3 position amplitude

— — 2 way switch giving cascaded ECG trace or one ECG trace and respiration

SENS — 2 position respiration sensitivity

✳ — ECG waveform freeze



☜Set low alarm levels and scroll

☜Set high alarm levels

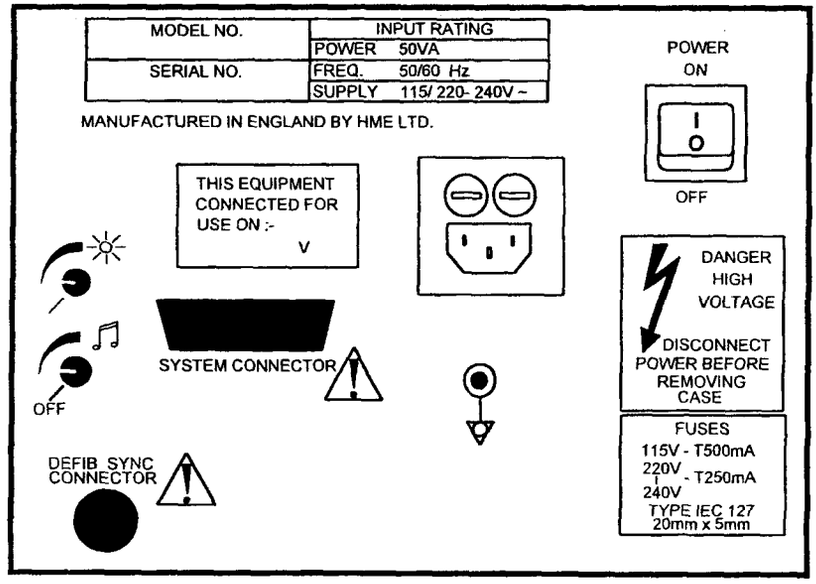
☜Alarms on/off

☜Unit on/standby

Front panel indicators

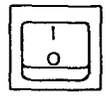
Green "~" ON Indicates mains power connected.
Yellow "CHG" ON Indicates that the internal battery is charging.
Red "LOW BAT" ON Indicates the internal battery is LOW and requires charging.

1.2.2 Rear Panel Controls



☜Brilliance

☜QRS bleep on/off, volume



☜Mains power ON **I** / OFF **0**

2. PRELIMINARY CHECKS

Delivery Inspection

HME Limited takes every precaution to ensure that their goods reach you in perfect condition. However, accidental damage can occur in transit and storage. For this reason we recommend that a thorough visual inspection is made prior to installation. Should any damage be evident or any parts missing, ensure that HME is informed at once.

Storage

Should the unit not be required for immediate use, it should be re sealed in its original packing, after carrying out the initial delivery inspection, and stored under covered conditions at a temperature between -10 and 50 degrees C, and relative humidity of 0 -99% (non-condensing).

2.1 Installation

LifePulse monitors are supplied with a 3 core plug-in mains lead, which must be fitted with a corresponding 3 pin mains plug. The cores are coloured in the European colour code

Brown	Live
Blue	Neutral
Green/Yellow	Earth

Fit the mains plug to the cable taking care that the wires have correct lengths, so that in the event of extreme strain, the earth wire will be the last to break. Make sure that the cable clamp secures the outer sheathing so that there is no direct strain on any individual wires at the terminals.

Where the plug is fused, a 5 amp fuse should be fitted.

2.2 Line Power Operation

Check that the factory set voltage setting (see input rating panel on rear of unit) matches the local mains power supply. If this needs to be changed the unit has an internal voltage selector switch which can be adjusted for either 115 Volts or 220 Volts (for 230V or 240V set the selector to 220V).

Connect the equipotential earth terminal to a potential equalisation conductor where provided or mandatory. Connect the power cable to the line power socket.

2.3 Fuses

Fuses are fitted in both the power live and neutral lines. The correctly rated fuses for the operating voltage selected must be fitted.

