



SLE 2000 HFO

Ventilator

Service manual



High Frequency Oscillatory
Ventilator

CE 0120



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Contents

1. Introduction	10
2. Ventilator Control Description	12
2.1. Front Panel	13
2.1.1. Front panel controls	13
2.2. Back Panel	15
2.3. Electronic Module	16
3. Access to the SLE2000 HFO	18
3.1. Electronic Module	18
3.2. Pneumatic Module	19
3.3. Separating the two modules	20
3.4. Removal of the oxygen cell	21
3.4.1. Screw in method	21
3.4.2. Trapped Method	21
3.5. Removal of the motor assembly	22
3.5.1. Motor assemblies	22
3.5.2. Removal of N2524 motor assembly	22
3.5.3. Removal of N2524/01 or N2524/02 motor assembly	24
4. Cleaning, Disinfection and Sterilization	28
4.1. Preparation of a new ventilator	28
4.2. Cleaning and disinfection of an in-service ventilator	28
4.2.1. Cleaning, Disinfection & Sterilization chart	29
4.3. Cleaning method	29
4.4. Disinfection method	30
4.5. Sterilization method	30
5. Filter Systems	31
5.1. Bacterial filter, SLE Part N°:N2029 (Autoclavable)	31
5.2. Bacterial filter, SLE Part N°:N2587 (Single use)	31
5.2.1. Precautions when using bacterial filter N2587	31
6. Maintenance	32
6.1. Monthly Operational Checks	32
6.1.1. Battery condition and LED display test	32
6.1.2. Air and Oxygen Supply Failure Alarm test	32
6.1.3. Condition of O ₂ Cell	32
6.1.4. Inspiratory Nozzle	33
6.1.5. CPAP pressure check	33
6.1.6. HFO pressure check	33
6.2. Servicing	34
7. Overhaul	36
8. Exchanging a Pneumatic Unit	38



9. SLE 2000 HFO Set up and Calibration	40
9.1. Recommended Equipment	40
10. Step 1: Pneumatic Module Initial Setup	40
10.1. Internal Pressure Regulator	40
10.2. O ₂ Cell Flow Needle Valve	40
10.3. Fresh Gas Flow Needle Valve	40
11. Step 2: Electronic Module Setup	41
11.1. Power Supply Unit	41
11.1.1. Voltage verification and setting	41
11.2. Ventilator CPU Board (A0702/04)	42
11.2.1. System Watchdog	42
11.2.2. U18/26(ADC).....	42
11.2.3. Buffered transducer output.....	42
11.2.4. Fresh Gas Block and Leak Alarm	43
11.2.5. Patient Purge Pressure Display Compensation	43
11.2.6. Maximum Inspiration Time	44
11.2.7. Airway Trigger Calibration	44
11.2.8. PTV sensitivity control	44
11.3. Motor Drive Board (A0739/02)	45
11.4. HFO Main Board (A0736/03)	45
11.4.1. Scaling of pressure LCD display	45
11.4.2. Bargraph Calibration	46
11.4.3. One second timer	46
11.4.4. Motor Stall Alarm.....	46
11.4.5. Fan Fail Alarm Verification	46
11.4.6. HFO Rate Display	47
11.4.7. HFO Alarm	47
11.5. Alarm module and oxygen conditioning circuit (A0738/02).....	47
11.5.1. Oxygen Calibration.....	47
11.5.2. Alarm sounder volume	47
11.6. Pressure Drift Monitor Board (A0745).....	48
12. Stage 3: Pneumatic Module Final Setup	49
13. Operational Verification	50
13.1. Basic Operation	50
13.2. HFO Modulation	51
13.3. Display Timebase	52
13.4. Display Pressure Range.....	52
13.5. Freeze Push-Button.....	53
13.6. HFO FAIL.....	53
13.7. FAN FAIL	53
13.8. Slow Rise Waveform	53
13.9. PTV Mode.....	53
13.10. SIMV Mode.....	54
13.11. Block and Leak alarms.....	54

13.12. Pressure Controls.....	54
13.13. Verification of HFO safety solenoid SV5.....	55
13.14. Verifying Pressure Drift Detection.....	55
13.15. HFO NEEP Verification.....	56
14. Technical Specification	58
14.1. Operating Modes.....	58
14.1.1. Conventional Ventilation	58
14.1.2. HFO Ventilation.....	58
14.2. Displays.....	58
14.3. Controls	59
14.4. Alarms	60
15. Circuit Descriptions	61
15.0.1. Front Panel Board Assembly (A0700/02)	61
15.0.2. LED Display Board Assembly (A0701/02)	61
15.0.3. Ventilator CPU Board Assembly (A0702/04)	61
15.0.4. HFO Main Board Assembly (A0736/03)	62
15.0.5. Bargraph Display Board Assembly (A0737)	63
15.0.6. Alarm Board Assembly (A0738/02)	64
15.0.7. Motor Drive Board Assembly (A0739/02)	65
15.0.8. Pressure Drift Monitor Board Assembly (A0745).....	66
15.0.9. Power Supply Unit	66
15.0.10. Graphic LCD Module	67
15.1. Pneumatic Circuit	68
15.1.1. Pneumatic Layout.....	69
15.1.2. How to Identify Proximal Airway Purge Type.....	70
15.1.3. Conventional Ventilation	71
15.1.4. HFO Operation	72
16. SLE2000 HFO Troubleshooting Chart	74
17. Circuit Details	80
17.1. AS/A0700/02 Display Board Assembly	80
17.1.1. CD/A0700/02 Display Board Circuit Diagram	81
17.2. AS/A0701/02 LED PCB Assembly	83
17.2.1. CD/A0701/02 LED Board Circuit Diagram.....	84
17.3. AS/A0702/04 CPU PCB Issue 2 Sheet 1 of 2	87
17.3.1. AS/A0702/04 CPU PCB Issue 1 Sheet 2 of 2.....	88
17.3.2. CD/A0702/04 CPU Board Circuit Diagram Issue 2.....	89
17.4. AS/A0702/04 CPU PCB Issue 3 Sheet 1 of 2	93
17.4.1. AS/A0702/04 CPU PCB Issue 3 Sheet 2 of 2.....	94
17.4.2. CD/A0702/04 CPU PCB Circuit Diagram Issue 3.....	95
17.5. AS/A0702/04 CPU PCB Issue 5 Sheet 1 of 2	99
17.5.1. AS/A0702/04 CPU PCB Issue 5 Sheet 2 of 2.....	100
17.5.2. CD/A0702/04 CPU PCB Circuit Diagram Issue 4.....	101
17.6. AS/A0736/03 Main PCB Revision E Issue 3	106
17.6.1. CD/A0736/03 Main PCB Circuit Diagram Issue 2.....	107



17.7. AS/A0736/03 Main PCB Revision F Issue 4.....	111
17.7.1. CD/A0736/03 Main PCB Circuit Diagram Issue 3.....	112
17.8. AS/A0736/03 Main PCB Revision G Issue 5.....	116
17.8.1. CD/A0736/03 Main PCB Circuit Diagram Issue 4.....	117
17.9. AS/A0736/03 Main PCB Revision G Issue 5.....	121
17.9.1. CD/A0736/03 Main PCB Circuit Diagram Issue 5.....	122
17.10. AS/A0737/01 Bargraph Display PCB Assembly.....	126
17.10.1. CD/A0737/01 Bargraph Display PCB Circuit Diagram.....	127
17.11. AS/A0738/02 Alarm PCB Assembly	129
17.11.1. CD/A0738/02 Alarm PCB Circuit Diagram	130
17.12. AS/A0739/02 Motor drive PCB Issue 1 Sheet 1 (Revision B)	134
17.12.1. AS/A0739/02 Motor drive PCB Issue 1 Sheet 2 (Revision B).....	135
17.12.2. CD/A0739/02 Motor drive PCB Circuit Diagram Issue 1(Revision B)	136
17.13. AS/A0739/02 Motor Drive PCB Issue 3 (Revision C)	139
17.13.1. CD/A0739/02 Motor drive PCB Circuit Diagram Issue 3 (Revision C).....	140
17.14. AS/A0756 HFO Motor Start Up PCB Issue 2.....	143
17.15. AS/A0745 Pressure Drift Monitor Board Issue 1	145
17.15.1. CD/A0745 Pressure Drift Monitor Board Circuit Diagram Issue 1	146
17.16. AS/A0745 Pressure Drift Monitor Board Issue 2	147
17.16.1. CD/A0745 Pressure Drift Monitor Board Circuit Diagram Issue 5	148
17.17. Serial Interface Option CD/A0702/03	150
17.18. CD/W0308 Wireloom Issue 6	152
17.19. Front Panel	153
17.20. SK0057 Power Supply Wiring Diagram	154
17.21. CD/W0307 Electronic/Pneumatic Module interconnection	155
17.22. Electronic Chassis Sheet 1 of 2.....	156
17.22.1. Electronic Chassis Sheet 2 of 2.....	157
17.23. Pneumatic Unit Assy. AS/L0203 Issue 3	161
17.23.1. AS/L0203 Sheet 1 of 4.....	161
17.23.2. AS/L0203 Sheet 2 of 4.....	162
17.23.3. AS/L0203 Sheet 3 of 4.....	163
17.23.4. AS/L0203 Sheet 4 of 4.....	164
17.24. Pneumatic Unit Assy AS/L0203 Issue 4	169
17.24.1. AS/L0203 Sheet 1 of 4.....	169
17.24.2. AS/L0203 Sheet 2 of 4.....	170
17.24.3. AS/L0203 Sheet 3 of 4.....	171
17.24.4. AS/L0203 Sheet 4 of 4.....	172
17.25. Pneumatic Unit Assy AS/L0203 Issue 5	177
17.25.1. AS/L0203 Sheet 1 of 4.....	177
17.25.2. AS/L0203 Sheet 2 of 4.....	178
17.25.3. AS/L0203 Sheet 3 of 4.....	179
17.25.4. AS/L0203 Sheet 4 of 4.....	180
18. A3 Circuit Diagram Appendix	187

19. Service Information and Technical Bulletins	206
19.1. Service Information	207
19.1.1. SI 980301 Ventilator Alarms and INOSYS Nitric Oxide Delivery System ..	207
19.1.2. SI 980302 Ventilator oxygen cells (N2191).....	209
19.1.3. SI 990201 Cooling fan replacement	210
19.1.4. SI 990301 Calibration of Issue 2 of the A0745 Pressure Drift Board.....	213
19.1.5. SI 990302 Possible inadvertant solenoid failure messages	215
19.1.6. SI 990303 Disabling of the hardware cycle fail alarm in CPAP HFO mode.	216
19.1.7. SI 990305 Addition of the oxygen alarm on SLE2000 HFO	218
19.1.8. SI 990306 Addition of the proximal airway purge	220
19.1.9. SI 990401 Attenuated alarm sounder for the 12/24V voltage monitor.	223
19.1.10. SI 990801 Enhanced EMC	225
19.1.11. SI 991101 Ventilator Power Supplies	230
19.1.12. SI 000101 Modification of SLE 2000 HFO motor drive circuit board.	233
19.1.13. SI 000201 Leak Alarm Trigger Threshold.	236
19.1.14. SI 000602 Addition of HFO NEEP	238
19.1.15. SI 020901 Cleaning, Disinfection and Sterilisation of SLE ventilators.	247
19.2. Technical Bulletins	248
19.2.1. TB 990603 Removal of hour counter from electrical chassis.	248
19.2.2. TB 000201 New versions of control software.	249
19.2.3. TB000601 New version of control firmware	250
19.2.4. TB 000801 Ventilator Firmware Status	251
19.2.5. TB 010201 New operational warnings	254
19.2.6. TB 040401 V0226 Potentiometer	255
20. Issue Revision Record	256



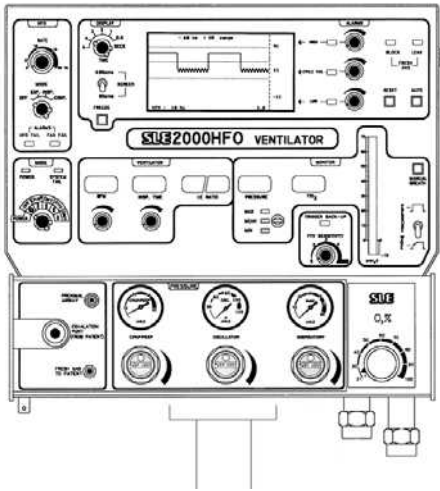
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Introduction

1. Introduction

The SLE2000 HFO Principles of Operation

The SLE2000 HFO is based on the patented valveless ventilator design and can be operated in conventional modes of ventilation.



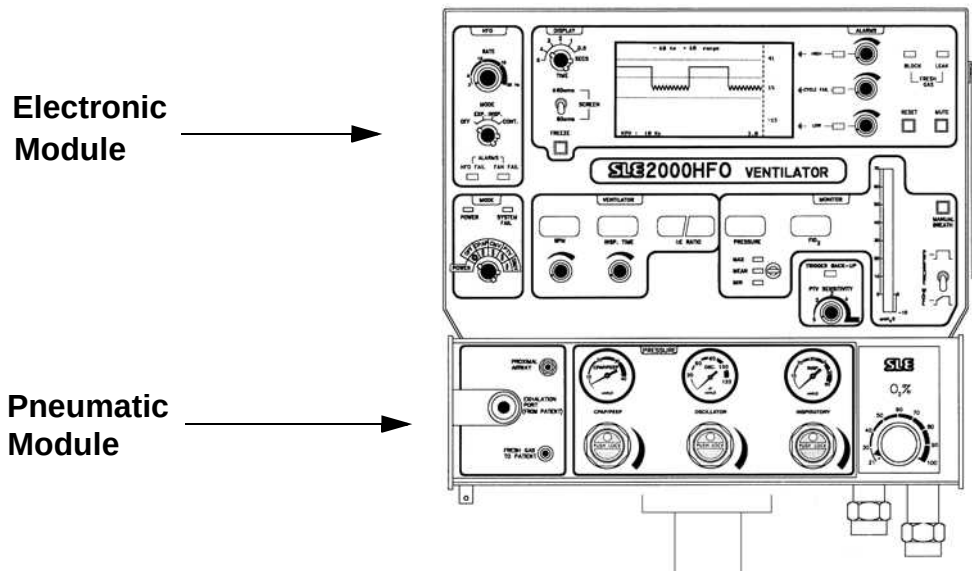
When used as a High frequency oscillatory ventilator an additional flow of driving gas is introduced into the exhalation block. This flow is supplied through a rotating shaft mounted on a variable speed motor. This flow of driving gas is adjusted by the oscillatory pressure regulator mounted in the pneumatic module ensuring a constant oscillatory pressure waveform at all operating frequencies. This rotating driving pressure produces oscillatory action in the patient circuit with an active expiratory flow of gas. The oscillatory flow of gas is supplied from a separate rotating jet, therefore it is possible to add the oscillations to the inspiration or expiration pressures. It is also possible to add oscillations to the inspiratory plateau when operating the ventilator in any of the Patient triggered modes of operation.

As in the SLE2000 every care has been taken in the design to ensure the safe operation of the ventilator. When in use the rotation of the motor is constantly being monitored, should any malfunction be detected in the HFO operation the flow of oscillatory driving gas will immediately be stopped, and the ventilator will display motor failure alarm. All other functions of the ventilator such as micro-processors, fans, internal solenoids and front panel controls are constantly being checked for correct operation.

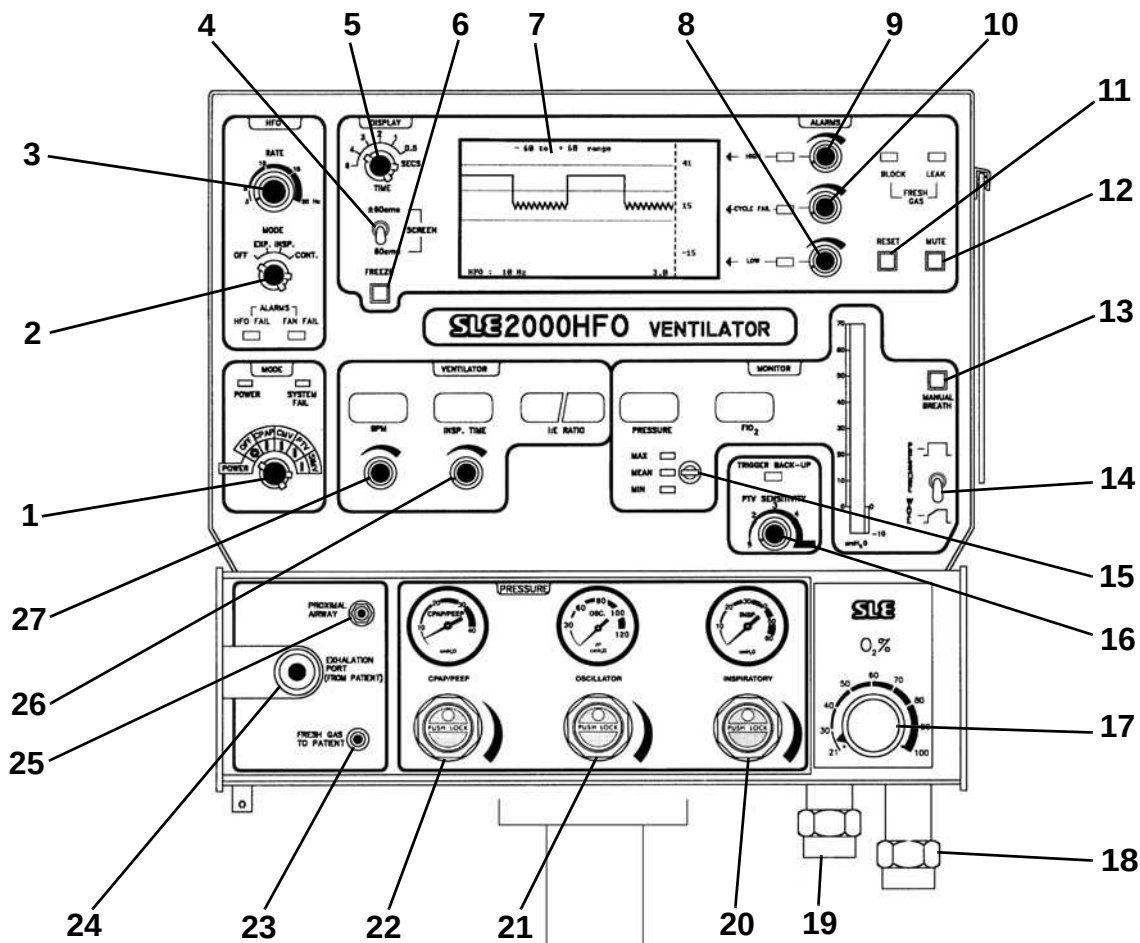
**Ventilator Control
Description**

2. Ventilator Control Description

The SLE 2000 HFO+ consists of two linked modules, Electronic and Pneumatic.



2.1 Front Panel



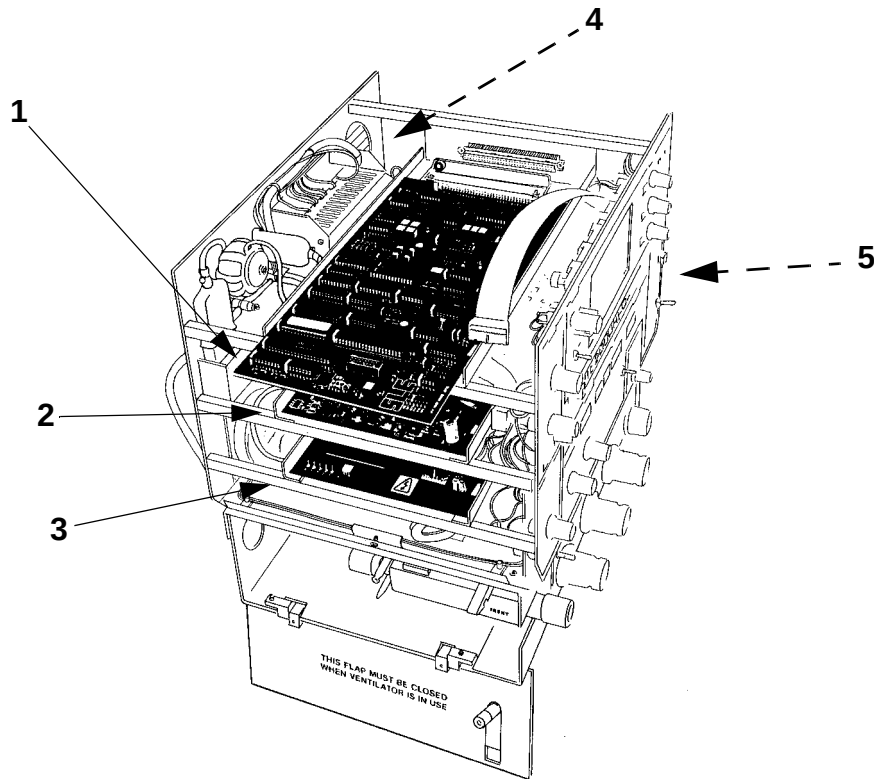
2.1.1 Front panel controls

- 1) Power on and mode switch.
- 2) HFO mode switch.
- 3) HFO rate switch.
- 4) Screen switch
- 5) Time control switch.
- 6) Display Freeze button.
- 7) Display screen.
- 8) Low alarm adjustment control.
- 9) High alarm adjustment control.
- 10) Cycle fail alarm adjustment control.
- 11) Alarm Reset button.
- 12) Alarm mute button.



-
- 13) Manual breath button.
 - 14) Pressure wave selector switch.
 - 15) Airway pressure monitoring selection switch.
 - 16) PTV sensitivity control.
 - 17) O₂ blender control.
 - 18) O₂ inlet.
 - 19) Medical air inlet.
 - 20) Inspiratory pressure regulator.
 - 21) Oscillator pressure regulator.
 - 22) CPAP/PEEP pressure regulator.
 - 23) Fresh gas to patient port.
 - 24) Exhalation block.
 - 25) Pressure monitoring port.
 - 26) Inspiration time control.
 - 27) Breaths per minute (BPM) control.

2.3 Electronic Module



Board positions within the electronic unit

The Electronic module is shielded against EM interference, these shields must be removed taking care not to damage the contact fingers at the connecting edges.

Position of the boards within the electronic module.

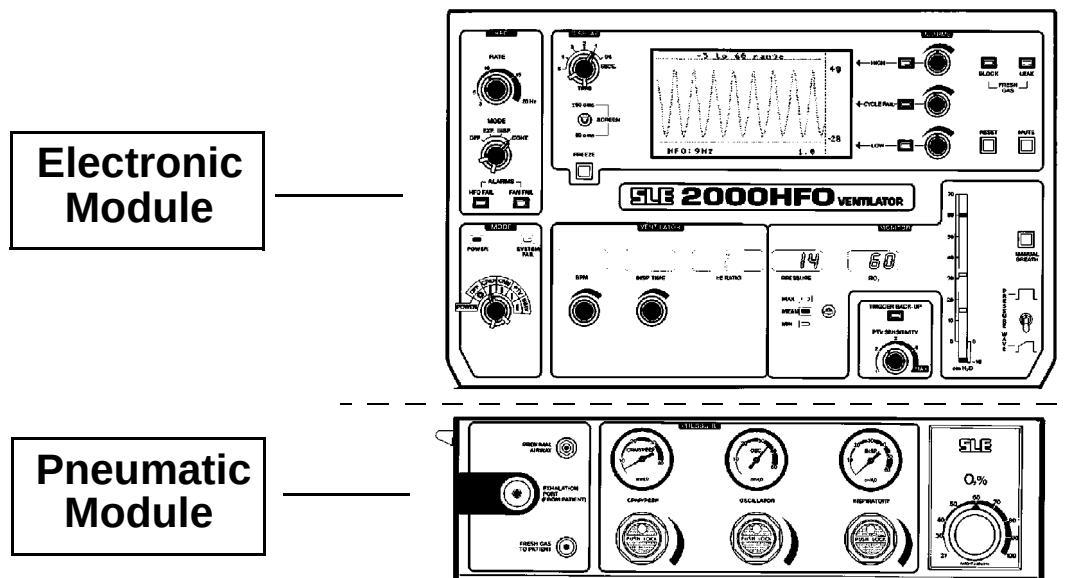
- 1) HFO Main Board Assembly (A0736/03)
 - 2) Ventilator CPU Board Assembly (A0702/04)
 - 3) Motor Drive Board Assembly (A0739/02)
 - 4) Alarm Board Assembly (A0738) (Not visible from drawing. - mounted on back panel.)
 - 5) Pressure Drift Monitor Assembly (A07450) (Not visible from drawing)
- Note: Boards 1,2, and 3 are polarised by the position of the edge connectors thus preventing the boards being inserted into the wrong sockets.

Access to Internal Components

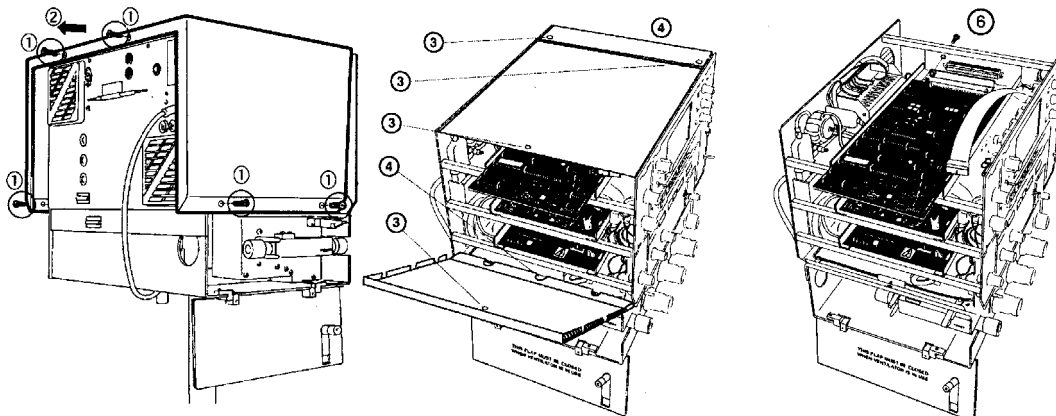
3. Access to the SLE2000 HFO

Caution: All electrical and pneumatic connections must be disconnected before attempting to gain access to either the Electronic or Pneumatic modules.

The SLE 2000 HFO consists of two linked modules, Electronic and Pneumatic

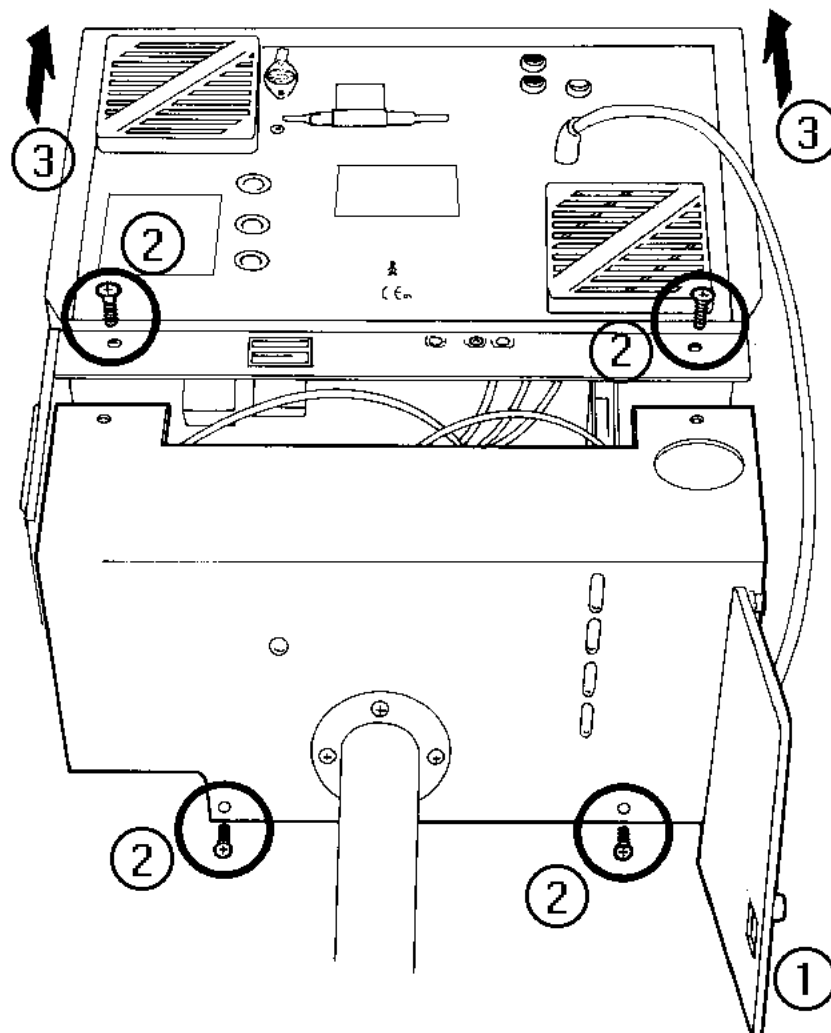


3.1 Electronic Module



1. Remove 2 screws at rear and 2 screws at either side of the unit.
2. Slide top cover to the rear and remove.
3. Remove these four screws from EM shielding.
4. Loosen these screws on either side of unit (one of them is not visible from the drawing).
5. Remove EM shielding taking care not to damage metal contact fingers on front edge of plates.
6. To remove the PCB assemblies, remove retaining thumbscrews (one for each board) next to the edge connector.
7. Disconnect all pneumatic and electrical connections to the board and pull board out.

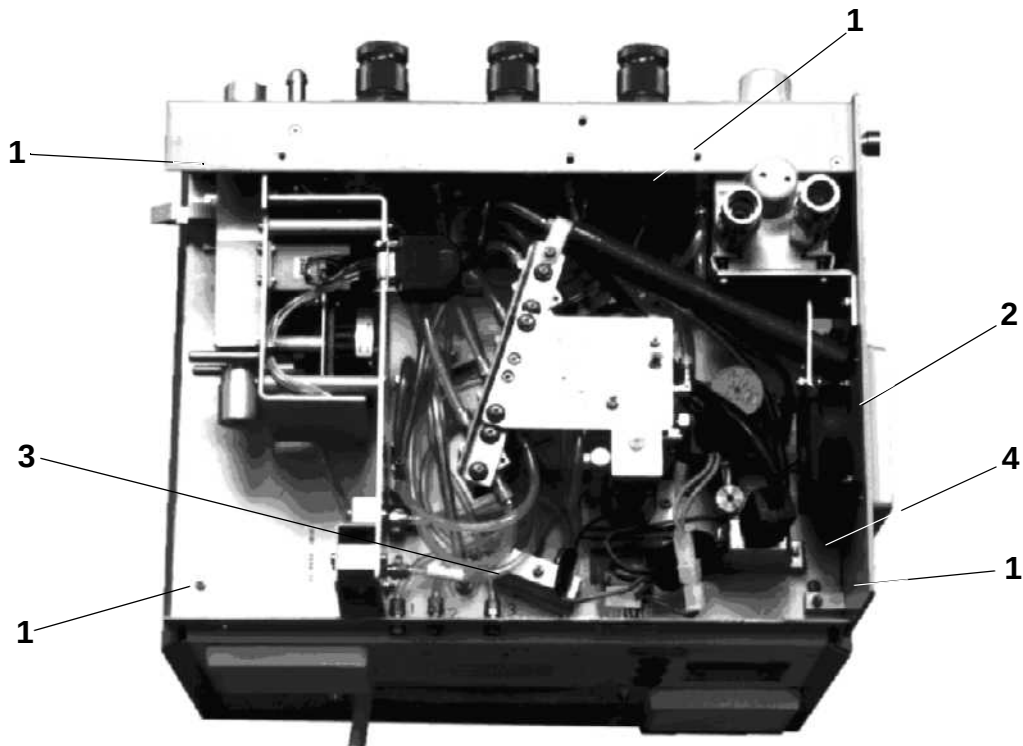
3.2 Pneumatic Module



1. Open side flap.
2. Remove 2 screws at rear and 2 screws at base of unit.
3. Lift complete unit from base.

The unit can then be placed on the work surface upside down. (See section 3.3 on page 20)

3.3 Separating the two modules

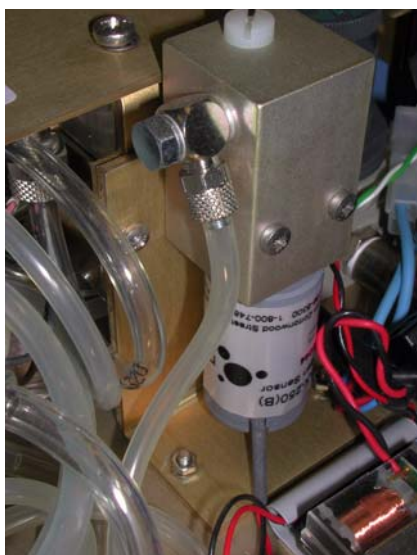


Invert the ventilator to gain access to the base of the pneumatic unit (see section 3.2 on page 19).

1. Remove the four screws
2. Remove proximal airway pressure tube connection
3. Remove fresh gas monitoring tube connection
4. Loosen both locking screws and disconnect 25 way plug.

It is now possible to separate the pneumatic module from the electronic chassis.

3.4 Removal of the oxygen cell



Screw In



Trapped

There are two types of oxygen cell fittings. Screw in and Trapped.

3.4.1 Screw in method

1. Gain access to the pneumatic module (see section 3.2 on page 19).
2. Release the electrical connector from the plastic clip and disconnect.
3. Remove the two screws retaining the manifold and lift the assembly clear.
4. Unscrew the old cell.
5. Remove protective tape from the gas inlet of the replacement cell.
6. Screw in the replacement cell (finger tight).
7. Replace the manifold using the two retaining screws.
8. Reconnect plug and socket and place back in plastic clip.
9. Calibrate the oxygen cell (see section 11.5.1 on page 47).

3.4.2 Trapped Method.

1. Gain access to the pneumatic module (see section 3.2 on page 19).
2. Release the electrical connector from the plastic clip and disconnect.
3. Remove the two screws retaining the manifold and lift clear.
4. Check that the "O"ring on the spigot on the manifold is in good condition — replace if necessary (Part N°. N2213)
5. The replacement cell (Part N°. N2191) is supplied with a foam pad attached to the base. Ensure that any remains of used pad are removed from recess in mounting base.
6. Place new cell in recess in mounting base with connecting wires to rear of machine.
7. Remove protective tape from gas inlet and engage with spigot on manifold.
8. Replace two retaining screws.
9. Check that cell is held firmly against manifold spigot without free movement.
10. Reconnect the electrical connector and place it back in plastic clip.
11. Calibrate the oxygen cell (see section 11.5.1 on page 47).

3.5 Removal of the motor assembly

Firstly gain access to the pneumatic module (see section 3.2 on page 19)

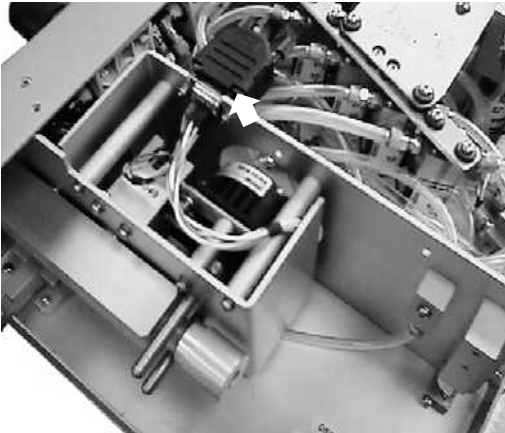
3.5.1 Motor assemblies

The SLE 2000 HFO ventilator has three models of motor assembly, Part N° N2524, N2524/01 and N2524/02. The first step is to ascertain which motor assembly is fitted to your ventilator. The difference between the /01 and the /02 motor assemblies is the /02 assembly has a bevelled face on the rotating jet. This indicates that the motor assembly has HFO NEEP.

The method of identifying which motor assembly is fitted is as follows.

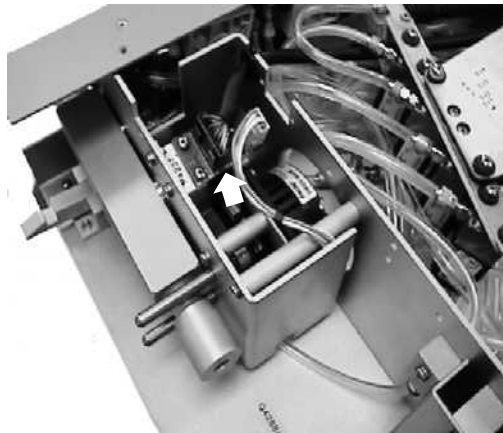
The N2524 motor assembly is connected to the ventilator via a 9 pin D connector (See photograph A). The N2524/01 & N2524/02 motor assembly is connected to the ventilator via a 8 way Molex connector (See photograph B).

N2524 Motor assembly



Photograph A

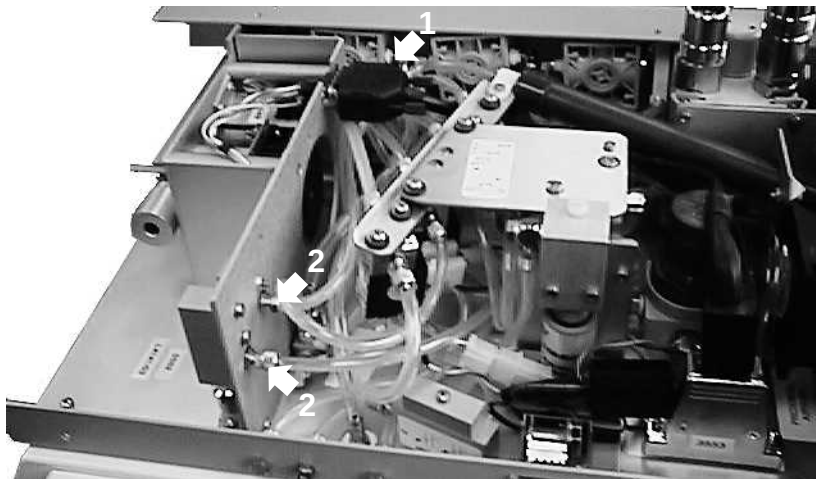
N2524/01 & N2524/02 Motor assembly



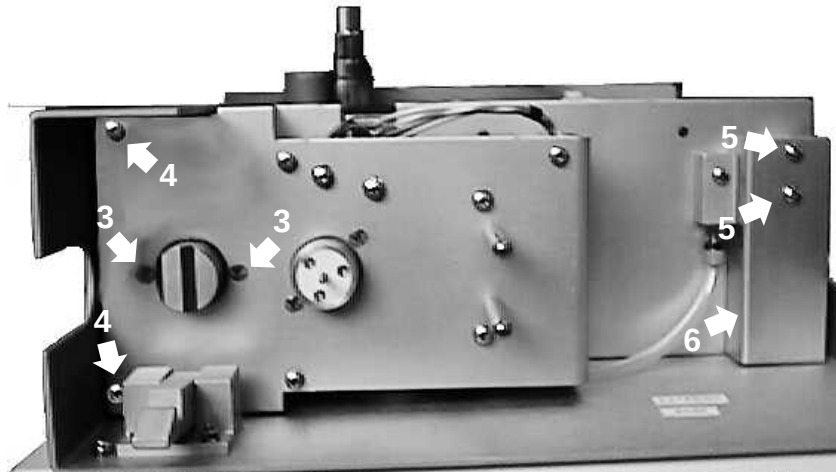
Photograph B

3.5.2 Removal of N2524 motor assembly

1. Release 2 screws on the 9 pin D connector (1) and unplug connector.
2. Fully unscrew the retaining nuts on the two pneumatic connectors (2) and remove the two tubes. Note that one of the connectors is marked for identification on re-assembly.



3. Remove the 2 screws (3) securing the orifice block.



4. Remove the 2 screws (4) retaining the motor assembly.
5. Remove the 2 screws (5) retaining the cover plate (6) and lift clear
6. Remove the final screw (7) retaining the motor assembly

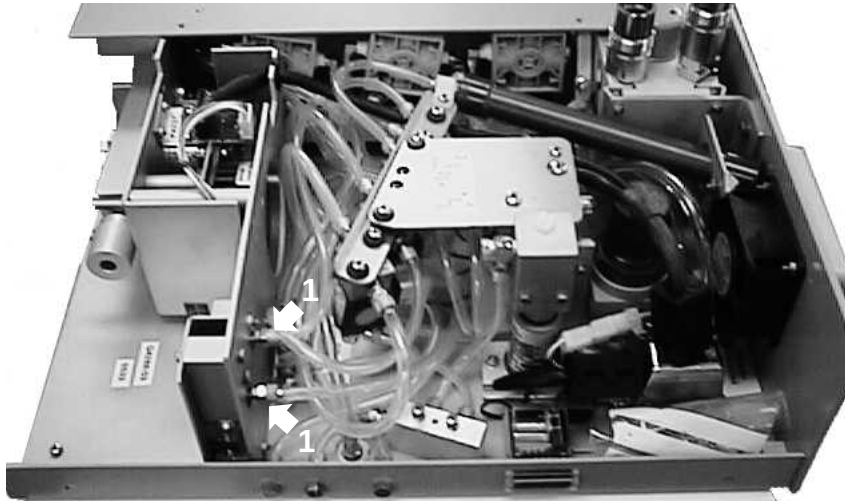


7. Remove the sub-assembly by tilting the top towards you.
8. Replace sub-assembly in reverse order.

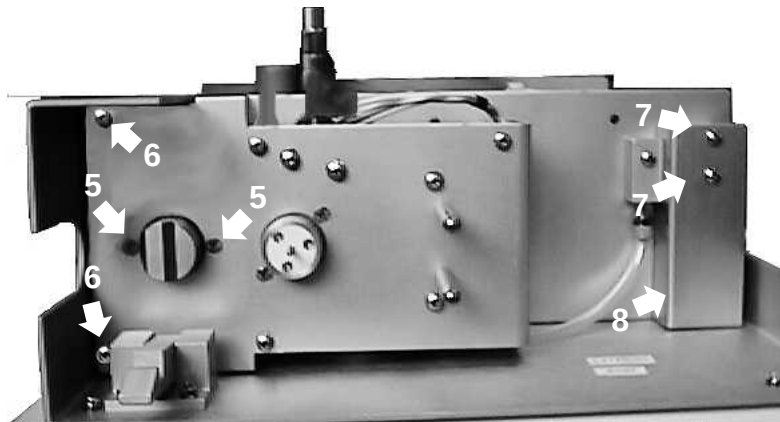
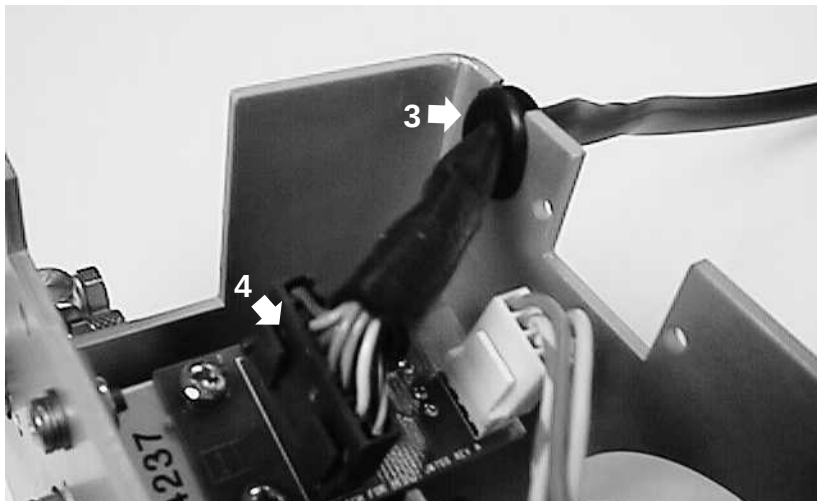
The sub assembly Part No. N2524 is available as a service exchange part.

3.5.3 Removal of N2524/01 or N2524/02 motor assembly

1. Fully unscrew the retaining nuts on the two pneumatic connectors (1) and remove the two tubes. Note that one of the connectors is marked for identification on re-assembly.



2. Pull out the grommet retaining the loom (3) and disconnect the 8-way Molex connector (4).



3. Remove the 2 screws (5) securing the orifice block
4. Remove the 2 screws (6) retaining the motor assembly.
5. Remove the 2 screws (7) retaining the cover plate (8) and lift clear
6. Remove the final screw (9) retaining the motor assembly



7. Remove the sub-assembly by tilting the top towards you.
8. Replace sub-assembly in reverse order.

The sub assembly Part No. N2524/01 and N2524/02 is available as a service exchange part.



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Maintenance



4. Cleaning, Disinfection and Sterilization

All cleaning, disinfection and sterilizing should be carried out under the direction of the appropriate hospital authority.

DO NOT allow moisture to enter the electronic module or its electrical sockets. Electronic malfunction may result.

DO NOT steam autoclave the SLE 2000 HFO or otherwise subject it to temperatures above 62°C.

DO NOT immerse any part of the SLE 2000 HFO in any liquid, with the exception of the expiratory exhalation block (SLE part No N0635).

4.1 Preparation of a new ventilator

Remove all transit packaging. Inspect the fresh gas port and proximal airway port for any packing material. (Retain packaging for future use as the ventilator must be returned in its original box).

Remove the protective film from the LCD screen.

Clean, disinfect and sterilize in accordance with the instructions in section 4.2 .

Remove the inlet air and O₂ gas port caps. (Retain for future use).

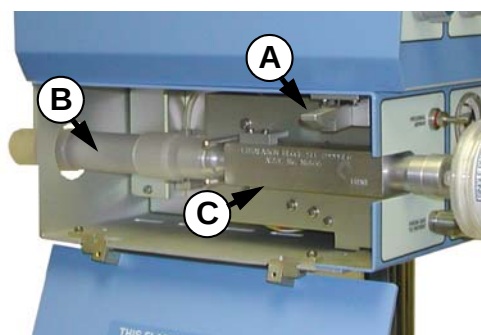
4.2 Cleaning and disinfection of an in-service ventilator

The table 1 outlines the areas of the ventilator which can be uniquely cleaned, disinfected and sterilized.

Before cleaning or disinfecting the exterior of the ventilator the following tasks should be performed:

- The mains cable should be disconnected from the mains supply.
- Remove the patient circuit and bacterial filters. Discard any single use items as per appropriate hospital authority guidelines. Reusable items should be processed as per appropriate hospital authority guidelines and the manufacturers instructions.
- Disconnect the gas supplies from the wall outlets.
- Disconnect the Oxygen and Air hoses from the ventilator and cap the inlet ports.

- Lift up lever (A) on side of ventilator and lower side flap.
- Remove the silencer (B) by pulling it through the hole at the rear.
- Remove the exhalation block (C) by firstly taking hold of the block and then pulling it out towards you without the need for undue force.



Refitting the silencer and exhalation block is the reversal of removal. **Do not force the exhalation block into place.**

4.2.1 Cleaning, Disinfection & Sterilization chart

Item	Clean	Disinfect	Sterilize
Ventilator	Yes	Yes	
Silencer			Yes
Exhalation block	Yes	Yes	Yes

Table 1

Warnings (General): Do not insert any object (such as a needle) in to the gas ports. This action will result in damage to the port. If the user believes there is a foreign object in a gas port, please refer the ventilator to qualified service personnel for inspection and repair.

Note: The silencer should be autoclaved only. If the silencer is found to have visual contamination internally, discard and replace with a new silencer.

4.3 Cleaning method

Note: Cleaning is an essential prerequisite to disinfection and sterilization.

Ventilator. For cleaning use three clean, disposable, absorbent, non-shedding cloths. Wipe clean with the first cloth using a hand hot water/mild general purpose detergent solution (as prescribed by the appropriate hospital authority). Do not overload the cloth with liquid. Remove the water/mild general purpose detergent solution with the second cloth using water only. Do not overload the cloth with liquid. Wipe dry with the remaining cloth. Care should be taken to ensure that the ventilator gas jets in the ports are not blocked by any debris.

Exhalation block. The exhalation block can be immersed and agitated in the detergent solution. Do not insert any objects into the exhalation block. Rinse the exhalation block in clean water, it must be allowed to dry thoroughly before sterilization.



Warning: Ensure that the detergent solution or water does not enter the unit or the exhalation block gas ports on the side of the machine.

4.4 Disinfection method

Note: Alcohols such as 70% isopropanol have a good activity against bacteria and viruses. They should only be used after all visible surface dirt has been removed from the area to be disinfected.

Ventilator. For disinfection use two clean, disposable, absorbent, non-shedding cloths. Wipe clean with the first cloth using Alcohol (70% isopropanol). Wipe dry with the remaining cloth.

Exhalation block. The exhalation block can be immersed in Alcohol (70% isopropanol). The exhalation block must be allowed to dry thoroughly before sterilization.

4.5 Sterilization method

The silencer SLE part N° N2186 and exhalation block SLE part N° N0635 must be sterilized between use on patients. The ventilator cannot be sterilized.

The exhalation block must be cleaned as an essential prerequisite to sterilization.

Autoclave with pure dry saturated steam at:

134°C (277°F) (Allowable variation of temperature of +3°C) at 220kPa (32psi) with a minimum holding time of 3 minutes

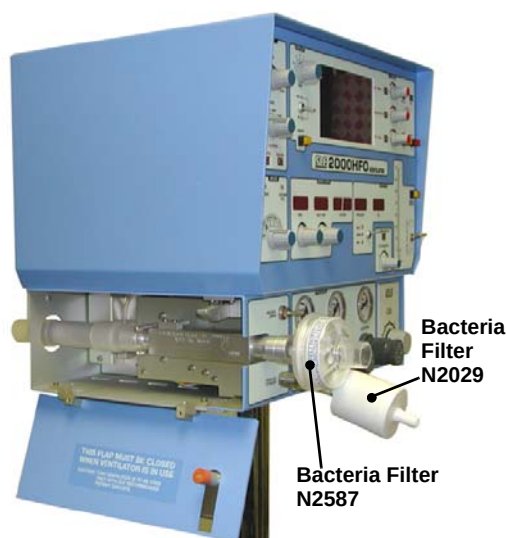
or

121°C (248°F) (Allowable variation of temperature of +3°C) at 96kPa (14.1psi) with a minimum holding time of 15 minutes.

There is no limit on number of autoclave cycles for the exhalation block.

The silencer can be autoclaved up to 20 times. The body of the silencer should be marked after each autoclave cycle with a high temperature, water proof, permanent marker to indicate number of sterilization cycles completed.

5. Filter Systems



It is recommended that bacteria filters are fitted in the fresh gas supply and on the patient side of the exhalation block.

The filters reduce the possibility of infection to the patient and contamination of the ventilator from secretions or fluids in the breathing circuits that could accidentally enter the ventilators gas ports.

It is recommended that a silencer be fitted on the exhaust side of the exhalation block, this helps to reduce the noise level of the system.

The SLE2000 HFO can be used without bacterial filters in place, but the user must take extra care in

not allowing secretions or fluids to enter the ventilators gas ports.

5.1 Bacterial filter, SLE Part N°:N2029 (Autoclavable)

This autoclavable bacterial filter is fitted into the humidifier supply line and has to be fitted in accordance with the indicator arrow embossed on the surface of the filter.

Do not immerse the filter in any liquid.

Autoclave with pure dry saturated steam at:

134°C (277°F) (Allowable variation of temperature of +3°C) at 220kPa (32psi) with a minimum holding time of 3 minutes

or

121°C (248°F) (Allowable variation of temperature of +3°C) at 96kPa (14.1psi) with a minimum holding time of 15 minutes.

The filter can be autoclaved a maximum of 25 times within its anticipated service life of 12 months. For other makes of bacterial filter please refer to manufacturers instructions.

5.2 Bacterial filter, SLE Part N°:N2587 (Single use)

This single use bacterial filter is fitted onto the exhalation block outlet. This filter should be disposed of in accordance with local hospital authority guidelines. A new filter should be used for every new patient.

5.2.1 Precautions when using bacterial filter N2587

The user should be aware that any occlusion of the filter increases the resistance to airflow, resulting in increased or erratic airway pressures. Airway pressures should be monitored during use and the filter changed if found to be contaminated in any way. When using humidification the filter should be checked regularly for signs of water build up which could cause occlusion.

6. Maintenance

6.1 Monthly Operational Checks

6.1.1 Battery condition and LED display test.

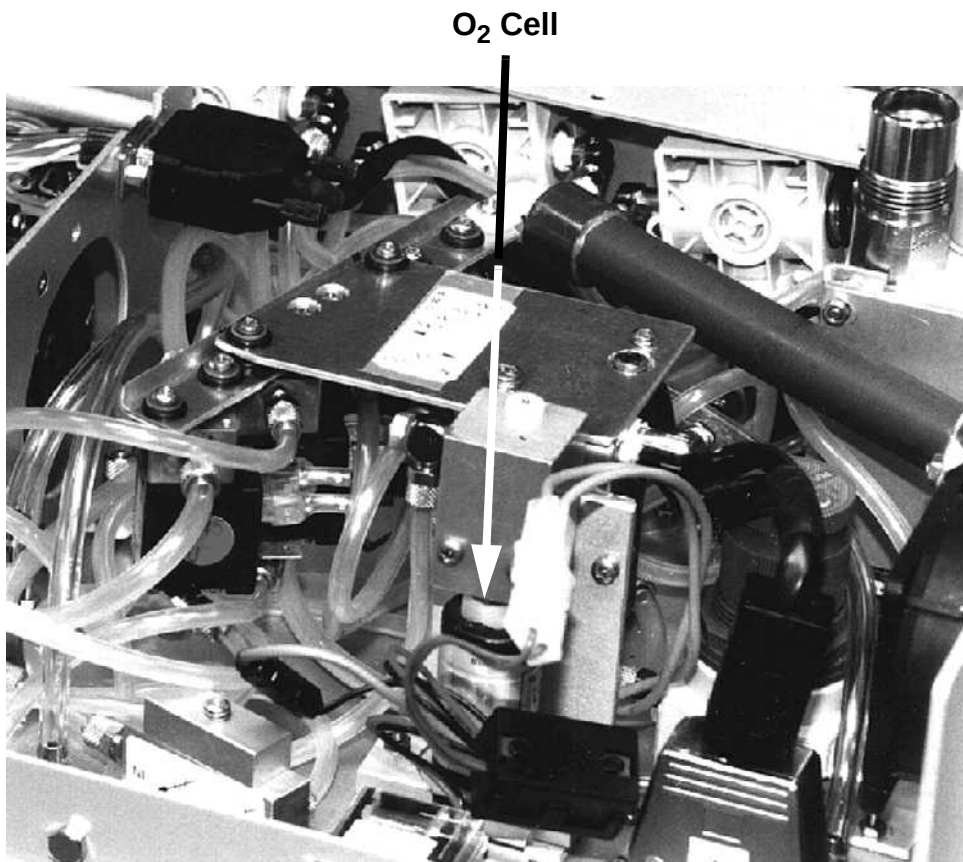
Switch unit to CPAP position. All alarms should sound for two seconds. All digital displays should show a sequence of digits from 0 to 9 and all alarm LED's (except the HFO fail and Block LED) will be on for the duration of this test.

6.1.2 Air and Oxygen Supply Failure Alarm test.

With the FIO₂ blender set to 60% remove in turn both air and oxygen supplies. Check that in each case the alarm sounds, and on replacement the alarm cancels.

6.1.3 Condition of O₂ Cell

Set blender to 21% and remove O₂ supply. Observe that displayed FIO₂ is 21%. Reconnect O₂ supply and remove air supply. Set blender to 100% and observe that displayed FIO₂ is 100% (for adjustment see section 11.5.1 on page 47). If the required value cannot be set within 4% or the reading is unstable then replace the cell. For the removal of the oxygen cell see section 3.4 on page 21.



6.1.4 Inspiratory Nozzle

Set ventilator to CMV, 60BPM, 0.5 sec inspiration time. Set a driving gas pressure to read 40cmH₂O. Peak inspiration pressure should be between 37 and 43 cmH₂O.

6.1.5 CPAP pressure check

Set ventilator to CPAP, HFO mode off. Check that the CPAP pressure regulator can be set up to produce a pressure of at least 35 cmH₂O.

6.1.6 HFO pressure check

Check that the Oscillator pressure regulator can be set up to produce a peak to peak pressure of 90 cmH₂O with the ET tube in the patient circuit occluded and the HFO rate set to 3Hz.



6.2 Servicing

A service should be completed every 6 months. This maintenance is intended to be carried out in the hospital.

Service of this ventilator should only be carried out by an SLE trained hospital engineer or an SLE service engineer. The ventilator is fitted with a time elapsed meter to assist in checking operational use and service periods. Times should be noted when any service or major component replacement is carried out on the individual units.

Preventative Maintenance will include:

- Visual inspection and cleaning of all exterior surfaces, controls, attachments and accessories.
- Removing of the covers and cleaning all dust from the interior of the unit.
- Replacement of all 3 cooling fan filters. (Two mounted on the back panel and one on the side). Access to the filters is gained by un-clipping the fan covers.
- Visual inspection of all tubing, electrical wiring, connectors, crimps, screws, nuts, hardware and check the general condition of all other internal components and assemblies.
- Inspection of the mains failure battery holder for corrosion and replacement of the battery.
- Pneumatic and electronic testing and where necessary calibration of ventilator.

Overhaul



7. Overhaul

Overhaul should be carried out at a maximum of 10,000 hours operation or every two years of service whichever is sooner. This overhaul will be performed by an SLE trained hospital engineer or an SLE service engineer at SLE.

The overhaul will include:

- Replacement of oxygen monitor cell if not replaced during last 12 months;
- Replacement of oxygen blender (Service exchange unit- N2185/02);
- Replacement of inspiratory solenoid SV1;
- Replacement of INSPIRATORY, CPAP and OSCILLATOR regulators;
- Replacement of motor assembly (Service exchange unit- N2524 or /01 or /02);

Check operation and general condition and replacing where necessary the following components:

- Solenoid valves SV2, SV3 and SV5;
- Tubing and connectors;
- Battery holder;
- Alarm sounders;
- Mode, wave shape, frequency range switches;
- Pressure relief valve.

Re calibration and testing which will include:

- A 24 hour monitored soak test with the ventilator connected to air and oxygen before a calibration verification.

On completion of the verification the ventilator is ready to be returned to service.

SLE offer an exchange service for the pneumatic module and the motor assembly.

Exchanging a Pneumatic Unit

8. Exchanging a Pneumatic Unit

The following details how to exchange the pneumatic unit of the SLE 2000 HFO.

Firstly gain access to the ventilator (See section '3. Access to the SLE2000 HFO' on page 18) and remove the pneumatic unit (See section '3.3 Separating the two modules' on page 20).

Re-fit the new pneumatic unit (the reverse of removal).

Once the ventilator has been re-assembled carry out the following steps from the Setup and Calibration chapter of this manual.

All of Section 10. Step 1: Pneumatic Module Initial Setup on page 40

Carry out the following sections from Section 11. Step 2: Electronic Module Setup on page 41

Section 11.2.2 U18/26(ADC) on page 42

Section 11.2.3 Buffered transducer output on page 42

Section 11.2.4 Fresh Gas Block and Leak Alarm on page 43

Section 11.2.6 Maximum Inspiration Time on page 44

Section 11.3 Motor Drive Board (A0739/02) on page 45

Section 11.4.1 Scaling of pressure LCD display on page 45

Section 11.4.4 Motor Stall Alarm on page 46

Section 11.4.5 Fan Fail Alarm Verification on page 46

Section 11.4.6 HFO Rate Display on page 47

Section 11.5.1 Oxygen Calibration on page 47

Section 11.6 Pressure Drift Monitor Board (A0745) on page 48

All of Section 12. Stage 3: Pneumatic Module Final Setup on page 49

All of Section 13. Operational Verification on page 50

Once complete, soak test the ventilator for 24 hours before return to service.

Setup and Calibration



9. SLE 2000 HFO Set up and Calibration

9.1 Recommended Equipment

The following equipment is recommended to perform this calibration procedure;

1. A Standard SLE Patient Circuit (N2029)
2. A Test Lung.
3. A Calibrated 20MHz+ Storage Oscilloscope.
4. A Calibrated DVM able to resolve 1mV.
5. A Calibrated RT200 Calibration Analyser or equivalent.
6. A 50ml syringe.
7. A 2ml syringe.
8. A calibrated oxygen analyser able to resolve 0.5% O₂.
9. Flow regulator assembly. This item is made up from 3 pieces of flexible tubing, a 'Y' piece connector, a 0-2 bar relieving regulator and applicable hose adaptors. See section 11.2.4 on page 43 for details of configuration.
10. A dummy load resistor of 15 Ohms, 1.5W

Note: All voltage measurements are to a tolerance of $\pm 1\text{mV}$ unless otherwise stated. All pressure measurements are to a tolerance of $\pm 1\text{mmH}_2\text{O}$ unless otherwise stated.

10. Step 1: Pneumatic Module Initial Setup

Connect ventilator to air and oxygen supplies. With a standard patient circuit fitted and with the electronic module switched to CPAP mode. Set HFO mode OFF and blender to 21%. Then wait approximately 15 minutes for the ventilator to stabilize before continuing.

10.1 Internal Pressure Regulator

Monitor the fresh gas pressure regulator output using the test point provided and adjust output of regulator (REG. 3) to $10\text{psi} \pm 0.5\text{psi}$.

10.2 O₂ Cell Flow Needle Valve

Monitor flow at the outlet on the base of the machine. Ensure that the oxygen cell is fitted securely and there are no leaks at its seating. Adjust and set needle valve NV2 to $7\text{LPM} \pm 0.25\text{LPM}$.

10.3 Fresh Gas Flow Needle Valve

Monitor flow from the fresh gas outlet port on the front panel, and adjust flow needle valve NV1 to give a flow at this port of $5.2\text{LPM} \pm 0.25\text{LPM}$. ($5\text{LPM} \pm 0.25\text{LPM}$ for version 2 proximal airway purge and ventilators with no proximal airway purge.)

With mode switch in OFF position check that Fresh Gas Flow at Fresh Gas Port is 0.8 to 1.2 LPM.

Once complete verify that the internal pressure regulator and O₂ cell needle valve are still within specification.

11. Step 2: Electronic Module Setup

11.1 Power Supply Unit

11.1.1 Voltage verification and setting

Check the following pin voltages with mains applied to the unit.

Measure between pins;	Voltage
1(GND) and 3 on PSU:	+5.12V $\pm$ 0.1V (see below for adjustment)
1(GND) and 9 on PSU:	+12V $\pm$ 0.36V
1(GND) and 13 on PSU:	+24 $\pm$ 0.5V

11.1.1.1 Adjustment of power supply voltage

Caution: Use a insulated screw driver to adjust R26. R26 is located on the left hand side, half way down within the power supply housing (When viewed from the front.)

Remove board A0736 and insert the dummy load resistor (15 Ohms 1.5W) between PLA 1a/b and PLA pin 32a/b. Monitoring the voltage between pin PLA pin 1a/b on the PSU and pin PLA 32a/b on the PCB connector for the top board (A0736), adjust the preset R26 on the power supply unit to give a voltage of **+5.12V $\pm$ 0.01V**. When set remove the dummy load resistor and re-insert the A0736 board.



11.2 Ventilator CPU Board (A0702/04)

To work on the A0702/04 CPU board requires removal of the A0736/03 board. Removal of the A0736/03 board cause's the supply voltage to rise. It is necessary to insert the dummy load resistor (15 Ohms 1.5W) between PLA pin 1a/b and PLA pin 32a/b to mimic the power drain of the removed board.

11.2.1 System Watchdog

Note: This is factory set and should not normally require adjustment on service.

Monitor (U3) pin 11. By adjusting RV10 ascertain the two points where the voltage falls from 5.12V to 0V, then set RV10 to midway between these positions and ensure that the voltage on (U3) pin 11 is a continuous +5.12V.

11.2.2 U18/26(ADC)

Monitor U18/26 (ADC)

With PTR1 ports open to atmosphere adjust RV2 to give:	3.11V
Set up a pressure of	60cmH ₂ O
Adjust RV5 so that U18/26 is:	4.91V
Repeat the above until both voltages are within ±10mV	
Set up a pressure of:	-60cmH ₂ O
Check that U18 /26 is:	1.28V

11.2.3 Buffered transducer output

Monitor PLB/23b:

With PTR1 ports open to atmosphere adjust RV3 to give:	3.42V
Set up a pressure of:	60cmH ₂ O
Adjust RV4 to give:	6.42V
Repeat the above until both voltages are within ±10mV	
Set up a pressure of:	-60cmH ₂ O
Check that the buffered transducer output (PLB/23b) is:	0.42V±0.01V

11.2.4 Fresh Gas Block and Leak Alarm

Disconnect the Air and O₂ supply from the ventilator.

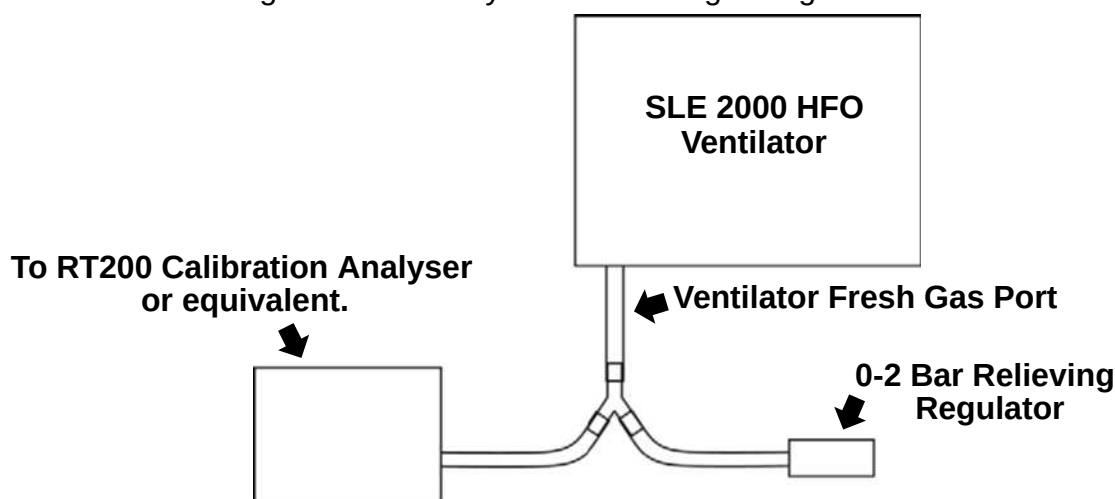
Connect DVM between pins 2 and 4 of PTR2

With PTR2 ports open to atmosphere adjust RV500 to give: $0.00V \pm 1mV$

Re-connect the Air and O₂ supply to the ventilator. Then wait approximately 15 minutes for the ventilator to stabilize before continuing.