Type IEC 127 20mm x 5mm

115V	T.500mA	250V
220V- 240V	T.250mA	250V

2.4 Battery Operation (LP 20/22/B)

A fully charged battery provides approximately 2 hours continuous use. A low battery indicator light illuminates when battery power is low (sufficient power for 15 minutes operation). The battery is charged when the LP 20/22/B is connected to the mains and the main power switch (back panel) is in the 'ON' position.

3. Technical Specification

3.1 Equipment classification

Type of protection against electric shock.	Class 1 and Internally powered equipment
Degree of protection against electric shock	Type CF - equipment with an applied part, intended for direct electrical connection to the heart. This equipment is defibrillator discharge protected.
Mode of operation.	Continuous
Degree of protection against harmful ingress of water.	IPX0
Degree of safety of application in the presence of a FLAMMABLE ANAESTHETIC	Equipment not suitable for use in the presence of a FLAMMABLE ANAESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE

General

Supply voltage	115 or 220-240V 50/60Hz.
Power input	50 VA
Screen	80mm x 100mm non-fade CRT display
Sensitivity	Selectable .5, 1 and 2cm/mV. Sensitivity selected indicated on tube face.
1mV calibration	By pressing and releasing the calibration button a 1mV step is displayed.
Trace speed	25mm per second
Freeze	Front panel button freezes waveforms displayed. In cascade mode only the bottom trace is frozen. QRS and respiration indicators, heart rate and respiration rate displays remain active.
Alarms	Alarm control on front panel. With alarm off there are no alarm level digits displayed
Heart rate alarm	The low and high alarm levels selected are displayed on the tube face. Low range 30 to 100 BPM High range 60 to 250 BPM
Pacemaker	Indication on tube face "P". Pacemaker pulses suppressed from heart rate counter and reconstituted as negative spike (2cm amplitude) on ECG waveform.
Heart rate display	The heart rate is digitally displayed on the tube face. Range 15 - 250 BPM.
Accuracy	±1% ±1 digit

QRS indicator	Visual indication on tube face with audible bleep (volume adjustment and audio on/off switch on rear panel)
Apnea alarm	When respiration rate falls below four breaths per minute "apnea" is displayed on the tube face, plus a continuous audible tone
Asystole alarm	If within 4 seconds of last R wave no further R wave is detected, "asystole" will be displayed on the tube face. If alarms are selected a continuous bleep will sound. Normal rhythm cancels asystole alarm.
Temperature	Optional temperature modules, when fitted, give digital display of up to two temperatures and Delta "T"
Accuracy	±0.1% ±1 digit
Input impedance	Greater than 20M Ohm.
Frequency response	0.1 to 30Hz
Patient input leakage current	Less than 10uA at 240V 50Hz
Battery (LP 20/22/B)	Rechargeable. With mains power connected and mains switch in on position battery is being charged. From a fully charged battery the unit will run for approximately 2 hours. When the battery low indicator is illuminated approximately 15 minutes monitoring remains. Battery recharge time 14 hours.
Outputs	All standard outputs are available from the optional rear mounted 25 way "D" connector. Separate socket for defibrillator synchronisation.
Equipotential earth	Terminal fitted to rear panel.
Electro-surgery immunity	The input is protected and screened against RF interference from electro- surgery equipment. The ECG trace is normally interference free. NOTE Severe RF levels and bad electrode placement may cause trace disturbance.
Defibrillator protection	The input is protected against defibrillation.
Size	192mm (7.6 inches) wide 155mm (6.1 inches) high, 262mm (10.3 inches) deep.
Weight	3.6Kg (7.9 lbs), 4.5Kg (10.lbs) with battery fitted.

3.2 Environmental

Operating

Temperature range	10°C - 40°C
Relative Humidity	30% - 90% (non condensing)
Pressure	860mb - 1060mb

Storage

Temperature range	-10°C - 50°C
Relative Humidity	0% - 99% (non condensing)
Pressure	860mb - 1060mb

3.3 Equipment Markings and Classification

The following is an explanation of the markings that may be found on the equipment.

Signifies the presence of high voltages during use.

Type CF equipment, and the inputs are protected against defibrillation damage.

Off (power disconnected from supply)

On (power connected to supply)

Protective earth (ground)

Equipotentiality

Alternating current

Attention - Consult accompanying documents

3.4 Standard Accessories

Mains input lead	XC0019
3 way patient cable (complete with fly leads with press stud ends)	XC0033
Operators manual	920 003

General Accessories

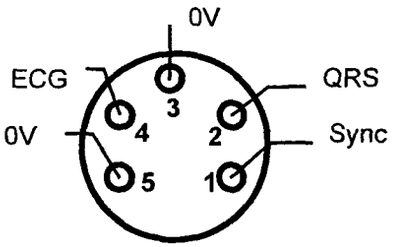
Rechargeable battery pack (LP 20/22/B only)	810034
Maintenance Manual	920 004
Fly lead press stud end - red	XC0027
Fly lead press stud end - green	XC0028
Fly lead press stud end - yellow	XC0029
Fly lead pinch clip end - red	XC0036
Fly lead pinch clip end - green	XC0037
Fly lead pinch clip end - yellow	XC0038
Adult single use pre-gelled electrodes	EA0001
Paediatric single use pre-gelled electrodes	EA0002
Temperature sensors: - Paediatric core	001 338
- Paediatric skin	001 339
- Adult core	001 340
- Adult skin	001 341
- Dual paediatric	001 342
- Dual adult	001 343

3.5 Defibrillator Sync Connector

Socket: 5 way DIN 45322 socket (60 degree type)

Pin	Function	Level	(Max)
1	Sync in	0-5V (>5mS)	(0-12V)
2	QRS out	8V (180mS)	(+12V)
3	0V common	0V	(0V)
4	ECG out	1V/mV	(+5V)
5	0V common	0V	(0V)

The sync socket conforms to the following pin view connection.



3.6 System Connector (optional)

25 Way "D" Type	Description	Signal Level	(Max)
1	N/C		
2	TxD	+8V	(+12V)
3	RxD	+8V	(+12V)
4	RTS	+8V	(+12V)
5	CTS	+8V	(+12V)
7	Digital GND	0V	0V
10	Analogue GND	0V	(0V)
11	Delayed ECG	1V/mV	(+5V)
12	ECG	1V/mV	(+5V)
14	Respiration	1V/Ohm	(+5V)
19	Heart rate	2V/100 BPM	(+5V)
20	ALM off	Active low	(+15V)
21	QRS	Active high +8V	(+10V)
22	ALM alarm	Active low	(+15V)
25	Unit on	Active high +5V	(+5V)

NOTE: System Connector, Defibrillator Sync Socket

Connection should be made only to equipment tested to comply with BS5724 Part I or equivalent. The LifePulse 20/22 must be separately earthed.

4. OPERATING INSTRUCTIONS

4.1 Using the LifePulse 20/22 Cardiac Monitor

Power supply - connect unit to local mains supply using the mains input lead supplied (Part No. XC0019). Switch rear mounted I-O (on/off) switch to I (on). The green ~ LED on the front panel will now be illuminated.

The LifePulse LP 20/22/B is fitted with a rechargeable battery pack. If this pack is fitted then the amber, CHG, LED on the front panel will be illuminated showing battery pack is charging. Once the above conditions are met, the unit is ready for use.

Switch on - depress on/standby button on front panel to switch unit on. When on the adjacent amber LED will be illuminated, a short bleep will be heard and a trace will appear on the tube within 10 seconds.