Switch ventilator on to CPAP mode and confirm that fresh gas flow is :5L/min $\pm$ 0.25L/min

Connect the flow regulator assembly in the following configuration:



Create a pressure by adjusting the relieving regulator at the fresh gas outlet of:
 $17.5cmH_2O \pm 0.5cmH_2O$

Adjust RV501 so that the leak alarm and LED just trip on.

Create a pressure by adjusting the relieving regulator at the fresh gas outlet of:
 $80cmH_2O \pm 0.5cmH_2O$

Adjust RV502 so that the high pressure alarm and LED just trip on.

11.2.5 Patient Purge Pressure Display Compensation

For Version 1 and 2 of proximal airway purges.

Connect all gas supplies to the complete ventilator. Attach a full patient circuit with the ET connection open to atmosphere.

Set the pressure display switch to minimum (MIN). The pressure display should flicker around zero. Adjust RV2 to produce a steady zero display.

11.2.6 Maximum Inspiration Time

Select CPAP mode

With max. insp. time control turned fully clockwise adjust RV6 to display:3.00 secs.

11.2.7 Airway Trigger Calibration

Set up the ventilator electrically and pneumatically and fit a standard patient circuit with a 2ml syringe fitted to the ET manifold.

11.2.7.1 Post de-energisation delay

Note: Factory set and should not require adjustment

With a dual beam oscilloscope, connect channel 1 to U200/2 (inverted), channel 2 to U200/4. Timebase 100ms/cm, sensitivity 2V/div.
Set ventilator to CMV Mode, 60BPM, 0.5sec insp. time.
This will produce 2 positive going waveforms. Adjust RV200 so that the interval between the 2 positive going edges is 200ms±10ms.

11.2.7.2 Sensitivity preset adjustment

Note: Factory set and should not require adjustment

Switch ventilator into CMV mode. Adjust to 1BPM rate and insp. time of 0.5 secs. Set respiratory pressures of 30/0cmH₂O. Set High and CPAP alarms to 35 and -5 cmH₂O respectively. Turn PTV sensitivity control fully clockwise. Switch ventilator into PTV mode and slowly draw 2ml of air from the tracheal port at an approximate rate of 2ml per 1/2 second repeatedly.

Starting with RV202 in the fully clockwise position, adjust gradually anticlockwise until ventilator triggers reliably at this degree of inspiratory effort.

11.2.8 PTV sensitivity control

Replace 2ml syringe with 50ml syringe. Turn PTV sensitivity control fully anticlockwise. Slowly draw 10ml of air from the tracheal port at an approximate rate of 10ml per 1/2 second. Ensure that the ventilator triggers reliably at this degree of inspiratory effort.

Presets RV7, RV8 and RV9 should not be present on this board since these are for CPAP, Cycle Fail and High pressure limits and are now monitored by the HFO CPU PCB (A0736/03).

11.3 Motor Drive Board (A0739/02)

Switch HFO mode to EXP.

Turn motor speed control fully clockwise.

Monitor TP1 with a calibrated oscilloscope or calibrated timer/counter.

Adjust RV1 to produce a frequency of: 4KHz $\pm$ 40Hz (250ms $\pm$ 25ms)

Turn motor speed control fully anti-clockwise

Verify that frequency at TP1 is: 600Hz $\pm$ 60Hz(1.67ms $\pm$ 0.167ms)Factory set.

Connect a patient circuit and test lung to the ventilator.

Adjust HFO peak to peak pressure to: 20cmH₂O approx.

Monitor buffered transducer output using a calibrated oscilloscope.

Verify that minimum HFO rate is: 3Hz,333ms $\pm$ 3ms
and that maximum HFO rate is: 20Hz,50ms $\pm$ 0.5ms

11.4 HFO Main Board (A0736/03)

Connect Pressure source to port P2 on PTR1 (A0702/04 board).

11.4.1 Scaling of pressure LCD display

Whilst monitoring TP2

Set up a pressure of: 60 cmH₂O $\pm$ 0.5cmH₂O.
Adjust P14 to give: 4.63V $\pm$ 0.01V
Set up a pressure of: -60 cmH₂O $\pm$ 0.5cmH₂O
Confirm TP2 is: 0.28V $\pm$ 0.01V

Remove pressure source from PTR1 port P2.

Set low alarm to: 0 cmH₂O

Confirm that the displayed low alarm level coincides with the displayed pressure level.

Reconnect pressure source to PTR1 port P2.

Set high, cycle fail and low alarm controls fully clockwise. Switch ventilator to CMV mode.



Adjust P11 so that displayed high alarm level: 62 cmH₂O
Adjust P13 so that displayed cycle fail level: 50 cmH₂O
Adjust P12 so that displayed low alarm level: 40 cmH₂O
Confirm that the fresh gas dump solenoid is de-activated at a position above the high alarm setting of between: 0cm and 2cm

11.4.2 Bargraph Calibration

Set high pressure limit to: 60 cmH₂O
Set cycle fail pressure limit to: 30 cmH₂O
Set low pressure limit to: 0 cmH₂O

Remove pressure source from transducer.

Adjust P10 so that the illuminated segment represents: 0 cmH₂O
Adjust P9 so that the illuminated segment represents: 60 cmH₂O
Adjust P8 so that the illuminated segment represents: 30 cmH₂O
Adjust P7 so that the illuminated segment represents: 0 cmH₂O

11.4.3 One second timer

Monitor TP6 using a digital timer.

Adjust P15 to give a pulse repetition rate of : 1.000 sec $\pm$ 0.005 secs.

Press "Freeze" button and observe that freeze function unlatches at 1 minute $\pm$ 1sec.

11.4.4 Motor Stall Alarm

Switch to HFO Mode and set motor speed to : 3Hz

Adjust P2 so that the HFO fail alarm is activated. Then slowly adjust P2 back again so that HFO fail alarm is just de-activated.

Short out JP1 and check that the HFO fail alarm is activated and that the jet feed solenoid is de-energised in each instance.

11.4.5 Fan Fail Alarm Verification

Short out JP3 (emulating Fan2 fail) and JP4 (emulating Fan1 fail) in turn and verify that the fan fail alarm is activated in each instance.

11.4.6 HFO Rate Display

Ensure that the motor speeds have been calibrated before performing this adjustment.
Switch the HFO mode to continuous and ventilator mode to CPAP

- a) Turn motor speed control fully anti-clockwise. Adjust P3 to produce a displayed rate of: 3Hz
- b) Turn motor speed control fully clockwise. Adjust P4 to produce a displayed rate of : 20Hz

Repeat steps a and b until both displayed rates are correct.

11.4.7 HFO Alarm

Note: The HFO alarm setup only applies to ventilators using display firmware version 1.6 or lower. For ventilators using display firmware version 1.7 or above HFO alarm setup is not required.

Switch the HFO mode to EXP. Fit a patient circuit with the ET manifold occluded to the ventilator.

Adjust oscillator pressure to a peak to peak value of: $6 \text{ cmH}_2\text{O} \pm 0 \text{ cmH}_2\text{O}$
Adjust oscillator frequency to: $3\text{Hz} \pm 0 \text{ Hz}$

Adjust P5 fully clockwise.

Adjust P6 so that the cycle fail alarm is just activated.

Increase oscillator pressure to a peak to peak value of: $8 \text{ cmH}_2\text{O} \pm 0 \text{ cmH}_2\text{O}$

Cycle fail alarm should be de-activated.

11.5 Alarm module and oxygen conditioning circuit (A0738/02)

11.5.1 Oxygen Calibration

a) With blender set to 100% Oxygen connect Oxygen supply only to ventilator. Adjust 100% Oxygen preset on back panel of ventilator so that displayed FIO_2 is 100%.

b) Set blender to 21%. Connect air supply only to ventilator. If necessary, adjust RV2 so that displayed FIO_2 is 21%.

Repeat steps a) and b) until both displayed values are correct.

11.5.2 Alarm sounder volume

Set up an alarm condition on the ventilator.

Adjust RV1 to an acceptable alarm volume, bearing in mind that the alarm will sound slightly weaker when the cover is fitted.

11.6 Pressure Drift Monitor Board (A0745)

Procedure depends on which issue of board is fitted.

Issue 1

(recognisable as only having two potentiometers)

Pay special attention to the indicated polarities when measuring voltages.

- a) Set the DC voltage between (High) (+) and (Low)(-) to +180mV $\pm$ 5mV using RV1.
- b) Set the DC voltage between (High) (+) and (Diff)(-) to +90mV $\pm$ 5mV using RV2.
- c) Repeat steps a) and b) until both voltages are correct to within $\pm$ 5mV.
Verify that the DC voltage between (Diff)(+) and (Low)(-) is +90mV $\pm$ 5mV.

Issue 2

(recognisable as only having three potentiometers)

- a) Whilst monitoring the DC voltage at DIFF, vary the pressure to the proximal airway port over the complete range (approx +60 to -60cmH₂O).
Adjust RV3 until the voltage measured at DIFF is the same at +60cmH₂O as it is at -60cmH₂O to within 20mV. (DIFF should be in the region of 8V).

Pay special attention to the indicated polarities when measuring voltages.

- b) Set the DC voltage between (High) (+) and (Low)(-) to +180mV $\pm$ 5mV using RV1
- c) Set the DC voltage between (High) (+) and (Diff)(-) to +90mV $\pm$ 5mV using RV2
- d) Repeat steps a) and b) until both voltages are correct to within $\pm$ 5mV
Verify that the DC voltage between (Diff)(+) and (Low)(-) is +90mV $\pm$ 5mV

12. Stage 3: Pneumatic Module Final Setup

Monitor the proximal airway pressure with a standard test manometer. With the PIP regulator turned fully anticlockwise, turn CPAP regulator fully clockwise and ensure that the CPAP pressure exceeds 35cmH₂O. Turn CPAP regulator fully anticlockwise and check that the airway pressure is now less than 1cmH₂O.

Set high pressure alarm fully clockwise. Turn PIP regulator to its maximum clockwise position and the CPAP regulator fully anticlockwise. With air and O₂ pressures at 4Bar and the inspiration time control set to 3.0 seconds, press the manual breath pushbutton and ensure that the PIP pressure exceeds 60cmH₂O. Then reduce air and O₂ input pressures to no greater than 3.5Bar ensuring PIP pressure is at least 50-52cmH₂O.

Connect oxygen analyser to fresh gas supply and by adjusting the blender control in 10% steps, verify that the oxygen output is accurate to within $\pm 3\%$ of each step. With the blender set to 60% O₂, increase the air supply pressure to the ventilator and note that the blender alarm is activated when air pressure is approximately 30psi greater than O₂ pressure. Gradually reduce air pressure until the alarm is de-activated. Note that O₂ concentration is between 57% and 63%. With the blender set to 60% O₂, decrease the air supply pressure to the ventilator and note that the blender alarm is activated when the air pressure is approximately 30psi less than O₂ pressure. Gradually increase air pressure until the alarm is de-activated. Note that O₂ concentration is between 57% and 63%. Restore air pressure to 4 Bar.

Remove test lung from patient circuit and occlude the ET port. Switch to HFO expiratory mode. Select an oscillatory rate of 3Hz, and turn the oscillator pressure regulator fully clockwise. Verify that the resulting pressure wave as viewed on the LCD display is at least ± 45 cmH₂O in amplitude.

Loosen the two screws locating the tachometer chopper wheel bracket. With the HFO still running, adjust the assembly up and down in its slots to establish the two positions where the pressure wave is de-activated by SV4. Position the assembly half-way between these limits and re-tighten the bracket screws.

Reduce the oscillator pressure to ± 10 cmH₂O and adjust the oscillator frequency to 10Hz. Refit the test lung to the patient circuit and set the ventilator to CMV. Verify that solenoid valve SV4 operates to provide oscillation during the expiratory phase of the breath only. Switch to HFO inspiratory mode and verify that oscillation occurs during the inspiratory phase of the breath only. Finally, check for continuous oscillation (i.e. in both expiratory and inspiratory phases) when switched to HFO continuous mode.



13. Operational Verification

13.1 Basic Operation

With mains power connected and a standard patient circuit with test lung attached, switch unit on and observe that:

- 1) All audible alarms sound for approximately 2 seconds.
- 2) All warning LED's except 'BLOCK' and 'HFO FAIL' are activated for approximately 2 seconds
- 3) All 7 Segment displays increment from 0 to 9 (Check all segments are operative)
- 4) LCD firmware initialises & displays SLE logo.
- 5) With mode switch set successively in CPAP, CMV, PTV, and SIMV, disconnect the mains supply & confirm that the Mains Failure audible alarm is activated in each position. On completion re-apply mains power.
- 6) By shorting together both pins of XL1 on the A0702/04 PCB, check operation of the processor watchdog timer by observing a processor reset function together with audible and visual alarms.
- 7) By shorting together both pins of XTL1 on the A0736 PCB, check operation of the processor watchdog timer by noting audible & visual alarms. Select CPAP mode, HFO OFF.
- 8) Check operation of MANUAL BREATH push-button, and by adjustment of INSP TIME control confirm that a range of inspiratory times from 0.1 sec. to 3.0 sec. shall be obtained, and that this adjustment can be monitored on the INSP TIME display.
- 9) Check that no mandatory breaths are present other than those produced by the MANUAL BREATH push-button.
- 10) Switch HFO successively to EXP, INSP, and CONT.modes. Ensure that manual breaths are not delivered in any HFO modes but OFF.
- 11) Set pressure display switch to MIN position. By selecting a range of inspiratory pressures from 0 cmH₂O to 60 cm H₂O in 10 cmH₂O steps, ensure accuracy of digitally displayed pressure to less than 1 cmH₂O error against an RT 200 reference.
- 12) By adjusting HIGH alarm setting to displayed inspiratory pressure, and operating MANUAL BREATH push-button, observe that inspiratory plateau on LCD pressure display and bargraph display correspond with alarm line and LED Segment, respectively.
- 13) Check that HIGH audible and visual alarm operates at pressures above or at HIGH alarm setting, and fresh gas solenoid is de-energized at pressures greater than 2cm above HIGH alarm setting.

-
- 14) By selecting a range of CPAP pressures from 0 cmH₂O to 30 cmH₂O in 10 cmH₂O steps, and adjusting the CPAP alarm setting to the CPAP pressure, observe that the displayed CPAP pressure plateau and bargraph display correspond with alarm line and LED Segment, respectively.
 - 15) Check that CPAP audible and visual alarm operates at pressures at or below CPAP alarm setting.
 - 16) With a CPAP alarm condition present, check that on pressing the MUTE button, the audible alarm is muted and the MUTE LED is activated for a period of one minute unless cancelled by the RESET button.
 - 17) Check that the RESET button cancels the MUTE function and resets all latched warning LED's.
 - 18) Set Pressure Display Switch to MEAN position. Select a CPAP pressure of 0 cmH₂O, and an INSP pressure of 20 cmH₂O. Select an INSP TIME of 0.5 seconds. Repeatedly press the MANUAL BREATH push-button at approximately 1 second intervals, to cycle ventilator and observe that the digitally displayed MEAN pressure gradually rises to 10 cmH₂O in a period of 30 seconds.
 - 19) Select CMV mode, HFO off. Set a CPAP pressure of 0 cmH₂O, and an INSP pressure of 20 cmH₂O. Set an INSP time of 0.5 seconds, and a CMV rate of 60 BPM. Set CYCLE FAIL alarm level to 10 cmH₂O, HIGH alarm level to 30 cmH₂O and CPAP alarm level to -5 cmH₂O. Press reset button, observe that the displayed pressure wave crosses the CYCLE FAIL alarm setting on the LCD display and bargraph, and that no alarms are present. Disconnect the proximal airway pressure monitoring tube from the pressure port and check that a CYCLE FAIL audible and visual alarm is activated. Replace the tube and observe that the audible alarm cancels, and that the latched LED is cancelled on pressing the RESET button.
 - 20) Select CPAP mode, HFO in EXP mode. Set an HFO frequency of 10 Hz, and turn HFO pressure control fully anticlockwise, so that no HFO pressure modulation is present. Check that a CYCLE FAIL audible and visual alarm is activated. Gradually introduce HFO pressure modulation and check that the audible alarm cancels at an HFO pressure of 4 cmH₂O peak to peak and that the latched LED is cancelled on pressing the RESET button.
 - 21) Set HFO to CONT mode and repeat previous test.
 - 22) Check that in HFO INSP mode, there is no HFO modulation and no CYCLE FAIL alarm.

13.2 HFO Modulation



-
- 1) Switch to CMV mode. Select 30 BPM with 1 second INSP time. Set an inspiratory pressure of 30 cmH₂O and a CPAP pressure of 0 cmH₂O. Set HIGH alarm to 60 cmH₂O, CYCLE FAIL alarm to 20 cmH₂O, and LOW alarm to -20 cmH₂O. Select a display frame time of 2 seconds.
 - 2) Switch HFO mode to EXP. Observe that HFO modulation occurs during expiratory phase of pressure cycle only
 - 3) Switch HFO mode to INSP. Observe that HFO modulation occurs during inspiratory phase of pressure cycle only.
 - 4) Switch HFO mode to CONT. Observe that HFO modulation occurs during both inspiratory and expiratory phases of pressure cycle.
 - 5) Switch HFO mode to OFF. Check that HFO modulation does not occur during any phase of pressure cycle.
 - 6) Select PTV mode. With HFO in CONT mode, observe that HFO modulation does not occur during any phase of pressure cycle.
 - 7) With HFO in INSP mode, observe that HFO modulation occurs during inspiratory phase only.
 - 8) With HFO in EXP mode, observe that HFO modulation does not occur during any phase of pressure cycle.
 - 9) Select SIMV mode and repeat the previous test.

13.3 Display Timebase

Check that the display time base rate control setting corresponds with the digitally displayed rate for settings of 6, 4, 3, 2, 1 and 0.5 seconds.

13.4 Display Pressure Range

Check that the display pressure range control setting corresponds with the digitally displayed range for settings of -60 to +60 cmH₂O and -5 to +60 cmH₂O.

13.5 Freeze Push-Button

- 1) Press FREEZE push-button and confirm that 'FREEZE' message is displayed for 1 minute $\pm$ 3 seconds. Displayed waveform should not update during this period. After 1 minute the display should revert to updating mode.
- 2) By pressing FREEZE push-button repeatedly check that the FREEZE function can be toggled on and off.

13.6 HFO FAIL

Select CPAP mode. Switch HFO to CONT mode. Set up an HFO pressure of 10 cmH₂O at 3Hz. Short out A0736/03/JP1. Check that HFO pressure modulation is suppressed in less than 1 second and that the HFO FAIL audible and visual alarm is activated.

13.7 FAN FAIL

Short out A0736/03/JP3 and A0736/03/JP4 in turn. Check that FAN FAIL audible and visual alarm is activated in each case.

13.8 Slow Rise Waveform

Switch to CMV mode. Select 30 BPM with 1 second INSP time. Set an inspiratory pressure of 30 cmH₂O. Set HIGH alarm to 60 cmH₂O, CYCLE FAIL alarm to 20 cmH₂O, and LOW alarm to -20 cmH₂O. Select a display frame time of 2 seconds.

Observe the pressure wave. With the PRESSURE WAVE switch in the square position, the pressure waveform rising edge should be fast (nearly vertical). With the PRESSURE WAVE switch in the slow rise position, the rising edge should be tapered in appearance, with a time constant of about $\frac{1}{4}$ second.

13.9 PTV Mode

- 1) With a full patient circuit connected, check operation of the PTV trigger system. By simulating a patient effort at the ET connector, using a 2ml syringe drawn out over a period of $\frac{1}{2}$ second, ensure reliable triggering at the maximum sensitivity setting. Repeat the test using a 10ml syringe with the sensitivity control at its minimum setting
- 2) Check that the trigger back-up system works properly and that the back-up audible beep and LED are activated when a back-up breath is initialized.

13.10 SIMV Mode

Check operation of the SIMV trigger system, ensuring that the back-up audible beep is activated during machine initialised breaths. Check that the SIMV BPM rate may be controlled by adjustment of the BPM control and display.

13.11 Block and Leak alarms

Under simulated temperature conditions for normal operation (28°C-32°C). By varying the pressure in the Fresh Gas supply external tubing, and monitoring this pressure using an RT 200, confirm that:

- 1) The LEAK audible alarm and warning LED are activated at pressures less than 17.5 cmH₂O.
- 2) The BLOCK audible alarm and warning LED are activated at pressures greater than 80 cmH₂O.
- 3) The Fresh Gas supply pressure relief valve RV2 is activated at pressures greater than 140 cmH₂O.

To generate a high pressure alarm condition with a standard patient circuit fitted to the ventilator occlude the expiratory limb, and note that:

- 4) The Fresh Gas supply solenoid valve is de-energized (leak alarm is activated).
- 5) Airway pressure is between 10 cmH₂O and 25 cmH₂O while the expiratory limb is occluded.
- 6) Fresh Gas supply flow rate is between 0.8 L/min and 1.2 L/min when expiratory limb is not occluded.

13.12 Pressure Controls

- 1) Check that the CPAP pressure regulator can be set to produce at least 35 cmH₂O and not > 45 cmH₂O airway pressure in its fully clockwise position.
- 2) Check that the INSP pressure regulator can be set to produce up to 64 cmH₂O inspiratory airway pressure in its fully clockwise position.
- 3) Check that the OSCILLATOR pressure regulator can be set to produce up to 90 cmH₂O Peak to peak pressure with the ET tube occluded and HFO rate set to 3Hz.
- 4) With the above settings, check that the mean pressure level is not greater than +6 cmH₂O.

-
- 5) Check that CPAP pressures are in accord with decal markings for 10, 20, 30 and 30 and 40 cmH₂O.
 - 6) Check that INSPIRATORY pressures are in accord with decal markings for 10, 20, 30, 40, 50 and 60 cmH₂O.
 - 7) Check that OSCILLATOR pressures are in accord with decal markings for 10, 20, 30, 40 and 50 cmH₂O, with the ET Tube occluded. Check this at 3Hz and 10Hz.

13.13 Verification of HFO safety solenoid SV5

- 1) Set the ventilator to CPAP + HFO count. mode; CPAP Pressure = 0 and HFO Pressure = Max. With patient circuit connected, ensure that the oscillation pressure waveform is present.
- 2) Electrically disconnect SV5 via 2 pin plug and socket. Set ventilator as in step 1 above. Ensure that oscillation pressure waveform is not present.
- 3) Measure DC voltage on SV5 socket and ensure voltage is 24V
- 4) Switch HFO mode switch to OFF position and ensure voltage on SV5 socket drops towards 0V.
- 5) Reconnect SV5 plug and socket.

13.14 Verifying Pressure Drift Detection

Using a short length of 1/8 Tygon connect a 2ml syringe to port P1 on pressure transducer PTR1 on the A702 board. Monitor the digital pressure display with the pressure display switch in the MIN position.

- 1) Using the syringe, adjust the pressure to -4 and hold for several seconds ensuring that the pressure drift detection warning is displayed on the LCD
- 2) Adjust the pressure to -2 and hold again. Ensure that the warning message is cleared
- 3) Adjust the pressure to +4 and hold ensuring that the warning message is displayed again.
- 4) Finally, adjust the pressure to +2 and hold and ensure the warning message is cleared
- 5) Disconnect the 2ml syringe and tubing.



13.15 HFO NEEP Verification

This verification is only for ventilators fitted with HFO NEEP.

1. Set vent to HFO Cont. and set the frequency to 10Hz. Set the CPAP regulator fully anti-clockwise.
2. Set the OSCILLATOR pressure regulator to 100cmH₂O.
3. Occlude the ET patient connector
4. Verify that the mean pressure level is not greater than +6 cmH₂O

Note: If the reading is outside the stated limits check the seating of the exhalation block and that the rotating jet assembly jets are not blocked.

Technical Specification



14. Technical Specification

14.1 Operating Modes

14.1.1 Conventional Ventilation

Modes:	OFF, CPAP, CMV, PTV, SIMV
BPM Range:	1-150 breaths per minute
Inspiratory Time:	0.1-3.0 seconds
I:E Range:	9.9:1 - 1:9.9 calculated from BPM and Inspiratory time
CPAP Pressure:	settings. 0cmH ₂ O to 35cmH ₂ O minimum.
Inspiratory Pressure:	0cmH ₂ O to 60cmH ₂ O switched fast or slow rise waveforms.

14.1.2 HFO Ventilation

Modes:	OFF, EXP, INSP, CONT.
Frequency Range:	3-20Hz. (1Hz resolution.)
Delta P Range:	0 - 120cmH ₂ O peak to peak
Mean Airway Range:	0 - 35cmH ₂ O.

14.2 Displays

240 × 128 pixel backlit LCD display.

Selectable pressure range: -5 to +60 cmH₂O or -60 to +60 cmH₂O

Selectable timebase frame: 6,4,3,2,1,0.5 seconds, showing pressure waveform, LOW, CYCLE FAIL, HIGH alarm settings and HFO rate. Freeze facility.

40 Segment bargraph display: showing pressure waveform, LOW, CYCLE FAIL, HIGH alarm settings in the range -10 to +70cmH₂O. (± 2 cmH₂O)

Seven segment LED's: showing BPM, INSP. TIME, I:E RATIO, FIO₂ and PRESSURE (max., mean or min.).

Indicator LED's: MAX., MEAN, MIN. pressures, MUTE, POWER, TRIGGER BACKUP.

Driving Pressure Gauges:
(Scaled for resultant airway pressures)

CPAP/PEEP: 0-40 cmH₂O
Oscillator: 0-120 cmH₂O
Inspiratory: 0-60 cmH₂O

14.3 Controls

Conventional ventilation mode switch:
BPM Control (ten turn):
INSP. TIME Control (ten turn):

OFF, ALARM TEST/CPAP, CMV, PTV, SIMV
1 to 150BPM
0.10 to 3.00 seconds
(min exp time: 0.25 seconds)

Pressure Display Switch:
Pressure Display Switch LCD:

MAX., MEAN, MIN.
-5 to +60cmH₂O or -60 to +60cmH₂O

Pressure Wave Switch:
Manual Breath Push button

Slow or Fast rise
Invokes a single manual breath.

Alarm Mute and Reset Push buttons:

Mute active for 60 seconds (approx.)

Display Freeze push button:

Active for 60 seconds (approx.)

Trigger Sensitivity Control:

Range: 2ml/0.5 sec max. To 10ml/0.5sec min.
when using SLE N2188 patient circuit.

HIGH, CYCLE FAIL, LOW pressure
alarm setting controls:

Resolution: 1cmH₂O on LCD, 2cmH₂O on bar-graph.

Display Timebase selector switch:

6,4,3,2,1,0.5 seconds/frame

Inspiratory Pressure and CPAP pressure
controls:

HFO Mode Switch:

OFF, EXP. INSP. and CONT.

RATE Control:

3 to 20Hz

Oscillator Pressure Control:

0cmH₂O to 120cmH₂O dP

CPAP/PEEP Pressure control:

0 to 40cmH₂O

Inspiratory Pressure control:

0 to 60cmH₂O

Air/Oxygen Blender Control

21-100% ± 3%



14.4 Alarms

Audible only:

Loss of mains supply: Battery powered alarm

Loss of Air or O₂ supply: Blender alarm.

Audible and Visual:

HIGH CIRCUIT PRESSURE

CYCLE FAIL

LOW CIRCUIT PRESSURE

FRESH GAS BLOCK

FRESH GAS LEAK or TOTAL GAS SUPPLY FAIL (loss of air and O₂).

SYSTEM FAIL: HFO FAIL, FAN FAIL.

Power, Dimensions etc.

Voltage: 100-250V/ 50-60Hz

Power: 120VA

Fuses: 220-250V~50-60Hz: Fuse T1.0A

100-120V~50-60Hz: Fuse T2.0A

Air and O₂: 3-5 bar

Operating Environment: Temp: 10-40°C

Humidity: 0-90% (non condensing)

Pressure: 700 to 1060hPa

Transport and Storage conditions: Temp: -40 to 70°C

Humidity: 0-90% (non condensing)

Pressure: 700 to 1060hPa

Size, Ventilator only: 37cms W × 39cms H × 32cms D

Height on pole: 141cms

Weight Ventilator Only: 16 Kgs

Complies with: IEC 601/1 and 601/2

BS 5724 Parts 1 and 2

Patient Circuit Required: Model: N2188 Single use

Model: N2200 Re-usable

15. Circuit Descriptions

15.0.1 Front Panel Board Assembly (A0700/02)

This board is mounted behind the front panel of the SLE2000 HFO Electronic unit and is above the A0701/02 board. On this board are the seven segment LED displays for; BPM, INSP, I:E, PRESSURE and FIO₂. There are two discreet LED's on this board for Power (green) and System Fail (red).

15.0.2 LED Display Board Assembly (A0701/02)

This board is mounted behind the front panel of the SLE2000 HFO Electronic unit and is below the A0700/02 board. It has a single logic device which is used to drive the max, min and mean LED's next to the pressure display switch.

15.0.3 Ventilator CPU Board Assembly (A0702/04)

The processor (U14) is an 80C31 microcontroller running at 11.0592MHz. It is an 8 bit processor, employing time multiplexed address and data operations. Software is provided by the ROM (U6).

Analogue input parameters from panel control settings (BPM rate, inspiration time and high pressure) are converted to digital 8 bit words by the ADC (U18) which scans each input in turn. Open circuit input fault conditions are detected by software and pull-up resistor array (RU3). Switched input parameters (Mode, Reset, Mute and Pressure display Mode) are scanned by (U12).

Confirmation of correct solenoid valve energisation voltages is fed to (U14/14) by potential divider R34, R32 and clamp D3.

Supply voltage supervisor (U7) will attempt to reset the processor (U14/9) should the logic supply voltage (5.12V dc) fall below (4.8V dc). It also holds the processor reset for a 2 second test period on power up.

Trigger back-up and alarm mute indication LED's are driven by the processor from (U14/5) and (U14/7) via buffer (U10) and are connected to PLB3a and PLB15b.

The main PIP solenoid and the wave shape solenoid valve are driven from (U14/8) via buffer (U10) and MOS driver Q4.

(U1) and (U2) are 7 segment display drivers.

There is a supervisory watchdog alarm system which consists of (U8) and (U3) and BZ2. This monitors a train of pulses of 20ms period from the processor (U14/3 - the port is toggled every 10ms) to confirm the correct running of the software. A disruption of these pulses will activate a latched audible alarm BZ2. In addition, reset pulses from (U7/6) to (U14/9) will attempt to restart the software until the watchdog pulses are restored.

The Mains Failure Alarm relay-RLI is energised from the 5.12 volt logic supply and holds pins 1 and 14 open. Should the relay de-energise contacts 1 and 14 will close, and a battery powered alarm will be activated via connections PLB 18a and PLB 20a.

PTR1 monitors proximal airway pressure in the range -60 to +60 cmH₂O. The resultant voltages serve two purposes:

The first is to present a voltage in the range 1.22V to 4.78V to the ADC U18/26 on the A0702/04 PCB, for trigger and high pressure fresh gas dump functions.

The second presents a voltage in the range 0.42V to 6.42V to the HFO CPU PCB (A0736/02), to compare against CPAP, CYCLE FAIL and HIGH PRESSURE alarm settings, and also to drive the LCD pressure display.

Fresh gas failure pressure transducer PTR2 monitors the fresh gas supply pressure and activates the audible alarm BZ2 and also drives the leak alarm LED should the pressure fall below 17.5 cmH₂O. If the pressure rises above 80 cmH₂O then the block LED is operated and the audible alarm will activate.

15.0.4 HFO Main Board Assembly (A0736/03)

15.0.4.1 Motor Stall Alarm

This circuit is active in all HFO modes. Jet rotation is monitored using two opto interrupter devices which under normal operation shall provide two pulse trains. One of these signals sets a bistable and the other resets it (U25A and B). The output from the bistable is monitored by an LM2917 tachometer IC (U26). Should the pulse train stop, then T4 is switched off and the HFO solenoid (SV4) is de-energised thus cutting off the gas supply to the rotating jet assembly.

In addition, during normal HFO operating conditions, T4 is periodically switched off by T3 in response to an HFO modulation voltage generated by U21. This uses the I:E solenoid (SV1) energisation voltage to switch SV4 according to expiratory, inspiratory or continuous HFO modes.

15.0.4.2 HFO Rate

This circuit uses the signal generated by the tachometer circuit (ref section 15.0.4.3) to display the HFO rate on the LCD display. This is achieved by using a TC9401(U20) in a frequency to voltage configuration. The derived voltage is input to the processor system via the ADC0809 (U5).

15.0.4.3 HFO Pressure Activity Monitor

This circuit uses a voltage representing the pressure wave (taken from the A0702/04 buffered transducer output) to monitor a minimum level of HFO pressure activity using an LM2917N tachometer IC. The alarm output is produced when the peak to peak pressure drops below 3cmH₂O or the frequency drops below 3Hz. This circuit is only activated when both CPAP mode and either expiratory or continuous modes of HFO operation are selected.

In all other modes the alarm is disabled by grounding the output (U27/5). The output signal is taken to one of the inputs on the Alarm Board (A0738/02).

15.0.4.4 Dual Fan Fail Alarm

This circuit operates audible and visual alarms if the speed of either fan motor falls below approx. 75% of normal rate. Current pulses from the motor commutation develop pulses which are compared with a reference voltage in U23A and B. This results in output pulses from U23/1 and U23/7 for each fan. The negative going edges trigger U22 which remains re-triggered (logic 1) as long as the interval between triggered pulses is greater than 5ms. The data output of U22 is fed to U24 and is latched in the latter by the positive going edge of the pulse from U22. The output of U24 remains at logic 0 as long as the interval between pulses from the motor is less than 5ms. However, if the motor runs slowly or stops or is open circuit then the output of U24 goes to logic 1 and enables the fan fail alarm via D2 or D3. MOS1 and MOS4 hold the reset pins of U24 inactive as long as there are motor pulses. U24 is reset during power up or if motor pulses fail and enables the fan fail alarm.

15.0.4.5 Oxygen Alarm

Introduced with version 2.1 of display firmware and addition of connecting wire to link PLA29b to PLB29b. See "CD/W0308 Wireloom Issue 6" on page 152. (See "SI 990305 Addition of the oxygen alarm on SLE2000 HFO" on page 218.)

15.0.4.6 LED Bargraph

This circuit simultaneously displays, on a 40 segment bargraph module, low, fail to cycle, and high alarm pressure thresholds as well as the instantaneous pressure signal (derived from the A0702/04 buffered transducer output). These four input voltages are first buffered and conditioned before being time multiplexed via the 4066 analogue switch (U31). Oscillator U19 drives a counter (U18) which is used to sequentially enable U31A,B,C and D. The multiplexed signal is then used to drive the bargraph PCB (A0737).

15.0.4.7 Processor System

All alarm parameters are determined by potentiometer voltages representing fail to cycle, low and high pressure thresholds. Also Timebase and pressure range switch settings, and CPAP mode status, patient circuit pressure, HFO motor speed are all represented by voltages which enter the processor system via addressable ADC0809 (U5)

U7 and its peripheral passive components form a one second interrupt generator which is used by the processor system to determine a 1 minute period for the screen freeze function. The watchdog device U12 will provide a reset pulse for the processor (U10) on power up, power down and brownout conditions. It will also monitor U13/13, (VIA- Versatile Interrupt Adapter) and if no change of state is recognised on this line (indicating a processor fail) within 1.6 seconds then the watchdog will provide a reset pulse for the processor. Whilst no pulse is recognised on U13/13 the watchdog will also provide a signal out on U12/14 indicating HFO CPU (A0736/030736/02) system fail which is sent to the Alarm PCB.

15.0.5 Bargraph Display Board Assembly (A0737)

This board accepts a time multiplexed signal from the HFO main Board (A0736/030736/02) which contains the signals for the high, fail to cycle and low alarm thresholds along with the

proximal airway pressure signal. This multiplexed signal is fed into four bargraph drivers (LM3914's) which in turn drive four 10*LED arrays. For each level of the signal only one of the 40 LED's is illuminated.

15.0.6 Alarm Board Assembly (A0738/02)

15.0.6.1 Alarm Conditioning Circuit

The Alarm circuit comprises U1, U2 and U3. Those alarm inputs which can be muted are input to U2 via a 4066 quad analogue switch (U1), the control pins of which are connected to the mute timer output from the A0702/04 board PLB/7b. The non mutable alarm inputs go to U2 directly. U2 is an 8-bit comparator which outputs a logic 1 if any input differs from its reference bit. U3 is a variable gain buffer which drives audible alarm BZ2.

15.0.6.2 O₂ Signal Processing

The pneumatic module contains a Galvanic fuel cell which monitors the oxygen concentration delivered by the blender. The voltage output from this cell is input to U4(LT1006) and associated components, which condition the cell output voltage to the range 0-4.5V. This voltage is then presented to the ADC U18/4 on the A0702/04 PCB and is used to display the FIO₂.

The alarm board also contains a battery powered alarm circuit, consisting of BT1 and BZ3. The circuit is completed when normally closed relay RL1 on the A0702/04 PCB is de-energised, as would happen in the event of a power failure.

15.0.6.3 Power Supply Monitor

The circuit associated with the LM339N quad comparator is set up to give two comparison 'windows', one for the 12V rail being between 11V and 13V and the other for the 24V rail being between 23V and 26V. If either of these rails falls outside the windows then the output transistor is switched on and the buzzer is activated. The circuit requires the 5.12V supply to be present and will continue to accurately monitor the 12V and 24V rails until the 5.12V supply drops below the brownout level.

15.0.7 Motor Drive Board Assembly (A0739/02)

There are 2 revisions of motor drive board assembly A0739/02 fitted to an HFO ventilator, revision B and revision C. The revision B can be found in two states modified and unmodified. The modified board has the addition of a HFO Start-up Motor PCB assembly A0756 at connector U3. See section 15.0.7.2 for details. The revision C board incorporates the A0756 boards components and functions.

Revision B board circuit diagram see "AS/A0739/02 Issue 1 (Revision B)" on page 134
Revision C board circuit diagram see "AS/A0739/02 Issue 3 (Revision C)" on page 139

15.0.7.1 Motor Drive Circuit

U3 is an RC4152 which produces a motor drive frequency proportional to the HFO rate control voltage. This is used as the clock input to the stepper motor controller L297 (U1) which in conjunction with the L298N (U2) provides 4 outputs to drive the HFO stepper motor. This circuit is operative in all HFO modes.

15.0.7.2 HFO Start-up Motor PCB assembly (A0756)

This PCB may be fitted to revision B Motor drive board A0739/02 issue 1. The PCB is positioned on connector U3 of the main board and carries RC4152 that would originally be positioned on the board. The purpose of the board is to prevent the motor stalling when the ventilator is turned on whilst set in HFO mode, with the oscillator rate set to a frequency above 10Hz. The components of the this board are incorporated into the main board A0739/02 issue 2 at revision C.

See drawing "AS/A0756 HFO Motor Start Up PCB Issue 2" on page 143.

See "SI 000101 Modification of SLE 2000 HFO motor drive circuit board." on page 233 for further details on how to modify the board.

15.0.7.3 LCD Backlight Inverter

This device provides a high voltage A.C. supply to the cold cathode LCD backlight. It is driven by a 12V DC. supply.

15.0.7.4 Miscellaneous

Also located on this PCB are the fresh gas solenoid MOS driver (MOS1) and associated components and a back E.M.F. diode for solenoid SV3.

15.0.8 Pressure Drift Monitor Board Assembly (A0745)

The Purpose of this board is to provide an output signal if the difference between the pressure transducer signal on the A0702 board and the pressure transducer signal on this board differ by more than a set voltage (determined by RV1)

Op amp U1B is used to generate an 8VDC supply from the 12VDC. this is used firstly to provide the supply voltage to PTR1 and secondly to provide an 8V positive bias to the differential voltage output from U1A.

Arithmetically the output from U1A is the sum of the PTR1 signal and 8V, minus the signal from PTR1 on the A0702 board.

This differential voltage (with 8V offset) is applied to the window comparator comprising U1C and U1D. The window comparator will provide an output if the differential voltage (Diff) passes above the voltage at (High) or below the voltage at (Low). A high signal output from the window comparator will cause Q1 to conduct, thereby grounding the Drift Alarm output signal and signalling an alarm condition to the processor system on the A0706 board.

15.0.9 Power Supply Unit

The power supply unit is a universal AC input switcher type. It has an overall power rating of 80W and is capable of operating down to zero load. It typically has a hold up time of 75ms. The pin connections to the unit are as follows;

Plug J1	Description	Typical Current Ratings
1	Ground	
2	Neutral	
3	Live	
Plug J2		
1,2,3	+5.12V	0.83A
4,5,6,7	0V	
8,9	+12V	0.25A
10	Power Fail Detect	
11	-12V	0A
12	key	
13	+24V	1.2A

The Power supply is not serviceable.

15.0.10 Graphic LCD Module

The Graphic LCD module is a 240 × 128 pixel display. It incorporates a built-in LCD controller with an on-board character generator, ROM and RAM. The LCD is a transmissive type with CCFL (Cold Cathode Fluorescent) backlighting provided by a tube mounted on the lower edge of the module.

The cold cathode tube is powered by an inverter mounted on the A0739/02 board. The inverter provides an ac voltage of 900V rms.

The digital interface to the LCD module consists of a 20 way ribbon cable comprising both data and control lines. Also the negative voltage for the LCD drive is supplied from this connection.

The Graphic LCD is not serviceable.

15.1 Pneumatic Circuit

For access to the pneumatic unit section 3.2 on page 19

Schematic representation of the SLE 2000 HFO pneumatics;

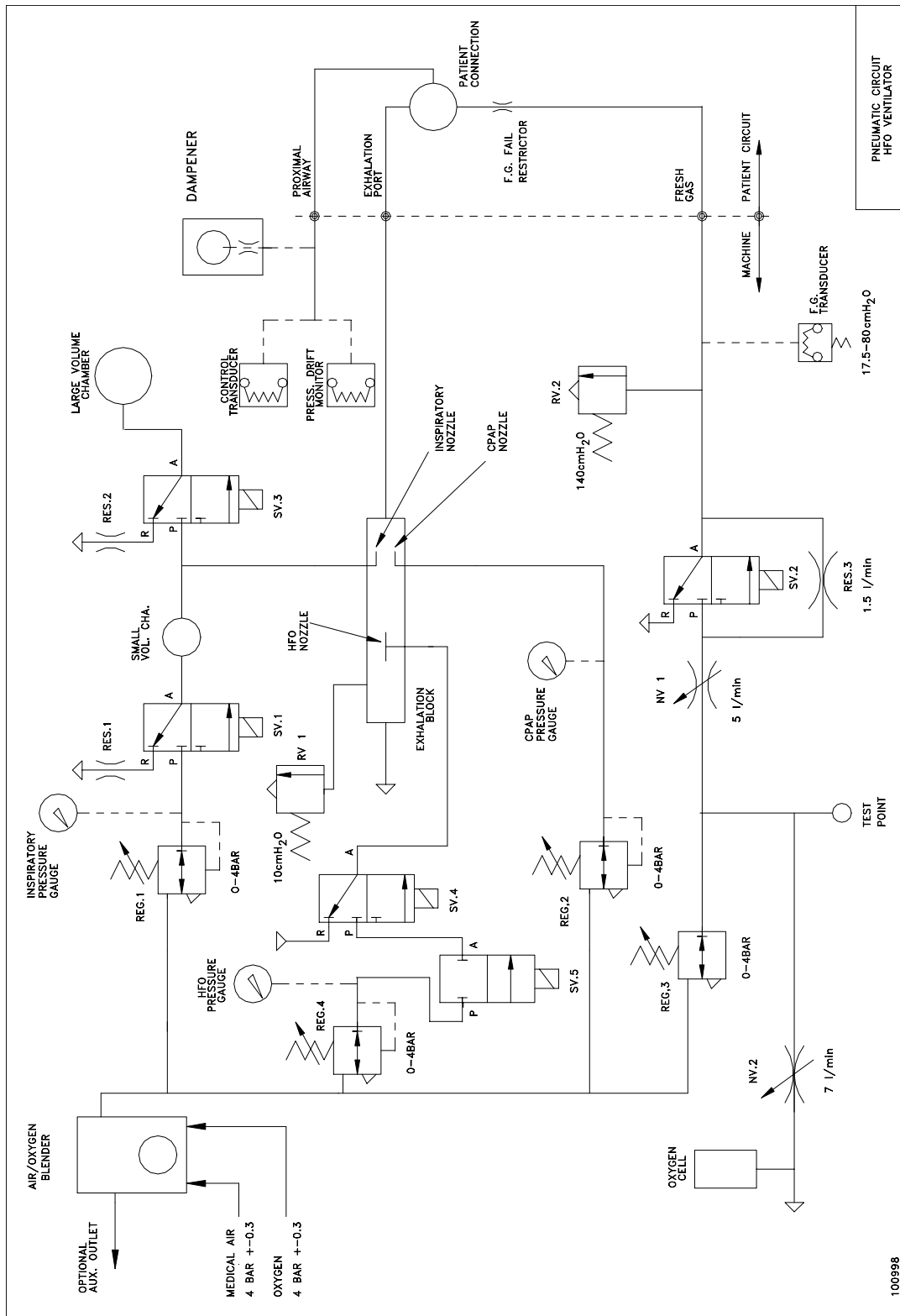
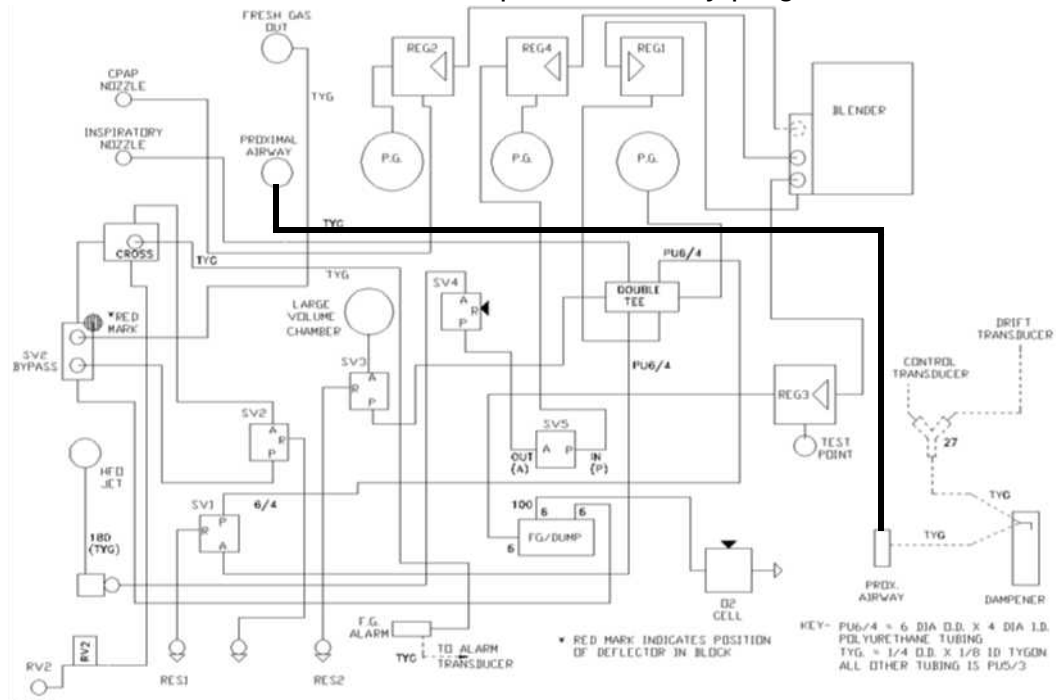


Image:sm0006_001

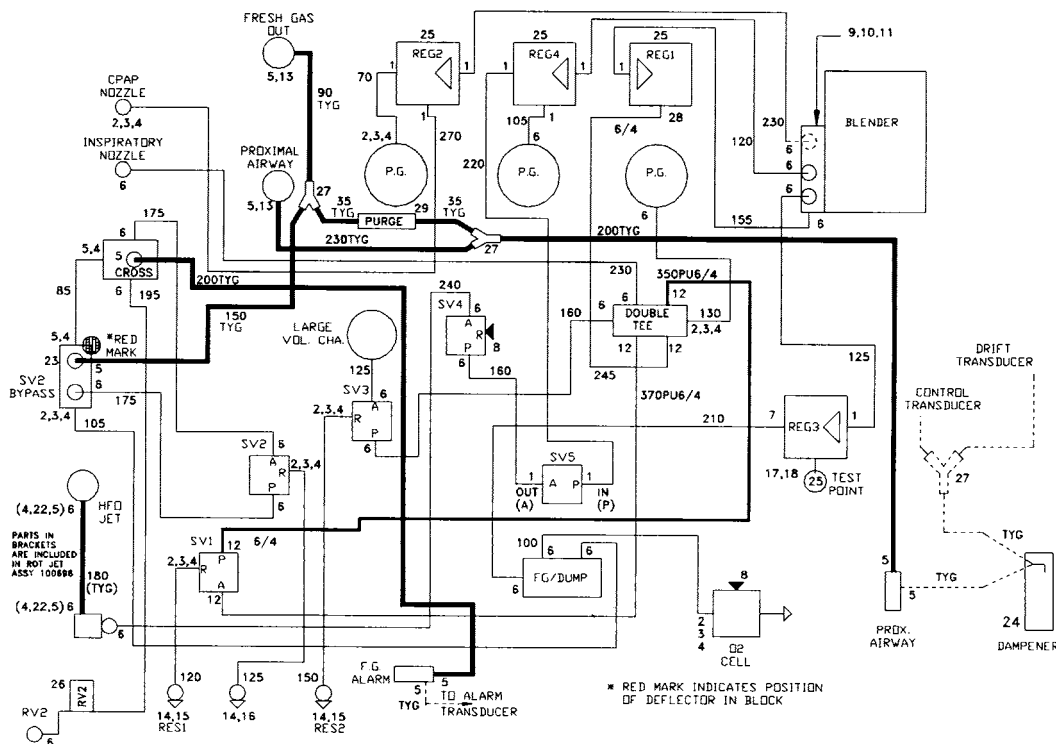
15.1.1 Pneumatic Layout

There are three possible pneumatic layouts within the pneumatic unit.

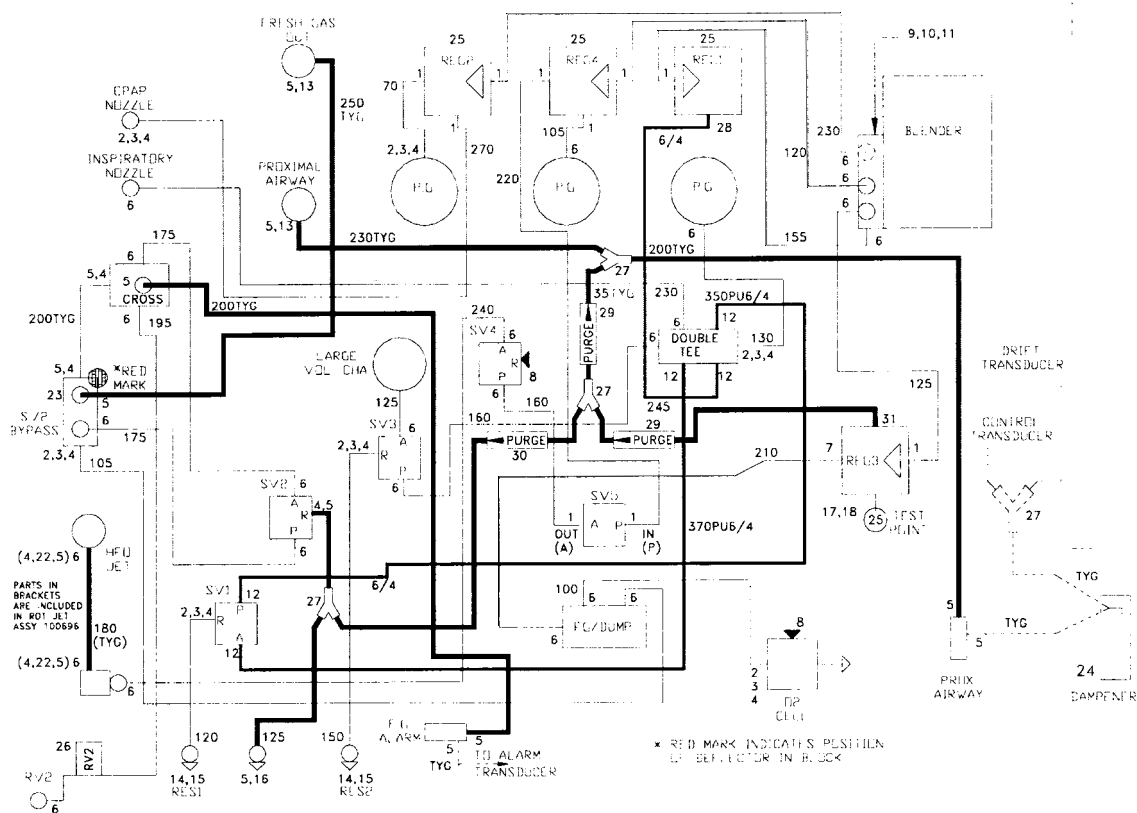
Schematic 1. For HFO ventilators with no proximal airway purge.



Schematic 2. For HFO ventilators with Version 1 proximal airway purge.

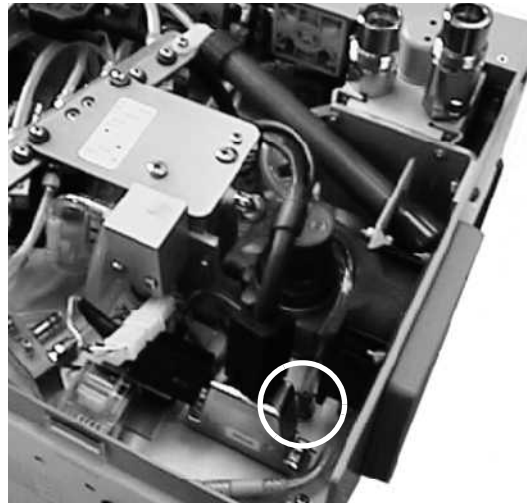


Schematic 3. For HFO ventilators with Version 2 proximal airway purge.



15.1.2 How to Identify Proximal Airway Purge Type

To identify the type of purge fitted to the ventilator, locate the proximal airway tube where it exits the electronic unit. This will be the starting point for identification. (Indicated in photograph).



15.1.2.1 Ventilator with No Proximal Airway Purge Facility

The proximal airway tube from the electronic bulkhead to the outlet port should be unbroken. Reference Schematic 1.

15.1.2.2 Ventilator with Version 1 Proximal Airway Purge

The proximal airway tube should be split by a "Y" connector. One limb should run to the proximal airway outlet port, the other limb should contain a brass restrictor before it is split by another "Y" connector. Reference Schematic 2. (Also see "AS/L0203 Sheet 4 of 4" on

page 164).

15.1.2.3 Ventilator with Version 2 Proximal Airway Purge

The regulator REG 3 should have all four outlet ports used. The proximal airway tube should be split by a "Y" connector. One limb should run to the proximal airway outlet port, the other limb should contain another "Y" connector (two limbs of this connector will contain a green plastic restrictor and the other limb one purple restrictor). Reference Schematic 3. (Also see "AS/ L0203 Sheet 4 of 4" on page 172).

15.1.3 Conventional Ventilation

Air and oxygen supplies are connected directly to the blender. The output from the blender is supplied via panel mounted regulator REG.1 (0 to 4bar) (inspiratory pressure) and solenoid valve SV1 to the inspiratory nozzle in the exhalation block. It is also connected to SV3 (the wave shape solenoid) and the large volume chamber.

In inspiration mode the valve SV1 opens and allows a flow of blended gas into the patient circuit via the inspiratory nozzle. This flow opposes the constant fresh gas flow and creates an inspiratory pressure.

The function of the large volume chamber and valve SV3 is to delay this flow of gas during the inspiratory phase when the waveform taper switch is "on". On expiration SV3 de-energises and dumps to atmosphere so that the expiratory airway pressure falls rapidly as in square mode.

REG2 (0 to 4bar)(CPAP) is also supplied from the oxygen blender. This front panel mounted regulator controls the flow of blended gas from the CPAP nozzle in the exhalation block. This gas being a constant flow in opposition to the fresh gas flow creates a CPAP/PEEP pressure in the patient circuit.

NOTE: Any changes of CPAP pressure will also change the peak inspiratory pressure; this is arranged so that the tidal volume is always constant and unaffected by changes in CPAP.

REG3 (0 to 4bar) is an internal regulator which regulates the blended gas to a working pressure of 10 psi. NV2 sets a 7LPM bleed to atmosphere. This is to ensure that the oxygen blender has a constant flow through it at all times to maintain its accuracy.

This bleed is fed to the oxygen monitoring cell, whose output is connected to the digital FIO₂ display circuitry in the electronics module.

RV1 is a pressure relief valve on the Exhalation Block which is activated if the exhalation block is occluded.

RV2 is a pressure relief valve that is activated if the Fresh Gas port is occluded.

NV1 is adjusted to set a 5 LPM blended gas flow into the fresh gas port on the front panel. This flow passes through valve SV2 (fresh gas dump solenoid) which will dump the fresh gas should the patient circuit pressure reach the high pressure alarm threshold. RV2 is a pre-set relieving valve which prevents pressures greater than approx. 120cmH₂O developing in the patient circuit



When the fresh gas is dumped a residual flow of 1 LPM 0.8 to 1.5LPM is maintained by REG3 in order to prevent excessive temperatures in the humidification chamber.

Both the SLE2000 single use patient circuit (N2188) and the reusable patient circuit (N2220) incorporate a restrictor close to the inspiratory port of the ET connector. This generates a nominal 20cmH₂O pressure in the fresh gas supply system as long as there are no leaks.

Pressure transducer PTR2, located on the A0702/04 PCB, monitors the fresh gas pressure and associated circuitry will activate a leak alarm should this pressure fall below 17.5cmH₂O and activate a block alarm if the pressure rises above 80cmH₂O.

15.1.4 HFO Operation

HFO pressure is determined by a 0-4Bar panel mounted pressure regulator REG4, resulting in HFO peak airway pressures in the range 0 to ± 45 cmH₂O. The HFO driving gas stream is rotated in the exhalation block by the rotating nozzle assembly at a rate determined by the HFO motor speed. Solenoid valve SV4 is de-energised in the event of a motor drive failure, thus cutting off the HFO driving gas pressure. SV4 also serves to modulate the HFO driving gas pressure in various ways during conventional ventilation; that is, during the inspiratory phase or during the expiratory phase, thus allowing combined modes of HFO and conventional ventilation.

An additional safety solenoid SV5 is incorporated in the HFO pressure line (along with SV4). This solenoid is only energised (open) when an HFO mode is selected. In all other modes, it is closed, cutting off the HFO supply pressure.

Troubleshooting Chart

16. SLE2000 HFO Troubleshooting Chart

Symptom	Possible Cause	Remedy
Leak Alarm - audible & visual	Incorrect circuit fitted.	Replace with correct circuit -P/No. N2188 or variant.
	Damaged circuit fitted.	Replace with new circuit.
	Humidifier chamber.	Replace chamber.
	High alarm condition.	High alarm LED illuminated - reset Insp. pressure and/or adjust High alarm parameter.
	Fresh gas supply has decreased.	- Adjust 5 LPM Fresh Gas needle valve.
	Leak alarm drift	- Adjust RV501 to trip alarm at 17.5 cmH ₂ O.
	SV2 has not energized	Replace solenoid.
Block Alarm - audible & visual	Fresh gas filter blocked.	Replace Autoclaveable filter -P/No. N2029.
	Fresh gas restrictor blocked.	Replace circuit -P/No. N2188.
Blender Alarm - audible when both gases connected.	Alarm shuttle sticking.	Remove both gases and re-apply the O ₂ first and then the Air. Or the Air and then the O ₂
	Air/O ₂ differential pressure exceeded.	- Replace blender if alarm persists. Check differential gas supply pressure is less than 30 PSI.
	Compressor	Check that performance gauge is within limits. - consult manufactures Users Manual.
High Alarm - audible & visual	Incorrect alarm setting.	Reset alarm parameter or pressure setting.

Cycle Fail Alarm - audible & visual.	Incorrect alarm setting.	Adjust to centre of wave form.
	Intermittent alarm on start up of Oscillation.	Only in oscillation while CR circuit is charging, if persistent check software version with SLE Life Support Service Dept.
	Proximal Airway line disconnected.	Reconnect tubing.
	SV1 - Solenoid failure.	Replace solenoid and soak test ventilator.
HFO Alarm- audible & visual.	Drive Motor	Replace motor assembly.
	Motor drive board	Replace board assembly.
	Drive belt	Replace belt and set up assembly as per service manual.
	Opto coupler incorrectly set	Set up as per service manual.
Fan Alarm - audible & visual	Faulty fan assembly.	Replace assembly with SLE approved part.
System Fail - audible & visual.	Ensure 5V is present at PSU.	Replace PSU.
CPAP Unable to set desired pressure.	Faulty patient circuit.	Replace circuit.
	Incorrectly assembled patient circuit.	Reassemble as per drawing supplied with circuit.
	Exhalation block - located incorrectly.	Relocate the block assembly.
	Regulator cap is in LOCKED position.	Pull regulator cap out to release from locked status.
	Jammed regulator.	Replace regulator.
	CPAP nozzle blocked.	-Unblock nozzle. -Replace block assembly.
Wave form has a slow rise time.	Water in proximal airway line.	Replace patient circuit. Trace tubing and remove water.
	PTR1 subjected to water ingress.	Replace PTR1 & calibrate.

PEAK INSP. PRESSURE Unable to set desired pressure.	Faulty patient circuit. Incorrectly assembled patient circuit. Exhalation block - located incorrectly. Regulator cap is in LOCKED position. Jammed regulator. Insp. nozzle blocked. High alarm condition.	Replace circuit. Reassemble as per drawing supplied with circuit. Relocate the block assembly. Pull regulator cap out to release from locked status. Replace regulator. -Unblock nozzle. -Replace block assembly. Reset alarm setting.
OSCILLATION PRESSURE Unable to set desired pressure.	Faulty patient circuit. Incorrectly assembled patient circuit. Exhalation block - located incorrectly. Regulator cap is in LOCKED position. Jammed regulator. Jet nozzle blocked. High alarm condition.	Replace circuit. Reassemble as per drawing supplied with circuit. Relocate the block assembly. Pull regulator cap out to release from locked status. Replace regulator. -Unblock nozzle. -Replace rotating jet assembly. Reset alarm setting.
OSCILLATION No Oscillation with no alarms.	Oscillation Mode Switch not turned on. Oscillation Mode Switch in INSP. Mode while Main Mode Switch is in CPAP Mode.	Turn to EXSP. or CONT. Turn to Mode Switch to CORRECT Mode of ventilation.
No Oscillation with alarms.	HFO Alarm - Motor fail. Solenoid failure.	Replace motor assembly. Replace solenoid.

Displayed Faults HELP message.	Displayed in I:E window -O/S of BPM or INSP pot.	Replace pot assembly.
SOL message.	Displayed in BPM window O/S of solenoid circuitry.	Check wiring and solenoids. Use dummy load.
LCD measurements vary from that displayed by pressure display.	Calibration of transducer.	Verify and adjust as required the calibration of PTR1 to ADC & Buff- ered output.