Certain default or initial control settings are displayed on the tube. They are as follows:

Sensitivity	1cm/mV
Alarm condition	Off
Cascade	On

The above initial settings can now be altered if desired by using the appropriate controls. With the exception of 1mV cal button, a short bleep indicates changed function when control button is depressed.

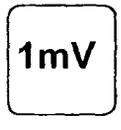
Lead selection

- By depressing the "lead" push button the lead selected for monitoring the ECG will change to Lead II. Further operations of this push button will select the leads available and the standardise ⎍ position. When standardise is selected, all alarms are inoperative.
Note When the 3 way patient cable (Part No. XC0033) is used, only Leads I, II, III and STD are available. When the 5 way patient cable (Part No. XC0007) is connected, Leads I, II, III, avR, avL, avf, V and STD are available.

Sensitivity

By depressing the sensitivity push button the sensitivity will change to 2cm/mV. Depressing this button again will give a sensitivity of 1/2cm/mV. Further operation of this button will select 1cm/mV again.

Calibration



Should a cal signal be required, pressing and releasing the 

control will display a 1mV step. For clarity of measurement the lead button can be pressed to reach the standardise position ⎍

Alarms

If alarms are required, depressing the  button will activate the alarms and display pre-set limits on the tube face.
Low heart rate alarm level : 50
High heart rate alarm level : 150
If alternative alarm levels are desired they may be changed as follows.

Continuous pressure on the [↓ LO] button will decrease the low alarm limit. Once the required level is reached, remove pressure from the button.

The low alarm limit can be raised by carrying out the same operation on the [LO ↑] button. Identical operations can be carried out on the [↓ HI ↑] high alarm limits until both the low and high alarm levels are set to the values required.

If alarms are no longer required, they can be de-activated by re depressing the button. [🔔] The pre-set limits will be removed and alarm off indicator " 🔔 " will be displayed on the tube.

Freeze

By depressing the [✳] button the ECG trace is frozen. The QRS indicator and heart rate are not affected.
Press [✳] again to un "freeze" the trace.

4.2 ECG Monitoring

Apply appropriate electrodes to patient as shown below, and attach a 3 way patient cable (Part No. XC0033). Connect input plug to ECG input socket on front panel.

ECG electrode application - There are several acceptable arrangements for positioning ECG electrodes. Optimum sites may vary with the patient's particular physiological characteristics and conditions. In most cases, ECG signal deficiencies may be improved by repositioning one or more of the electrodes.

For the best monitoring results, chest placement of the electrodes is preferred because there are fewer skeletal muscles to cause artefact. Fig. 1 shows typical electrode positions for 3 lead ECG monitoring (Leads I, II, III).

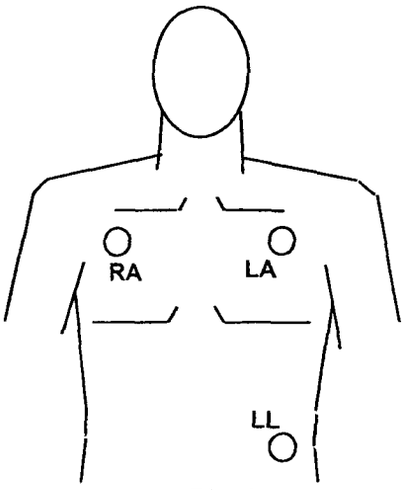


Fig 1

Under certain conditions it may be preferred to place the electrodes on the limbs. This electrode configuration would normally be used only on a short term basis or to monitor an

anaesthetised patient during surgery. It is not recommended for continuous long term monitoring because of excessive muscle artefact caused by movement of the limbs.

Use the following steps to apply ECG electrodes:

1. If necessary, shave the area where the electrode is to be placed.
2. The skin should be abraded slightly with a gauze pad or, alternatively, commercially available electrode preparation solutions may be used in place of abrasion.
3. Clean the area with an alcohol pad to remove all abrading residues and baby oils (not necessary with prep solutions).
4. Dry the skin.
5. Snap the ECG lead wire to the electrodes prior to placement on the patient's chest.
6. If reusable or non-gelled electrodes are used, apply gel to the electrodes. If pre-gelled disposable electrodes are used, peel the backing from the electrode adhesive and apply the electrodes.

4.2.1 Heart Rate Indication

The patient's heart rate will be displayed between the low and high alarm levels. Each QRS detected will cause a ♥ to be seen adjacent to the heart rate display.

4.2.2 Pacemaker indication

If the patient connected to the LifePulse 20/22 Cardiac Monitor is fitted with a pacemaker which is working, the ECG display will show a 2cm negative spike superimposed on the ECG waveform. The symbol adjacent to the heart rate display will change to a letter "P" for each pacemaker pulse detected.

4.2.3 Warning Messages

MESSAGE	CAUSE
LEAD OFF	A lead has fallen off, is faulty or has bad contact.
INOP	Generally as a result of a defibrillator discharge the monitor electronics may be briefly saturated and the trace is unreliable until the message disappears, usually after a few seconds. Alternatively if the warning persists it may be caused by an incorrect type of electrode or a faulty lead or connection.
ASYSTOLE	No heart activity is detected.

4.2.4 Electrode fault

Should an electrode or lead wire become disconnected "lead off" will be displayed adjacent to the heart rate to indicate a fault condition. Whilst fault condition remains a continuous audible tone will be heard if alarms are enabled.

4.2.5 Respiration and ECG Monitoring

Respiration monitoring is achieved using the ECG patient cable. However, the required positioning of the electrodes is different. The positions in the following diagram Fig 2 is suitable for adult and neonate monitoring . Note that the electrode positioning may be optimised for either transthoracic or transabdominal respiratory monitoring. These electrode

positions will, in most cases, offer the maximum strength for combined respiration and ECG signals when both parameters are to be monitored.

To select the respiration function press the — key to switch from Cascade to RESP- ON. A respiration waveform will now be displayed on the lower trace. The breathing rate (BR) is displayed digitally in the patient's status column and the value is continuously updated.

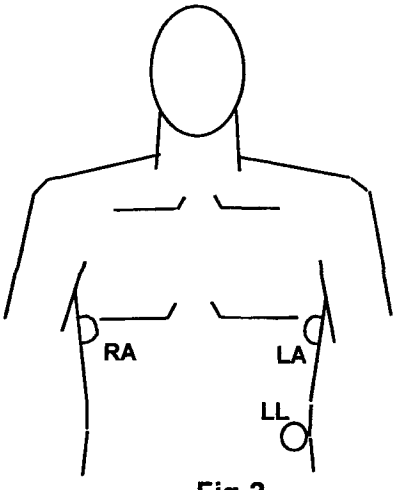


Fig 2

Proper electrode application is particularly critical when monitoring respiration. Refer to Electrode application in the ECG monitoring section.

4.2.6 Temperature

If this option is available then plug in an approved temperature sensor (see page 3-3) into the socket on the front panel. Digital displays of single or dual and Delta "T" appear on the screen.

4.2.7 Battery State

When the unit is fitted with its rechargeable battery pack (HME Part No. 810034) and both mains power "~" (green indicator) and "CHG" (amber indicator) are illuminated, the battery is being charged.

If no mains is applied the unit will automatically run from the battery pack. From a fully charged battery the unit will run for approximately 2.0 hours,. When approximately 15 minutes of battery life remains the "low" (red indicator) will be illuminated. When the mains is restored the battery will be charged and the red indicator will be extinguished.

4.3 Rear Panel Controls

4.3.1 QRS bleep on/off and volume

Turning this control clockwise the audible QRS bleep is turned on, further clockwise rotation will increase the volume of the bleep

4.3.2 Brilliance

Should the brilliance of the display require changing, clockwise rotation of the control will increase brilliance and anti-clockwise rotation will decrease brilliance. In order to prolong the life of the tube display the brilliance level should be set to give a clear trace without being too bright.