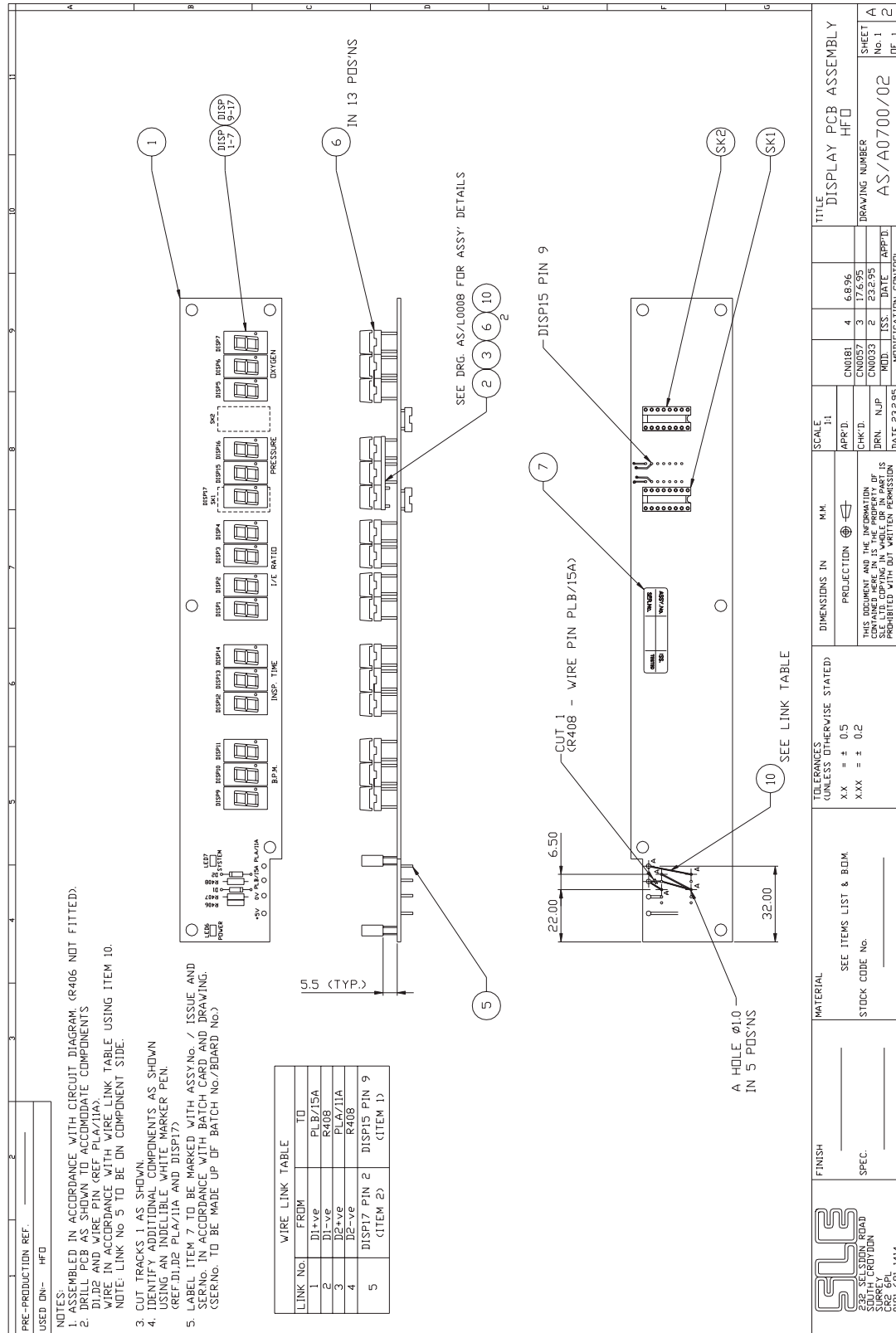


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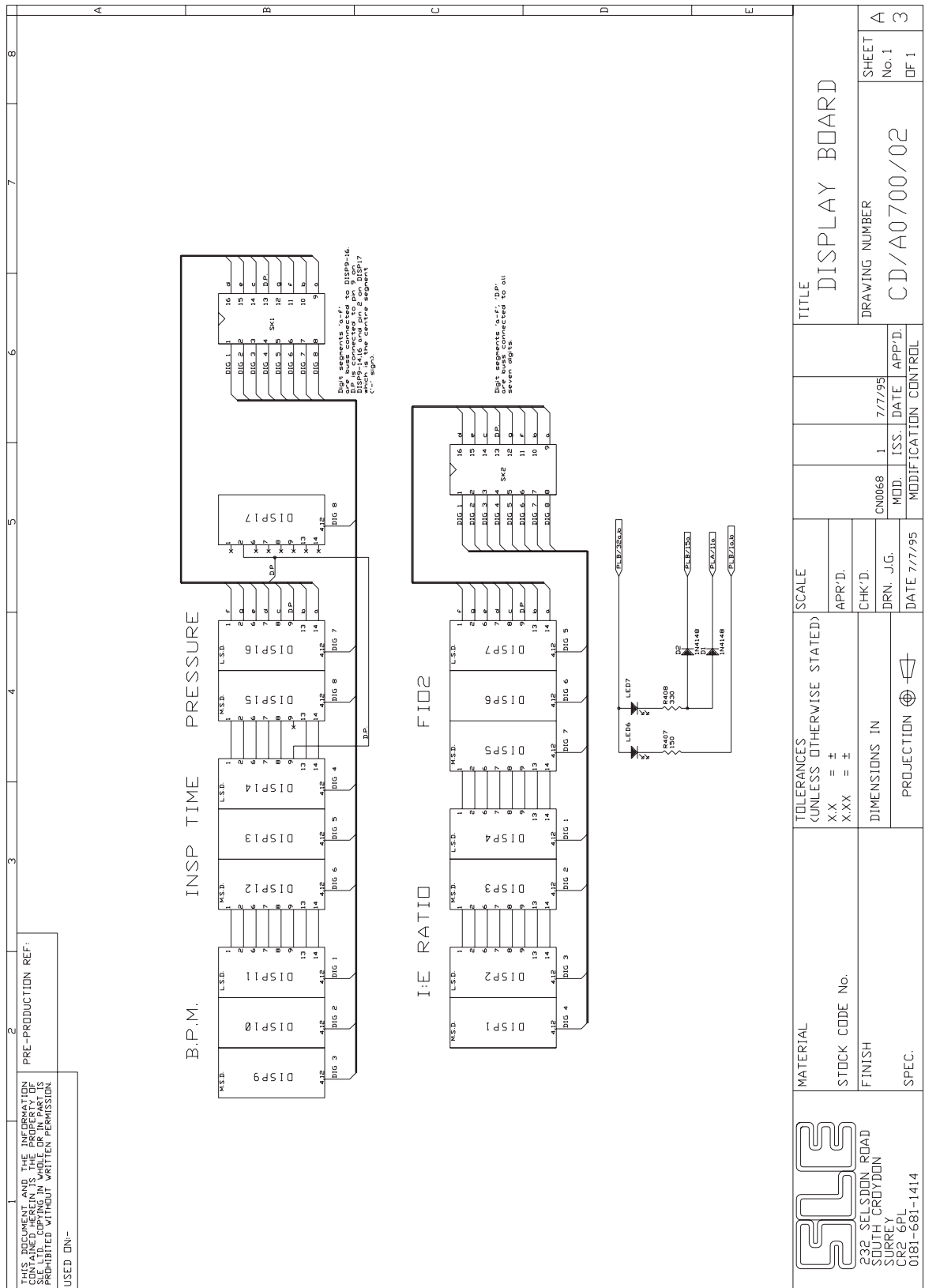
Circuit Details

17. Circuit Details

17.1 AS/A0700/02 Display Board Assembly



17.1.1 CD/A0700/02 Display Board Circuit Diagram



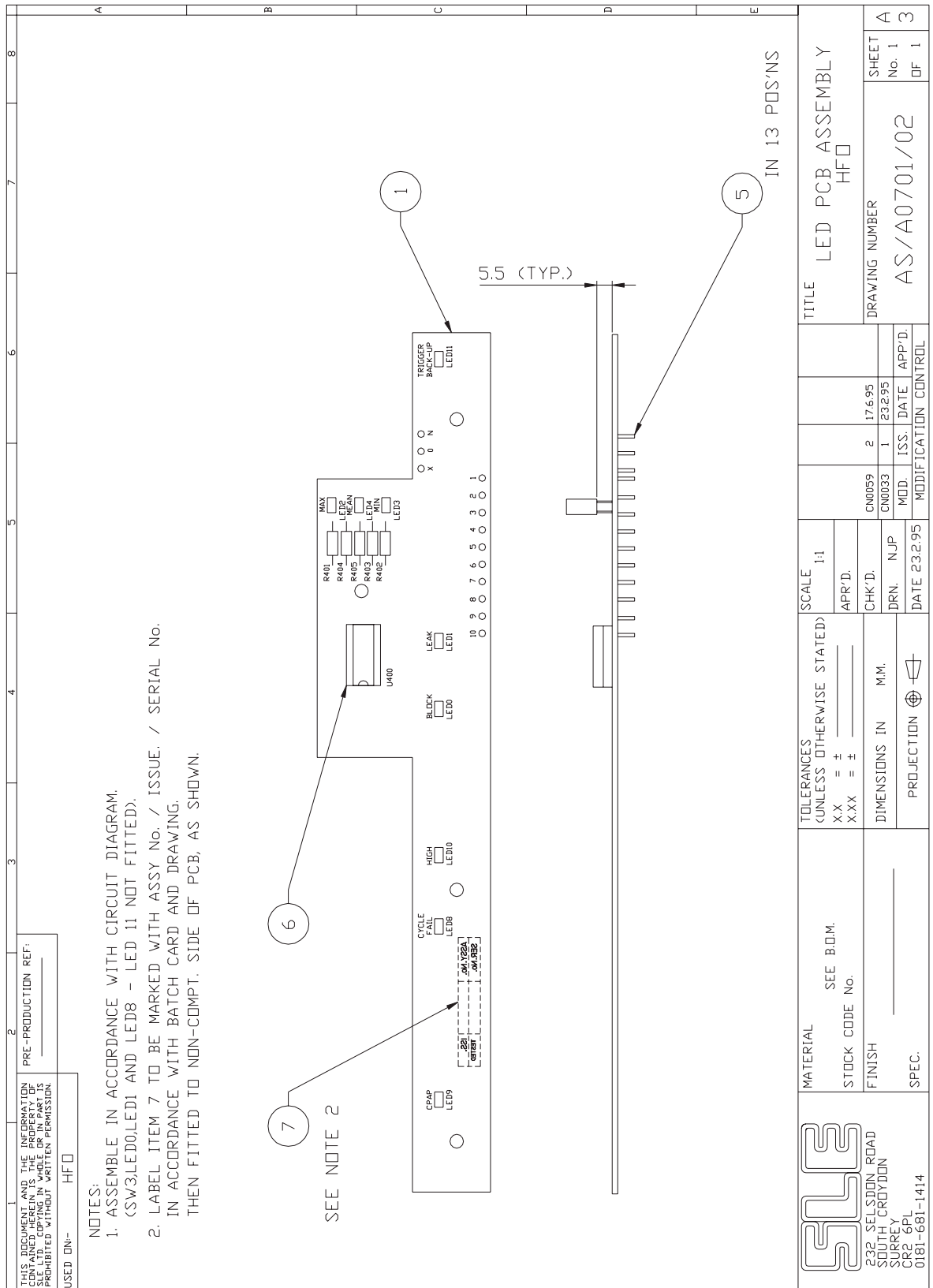


PARTS LIST

Finished Item Stock Number **A0700/02**
Finished Item Description Display Pcb Assy (HFO)
Bill of materials AS/A0700/02 Issue 4

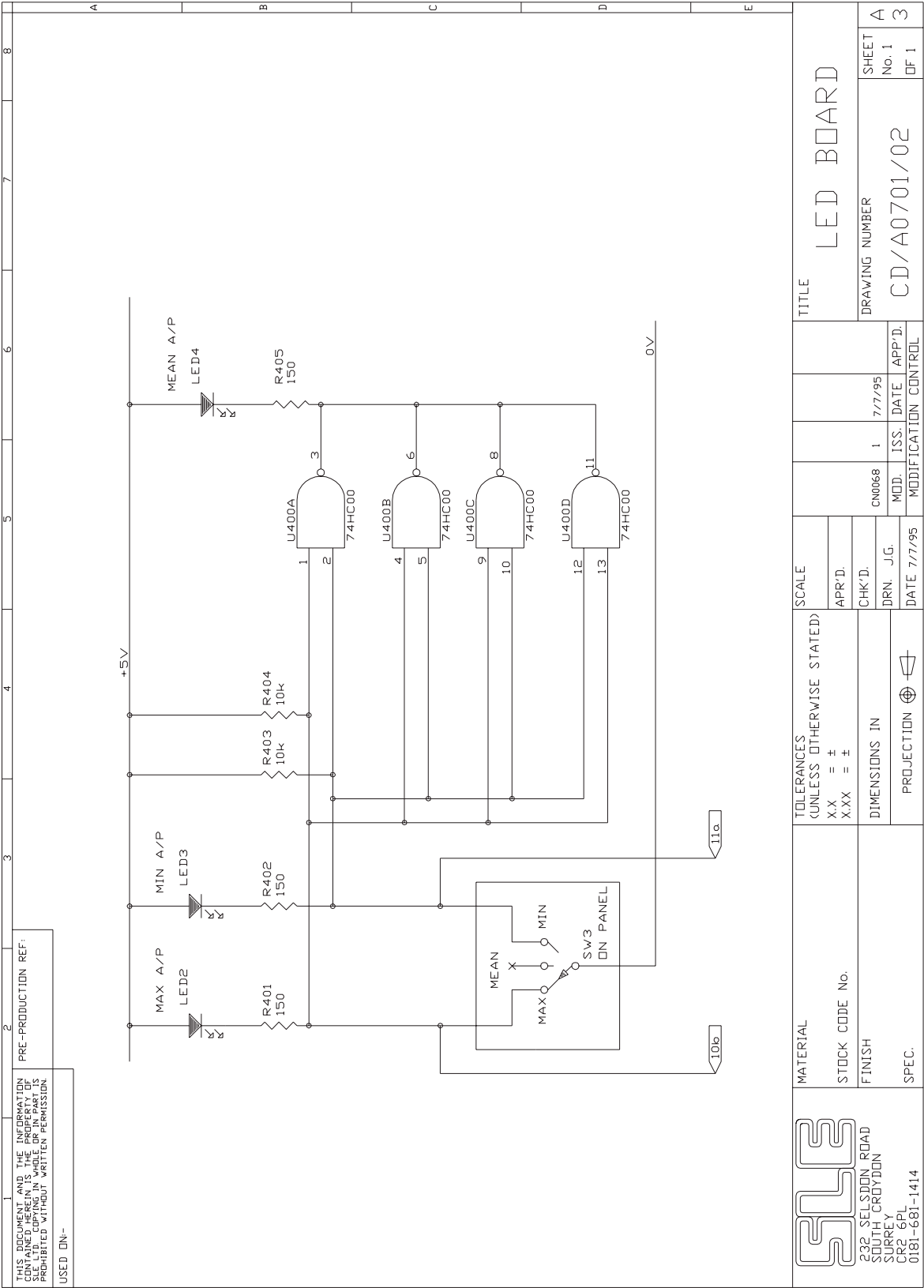
Part Number	Component Description	Used	Component Reference(s)
J0700	Display Board blank	1.00	ITEM 1 (PCB)
D0308	LED Green Rectangular LGB480EH	1.00	LED 6
L0008	Display extender board	1.00	ITEM 2
D0406	1N4148	2.00	D1,D2
D0546	LED Red Rectangular LSB480EH	1.00	LED 7
M0307	Terminal Pin(Pcb single sided)	4.00	ITEM 5
D0590	Display 7 Segment MAN4640A	16.00	DISP 1-7,DISP 9-17
R0424	330R Resistor 1% 0.25W SMA0207	1.00	R408
R0416	150R Resistor 1% 0.25W SMA0207	1.00	R407
S0212	IC Socket 16 way DIL	2.00	SK1,SK2
S0445	Socket 14 way DIL	15.00	ITEM 6 (DISP1-7, DISP9-14) (DISP15-16 See also AS/L0008)
W0103	Wire Wrapping Kynar Red 30awg	0.10 Metre	ITEM 10
M0718	Label, PCB Identification	1.00	ITEM 7

17.2 AS/A0701/02 LED PCB Assembly





17.2.1 CD/A0701/02 LED Board Circuit Diagram



PARTS LIST

Finished Item Stock Number **A0701/02**
 Finished Item Description LED Pcb Assy (HFO)
 Bill of materials AS/A0701/02 Issue 2

Part Number	Component Description	Used	Component Reference(s)
J0701	LED pcb blank	1.00	ITEM 1 (PCB)
D0308	LED Green Rectangular LGB480EH	3.00	LED2,3,4
D0508	74HC00	1.00	U400
M0307	Terminal Pin(Pcb single sided	13.00	ITEM 5 (Wire pin 1-10,X,O,N)
R0463	10K Resistor 1% 0.25W SMA0207	2.00	R403,404
R0416	151R Resistor 1% 0.25W SMA0207	3.00	R401,R402,R405
S0242	IC Socket 14 way DIL	1.00	ITEM 6 (U400)
M0718	Label,PCB Identification	1.00	ITEM 7



CPU Board AS/A0702/04

AS/A0702/04 Issue 2: Standard board

(See board drawing AS/A0702/04 issue 2 on page 87 and circuit diagram CD/A0702/04 issue 2 on page 89).

Stabilization of leak alarm trigger threshold

AS/A0702/04 Issue 3: Addition of capacitor C0481 to stabilise leak alarm trigger threshold

(See board drawing AS/A0702/04 issue 3 on page 93 and circuit diagram CD/A0702/04 issue 3 on page 95).

Also see service information "SI 000201 Leak Alarm Trigger Threshold." on page 236.

Alarm sounder failing to operate in fresh gas blocked conditions

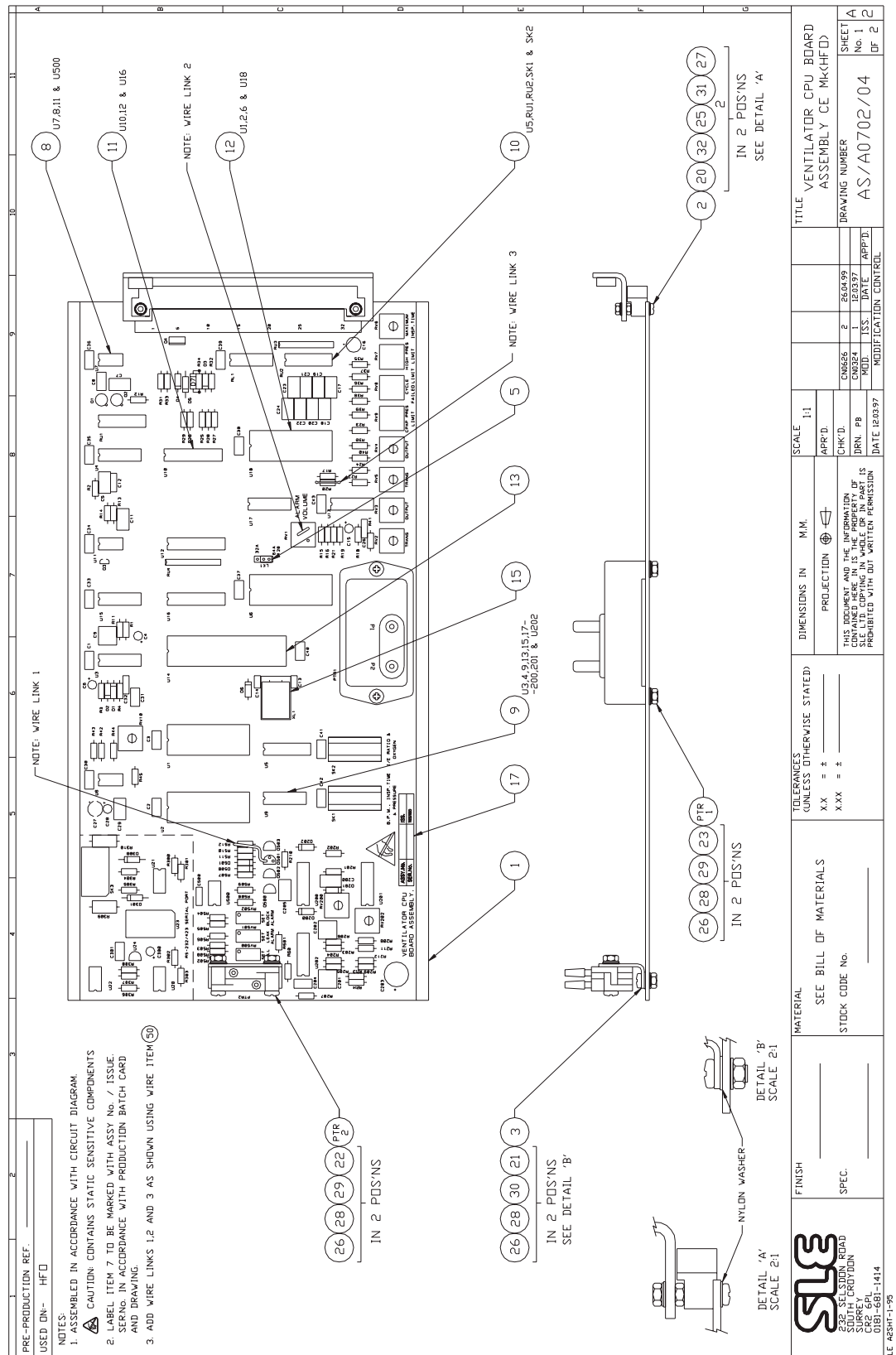
AS/A0702/04 Sht 1 Issue 5: No change

AS/A0702/04 Sht 2 Issue 5: Modification to show track cut between C500 to U500 pin 7. Connection of link between C500 and U500 pin 8 and connection of a 68M resistor across pin 5 and 7.

CD/A0702/04 issue 4: Modification of circuit diagram to show track cut between C500 to U500 pin 7, Connection of link between C500 and U500 pin 8 and connection of a 68M resistor across pin 5 and 7.

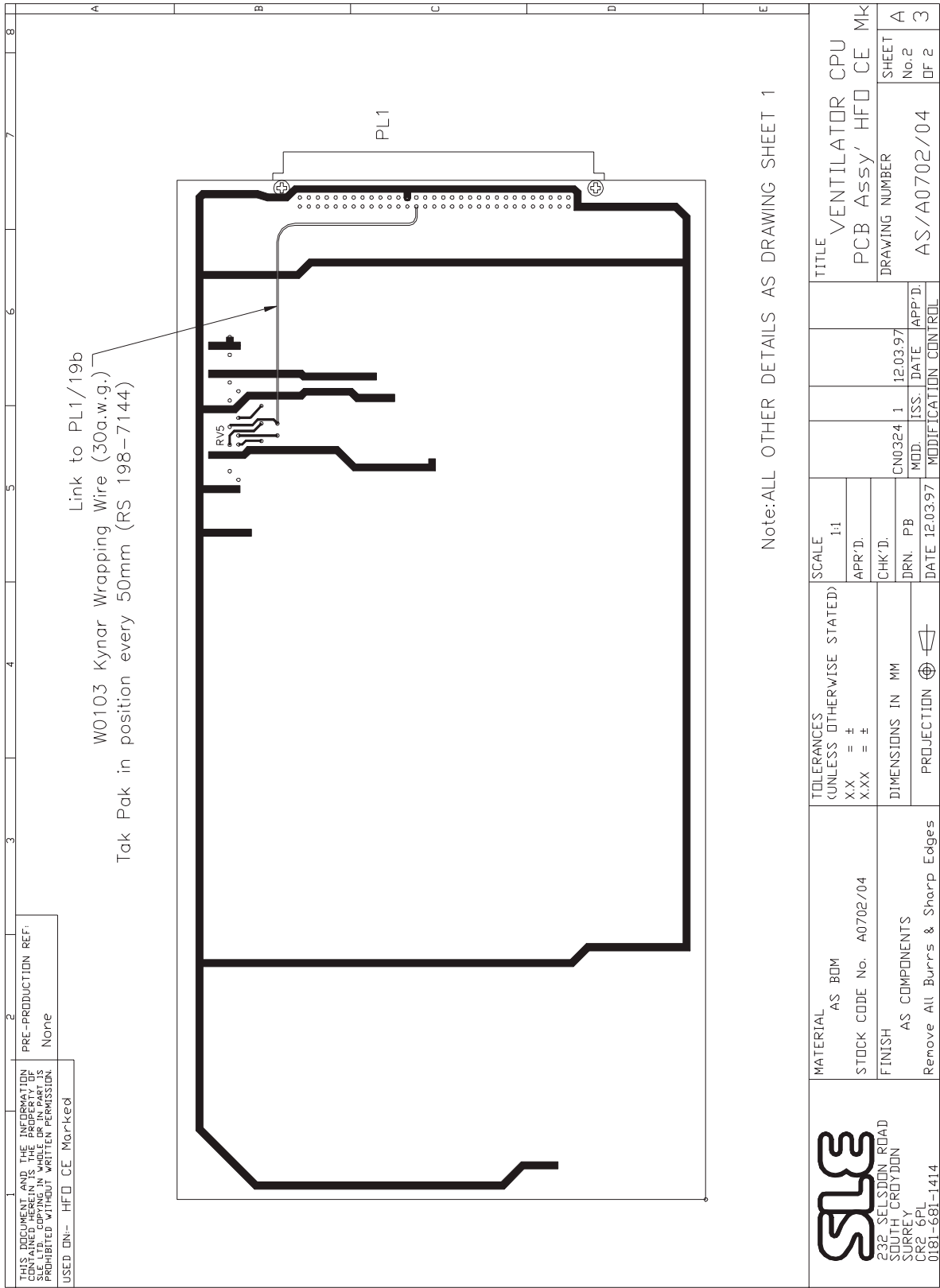
(See board drawing AS/A0702/04 issue 5 on page 99 and circuit diagram CD/A0702/04 issue 6 on page 101).

17.3 AS/A0702/04 CPU PCB Issue 2 Sheet 1 of 2

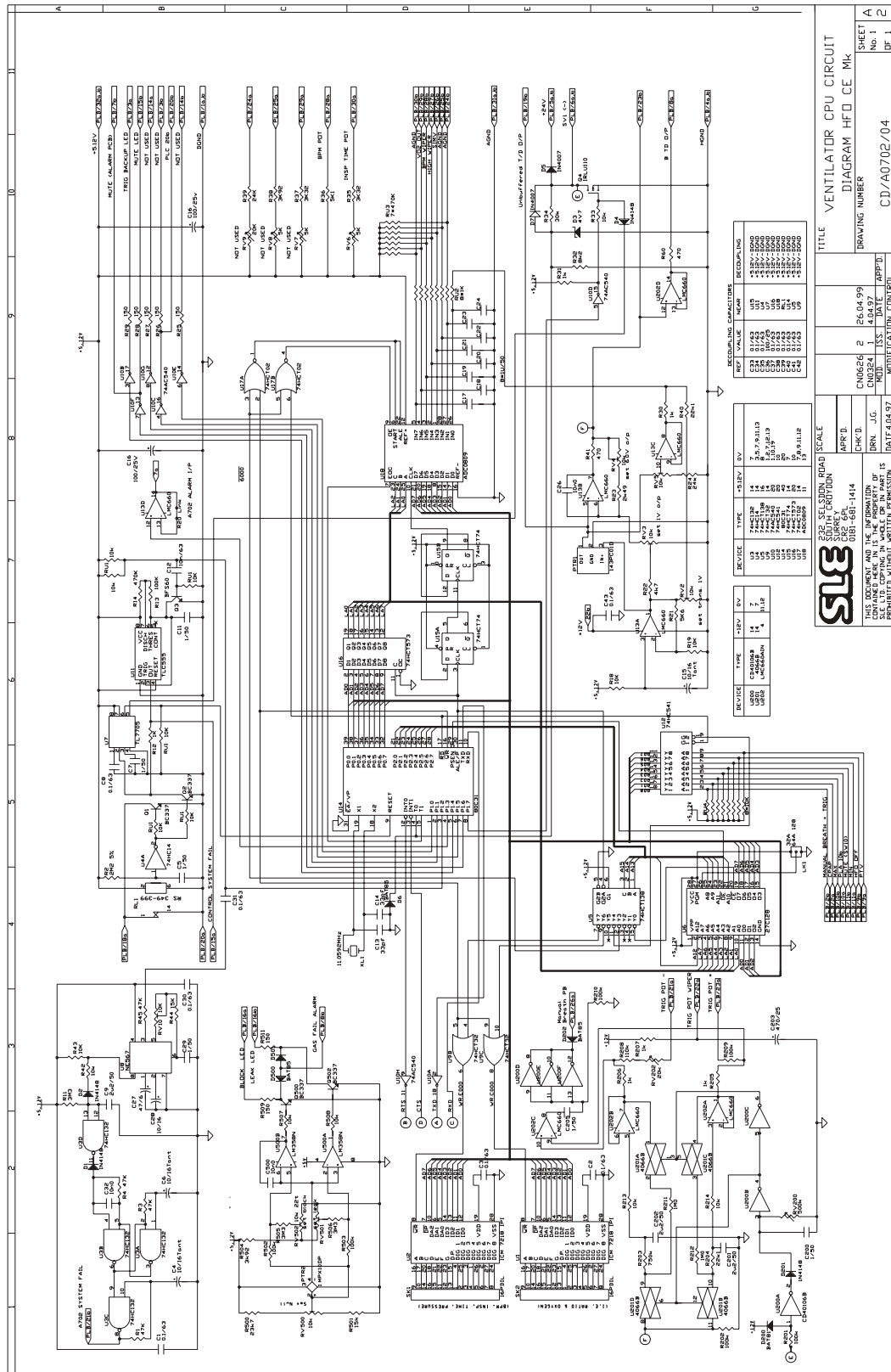




17.3.1 AS/A0702/04 CPU PCB Issue 1 Sheet 2 of 2



17.3.2 CD/A0702/04 CPU Board Circuit Diagram Issue 2



A3 version on page 189 of circuit diagram appendix.



PARTS LIST

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Finished Item Description Ventilator CPU PCB Assy' CE MK
Bill of materials AS/A0702/04 Issue 2

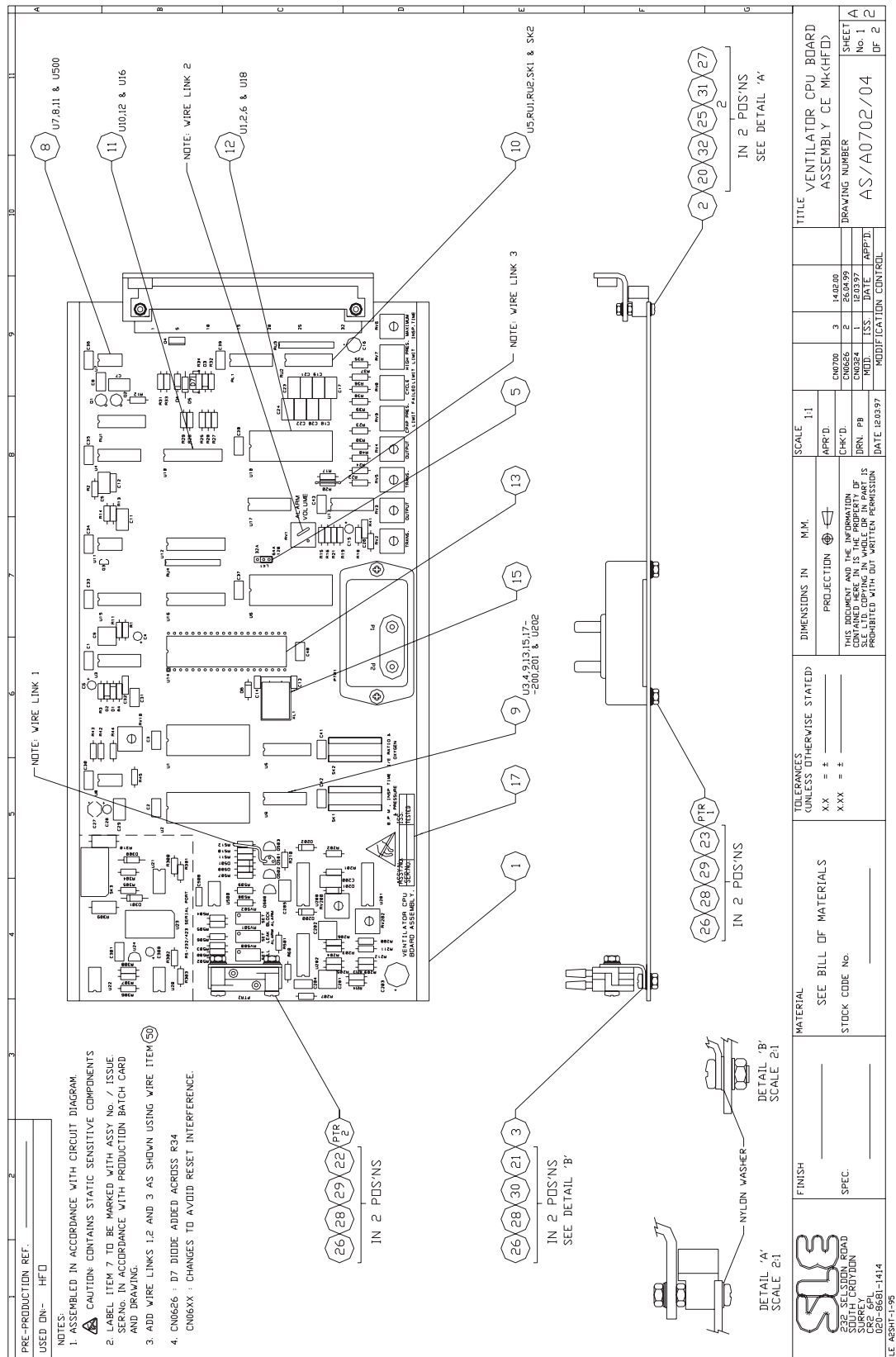
Part Number	Component Description	Used	Component Reference(s)
J0702	Ventilator CPU pcb blank	1 00 Each	ITEM 1 (PCB Rev D) Check pressure transducer type (ITEM PTR2)and read note for component pre-fix
C0256	47uF Capacitor 16V 10-20% Tan	1 00 Each	C27
C0260	10nF Capacitor 63V 20t MKS2	4 00 Each	C12,26,32,C500
C0434	10u Capacitor 35V 20% 5mm Lead	4 00 Each	C4,6,15,28
C0439	100u Capacitor 25V 20% Elect	2 00 Each	C16,C36
C0441	470uF Capacitor 25V 20%	1 00 Each	C203
C0450	0 1uF Capacitor 63V 10% MKS2	17 00 Each	C1-3,8,30,31,33 35,37-43,C204
C0459	2 2uF Capacitor 50V 10%	3 00 Each	C9,201,202
C0461	33pF Capacitor 100V 10% Ceram	2 00 Each	C13,C14
C0462	luF Capacitor 50/63V 10% MKS2	14 00 Each	C5,7,11,17-24, C29,C200,C20S
D0284	BZX79C4V7 (was BZY88C 4v7)	1 00 Each	D3
D0288	LM358N	1 00 Each	when pre-fix is not 'S.' for PTR2
D0298	ICM7218DIJ1 28 Pin Harris	2 00 Each	U1,U2
D0305	ADC0809CCN NSC	1 00 Each	U18
D0320	74HC132N	1 00 Each	U3
D0336	BC337	4 00 Each	Q1,Q2,Q500,Q502
D0402	IN4007 Plastic Diode	2 00 Each	D5 & D7 CN0626
D0406	IN4148	4 00 Each	D1,D2,D4,D201
D0407	BAT85	4 00 Each	D202,D500,D501,D6
D0513	74HC14	1 00 Each	U4
D0525	4066 Quad Bilateral Switch	1 00 Each	U201
D0566	TL7705ACP	1 00 Each	U7
D0569	BAT81	1 00 Each	D200
D0570	Crystal 11 0592 MHz	1 00 Each	XL1
D0571	74HCT138N	1 00 Each	U5
D0572	74HCT32N	1 00 Each	U9
D0573	74HCT74N	1 00 Each	U15
D0574	74HCT573N	1 00 Each	U16
D0575	74HCT02N	1 00 Each	U17
D0576/01	27C128-20/P	1 00 Each	U6
D0577	LM567CN	1 00 Each	U8
D0578	74AC540	1 00 Each	U10
D0579	74HC541	1 00 Each	U12
D0580	TLC555CP	1 00 Each	U11

Part Number	Component Description	Used	Component Reference(s)
D0581	LMC660AIN	2 00 Each	U13,U202
D0584	CD40106BE	1 00 Each	U200
D0636	IRLU110 power MOSFET,TO-251	1 00 Each	Q4
D0638	ZTX450Each	1 00 Each	Q3
D0644/01	P80C32EBPN 8-bit CMOS CPU	1 00 Each	U14
M0626	Jumper Link	1 00 Each	ITEM 5
M0660	Pad Adhesive double sided	1 00 Each	ITEM 15 (XL1
M0718	Label, PCB Identification	1 00 Each	ITEM 17
N2176	Sensor SXOIDN (Sensym only)	1 00 Each	PTR2
If N2176 is not Pre-Fixed with M on component then R501 becomes 33K(PT No R0473) & U500 becomes LM358(PT No D0288)			
N2521	Pressure Transducer 143SCOID	1 00 Each	PTR1
00227	Relay W172DIP-5 5V DC	1 00 Each	RL1
P0230	DIN41612 64 Way 90 deg Plug	1 00 Each	PLB
P0464	12way P C B Header Straight	0 25 Each	LK1
R0224	30K Resistor 0 25W 1%	1 00 Each	R34
R0226	110K Resistor 1% 0.25W	1.00 Each	R208
R0228	8K2 1% 50PPM 0.25W	1.00 Each	R32
R0233	4K7 Resistor 1* 0.25W 50PPM MF	1.00 Each	R22
R0268	5K1 Resistor 1* 0.25W SMA0207	1.00 Each	R36
R0349	24K Resistor 0.25W 1%	2.00 Each	R24,R39
R0350	1K x 8 Resistor Network	1.00 Each	RU2
R0351	10K x 8 Resistor Network	1.00 Each	RU1
R0416	150R Resistor 1% 0.25W SMA0207	7.00 Each	R25-R29,R509,R511
R0428	470R Resistor 1% 0.25W	2.00 Each	R41,R60
R0436	1.0K Resistor 1% 0.25W SMA0207	6.00 Each	R12,R30,R31,R205-R207
R0445	2K49 Resistor 1% 0.25W SMA0207	1.00 Each	R23
R0449	3.32K Resistor 1% 0.25W SMA	2.00 Each	R35,R37
R0451	3.92K Resistor 1% 0.25W SMA020	2.00 Each	R38,R504
R0456	5.6K Resistor 1% 0.25W SMA0207	1.00 Each	R21
R0463	10K Resistor 1% 0 25W SMA0207	7.00 Each	R18,19,33,42,43,R507, R508
R0467	15K Resistor 1% 0.25W SMA0207	1.00 Each	R44
R0469	22.1K Resistor 1% 0.25W SMA020	2.00 Each	R40,R204
R0470	23.7K Resistor 1% 0.25W	1.00 Each	R500
R0473	33K Resistor 1% 0.25W	1.00 Each	R501=Pt No.R0467 when pre-fix is not 'S' for PTR2
R0479	47K Resistor 1% 0.25W SMA0207	4.00 Each	R1,3,4,R45
R0486	100K Resistor 1% 0.25W SMA0207	7.00 Each	R13,201,202,209,210,R502,R503
R0496	470K Resistor 1% 0.25W SMA0207	1.00 Each	R14
R0499	750K Resistor 1% 0.25W	1.00 Each	R203
R0501	1.0M Resistor 1% 0.25W SMA0207	2.00 Each	R211,R212



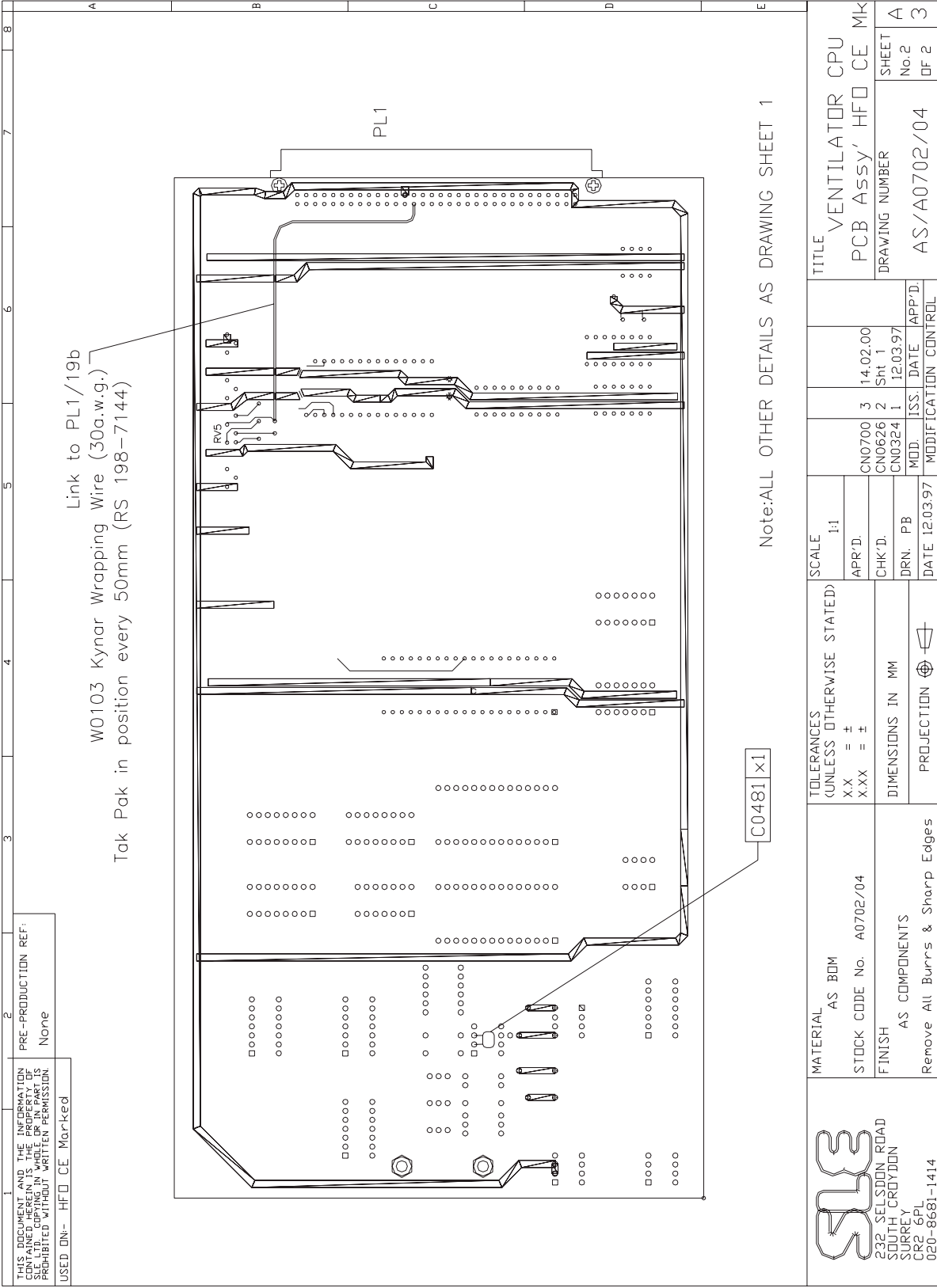
Part Number	Component Description	Used	Component Reference(s)
R0504	2.2M Resistor 1% 0.25W	1.00 Each	R2
R0506	3.3M Resistor 1% 0.25W SMA0207	3.00 Each	R11,R505,R506
R0555	470K x 8 Resistor Network	1.00 Each	RU3
R0556	10K x 8 Resistor Network	1.00 Each	RU4
R0571	10k Resistor 1% 0.125W M/Film	2.00 Each	R213 & R214
S0209	IC Socket 28 way DIL	4.00 Each	ITEM 12(U1,2,6&U18)
S0212	IC Socket 16 way DIL	5.00 Each	ITEM 10 (U5,RUI,RU2, SKI,SK2)
S0227	IC Socket 40 way DIL	1.00 Each	ITEM 13 (U14)
S0237	IC Socket 20 way DIL	3.00 Each	ITEM 11(U16,12 &
			U10)
S0241	IC Socket 8 way DIL	4.00 Each	ITEM 8 (U7,8,11 &
			U500)
S0242	IC Socket 14 way DIL	9.00 Each	ITEM 9 (U3,4,9,13,
			15,17,200,201 &
			U202)
T0205	Alarm Transducer Bracket	1.00 Each	ITEM 3
T0683	Handle (pcb)	1.00 Each	ITEM 2
V0404	5.0K Trimmer,cermet,top adjust	1.00 Each	RV6
V0405	10K Trimmer, cermet, top adj	5.00 Each	RV2-RV5,RV10
V0406	20K Trimmer cermet,top adjust	1.00 Each	RV202
V0410	500K Trimmer	1.00 Each	RV200
V0414	10K Trimmer, cermet, top adj	3.00 Each	RV500-RV502
H3116	M3 x 16 Pan Hd Pozi s.st	2.00 Each	ITEM 22
H3108	M3 x 8 Pan Hd Pozi s.st	2.00 Each	ITEM 21
H3225	M3 x 25 Csk Hd Pozi s.st	2.00 Each	ITEM 23
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 20
H3091	M3 Nut Full s.st	6.00 Each	ITEM 26
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
H3094	M3 S/Proof Washer s.st DIN6798	6.00 Each	ITEM 28
H3095	M3 Plain Washer Nylon	2.00 Each	ITEM 30
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 32
H3093	M3 Plain Washer s.st	4.00 Each	ITEM 29
W0103	Wire Wrapping Kynar Red 30awg	0.20 Metre	ITEM 50

17.4 AS/A0702/04 CPU PCB Issue 3 Sheet 1 of 2

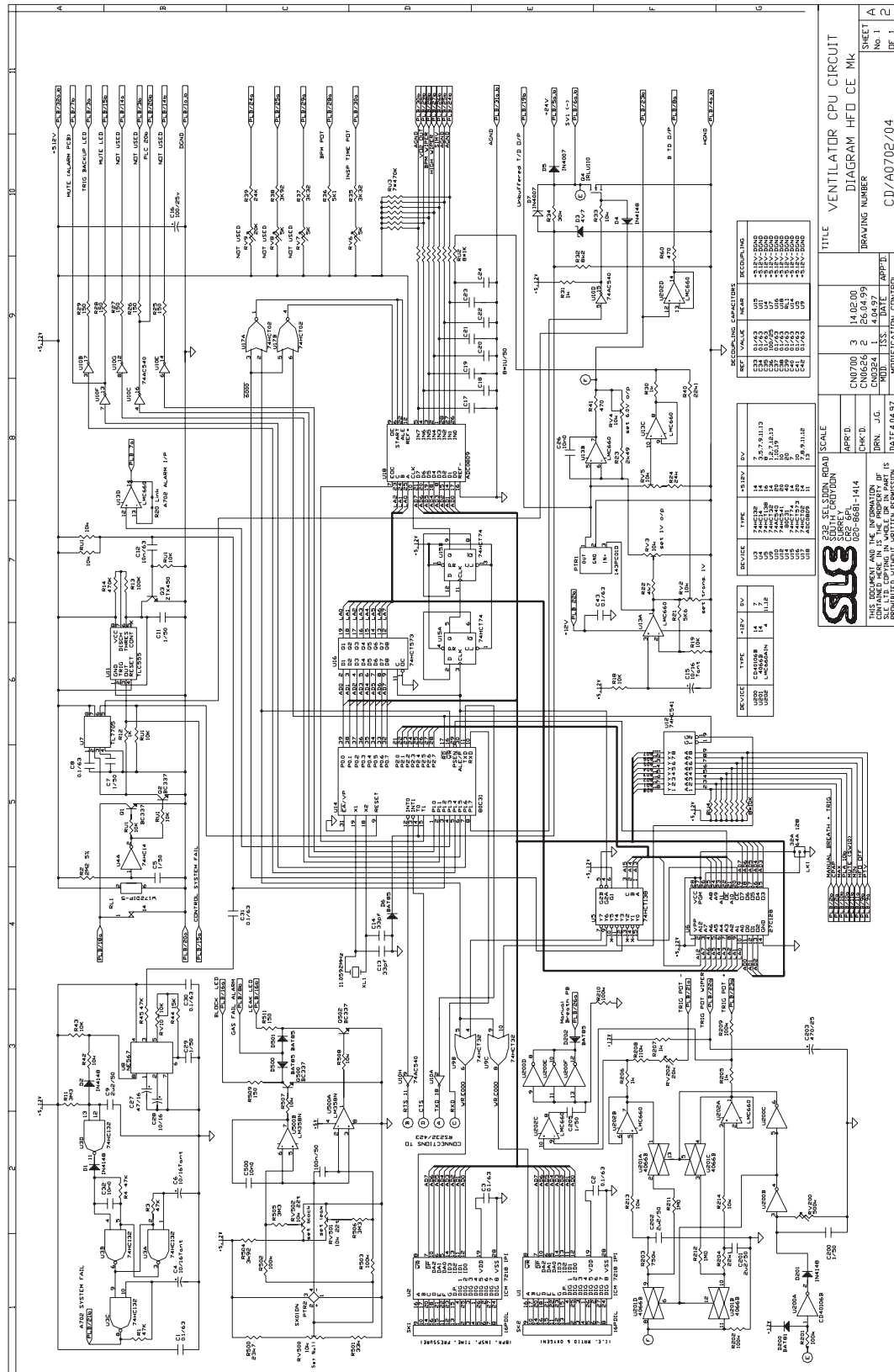




17.4.1 AS/A0702/04 CPU PCB Issue 3 Sheet 2 of 2



17.4.2 CD/A0702/04 CPU PCB Circuit Diagram Issue 3



A3 version on page 191 of circuit diagram appendix.



PARTS LIST

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Finished Item Description Ventilator CPU PCB Assy' CE MK
Bill of materials AS/A0702/04 Issue 3

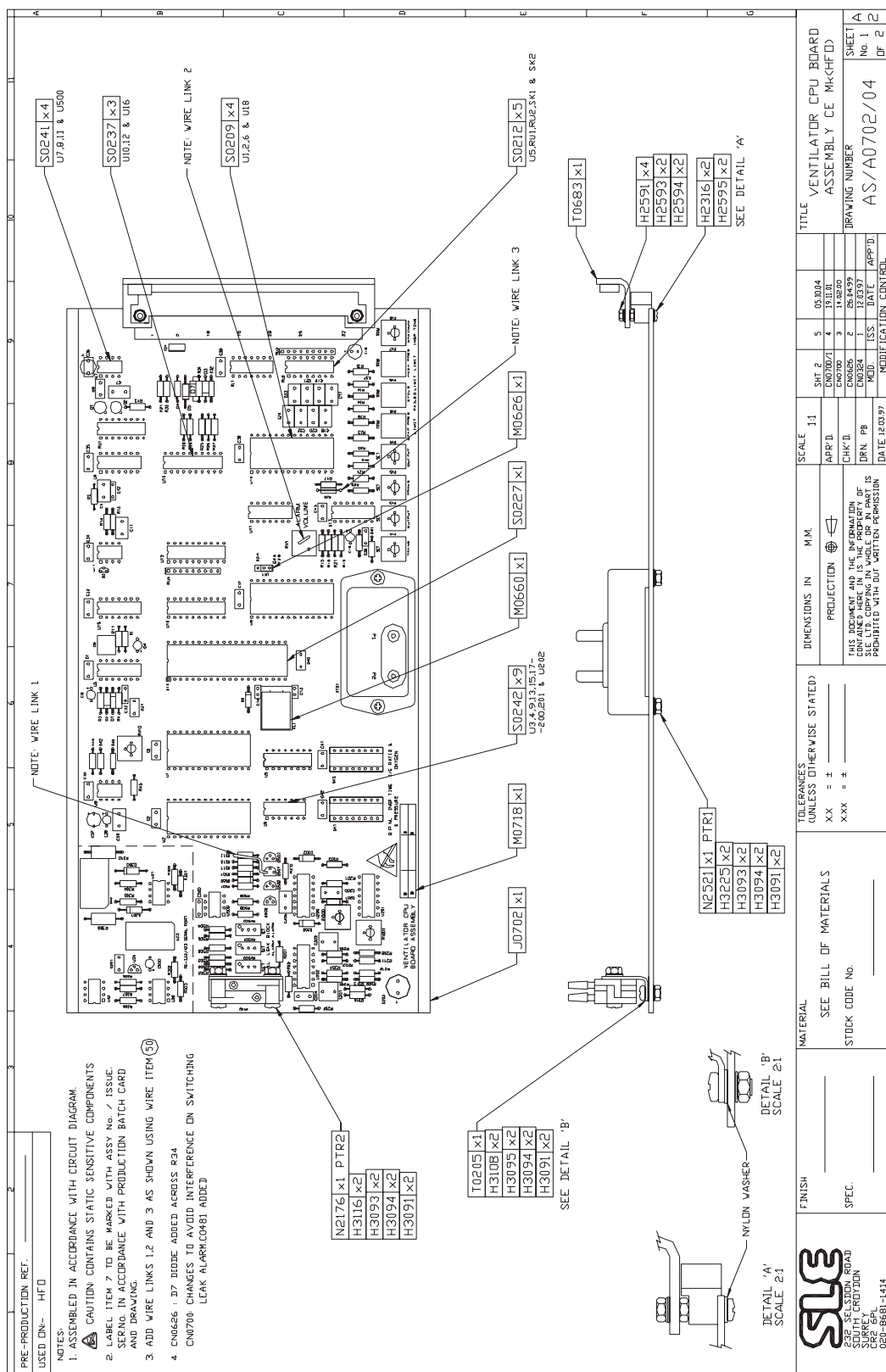
Part Number	Component Description	Used	Component Reference(s)
J0702	Ventilator CPU pcb blank	1 00 Each	ITEM 1 (PCB Rev D) Check pressure transducer type (ITEM PTR2)and read note for component pre-fix
C0256	47uF Capacitor 16V 10-20% Tan	1 00 Each	C27
C0260	10nF Capacitor 63V 20t MKS2	4 00 Each	C12,26,32,C500
C0434	10u Capacitor 35V 20% 5mm Lead	4 00 Each	C4,6,15,28
C0439	100u Capacitor 25V 20% Elect	2 00 Each	C16,C36
C0441	470uF Capacitor 25V 20%	1 00 Each	C203
C0450	0 1uF Capacitor 63V 10% MKS2	17 00 Each	C1-3,8,30,31,33 35,37-43,C204
C0459	2 2uF Capacitor 50V 10%	3 00 Each	C9,201,202
C0461	33pF Capacitor 100V 10% Ceram	2 00 Each	C13,C14
C0462	luF Capacitor 50/63V 10% MKS2	14 00 Each	C5,7,11,17-24, C29,C200,C20S
C0481	100nF Capacitor 50V	1 00 Each	C2
D0284	BZX79C4V7 (was BZY88C 4v7)	1 00 Each	D3
D0288	LM358N	1 00 Each	when pre-fix is not 'S.' for PTR2
D0298	ICM7218DIJ1 28 Pin Harris	2 00 Each	U1,U2
D0305	ADC0809CCN NSC	1 00 Each	U18
D0320	74HC132N	1 00 Each	U3
D0336	BC337	4 00 Each	Q1,Q2,Q500,Q502
D0402	IN4007 Plastic Diode	2 00 Each	D5 & D7 CN0626
D0406	IN4148	4 00 Each	D1,D2,D4,D201
D0407	BAT85	4 00 Each	D202,D500,D501,D6
D0513	74HC14	1 00 Each	U4
D0525	4066 Quad Bilateral Switch	1 00 Each	U201
D0566	TL7705ACP	1 00 Each	U7
D0569	BAT81	1 00 Each	D200
D0570	Crystal 11 0592 MHz	1 00 Each	XL1
D0571	74HCT138N	1 00 Each	U5
D0572	74HCT32N	1 00 Each	U9
D0573	74HCT74N	1 00 Each	U15
D0574	74HCT573N	1 00 Each	U16
D0575	74HCT02N	1 00 Each	U17
D0576/01	27C128-20/P	1 00 Each	U6
D0577	LM567CN	1 00 Each	U8
D0578	74AC540	1 00 Each	U10
D0579	74HC541	1 00 Each	U12

Part Number	Component Description	Used	Component Reference(s)
D0580	TLC555CP	1 00 Each	U11
D0581	LMC660AIN	2 00 Each	U13,U202
D0584	CD40106BE	1 00 Each	U200
D0636	IRLU110 power MOSFET,TO-251	1 00 Each	Q4
D0638	ZTX450Each	1 00 Each	Q3
D0644/01	P80C32EBPN 8-bit CMOS CPU	1 00 Each	U14
M0626	Jumper Link	1 00 Each	ITEM 5
M0660	Pad Adhesive double sided	1 00 Each	ITEM 15 (XL1
M0718	Label, PCB Identification	1 00 Each	ITEM 17
N2176	Sensor SX01DN (Sensym only)	1 00 Each	PTR2
If N2176 is not Pre-Fixed with M on component then R501 becomes 33K(Pt No R0473) & U500 becomes LM358(Pt No D0288)			
N2521	Pressure Transducer 143SC01D	1 00 Each	PTR1
00227	Relay W172DIP-5 5V DC	1 00 Each	RL1
P0230	DIN41612 64 Way 90 deg Plug	1 00 Each	PLB
P0464	12way P C B Header Straight	0 25 Each	LK1
R0224	30K Resistor 0 25W 1%	1 00 Each	R34
R0226	110K Resistor 1% 0.25W	1.00 Each	R208
R0228	8K2 1% 50PPM 0.25W	1.00 Each	R32
R0233	4K7 Resistor 1* 0.25W 50PPM MF	1.00 Each	R22
R0268	5K1 Resistor 1* 0.25W SMA0207	1.00 Each	R36
R0349	24K Resistor 0.25W 1%	2.00 Each	R24,R39
R0350	1K x 8 Resistor Network	1.00 Each	RU2
R0351	10K x 8 Resistor Network	1.00 Each	RU1
R0416	150R Resistor 1% 0.25W SMA0207	7.00 Each	R25-R29,R509,R511
R0428	470R Resistor 1% 0.25W	2.00 Each	R41,R60
R0436	1.0K Resistor 1% 0.25W SMA0207	6.00 Each	R12,R30,R31,R205-R207
R0445	2K49 Resistor 1% 0.25W SMA0207	1.00 Each	R23
R0449	3.32K Resistor 1% 0.25W SMA	2.00 Each	R35,R37
R0451	3.92K Resistor 1% 0.25W SMA020	2.00 Each	R38,R504
R0456	5.6K Resistor 1% 0.25W SMA0207	1.00 Each	R21
R0463	10K Resistor 1% 0 25W SMA0207	7.00 Each	R18,19,33,42,43,R507, R508
R0467	15K Resistor 1% 0.25W SMA0207	1.00 Each	R44
R0469	22.1K Resistor 1% 0.25W SMA020	2.00 Each	R40,R204
R0470	23.7K Resistor 1% 0.25W	1.00 Each	R500
R0473	33K Resistor 1% 0.25W	1.00 Each	R501=Pt No.R0467 when pre-fix is not 'S' for PTR2
R0479	47K Resistor 1% 0.25W SMA0207	4.00 Each	R1,3,4,R45
R0486	100K Resistor 1% 0.25W SMA0207	7.00 Each	R13,201,202,209,210,R502,R503
R0496	470K Resistor 1% 0.25W SMA0207	1.00 Each	R14
R0499	750K Resistor 1% 0.25W	1.00 Each	R203



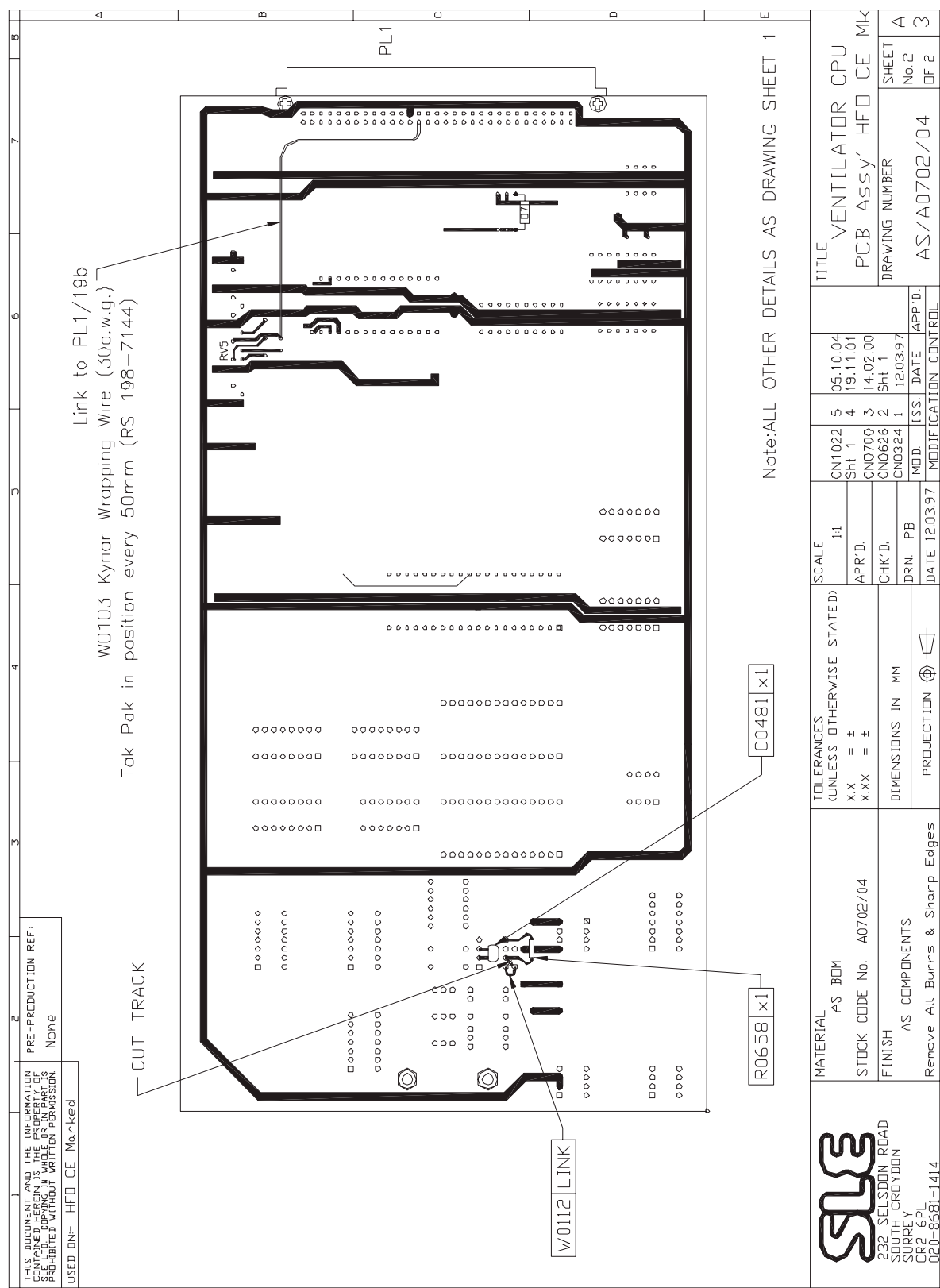
Part Number	Component Description	Used	Component Reference(s)
R0501	1.0M Resistor 1% 0.25W SMA0207	2.00 Each	R211,R212
R0504	2.2M Resistor 1% 0.25W	1.00 Each	R2
R0506	3.3M Resistor 1% 0.25W SMA0207	3.00 Each	R11,R505,R506
R0555	470K x 8 Resistor Network	1.00 Each	RU3
R0556	10K x 8 Resistor Network	1.00 Each	RU4
R0571	10k Resistor 1% 0.125W M/Film	2.00 Each	R213 & R214
S0209	IC Socket 28 way DIL	4.00 Each	ITEM 12(U1,2,6&U18)
S0212	IC Socket 16 way DIL	5.00 Each	ITEM 10 (U5,RUI,RU2, SKI,SK2)
S0227	IC Socket 40 way DIL	1.00 Each	ITEM 13 (U14)
S0237	IC Socket 20 way DIL	3.00 Each	ITEM 11(U16,12 &
			U10)
S0241	IC Socket 8 way DIL	4.00 Each	ITEM 8 (U7,8,11 &
			U500)
S0242	IC Socket 14 way DIL	9.00 Each	ITEM 9 (U3,4,9,13,
			15,17,200,201 &
			U202)
T0205	Alarm Transducer Bracket	1.00 Each	ITEM 3
T0683	Handle (pcb)	1.00 Each	ITEM 2
V0404	5.0K Trimmer,cermet,top adjust	1.00 Each	RV6
V0405	10K Trimmer, cermet, top adj	5.00 Each	RV2-RV5,RV10
V0406	20K Trimmer cermet,top adjust	1.00 Each	RV202
V0410	500K Trimmer	1.00 Each	RV200
V0414	10K Trimmer, cermet, top adj	3.00 Each	RV500-RV502
H3116	M3 x 16 Pan Hd Pozi s.st	2.00 Each	ITEM 22
H3108	M3 x 8 Pan Hd Pozi s.st	2.00 Each	ITEM 21
H3225	M3 x 25 Csk Hd Pozi s.st	2.00 Each	ITEM 23
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 20
H3091	M3 Nut Full s.st	6.00 Each	ITEM 26
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
H3094	M3 S/Proof Washer s.st DIN6798	6.00 Each	ITEM 28
H3095	M3 Plain Washer Nylon	2.00 Each	ITEM 30
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 32
H3093	M3 Plain Washer s.st	4.00 Each	ITEM 29
W0103	Wire Wrapping Kynar Red 30awg	0.20 Metre	ITEM 50

17.5 AS/A0702/04 CPU PCB Issue 5 Sheet 1 of 2

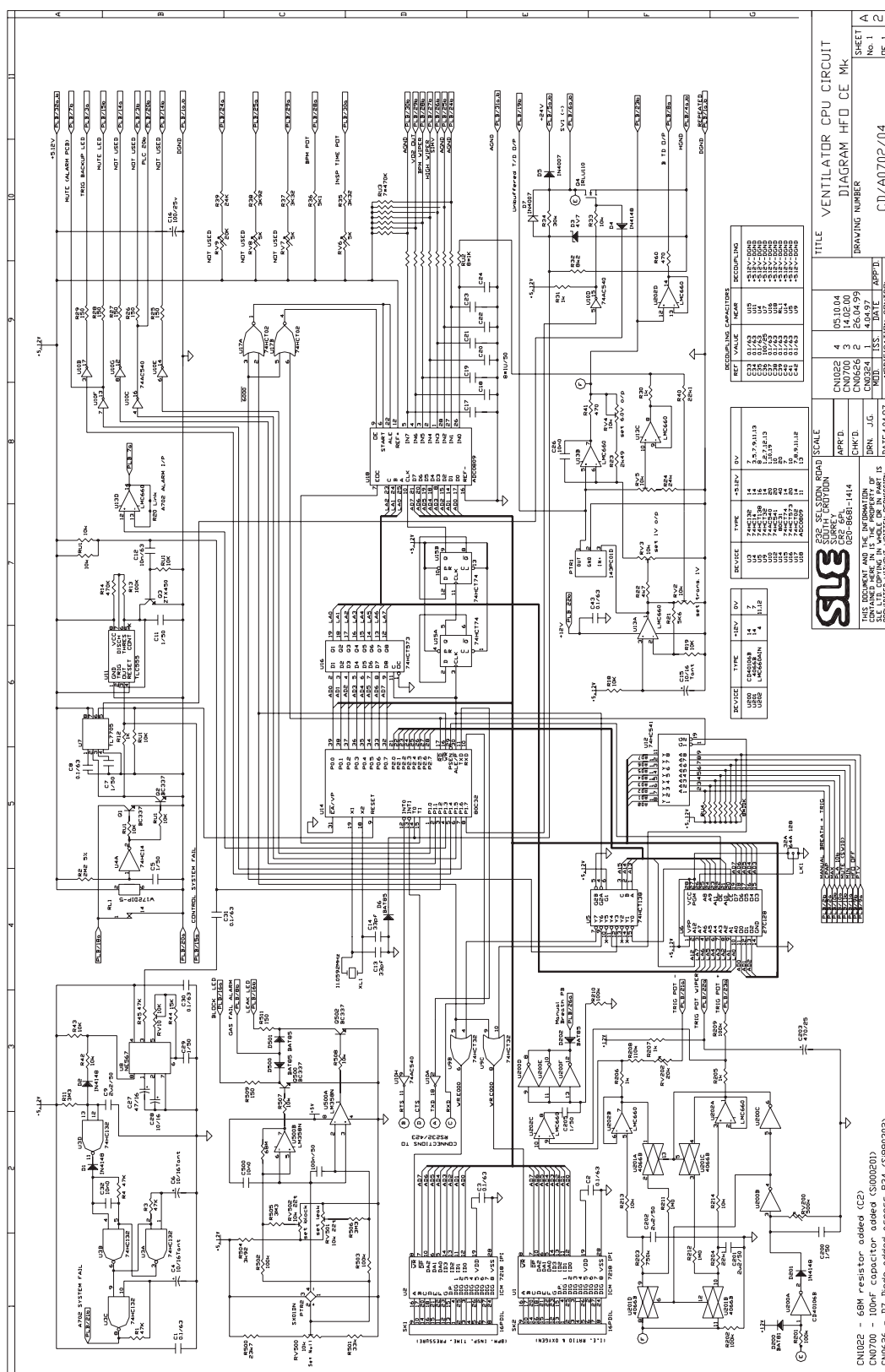




17.5.1 AS/A0702/04 CPU PCB Issue 5 Sheet 2 of 2



17.5.2 CD/A0702/04 CPU PCB Circuit Diagram Issue 4



A3 version on page 193 of circuit diagram appendix.



PARTS LIST

Finished Item Stock Number **A0702/04**
 Finished Item Description Ventilator CPU PCB Assy' CE MK
 Bill of materials AS/A0702/04 Issue 5

Part Number	Component Description	Used	Component Reference(s)
J0702	Ventilator CPU pcb blank	1 00 Each	ITEM 1 (PCB Rev D) Check pressure transducer type (ITEM PTR2)and read note for component pre-fix
C0256	47uF Capacitor 16V 10-20% Tan	1 00 Each	C27
C0260	10nF Capacitor 63V 20t MKS2	4 00 Each	C12,26,32,C500
C0434	10u Capacitor 35V 20% 5mm Lead	4 00 Each	C4,6,15,28
C0439	100u Capacitor 25V 20% Elect	2 00 Each	C16,C36
C0441	470uF Capacitor 25V 20%	1 00 Each	C203
C0450	0 1uF Capacitor 63V 10% MKS2	17 00 Each	C1-3,8,30,31,33 35,37-43,C204
C0459	2 2uF Capacitor 50V 10%	3 00 Each	C9,201,202
C0461	33pF Capacitor 100V 10% Ceram	2 00 Each	C13,C14
C0462	luF Capacitor 50/63V 10% MKS2	14 00 Each	C5,7,11,17-24, C29,C200,C20S
C0481	100nF Capacitor 50V	1 00 Each	C2
D0284	BZX79C4V7 (was BZY88C 4v7)	1 00 Each	D3
D0288	LM358N	1 00 Each	when pre-fix is not 'S.' for PTR2
D0298	ICM7218DIJ1 28 Pin Harris	2 00 Each	U1,U2
D0305	ADC0809CCN NSC	1 00 Each	U18
D0320	74HC132N	1 00 Each	U3
D0336	BC337	4 00 Each	Q1,Q2,Q500,Q502
D0402	IN4007 Plastic Diode	2 00 Each	D5 & D7 CN0626
D0406	IN4148	4 00 Each	D1,D2,D4,D201
D0407	BAT85	4 00 Each	D202,D500,D501,D6
D0513	74HC14	1 00 Each	U4
D0525	4066 Quad Bilateral Switch	1 00 Each	U201
D0566	TL7705ACP	1 00 Each	U7
D0569	BAT81	1 00 Each	D200
D0570	Crystal 11 0592 MHz	1 00 Each	XL1
D0571	74HCT138N	1 00 Each	U5
D0572	74HCT32N	1 00 Each	U9
D0573	74HCT74N	1 00 Each	U15
D0574	74HCT573N	1 00 Each	U16
D0575	74HCT02N	1 00 Each	U17
D0576/01	27C128-20/P	1 00 Each	U6
D0577	LM567CN	1 00 Each	U8
D0578	74AC540	1 00 Each	U10
D0579	74HC541	1 00 Each	U12

Part Number	Component Description	Used	Component Reference(s)
D0580	TLC555CP	1 00 Each	U11
D0581	LMC660AIN	2 00 Each	U13,U202
D0584	CD40106BE	1 00 Each	U200
D0636	IRLU110 power MOSFET,TO-251	1 00 Each	Q4
D0638	ZTX450Each	1 00 Each	Q3
D0644/01	P80C32EBPN 8-bit CMOS CPU	1 00 Each	U14
M0626	Jumper Link	1 00 Each	ITEM 5
M0660	Pad Adhesive double sided	1 00 Each	ITEM 15 (XL1
M0718	Label, PCB Identification	1 00 Each	ITEM 17
N2176	Sensor SX01DN (Sensym only)	1 00 Each	PTR2
If N2176 is not Pre-Fixed with M on component then R501 becomes 33K(Pt No R0473) & U500 becomes LM358(Pt No D0288)			
N2521	Pressure Transducer 143SC01D	1 00 Each	PTR1
00227	Relay W172DIP-5 5V DC	1 00 Each	RL1
P0230	DIN41612 64 Way 90 deg Plug	1 00 Each	PLB
P0464	12way P C B Header Straight	0 25 Each	LK1
R0224	30K Resistor 0 25W 1%	1 00 Each	R34
R0226	110K Resistor 1% 0.25W	1.00 Each	R208
R0228	8K2 1% 50PPM 0.25W	1.00 Each	R32
R0233	4K7 Resistor 1* 0.25W 50PPM MF	1.00 Each	R22
R0268	5K1 Resistor 1* 0.25W SMA0207	1.00 Each	R36
R0349	24K Resistor 0.25W 1%	2.00 Each	R24,R39
R0350	1K x 8 Resistor Network	1.00 Each	RU2
R0351	10K x 8 Resistor Network	1.00 Each	RU1
R0416	150R Resistor 1% 0.25W SMA0207	7.00 Each	R25-R29,R509,R511
R0428	470R Resistor 1% 0.25W	2.00 Each	R41,R60
R0436	1.0K Resistor 1% 0.25W SMA0207	6.00 Each	R12,R30,R31,R205-R207
R0445	2K49 Resistor 1% 0.25W SMA0207	1.00 Each	R23
R0449	3.32K Resistor 1% 0.25W SMA	2.00 Each	R35,R37
R0451	3.92K Resistor 1% 0.25W SMA020	2.00 Each	R38,R504
R0456	5.6K Resistor 1% 0.25W SMA0207	1.00 Each	R21
R0463	10K Resistor 1% 0 25W SMA0207	7.00 Each	R18,19,33,42,43,R507, R508
R0467	15K Resistor 1% 0.25W SMA0207	1.00 Each	R44
R0469	22.1K Resistor 1% 0.25W SMA020	2.00 Each	R40,R204
R0470	23.7K Resistor 1% 0.25W	1.00 Each	R500
R0473	33K Resistor 1% 0.25W	1.00 Each	R501=Pt No.R0467 when pre-fix is not 'S' for PTR2
R0479	47K Resistor 1% 0.25W SMA0207	4.00 Each	R1,3,4,R45
R0486	100K Resistor 1% 0.25W SMA0207	7.00 Each	R13,201,202,209,210,R502,R503
R0496	470K Resistor 1% 0.25W SMA0207	1.00 Each	R14
R0499	750K Resistor 1% 0.25W	1.00 Each	R203



Part Number	Component Description	Used	Component Reference(s)
R0501	1.0M Resistor 1% 0.25W SMA0207	2.00 Each	R211,R212
R0504	2.2M Resistor 1% 0.25W	1.00 Each	R2
R0506	3.3M Resistor 1% 0.25W SMA0207	3.00 Each	R11,R505,R506
R0555	470K x 8 Resistor Network	1.00 Each	RU3
R0556	10K x 8 Resistor Network	1.00 Each	RU4
R0571	10k Resistor 1% 0.125W M/Film	2.00 Each	R213 & R214
R0658	68M Resistor 0.25W High Ohmic	1.00 Each	See AS/A0702/04 sht 2
S0209	IC Socket 28 way DIL	4.00 Each	ITEM 12(U1,2,6&U18)
S0212	IC Socket 16 way DIL	5.00 Each	ITEM 10 (U5,RUI,RU2, SKI,SK2)
S0227	IC Socket 40 way DIL	1.00 Each	ITEM 13 (U14)
S0237	IC Socket 20 way DIL	3.00 Each	ITEM 11(U16,12 & U10)
S0241	IC Socket 8 way DIL	4.00 Each	ITEM 8 (U7,8,11 & U500)
S0242	IC Socket 14 way DIL	9.00 Each	ITEM 9 (U3,4,9,13, 15,17,200,201 & U202)
T0205	Alarm Transducer Bracket	1.00 Each	ITEM 3
T0683	Handle (pcb)	1.00 Each	ITEM 2
V0404	5.0K Trimmer,cermet,top adjust	1.00 Each	RV6
V0405	10K Trimmer, cermet, top adj	5.00 Each	RV2-RV5,RV10
V0406	20K Trimmer cermet,top adjust	1.00 Each	RV202
V0410	500K Trimmer	1.00 Each	RV200
V0414	10K Trimmer, cermet, top adj	3.00 Each	RV500-RV502
H3116	M3 x 16 Pan Hd Pozi s.st	2.00 Each	ITEM 22
H3108	M3 x 8 Pan Hd Pozi s.st	2.00 Each	ITEM 21
H3225	M3 x 25 Csk Hd Pozi s.st	2.00 Each	ITEM 23
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 20
H3091	M3 Nut Full s.st	6.00 Each	ITEM 26
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
H3094	M3 S/Proof Washer s.st DIN6798	6.00 Each	ITEM 28
H3095	M3 Plain Washer Nylon	2.00 Each	ITEM 30
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 32
H3093	M3 Plain Washer s.st	4.00 Each	ITEM 29
W0103	Wire Wrapping Kynar Red 30awg	0.20 Metre	ITEM 50
W0112	Tinned copper wire 22swg	0.01 Metre	See AS/A0702/04 sht 2

Main Board AS/A0736/03

Revision E: Standard board

(See board drawing AS/A0736/03 issue 3 on page 106 and circuit diagram CD/A0736/03 issue 2 on page 107).

Revision F: U7 timer (ZN1034E) no longer manufactured and replaced by timer (NE555N) which required additional components.

(See board drawing AS/A0736/03 issue 4 on page 111 and circuit diagram CD/A0736/03 issue 3 on page 112).

Revision G: Incorporates resistors R122 and R123.

(See board drawing AS/A0736/03 issue 5 on page 116 and circuit diagram CD/A0736/03 issue 4 on page 117).

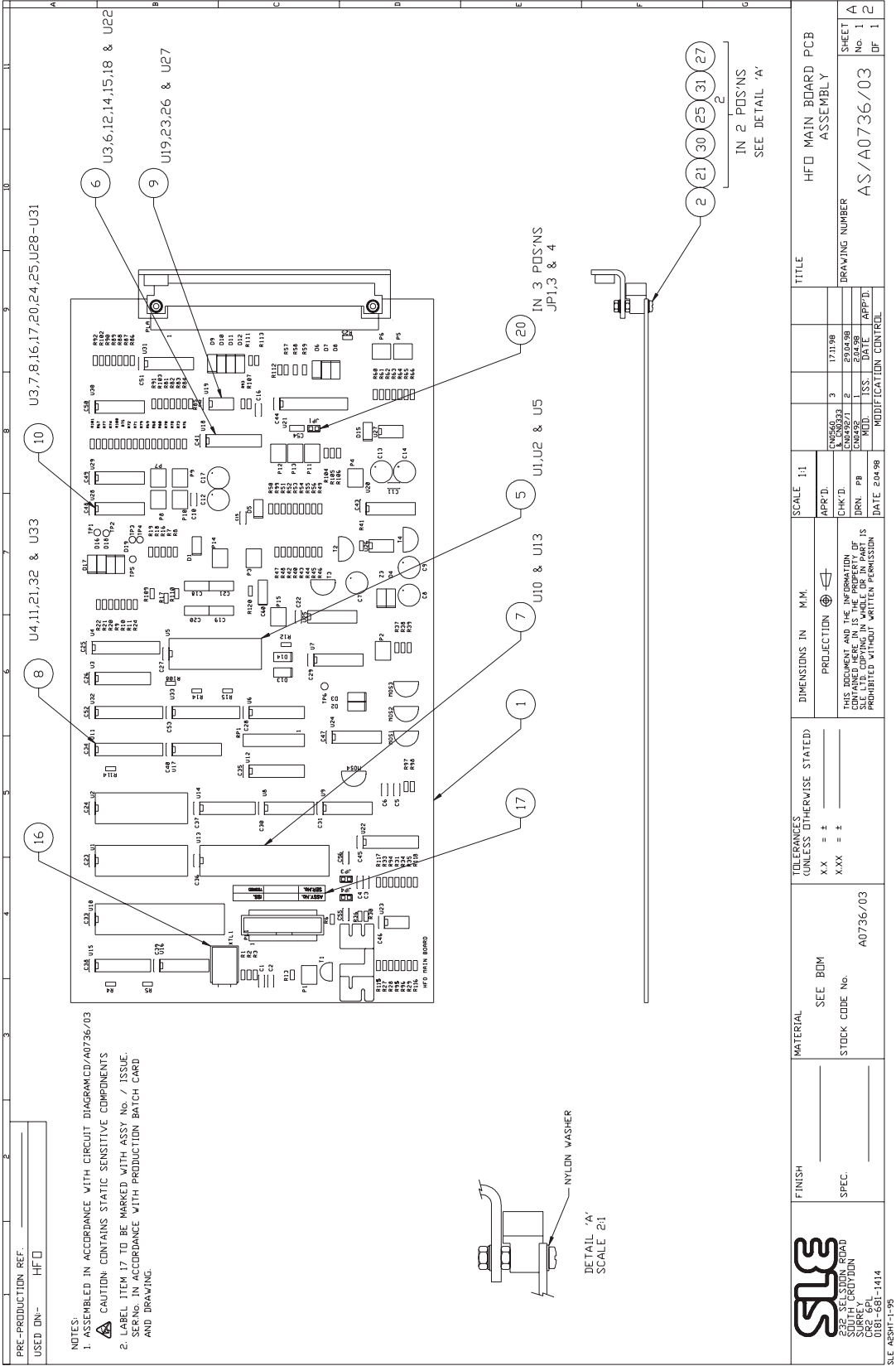
Revision G: As above.

Circuit diagram modified to include extra 470pF capacitor mounted on rear of C11.

(See board drawing AS/A0736/03 issue 5 on page 121 and circuit diagram CD/A0736/03 issue 5 on page 122).

17.6 AS/A0736/03 Main PCB Revision E Issue 3

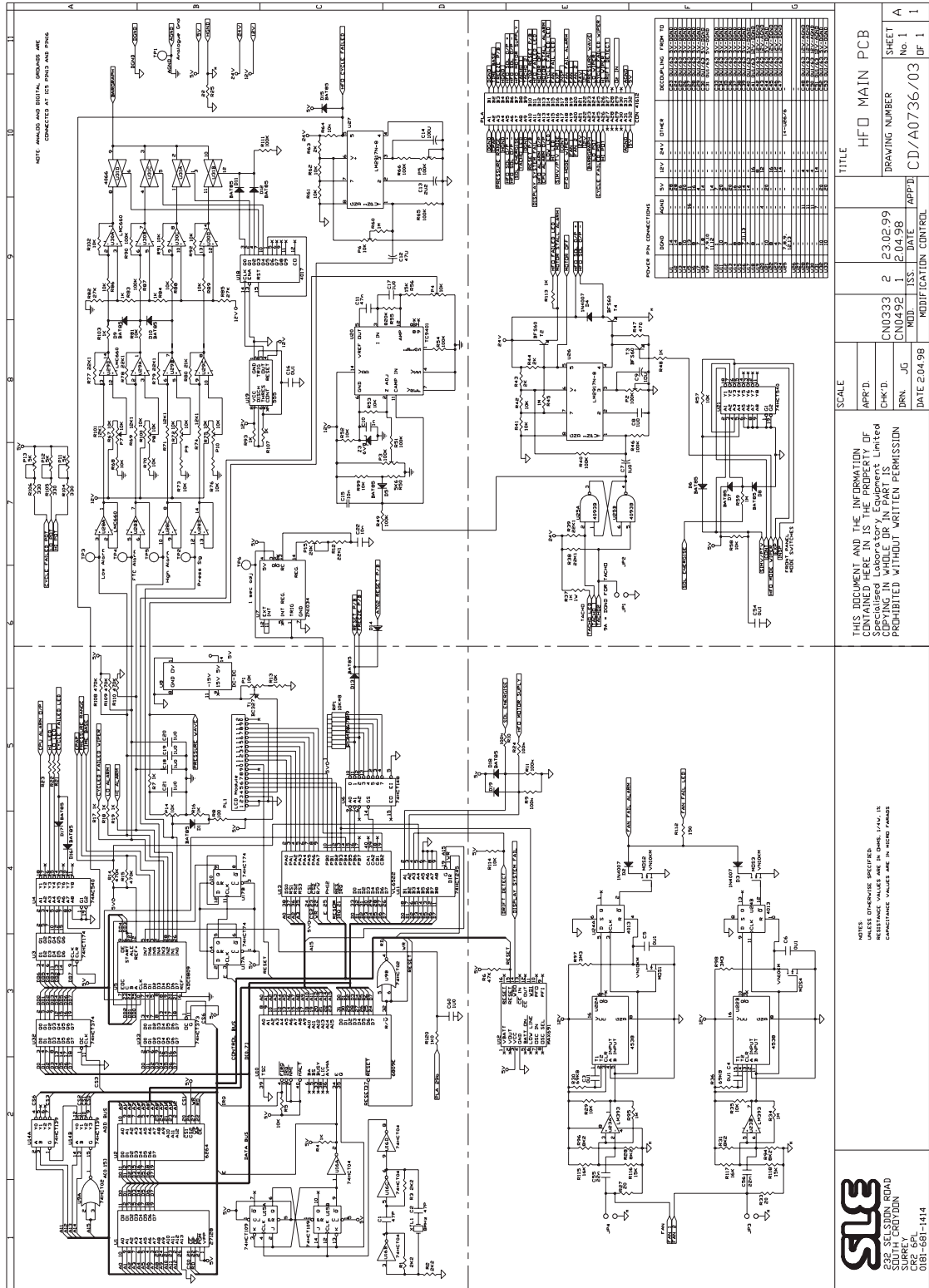
Note: Check the revision status of the main board



17.6.1 CD/A0736/03 Main PCB Circuit Diagram Issue 2

(For Revision E Main Board)

Note: Check the revision status of the main board





Note: Check the revision status of the main board

PARTS LIST

Finished Item Stock Number **A0736/03**
Finished Item Description HFO Main PCB Assy'CE Papst Fan
Bill of materials AS/A0736/03 Issue 3

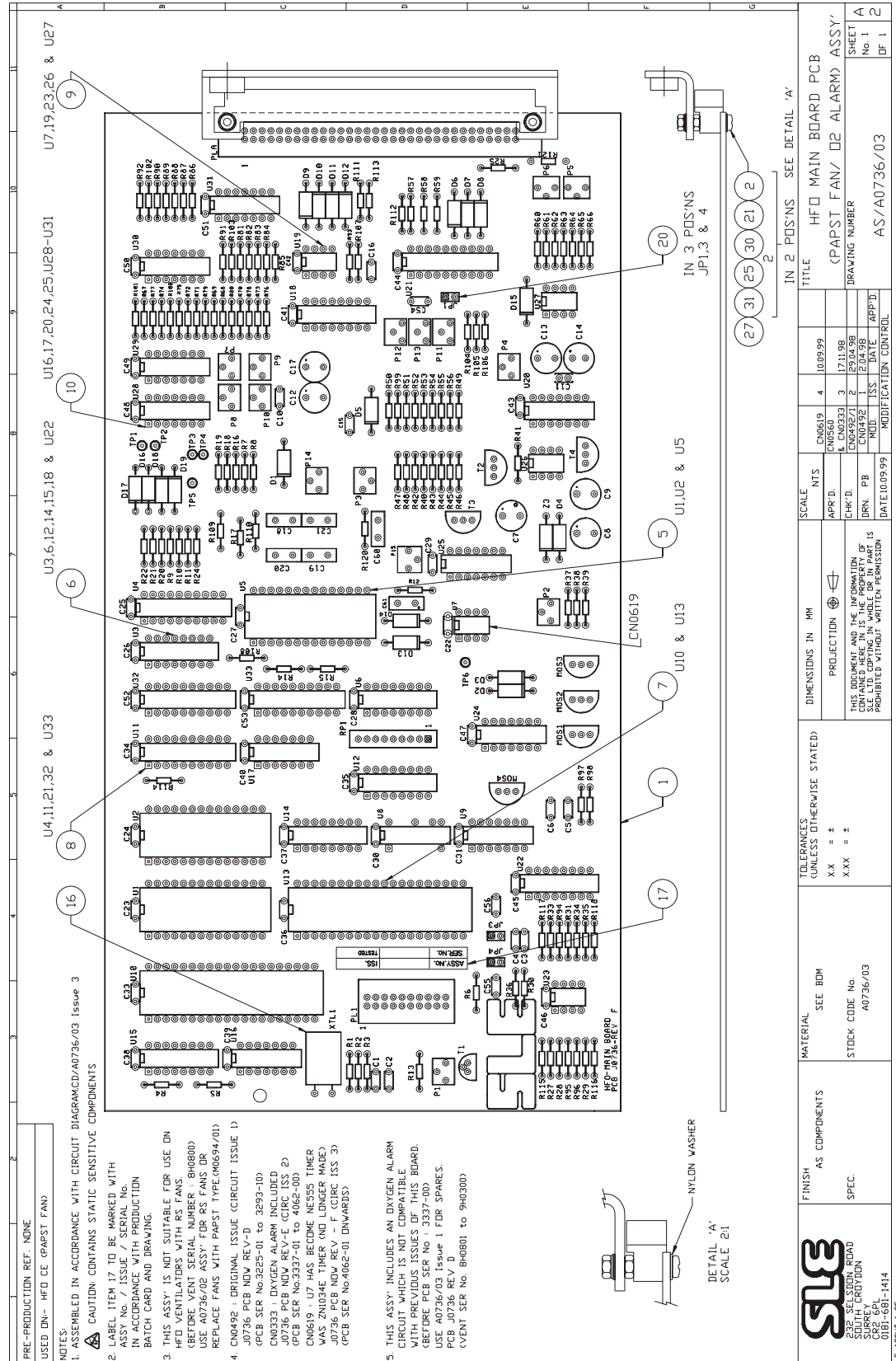
Part Number	Component Description	Used	Component Reference(s)
J0736	HFO Main Board blank	1.00 Each	ITEM 1 (PCB Rev E)
C0224	2.2uF Capacitor 35v 20% Tant.	1.00 Each	C13
C0256	47uF Capacitor 16V 10-20% Tan.	1.00 Each	C12
C0260	lOnF Capacitor 63V 208 MKS2	2.00 Each	C15,C22
C0403	47pF Capacitor lOOV 2% Ceramic	2.00 Each	C1,C2
C0412	22n Capacitor 50V 20%	2.00 Each	C55 & C56
C0426	lnF Capacitor 63V 10% Poly.BF	1.00 Each	C10
C0433	luF Capacitor 35V 20% Tantalum	1.00 Each	C7
C0439	lOOu Capacitor 25V 20% Elect.	1.00 Each	C14
C0450	O.luF Capacitor 63V 10% MKS2	36.00 Each	C3-6, C16, C23-31,C33-C54
C0462	luF Capacitor 50/63V 10t MXS2	7.00 Each	C8,C17,C18-C21 h C60
C0469	lOuF Capacitor 35V 20% Tant.	1.00 Each	C9
C0478	0.0047uF Cap.63v 20% polyester	1.00 Each	C11
D0250	BZX79C6V8	1.00 Each	Z3
D0276	74LS373	1.00 Each	U33
D0299	SN74LS02N	1.00 Each	U9
D0302	74LS74AN	1.00 Each	U17
D0305	ADC0809CCN NSC	1.00 Each	U5
D0329	74LS139N	1.00 Each	U14
D0330	74LS374N	1.00 Each	U32
D0335	74LS109	1.00 Each	U15
D0402	IN4007 Plastic Diode	3.00 Each	D2-D4
D0407	BAT85	16.00 Each	DI,D5-D19
D0450	68B09EP	1.00 Each	U10
D0452	HM6264LP-150 or UM6264B1OL or	1.00 Each	U2
D0459	R6522AP	1.00 Each	U13(See Drg.PS/D0459)
D0483	74LS174	1.00 Each	U3
D0493	74S04	1.00 Each	UI6
D0496	CD4017BCN	1.00 Each	U18
D0523	74HCT245AN	1.00 Each	U11
D0525	4066 Quad Bilateral Switch	1.00 Each	U31
D0531	4013	1.00 Each	U24
D0544	4538	1.00 Each	U22

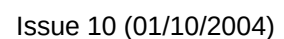
Part Number	Component Description	Used	Component Reference(s)
D0576	27C128A-20	1.00 Each	U1
D0578	74AC540	2.00 Each	U4 & U21
D0580	TLC555CP	1.00 Each	U19
D0581	LMC660AIN	3.00 Each	U28-U30
D0585	BC327	1.00 Each	T1
D0594	ZN1034	1.00 Each	U7
D0595	74LS148N	1.00 Each	U6
D0596	Crystal 8.0Mhz	1.00 Each	XTL1
D0617	NMAOSISD	1.00 Each	U8
D0618	MAX691	1.00 Each	U12
D0619	9401	1.00 Each	U20
D0620	LM393	1.00 Each	U23
D0621	4093B	1.00 Each	U25
D0622	VN1OXM	4.00 Each	MOS1-MOS4
D0632	LM2917N-8	2.00 Each	U26,U27
D0638	ZTX450	3.00 Each	T2-T4
M0307	Terminal Pin(Pcb single sided)	6.00 Each	TP1-TP6)
M0626	Jumper Link	3.00 Each	JP1,JP3,JP4
M0660	Pad Adhesive double sided	1.00 Each	ITEM 16
M0718	Label, PCB Identification	1.00 Each	ITEM 17
P0230	DIN41612 64 Way 90 deg Plug	1.00 Each	PLA
P0455	20 way IDC Header Plug	1.00 Each	PL1
P0464	12way P.C.B Header Straight	0.50 Each	ITEM 20 cut into 3x2 way JP
R0228	8K2 1% 50PPM 0.25W	4.00 Each	R28,31,94,96
R0232	16K 1% 50PPM 0.25W	2.00 Each	R115 & R117
R0280	470R Resistor 1% 0.25W Met.flm	1.00 Each	R47
R0406	20R Resistor 1% 0.25W	2.00 Each	R27 & R33
R0407	22R Resistor 1S 0.25W SMA0207	1.00 Each	R2F
R0413	100R Resistor 1% 0.25W SMA0207	1.00 Each	R8
R0416	150R Resistor 1% 0.25W SMA0207	4.00 Each	R20-22,R112
R0424	330R Resistor 1% 0.25W SMA0207	3.00 Each	R104-R106
NOTE:COMPONENT R121 IS NOT FITTED ON THIS MODEL			
R0436	1.0K Resistor 1% 0.25W SMA0207	14.00 Each	R4,7,16-19,48,83,84, 93 ,103,107,R113 &R120
R0442	2.0K Resistor 1% 0.25W SMA0207	3.00 Each	R43,44,63
R0443	2.2K Resistor 1% 0.25W SMA0207	3.00 Each	R1-R3
R0456	5.6K Resistor 1% 0.25W SMA0207	1.00 Each	R50

Part Number	Component Description	Used	Component Reference(s)
R0463	10K Resistor 1% 0.25W SMA0207	30.00 Each	R5,13,29,35,41,42,52,53,57, 58,61 ,62,64,67,68,70,72,73,75,76,81,86,88,89,91,92, 99, 100 ,102,R114
R0464	12.1K Resistor 1% 0.25W SMA020	4.00 Each	R69,71,74,R101
R0467	15K Resistor 1% 0.25W SMA0207	3.00 Each	R56,R116 & R118
R0469	22.1K Resistor 1% 0.25W SMA020	6.00 Each	R12,38,39,R77-79
R0471	27K Resistor 1% 0.25W SMA0207	2.00 Each	R82,85
R0473	33K Resistor 1% 0.25W	2.00 Each	R9 & R11
R0479	47K Resistor 1t 0.25W SMA0207	1.00 Each	R6
R0483	69.8K Resistor 1% 0.25W SMA020	2.00 Each	R30,R36
R0486	100K Resistor 1% 0.25W SMA0207	12.00 Each	R10,24,40,46,49 ,51,54,65 ,66,87,90,R113
R0496	470K Resistor 1% 0.25W SMA0207	5.00 Each	R14,15,R108-R110
R0500	820K Resistor 1~_ 0.25W SMA0207	1.00 Each	R55
R0501	1.0M Resistor 1% 0.25W SMA0207	5.00 Each	R34,45,59,60,95
R0506	3.3M Resistor 1% 0.25W SMA0207	2.00 Each	R97,R98
R0556	10K x 8 Resistor Network	1.00 Each	RP1
R0557	1K0 Resistor 5t 1W 250PPM PR01	1.00 Each	R37
R0575	21K .125w Precision Resistor	1.00 Each	R80
50209	IC Socket 28 way DIL	3.00 Each	ITEM 5
S0212	IC Socket 16 way DIL	7.00 Each	ITEM 6
S0227	IC Socket 40 way DIL	2.00 Each	ITEM 7
S0237	IC Socket 20 way DIL	5.00 Each	ITEM 8
S0241	IC Socket 8 way DIL	4.00 Each	ITEM 9
S0242	IC Socket 14 way DIL	12.00 Each	ITEM 10
T0683	Handle (pcb)	1.00 Each	ITEM 2
V0405	10K Trimmer, cermet, top adj	8.00 Each	PI,4,6-10,P14
V0406	20K Trimmer cermet,top adjust	1.00 Each	P15
V0408	100K Trimmer, cermet, top adj	3.00 Each	P2,P3,P5
V0426	5K Trimmer, cermet, top adjust	3.00 Each	PII-P13
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 30
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 21
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
W0103	Wire Wrapping Kynar Red 30awg	0.30 Metre	Link wire modifications to PCB

17.7 AS/A0736/03 Main PCB Revision F Issue 4

Note: Check the revision status of the main board





Note: Check the revision status of the main board

PARTS LIST

Finished Item Stock Number **A0736/03**
 Finished Item Description **HFO Main PCB Assy'CE Papst Fan**
 Bill of materials **AS/A0736/03 Issue 4**

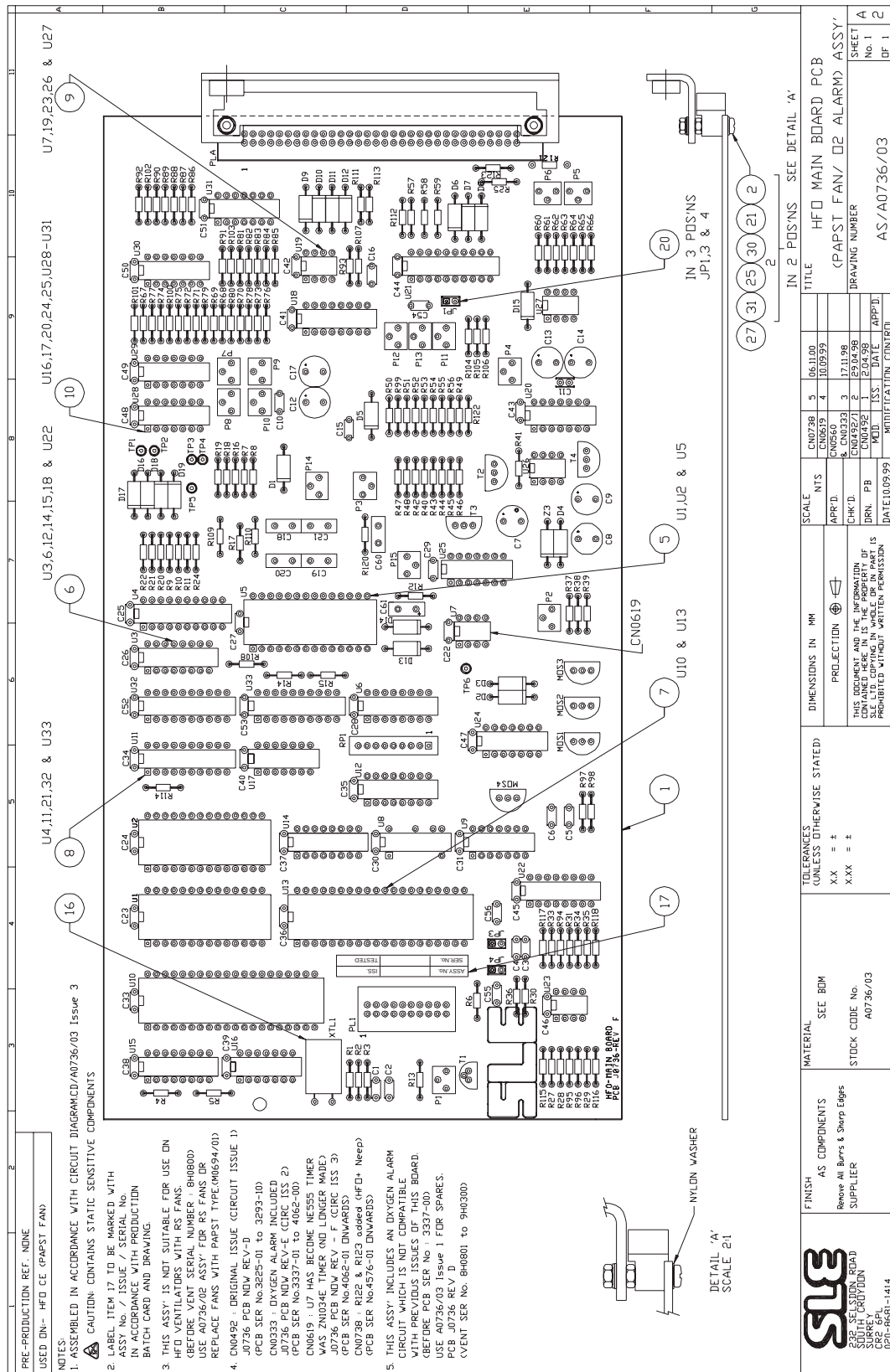
Part Number	Component Description	Used Unit	Component Reference(s)
J0736	HFO Main Board blank	1.00 Each	ITEM 1 (PCB Rev E)
C0224	2.2uF Capacitor 35v 20% Tant.	1.00 Each	C13
C0256	47uF Capacitor 16V 10-20% Tan.	1.00 Each	C12
C0260	10nF Capacitor 63V 208 MKS2	2.00 Each	C15,C22
C0403	47pF Capacitor 100V 2% Ceramic	2.00 Each	C1,C2
C0412	22n Capacitor 50V 20%	2.00 Each	C55 & C56
C0426	1nF Capacitor 63V 10% Poly.BF	1.00 Each	C10
C0433	1uF Capacitor 35V 20% Tantalum	1.00 Each	C7
C0439	100uF Capacitor 25V 20% Elect.	1.00 Each	C14
C0450	0.1uF Capacitor 63V 10% MKS2	36.00 Each	C3-6, C16, C23-31,C33-C54
C0462	1uF Capacitor 50/63V 10t MXS2	7.00 Each	C8,C17,C18-C21 h C60
C0469	10uF Capacitor 35V 20% Tant.	1.00 Each	C9
C0478	0.0047uF Cap.63v 20% polyester	1.00 Each	C11
D0250	BZX79C6V8	1.00 Each	Z3
D0276	74LS373	1.00 Each	U33
D0299	SN74LS02N	1.00 Each	U9
D0302	74LS74AN	1.00 Each	U17
D0305	ADC0809CCN NSC	1.00 Each	U5
D0329	74LS139N	1.00 Each	U14
D0330	74LS374N	1.00 Each	U32
D0335	74LS109	1.00 Each	U15
D0402	1N4007 Plastic Diode	3.00 Each	D2-D4
D0407	BAT85	16.00 Each	DI,D5-D19
D0450	68B09EP	1.00 Each	U10
D0452	HM6264LP-150 or UM6264B1OL or	1.00 Each	U2
D0457	NE555N	1.00 Each	U7 Replaces D0594 CN0619 for Rev F PCB Blank
D0459	R6522AP	1.00 Each	U13(See Drg.PS/D0459)
D0483	74LS174	1.00 Each	U3
D0493	74S04	1.00 Each	U16
D0496	CD4017BCN	1.00 Each	U18
D0523	74HCT245AN	1.00 Each	U11
D0525	4066 Quad Bilateral Switch	1.00 Each	U31

Part Number	Component Description	Used Unit	Component Reference(s)
D0531	4013	1.00 Each	U24
D0544	4538	1.00 Each	U22
D0576	27C128A-20	1.00 Each	U1
D0578	74AC540	2.00 Each	U4 & U21
D0580	TLC555CP	1.00 Each	U19
D0581	LMC660AIN	3.00 Each	U28-U30
D0585	BC327	1.00 Each	T1
D0594	ZN1034E Precision Timer IC	0.00 Each	Replaced by DO457 CN0619 for REV-F ofPCB Blank
D0595	74LS148N	1.00 Each	U6
D0596	Crystal 8.0Mhz	1.00 Each	XTL1
D0617	NMAOSISD	1.00 Each	U8
D0618	MAX691	1.00 Each	U12
D0619	9401	1.00 Each	U20
D0620	LM393	1.00 Each	U23
D0621	4093B	1.00 Each	U25
D0622	VN10XM	4.00 Each	MOS1-MOS4
D0632	LM2917N-8	2.00 Each	U26,U27
D0638	ZTX450	3.00 Each	T2-T4
M0307	Terminal Pin(Pcb single sided)	6.00 Each	TP1-TP6)
M0626	Jumper Link	3.00 Each	JP1,JP3,JP4
M0660	Pad Adhesive double sided	1.00 Each	ITEM 16
M0718	Label, PCB Identification	1.00 Each	ITEM 17
P0230	DIN41612 64 Way 90 deg Plug	1.00 Each	PLA
P0455	20 way IDC Header Plug	1.00 Each	PL1
P0464	12way P.C.B Header Straight	0.50 Each	ITEM 20 cut into 3x2 way JP
R0228	8K2 1% 50PPM 0.25W	4.00 Each	R28,31,94,96
R0232	16K 1% 50PPM 0.25W	2.00 Each	R115 & R117
R0280	470R Resistor 1% 0.25W Met.flm	1.00 Each	R47
R0406	20R Resistor 1% 0.25W	2.00 Each	R27 & R33
R0407	22R Resistor 1S 0.25W SMA0207	1.00 Each	R2F
R0413	100R Resistor 1% 0.25W SMA0207	1.00 Each	R8
R0416	150R Resistor 1% 0.25W SMA0207	4.00 Each	R20-22,R112
R0424	330R Resistor 1% 0.25W SMA0207	3.00 Each	R104-R106
NOTE:COMPONENT R121 IS NOT FITTED ON THIS MODEL			
R0436	1.0K Resistor 1% 0.25W SMA0207	14.00 Each	R4,7,16-19,48,83,84, 93 ,103,107,R113 & R120
R0442	2.0K Resistor 1% 0.25W SMA0207	3.00 Each	R43,44,63
R0443	2.2K Resistor 1% 0.25W SMA0207	3.00 Each	R1-R3

Part Number	Component Description	Used Unit	Component Reference(s)
R0456	5.6K Resistor 1% 0.25W SMA0207	1.00 Each	R50
R0463	10K Resistor 1% 0.25W SMA0207	30.00 Each	R5,13,29,35,41,42,52,53,57, 58,61 ,62 ,64,67,68,70, 72,73,75, 76,81,86,88, 89,91,92,99, 100 ,102,R114
R0464	12.1K Resistor 1% 0.25W SMA020	4.00 Each	R69,71,74,R101
R0467	15K Resistor 1% 0.25W SMA0207	3.00 Each	R56,R116 & R118
R0469	22.1K Resistor 1% 0.25W SMA020	6.00 Each	R12,38,39,R77-79
R0471	27K Resistor 1% 0.25W SMA0207	2.00 Each	R82,85
R0473	33K Resistor 1% 0.25W	2.00 Each	R9 & R11
R0479	47K Resistor 1t 0.25W SMA0207	1.00 Each	R6
R0483	69.8K Resistor 1% 0.25W SMA020	2.00 Each	R30,R36
R0486	100K Resistor 1% 0.25W SMA0207	12.00 Each	R10,24,40,46,49 ,51,54, 65 ,66,87,90,R113
R0496	470K Resistor 1% 0.25W SMA0207	5.00 Each	R14,15,R108-R110
R0500	820K Resistor 1% 0.25W SMA0207	1.00 Each	R55
R0501	1.0M Resistor 1% 0.25W SMA0207	5.00 Each	R34,45,59,60,95
R0506	3.3M Resistor 1% 0.25W SMA0207	2.00 Each	R97,R98
R0556	10K x 8 Resistor Network	1.00 Each	RP1
R0557	1K0 Resistor 5t 1W 250PPM PR01	1.00 Each	R37
R0575	21K .125w Precision Resistor	1.00 Each	R80
50209	IC Socket 28 way DIL	3.00 Each	ITEM 5
S0212	IC Socket 16 way DIL	7.00 Each	ITEM 6
S0227	IC Socket 40 way DIL	2.00 Each	ITEM 7
S0237	IC Socket 20 way DIL	5.00 Each	ITEM 8
S0241	IC Socket 8 way DIL	5.00 Each	ITEM 9
S0242	IC Socket 14 way DIL	9.00 Each	ITEM 10
T0683	Handle (pcb)	1.00 Each	ITEM 2
V0405	10K Trimmer, cermet, top adj	8.00 Each	PI,4,6-10,P14
V0406	20K Trimmer cermet,top adjust	1.00 Each	P15
V0408	100K Trimmer, cermet, top adj	3.00 Each	P2,P3,P5
V0426	5K Trimmer, cermet, top adjust	3.00 Each	PII-P13
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 30
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 21
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
W0103	Wire Wrapping Kynar Red 30awg	0.30 Metre	Not Required for PCB Rev F

17.8 AS/A0736/03 Main PCB Revision G Issue 5

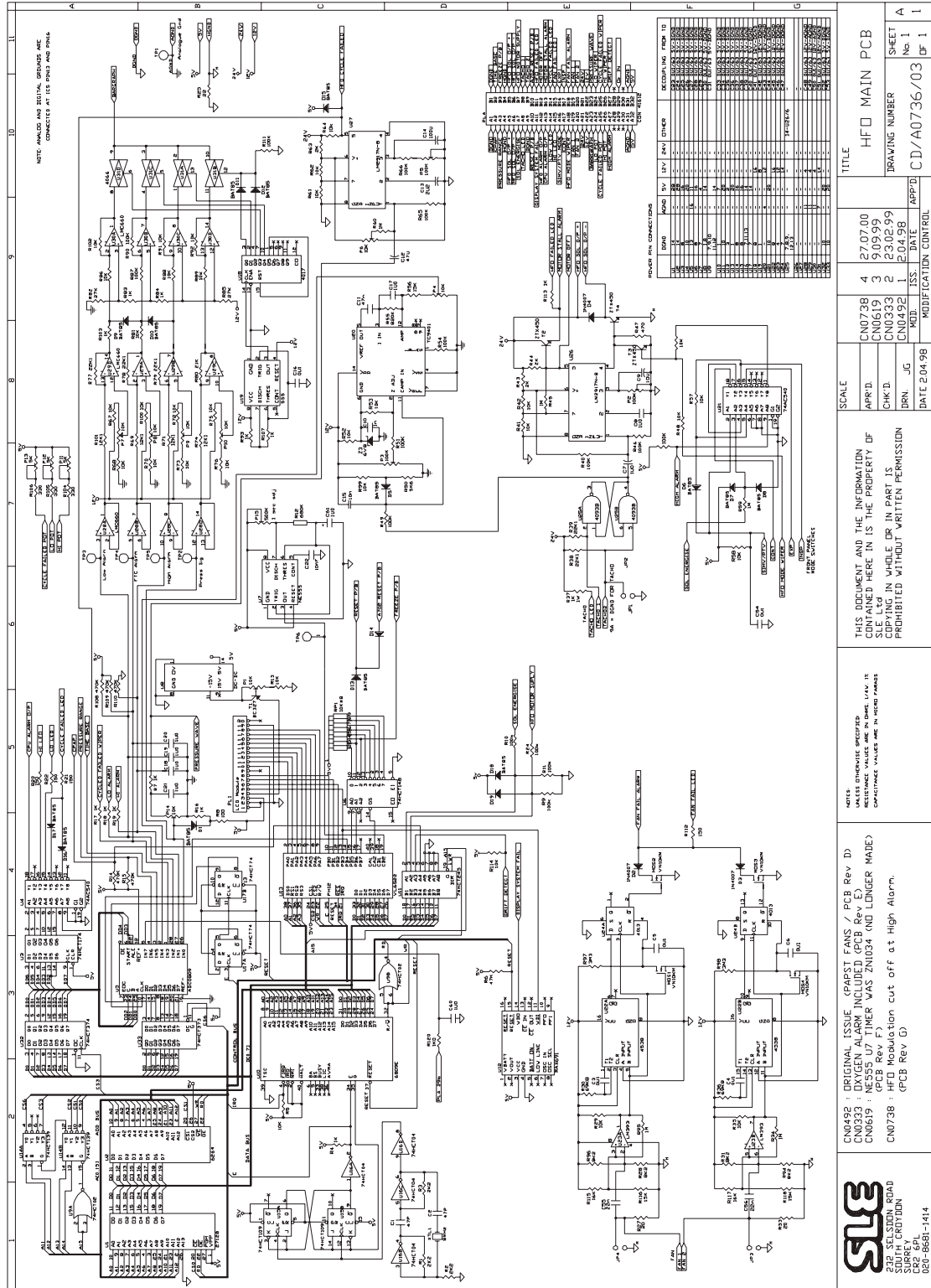
Note: Check the revision status of the main board



17.8.1 CD/A0736/03 Main PCB Circuit Diagram Issue 4

(For Revision G Main Board)

Note: Check the revision status of the main board





Note: Check the revision status of the main board

PARTS LIST

Finished Item Stock Number **A0736/03**
Finished Item Description HFO Main PCB Assy'CE Papst Fan
Bill of materials AS/A0736/03 Issue 5

Part Number	Component Description	Used Unit	Component Reference(s)
J0736	HFO Main Board blank	1.00 Each	ITEM 1 (PCB Rev E)
C0224	2.2uF Capacitor 35v 20% Tant.	1.00 Each	C13
C0256	47uF Capacitor 16V 10-20% Tan.	1.00 Each	C12
C0260	lOnF Capacitor 63V 208 MKS2	2.00 Each	C15,C22
C0403	47pF Capacitor lOOV 2% Ceramic	2.00 Each	C1,C2
C0412	22n Capacitor 50V 20%	2.00 Each	C55 & C56
C0426	lnF Capacitor 63V 10% Poly.BF	1.00 Each	C10
C0433	luF Capacitor 35V 20% Tantalum	1.00 Each	C7
C0439	lOOu Capacitor 25V 20% Elect.	1.00 Each	C14
C0450	O.luF Capacitor 63V 10% MKS2	36.00 Each	C3-6, C16, C23-31,C33-C54
C0462	luF Capacitor 50/63V 10t MXS2	7.00 Each	C8,C17,C18-C21 h C60
C0469	lOuF Capacitor 35V 20% Tant.	1.00 Each	C9
C0478	0.0047uF Cap.63v 20% polyester	1.00 Each	C11
D0250	BZX79C6V8	1.00 Each	Z3
D0276	74LS373	1.00 Each	U33
D0299	SN74LS02N	1.00 Each	U9
D0302	74LS74AN	1.00 Each	U17
D0305	ADC0809CCN NSC	1.00 Each	U5
D0329	74LS139N	1.00 Each	U14
D0330	74LS374N	1.00 Each	U32
D0335	74LS109	1.00 Each	U15
D0402	IN4007 Plastic Diode	3.00 Each	D2-D4
D0407	BAT85	16.00 Each	DI,D5-D19
D0450	68B09EP	1.00 Each	U10
D0452	HM6264LP-150 or UM6264B1OL or	1.00 Each	U2
D0457	NE555N	1.00 Each	U7 Replaces D0594 CN0619 for Rev F PCB Blank
D0459	R6522AP	1.00 Each	U13(See Drg.PS/D0459)
D0483	74LS174	1.00 Each	U3
D0493	74S04	1.00 Each	UI6
D0496	CD4017BCN	1.00 Each	U18
D0523	74HCT245AN	1.00 Each	U11
D0525	4066 Quad Bilateral Switch	1.00 Each	U31
D0531	4013	1.00 Each	U24

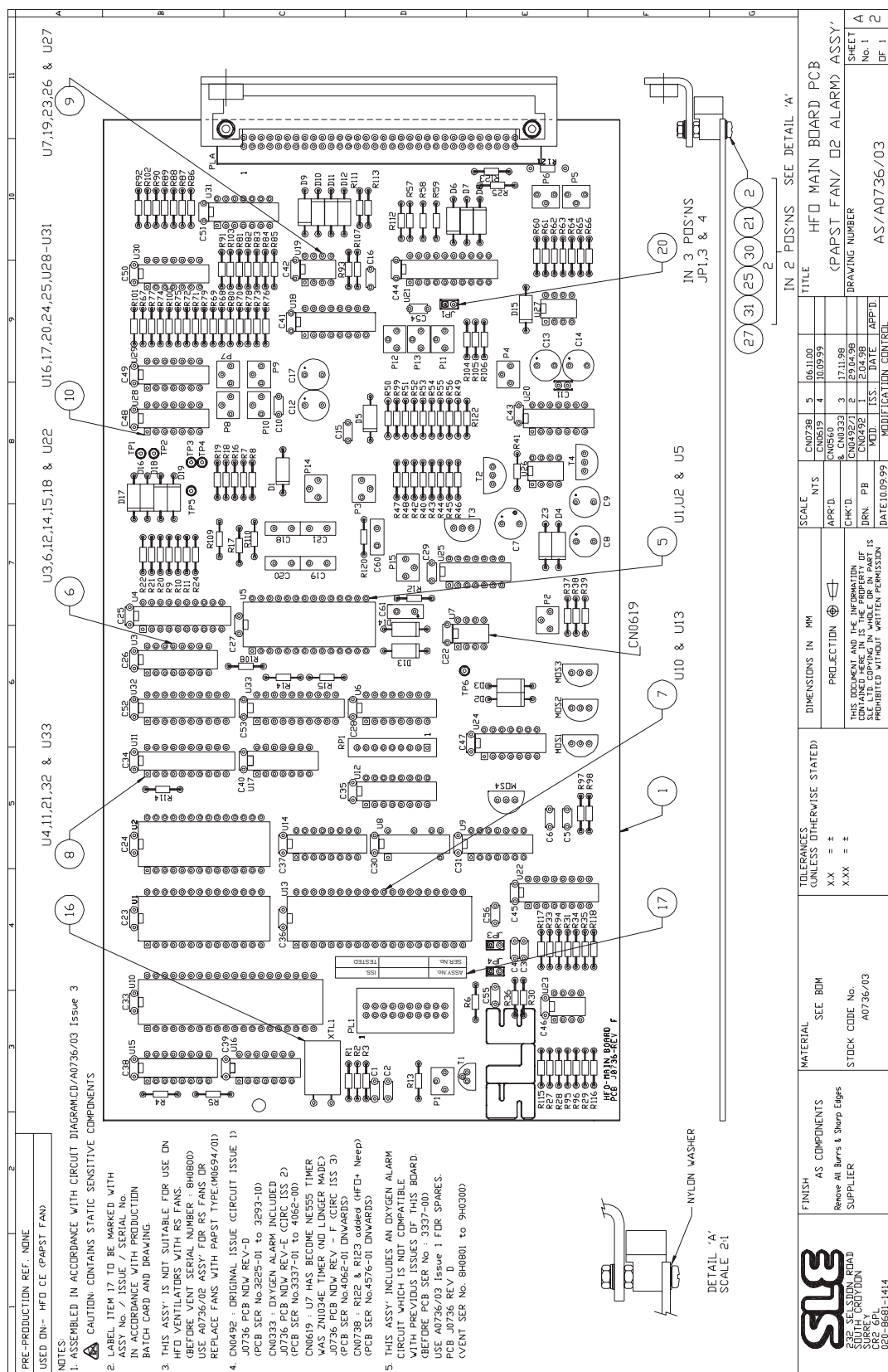
Part Number	Component Description	Used Unit	Component Reference(s)
D0544	4538	1.00 Each	U22
D0576	27C128A-20	1.00 Each	U1
D0578	74AC540	2.00 Each	U4 & U21
D0580	TLC555CP	1.00 Each	U19
D0581	LMC660AIN	3.00 Each	U28-U30
D0585	BC327	1.00 Each	T1
D0594	ZN1034E Precision Timer IC	0.00 Each	Replaced by DO457 CN0619 for REV-F ofPCB Blank
D0595	74LS148N	1.00 Each	U6
D0596	Crystal 8.0Mhz	1.00 Each	XTL1
D0617	NMAOSISD	1.00 Each	U8
D0618	MAX691	1.00 Each	U12
D0619	9401	1.00 Each	U20
D0620	LM393	1.00 Each	U23
D0621	4093B	1.00 Each	U25
D0622	VN10XM	4.00 Each	MOS1-MOS4
D0632	LM2917N-8	2.00 Each	U26,U27
D0638	ZTX450	3.00 Each	T2-T4
M0307	Terminal Pin(Pcb single sided)	6.00 Each	TP1-TP6)
M0626	Jumper Link	3.00 Each	JP1,JP3,JP4
M0660	Pad Adhesive double sided	1.00 Each	ITEM 16
M0718	Label, PCB Identification	1.00 Each	ITEM 17
P0230	DIN41612 64 Way 90 deg Plug	1.00 Each	PLA
P0455	20 way IDC Header Plug	1.00 Each	PL1
P0464	12way P.C.B Header Straight	0.50 Each	ITEM 20 cut into 3x2 way JP
R0228	8K2 1% 50PPM 0.25W	4.00 Each	R28,31,94,96
R0232	16K 1% 50PPM 0.25W	2.00 Each	R115 & R117
R0280	470R Resistor 1% 0.25W Met.flm	1.00 Each	R47
R0406	20R Resistor 1% 0.25W	2.00 Each	R27 & R33
R0407	22R Resistor 1S 0.25W SMA0207	1.00 Each	R25
R0413	100R Resistor 1% 0.25W SMA0207	1.00 Each	R8
R0416	150R Resistor 1% 0.25W SMA0207	4.00 Each	R20-22,R112
R0424	330R Resistor 1% 0.25W SMA0207	3.00 Each	R104-R106
NOTE:COMPONENT R121 IS NOT FITTED ON THIS MODEL			
R0436	1.0K Resistor 1% 0.25W SMA0207	13.00 Each	R4,7,16-19,83,84, 93 ,103,107,R113 & R120
R0442	2.0K Resistor 1% 0.25W SMA0207	3.00 Each	R43,44,63
R0443	2.2K Resistor 1% 0.25W SMA0207	3.00 Each	R1-R3
R0456	5.6K Resistor 1% 0.25W SMA0207	1.00 Each	R50



Part Number	Component Description	Used Unit	Component Reference(s)
R0463	10K Resistor 1% 0.25W SMA0207	32.00 Each	R5,13,29,35,41,42, 48, 52, 53, 57, 58,61,62 ,64, 67, 68, 70, 72 ,73 ,75 , 76, 81,86,88, 89,91,92,99, 100 ,102,114 R122
R0464	12.1K Resistor 1% 0.25W SMA020	4.00 Each	R69,71,74,R101
R0467	15K Resistor 1% 0.25W SMA0207	3.00 Each	R56,R116 & R118
R0469	22.1K Resistor 1% 0.25W SMA020	6.00 Each	R12,38,39,R77-79
R0471	27K Resistor 1% 0.25W SMA0207	2.00 Each	R82,85
R0473	33K Resistor 1% 0.25W	2.00 Each	R9 & R11
R0479	47K Resistor 1t 0.25W SMA0207	1.00 Each	R6
R0483	69.8K Resistor 1% 0.25W SMA020	2.00 Each	R30,R36
R0486	100K Resistor 1% 0.25W SMA0207	13.00 Each	R10,24,40,46,49 ,51,54, 65 ,66,87,90,113, R123
R0496	470K Resistor 1% 0.25W SMA0207	5.00 Each	R14,15,R108-R110
R0500	820K Resistor 1~_ 0.25W SMA0207	1.00 Each	R55
R0501	1.0M Resistor 1% 0.25W SMA0207	5.00 Each	R34,45,59,60,95
R0506	3.3M Resistor 1% 0.25W SMA0207	2.00 Each	R97,R98
R0556	10K x 8 Resistor Network	1.00 Each	RP1
R0557	1K0 Resistor 5t 1W 250PPM PR01	1.00 Each	R37
R0575	21K .125w Precision Resistor	1.00 Each	R80
50209	IC Socket 28 way DIL	3.00 Each	ITEM 5
S0212	IC Socket 16 way DIL	7.00 Each	ITEM 6
S0227	IC Socket 40 way DIL	2.00 Each	ITEM 7
S0237	IC Socket 20 way DIL	5.00 Each	ITEM 8
S0241	IC Socket 8 way DIL	5.00 Each	ITEM 9
S0242	IC Socket 14 way DIL	9.00 Each	ITEM 10
T0683	Handle (pcb)	1.00 Each	ITEM 2
V0405	10K Trimmer, cermet, top adj	8.00 Each	PI,4,6-10,P14
V0406	20K Trimmer cermet,top adjust	1.00 Each	P15
V0408	100K Trimmer, cermet, top adj	3.00 Each	P2,P3,P5
V0426	5K Trimmer, cermet, top adjust	3.00 Each	PII-P13
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 30
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 21
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
W0103	Wire Wrapping Kynar Red 30awg	0.30 Metre	Not Required for PCB Rev F

17.9 AS/A0736/03 Main PCB Revision G Issue 5

Note: Check the revision status of the main board

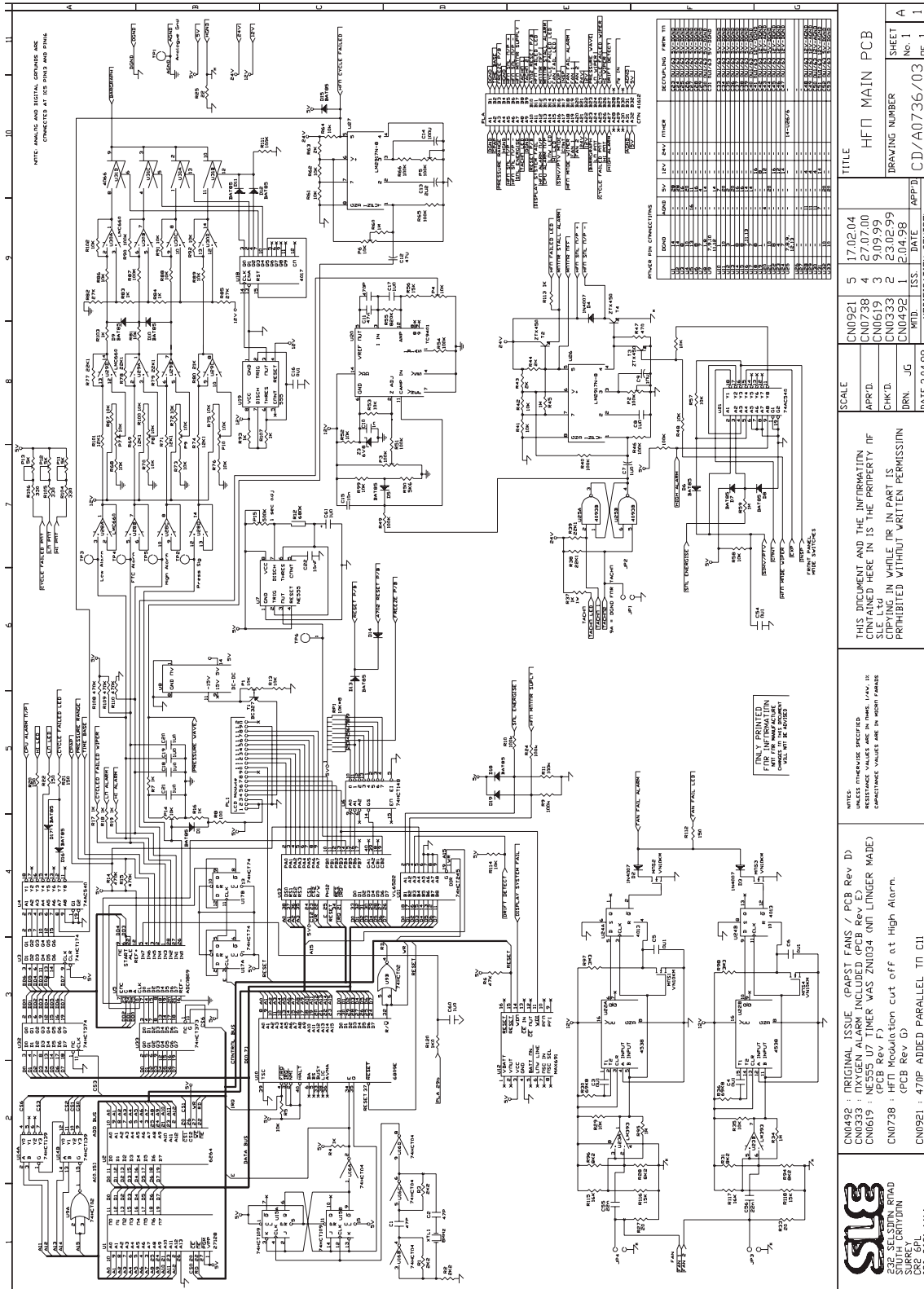




17.9.1 CD/A0736/03 Main PCB Circuit Diagram Issue 5

(For Revision G Main Board)

Note: Check the revision status of the main board



A3 version on page 201 of circuit diagram appendix.