4.4 Operator First Line Trouble Shooting

This section gives some of the more common problems encountered during use and possible causes. If the operator cannot locate the problem after consulting the tables in this section, the monitor should be switched off, disconnected from mains power source and a qualified technician should be consulted.

Before attempting trouble shooting verify that the power cable is properly connected to both the monitor and mains power source.

SYMPTOM	POSSIBLE CAUSE
Green power indicator not illuminated	1. Power cable not connected to live power source 2. Rear panel AC power switch in OFF position 3. Defective power cable 4. Mains input fuses blown
Amber unit "ON" indicator not illuminated	1. Unit not switched on
Green power indicator and amber "ON" indicator lit but no display present	1. Rear panel brilliance control set too low
No signal on trace	1. Defective patient cable
Excessively noisy trace	1. Electrode site not properly prepared 2. Poor electrode contact 3. Defective patient cable
No heart rate display or flashing heart symbol	1. Patient electrodes incorrectly sited. Try repositioning the electrodes
No QRS bleep	1. Switch on rear panel in OFF position or volume set too low
No alarm digits displayed	1. Alarms switched off
Continuous alarm indications. No ECG signal on display ("lead off" displayed)	1. Defective patient cable 2. Electrode or lead off
Respiration not indicating. ECG waveform OK	1. Check electrode position (see Fig 2)
No temperature digits	1. Check front panel connection. 2. Replace temperature sensor
Temperature digits reading 20 degrees	1. Replace temperature sensor

4.5 Cleaning and Maintenance by the User

4.5.1 Cleaning

The unit and patient lead should be kept clean and free from electrode gel. It is recommended that they are wiped clean with a cloth or tissue dampened with water and detergent. Repeated cleaning with hot water and detergent should remove even heavy soiling. Do not autoclave the unit or patient cable.

Cleaning (weekly)

The unit and power lead should be kept clean and checked for signs of damage. It is recommended that they be wiped clean with a cloth or tissue dampened with water and detergent.

Check mains power connections weekly and examine outer sheath of power lead for signs of damage.

Note Electrical connectors must not be immersed in any fluid.

4.5.2 Battery (LP 20/22/B only)

If the unit is not in constant use the state of battery charge should be checked periodically and recharged if necessary.

Recharging a flat battery will take approximately 14 hours and is achieved by connecting the unit to the mains power and switching the rear power switch to I (on). Observe that the green ~ indicator and amber "CHG" are illuminated.

Note: The monitor does not have to be in operation for battery charging.

4.5.3 Further Maintenance

HME recommend that preventative maintenance checks are carried out on the unit 6 monthly under a HME Service Contract. Alternatively, the maintenance may be carried out by suitably qualified personnel. Details of the procedure are provided in the Maintenance Manual 920-004. Further technical information is available from HME Limited upon request.

5. Recommended Spare Parts

5.1 Electronic and Electro-Mechanical Spares

Certain items have a long shelf life but a limited life in use. Items in this category are mains power leads, patient input cables, which are subject to physical damage in use, and fuses.

5.1.1 Ordering Spare Parts

Due to developments improving the product, over the years certain spare parts may not be readily interchangeable between early and late production units. Always quote the serial number of the unit and date of purchase, if known. This information is in addition to the circuit reference and the reference number and issue of the PCB required.

Items returned for replacement under guarantee should be labelled with the unit type, serial number, date of purchase, if known, and written details of the symptoms or fault found.

Orders for spare parts may be sent by post, telex, fax or telephoned to HME or approved agents or distributors.