Note: Check the revision status of the main board

PARTS LIST

Finished Item Stock Number **A0736/03**
 Finished Item Description HFO Main PCB Assy'CE Papst Fan
 Bill of materials AS/A0736/03 Issue 6

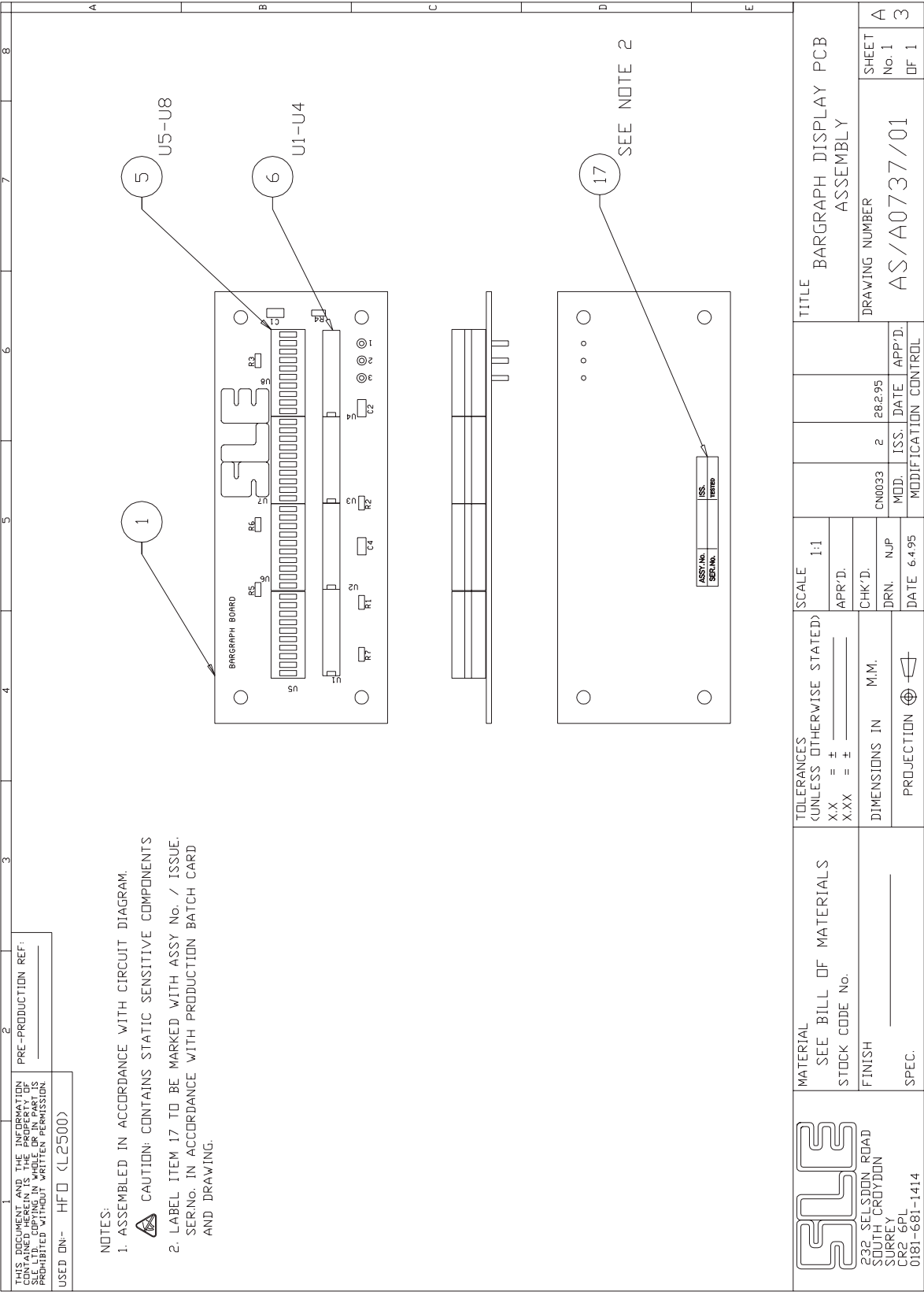
Part Number	Component Description	Used Unit	Component Reference(s)
J0736	HFO Main Board blank	1.00 Each	ITEM 1 (PCB Rev E)
C0224	2.2uF Capacitor 35v 20% Tant.	1.00 Each	C13
C0256	47uF Capacitor 16V 10-20% Tan.	1.00 Each	C12
C0260	10nF Capacitor 63V 208 MKS2	2.00 Each	C15,C22
C0403	47pF Capacitor 100V 2% Ceramic	2.00 Each	C1,C2
C0412	22n Capacitor 50V 20%	2.00 Each	C55 & C56
C0426	1nF Capacitor 63V 10% Poly.BF	1.00 Each	C10
C0433	1uF Capacitor 35V 20% Tantalum	1.00 Each	C7
C0439	100u Capacitor 25V 20% Elect.	1.00 Each	C14
C0450	0.1uF Capacitor 63V 10% MKS2	36.00 Each	C3-6, C16, C23-31,C33-C54
C0462	1uF Capacitor 50/63V 10t MXS2	7.00 Each	C8,C17,C18-C21 h C60
C0469	10uF Capacitor 35V 20% Tant.	1.00 Each	C9
C0478	0.0047uF Cap.63v 20% polyester	1.00 Each	C11
C0512	470pF Cap 100v 10% ceramic	1.00 Each	in parallel to C11 mounted on rear
D0250	BZX79C6V8	1.00 Each	Z3
D0276	74LS373	1.00 Each	U33
D0299	SN74LS02N	1.00 Each	U9
D0302	74LS74AN	1.00 Each	U17
D0305	ADC0809CCN NSC	1.00 Each	U5
D0329	74LS139N	1.00 Each	U14
D0330	74LS374N	1.00 Each	U32
D0335	74LS109	1.00 Each	U15
D0402	1N4007 Plastic Diode	3.00 Each	D2-D4
D0407	BAT85	16.00 Each	DI,D5-D19
D0450	68B09EP	1.00 Each	U10
D0452	HM6264LP-150 or UM6264B1OL or	1.00 Each	U2
D0457	NE555N	1.00 Each	U7 Replaces D0594 CN0619 for Rev F PCB Blank
D0459	R6522AP	1.00 Each	U13(See Drg.PS/D0459)
D0483	74LS174	1.00 Each	U3
D0493	74S04	1.00 Each	U16
D0496	CD4017BCN	1.00 Each	U18
D0523	74HCT245AN	1.00 Each	U11
D0525	4066 Quad Bilateral Switch	1.00 Each	U31



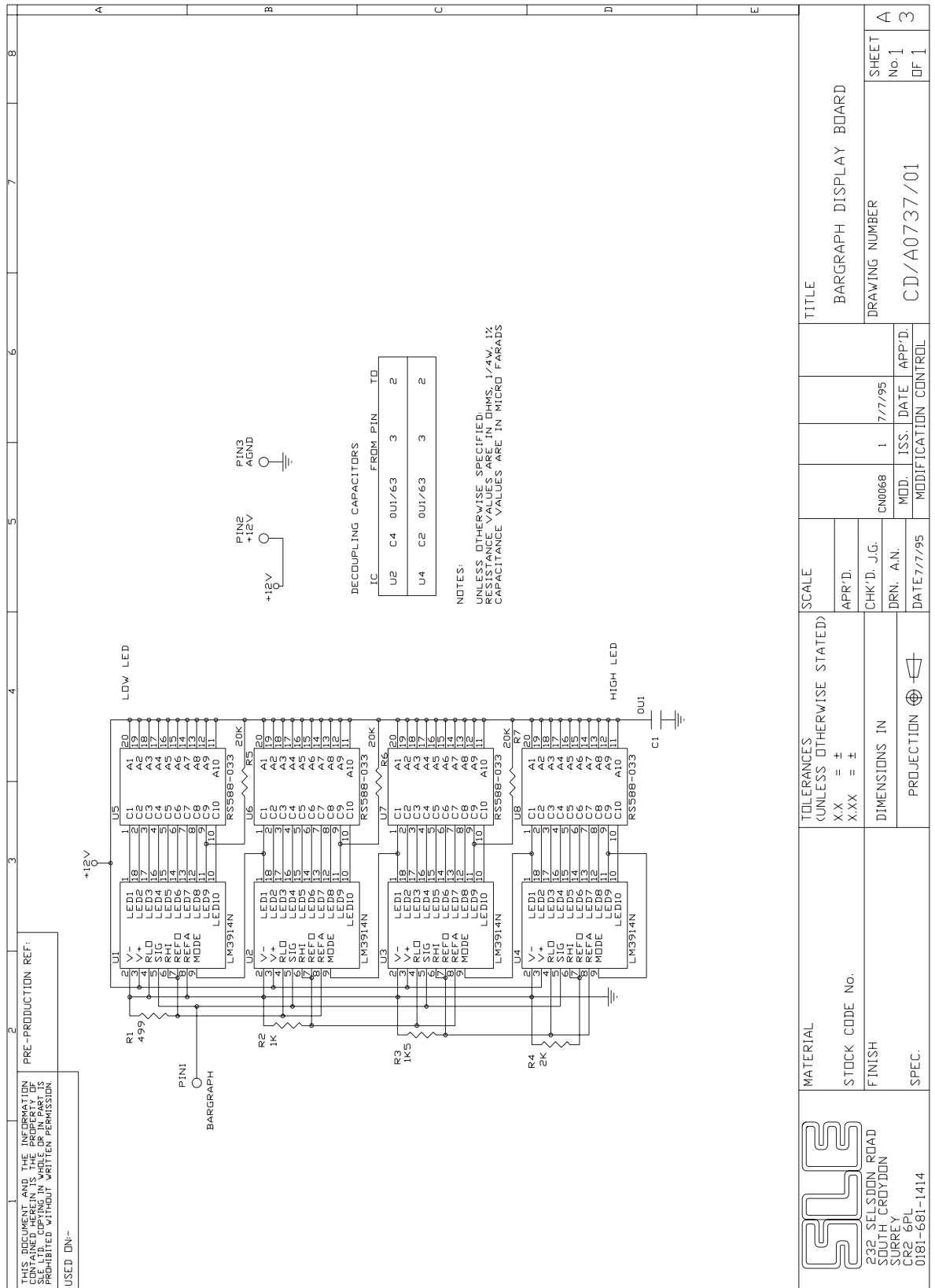
Part Number	Component Description	Used Unit	Component Reference(s)
D0531	4013	1.00 Each	U24
D0544	4538	1.00 Each	U22
D0576	27C128A-20	1.00 Each	U1
D0578	74AC540	2.00 Each	U4 & U21
D0580	TLC555CP	1.00 Each	U19
D0581	LMC660AIN	3.00 Each	U28-U30
D0585	BC327	1.00 Each	T1
D0594	ZN1034E Precision Timer IC	0.00 Each	Replaced by DO457 CN0619 for REV-F ofPCB Blank
D0595	74LS148N	1.00 Each	U6
D0596	Crystal 8.0Mhz	1.00 Each	XTL1
D0617	NMAOSISD	1.00 Each	U8
D0618	MAX691	1.00 Each	U12
D0619	9401	1.00 Each	U20
D0620	LM393	1.00 Each	U23
D0621	4093B	1.00 Each	U25
D0622	VN10XM	4.00 Each	MOS1-MOS4
D0632	LM2917N-8	2.00 Each	U26,U27
D0638	ZTX450	3.00 Each	T2-T4
M0307	Terminal Pin(Pcb single sided)	6.00 Each	TP1-TP6)
M0626	Jumper Link	3.00 Each	JP1,JP3,JP4
M0660	Pad Adhesive double sided	1.00 Each	ITEM 16
M0718	Label, PCB Identification	1.00 Each	ITEM 17
P0230	DIN41612 64 Way 90 deg Plug	1.00 Each	PLA
P0455	20 way IDC Header Plug	1.00 Each	PL1
P0464	12way P.C.B Header Straight	0.50 Each	ITEM 20 cut into 3x2 way JP
R0228	8K2 1% 50PPM 0.25W	4.00 Each	R28,31,94,96
R0232	16K 1% 50PPM 0.25W	2.00 Each	R115 & R117
R0280	470R Resistor 1% 0.25W Met.flm	1.00 Each	R47
R0406	20R Resistor 1% 0.25W	2.00 Each	R27 & R33
R0407	22R Resistor 1S 0.25W SMA0207	1.00 Each	R25
R0413	100R Resistor 1% 0.25W SMA0207	1.00 Each	R8
R0416	150R Resistor 1% 0.25W SMA0207	4.00 Each	R20-22,R112
R0424	330R Resistor 1% 0.25W SMA0207	3.00 Each	R104-R106
NOTE:COMPONENT R121 IS NOT FITTED ON THIS MODEL			
R0436	1.0K Resistor 1% 0.25W SMA0207	13.00 Each	R4,7,16-19,83,84, 93 ,103,107,R113 & R120
R0442	2.0K Resistor 1% 0.25W SMA0207	3.00 Each	R43,44,63
R0443	2.2K Resistor 1% 0.25W SMA0207	3.00 Each	R1-R3
R0456	5.6K Resistor 1% 0.25W SMA0207	1.00 Each	R50

Part Number	Component Description	Used Unit	Component Reference(s)
R0463	10K Resistor 1% 0.25W SMA0207	32.00 Each	R5,13,29,35,41,42, 48, 52, 53, 57, 58,61,62 ,64, 67, 68, 70, 72 ,73 ,75 , 76, 81,86,88, 89,91,92,99, 100 ,102,114 R122
R0464	12.1K Resistor 1% 0.25W SMA020	4.00 Each	R69,71,74,R101
R0467	15K Resistor 1% 0.25W SMA0207	3.00 Each	R56,R116 & R118
R0469	22.1K Resistor 1% 0.25W SMA020	6.00 Each	R12,38,39,R77-79
R0471	27K Resistor 1% 0.25W SMA0207	2.00 Each	R82,85
R0473	33K Resistor 1% 0.25W	2.00 Each	R9 & R11
R0479	47K Resistor 1t 0.25W SMA0207	1.00 Each	R6
R0483	69.8K Resistor 1% 0.25W SMA020	2.00 Each	R30,R36
R0486	100K Resistor 1% 0.25W SMA0207	13.00 Each	R10,24,40,46,49 ,51,54, 65 ,66,87,90,113, R123
R0496	470K Resistor 1% 0.25W SMA0207	5.00 Each	R14,15,R108-R110
R0500	820K Resistor 1~_ 0.25W SMA0207	1.00 Each	R55
R0501	1.0M Resistor 1% 0.25W SMA0207	5.00 Each	R34,45,59,60,95
R0506	3.3M Resistor 1% 0.25W SMA0207	2.00 Each	R97,R98
R0556	10K x 8 Resistor Network	1.00 Each	RP1
R0557	1K0 Resistor 5t 1W 250PPM PR01	1.00 Each	R37
R0575	21K .125w Precision Resistor	1.00 Each	R80
S0209	IC Socket 28 way DIL	3.00 Each	ITEM 5
S0212	IC Socket 16 way DIL	7.00 Each	ITEM 6
S0227	IC Socket 40 way DIL	2.00 Each	ITEM 7
S0237	IC Socket 20 way DIL	5.00 Each	ITEM 8
S0241	IC Socket 8 way DIL	5.00 Each	ITEM 9
S0242	IC Socket 14 way DIL	9.00 Each	ITEM 10
T0683	Handle (pcb)	1.00 Each	ITEM 2
V0405	10K Trimmer, cermet, top adj	8.00 Each	PI,4,6-10,P14
V0406	20K Trimmer cermet,top adjust	1.00 Each	P15
V0408	100K Trimmer, cermet, top adj	3.00 Each	P2,P3,P5
V0426	5K Trimmer, cermet, top adjust	3.00 Each	PII-P13
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 30
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 21
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
W0103	Wire Wrapping Kynar Red 30awg	0.30 Metre	Not Required for PCB Rev F

17.10 AS/A0737/01 Bargraph Display PCB Assembly



17.10.1 CD/A0737/01 Bargraph Display PCB Circuit Diagram



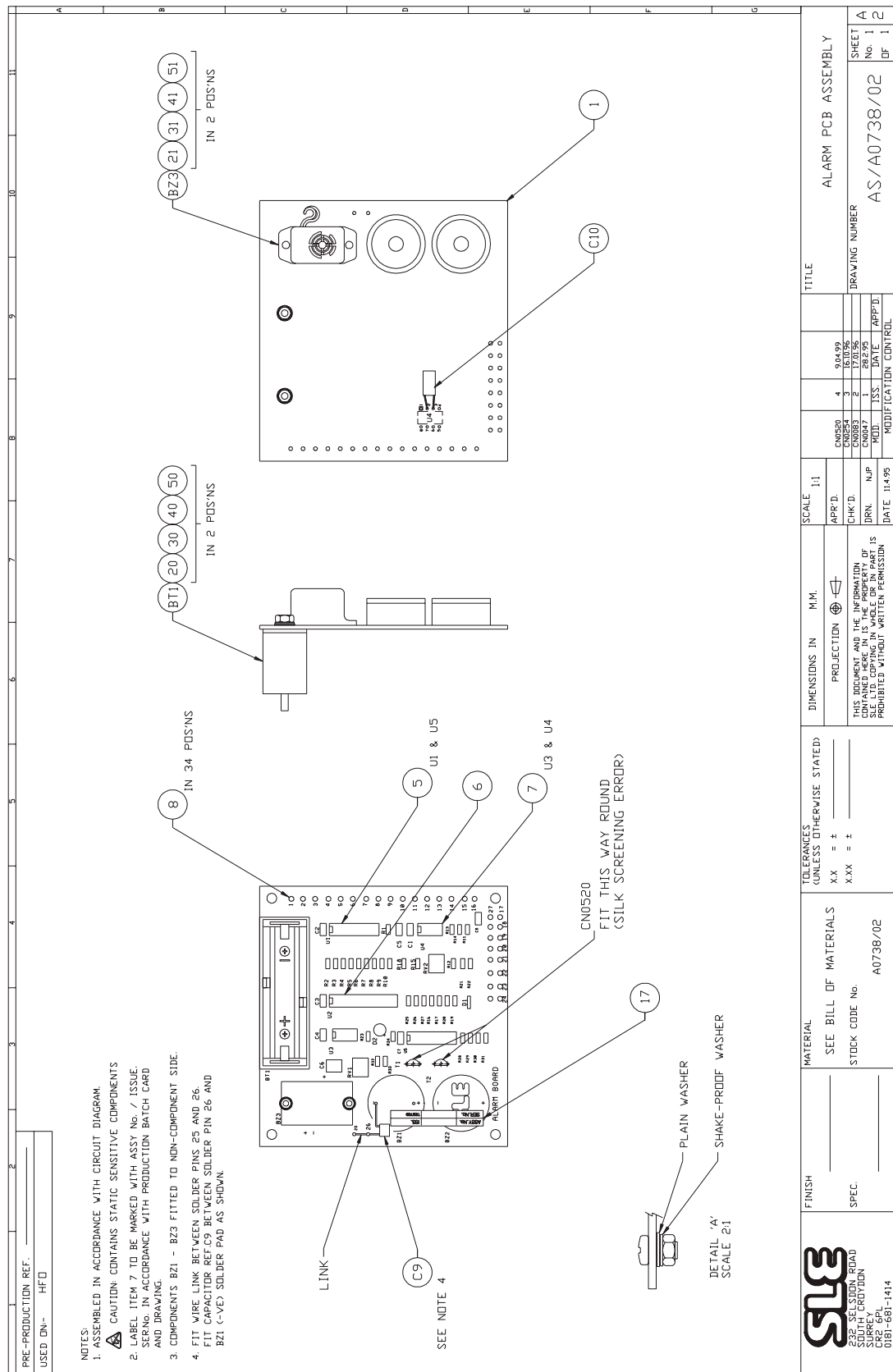


PARTS LIST

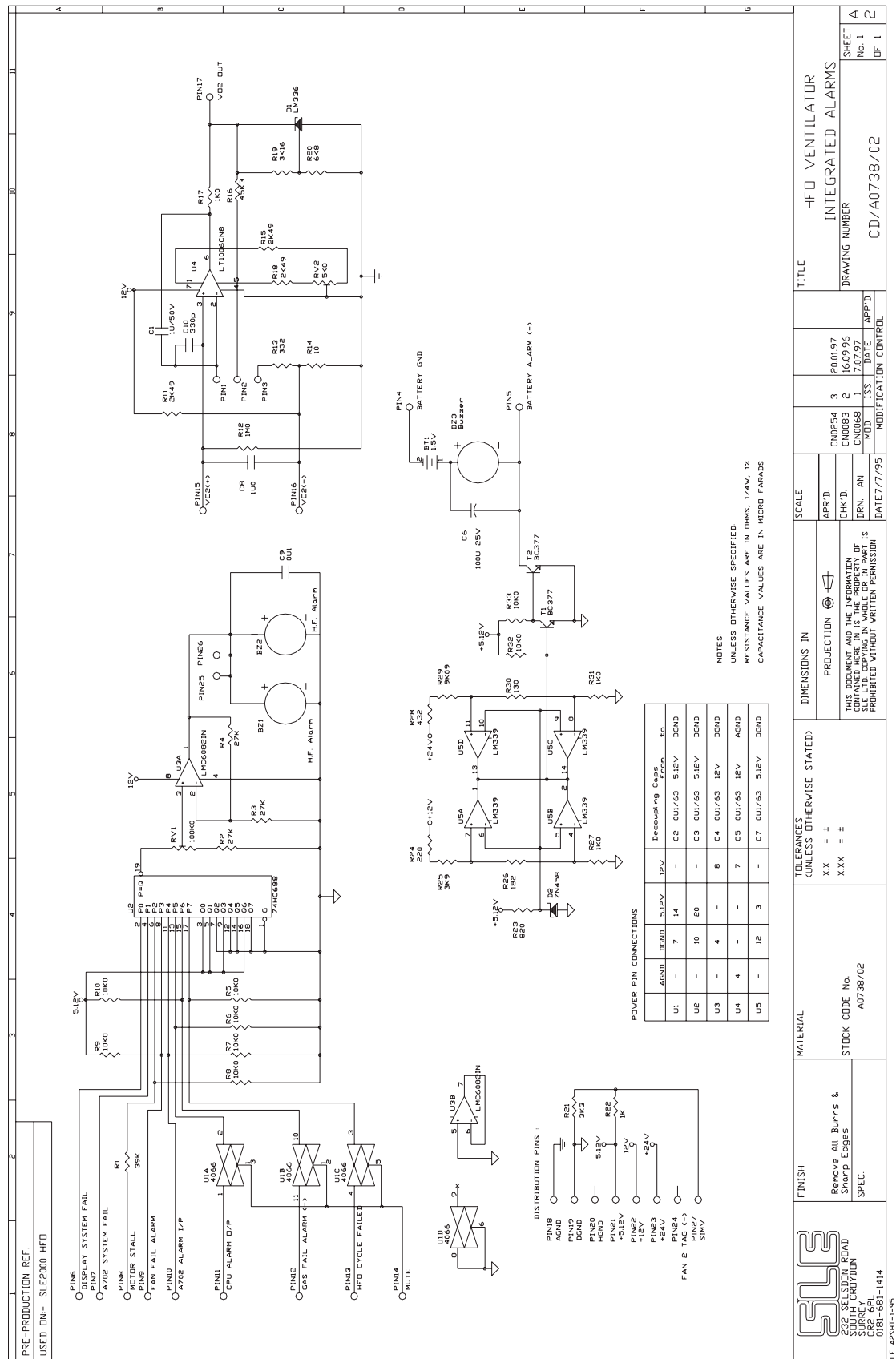
Finished Item Stock Number **A0737/01**
Finished Item Description Bargraph Display Pcb Assembly
Bill of materials AS/A0737/01 Issue 2

Part Number	Component Description	Used Unit	Component Reference(s)
J0737	Bargraph Board blank	1.00	ITEM 1 (PCB)
C0450	0.1uF Capacitor 63V 10% MKS2	3.00	C1,C2,C4
R0429	499R Resistor 1% 0.25W SMA0207	1.00	R1
R0436	1.0K Resistor 1% 0.25W SMA0207	1.00	R2
R0439	1.5K Resistor 1% 0.25W SMA0207	1.00	R3
R0442	2.0K Resistor 1% 0.25W SMA0207	1.00	R4
R0212	20K Resistor 1% 0.25W SMA0207	3.00	R5-R7
D0629	LM3914N	4.00	U1-U4
D0630	LED Array 10 bar DIL	4.00	U5-U8
S0237	IC Socket 20 way DIL	4.00	ITEM 5 (U5-U8)
S0239	IC Socket 18 way DIL	4.00	ITEM 6 (U1-U4)
M0307	Terminal Pin(Pcb single sided)	3.00	PIN REF.1,2 & 3
M0718	Label, PCB Identification	1.00	ITEM 17

17.11 AS/A0738/02 Alarm PCB Assembly



17.11.1 CD/A0738/02 Alarm PCB Circuit Diagram



PARTS LIST

Finished Item Stock Number **A0738/02**
 Finished Item Description **ALARM PCB ASSEMBLY**
 Bill of materials **AS/A0738/02 Issue 3**

Part Number	Component Description	Used Unit	Component Reference(s)
J0738/01	Alarm board pcb Rev.D	1.00	ITEM 1
N2179	Battery Holder (AA size)	1.00	BT1
N2096	SMA-24L Audible Alarm 98dB	2.00	BZ1,BZ2
N2082	SMB-01 Audible Alarm	1.00	BZ3
C0214	330pf 100v Ceramic 10% PCM5	1.00	ITEM C10
C0462	1uF Capacitor 50/63V 10% MKS2	2.00	C1,C8
C0439	100u Capacitor 25V 20% Elect.	1.00	C6
C0450	0.1uF Capacitor 63V 10% MKS2	6.00	C2-C5,C7, C9
D0427	LM336-5 Diode	1.00	D1
V0408	100K Trimmer, cermet, top adj	1.00	RV1
V0404	5.0K Trimmer,cermet,top adjust	1.00	RV2
R0475	39K Resistor 1% 0.25W SMA0207	1.00	R1
R0471	27K Resistor 1% 0.25W SMA0207	3.00	R2-R4
R0463	10K Resistor 1% 0.25W SMA0207	8.00	R5-R10,R32,R33
R0445	2K49 Resistor 1% 0.25W SMA0207	3.00	R11,R15,R18
R0501	1.0M Resistor 1% 0.25W SMA0207	1.00	R12
R0425	332R Resistor 1% 0.25W SMA0207	1.00	R13
R0405	10R Resistor 1% 0.25W SMA0207	1.00	R14
R0478	45K3 Resistor 1% 0.25W SMA0207	1.00	R16
R0436	1.0K Resistor 1% 0.25W SMA0207	4.00	R17,R22,R27,R31
R0448	3K16 Resistor 1% 0.25W SMA0207	1.00	R19
R0316	820R Resistor 1% 0.25W SMA0207	1.00	R23
R0337	3K3 Resistor 1% 0.25W SMA0207	1.00	R21
R0277	220R Resistor 1% 0.25W SMA0207	1.00	R24
R0457	6K8 Resistor 1% 0.25W SMA0207	1.00	R20
R0564	3K9 Resistor 1% 0.25W SMA0207	1.00	R25
R0418	182R Resistor 1% 0.25W SMA0207	1.00	R26
R0577	130R Resistor 1% 0.25W SMA0207	1.00	R30
R0462	9.09K Resistor 1% 0.25W SMA020	1.00	R29
R0427	432R Resistor 1% 0.25W SMA0207	1.00	R28
D0583	LT1006CN8	1.00	U4
D0642	LM339N Dual voltage comparitor	1.00	U5
D0336	BC337	2.00	T1,T2
D0525	4066 Quad Bilateral Switch	1.00	U1
D0586	LMC6082 Dual low power op amp	1.00	U3
D0628	74HC688N	1.00	U2



Part Number	Component Description	Used Unit	Component Reference(s)
D0634	ZN458A	1.00	D2
S0242	IC Socket 14 way DIL	2.00	ITEM 5 (U1,U5)
S0237	IC Socket 20 way DIL	1.00	ITEM 6 (U2)
S0241	IC Socket 8 way DIL	2.00	ITEM 7 (U3 & U4)
H3210	M3 x 10 Csk Hd Pozi s.st	2.00	ITEM 20
H3093	M3 Plain Washer s.st	2.00	ITEM 30
H3094	M3 Shakeproof Washer s.st	2.00	ITEM 40
H3091	M3 Nut Full s.st	2.00	ITEM 50
H2106	M2 x 6 Pan Hd Pozi s.st	2.00	ITEM 21
H2091	M2 Nut Full s.st	2.00	ITEM 51
H2093	M2 Plain Washer s.st.	2.00	ITEM 31
H2094	M2 Shakeproof Washer s.st	2.00	ITEM 41
M0718	Label, PCB Identification	1.00	ITEM 17
M0307	Terminal Pin(Pcb single sided)	34.00	ITEM 8

Motor Drive PCB AS/A0739/02

Revision B: Standard board

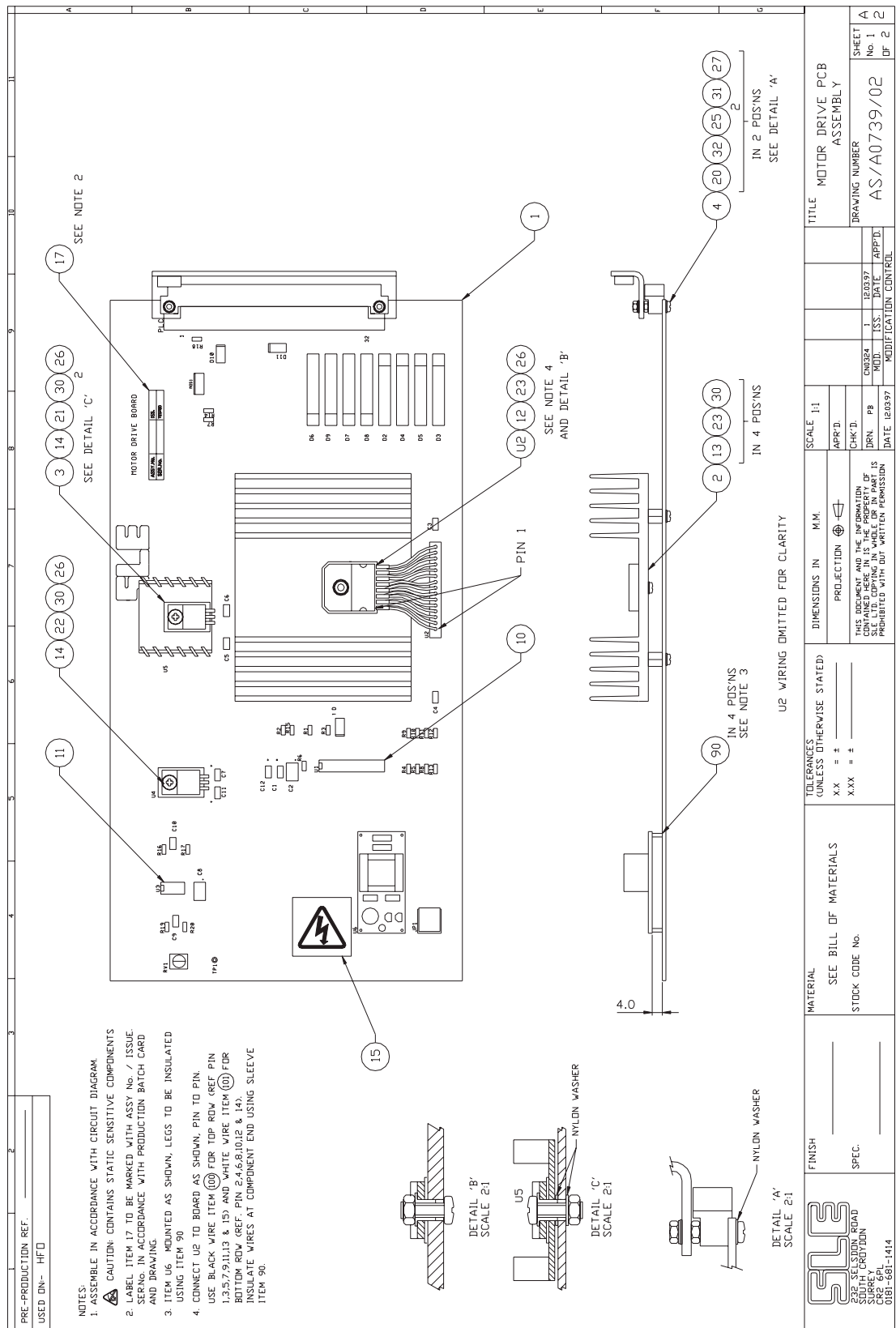
(See board drawing AS/A0739/02 issue 1 on page 134 and circuit diagram CD/A0739/02 issue 1 on page 136).

Revision C: Incorporates HFO Start-up Motor PCB assembly (A0756)

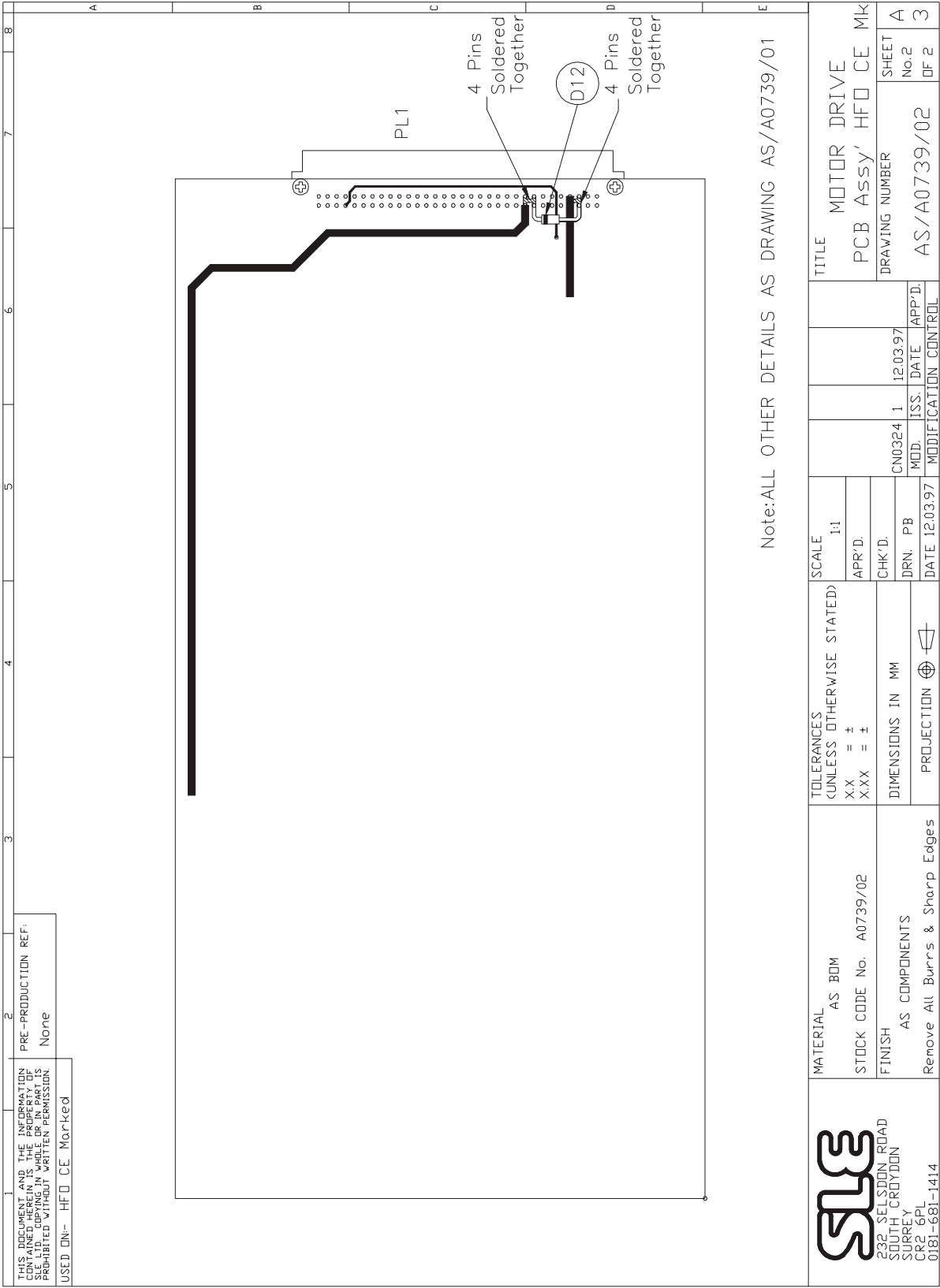
(See board drawing AS/A0739/02 issue 3 on page 139 and circuit diagram CD/A0739/02 issue 3 on page 140).

Also see service information “SI 000101 Modification of SLE 2000 HFO motor drive circuit board.” on page 233.

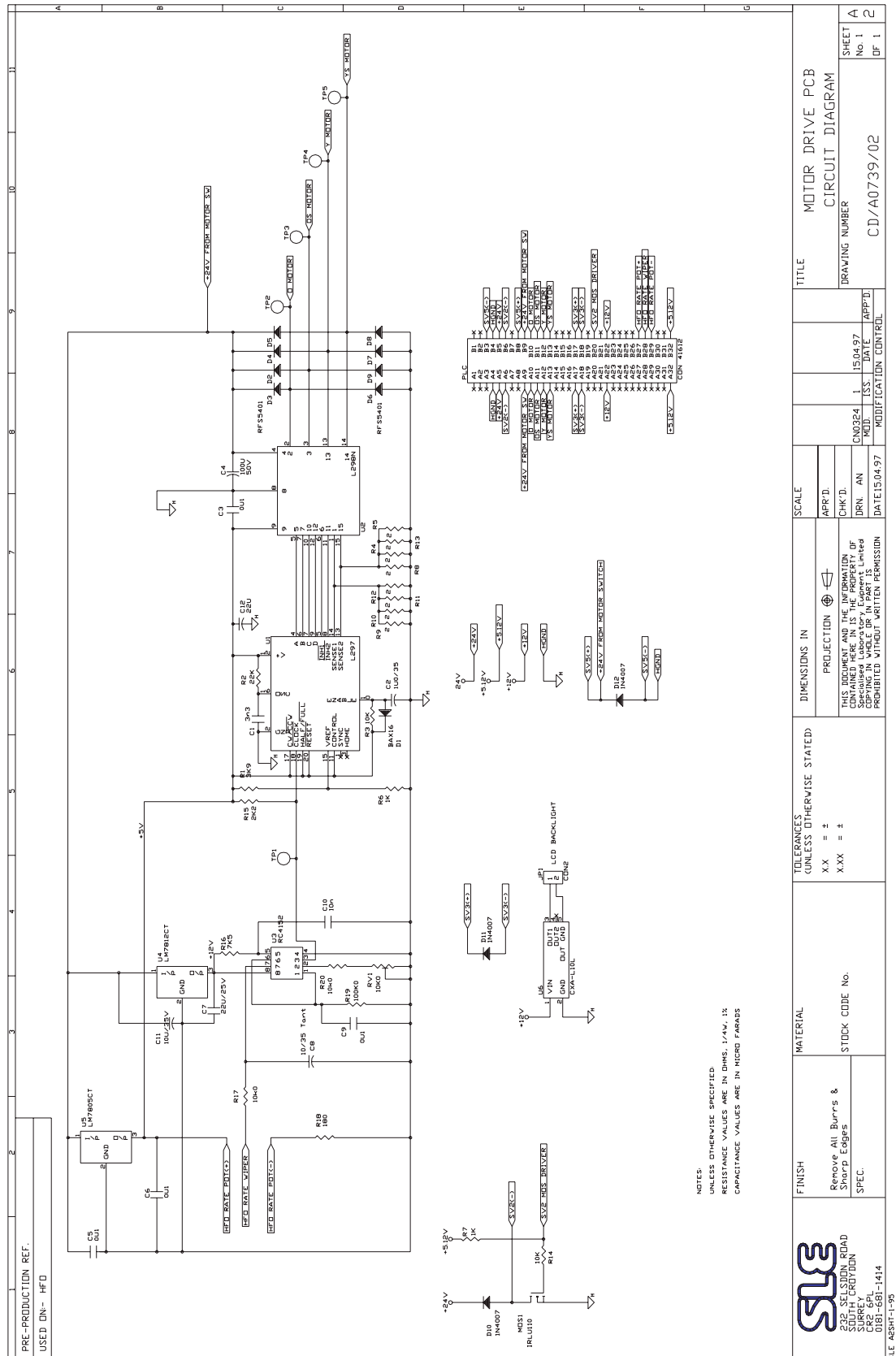
17.12 AS/A0739/02 Motor drive PCB Issue 1 Sheet 1 (Revision B)



17.12.1 AS/A0739/02 Motor drive PCB Issue 1 Sheet 2 (Revision B)



17.12.2 CD/A0739/02 Motor drive PCB Circuit Diagram Issue 1(Revision B)



PARTS LIST

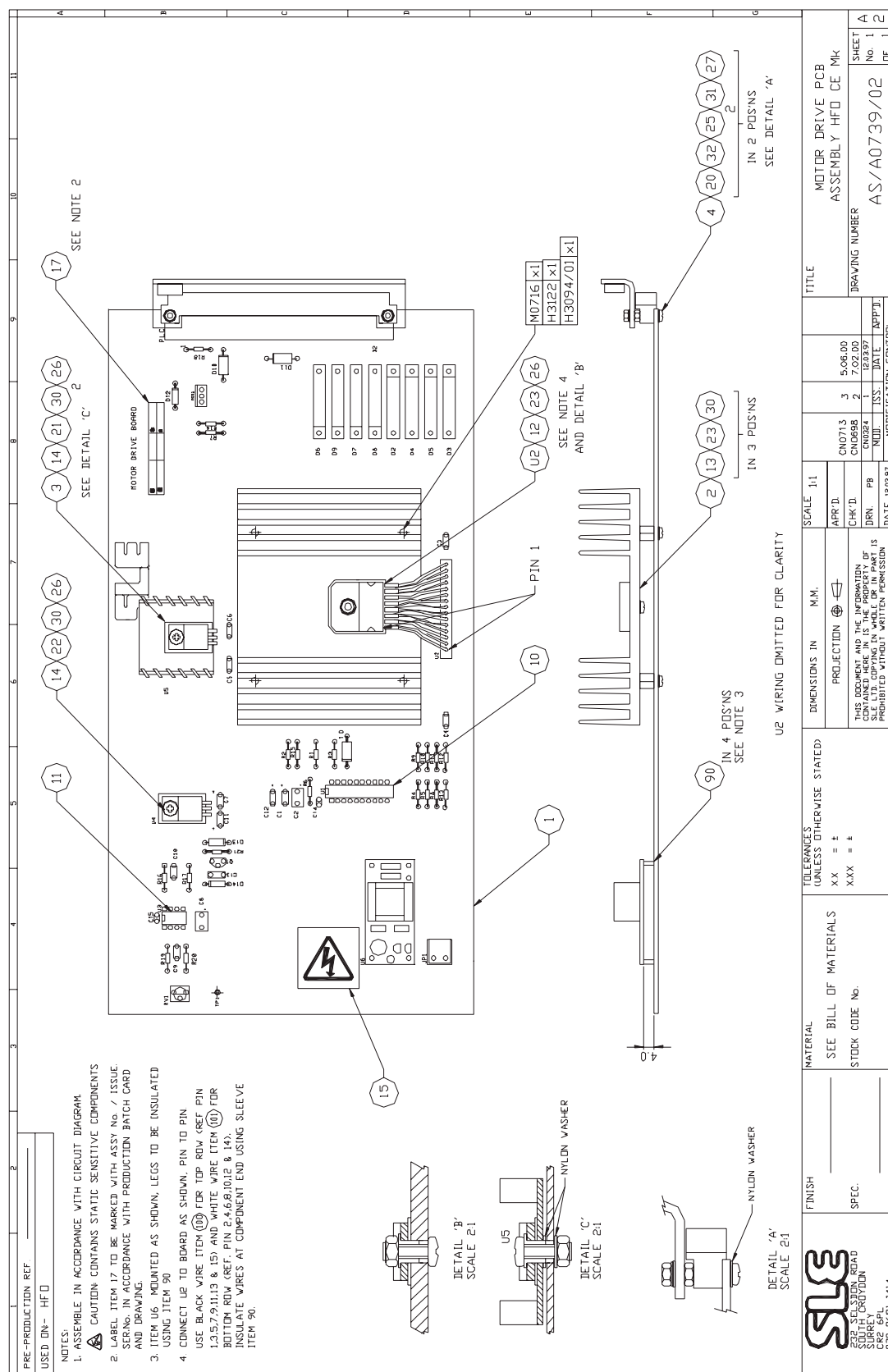
Finished Item Stock Number **A0739/02**
 Finished Item Description Motor Drive PCB Assy' CE Mk
 Bill of materials AS/A0739/02 Issue 1

Part Number	Component Description	Used Unit	Component Reference(s)
J0739	Motor Drive Board blank	1.00 Each	ITEM 1 (PCB)
C0410	3.3nF Capacitor 50V 10% Ceramc	1.00 Each	C1
C0433	1uF Capacitor 35V 20% Tantalum	1.00 Each	C2
C0450	0.1uF Capacitor 63V 10% MKS2	4.00 Each	C3,5,6 & C9
C0469	10uF Capacitor 35V 20% Tant.	2.00 Each	C8,C11
C0260	10nF Capacitor 63V 20% MKS2	1.00 Each	C10
C0277	100uF Capacitor 50 or 63V 20%	1.00 Each	C4
C0436	22uF Capacitor 35V 20%	2.00 Each	C7,C12
D0623	BAX16 Diode	1.00 Each	D1
D0624	5401 Diode	8.00 Each	D2-D9
D0402	1N4007 Plastic Diode	3.00 Each	D10,D11 & D12 Added on rear as modification
D0636	IRLU110	1.00 Each	MOS1
D0625	L297	1.00 Each	U1
D0626	L298N	1.00 Each	U2
D0627	RC4152	1.00 Each	U3
D0428	LM7812CT	1.00 Each	U4
D0432	LM7805CT	1.00 Each	U5
D0601/01	CXA-L10L Inverter	1.00 Each	U6
V0405	10K Trimmer, cermet, top adj	1.00 Each	RV1
R0451	3.92K Resistor 1% 0.25W SMA020	1.00 Each	R1
R0469	22.1K Resistor 1% 0.25W SMA020	1.00 Each	R2
R0463	10K Resistor 1% 0.25W SMA0207	4.00 Each	R3,R14,R17,R20
R0574	2.0R Resistor 1% 0.25W SMA0207	8.00 Each	R4,5,8,R9-R13
R0436	1.0K Resistor 1% 0.25W SMA0207	2.00 Each	R6,R7
R0443	2.2K Resistor 1% 0.25W SMA0207	1.00 Each	R15
R0460	7.5K Resistor 1% 0.25W SMA0207	1.00 Each	R16
R0417	180R Resistor 1% 0.25W SMA0207	1.00 Each	R18
R0486	100K Resistor 1% 0.25W SMA0207	1.00 Each	R19
P0467	Pcb Header 2 way	1.00 Each	JP1
P0230	64 way Plug - right angle	1.00 Each	PLC
M0680/01	Heatsink (modified)	1.00 Each	ITEM 2
M0228	Heat Sink TO-220	1.00 Each	ITEM 3
M0307	Terminal Pin(Pcb single sided)	1.00 Each	TP1
M0309/01	H12 x 20mm Sleeve (1.2mm I/D)	16.00 Each	ITEM 90
M0463	T0220 Transistor Heatsink	2.00 Each	ITEM 14

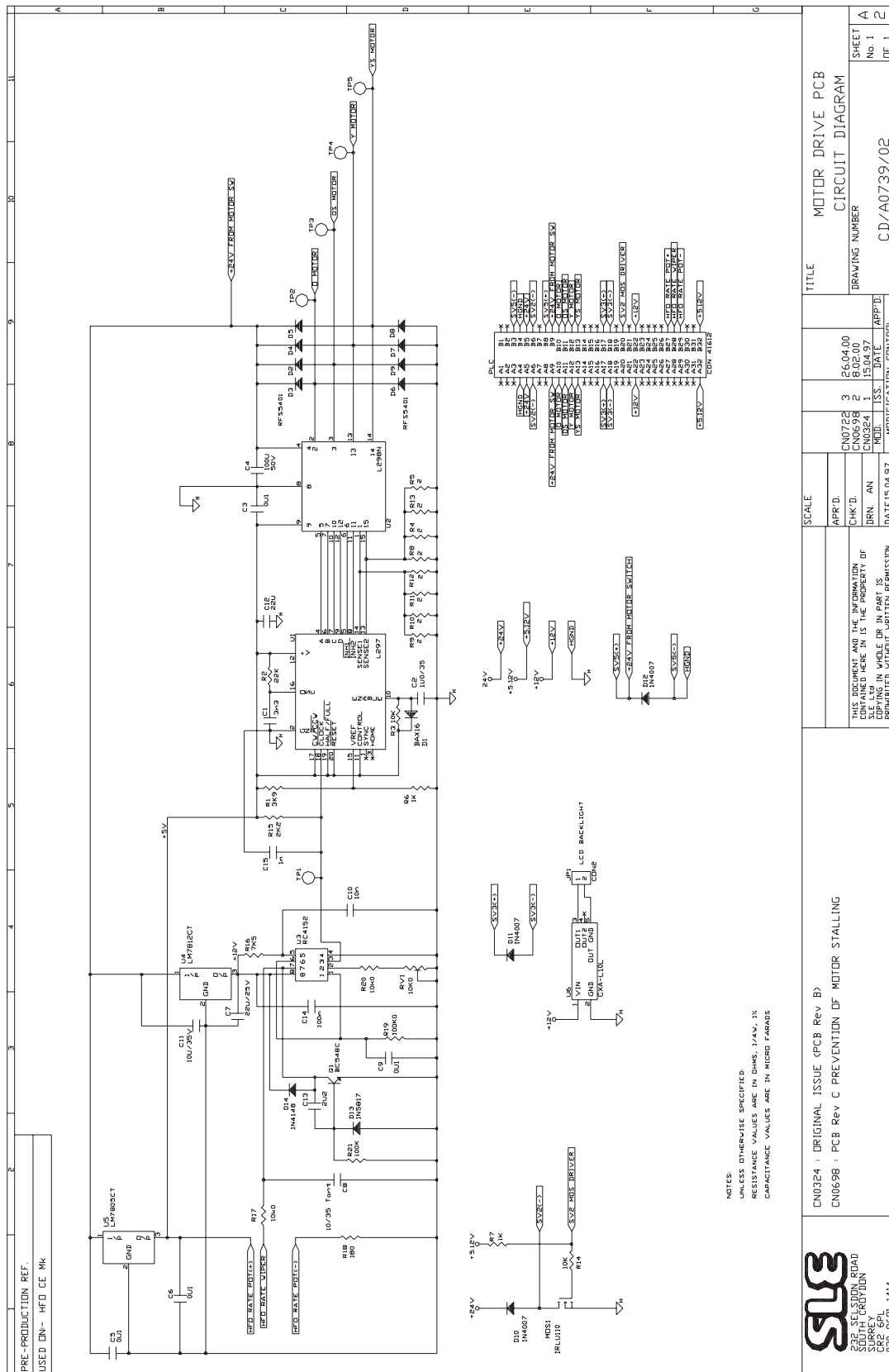


Part Number	Component Description	Used Unit	Component Reference(s)
M0706/03	Label,Hazard Flash (25sq.)	1.00 Each	ITEM 15
M0716	Spacer hex.6.35-ID3.5 x 6.35lg	4.00 Each	ITEM 13
M0718	Label, PCB Identification	1.00 Each	ITEM 17
M0720	T0-3P IC Mounting Kit Silicone	1.00 Each	ITEM 12
S0237	IC Socket 20 way DIL	1.00 Each	ITEM 10
S0241	IC Socket 8 way DIL	1.00 Each	ITEM 11
T0683	Handle (pcb)	1.00 Each	ITEM 4
H3095	M3 Plain Washer Nylon	7.00 Each	ITEM 30
H3091	M3 Nut Full s.st	7.00 Each	ITEM 26
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 32
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 20
H3110	M3 x 10 Pan Hd Pozi s.st	1.00 Each	ITEM 21
H3108	M3 x 8 Pan Hd Pozi s.st	1.00 Each	ITEM 22
H3112	M3 x 12 Pan Hd Pozi s.st	5.00 Each	ITEM 23
W0001	Wire Equipment 7/0.2 Black	0.10 Metre	ITEM 100 (AS REQUIRED)
W0001/09	Wire Equipment 7/0.2 White	0.10 Metre	ITEM 101 (AS REQUIRED)

17.13 AS/A0739/02 Motor Drive PCB Issue 3 (Revision C)



17.13.1 CD/A0739/02 Motor drive PCB Circuit Diagram Issue 3 (Revision C)



PARTS LIST

Finished Item Stock Number

A0739/02

Finished Item Description

Motor Drive PCB Assy' CE Mk

Bill of materials

AS/A0739/02 Issue 2

Part Number	Component Description	Used Unit	Component Reference(s)
J0739	Motor Drive Board blank	1.00 Each	ITEM 1 (PCB)
C0260	10nF Capacitor 63V 20% MKS2	1.00 Each	C10
C0277	100uF Capacitor 50 or 63V 20%	1.00 Each	C4
C0410	3.3nF Capacitor 50V 10% Ceramc	1.00 Each	C1
C0433	1uF Capacitor 35V 20% Tantalum	1.00 Each	C2
C0436	22uF Capacitor 35V 20%	2.00 Each	C7,C12
C0450	0.1uF Capacitor 63V 10% MKS2	4.00 Each	C3,5,6 & C9
C0469	10uF Capacitor 35V 20% Tant.	2.00 Each	C8,C11
C0481	100nF Cap 50v 20% M/lay ceramic	1.00 Each	C14
C0485	2.2uF Cap 63/50v 20% 2F4 ceramic	1.00 Each	C13
C0511	1nF Cap 100v 10% ceramic	1.00 Each	C15
D0402	1N4007 Plastic Diode	3.00 Each	D10,D11 & D12 in new position
D0406	1N4148	1.00 Each	D14
D0428	LM7812CT	1.00 Each	U4
D0432	LM7805CT	1.00 Each	U5
D0601/01	CXA-L1OL Inverter	1.00 Each	U6
D0623	BAX16 Diode	1.00 Each	D1
D0624	5401 Diode	8.00 Each	D2-D9
D0625	L297	1.00 Each	U1
D0626	L298N	1.00 Each	U2
D0627	RC4152	1.00 Each	U3
D0636	IRLU110	1.00 Each	MOS1
D0651	1N5817 Schottky diode	1.00 Each	D13
H2316	M2.5 X 16 Pan Hd Pozi s.st	2.00 Each	ITEM 20
H2591	M2.5 Nut Full s.st	4.00 Each	ITEM 25
H2593	M2.5 Plain Washer s.st	2.00 Each	ITEM 31
H2594	M2.5 Shakeproof Washer s.st	2.00 Each	ITEM 27
H2595	M2.5 Plain Nylon Washer	2.00 Each	ITEM 32
H3091	M3 Nut Full s.st	7.00 Each	ITEM 26
H3095	M3 Plain Washer Nylon	6.00 Each	ITEM 30
H3094/01	M3 St Stl Crinkle Washer Typ A	1.00 Each	CN 0713
H3108	M3 x 8 Pan Hd Pozi s.st	1.00 Each	ITEM 22
H3110	M3 x 10 Pan Hd Pozi s.st	1.00 Each	ITEM 21
H3112	M3 x 12 Pan Hd Pozi s.st	5.00 Each	ITEM 23
M0228	Heat Sink TO-220	1.00 Each	ITEM 3
M0307	Terminal Pin(Pcb single sided)	1.00 Each	TP1

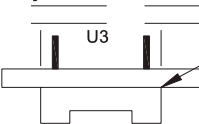


Part Number	Component Description	Used Unit	Component Reference(s)
M0309/01	H12 x 20mm Sleeve (1.2mm I/D)	16.00 Each	ITEM 90
M0463	T0220 Transistor Heatsink	2.00 Each	ITEM 14
M0680/01	Heatsink (modified)	1.00 Each	ITEM 2
M0706/03	Label,Hazard Flash (25sq.)	1.00 Each	ITEM 15
M0716	Spacer hex.6.35-ID3.5 x 6.35lg	4.00 Each	ITEM 13
M0718	Label, PCB Identification	1.00 Each	ITEM 17
M0720	T0-3P IC Mounting Kit Silicone	1.00 Each	ITEM 12
P0230	64 way Plug - right angle	1.00 Each	PLC
P0467	Pcb Header 2 way	1.00 Each	JP1
R0417	180R Resistor 1% 0.25W SMA0207	1.00 Each	R18
R0436	1.0K Resistor 1% 0.25W SMA0207	2.00 Each	R6,R7
R0443	2.2K Resistor 1% 0.25W SMA0207	1.00 Each	R15
R0451	3.92K Resistor 1% 0.25W SMA020	1.00 Each	R1
R0460	7.5K Resistor 1% 0.25W SMA0207	1.00 Each	R16
R0463	10K Resistor 1% 0.25W SMA0207	4.00 Each	R3,R14,R17,R20
R0469	22.1K Resistor 1% 0.25W SMA020	1.00 Each	R2
R0486	100K Resistor 1% 0.25W SMA0207	1.00 Each	R19 & R21 (1 off added)
R0574	2.0R Resistor 1% 0.25W SMA0207	8.00 Each	R4,5,8,R9-R13
S0237	IC Socket 20 way DIL	1.00 Each	ITEM 10
S0241	IC Socket 8 way DIL	1.00 Each	ITEM 11
T0683	Handle (pcb)	1.00 Each	ITEM 4
V0405	10K Trimmer, cermet, top adj	1.00 Each	RV1
W0001	Wire Equipment 7/0.2 Black	0.10 Metre	ITEM 100 (AS REQUIRED)
W0001/09	Wire Equipment 7/0.2 White	0.10 Metre	ITEM 101 (AS REQUIRED)

17.14 AS/A0756 HFO Motor Start Up PCB Issue 2

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USED ON:- HFO & HFO+			

Ref: A0739 Motor Drive PCB Assy



U3

SOCKET TO FIT
FLUSH WITH BOARD

D0627 U3 Ref

S0241/01 x1

J0756 x1

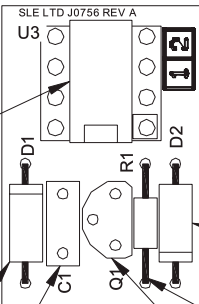
D0406 D1

D0651 D2

C0485 C1

R0486 R1

D0655 Q1



SLE LTD J0756 REV A

This PCB Assy is required for modifying all A0739 PCBs until Rev C
Motor Drive board is available with the above components incorporated.

MATERIAL: AS BOM		FINISH: AS COMPONENTS		CN0722 CN0698	2 1	26.04.00 9.02.00	
STOCK CODE No. A0756		Remove All Burrs & Sharp Edges		MOD.	ISS.	DATE	APP'D.
MODIFICATION CONTROL							

 232 SELSDON ROAD SOUTH CROYDON SURREY CR2 6PL 020-8681-1414	SCALE: 2:1	TOLERANCES (UNLESS OTHERWISE STATED) X.X = ± X.XX = ±	TITLE: HFO START-UP MOTOR PCB ASSY	
	APR'D.		DRAWING NUMBER: AS/A0756	
	CHK'D			
	DRN: PB	DIMENSIONS IN MM	OF 4	

DATE: 9.02.00	PROJECTION 
----------------------	--



PARTS LIST

Finished Item Stock Number **AS/A0756**
Finished Item Description HFO Start-up Motor PCB Assembly
Bill of materials AS/A0756 Issue 2

Part Number	Component Description	Used	Component Reference(s)
J0756	HFO Start-up Motor Mod PCB	1.00 Each	Rev A
C0485	2.2uf Cap 63/50v 20% 2F4	1.00 Each	C1
D0406	1N4148	1.00 Each	D1
D0627	RC4152N V/F, F/V Converter	0.00 each	U3 (part of A0739 Assembly)
D0651	1N5817 Schottky Diode	1.00 Each	D2
D0655	BC548c Bipolar Transistor	1.00 Each	Q1
R0486	100K Resistor 1% 0.25W SMA0207	1.00 Each	R1
S0241/01	2.54mm P Std Profile DIL Socket	1.00 Each	Socket for U3

17.15 AS/A0745 Pressure Drift Monitor Board Issue 1

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USED ON:- HFO CE Marked			

2

1

10 11 12 13

IN 2 POS'NS

REAR VIEW

NOTES:

1. ASSEMBLED IN ACCORDANCE WITH CIRCUIT DIAGRAM CD/A0745
2. LABEL ITEM 1 TO BE MARKED WITH ASSY No./ISSUE, SER No. IN ACCORDANCE WITH PRODUCTION BATCH CARD AND DRAWING.

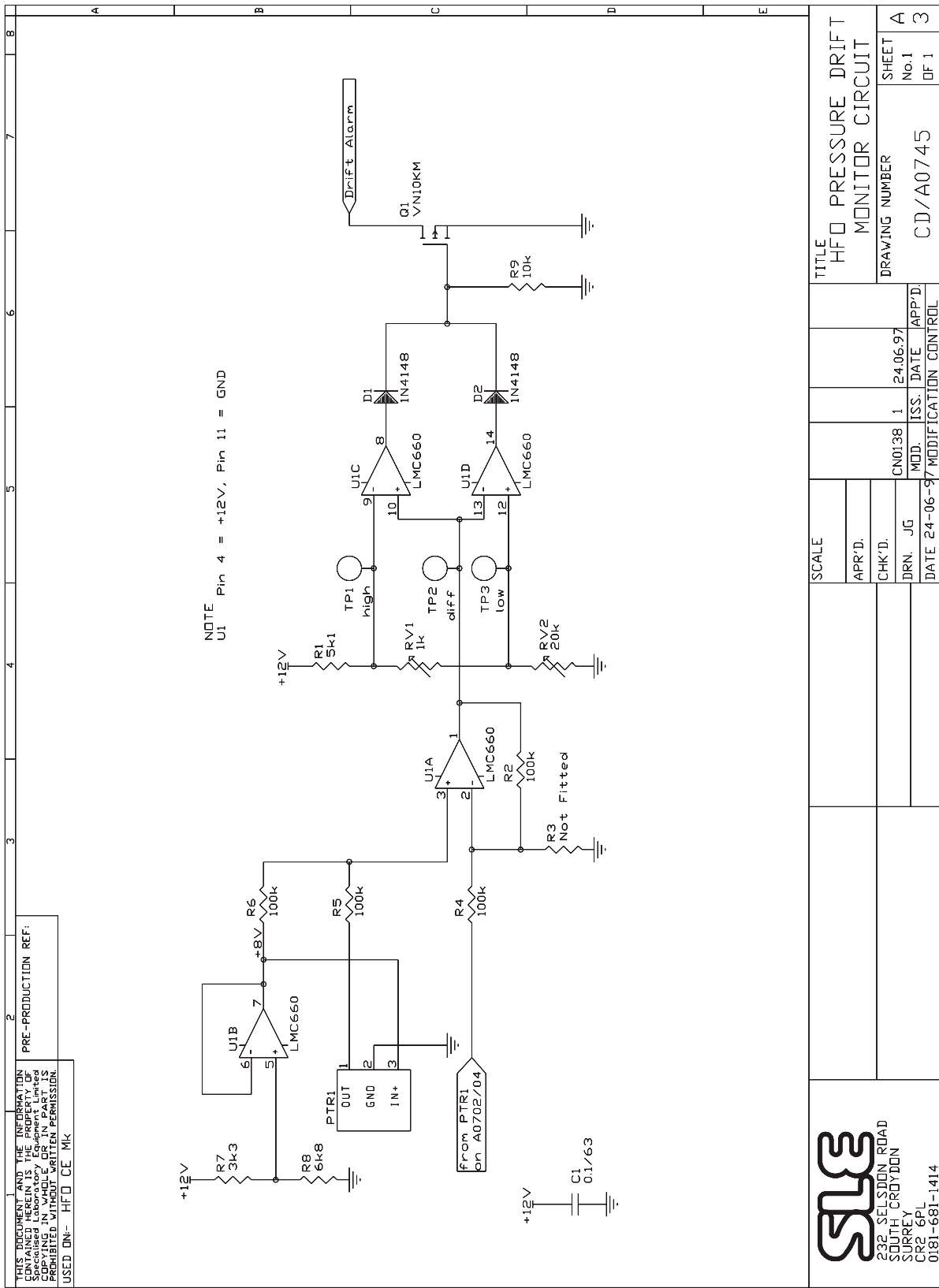
CAUTION: STATIC SENSITIVE PRECAUTIONS APPLY

MATERIAL: AS BOM STOCK CODE No. A0745	FINISH: AS COMPONENTS Remove All Burrs & Sharp Edges	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>CN0324</td> <td>1</td> <td>12.03.97</td> <td></td> </tr> <tr> <td>MOD.</td> <td>ISS.</td> <td>DATE</td> <td>APP'D.</td> </tr> </table> MODIFICATION CONTROL	CN0324	1	12.03.97		MOD.	ISS.	DATE	APP'D.
CN0324	1	12.03.97								
MOD.	ISS.	DATE	APP'D.							

 232 SELSDON ROAD SOUTH CROYDON SURREY CR2 6PL 0181-681-1414	SCALE: 1:1	TOLERANCES (UNLESS OTHERWISE STATED) X.X = ± X.XX = ±	TITLE: HFO PRESSURE DRIFT MONITOR PCB				
	APR'D.						
	CHK'D	DIMENSIONS IN MM	DRAWING NUMBER: AS/A0745				
	DRN: PB						
DATE: 12.03.97	PROJECTION	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">SHEET No. 1</td> <td style="width: 50%;">A</td> </tr> <tr> <td>OF 1</td> <td>4</td> </tr> </table>		SHEET No. 1	A	OF 1	4
SHEET No. 1	A						
OF 1	4						

SLE A4SHT-1-95

17.15.1 CD/A0745 Pressure Drift Monitor Board Circuit Diagram Issue 1



17.16 AS/A0745 Pressure Drift Monitor Board Issue 2

THIS DOCUMENT AND THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF SLE LTD. COPYING IN WHOLE OR IN PART IS PROHIBITED WITHOUT WRITTEN PERMISSION.		PRE-PRODUCTION REF:	
USED ON:- HFO CE Marked			

10 11 12 13
IN 2 POS'NS

REAR VIEW

NOTES:

1. ASSEMBLED IN ACCORDANCE WITH CIRCUIT DIAGRAM CD/A0745
- ⚠ CAUTION: STATIC SENSITIVE PRECAUTIONS APPLY
2. LABEL ITEM 1 TO BE MARKED WITH ASSY No./ISSUE, SER No. IN ACCORDANCE WITH PRODUCTION BATCH CARD AND DRAWING.