Spare Parts Recommended as Essential

Number of units to be maintained	**Stock No**	**1**	**5**	**10**
Patient cable 3 way	XC0041	1	2	3
Mains lead	XC0019	1	2	3
Mains fuses - 200-260V T250mA	FA0052	4	6	10
Mains fuses - 100-132V T500mA	FA0056	4	6	10
LT fuses T2A	FA0063	2	3	5
LT fuses F2A	FA0019	2	3	5

Spare Parts Recommended as Desirable

Number of units to be maintained	**Stock No**	**1**	**5**	**10**
Battery pack	810 334	-	1	2
Mains switch	LR0021	-	1	1
Cathode ray tube	DC0004	-	1	1
Processor assembly	010-321	-	1	2
ECG amplifier assembly	010-323	-	1	2
CRT interface assembly	010-322	-	1	2
Maintenance manual	920-004	-	1	1

6. Equipment Changes

Date	Change

7. Warranty

HME Limited ('the Company') guarantees such equipment against defects (normal wear and tear exempted) in materials and workmanship for one year from the date of delivery, PROVIDED that this guarantee shall not be operative nor shall the Company be under any liability to the customer

1. unless the customer notifies the Company in writing of the defect not more than [two days] after the defect first becomes apparent to the customer;

2. unless the defective equipment is returned (as a unit) to the Company works, freight prepaid within fourteen days after the defect first becomes apparent;

3. in the event of any improper use or mishandling of the equipment, removal of date Serial Numbered Medical Equipment

4. stamps or markings from the equipment or it's component parts or the repair or replacement of any parts or the repair or replacement of any parts thereof by unauthorised persons;

5. if the equipment is used at any time after the discovery of the defect;

6. if the equipment is sold by the customer

7. if the equipment is sold pursuant to an international supply contract as defined by S.26 of the Unfair Contract Terms Act, 1977;

8. in respect of any consequential or special loss or damage sustained by the customer howsoever caused.

The Company's liability under this guarantee shall be limited at its option to the repair or replacement of the equipment or damages not exceeding the invoice price of the equipment. Delay in installation beyond the control of the Company will not extend the starting date for this guarantee more than one month from the receipt of the equipment at the customer's location.

The Company does not exclude or restrict its reliability for death or personal injury resulting from negligence of itself or its servants or agents (but not independent contractors) while acting in the course of their employment or agency of the Company; or for breach of any undertaking as to the title implied by S.12 of the Sale Of Goods Act, 1893. Save as aforesaid, this Guarantee is in substitution for and shall replace all conditions and warranties on the part of the Company implied by statute common law or otherwise all of which are expressly excluded.

Spare Parts

The Company guarantees spare parts against defects (normal wear and tear excepted) in materials and workmanship for 30 days from delivery and otherwise on the same terms as the guarantee in respect of serial numbered medical equipment.

Electrical Safety

The Company considers that the equipment has been designed, constructed and tested so as to comply with the requirements of BS5724 Part One, 'Specification for Safety of Medical Electrical Equipment'.

The Company considers itself responsible for the effects of safety, reliability and performance of this equipment only if:

installation, preventative maintenance, re-adjustments modifications or repairs are carried out by persons authorised by the Company.

Authorised persons are:

the Company, its employees, the Company's approved agents or distributors and their employees.

The electrical installation in the relevant room complies with the current regulations of the country in which the equipment is used. The standard for the United Kingdom is 'Regulations for the Electrical Equipment of Buildings' published by the Institution of Electrical Engineers.

The equipment is used in accordance with the operating instructions.

Service Agreements

Periodic inspection and preventative maintenance are essential to ensure continued effective operation. Contact the Company or its approved agents or distributors for further information on service contracts.

Operating and maintenance Manuals

Although every care has been taken to ensure that the information in this manual is accurate, continuous development may result in equipment changes. The Company reserves the right to make such changes without prior notification, and resulting manual inaccuracies may occur. This manual and any changes are protected by copyright.

In order to maintain or improve standards of manufacture and reliability, HME products are continuously reviewed. For this reason the contents of this publication are subject to change without notice.

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