MATERIAL: AS BOM STOCK CODE No. A0745	FINISH: AS COMPONENTS Remove All Burrs & Sharp Edges	CN0435 CN0324	2 1	29.05.98 12.03.97	
		MOD.	ISS.	DATE	APP'D.
MODIFICATION CONTROL					

 232 SELSDON ROAD SOUTH CROYDON SURREY CR2 6PL 0181-681-1414	SCALE: 1:1	TOLERANCES (UNLESS OTHERWISE STATED) X.X = ± X.XX = ±	TITLE: HFO PRESSURE DRIFT MONITOR PCB	
	APR'D.			
	CHK'D	DIMENSIONS IN MM	DRAWING NUMBER: AS/A0745	
	DRN: PB			
DATE: 12.03.97	PROJECTION	SHEET No. 1 OF 1	A 4	

PARTS LIST

Finished Item Stock Number **A0745**
 Finished Item Description HFO Pressure Drift Monitor PCB
 Bill of materials AS/A0745 Issue 2

Part Number	Component Description	Used Unit	Component Reference(s)
C0450	O.luF Capacitor 63V 10W MKS2	1.00 Each	C1
D0406	IN4148	2.00 Each	D1,D2
D0581	LMC660AIN	1.00 Each	U1
D0622	VN1OKM	1.00 Each	Q1
G0745	HFO Pressure Drift Blank PCB	1.00 Each	PC3
M0307	Terminal Pin(Pcb single sided)	7.00 Each	
M0718	Label, PCB Identification	1.00 Each	ITEM 1
N2521	Pressure Transducer 143PCOID	1.00 Each	PTR1
R0268	5K1 Resistor 18 0.25W SMA0207	1.00 Each	R1
R0337	3K3 Resistor 1t 0.25W SMA0207	1.00 Each	R7
R0457	6K8 Resistor 16 0.25W SMA0207	1.00 Each	R8
R0463	IOK Resistor 18 0.25W SMA0207	1.00 Each	R9
R0483	69.8K Resistor 1%_ 0.25W SMA020	1.00 Each	R6
R0484	75K Resistor 18 0.25W	3.00 Each	R2,R4,R5
R0486	I00K Resistor 1%_ 0 25W SMA0207	0.00 Each	NOT USED
S0242	IC Socket 14 way DIL	1.00 Each	SKT U1 ITEM 2
V0405	I0K Trimmer, cermet, top adj	1.00 Each	RV3
V0413	1.0K Trimmer	1.00 Each	RV2
V0415	20K Trimmer, cermet, top adj.	1.00 Each	RV1
H3225	M3 x 25 Csk Hd Pozi s.st	2.00 Each	ITEM 10
H3093	M3 Plain Washer s.st	2.00 Each	ITEM 11
H3094	M3 S/Proof Washer s.st DIN6798	2.00 Each	ITEM 12
H3091	M3 Nut Full s.st	2.00 Each	ITEM 13



PARTS LIST

Finished Item Stock Number

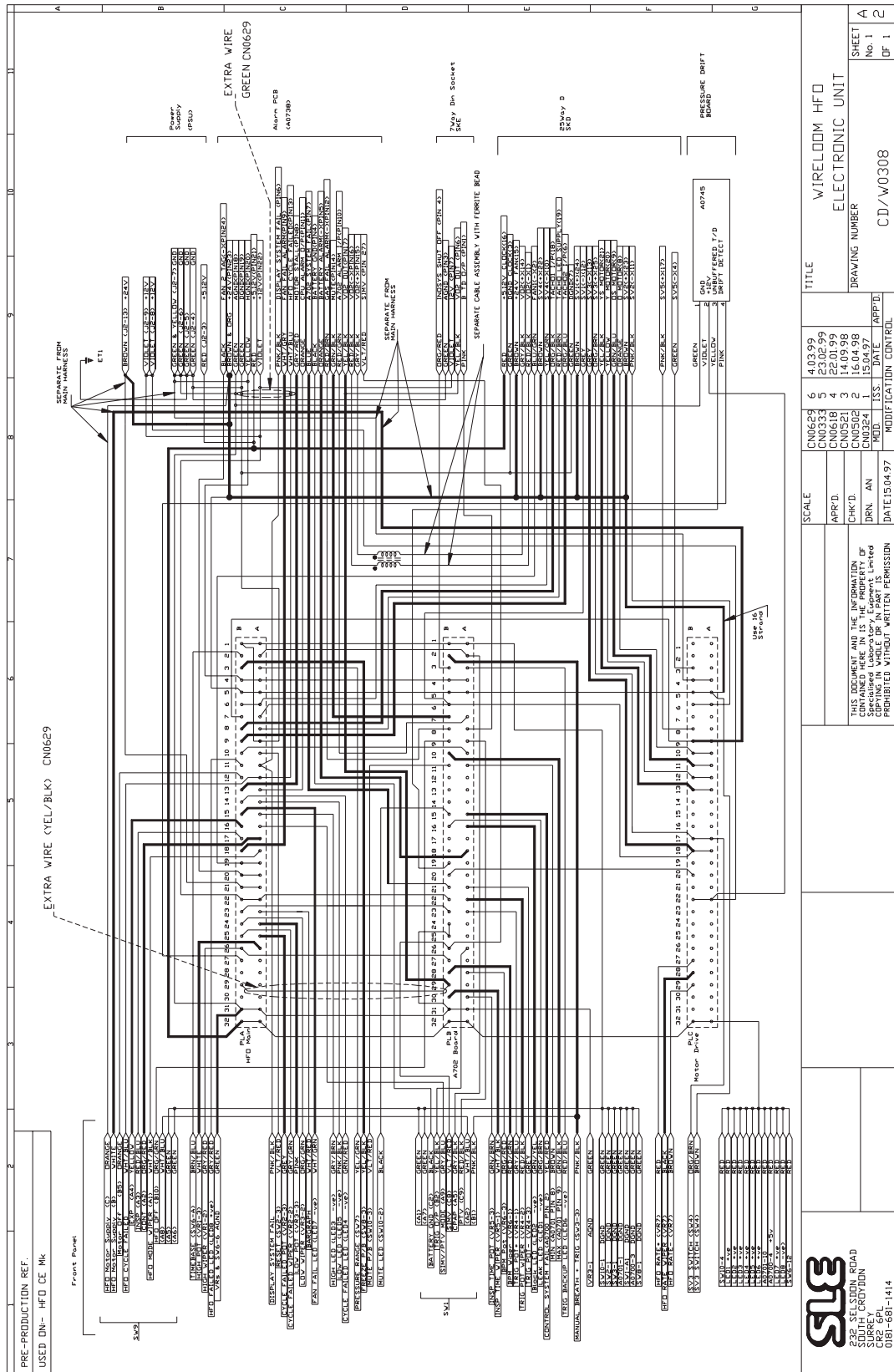
A0702/03

Finished Item Description

RS423 option for A0702 pcb

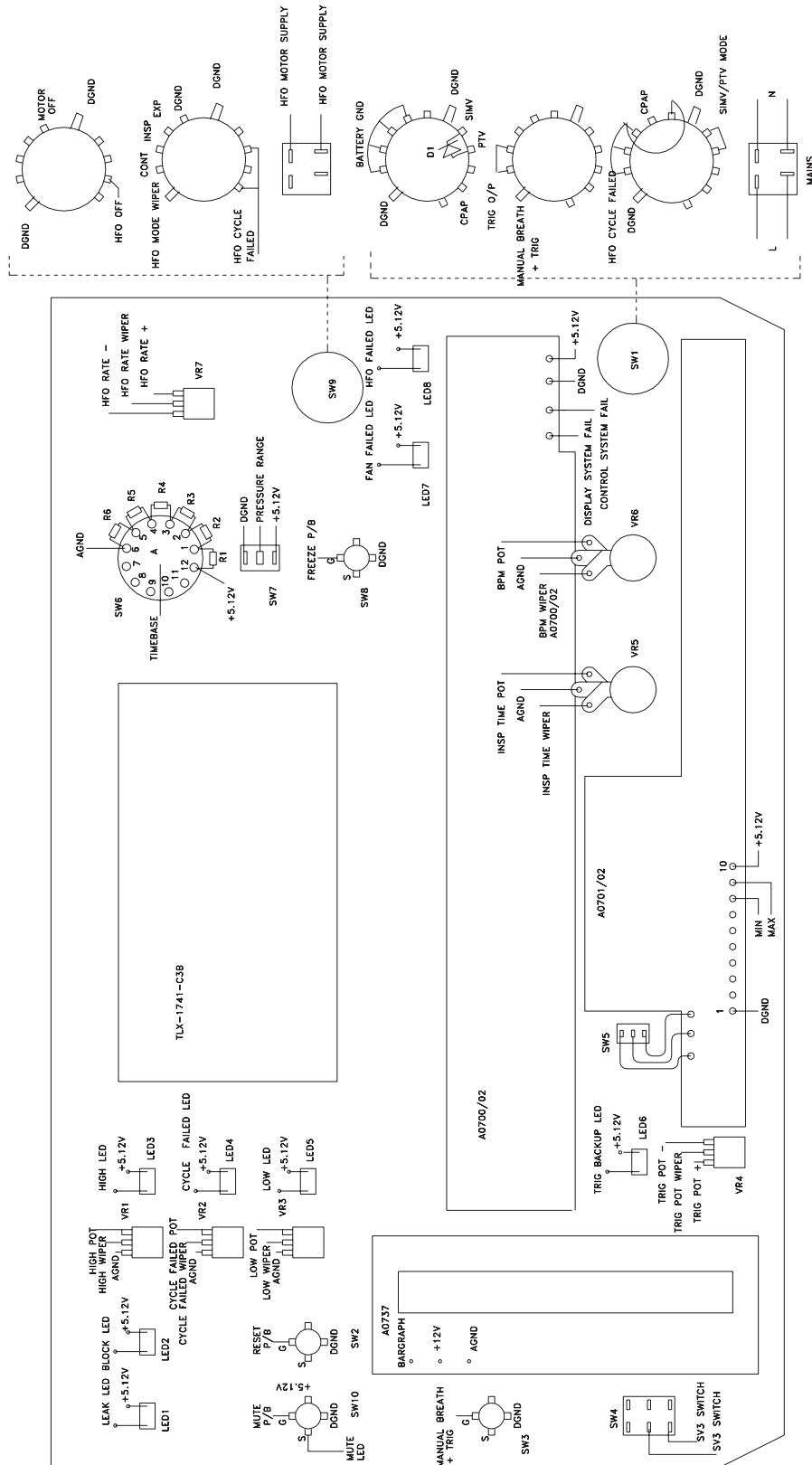
Part Number	Component Description	Used Unit	Component Reference(s)
D0643	HPCL 2730	2.00	U20,21
D0640	UA9636ACP	1.00	U22
D0593	NMA0512D	1.00	U23
D0432	7805 Regulator	1.00	U24
D0250	BZX79C6V8	2.00	D300,301
R0443	2.2K Resistor 1% 0.25W SMA0207	2.00	R300,301
R0432	680R Resistor 1% 0.25W	2.00	R302,303
R0425	332R Resistor 1% 0.25W SMA0207	2.00	R304,305
R0436	1.0K Resistor 1% 0.25W SMA0207	2.00	R306,307
R0343	300K 1% 50PPM 0.25W	1.00	R308
R0557	1K0 Resistor 5% 1W 250PPM PR01	2.00	R309,310
C0433	1uF Capacitor 35V 20% Tantalum	1.00	C300
C0450	0.1uF Capacitor 63V 10% MKS2	1.00	C301
S0241	IC Socket 8 way DIL	3.00	U20,21,22
S0242	IC Socket 14 way DIL	1.00	SK3

17.18 CD/W0308 Wireloom Issue 6



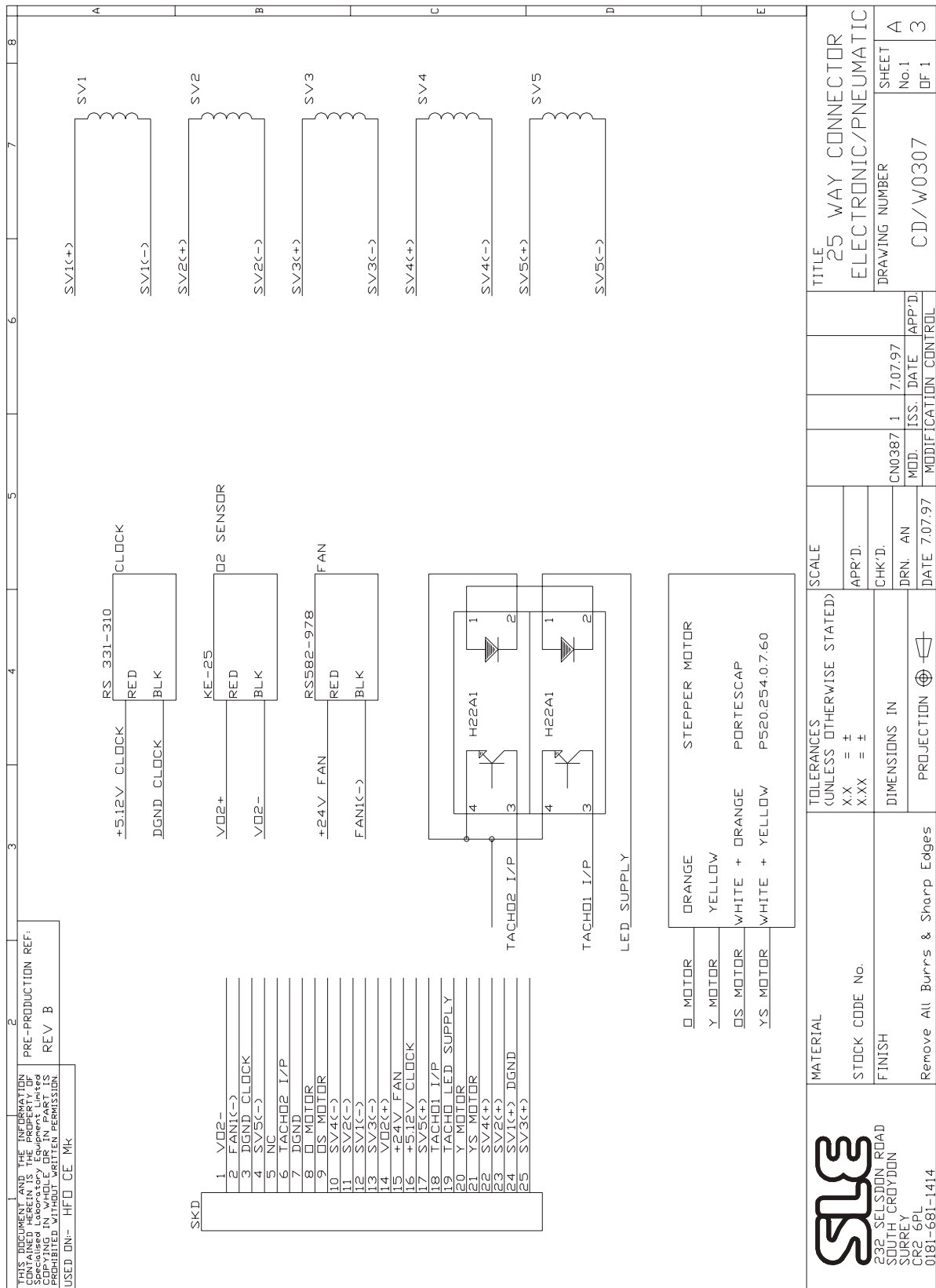
A3 version on page 203 of circuit diagram appendix.

17.19 Front Panel

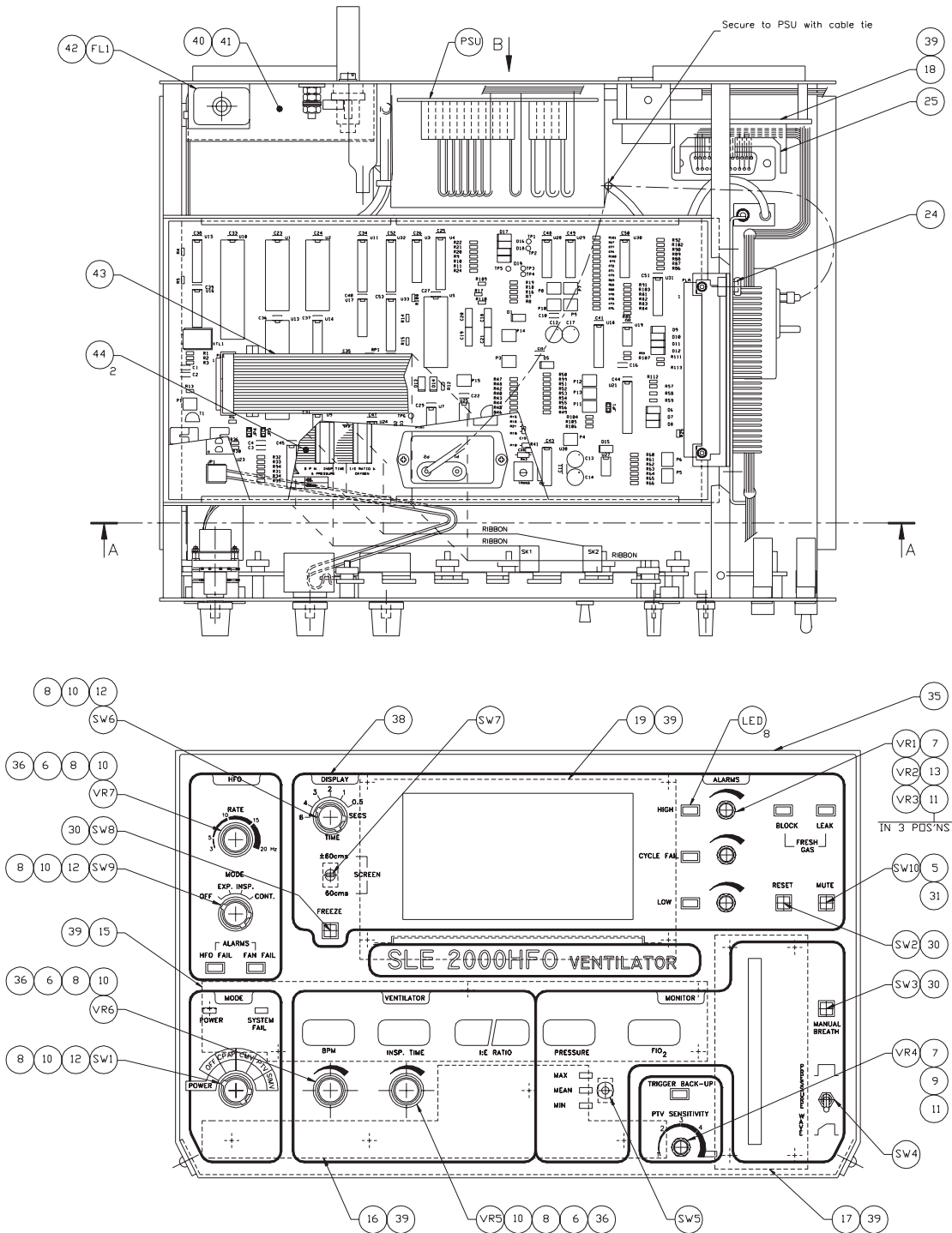




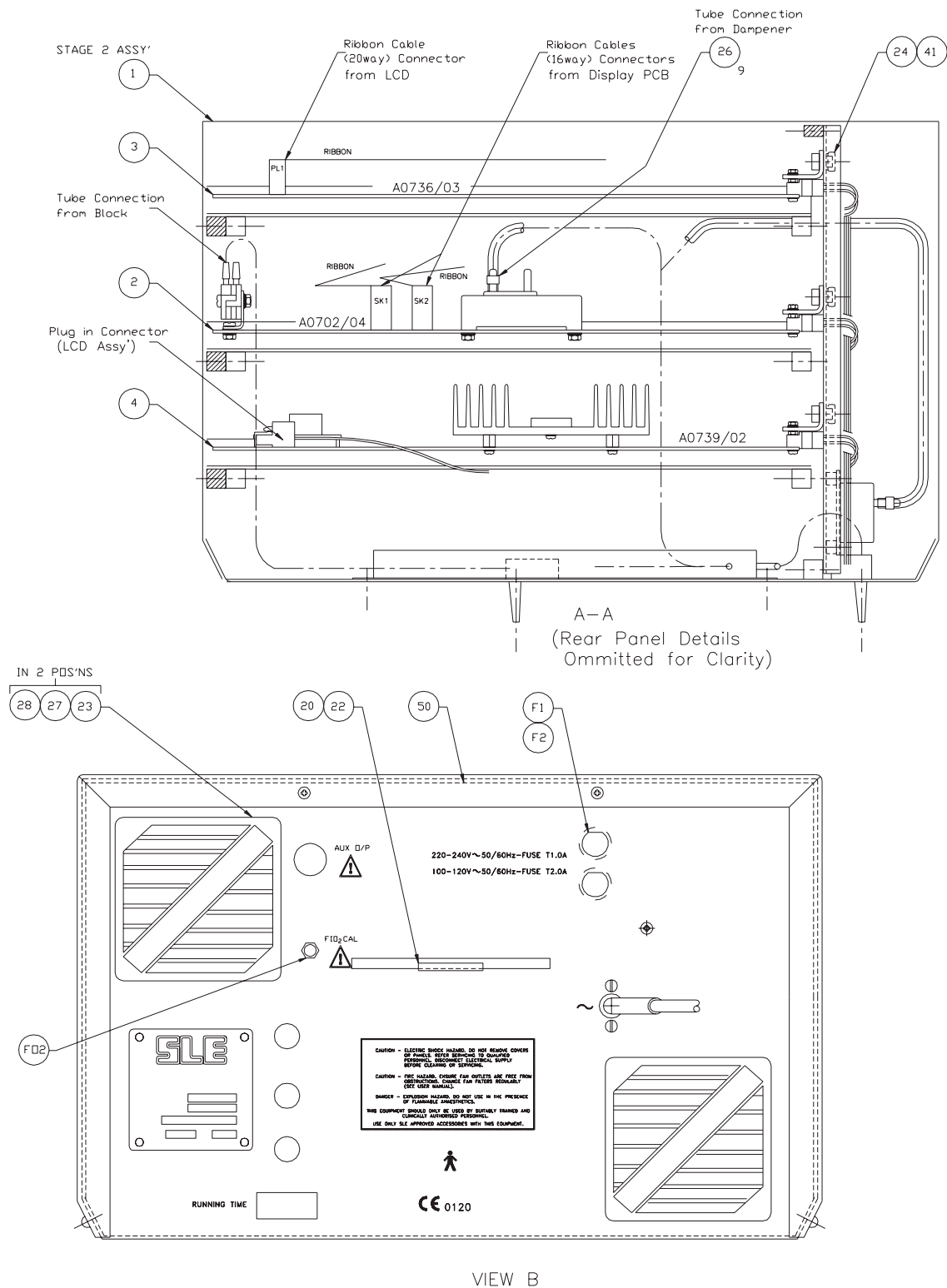
17.21 CD/W0307 Electronic/Pneumatic Module interconnection



17.22 Electronic Chassis Sheet 1 of 2



17.22.1 Electronic Chassis Sheet 2 of 2



VIEW B



PARTS LIST

Finished Item Stock Number **L0200**

Finished Item Description **HFO Electronic Chassis Assy CE Mark'**

Bill of materials **SM/L0200**

Part Number	Component Description	Used Unit	Component Reference(s)
T0939	Chassis for HFO (Electronic Assy')	1.00	ITEM 1
A0702/04	Ventilator CPU PCB Assy.(HFO)	1.00	ITEM 2
A0736/03	HFO Main Board Assembly	1.00	ITEM 3
A0739/02	Motor Drive Pcb Assembly	1.00	ITEM 4
D0318	LED red 3mm (matched output)	1.00	ITEM 5
K0228	Knob 1/4 S151-250-grey	3.00	ITEM 6
K0230	Knob 1/8S111-125-grey	4.00	ITEM 7
K0232	Cap Blue C150	6.00	ITEM 8
K0233	Collet Knob Cap - blue C110	1.00	ITEM 9
K0234	Nut Cover with Line N151-grey	6.00	ITEM 10
K0235	Nut Cover with Line N111-grey	4.00	ITEM 11
K0244	Knob SW151 - 006 - Grey	3.00	ITEM 12
K0258	Knob Cap C110 Red	3.00	ITEM 13
M0211	Trim Tool (unmodified)	1.00	ITEM 20
M0284	1 amp Fuse Anti-Surge 20mm	2.00	ITEM 21
M0266	Fuseholder	2.00	F1 & F2
M0304	Cable Clips (stick on)	1.00	ITEM 22
M0701/02	80mm Fan Filter Front PAINTED	2.00	ITEM 23
M0714	Knob knurled thumb screw type1	3.00	ITEM 24
M0484/03	MN1500 1.5v AA size Cells	1.00	ITEM 25
M0701/04	80mm Fan Filter Insert Pad	2.00	ITEM 27
M0701/05	80mm Fan Filter Grille	2.00	ITEM 28
N2126	Yellow lens19-952-4	3.00	ITEM 30
N2127	Red Lens 19-952-2	1.00	ITEM 31
T0671	Cover (HFO)	1.00	ITEM 35
T2019	Washer,special (sponge rubber)	3.00	ITEM 36
O0413	Mode Rotary SwitchRA3041	1.00	SW1
N2125	Sq. Illum. Push Button Switch	4.00	SW2,SW3,SW8 & SW10
O0409	Locking Switch	1.00	SW4
O0426	Toggle Switch	1.00	SW5
O0422	1 Pole 12Way Rotary Switch	1.00	SW6
O0425	Switch scale	1.00	SW7
O0240	Mode Rotary SwitchRA2787A	1.00	SW9
A0700/02	Display Pcb Assy (HFO)	1.00	ITEM 15
A0701/02	LED Pcb Assy (HFO)	1.00	ITEM 16

Part Number	Component Description	Used Unit	Component Reference(s)
A0737/01	Bargraph Display Pcb Assembly	1.00	ITEM 17
A0738/02	ALARM PCB ASSEMBLY	1.00	ITEM 18
L0015	Graphic LCD Module Assy'	1.00	ITEM 19
V0226	10K Pot. Panel mt, Single turn	4.00	VR1,VR2,VR3 & VR4
V0416	10K Pot. Wirewound 3590S-2-103	2.00	VR5 & VR6
V0429	1K Potentiometer,cermet	1.00	VR7
V0421	500R Potentiometer, cermet	1.00	F02
N2147	Hour Meter for SLE2000	1.00	ITEM 37
P0234	Mains Filter	1.00	FL1
T0680	Overlay front panel HFO	1.00	ITEM 38
T0209	Knurled Thumb Nut Nylon 66	21.00	ITEM 39
M0294	Mains Terminal Block	1.00	ITEM 40
D0704	Varistor attached to Item 40	1.00	
T0934	Terminal Cover	1.00	ITEM 41
P0211/01	Shroud for P0234	1.00	ITEM 42
S0401	25 way D connector socket	1.00	
P0025	Mains Plug 13 Amp 3Pin	1.00	
M0675	Terminal Receptacle 250	2.00	
M0675/01	Boot Receptacle 250	2.00	
P0211/01	Shroud for P0234	3.00	ITEM 42
M0677	Power supply NFS110-7902P	1.00	PSU
M0677/01	Cover for psu M0677	1.00	
P0025/03	3 amp Mains Fuse	1.00	
M0712	PCB Guide 101.6mm long	6.00 Pk 10	
M0712/01	PCB Guide 152.4 mm long	6.00 Pk 10	
T0942	Window (HFO) EMC	1.00	
T0704	Tubing holder	1.00	
T0705	Cover (dampener assy)	1.00	
T0706	Spacer (dampener assy)	2.00	
T0707	Retaining disc (dampener assy)	2.00	
N2520	Y Piece hose connector YS4	1.00	
N2519	Tubing OD 3mm ID 2mm trans.	4.00 Metre	
W0293	20 Way Ribbon Cable IDC	1.00	ITEM 43
W0294	16way STD IDC Ribbon Cable	2.00	ITEM 44
H9908	M3 x 8 socket cap hd s.st	3.00	
D0641	Stackable LED - Red	8.00	LED1-LED8
R0436	1.0K Resistor 1% 0.25W SMA0207	1.00	
R0488	150K Resistor 1% 0.25W	1.00	

Pneumatic Chassis AS/L0203

Issue 3: For ventilator with SLE Part N° N2524 motor assembly with Version 1 proximal airway purge.

(See drawings AS/A0L0203 issue 3 on page 161).

Issue 4: For ventilator with SLE Part N° N2524/01 motor assembly with Version 2 proximal airway purge.

(See drawings AS/A0L0203 issue 4 on page 169).

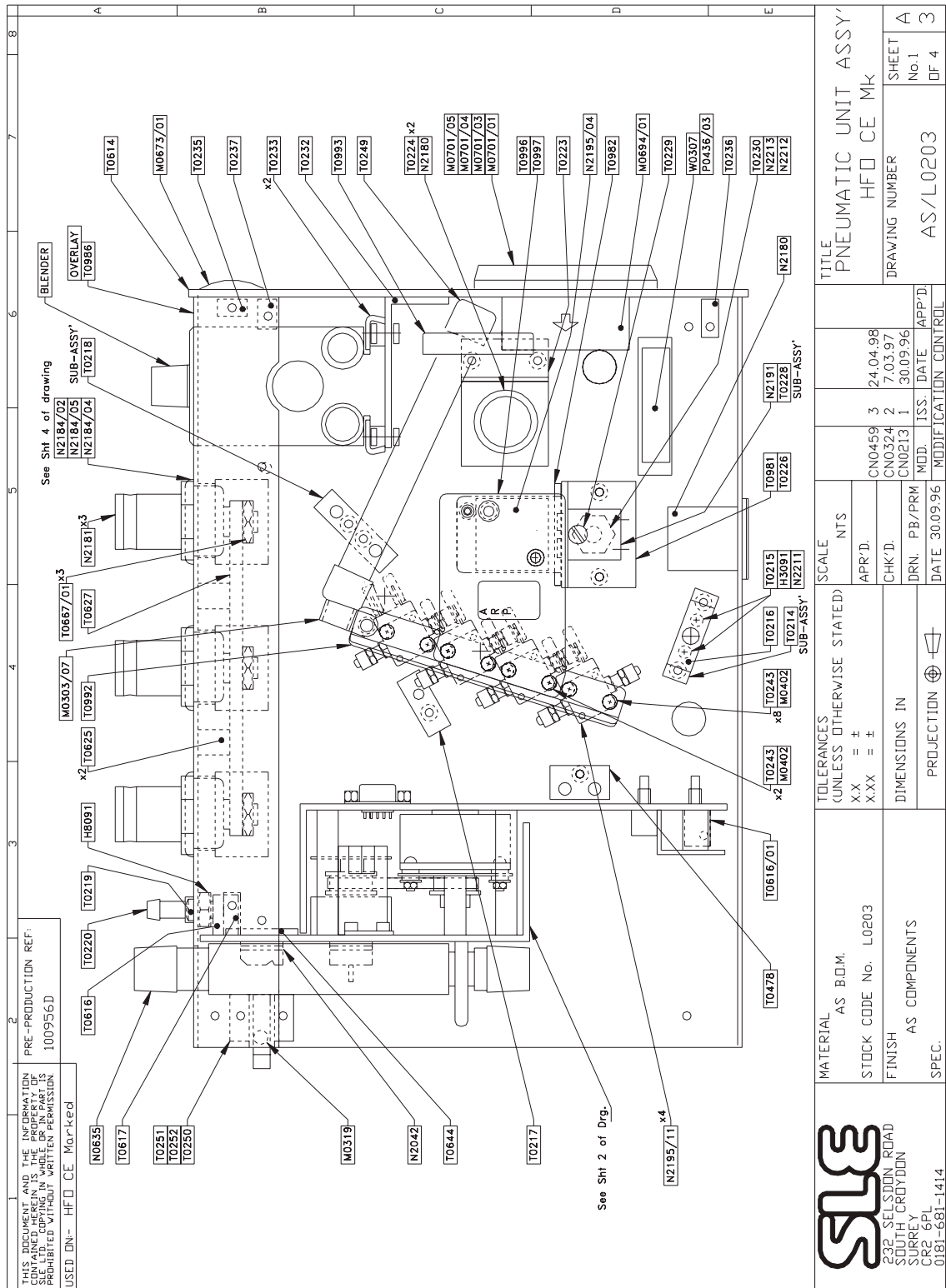
Issue 5: For ventilator with SLE Part N° N2524/02 motor assembly with Version 2 proximal airway purge.

(See drawings AS/A0L0203 issue 4 on page 177).

17.23 Pneumatic Unit Assy. AS/L0203 Issue 3

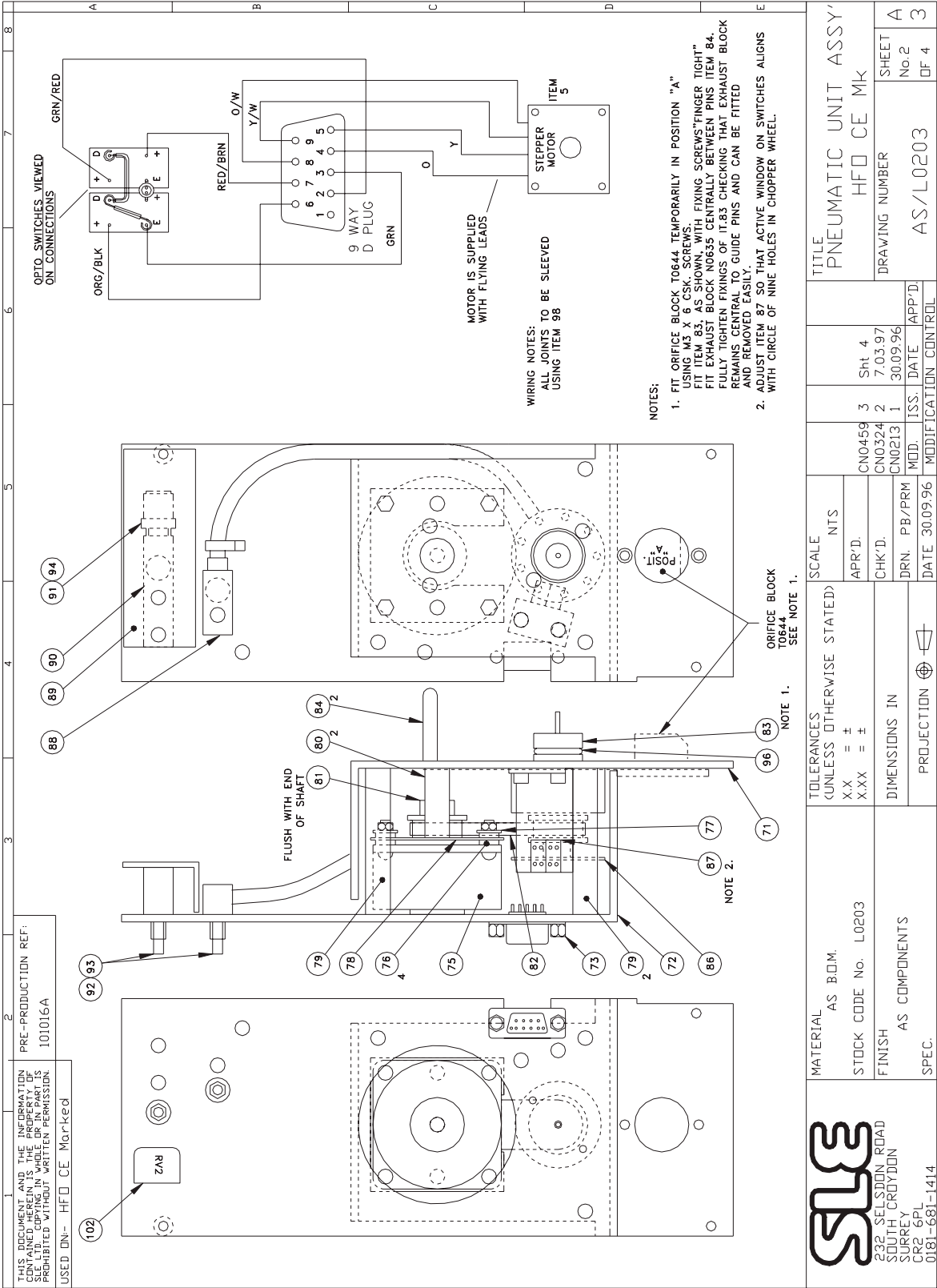
17.23.1 AS/L0203 Sheet 1 of 4

(For ventilator with SLE Part N° N2524 motor assembly.)



See "Motor assemblies" on page 22.

17.23.2 AS/L0203 Sheet 2 of 4
(For ventilator with SLE Part N° N2524 motor assembly)



**For Ventilator with SLE Part N° N2524 motor assembly.
(See “Motor assemblies” on page 22.)**

PARTS LIST

Finished Item Stock Number L0203

Finished Item Description HFO Pneumatic Assembly CE Mk

Bill of materials AS/L0203 Issue 3

Part Number	Component Description	Used Unit	Component Reference(s)
L0007	Opto switch assembly	1.00 Each	ITEM 77
L0009/10	Jet Shaft Assy'-Lip Seal Type	1.00 Each	ITEM 73
L0203/00	Kit of Std Pts HFO Pneumati CE	1.00 Each	All other assy' items
L0203/01	Kit of Pts HFO Pneumatic CE/UK	1.00 Each	ITEM 44
L0205	Assy' of Base Part HFO CE	1.00 Each	
N0635	Exhalation Block Assy'HFO	1.00 Each	ITEM 22
N2184/02	CPAP/PEEP Pressure Gauge 4 bar	1.00 Each	ITEM 8A
N2184/05	OSC-Pressure Gauge 0-120cm	1.00 Each	ITEM 8B
N2184/04	INSP-Pressure Gauge 4 bar	1.00 Each	ITEM 8C
N2191	Oxygen Cell Sensor SLE2000	1.00 Each	ITEM 40
N2195/04	Solenoid Valve 3.0mm c/w Plug	1.00 Each	ITEM 60
T0249	Volume Chamber Assy'	1.00 Each	ITEM 50 Drg.100249
W0307	Wiring Loom - HFO CE Pneumatic	1.00 Each	ITEM 51
M0303/07	Nylon Cable Clip 12.7 dia	1.00 Each	ITEM 62
M0306	Screwlock Assembly female	2.00 Each	ITEM 73
M0319	Compression spring SMALL	1.00 Each	ITEM 21
M0402	Rubber Grommets	10.00 Each	ITEM 30
M0673/01	Dome Plug Dia 25.4 PAINTED	1.00 Each	ITEM 13
M0694/01M0694	Fan axial 24v 5.2 l/s 60x60x25	1.00 Each	ITEM 51c
M0695	Grommet,vibration isolating.	4.00 Each	ITEM 76
M0696	Belt,toothed 80 teeth	1.00 Each	ITEM 82
M0697	Stepper Motor	1.00 Each	ITEM 75
M0699	Pulley,moulded/aluminium hub	1.00 Each	ITEM 81
M0701/01	80mm Fan Filter Front PAINTED	1.00 Each	ITEM 45a
M0701/03	80mm Fan Filter Rear Black	1.00 Each	ITEM 45b
M0701/04	80mm Fan Filter Insert Pad	1.00 Each	ITEM 45c
M0701/05	80mm Fan Filter Grille	1.00 Each	ITEM 45d
M0751	PTFE Tape x 12mm Wide.12M Roll	0.05 Each	
N2030	Tygon Tubing 1/8" x 1/4"	1.50 Metre	Sht 4 of drg. ITEM 21
N2042	O Ring BS017 Silicone Rubber	2.00 Each	ITEM 96
N2070	In-line orafice restrictor	1.00 Each	Sht 4 of drg. ITEM 29 (Purge)
N2147	Hour Meter for SLE2000	1.00 Each	ITEM 51a
N2178	O Ring BS905 EPDM	1.00 Each	Sht 4 of drg. Regulator 3

Part Number	Component Description	Used Unit	Component Reference(s)
N2180	Pressure regulator 0-2 bar	1.00 Each	ITEM 41
N2180/01	Blanking Plug 1/8	4.00 Each	Sht 4 of drg. ITEM 25
N2181	Pressure Regulator 0-4 bar	3.00 Each	ITEM 7
N2185	Microblender (UK version)	1.00 Each	ITEM 6
N2185/99	Red protective cap (Dia 19mm)	2.00 Each	Fit to blender inlet ports
N2194	Relief Valve Series 500	1.00 Each	ITEM 91
N2195/01	Solenoid Valve for H.F.O	4.00 Each	ITEM 31
N2211	O Ring BS010 Black EPDM	2.00 Each	ITEM 53
N2212	O Ring BS008 EPDM	2.00 Each	ITEM 37
N2213	O Ring BS011 EPDM	1.00 Each	ITEM 36
N2339	Z9 Y-Piece connector	2.00 Each	Sht 4 of drg. ITEM 27
N2360	5/3 1/8 Male Stud Elbow	10.00 Each	Sht 4 of drg. ITEM 1
N2360/64	6/4 1/8" Male Stud Elbow	1.00 Each	Sht 4 of drg ITEM 28
N2361	5/3 1/8 Male Stud	1.00 Each	Sht 4 of drg. ITEM 7
N2362	5/3 M5 Male Stud	27.00 Each	Sht 4 of drg. ITEM 6
N2362/01	Coupling - modified	3.00 Each	Sht 4 of drg. ITEM 14
N2363	6/4 M5 Male Stud	5.00 Each	Sht 4 of drg. ITEM 12
N2364	1610 5/3 M5 Banjo Ring Piece	7.00 Each	Sht 4 of drg. ITEM 2
N2365	1631 01 M5 Single Banjo	7.00 Each	Sht 4 of drg. ITEM 3
N2366	1/8 Female-Female Elbow	1.00 Each	Sht 4 of drg. ITEM 17
N2367	2500 1/8 Male Barrel	1.00 Each	Sht 4 of drg. ITEM 18
N2369	4.5 M5 Hosetail - Male	8.00 Each	Sht 4 of drg. ITEM 5
N2370	M5 plug	2.00 Each	Sht 4 of drg. ITEM 8
N2370/01	Restrictor plug - drilled	2.00 Each	Sht 4 of drg. ITEM 15
N2372	Polyurethane Tubing APU 5/3-CL	4.70 Metre	Sht 4 of drg. ITEM 19
T0252	Catch Piece	1.00 Each	ITEM 19
T0280/01	Washer seal I/D 4.9 O/D 9.5	2.00 Each	Sht 4 of drg. ITEM 13
T0478	SV2 Bypass Block Assembly	1.00 Each	ITEM 32
T0481	Deflector	1.00 Each	Sht 4 of drg. ITEM 23
T0611	Guide Post	2.00 Each	ITEM 84
T0612	Spacer (flanged)	4.00 Each	ITEM 77
T0613	Spacer M3 Round Bar x 28mm lg	2.00 Each	ITEM 80
T0613/01	Spacer M3 Round Bar x 59mm lg	3.00 Each	ITEM 79
T0614	Cover (fixed side with fan)	1.00 Each	ITEM 5
T0616	Block (fixing) Item 1	1.00 Each	ITEM 23
T0616/01	Block (fixing) Item 2	1.00 Each	ITEM 24
T0617	Block (fixing small end)	1.00 Each	ITEM 25
T0618	Block (connector R/A)	1.00 Each	ITEM 88
T0619	Plate (Motor)	1.00 Each	ITEM 78
T0621	Partition (Inner)	1.00 Each	ITEM 72

Part Number	Component Description	Used Unit	Component Reference(s)
T0622	Partition (Outer)	1.00 Each	ITEM 71
T0624	Washer, special seal,nylon	1.00 Each	Sht 4 of drg. ITEM 11
T0624/01	Washer,special seal 1/2"-20unf	1.00 Each	Sht 4 of drg. ITEM 11
T0625	Spacer,M3 x 22mm lg. round bar	2.00 Each	ITEM 12
T0626	Banjo Tee (Blender output)	1.00 Each	Sht 4 of drg. ITEM 9
T0627	Mount (gauge)	1.00 Each	ITEM 11
T0628	Banjo bolt	1.00 Each	Sht 4 of drg. ITEM 10
T0644	Orifice Block (HFO)	1.00 Each	ITEM 26
T0647	Chopper Wheel	1.00 Each	ITEM 86
T0667/01	Locknut (modified)	3.00 Each	ITEM 10
T0981	Analyser Bracket for CE/HFO	1.00 Each	ITEM 33
T0982	Bracket for Solenoid 5	1.00 Each	ITEM 59
T0986	Main Chassis for CE HFO	1.00 Each	ITEM 4
T0992	Solenoid Valve Support Strap	1.00 Each	ITEM 58
T0993	Volume Chamber Support	1.00 Each	ITEM 61
T0996	Label-Solenoid Valve Positions	1.00 Each	ITEM 64
T0997	Solenoid Valve Support Bracket	1.00 Each	ITEM 63
H2106/03	M2 x 6mm Brass Pan HD Pozi	2.00 Each	Drg.100684 ITEM 9
H3091	M3 Nut Full s.st	31.00 Each	Sht 3 of drg ITEM 16
H3094	M3 S/Proof Washer s.st DIN6798	70.00 Each	Sht 3 of drg. ITEM 17
H3095	M3 Plain Washer Nylon	11.00 Each	Sht 3 of drg ITEM 18
H3108	M3 x 8 Pan Hd Pozi s.st	19.00 Each	Sht 3 of drg. ITEM 2
N2373	Polyurethane Tubing 6/4 APU	0.50 Metre	Sht 4 of drg. ITEM 20
P0436/03	25 Way D Plug Cover RFI/EMI	1.00 Each	ITEM 51d
T0214	FG/Dump Manifold	1.00 Each	ITEM 46
T0215	Restrictor Screw	2.00 Each	ITEM 47
T0216	Sealing Cap	1.00 Each	ITEM 52
T0217	Cross Connectors	1.00 Each	ITEM 49
T0218	Double Tee	1.00 Each	ITEM 57
T0219	Patient Connector	1.00 Each	ITEM 15
T0220	Humidifier Connector	1.00 Each	ITEM 14
T0223	Regulator Bracket	1.00 Each	ITEM 42
T0224	Captive Nut	2.00 Each	ITEM 43
T0226	Analyser Base	1.00 Each	ITEM 34
T0228	Analyser block	1.00 Each	ITEM 39
T0229	Vent Screw	1.00 Each	ITEM 38
T0230	Analyser Connector	1.00 Each	ITEM 35
T0232	Blender Bracket	1.00 Each	ITEM 56
T0233	Clamp Block	2.00 Each	ITEM 54
T0235	Fixing Block (cross)	1.00 Each	ITEM 2

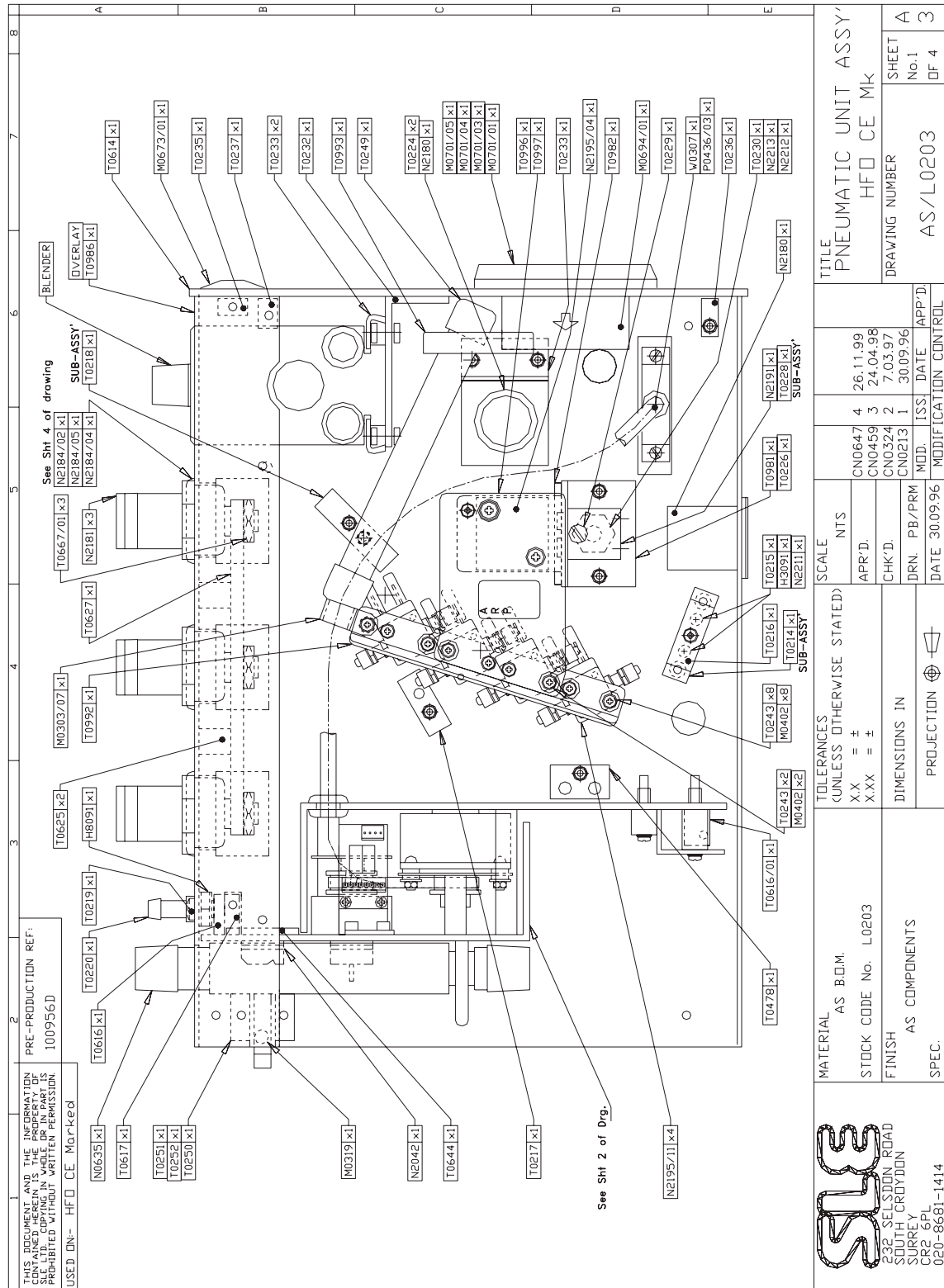


Part Number	Component Description	Used Unit	Component Reference(s)
T0236	Fixing Block (end)	2.00 Each	ITEM 3
T0237	Fixing block (small end)	1.00 Each	ITEM 1
T0240	Relief Valve Cover	1.00 Each	ITEM 89
T0241	Relief Valve Block	1.00 Each	ITEM 90
T0243	Spacer - solenoid	10.00 Each	ITEM 29
T0250	Latch Block	1.00 Each	ITEM 18
T0251/01	Hinge Pins (Long)	1.00 Each	ITEM 20
H3110	M3 x 10 Pan Hd Pozi s.st	20.00 Each	Sht 3 of drg. ITEM 3
H3112	M3 x 12 Pan Hd Pozi s.st	2.00 Each	Sht 3 of drg. ITEM 4
H3116	M3 x 16 Pan Hd Pozi s.st	7.00 Each	Sht 3 of drg ITEM 5
H3120	M3 x 20 Pan Hd Pozi s.st	2.00 Each	Drg.100684 ITEM 7
H3125	M3 x 25 Pan Hd Pozi s.st	2.00 Each	Sht 3 of drg. ITEM 8
H3130	M3 x 30 Pan Hd Pozi s.st	4.00 Each	Sht 3 of drg. ITEM 6
H3206	M3 x 6 Csk Hd Pozi s.st	2.00 Each	Drg.100684 ITEM 11
H3208	M3 x 8 Csk Hd Pozi s.st	7.00 Each	Sht 3 of drg. ITEM 9
H3210	M3 x 10 Csk Hd Pozi s.st	10.00 Each	Sht 3 of drg. ITEM 10
H3216	M3 x 16 Csk Hd Pozi s.st	10.00 Each	Sht 3 of drg. ITEM 12
H3220	M3 x 20 Csk Hd Pozi s.st	5.00 Each	Sht 3 of drg. ITEM 13
H3225	M3 x 25 Csk Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 14
H4010	M4 x 10 Hex Hd St.Stl Screw	1.00 Each	Sht 3 of drg. ITEM 20
H4091	M4 Nut Full s.st.	3.00 Each	Sht 3 of drg. ITEM 23
H4094	M4 Shakeproof Washer s.st	3.00 Each	Sht 3 of drg ITEM 24
H4108	M4 x 8 Pan Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 19
H4110	M4 x 10 Pan Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 21
H9608	M3 x 8 Button Hd Socket s.st	3.00 Each	Sht 3 of drg. ITEM 15
H9710	M4 x 10 Button Hd Socket s.st	2.00 Each	Sht of drg. ITEM 22

17.24 Pneumatic Unit Assy AS/L0203 Issue 4

17.24.1 AS/L0203 Sheet 1 of 4

(For ventilator with SLE Part N° N2524/01 motor assembly)

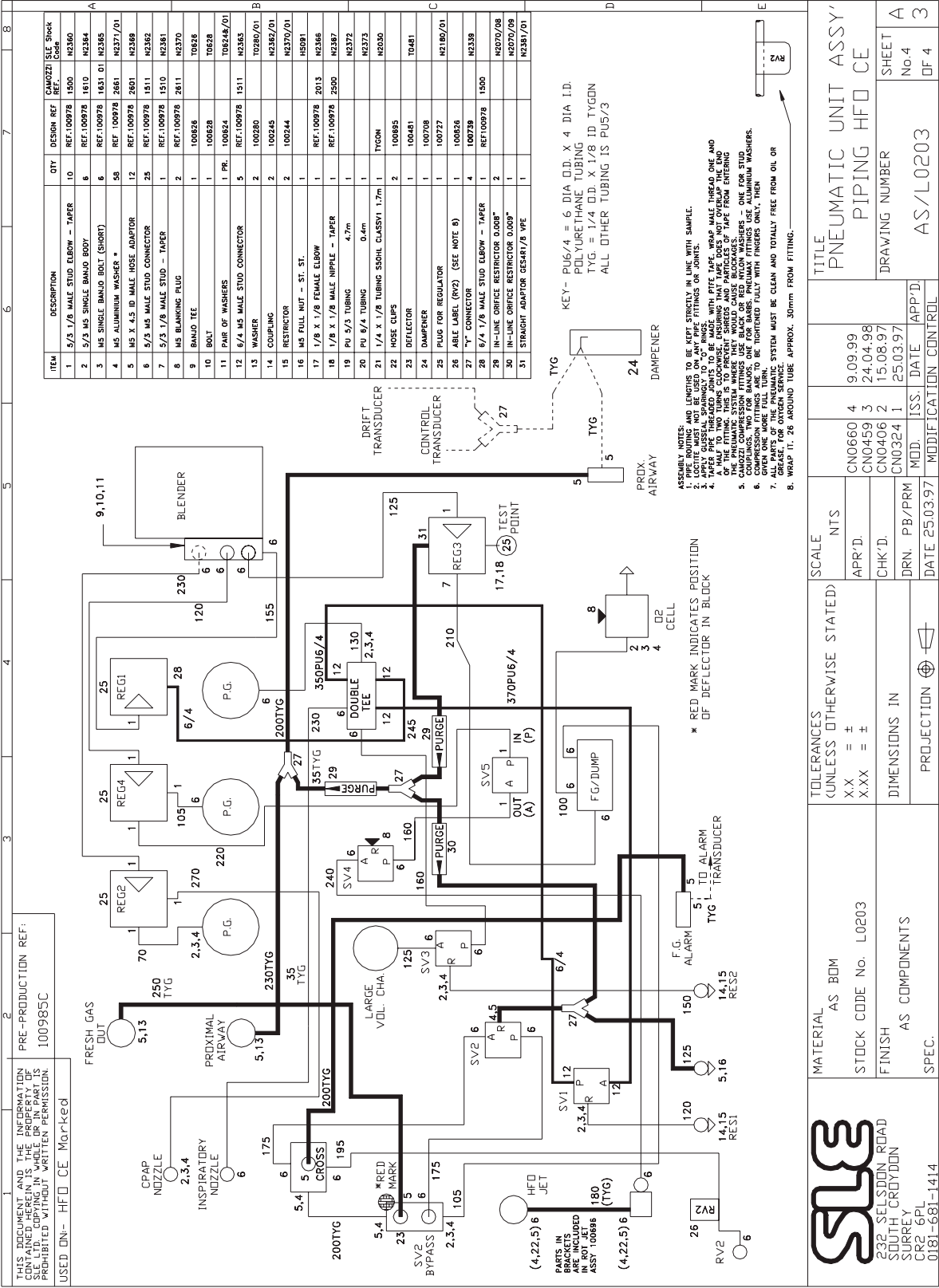


See "Motor assemblies" on page 22.





17.24.4 AS/L0203 Sheet 4 of 4
(For ventilator with SLE Part N° N2524/01 motor assembly)



See "Motor assemblies" on page 22.

**For Ventilator with SLE Part N° N2524/01 motor assembly.
(See “Motor assemblies” on page 22.)**

PARTS LIST

Finished Item Stock Number **L0203**
Finished Item Description HFO Pneumatic Assembly CE Mk
Bill of materials AS/L0203 Issue 4

Part Number	Component Description	Used Unit	Component Reference(s)
A0755	Opto switch PCB assembly	1.00 Each	
L0009/10	Jet Shaft Assy'-Lip Seal Type	1.00 Each	ITEM 83
L0203/00	Kit of Std Pts HFO Pneumati CE	1.00 Each	All other assy' items
L0203/01	Kit of Pts HFO Pneumatic CE/UK	1.00 Each	ITEM 44
L0205	Assy' of Base Part HFO CE	1.00 Each	
N0635	Exhalation Block Assy'HFO	1.00 Each	ITEM 22
N2184/02	CPAP/PEEP Pressure Gauge 4 bar	1.00 Each	ITEM 8A
N2184/05	OSC-Pressure Gauge 0-120cm	1.00 Each	ITEM 8B
N2184/04	INSP-Pressure Gauge 4 bar	1.00 Each	ITEM 8C
N2191	Oxygen Cell Sensor SLE2000	1.00 Each	ITEM 40
N2195/04	Solenoid Valve 3.0mm c/w Plug	1.00 Each	ITEM 60
T0249	Volume Chamber Assy'	1.00 Each	ITEM 50 Drg.100249
W0307	Wiring Loom - HFO CE Pneumatic	1.00 Each	ITEM 51b

PARTS LIST

Finished Item Stock Number **L0203/00**
Finished Item Description HFO Pneumatic Assembly CE Mk
Bill of materials AS/L0203 Issue 4

Part Number	Component Description	Used Unit	Component Reference(s)
M0303/07	Nylon Cable Clip 12.7 dia	1.00 Each	ITEM 62
M0306	Screwlock Assembly female	2.00 Each	ITEM 73
M0319	Compression spring SMALL S.Stl	1.00 Each	ITEM 21
M0402	Rubber Grommets	10.00 Each	ITEM 30
M0673/01	Dome Plug Dia 25.4 PAINTED	1.00 Each	ITEM 13
M0694/01	Fan "PAPST" 614L 24v DC 0.8W	1.00 Each	ITEM 51c
M0695	Grommet,vibration isolating.	4.00 Each	ITEM 76
M0696	GATES 640MXL019 Belt-80 Teeth	1.00 Each	ITEM 82
M0697	Stepper Motor	1.00 Each	ITEM 75
M0699	Pulley,moulded/aluminium hub	1.00 Each	ITEM 81
M0701/01	80mm Fan Filter Front PAINTED	1.00 Each	ITEM 45a
M0701/03	80mm Fan Filter RearBlack	1.00 Each	ITEM 45b
M0701/04	80mm Fan Filter Insert Pad	1.00 Each	ITEM 45c
M0701/05	80mm Fan Filter Grille	1.00 Each	ITEM 45d



Part Number	Component Description	Used Unit	Component Reference(s)
M0751	PTFE Tape x 12mm Wide.12M Roll	0.05 Each	
N2030	Tygon Tubing 1/8" x 1/4"	1.50 Metre	Sht 4 of drg. ITEM 21
N2042	O Ring BS017 Silicone Rubber	2.00 Each	ITEM 96
N2070	In-Line Orifice Restrictor	1.00 Each	Sht 4 of drg ITEM 29 (Purge)
N2147	Hour Meter for SLE2000	1.00 Each	ITEM 51a
N2178	O Ring BS905 EPDM	1.00 Each	Sht 4 of drg.
N2180	Pressure regulator 0-2 bar	1.00 Each	ITEM 41
N2180/01	Blanking Plug 1/8	4.00 Each	Sht 4 of drg. ITEM 25
N2181	Pressure Regulator 0-4 bar	3.00 Each	ITEM 7
N2185/40	Black SLE Blender Fascia Label	1.00 Each	(Replaces existing fascia)
N2194	Relief Valve Series 500	1.00 Each	ITEM 91
N2195/01	Tested Solenoid Valve HFO	4.00 Each	ITEM 31
N2211	O Ring BS010 Black EPDM	2.00 Each	ITEM 53
N2212	O Ring BS008 EPDM	2.00 Each	ITEM 37
N2213	O Ring BS011 EPDM	1.00 Each	ITEM 36
N2339	Z9 Y piece Connectors	2.00 Each	Sht 4 of drg.ITEM 27
N2360	5/3 1/8 Male Stud Elbow	10.00 Each	Sht 4 of drg. ITEM 1
N2360/64	6/4 1/8" Male Stud Elbow	1.00 Each	Sht 4 of drg ITEM 28
N2361	5/3 1/8 Male Stud Coupling	1.00 Each	Sht 4 of drg. ITEM 7
N2362	5/3 M5 Male Stud Coupling	27.00 Each	Sht 4 of drg. ITEM 6
N2362/01	Coupling - modified	3.00 Each	Sht 4 of drg. ITEM 14
N2363	6/4 M5 Male Stud Coupling	5.00 Each	Sht 4 of drg. ITEM 12
N2364	1610 5/3 M5 Banjo Ring Piece	7.00 Each	Sht 4 of drg. ITEM 2
N2365	1631 01 M5 Single Banjo Bolt	7.00 Each	Sht 4 of drg. ITEM 3
N2366	1/8 Female-Female Elbow	1.00 Each	Sht 4 of drg. ITEM 17
N2367	2500 1/8 Male Barrel Nipple	1.00 Each	Sht 4 of drg. ITEM 18
N2369	4.5 M5 Hosetail - Male	8.00 Each	Sht 4 of drg. ITEM 5
N2370	M5 plug	2.00 Each	Sht 4 of drg. ITEM 8
N2370/01	Restrictor plug - drilled	2.00 Each	Sht 4 of drg. ITEM 15
N2371/01	M5 Aluminium Washer No.411-M5	58.00 Each	Sht 4 of drg. ITEM 4
N2372	Polyurethane Tubing APU 5/3-CL	4.70 Metre	Sht 4 of drg. ITEM 19
N2373	Polyurethane Tubing 6/4 APU	0.50 Metre	Sht 4 of drg. ITEM 20
P0436/03	25 Way D Plug Cover RFI/EMI	1.00 Each	ITEM 51d
S0411/01	Crimp Contacts for Molex Conn.	4.00 Each	Stepper motor flylead
S0413	4 Way 0.10"Pitch Molex Housing	1.00 Each	Stepper motor flylead
T0214	FG/Dump Manifold	1.00 Each	ITEM 46
T0215	Restrictor Screw	2.00 Each	ITEM 47
T0216	Sealing Cap	1.00 Each	ITEM 52
T0217	Cross Connectors	1.00 Each	ITEM 49
T0218	Double Tee	1.00 Each	ITEM 57

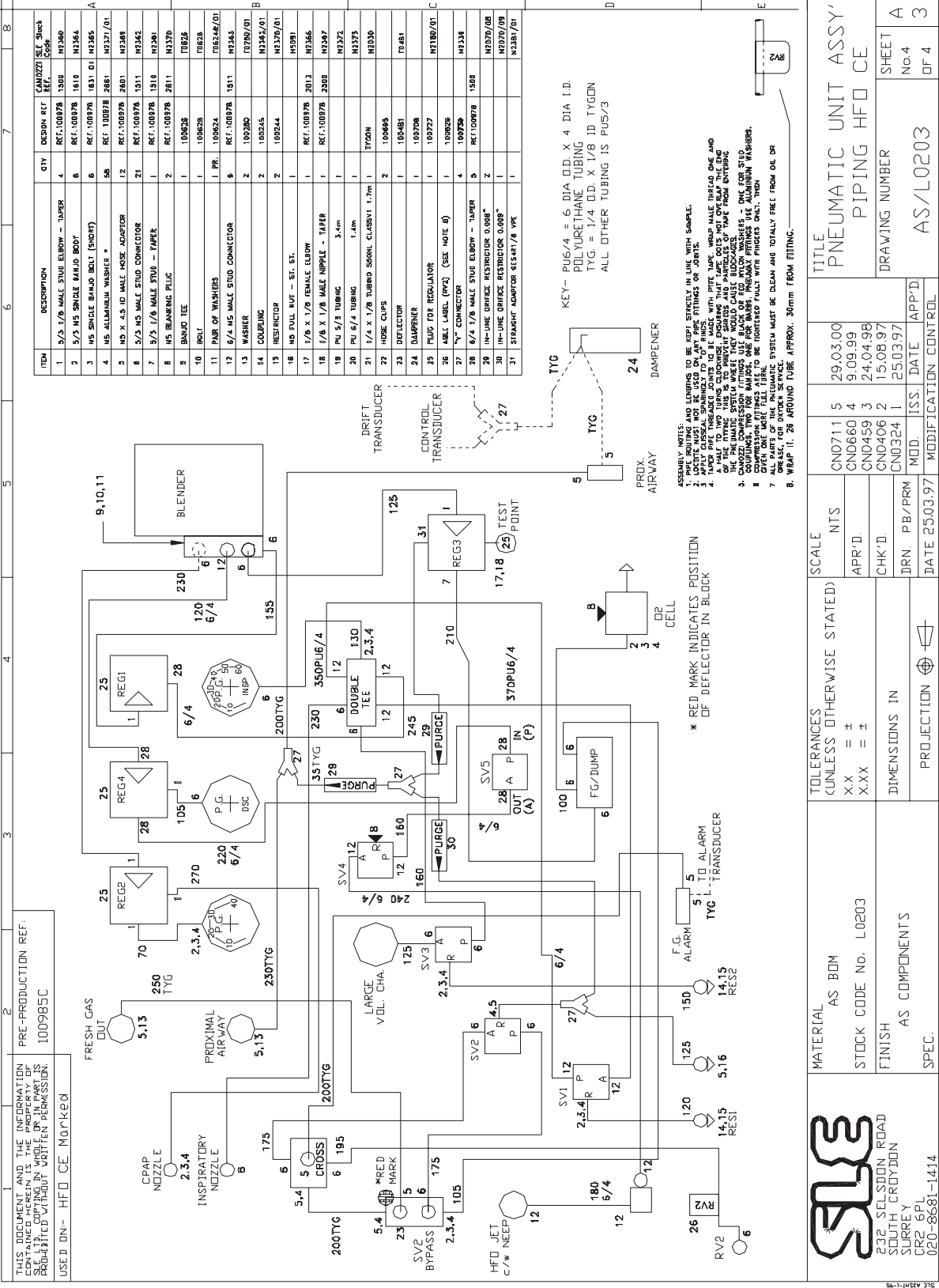
Part Number	Component Description	Used Unit	Component Reference(s)
T0219	Patient Connector	1.00 Each	ITEM 15
T0220	Hummidifier Connector	1.00 Each	ITEM 14
T0223	Regulator Bracket	1.00 Each	ITEM 42
T0224	Captive Nut	2.00 Each	ITEM 43
T0226	Analyser Base	1.00 Each	ITEM 34
T0228	Analyser block	1.00 Each	ITEM 39
T0229	Vent Screw	1.00 Each	ITEM 38
T0230	Analyzer Connector	1.00 Each	ITEM 35
T0232	Blender Bracket	1.00 Each	ITEM 56
T0233	Clamp Block	2.00 Each	ITEM 54
T0235	Fixing Block (cross)	1.00 Each	ITEM 2
T0236	Fixing Block (end)	2.00 Each	ITEM 3
T0237	Fixing block (small end)	1.00 Each	ITEM 1
T0240	Relief Valve Cover	1.00 Each	ITEM 89
T0241	Relief Valve Block	1.00 Each	ITEM 90
T0243	Spacer - solenoid	10.00 Each	ITEM 29
T0250	Latch Block (Finish:Anodised)	1.00 Each	ITEM 18
T0251	Hinge Pins (Short)	1.00 Each	ITEM 20
T0252	Catch Piece (Finish:Anodised)	1.00 Each	ITEM 19
T0280/01	Washer seal I/D 4.9 O/D 9.5	2.00 Each	Sht 4 of drg. ITEM 13
T0478	SV2 Bypass Block Assembly	1.00 Each	ITEM 32
T0481	Deflector	1.00 Each	Sht 4 of drg. ITEM 23
T0611	Guide Post	2.00 Each	ITEM 84
T0612	Spacer (flanged)	4.00 Each	ITEM 77
T0613	Spacer M3 Round Bar x 28mm lg	2.00 Each	ITEM 80
T0613/01	Spacer M3 Round Bar x 59mm lg	3.00 Each	ITEM 79
T0614	Cover (fixed side with fan)	1.00 Each	ITEM 5
T0616	Block (fixing) Item 1	1.00 Each	ITEM 23
T0616/01	Block (fixing) Item 2	1.00 Each	ITEM 24
T0617	Block (fixing small end)	1.00 Each	ITEM 25
T0618	Block (connector R/A)	1.00 Each	ITEM 88
T0619	Plate (Motor)	1.00 Each	ITEM 78
T0621	Partition (Inner)	0.00 Each	NOT USED SEE CN0647
T0622	Partition (Outer)	0.00 Each	NOT USED SEE CN0647
T0624	Washer, special seal,nylon	1.00 Each	Sht 4 of drg. ITEM 11
T0624/01	Washer,special seal 1/2"-20unf	1.00 Each	Sht 4 of drg. ITEM 11
T0625	Spacer,M3 x 22mm lg. round bar	2.00 Each	ITEM 12
T0626	Banjo Tee (Blender output)	1.00 Each	Sht 4 of drg. ITEM 9
T0627	Mount (gauge)	1.00 Each	ITEM 11
T0628	Banjo bolt	1.00 Each	Sht 4 of drg.ITEM 10



Part Number	Component Description	Used Unit	Component Reference(s)
T0644	Orifice Block (HFO)	1.00 Each	ITEM 26
T0647	Chopper Wheel	1.00 Each	ITEM 86
T0648/01	OPTO PCB Bracket	1.00 Each	Introduced on CN0647
T0667/01	Locknut (modified)	3.00 Each	ITEM 10
T0826	Label - RV2(19x40mm)White ABLE	1.50 Each	ITEM 102
T0981	Analyser Bracket for CE/HFO	1.00 Each	ITEM 33
T0982	Bracket for Solenoid 5	1.00 Each	ITEM 59
T0986	Chassis for CE HFO/PNEUMATIC	1.00 Each	ITEM 4
T0992	Solenoid Valve Support Strap	1.00 Each	ITEM 58
T0993	Volume Chamber Support	1.00 Each	ITEM 61
T0996	Label-Solenoid Valve Positions	1.00 Each	ITEM 64
T0997	Solenoid Valve Support Bracket	1.00 Each	ITEM 63
T1083	Inner Partition HFO "PLUS"	1.00 Each	replaces T0621
T1085	Outer Partition HFO "PLUS"	1.00 Each	Intro CN0647to replace T0622
H2106/03	M2 x 6mm Brass Pan HD Pozi	2.00 Each	Drg.100684 ITEM 9
H3091	M3 Nut Full s.st	33.00 Each	Sht 3 of drg ITEM 16
H3094	M3 S/Proof Washer s.st DIN6798	70.00 Each	Sht 3 of drg. ITEM 17
H3095	M3 Plain Washer Nylon	11.00 Each	Sht 3 of drg ITEM 18
H3108	M3 x 8 Pan Hd Pozi s.st	21.00 Each	Sht 3 of drg. ITEM 2
H3110	M3 x 10 Pan Hd Pozi s.st	20.00 Each	Sht 3 of drg. ITEM 3
H3112	M3 x 12 Pan Hd Pozi s.st	2.00 Each	Sht 3 of drg. ITEM 4
H3116	M3 x 16 Pan Hd Pozi s.st	7.00 Each	Sht 3 of drg ITEM 5
H3120	M3 x 20 Pan Hd Pozi s.st	2.00 Each	Drg.100684 ITEM 7
H3125	M3 x 25 Pan Hd Pozi s.st	2.00 Each	Sht 3 of drg. ITEM 8
H3130	M3 x 30 Pan Hd Pozi s.st	4.00 Each	Sht 3 of drg. ITEM 6
H3206	M3 x 6 Csk Hd Pozi s.st	2.00 Each	Drg.100684 ITEM 11
H3208	M3 x 8 Csk Hd Pozi s.st	7.00 Each	Sht 3 of drg. ITEM 9
H3210	M3 x 10 Csk Hd Pozi s.st	10.00 Each	Sht 3 of drg. ITEM 10
H3216	M3 x 16 Csk Hd Pozi s.st	10.00 Each	Sht 3 of drg. ITEM 12
H3220	M3 x 20 Csk Hd Pozi s.st	5.00 Each	Sht 3 of drg. ITEM 13
H3225	M3 x 25 Csk Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 14
H4010	M4 x 10 Hex Hd St.Stl Screw	1.00 Each	Sht 3 of drg. ITEM 20
H4091	M4 Nut Full s.st.	3.00 Each	Sht 3 of drg. ITEM 23
H4094	M4 Shakeproof Washer s.st	3.00 Each	Sht 3 of drg ITEM 24
H4108	M4 x 8 Pan Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 19
H4110	M4 x 10 Pan Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 21
H9608	M3 x 8 Button Hd Socket s.st	3.00 Each	Sht 3 of drg. ITEM 15
H9710	M4 x 10 Button Hd Socket s.st	2.00 Each	Sht of drg. ITEM 22



17.25.4 AS/L0203 Sheet 4 of 4
(For ventilator with SLE Part N° N2524/02 motor assembly)



See "Motor assemblies" on page 22.

For Ventilator with SLE Part N° N2524/02 motor assembly.
(See "Motor assemblies" on page 22.)

PARTS LIST

Finished Item Stock Number **L0203**
 Finished Item Description HFO Pneumatic Assembly CE Mk
 Bill of materials AS/L0203 Issue 5

Part Number	Component Description	Used Unit	Component Reference(s)
A0755	Opto switch PCB assembly	1.00 Each	
L0009/20	Jet Shaft Assy with NEEP jet	1.00 Each	
L0203/00	Kit of Std Pts HFO Pneumati CE	1.00 Each	
L0203/01	Kit of Pts HFO Pneumatic CE/UK	1.00 Each	
L0205	Assy' of Base Part HFO CE	1.00 Each	
N0635	Exhalation Block Assy'HFO	1.00 Each	
N2184/02	CPAP/PEEP Pressure Gauge 4 bar	1.00 Each	
N2184/05	OSC-Pressure Gauge 0-120cm	1.00 Each	
N2184/04	INSP-Pressure Gauge 4 bar	1.00 Each	
N2191	Oxygen Cell Sensor SLE2000	1.00 Each	
N2195/04	Solenoid Valve 3.0mm c/w Plug	1.00 Each	
T0249	Volume Chamber Assy'	1.00 Each	
W0307	Wiring Loom - HFO CE Pneumatic	1.00 Each	

PARTS LIST

Finished Item Stock Number **L0203/00**
 Finished Item Description HFO Pneumatic Assembly CE Mk
 Bill of materials AS/L0203 Issue 5

Part Number	Component Description	Used Unit	Component Reference(s)
M0303/07	Nylon Cable Clip 12.7 dia	1.00 Each	ITEM 62
M0306	Screwlock Assembly female	2.00 Each	ITEM 73
M0319	Compression spring SMALL S.Stl	1.00 Each	ITEM 21
M0402	Rubber Grommets	10.00 Each	ITEM 30
M0673/01	Dome Plug Dia 25.4 PAINTED	1.00 Each	ITEM 13
M0694/01	Fan "PAPST" 614L 24v DC 0.8W	1.00 Each	ITEM 51c
M0695	Grommet,vibration isolating.	4.00 Each	ITEM 76
M0696	GATES 640MXL019 Belt-80 Teeth	1.00 Each	ITEM 82
M0697	Stepper Motor	1.00 Each	ITEM 75
M0699	Pulley,moulded/aluminium hub	1.00 Each	ITEM 81
M0701/01	80mm Fan Filter Front PAINTED	1.00 Each	ITEM 45a
M0701/03	80mm Fan Filter RearBlack	1.00 Each	ITEM 45b



Part Number	Component Description	Used Unit	Component Reference(s)
M0701/04	80mm Fan Filter Insert Pad	1.00 Each	ITEM 45c
M0701/05	80mm Fan Filter Grille	1.00 Each	ITEM 45d
M0751	PTFE Tape x 12mm Wide.12M Roll	0.05 Each	
N2030	Tygon Tubing 1/8" x 1/4"	1.50 Metre	Sht 4 of drg. ITEM 21
N2042	O Ring BS017 Silicone Rubber	2.00 Each	ITEM 96
N2070	In-Line Orifice Restrictor	1.00 Each	Sht 4 of drg ITEM 29 (Purge)
N2070/08	Filtered orifice N° 0-008-125	1.00 Each	Sht 4 of drg ITEM 29
N2070/09	Filtered orifice N° 0-009-125	1.00 Each	Sht 4 of drg ITEM 30
N2147	Hour Meter for SLE2000	1.00 Each	ITEM 51a
N2178	O Ring BS905 EPDM	1.00 Each	Sht 4 of drg.
N2180	Pressure regulator 0-2 bar	1.00 Each	ITEM 41
N2180/01	Blanking Plug 1/8	4.00 Each	Sht 4 of drg. ITEM 25
N2181	Pressure Regulator 0-4 bar	3.00 Each	ITEM 7
N2185/40	Black SLE Blender Fascia Label	1.00 Each	(Replaces existing fascia)
N2194	Relief Valve Series 500	1.00 Each	ITEM 91
N2195/01	Tested Solenoid Valve HFO	3.00 Each	
N2195/06	Tested Solenoid Valve HFO+	1.00 Each	
N2211	O Ring BS010 Black EPDM	2.00 Each	ITEM 53
N2212	O Ring BS008 EPDM	2.00 Each	ITEM 37
N2213	O Ring BS011 EPDM	1.00 Each	ITEM 36
N2339	Z9 Y piece Connectors	2.00 Each	Sht 4 of drg.ITEM 27
N2360	5/3 1/8 Male Stud Elbow	4.00 Each	Sht 4 of drg. ITEM 1
N2360/64	6/4 1/8" Male Stud Elbow	5.00 Each	Sht 4 of drg ITEM 28
N2361	5/3 1/8 Male Stud Coupling	1.00 Each	Sht 4 of drg. ITEM 7
N2362	5/3 M5 Male Stud Coupling	21.00 Each	Sht 4 of drg. ITEM 6
N2362/01	Coupling - modified	3.00 Each	Sht 4 of drg. ITEM 14
N2363	6/4 M5 Male Stud Coupling	5.00 Each	Sht 4 of drg. ITEM 12
N2364	1610 5/3 M5 Banjo Ring Piece	7.00 Each	Sht 4 of drg. ITEM 2
N2365	1631 01 M5 Single Banjo Bolt	7.00 Each	Sht 4 of drg. ITEM 3
N2366	1/8 Female-Female Elbow	1.00 Each	Sht 4 of drg. ITEM 17
N2367	2500 1/8 Male Barrel Nipple	1.00 Each	Sht 4 of drg. ITEM 18
N2369	4.5 M5 Hosetail - Male	10.00 Each	Sht 4 of drg. ITEM 5
N2370	M5 plug	2.00 Each	Sht 4 of drg. ITEM 8
N2370/01	Restrictor plug - drilled	2.00 Each	Sht 4 of drg. ITEM 15
N2371/01	M5 Aluminium Washer No.411-M5	58.00 Each	Sht 4 of drg. ITEM 4
N2372	Polyurethane Tubing APU 5/3-CL	3.40 Metre	Sht 4 of drg. ITEM 19
N2373	Polyurethane Tubing 6/4 APU	1.40 Metre	Sht 4 of drg. ITEM 20
N2381/01	Straight Adaptor GES4R1/8 VPE	1.00 Each	ITEM 31
P0436/03	25 Way D Plug Cover RFI/EMI	1.00 Each	ITEM 51d
S0411/01	Crimp Contacts for Molex Conn.	4.00 Each	Stepper motor flylead

Part Number	Component Description	Used Unit	Component Reference(s)
S0413	4 Way 0.10"Pitch Molex Housing	1.00 Each	Stepper motor flylead
T0214	FG/Dump Manifold	1.00 Each	ITEM 46
T0215	Restrictor Screw	2.00 Each	ITEM 47
T0216	Sealing Cap	1.00 Each	ITEM 52
T0217	Cross Connectors	1.00 Each	ITEM 49
T0218	Double Tee	1.00 Each	ITEM 57
T0219	Patient Connector	1.00 Each	ITEM 15
T0220	Hummidifier Connector	1.00 Each	ITEM 14
T0223	Regulator Bracket	1.00 Each	ITEM 42
T0224	Captive Nut	2.00 Each	ITEM 43
T0226	Analyser Base	1.00 Each	ITEM 34
T0228	Analyser block	1.00 Each	ITEM 39
T0229	Vent Screw	1.00 Each	ITEM 38
T0230	Analyzer Connector	1.00 Each	ITEM 35
T0232	Blender Bracket	1.00 Each	ITEM 56
T0233	Clamp Block	2.00 Each	ITEM 54
T0235	Fixing Block (cross)	1.00 Each	ITEM 2
T0236	Fixing Block (end)	2.00 Each	ITEM 3
T0237	Fixing block (small end)	1.00 Each	ITEM 1
T0240	Relief Valve Cover	1.00 Each	ITEM 89
T0241	Relief Valve Block	1.00 Each	ITEM 90
T0243	Spacer - solenoid	10.00 Each	ITEM 29
T0250	Latch Block (Finish:Anodised)	1.00 Each	ITEM 18
T0251	Hinge Pins (Short)	1.00 Each	ITEM 20
T0252	Catch Piece (Finish:Anodised)	1.00 Each	ITEM 19
T0280/01	Washer seal I/D 4.9 O/D 9.5	2.00 Each	Sht 4 of drg. ITEM 13
T0478	SV2 Bypass Block Assembly	1.00 Each	ITEM 32
T0481	Deflector	1.00 Each	Sht 4 of drg. ITEM 23
T0611	Guide Post	2.00 Each	ITEM 84
T0612	Spacer (flanged)	4.00 Each	ITEM 77
T0613	Spacer M3 Round Bar x 28mm lg	2.00 Each	ITEM 80
T0613/01	Spacer M3 Round Bar x 59mm lg	3.00 Each	ITEM 79
T0614	Cover (fixed side with fan)	1.00 Each	ITEM 5
T0616	Block (fixing) Item 1	1.00 Each	ITEM 23
T0616/01	Block (fixing) Item 2	1.00 Each	ITEM 24
T0617	Block (fixing small end)	1.00 Each	ITEM 25
T0618	Block (connector R/A)	1.00 Each	ITEM 88
T0619	Plate (Motor)	1.00 Each	ITEM 78
T0621	Partition (Inner)	0.00 Each	NOT USED SEE CN0647
T0622	Partition (Outer)	0.00 Each	NOT USED SEE CN0647



Part Number	Component Description	Used Unit	Component Reference(s)
T0624	Washer, special seal,nylon	1.00 Each	Sht 4 of drg. ITEM 11
T0624/01	Washer,special seal 1/2"-20unf	1.00 Each	Sht 4 of drg. ITEM 11
T0625	Spacer,M3 x 22mm lg. round bar	2.00 Each	ITEM 12
T0626	Banjo Tee (Blender output)	1.00 Each	Sht 4 of drg. ITEM 9
T0627	Mount (gauge)	1.00 Each	ITEM 11
T0628	Banjo bolt	1.00 Each	Sht 4 of drg.ITEM 10
T0644	Orifice Block (HFO)	1.00 Each	ITEM 26
T0647	Chopper Wheel	1.00 Each	ITEM 86
T0648/01	OPTO PCB Bracket	1.00 Each	Introduced on CN0647
T0667/01	Locknut (modified)	3.00 Each	ITEM 10
T0826	Label - RV2(19x40mm)White ABLE	1.50 Each	ITEM 102
T0981	Analyser Bracket for CE/HFO	1.00 Each	ITEM 33
T0982	Bracket for Solenoid 5	1.00 Each	ITEM 59
T0986	Chassis for CE HFO/PNEUMATIC	1.00 Each	ITEM 4
T0992	Solenoid Valve Support Strap	1.00 Each	ITEM 58
T0993	Volume Chamber Support	1.00 Each	ITEM 61
T0996	Label-Solenoid Valve Positions	1.00 Each	ITEM 64
T0997	Solenoid Valve Support Bracket	1.00 Each	ITEM 63
T1083	Inner Partition HFO "PLUS"	1.00 Each	replaces T0621
T1085	Outer Partition HFO "PLUS"	1.00 Each	Intro CN0647to replace T0622
H2106/03	M2 x 6mm Brass Pan HD Pozi	2.00 Each	Drg.100684 ITEM 9
H3091	M3 Nut Full s.st	33.00 Each	Sht 3 of drg ITEM 16
H3094	M3 S/Proof Washer s.st DIN6798	70.00 Each	Sht 3 of drg. ITEM 17
H3095	M3 Plain Washer Nylon	11.00 Each	Sht 3 of drg ITEM 18
H3108	M3 x 8 Pan Hd Pozi s.st	21.00 Each	Sht 3 of drg. ITEM 2
H3110	M3 x 10 Pan Hd Pozi s.st	20.00 Each	Sht 3 of drg. ITEM 3
H3112	M3 x 12 Pan Hd Pozi s.st	2.00 Each	Sht 3 of drg. ITEM 4
H3116	M3 x 16 Pan Hd Pozi s.st	7.00 Each	Sht 3 of drg ITEM 5
H3120	M3 x 20 Pan Hd Pozi s.st	2.00 Each	Drg.100684 ITEM 7
H3125	M3 x 25 Pan Hd Pozi s.st	2.00 Each	Sht 3 of drg. ITEM 8
H3130	M3 x 30 Pan Hd Pozi s.st	4.00 Each	Sht 3 of drg. ITEM 6
H3206	M3 x 6 Csk Hd Pozi s.st	2.00 Each	Drg.100684 ITEM 11
H3208	M3 x 8 Csk Hd Pozi s.st	7.00 Each	Sht 3 of drg. ITEM 9
H3210	M3 x 10 Csk Hd Pozi s.st	10.00 Each	Sht 3 of drg. ITEM 10
H3216	M3 x 16 Csk Hd Pozi s.st	10.00 Each	Sht 3 of drg. ITEM 12
H3220	M3 x 20 Csk Hd Pozi s.st	5.00 Each	Sht 3 of drg. ITEM 13
H3225	M3 x 25 Csk Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 14
H4010	M4 x 10 Hex Hd St.Stl Screw	1.00 Each	Sht 3 of drg. ITEM 20
H4091	M4 Nut Full s.st.	3.00 Each	Sht 3 of drg. ITEM 23
H4094	M4 Shakeproof Washer s.st	3.00 Each	Sht 3 of drg ITEM 24

Part Number	Component Description	Used Unit	Component Reference(s)
H4108	M4 x 8 Pan Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 19
H4110	M4 x 10 Pan Hd Pozi s.st	1.00 Each	Sht 3 of drg. ITEM 21
H9608	M3 x 8 Button Hd Socket s.st	3.00 Each	Sht 3 of drg. ITEM 15
H9710	M4 x 10 Button Hd Socket s.st	2.00 Each	Sht of drg. ITEM 22

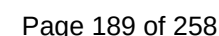


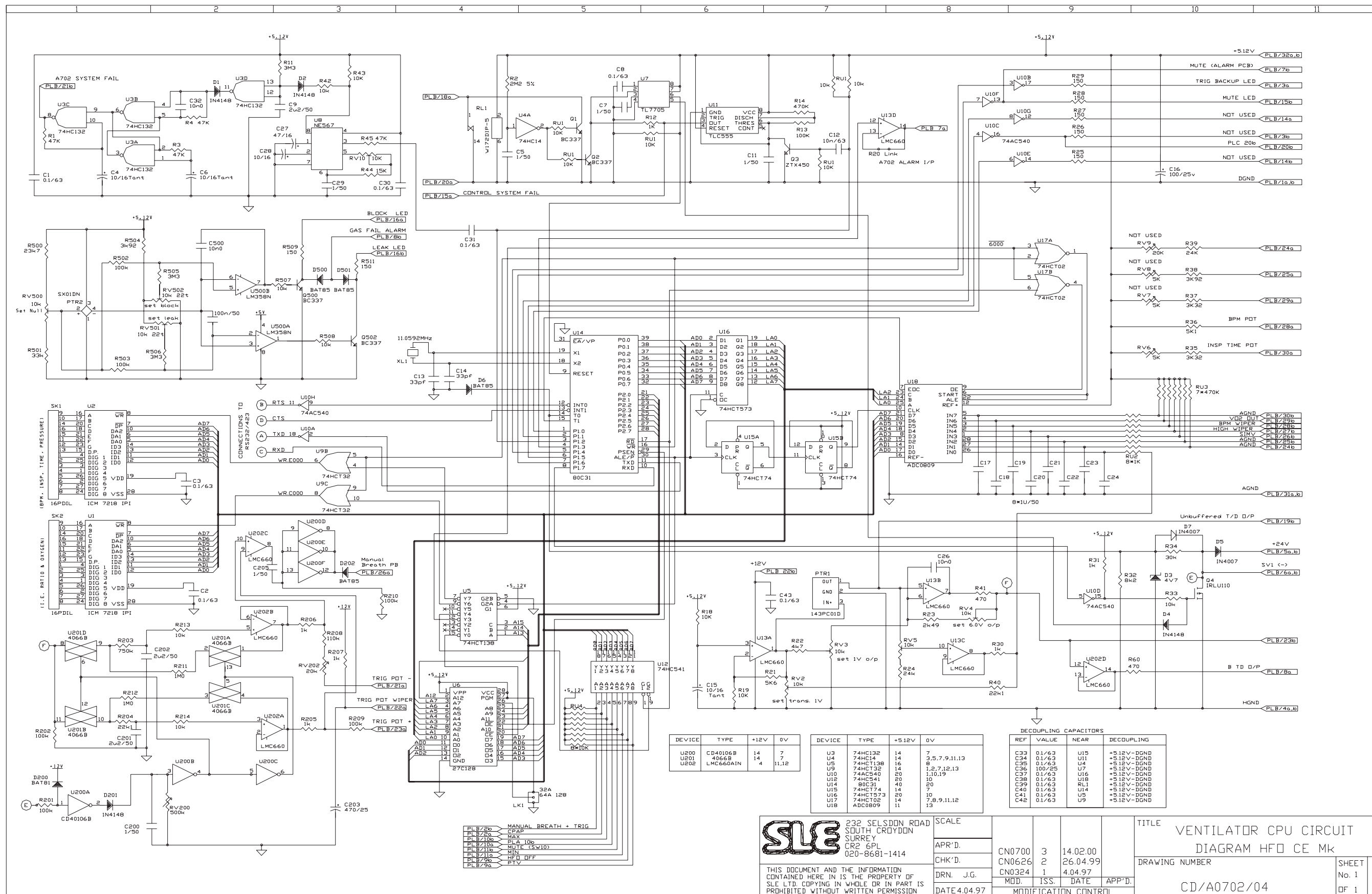
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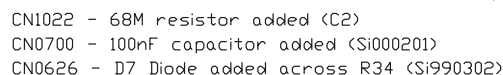
A3 circuit Diagram Appendix

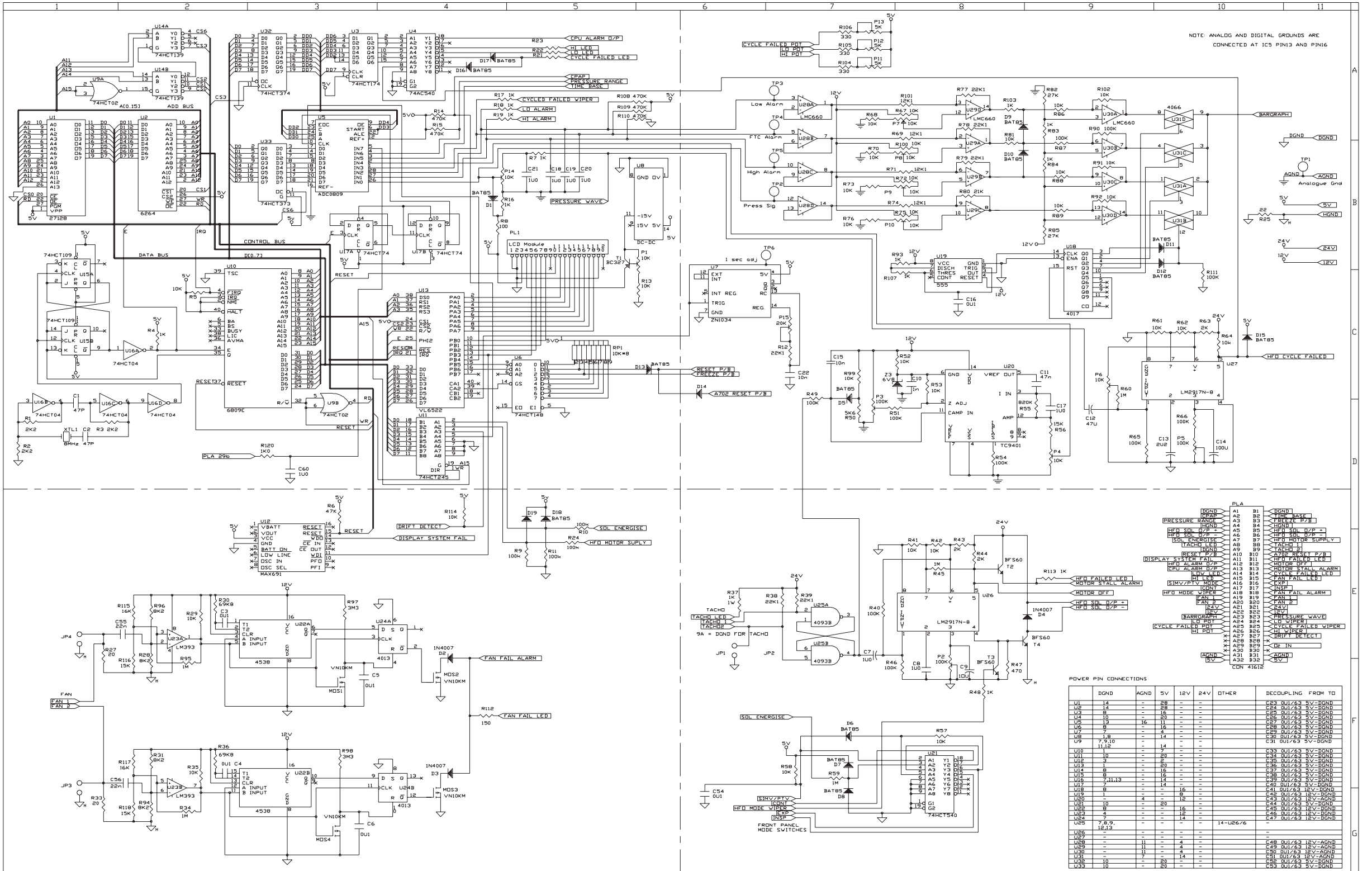


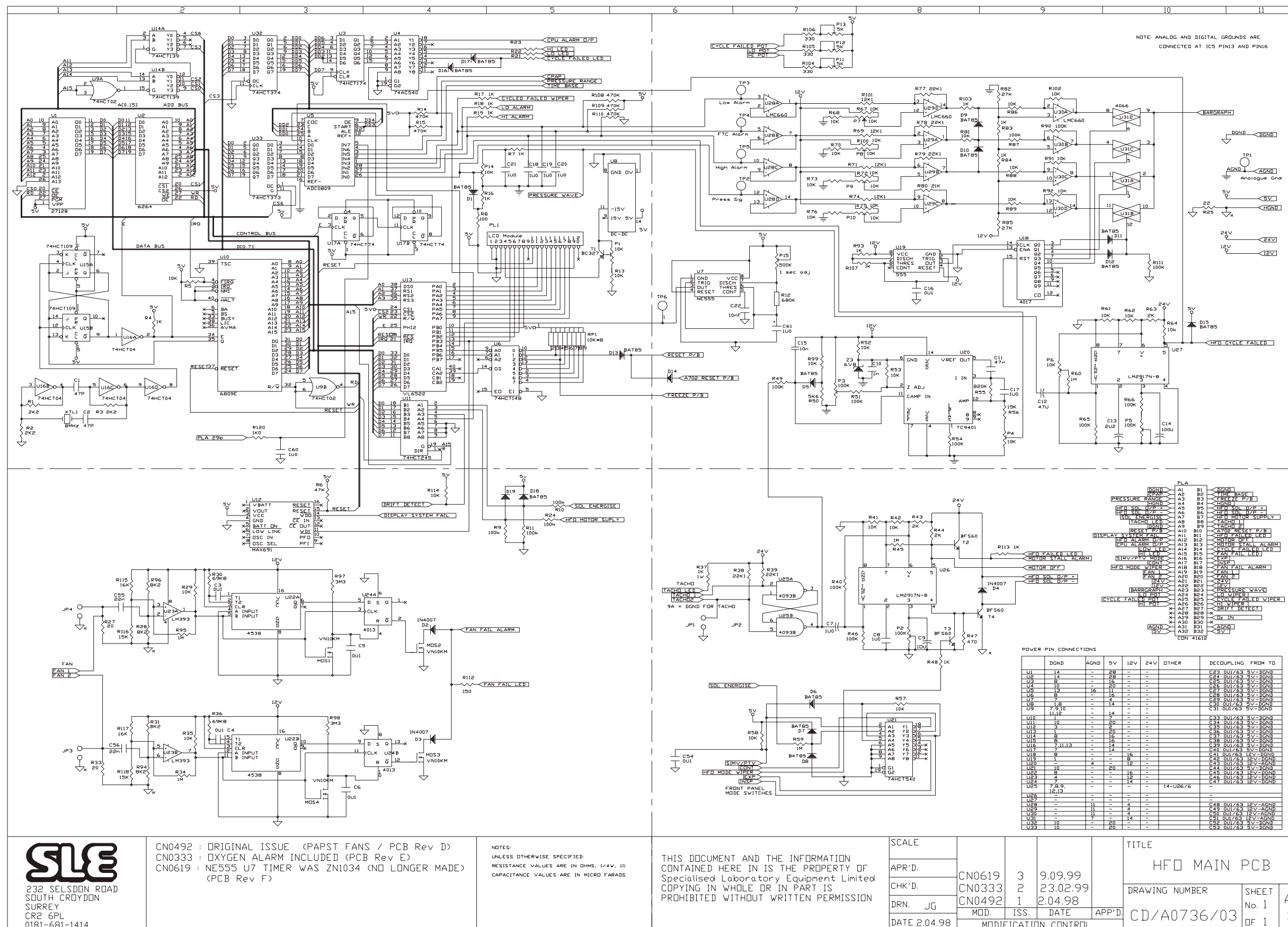
The following chapter contains A3 version of the circuit diagrams.

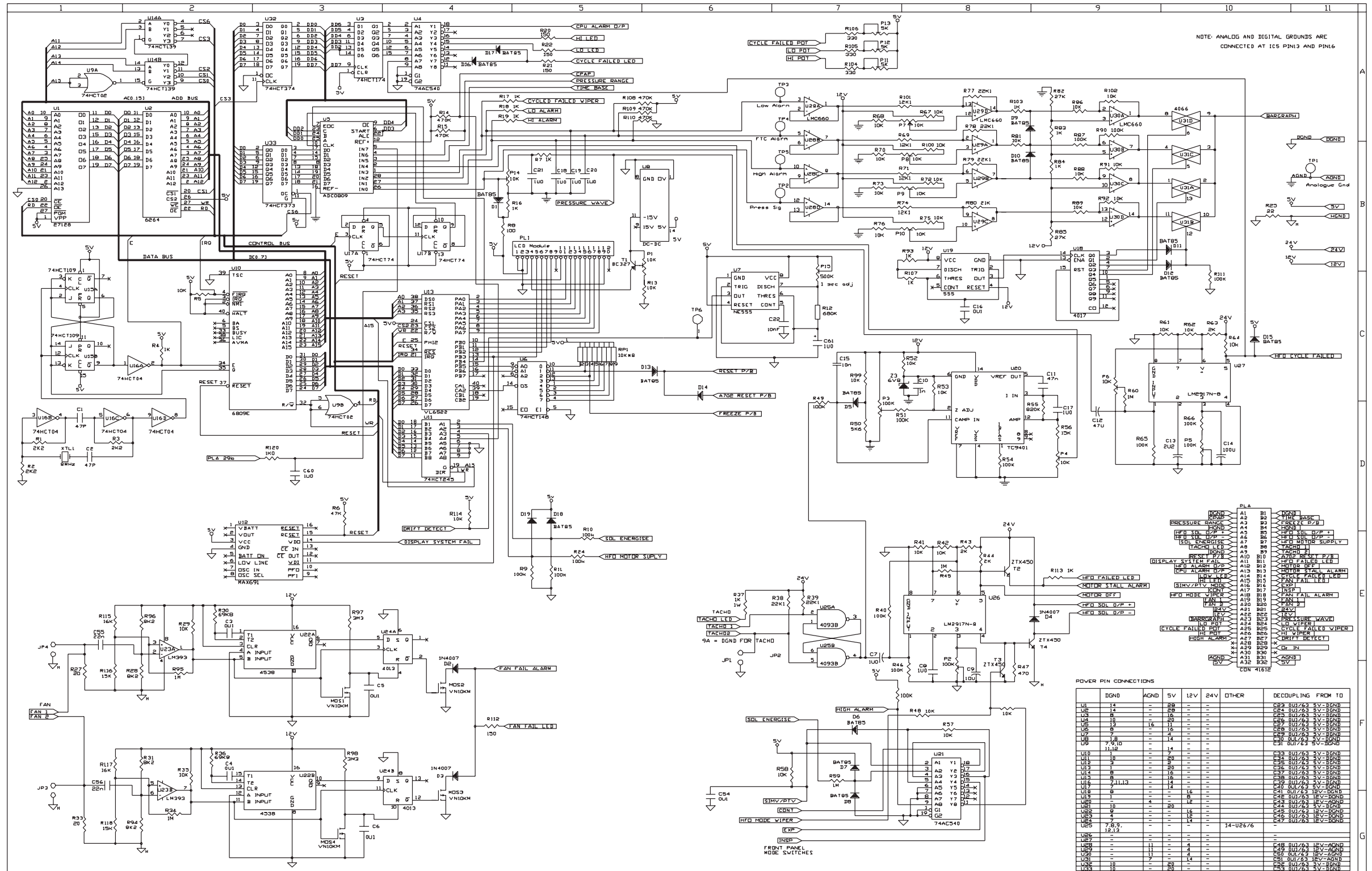










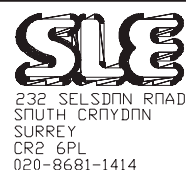


CN0492 : ORIGINAL ISSUE (PAPST FANS / PCB Rev D)
 CN0333 : OXYGEN ALARM INCLUDED (PCB Rev E)
 CN0619 : NE555 U7 TIMER WAS ZN1034 (NO LONGER MADE) (PCB Rev F)
 CN0738 : HFO Modulation cut off at High Alarm. (PCB Rev G)

NOTES:
 UNLESS OTHERWISE SPECIFIED:
 RESISTANCE VALUES ARE IN OHMS, 1/4W, 1%
 CAPACITANCE VALUES ARE IN MICRO FARADS

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SCALE	DATE	MOD.	ISS.	DATE	APP'D.	TITLE	DRAWING NUMBER	SHEET	OF	A
APR'D.	CN0738	4	27.07.00			HFO MAIN PCB				
CHK'D.	CN0619	3	9.09.99							
DRN.	CN0333	2	23.02.99							
	CN0492	1	2.04.98							
	MOD.									
	ISS.									
	DATE									
	APP'D.									
DATE 2.04.98	MODIFICATION CONTROL					CD/A0736/03				



CN0492 : ORIGINAL ISSUE (PAPST FANS / PCB Rev D)
CN0333 : PLYGEN ALARM INCLUDED (PCB Rev E)
CN0619 : NE555 U7 TIMER WAS ZN1034 (NP LINGER MADE)
(PCB Rev F)
CN0738 : HFP Modulation cut off at High Alarm.
(PCB Rev G)
CN0921 : 470P ADDED PARALLEL TO C11

NOTES:
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RESISTANCE VALUES ARE IN OHMS, 1/4W, 1%
CAPACITANCE VALUES ARE IN MICROFARADS

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SCALE	CN0921	5	17.02.04		TITLE		
APR'D.	CN0738	4	27.07.00		HFN MAIN PCB		
	CN0619	3	9.09.99				
CHK'D.	CN0333	2	23.02.99				
DRN.	CN0492	1	2.04.98		DRAWING NUMBER		SHEET
JG							No. 1
DATE 2.04.98	MOD.	ISS.	DATE	APP'D	CD/A0736/03		PF 1
	MODIFICATION CONTROL						



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SCALE	CN0629	6	4.03.99	TITLE	WIRELOOM HFO ELECTRONIC UNIT	DRAWING NUMBER	SHEET No. 1	A2
	CN0333	5	23.02.99					
APR'D.	CN0618	4	22.01.99					
	CN0521	3	14.09.98					
CHK'D.	CN0502	2	16.04.98					
DRN. AN	CN0324	1	15.04.97	APP'D.	CD/W0308	OF 1		
DATE 15.04.97	MOD.	ISS.	DATE					
MODIFICATION CONTROL								

**Service Information
and Technical Bulletins**



19. Service Information and Technical Bulletins

Below is a list of service information letters and technical bulletins issued at the time of publication of this manual.

Service Information

- SI 980301 Ventilator Alarms & INOSYS Nitric Oxide Delivery System. See page 207.
- SI 980302 Ventilator oxygen cells (N2191). See page 209.
- SI 990201 Cooling fan replacement. See page 210.
- SI 990301 Calibration of Issue 2 of the A0745 Pressure Drift Board. See page 213.
- SI 990302 Possible inadvertant solenoid failure messages. See page 215..
- SI 990303 Disabling of the hardware cycle fail alarm in CPAP HFO mode. See page 216.
- SI 990305 Addition of the oxygen alarm on SLE2000 HFO. See page 218.
- SI 990306 Addition of the proximal airway purge (Obsolete, reference only). See page 220.
- SI 990401 Slightly attenuated alarm sounder for the 12/24V voltage monitor. See page 223.
- SI 990801 Enhanced EMC. See page 225.
- SI 991101 Ventilator Power Supplies. See page 230.
- SI 000101 Modification of SLE 2000 HFO motor drive circuit board. See page 233.
- SI 000201 Leak Alarm Trigger Threshold. See page 236.
- SI 000602 Addition of HFO NEEP. See page 238.
- SI 020901 Cleaning, Disinfection and Sterilisation of SLE ventilators. See page 247.

Technical Bulletins

- TB 990603 Removal of hour counter from electrical chassis. See page 248.
- TB 000201 New versions of control software. See page 249.
- TB000601 New version of control firmware. See page 250.
- TB 000801 Ventilator Firmware Status. See page 251.
- TB 010201 New operational warnings. See page 254.
- TB040401 V0226 potentiometer. See page 255.

19.1 Service Information

19.1.1 SI 980301 Ventilator Alarms and INOSYS Nitric Oxide Delivery System

Subject	:Ventilator Alarms and INOSYS Nitric Oxide Delivery System
Equipment	:2000 and 2000 HFO Infant Ventilators
Serial Numbers	:All
Service Information Number	:Si 980301
Change Note Ref	:CN 0521
Date	:27/05/98

The INOSYS Nitric Oxide Delivery System has the ability to accept an alarm signal from the ventilator it is being used with, in the event of a leak being detected in the patient circuit. This will shut off the supply of NO to the flowmeters and hence to the patient. This signal is connected via a rear panel 3 pin Din connector. The signal levels required are TTL compatible, active low. i.e. +5 volts = valve open. 0 volts = valve closed.

The following modifications are required to the SLE 2000 and 2000 HFO Infant Ventilators, if you wish to feed an alarm signal to the INOSYS unit to cut off the supply of NO gas to the patient in the event of a fresh gas supply reduction, due to a high alarm condition or ventilator failure.

2000 Infant Ventilator:-

Connect a wire from pin 16 of the Power Supply Board A0703 via a 1k_0 .25 watt resistor to the spare pin 4 on the rear panel auxiliary output connector (7 Pin DIN). The resistor should be connected directly to pin 4 and then sleeved with heatshrink sleeving. The wire should follow the run of the existing cable loom, using cable ties to hold it in place.

2000 HFO Infant Ventilator:-

Connect a wire from PLB/pin 3 of the A0702 board to the spare pin 4 on the rear panel auxiliary output connector (7 Pin DIN). This wire should follow the run of the existing cable loom using, cable ties to hold it in place.

Note: A resistor is not required on the 2000 HFO as the alarm signal comes from a buffer output.

Connecting Cable:-

A connecting cable will be required to connect the INOSYS and the Ventilator together and this should be made up using a screened lead with the following pin connections

3 Pin plug INOSYS	7 Pin plug Ventilator
Pin 1 (alarm signal)	Pin 4 (alarm signal)



Pin 2 (0 Volts)screen

Pin 3 (0 Volts)screen

All other pins must be left unconnected.

IMPORTANT:

Ventilators and INOSYS units must be checked to verify correct operation after this modification has been carried out. See the appropriate user manuals for these procedures.

19.1.2 SI 980302 Ventilator oxygen cells (N2191)

Regarding	:Ventilator oxygen cells (N2191)
Model	:2000 and 2000 HFO Infant Ventilators
For Serial Numbers	:All ventilators
To	:
Service Information Number	:Si 980302
Date	:16/03/98

The oxygen cells in the ventilators are fitted with an adhesive foam pad between the sensor and the baseplate. This pad has, until now, been stuck to the mounting base in the ventilator. This means that the pad does not get replaced when the oxygen cell is replaced. Over a number of replacements of the oxygen cell, the foam pad will compress and not be so effective at holding the cell in place.

New cells fitted to ventilators and replacement spares will now be provided with the foam pad stuck to the base of them. This means that when the cell is replaced, the foam pad is also replaced.

When fitting replacement cells it is now necessary to remove the old pad from the mounting base first so the new cell with the pad stuck to the bottom can be accommodated.

Note: Do not fit an oxygen cell without the foam pad.

19.1.3 SI 990201 Cooling fan replacement

Subject :Cooling fan replacement
Equipment :SLE2000 HFO Infant Ventilators
Serial Numbers :Boards A0736/01,A0736/02
Service Information Number :Si 990201
Change Note Ref :CN 0492
Date :18/02/99

Introduction

When replacing the cooling fans on a HFO ventilator it is possible that the fan fail detect circuit on the A0736 board will require modification as well. This is because the original fan fail detect circuit only works with a type of fan which has since become obsolete. The obsolete fan is recognisable as having one red and one black flying lead and marked RS 582 978. The replacement fans have one red and one blue flying lead and are marked Papst TYP614L. The boards likely to need updating are A0736, A0736/01, A0736/02. Boards of A0736/03 or later will accept the replacement fans.

Parts Kit required to perform cooling fan replacement and circuit modification.

Description	Quantity	Stock Code	☒
Papst Fans	2	M0694/01	☐
22nF ceramic capacitor	2	C0412	☐
20R Resistor	2	R0406	☐
8k2 Resistor	4	R0228	☐
15k Resistor	2	R0467	☐
16k Resistor	2	R0232	☐
1M Resistor	2	R0501	☐

These parts are available as a kit - Fan Replacement Kit N9008.

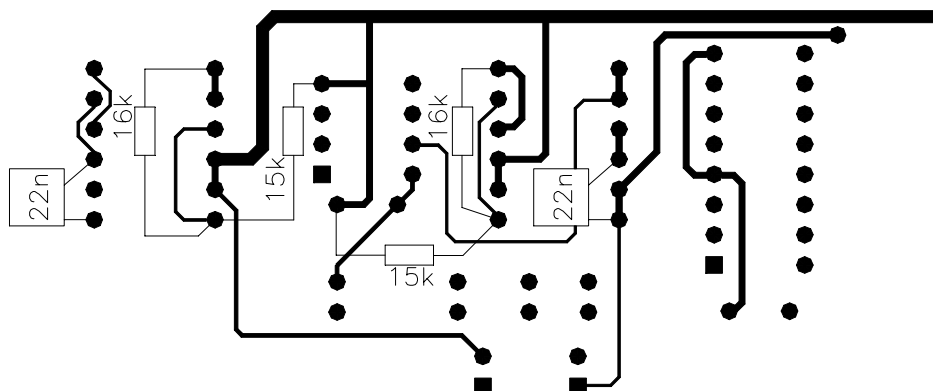
Procedure for Modifying the fan fail circuit for replacement fans.

- 1) Locate the fan fail circuit in the bottom left hand corner of the A0736 PCB comprising U23 and a group of six resistors on either side of U23 (12 resistors in all)

- 2) Replace the following resistors

Circuit reference	Remove	Replace with (stock no)
R95	100k	1M (R0501)
R34	100k	1M (R0501)
R27	10R	20R (R0406)
R33	10R	20R (R0406)
R28	1k	8.2k (R0228)
R96	10k	8.2k (R0228)
R94	1k	8.2k (R0228)
R31	10k	8.2k (R0228)

- 3) Remove the following resistors;
R26(1k) and R32(1k)
- 4) The following components should be attached to the solder side of the board as shown on the diagram below;
2 ∇ 22nF ceramic capacitors (C0412)
2 ∇ 15k Resistors (R0467)
2 ∇ 16k Resistors (R0232)

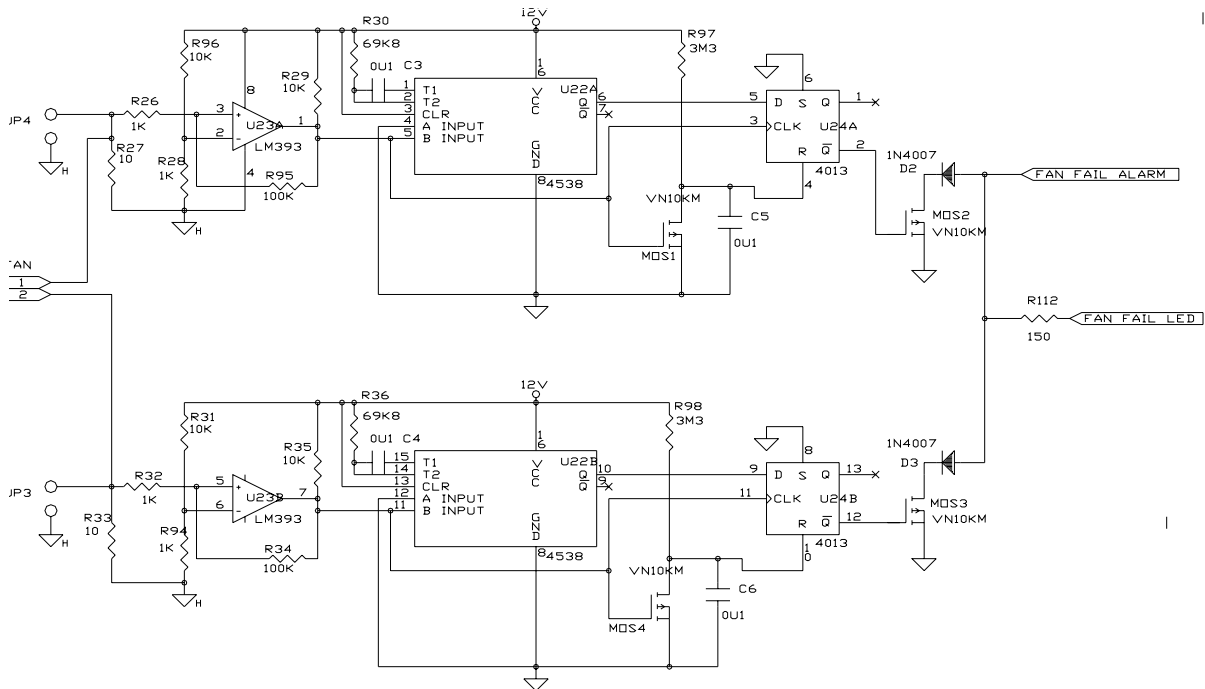


- 5) Ensure that both cooling fans (M0694/01) are replaced in the ventilator chassis. The modified circuit will not work with the original fans.
- 6) Test the fan fail detect circuit before reassembly of the ventilator

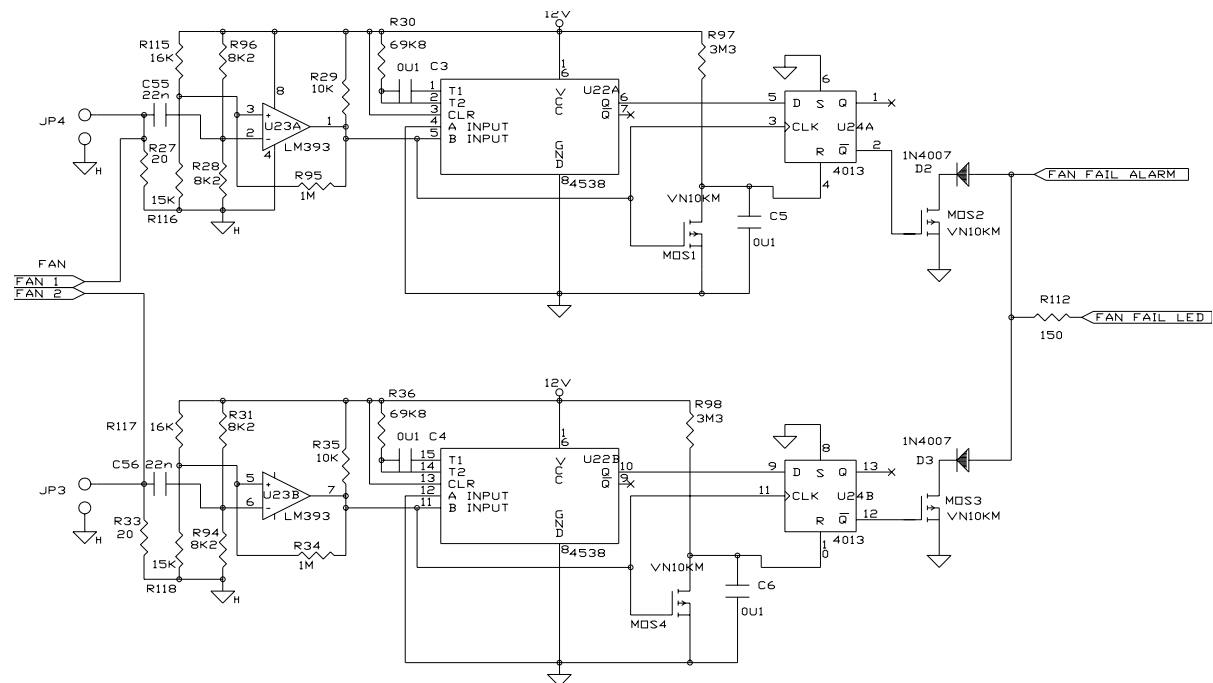
Testing of the modified fan fail detect circuit

Short out JP3 (emulating Fan2 fail) and JP4 (emulating Fan1 fail) in turn and verify that the fan fail alarm is activated in each instance.

Circuit diagram before modification



Circuit Diagram after modification



19.1.4 SI 990301 Calibration of Issue 2 of the A0745 Pressure Drift Board

Subject	:Calibration of Issue 2 of the A0745 Pressure Drift Board
Equipment	:SLE2000 HFO and SLE2000 HFO 'PLUS' Infant Ventilators
Serial Numbers	:Boards A0745 issue 2 (recognisable as having 3 potentiometers instead of 2)
Service Information Number	:Si 990301
Change Note Ref	:CN 0625
Date	:02/03/99

Introduction

Issue 2 of the Pressure Drift Board (both A0745/01 and A0745/02) incorporates an extra adjustment (RV3) and has a different calibration procedure to issue 1 which only has 2 adjustments. The extra adjustment was introduced because in a small number of cases it was found that the gain of the pressure transducers varied between samples to such an extent that transducers could not be matched by offset adjustment alone (over the complete range of the transducer).

Calibration procedure for the SLE2000HFO.

A0745 board issue 2 (recognisable as having three potentiometers)

- a) Whilst monitoring the DC voltage at DIFF, vary the pressure to the proximal airway port over the complete range (approx +60 to -60cmH₂O).

Adjust RV3 until the voltage measured at DIFF is the same at +60cmH₂O as it is at -60cmH₂O to within 20mV. (DIFF should be in the region of 8V).

Pay special attention to the indicated polarities when measuring voltages.

- b) Set the DC voltage between HIGH(+) and LOW(-) to +180mV $\pm$ 5mV using **RV2**.
- c) Set the DC voltage between HIGH(+) and DIFF(-) to +90mV $\pm$ 5mV using **RV1**.
- d) Repeat steps b) and c) until both voltages are correct to within $\pm$ 5mV.
Verify that the voltage between DIFF(+) and LOW(-) is +90mV $\pm$ 5mV.

Calibration procedure for the SLE2000HFO 'PLUS'.

A0745 board issue 2 (recognisable as having three potentiometers)

- a) Whilst monitoring the DC voltage at DIFF, vary the pressure to the proximal airway port over the complete range (approx +140 to -70cmH₂O).

Adjust RV3 until the voltage measured at DIFF is the same at +140cmH₂O as it is at -70cmH₂O to within 20mV. (DIFF should be in the region of 8V).

19.1.5 SI 990302 Possible inadvertant solenoid failure messages

Subject	:Possible inadvertant solenoid failure messages (80C31/32 Microcontroller logical 1 to 0 transition currents on port 3)
Equipment	:SLE 2000 SLE2000HFO SLE2000HFO 'PLUS' (A0702 boards - all variants)
Serial Numbers	:All ventilators prior to serial number starting 904 (April 99)
Service Information Number	:Si 990302
Change Note Ref	:CN 0626
Date	:02/03/99

Introduction

Recently it has been found that some makes of microcontrollers produce a solenoid failure message when used on HFO ventilators. This is because the solenoid failure detection circuit connected to one of the controller inputs does not adequately pull the input to zero (The 80C32 sources a 1 to 0 transition current of 650mA at 2V). For a similar reason it is necessary to change the solenoid failure detection circuit for an SLE2000 Ventilator.

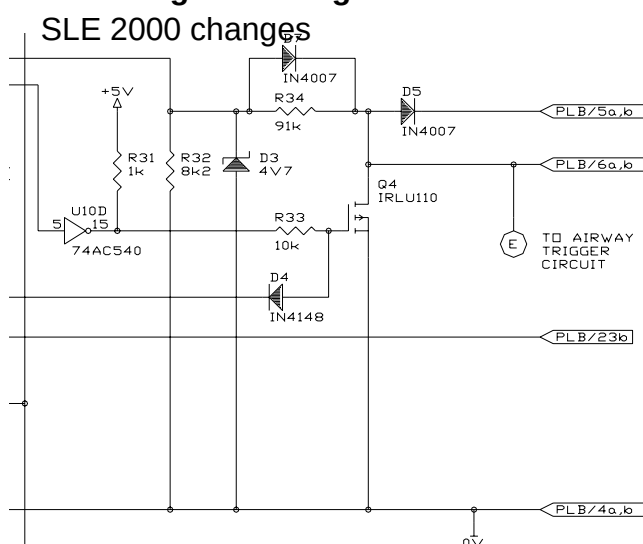
Modification procedure for A0702 boards on the SLE ventilators.

Connect a diode (1N4007) in parallel with R34 with its cathode (+ve) connected to the drain of Q4(IRLU110) on all A0702 boards.

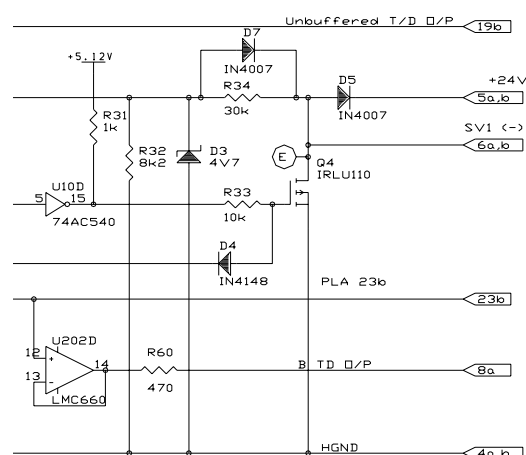
Additionally, if the ventilator is an SLE2000 then change R32 to 8k2 and R34 to 91k. (0.25W 1% Metal Film)

Rationale: The diode will be reverse biased when Q4 is turned off. When Q4 is turned on it has a value of R_{ds} of 0.5W, giving a V_{ds} of <0.1v. The diode voltage is added to this which shall result in the microcontroller i/p being pulled down to <0.8v.

Circuit Diagram changes



SLE 2000 HFO & HFO 'plus' Changes





19.1.6 SI 990303 Disabling of the hardware cycle fail alarm in CPAP HFO mode.

Subject :Disabling of the hardware cycle fail alarm in CPAP & HFO mode.

Equipment :SLE2000HFO

Serial Numbers From: Ventilators with version 1.8 Display firmware
To: Serial number starting 904 (April 99)

Service Information Number :Si 990303

Change Note Ref :CN 0629

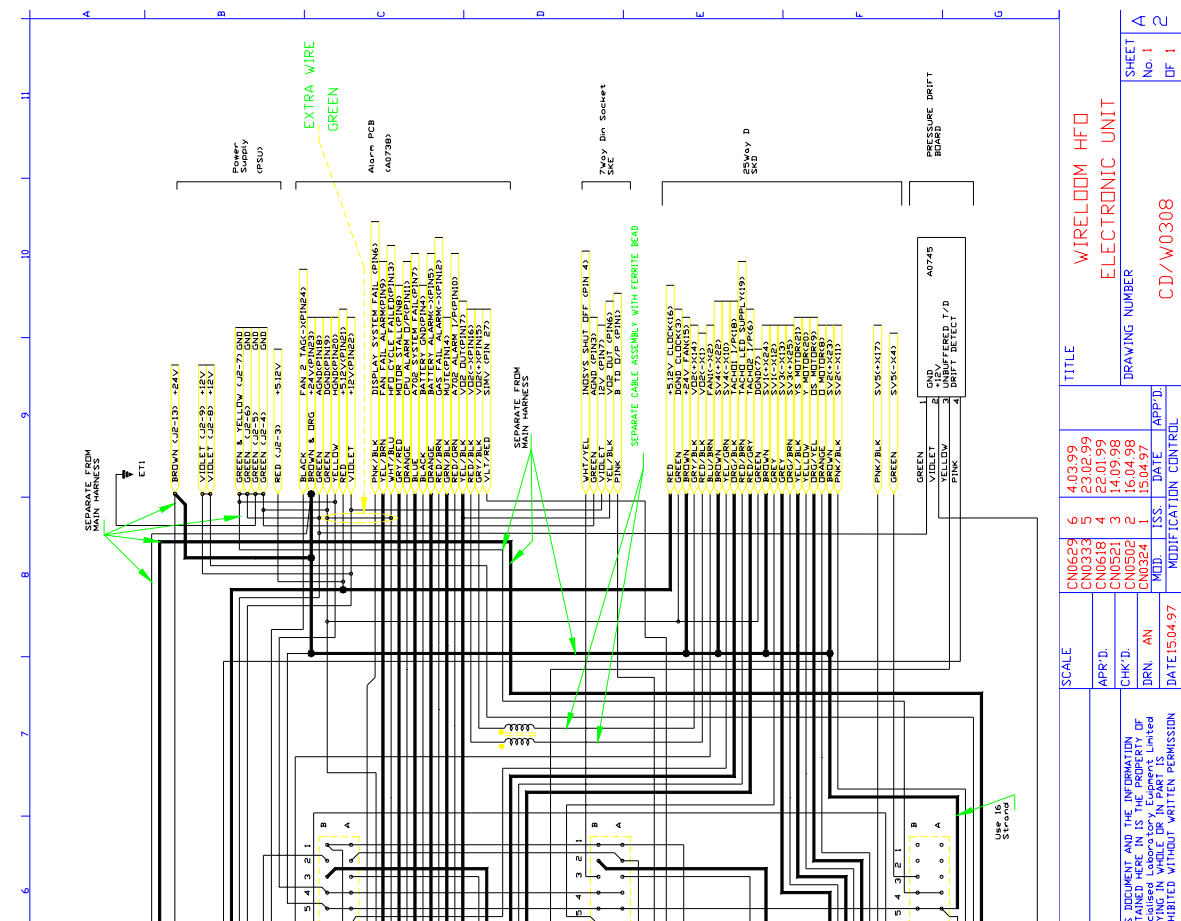
Date :03/03/1999

Introduction

There are two cycle fail detection mechanisms when the ventilator is in HFO/CPAP mode. In the earlier ventilators the cycle fail detection was achieved by a pressure activity monitor implemented in hardware alone. This is an alarm that detects the low or complete absence of oscillation and cannot be muted. An enhanced cycle fail alarm was introduced in the firmware (from version 1.8). SLE2000HFOs with version 1.8 display firmware or later will have both implementations. Under normal operating conditions the user would not be aware of this and it is not a problem. However, if there is confusion, the hardware alarm can be disabled by simply grounding pin 13 on the alarm board.

Modification detail.

Add wires to loom to link pins 13 and 19 on A0738/02.(see below)



Verifying the disabling of the hardware cycle fail alarm.

The presence of the hardware cycle fail alarm is most noticable when initially switching from CPAP to HFO.CPAP. On first changing modes the alarm will sound and the cycle fail LED will illuminate. If this alarm cannot be reset for a few seconds then the hardware cycle fail alarm is still present. Otherwise it is disabled.

Testing the operation of the oxygen alarm

- 1) Set the ventilator as follows;
 - HFO Mode : OFF
 - CPAP Pressure : 0cmH₂O
 - Ventilator Mode CPAP
 - High Alarm Level : maximum
 - Low Alarm Level : minimum
 - Display time : 1 sec.
- 2) Ensure that the ventilator is connected to air and oxygen and set the blender to 60%.
- 3) Press reset and wait for at least 30 seconds for the oxygen reading on the LED display to stabilise.
- 4) Adjust the blender to 50% and ensure a low FiO₂ warning message is displayed on the LCD and an alarm sounds.
- 5) Then adjust the blender to 70% and ensure a high FiO₂ warning message is displayed on the LCD and an alarm sounds.
- 6) Press reset and ensure that the alarm cancels.



19.1.8 SI 990306 Addition of the proximal airway purge

Subject : Addition of the proximal airway purge
Equipment : SLE2000HFO
Serial Numbers :
Service Information Number : Si 990306
Change Note Ref : CN 0459
Date : 05/03/99

**Please note that this service information letter is
OBSOLETE and is for reference only.**

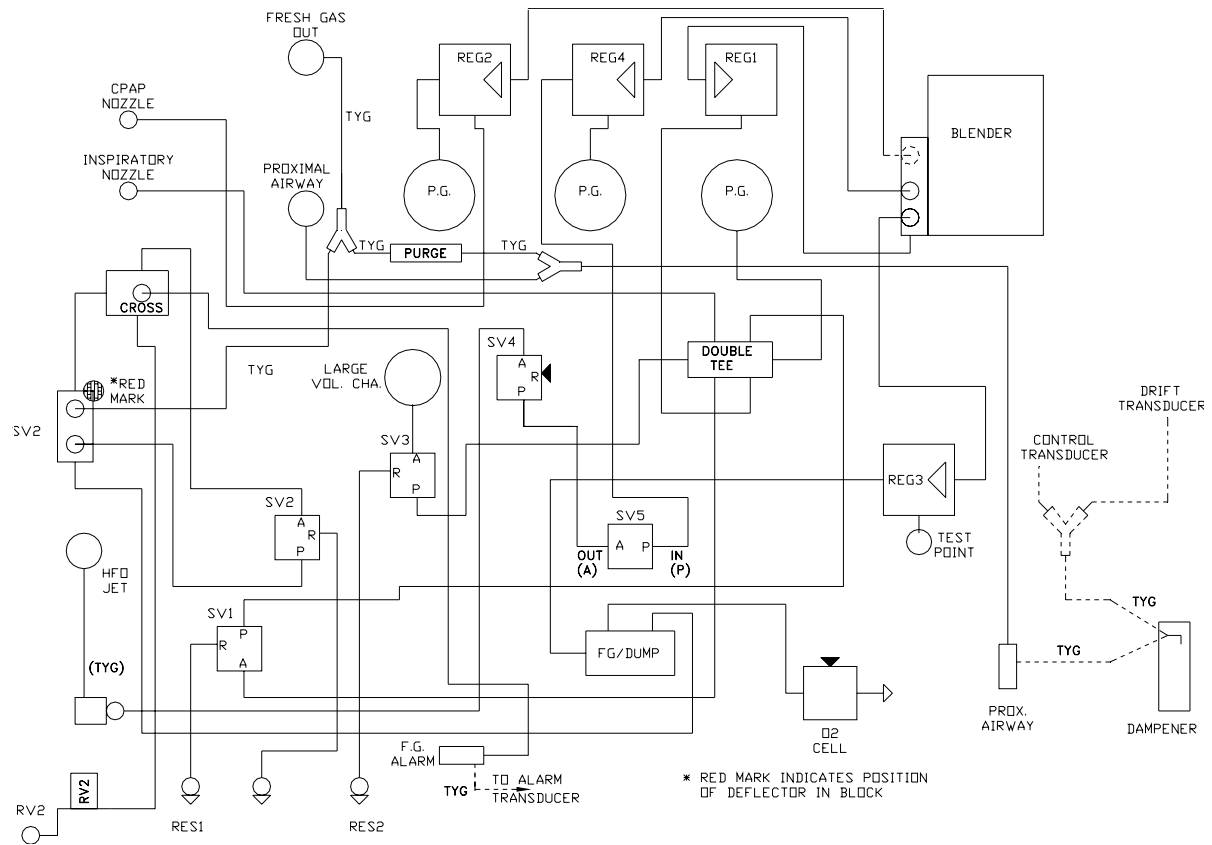
Introduction

On the SLE2000HFO it has been observed that when the ventilator is being used in an HFO mode that moisture can migrate up the proximal airway tube towards the ventilator. Under certain humidifier settings and ambient temperature conditions the build up of moisture can be significant. If this build up of moisture is left unchecked there may be a possibility of the proximal airway tube becoming partially blocked with water. A proximal airway purge has been introduced which, when fitted, provides a small continuous gas flow down the proximal tube to keep it clear of moisture.

Modification detail.

HFO Proximal airway purge conversion kit is available as part No. N9007

The pneumatic circuit diagram is shown here





1. ARRANGE ALL TUBING SO THAT IT CANNOT BE TRAPPED OR KINKED WHEN MACHINE IS REFITTED TO BASE.
2. CHECK FRESH GAS FLOW.
3. CHECK FRESH GAS ALARM SETTING

IT	DESCRIPTION	QTY	PART NO.
1	IN-LINE ORIFICE RESTRICTOR	1	N2070
2	"Y" CONNECTOR	2	N2339
3	ONE COPY OF THIS DRG	1	
4	1/4 X 1/8 TURNING TYGON S-50-HL CLASSVI	2	2X35 mm

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WILL NOT BE ADVISED

CE VERSION OF HFO



1. ARRANGE ALL TUBING SO THAT IT CANNOT BE TRAPPED OR KINKED WHEN MACHINE IS REFITTED TO BASE.
2. CHECK FRESH GAS FLOW.
3. CHECK FRESH GAS ALARM SETTING

IT	DESCRIPTION	QTY	PART NO.
1	IN-LINE ORIFICE RESTRICTOR	1	N2070
2	"Y" CONNECTOR	2	N2339
3	ONE COPY OF THIS DRG	1	
4	1/4 X 1/8 TUBING, TYGON S-50-HL CLASSVI	2	2X35 mm

INFORMATION ONLY
NOT FOR MANUFACTURE
CHANGES TO THIS DOCUMENT
WILL NOT BE ADVISED

Non CE VERSION
of HFO

Page 222 of 258

19.1.9 SI 990401 Attenuated alarm sounder for the 12/24V voltage monitor.

Subject	:Slightly attenuated alarm sounder for the 12/24V voltage monitor.
Equipment	:SLE2000HFO/HFO 'plus'
Serial Numbers	:All SLE2000HFO ventilators prior to serial numbers 9H0301(99) All SLE2000HFO "plus" ventilators prior to serial numbers 9J0305(99)
Service Information Number	:Si 990401
Change Note Ref	:CN 0520
Date	:13/04/99

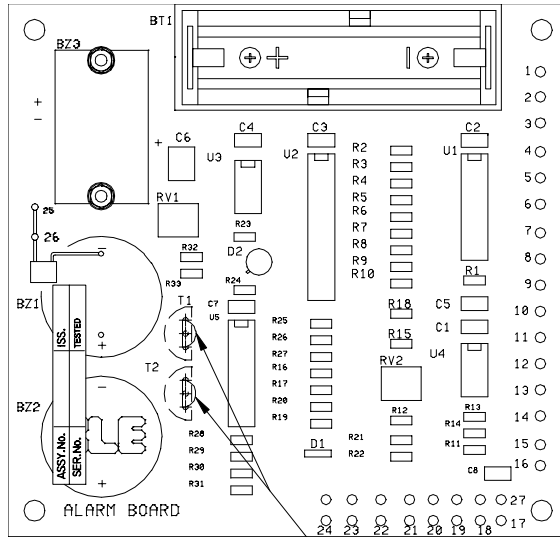
Introduction

The silk screening on the A0738/02 board is incorrect for transistors T1 and T2. In production this has resulted in both transistors fitted with the emitter and collector transposed. In this configuration there may not be enough current to drive the alarm sounder. During testing of the ventilator, if the alarm would not reliably sound, a modification was made to reduce the resistor R33 from 10k0 to 8k2. This provides enough current for the alarm sounder to work.

Now the transistors are fitted in production as originally intended so that they are working in a more conventional manner. That is, to fit them in the opposite way to that indicated on the silk screen.

All units manufactured to date and currently in service have passed their final test and were functional on leaving the factory. There is no reason to suppose that any of the operating parameters for this circuit would have changed or that device failure would have occurred since the reverse configuration does not have the potential to damage the components. Therefore units in the field shall continue to operate reliably and it is not necessary to modify them. However service personnel should be made aware of the new production directive and how it will result in T1 and T2 apparently being fitted the wrong way round.

New Production Directive



CN0520

FIT THIS WAY ROUND

Testing the 12/24V voltage monitor

With the power off, disconnect the +24V line from the PSU (Pin 13 on J2). Switch the mode to CPAP and check the operation of the 12V supply supply monitor by ensuring that the battery alarm sounds.

Turn of the vent, reconnect the +24V line and disconnect the +12V line from the PSU (pin 9 on J2). Switch the mode to CPAP and check the operation of the 12V supply monitor by ensuring that the battery alarm sounds again. Reconnect the +12V line.

19.1.10 SI 990801 Enhanced EMC

Subject : Enhanced EMC
 Equipment : SLE2000HFO non CE, SLE2000HFO CE and SLE2000HFO+
 Serial Numbers
 Service Information Number : Si 990801
 Change Note Ref :
 Date : 01/11/99

Introduction

It has been reported there are instances of unexplained resets occurring in the HFO. The reports are confined to non CE Units. The difference between CE and Non-CE Units is that CE Units have greater EMI resilience and so this would indicate that the source of the resets is external in nature. After extensive work, various areas for enhancement have been identified. These changes will raise the EMI performance of all HFO types.

Modification Detail.

Control PCB A0702/02, 04, 05 (HFO non CE, HFO CE, HFO +)

Replace C8 with 1uF 63v Capacitor. SLE part No C0462
 Replace U7 with TL7705BCP. SLE part No: D0714
 Remove U6 and U14.
 Cut track from pin 31 of U14 socket as shown fig 1.
 Link pins 31 and 40 of U14 as shown fig 2. SLE part No: W0103
 Link pins 13 of U18 and 0v as shown fig 2. SLE part No: W0103
 Fit 100pF ceramic Capacitor as shown fig 2. SLE part No: C0404
 Link C7 0v pin to U7 pin4 as shown fig 2. SLE part No: W0103

Fit U14 ATMEL 89C55-33PC. with Firmware as follows: SLE part No: D0710

Ventilator	Initial Control Firmware version	Control Firmware Version	*Implement CR No
HFO non CE	1.09	1.11	CN0078
"	1.10	1.11	-
"	1.10.3	1.11	-
HFO CE	1.09	1.11	CN0078
"	1.10	1.11	-
"	1.10.3	1.11	-
HFO +	1.17	1.20	-
"	1.18	1.20	-

* The specified change request must be carried out for this initial Firmware version

LCD Display L0015

Remove the LCD Display and fit four M3 solder tags as shown in fig 3. SLE part No: M0661/33

Refit the LCD Display using four M3 nuts as also shown in fig 3 SLE part No: H3091

Cable W0293 for LCD Display L0015 to HFO Main PCB A0736/03

Drill M3 clearance hole in PCB slider rail T0659/02 as in shown fig 4b.

Fit Tie Clamp SLE part No: M0856

using M3 fixing screw assembly as shown in figs 4a and 4b. SLE part No: H3091

SLE part No: H3094

SLE part No: H3108

Fit Ferrite Sleeve on to cable as shown figs 4a and 4b. SLE part No: M0855

Fix Ferrite Sleeve on to Slider Rail as shown figs 4a and 4b. using Cable Tie SLE part No: M0856

Motor Drive PCB A0739/01, 02, 03 (HFO non CE, HFO CE, HFO +)

Cut PCB track at (8) points as shown fig 5.

Fit 100nF Capacitor from pin 4 to pin 8 of U3 as shown fig 5. SLE part No: C0481

Fit 1nF Capacitor from pin 2 to pin 18 of U1 shown fig 5. SLE part No: C0490

Link R4 0v to pin 18 of U1 as shown fig 5. SLE part No: W0103(red)

Link U1 pin 2, R6 0v end and C2 0v end as shown fig 5. SLE part No: W0103(red)

Link C2 0v end U3 pin 4 as shown fig 5. SLE part No: W0103(red)

Link U2 pin 8 to heatsink of U8 as shown fig 5. SLE part No: W0103(red)

Link U6 Vin pin to PLC pins 22a and b as shown fig 5. SLE part No: W0103/10(black)

Link U6 GND pin to PLC pins 4a and b as shown fig 5. SLE part No: W0103 (red)

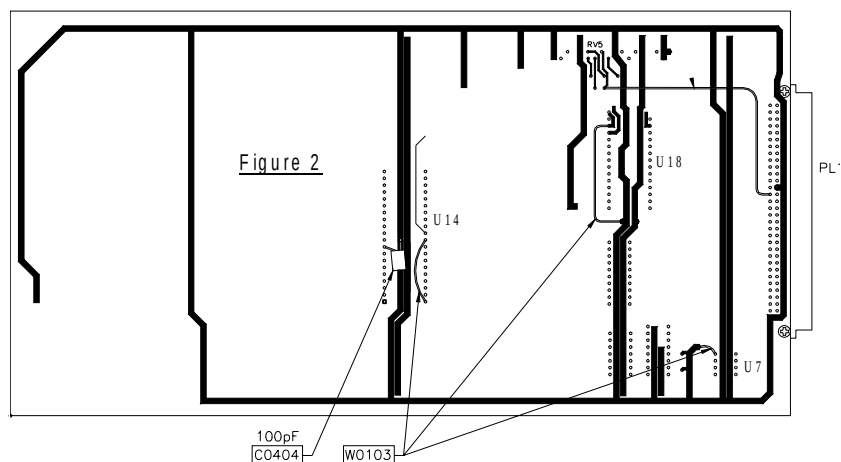
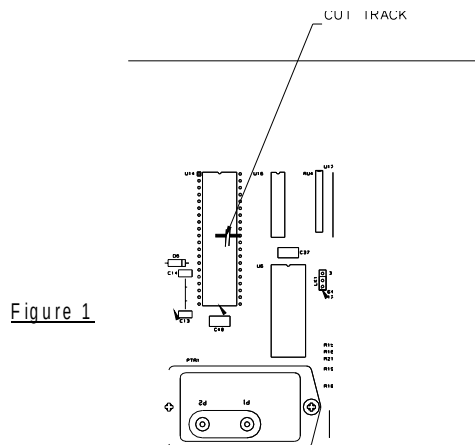
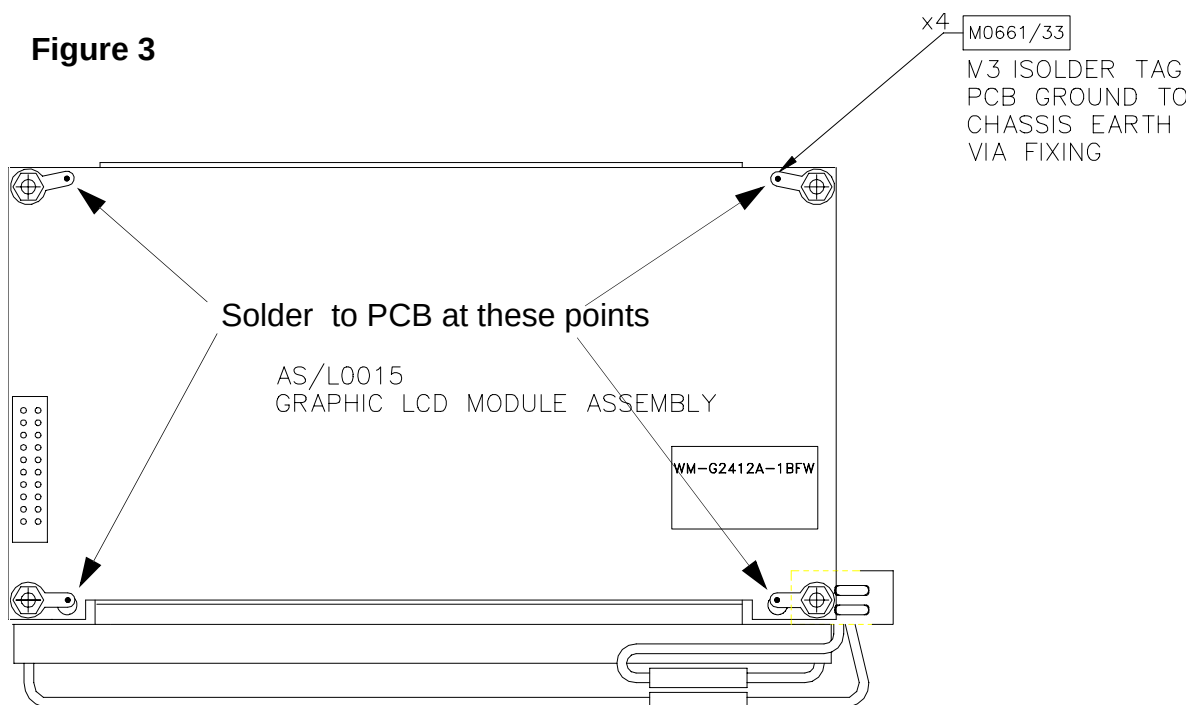


Figure 3



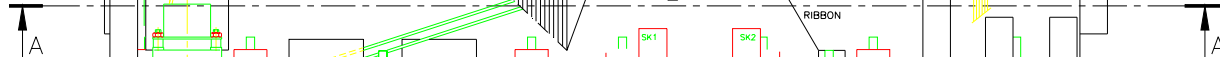
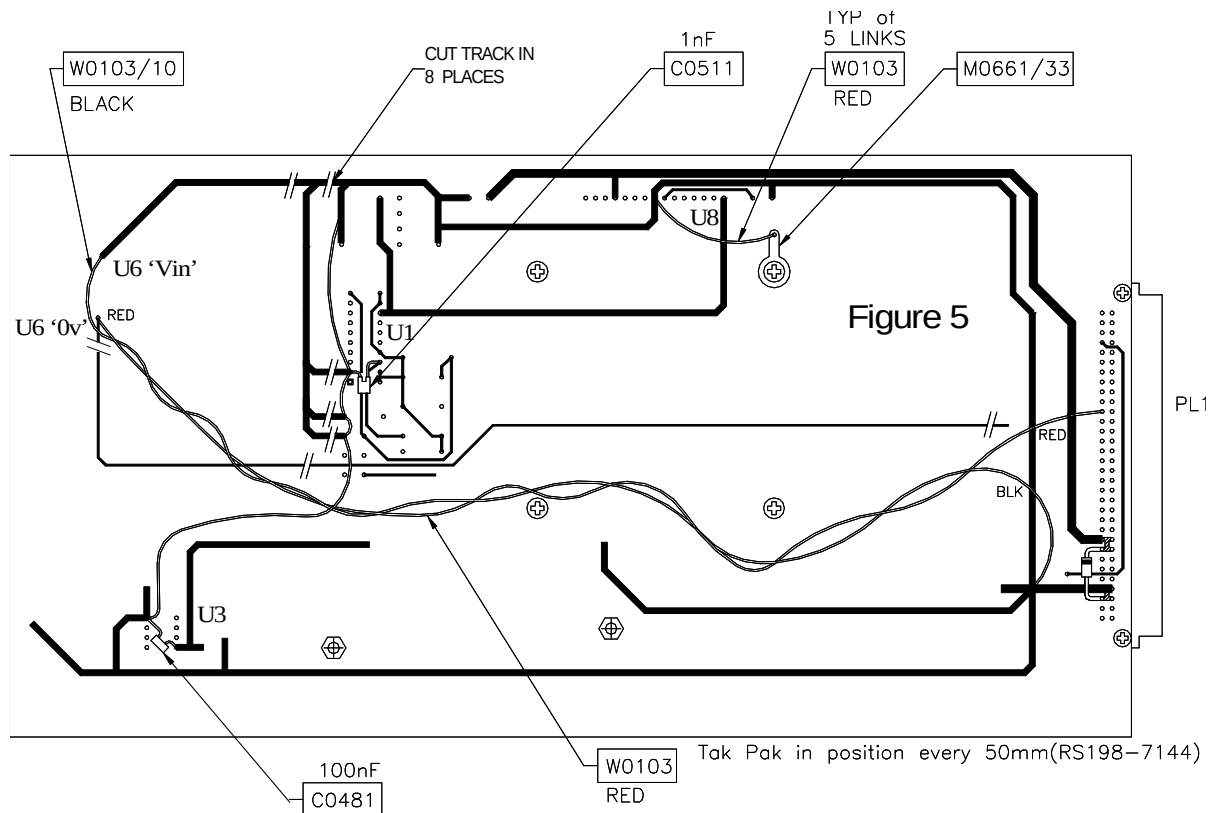


Figure 4b





Verifying the mods.

Visually inspect the modifications and confirm that they have been carried out in full accordance with the above procedure. After reassembly ensure that the ventilator is fully operational in accordance with its test schedule.

19.1.11 SI 991101 Ventilator Power Supplies

Subject	: Ventilator Power Supplies
Equipment	: SLE 2000 HFO CE & Non CE Versions
Serial Numbers	:All ventilators prior to serial number 8H0410. Excluding 6H0910, 7H0108/S, 7H0409/S 7H0710, 7H0904, 7H0905, 7H0908, 8H0207 and 8H0209 as this modification has already been carried out on these ventilators
Service Information Number	:Si 991101
Change Note Ref	:CN 0559
Date	:11/11/99

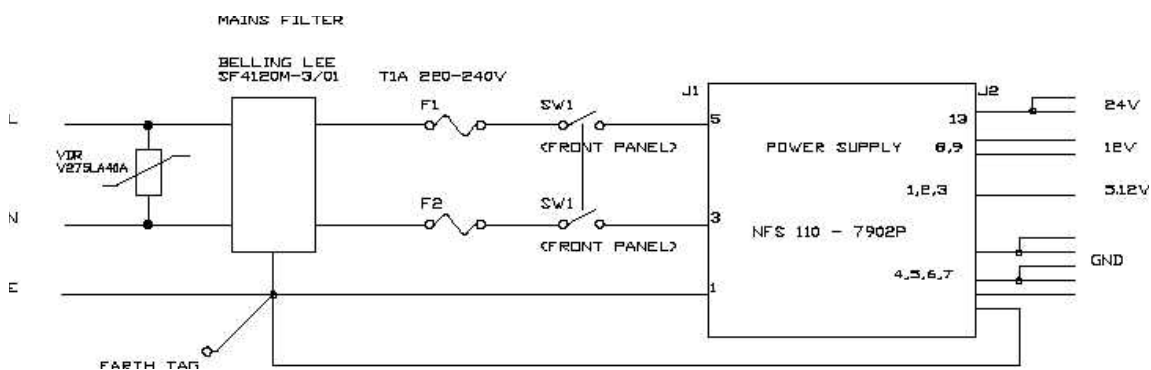
Introduction

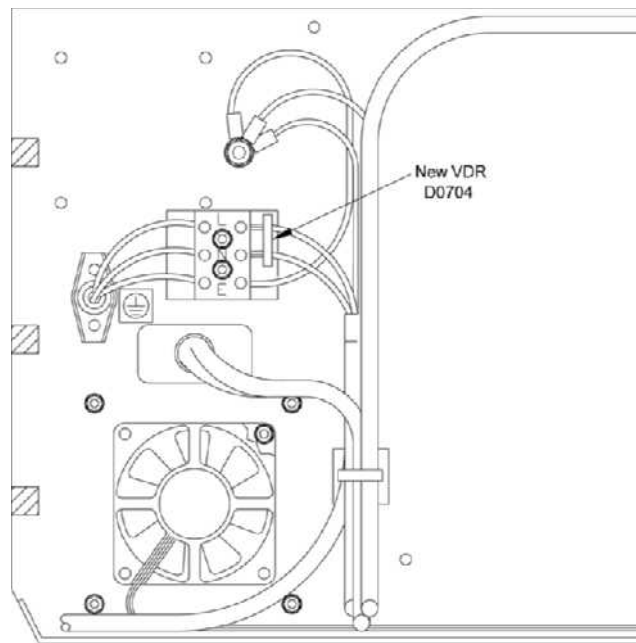
It is recommended that VDR's are fitted across the mains input terminals. This will limit mains borne transient spikes and improve the long-term reliability of the power supply.

Modification detail.

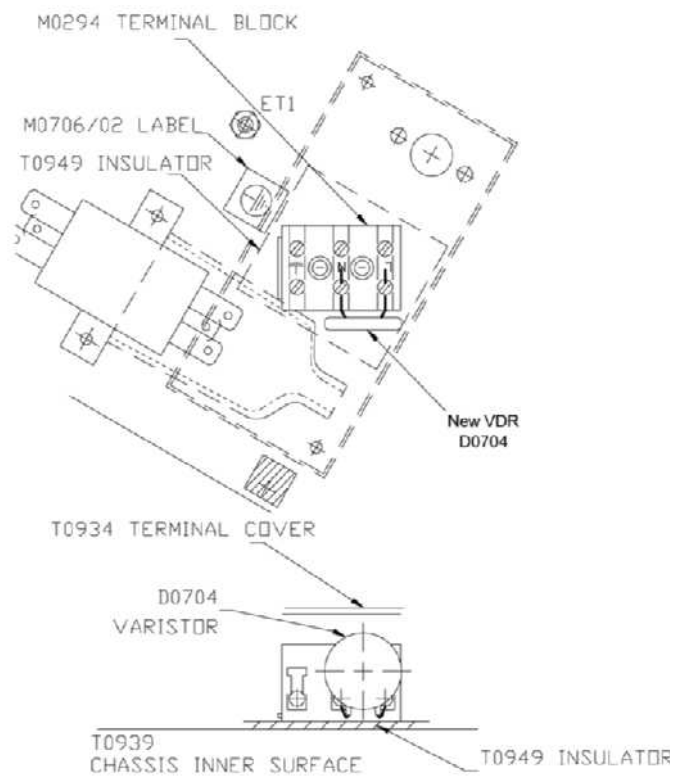
Remove the ventilator's outer case (and inner screening metalwork in the case of the CE version) as described in the Service Manual.

Connect a Voltage Dependant Resistor (VDR) Harris Semiconductor type V275LA40A. SLE Part N^o: D0704, across the live and neutral terminals of the mains terminal block as shown on the following circuit diagram and sketches.





Sketch of NON CE version of SLE2000 HFO
showing placement of new VDR



Sketch of CE version of SLE2000 HFO
showing placement of new VDR



Note: On the CE version of the ventilator, the terminal block is covered by a metal screening case. This has to be removed to fit the VDR. Care should be taken when fitting the VDR to ensure that it does not touch the screening case when the case is refitted.

Once the modification has been completed and the screening and main covers refitted, the normal functional and electrical safety checks should be carried out on the ventilator, before returning it for use with patients.

Rationale.

This modification has been recommended by the power supply manufacturer. It provides additional protection to the supply, when used in areas that are subject to high mains transient spikes.

19.1.12 SI 000101 Modification of SLE 2000 HFO motor drive circuit board.

Subject	:Modification of SLE 2000 HFO motor drive circuit board.
Equipment	:SLE 2000 HFO & HFO+ ventilators
Serial Numbers	:All
Service information Number	:Si 000101
Change Note Ref	:CN 698
Date	:24/03/2000

Introduction

It is possible under certain conditions for the HFO drive motor to stall. This can happen if HFO mode is selected and the oscillator rate control is set to the frequency above 10Hz.

A simple modification has been introduced to overcome this problem and it is recommended that this is carried out during routine servicing or in case of customer complaint.

Equipment Required

General hand tools and DIL IC Extractor.

Additional Parts

Circuit board SLE Part N°: J0756

Warnings and Cautions

All work should be carried out by a suitably qualified engineer.

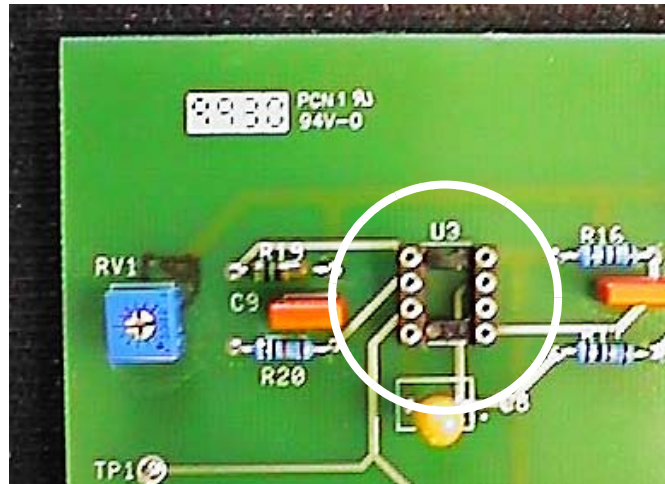
Anti static precautions have to be observed when handling the printed circuit boards.

Modification Detail

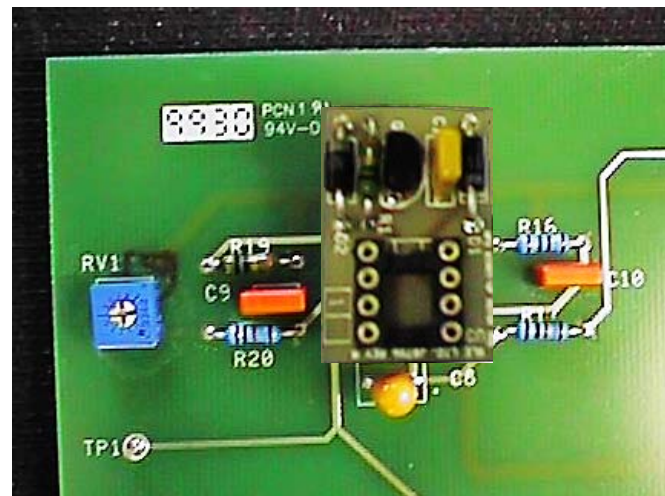
1. Remove ventilator covers. Remove the motor drive board from the ventilator, taking care to unplug the LCD backlight connector.



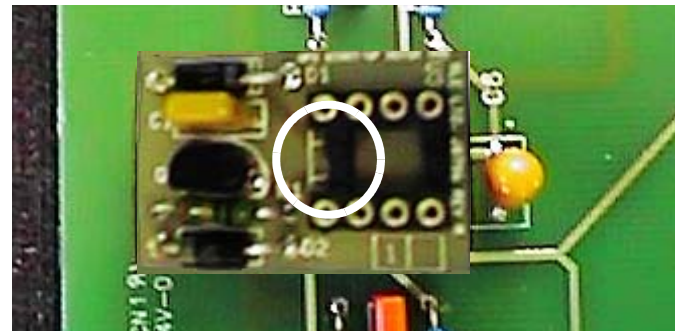
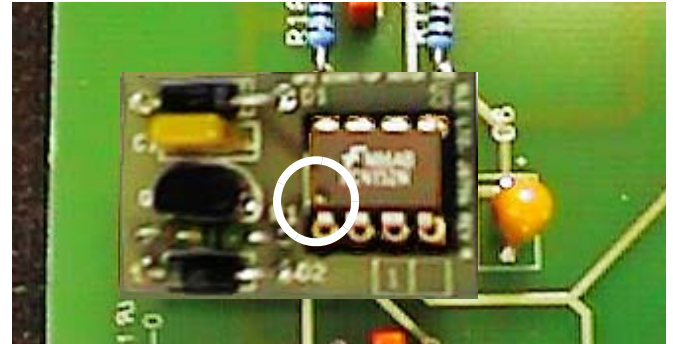
2. Remove the integrated circuit from the motor drive board at position U3.



3. Insert into the connector the circuit board supplied. Note: the orientation of this board.



4. Replace the integrated circuit on the new board. Note: the integrated circuit has to be aligned with the dot corresponding to the cut out in the connector.



5. Fit motor drive board back into ventilator, ensuring backlight connector is plugged securely into it's socket, before pushing board back into its socket. Fit thumb retaining screw. Refit covers.

Testing.

Connect power, gases and patient circuit. Switch "ON" ventilator. Check all ventilator basic functions. Set HFO frequency control to maximum. Switch "ON" HFO mode and check motor starts and runs correctly. Repeat this test three times. Check that motor speed can be varied by using frequency control.

Return ventilator to service.



19.1.13 SI 000201 Leak Alarm Trigger Threshold.

Subject	:Leak Alarm Trigger Threshold.
Equipment	:2000, 2000HFO & 2000HF0+ Ventilators
Serial Numbers	:All
Service information Number	:Si 000201
Change Note Ref	:CN 700
Date	:10/02/2000

Introduction

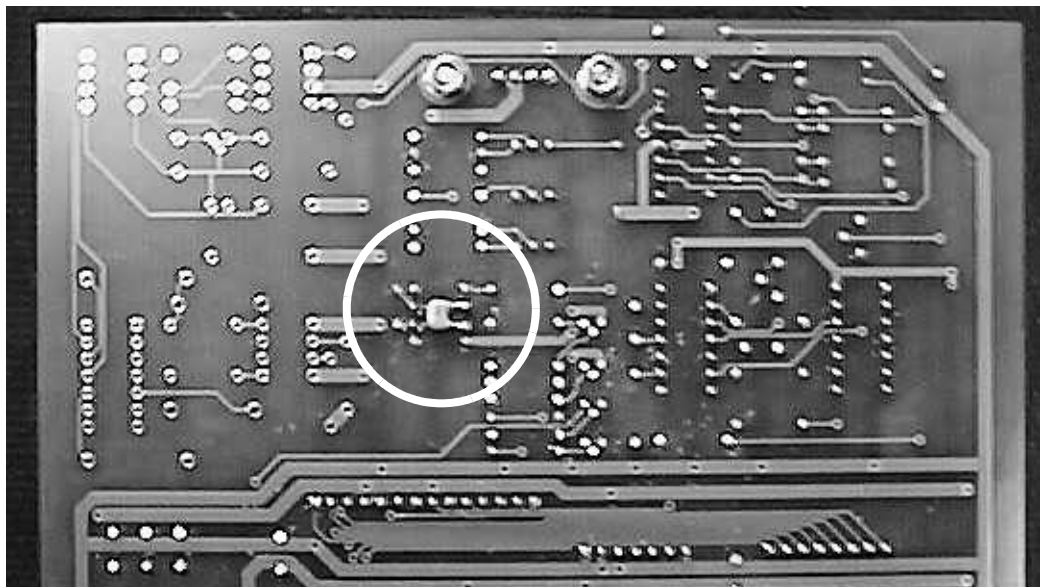
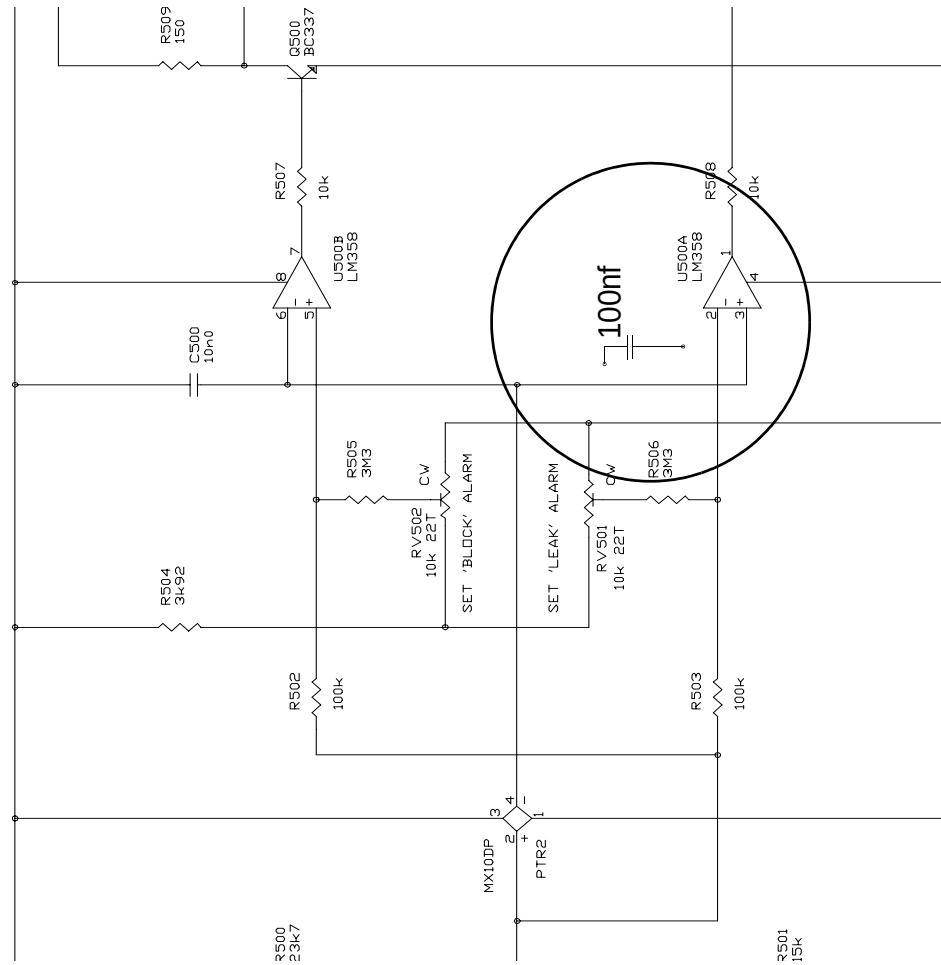
It has been notice during final test on some ventilators, that the leak alarm trigger threshold is unstable causing the leak alarm “LED” to flicker and the alarm sound to be intermittent.

This is unlikely to be problem in normal use, as the pressures in the patient circuit are not stable enough to cause this condition to be seen. However as a precaution a 100nf capacitor has been added across the input of U500A Pins 2 & 3 on the A0702 Board.

See photograph and circuit diagram

This capacitor is being added as standard to all new production and it is recommended that this modification should be carried out during routine servicing.

The capacitor used is a 100nf multilayer palladium/ceramic type and can be order from SLE using part N°: C0481. Alternatively it can be ordered from your local component supply using the Philips part N°: CW20C 104M





19.1.14 SI 000602 Addition of HFO NEEP

Subject	Addition of NEEP in the HFO MODE
Equipment	SLE 2000 HFO
Serial Numbers	All serial numbers above 7H0700
Service information Number	SI 000602
Change Note Ref	CN 0711
Date	31/07/2000

Introduction

The incorporation of a NEEP jet when operating in HFO mode, so that the mean pressure levels are reduced to near zero.

The following information describes how to install the HFO NEEP jet.

Equipment Required

General workshop tools.

Additional parts

HFO modification kit (N9006/02) for Ventilator with N2524 Motor Assembly (See Table A on page 246 for full list of parts).

HFO modification kit (N9006/01) for Ventilator with N2524/01 Motor Assembly (See Table B on page 246 for full list of parts).

Warnings and Cautions

All work should be carried out by a suitably qualified engineer with experience of the SLE 2000 HFO ventilator.

The ventilator has to be checked and certified as functioning correctly before being returned to service.

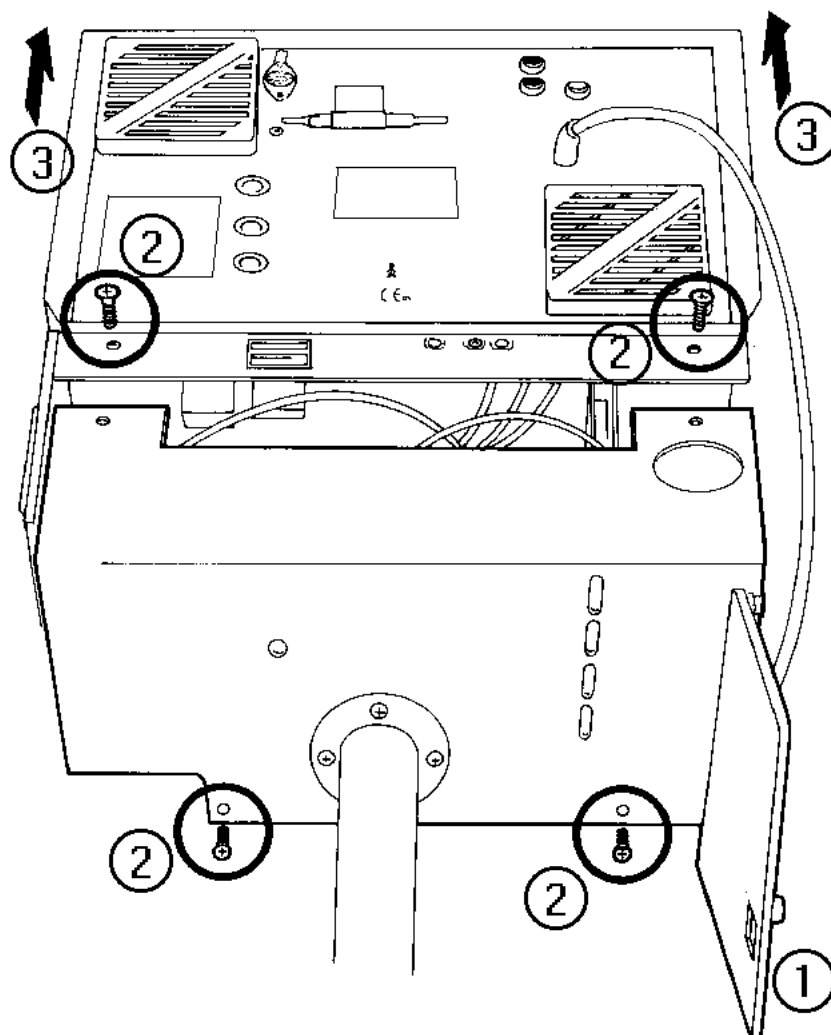
The ventilator has to be labelled to show that it has been modified.

All operators of the ventilator have to be made aware of the modification before use.

Instructions on how to perform modification

STEP 1: Access to the Pneumatic Module

1. Disconnect all gas hoses, the patient circuit and disconnect from the power supply.



2. Open side flap.
3. Remove 2 screws at rear and 2 screws at base of unit.
4. Lift complete unit from base.

The unit can then be placed on the work surface upside down.

STEP 2: Removal of the motor assembly

Motor assemblies

The SLE 2000 HFO ventilator has two models of motor assembly, Part N° N2524 and N2524/01. The first step is to ascertain which motor assembly is fitted to your ventilator.

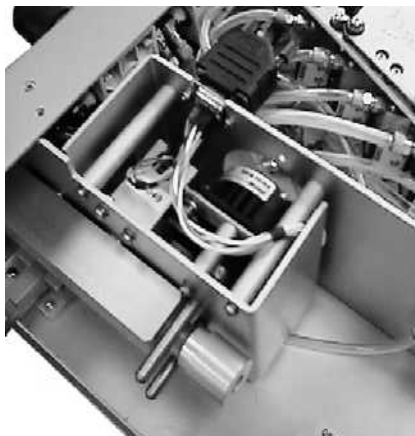
The method of identifying which motor assembly is fitted is as follows.

The N2524 motor assembly is connected to the ventilator via a 9 pin D connector (See photograph A).

For this motor assembly use modification kit N9006/02.

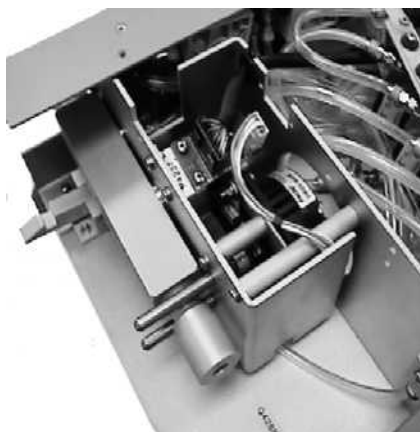
The N2524/01 motor assembly is connected to the ventilator via an 8 way Molex connector (See photograph B). For this motor assembly use modification kit N9006/01.

N2524 Motor assembly



Photograph A

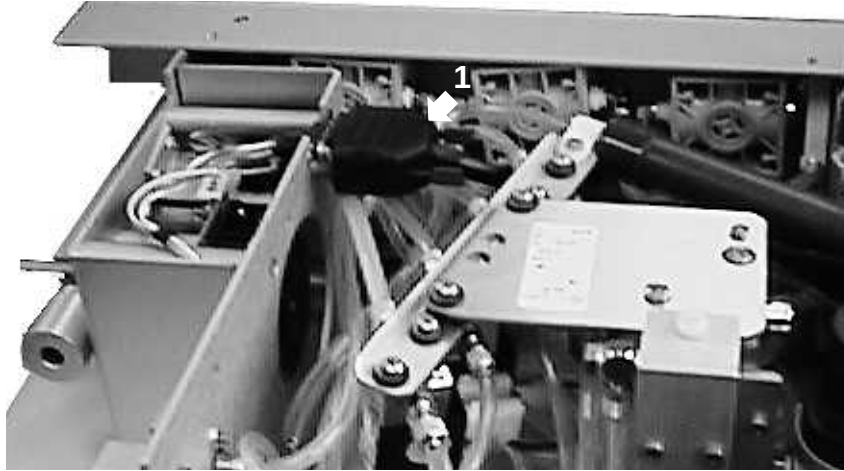
N2524/01 Motor assembly



Photograph B

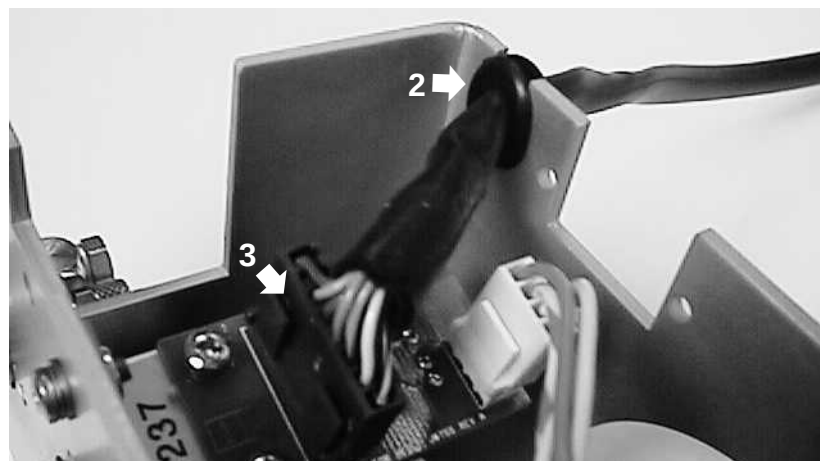
Removal of N2524 motor assembly

- A. Release 2 screws on the 9 pin D connector (1) and unplug connector.



Removal of N2524/01 motor assembly

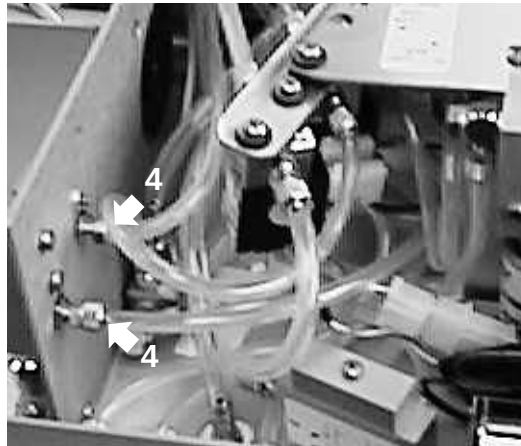
- B. Pull out the grommet retaining the loom (2) and disconnect the 8-way Molex connector (3).



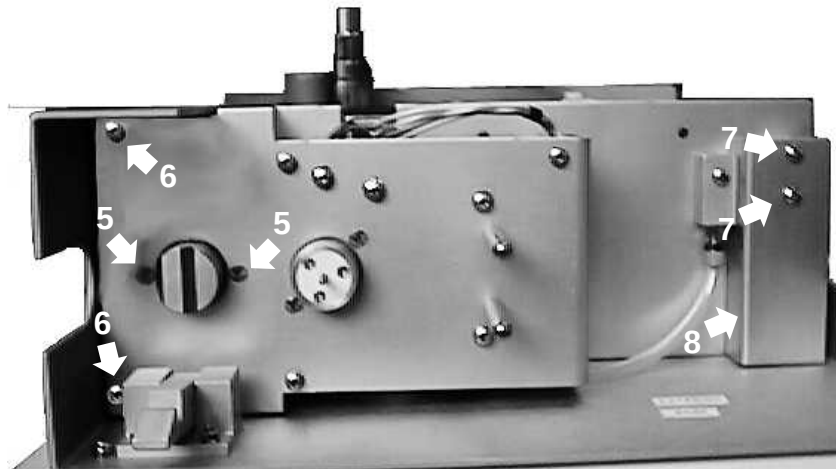
The disassembly is now the same for both motor assemblies.

1. Fully unscrew the retaining nuts on the two pneumatic connectors (4) and remove the two tubes.

Ensure that one of the connectors is marked for identification on re-assembly.

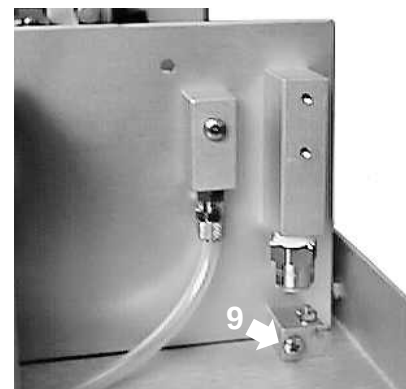


2. Remove the 2 screws (5) securing the orifice block



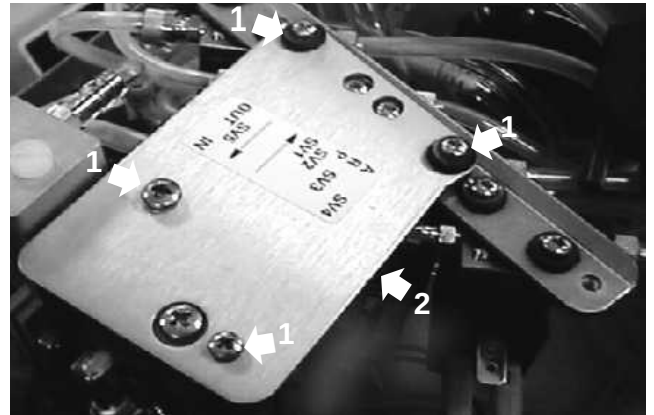
3. Remove the 2 screws (6) retaining the motor assembly.
4. Remove the 2 screws (7) retaining the cover plate (8) and lift clear
5. Remove the final screw (9) retaining the motor assembly
6. Remove the sub-assembly by tilting the top towards you.

Note: The old motor assembly can be exchanged as part of the Service Exchange Scheme run by SLE.

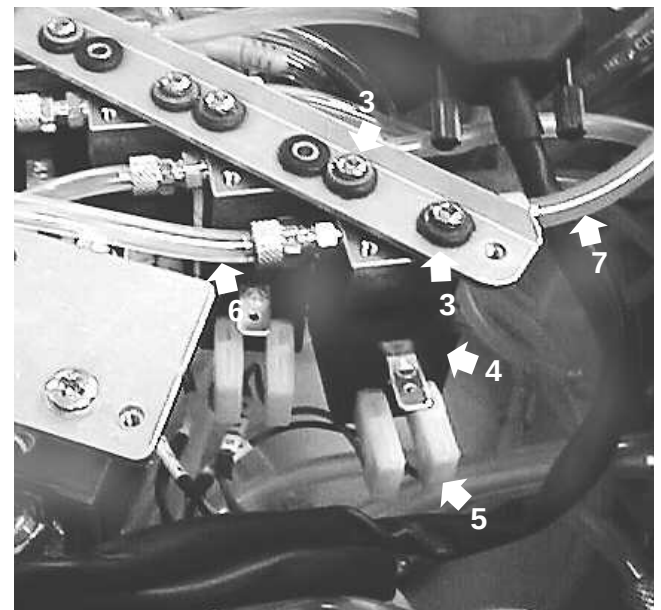


STEP 3: Replacement of the SV4 solenoid valve

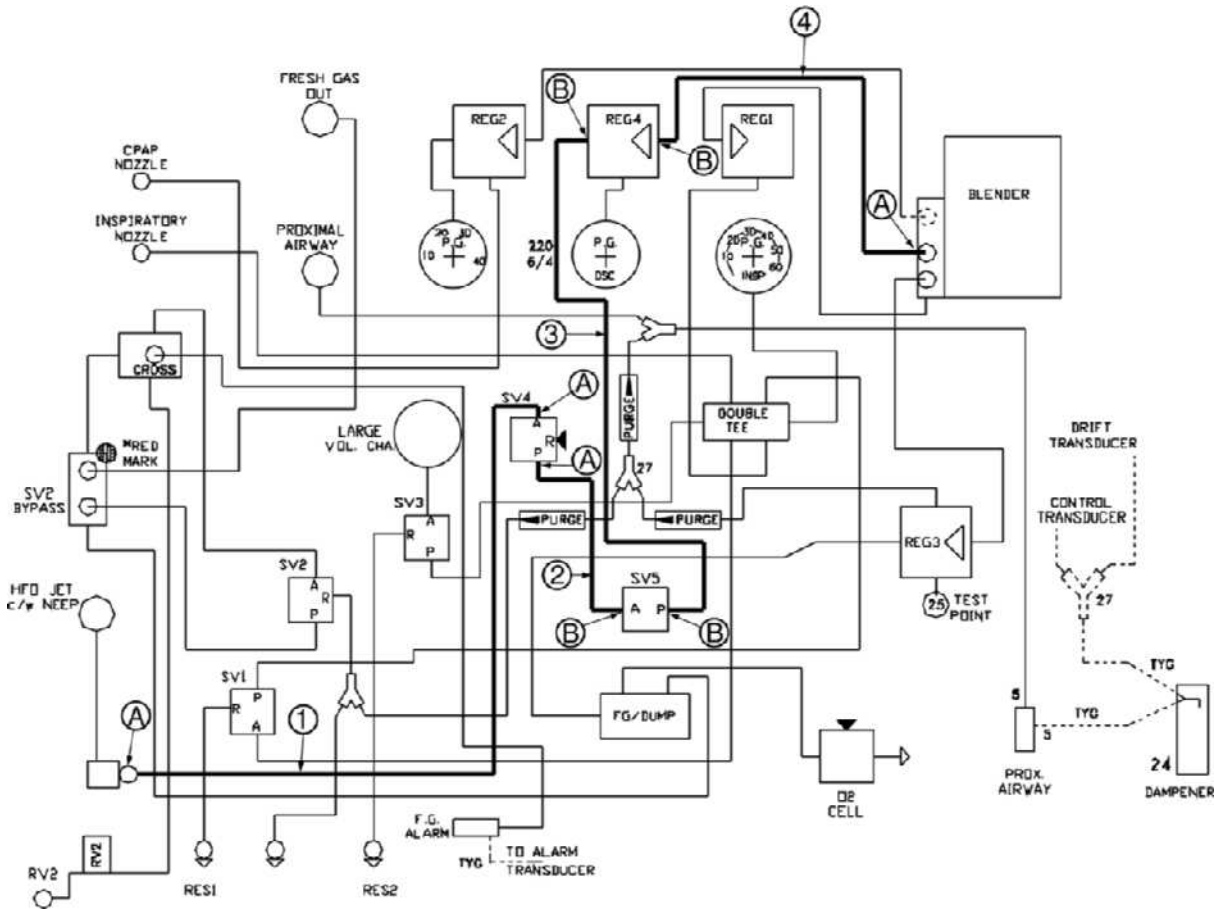
1. Remove the screws and washers (1) from the solenoid support bracket (2). Remove the bracket from the pneumatic unit.



2. Remove the screws and washers (3) from the SV4 solenoid (4).
3. Disconnect the SV4 solenoid electrical connectors (5)
4. Disconnect the SV5 to SV4 pneumatic tube (6) from the SV4 solenoid (4). Discard the SV4 solenoid and attached tube (7).



5. Disconnect and discard the all the tubes (1-4) and connectors (A & B) indicated in the following schematic:



6. At positions **A** fit 6/4 M5 male stud couplings.
7. At positions **B** fit 6/4 1/8" male stud elbows.
8. Cut the new 6/4 APU Polyurethane tubing to the required lengths.

Tube 1 = 240 mm
 Tube 2 = 160 mm
 Tube 3 = 220 mm
 Tube 4 = 120 mm

9. Re-fit the new tubes into the pneumatic unit.
10. Fit blanking plug and seal to SV4 port 3.
11. Re-connect the electrical connectors (5) to the new SV4 solenoid valve.
12. Re-attach the SV4 solenoid valve to the support strap using the existing screws and washers (3).
13. Re-attach the solenoid support bracket (2).

STEP 4: Installation of New Motor Assembly

Refitting of the new motor assembly is the reversal of removal.

STEP 5: Final assembly and Test

- A. Replace the ventilator back on it's stand.
- B. Reconnect the gas supplies, exhalation block, patient circuits and power supply.
- C. Carry out a operational check of the ventilator.

Verify that:

- 1. Inadvertent mean pressure is less than 5cmH₂O but **NOT** negative for all HFO Delta pressures.
 - 2. Inadvertent PEEP is less than 0.5cmH₂O but **NOT** negative for all conventional ventilation modes, including CPAP mode.
- D. Label the ventilator to show it has been modified for HFO NEEP.
 - E. Return the ventilator to service.

Table A: Modification Kit N9006/02 for N2524 motor assembly

Part N°	Component description	Quantity	Note
N2195/06	KV solenoid valve	1.00	
N2370	Blanking plug	1.00	
N2371	Seal	1.00	
N2524/03	HFO NEEP motor assembly	1.00	
N2373	Polyurethane Tubing 6/4 APU	1 metre	
N2360	6/4 1/8" male stud elbow	4.00	
N2363	6/4 M5 male stud coupling	4.00	

Table B: Modification Kit N9006/01 for N2524/01 motor assembly

Part N°	Component description	Quantity	Note
N2195/06	KV solenoid valve	1.00	
N2370	Blanking plug	1.00	
N2371	Seal	1.00	
N2524/02	HFO NEEP motor assembly	1.00	
N2373	Polyurethane Tubing 6/4 APU	1 metre	
N2360	6/4 1/8" male stud elbow	4.00	
N2363	6/4 M5 male stud coupling	4.00	

19.1.15 SI 020901 Cleaning, Disinfection and Sterilisation of SLE ventilators.

Subject: Cleaning, Disinfection and Sterilisation of SLE ventilators.
Equipment: SLE 2000, SLE2000 HFO, SLE2000 HFO Plus
Serial Numbers: All
Service information Number: SI020901
Date: 24/09/2002

Introduction

The MDA has issued a safety notice SN 2001(28) "Compatibility of medical devices and reprocessing equipment with Decontamination agents," which states that manufactures of medical devices should state decontamination agents that are compatible with there products.

The following is an extract from Medical Devices Agency safety notice SN 2001(28)

The Medical Devices Agency continues to receive reports about damage to medical devices or their components and to reprocessing equipment following contact with incompatible decontamination agents.

The damage is usually the result of reactions between the decontamination agent and the materials of construction of the device or reprocessing unit. Such damage may affect the performance or functionality of the device or the effectiveness of the decontamination procedure.

Manufacturers of reusable medical devices are required to provide information on how to decontaminate their devices. This information should include the types of decontamination agent that may be used, together with a warning of any agents or processes that are known to be detrimental to the device.

Due to SN 2001(28) we are issuing more detailed guidelines for the Cleaning, Disinfection and Sterilisation of our products, to be used in conjunction with those already in the user manuals.

Cleaning, Disinfection and Sterilisation Guidelines.

We recommend the following agents:

Ventilator outer casings and pole: Liquid cleaner or detergent. (As recommended by an appropriate hospital authority).

Do not use any strong solvent cleaners on the front panels or labels.

Main and rotating jets: 70% Isopropanol alcohol (AZO wipes).

Do not use Haz Tab on the main and rotating jet or manifold as this may cause corrosion over time.

Exhalation block: Standard autoclave at a 134 degrees Celsius for 3 minutes or at 121 degrees Celsius for 20 minutes. No limit to number of autoclave cycles

Measures to prevent contamination of SLE ventilators whilst in use.

We recommend that in line bacterial filters are used between the patient circuit and the exhalation block and the fresh gas port and humidifier supply line. We also recommend that single use patient circuits are used where possible.



19.2 Technical Bulletins

19.2.1 TB 990603 Removal of hour counter from electrical chassis.

Subject	:Removal of hour counter from electrical chassis.
Equipment	:SLE Ventilators
Model	:SLE 2000 & SLE 2000 HFO
Serial Numbers	:N/A
Technical Bulletin Number	:TB 990603
Change Note Ref.	:CN 0574
Date	:03/06/99

This bulletin has been raised due to a design change. The change being the removal of a duplicated hour counter from the electronic chassis of SLE 2000 and SLE 2000 HFO ventilators.

The change is to be phased in and some new ventilators will still have two hour counters. This will cease when stocks of the old chassis have been exhausted.

Existing ventilators do not require modification to remove the duplicated hour counter.

The one hour counter, will be located in the pneumatic chassis. This is the unit that is subject to the most wear and tear and requires a major overhaul at 10,000 hours, so it is important that we record the running time of these chassis. The power consumption of the hours counters is very small, so removal of one will not affect the overall power rating of the ventilator.

19.2.2 TB 000201 New versions of control software.

Subject	:New versions of control software.
Equipment	:SLE 2000, SLE 2000 HFO and SLE 2000 HFO+ Ventilators.
Serial Numbers	:All
Technical Bulletin Number	:TB 000201
Change Note Ref	:CN 616
Date	:11/02/2000

Introduction

Removal of audible bleep in patient triggered modes

Following customer feedback, the control software on the above range of ventilators has been changed. In the new version the audible bleep, in PTV and SIMV modes is suppressed for machine triggered breaths. Breaths are still indicated by the trigger back up LED illuminating. If required the audible bleep can be re-instated by holding in the reset button when powering up the ventilator.

The above feature is available from the following software versions

Ventilator	Software Version
SLE 2000	V3.3
SLE 2000 HFO	V1.103
SLE 2000 HFO+	V1.18



19.2.3 TB000601 New version of control firmware

Subject	New versions of control firmware.
Equipment	SLE 2000 HFO
Serial Numbers	All ventilators with V1.10 firmware and above.
Technical Bulletin Number	TB000601
Change Note Ref	CN729
Date	01/06/2000

Introduction

New Mean pressure Calculation

Under some circumstances there can be a small error in the calculation of the mean pressure. This was due to a problem in the calculation algorithm in the firmware. The algorithm has been corrected to remove the error and the firmware has been released at version 1.12.

Note: All other functions remain the same.

The above correction is available in the following firm ware version.

Ventilator	Firmware Version
SLE 2000 HFO	V1.12

19.2.4 TB 000801 Ventilator Firmware Status

Subject :Ventilator Firmware Status.
 Equipment :SLE 2000, SLE 2000 HFO & SLE 2000 HFO PLUS
 Serial Numbers :All
 Technical Bulletin Number :TB 000801
 Change Note Ref :N/A
 Date :08/09/00

Introduction

The purpose of this technical bulletin is to provide information on the control and display versions of firmware available for the SLE 2000, SLE 2000 HFO and SLE 2000HFO Plus ventilators.

SLE 2000

Control firmware.

Firmware version	Date of change	Change note N°	Details of change.
V3.0	09/03/93		Includes "Mary interface" and runs on a 80C32 processor. For ventilators fitted with serial port.
V3.1	17/06/94		Changed I/E Ratio display from flashing to non-flashing hyphens if ratio <1:9.9 or > 9.9:1.
V3.3	15/01/99	CN0616	No audible indication of machine triggered breaths in patient triggered modes (SIMV and PTV) unless reset button is held in during power up.

SLE 2000 HFO

Control firmware.

Firmware version	Date of change	Change note N°	Details of change.
V1.09	09/03/93		Flashing of I/E Ratio display replaced with hyphens to indicate out of limit values.
V1.10	17/06/94	CN0078	Airway pressure signal conditioner ranging modified to give RV2(zero) and RV5 (span) greater travel.
V1.103	15/01/99	CN0616	Removal of the audible indication of machine triggered breaths in patient triggered modes (SIMV and PTV).
V1.11	22/10/99	CN0676	Change to the averaging period of the mean calculation to 4 seconds. Watchdog servicing time changed from 350ms to 20ms.

V1.12	01/09/00	CN0729	Quantisation error correction in CMV mean calculation.
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Display firmware.

Firmware version	Date of change	Change note N°	Details of change.
V1.0	17/01/95		Initial release
V1.1	07/02/95		Adjustment of the offset on the HFO rate display by 2Hz., to allow for setting of the HFO rate circuit without saturation at the top end.
V1.2	08/06/95	CN0056	Correction of error in Fail to Cycle detection algorithm which caused spurious triggering of Fail to Cycle alarm. Increased debouncing on "Freeze" push button. Correction of graphic display that did not update when the ventilator is switched on with the display rate switch position in 0.5sec setting.
V1.3	26/07/95	CN0063	Modification to prevent the screen going blank when subject to 8KV ES discharge.
V1.4	20/12/95	CN0099	Correction of error in Fail to Cycle detection which caused erroneous triggering at low pressures.
V1.5	26/03/96	CN0116	Delta P to be displayed for CPAP and HFO modes and ident on oscillator pressure gauge changed.
V1.6	10/07/96	CN0156	Increased range of display of delta pressures. Addition of display of pressure transducer saturation (positive and negative).
V1.7	30/04/97	CN0308	Implementation of an HFO disconnection alarm and pressure transducer drift alarm.
V1.8	15/05/97	CN0362	Modification of High alarm level (minimum setting). Update of SLE logo. Addition of conditional assembly directives for french version.
V1.9	18/11/97	CN0428 CN0449	Inclusion of display firmware in German. Change in method of setting the Delta P alarm.
V2.0	18/03/98	CN0495	Modification of the pressure transducer drift detection algorithm.
V2.1	26/02/99	CN0632	Inclusion of O ₂ alarm. High Delta P converted to alarm condition. Delta P to be set as a percentage rather than a fixed window. Reduction of the response time of the Delta P alarm.

SLE 2000 HFO PLUS

Control firmware.

Firmware version	Date of change	Change note N°	Details of change.
V1.17	02/10/98		Indication of delivery of a machine breath changed from audible to visual in spontaneous period of SIMV mode.
V1.18	28/06/99	CN0616	Removal of the audible indication of machine triggered breaths in patient triggered modes (SIMV and PTV).
V1.20	22/10/99	CN0676	Change to the averaging period of the mean calculation to 4 seconds. Watchdog servicing time changed from 350ms to 20ms.

Display firmware.

Firmware version	Date of change	Change note N°	Details of change.
V1.0	30/09/98	CN0560	Initial release.
V1.1	08/12/98	CN0589	Removal of mean pressure drop alarm. High delta P converted to alarm condition.
V1.2	12/02/98	CN0608	The response time of the delta P alarm decreased at slower screen update rates.



19.2.5 TB 010201 New operational warnings

Subject	: New operational warnings
Equipment	: SLE 2000 HFO & SLE 2000 HFO PLUS
Serial Numbers	: All
Technical Bulletin Number	: TB 010201 Issue 3
Change Note Ref	: CN791
Date	: 10/04/01

Introduction

The purpose of this technical bulletin is to provide information on the new operational warnings for the SLE 2000 HFO and SLE 2000HFO Plus ventilators when ventilating a neonate in high frequency oscillation with 3mm or smaller size endotracheal tubes.

Under these conditions the resistance to flow through these smaller size ET tubes and ET connector is so great that the ventilator is unable to reliably detect the tube falling out of the patient or disconnection between the tube and the ET connector and users must vigilantly monitor the patient.

SLE 2000 HFO

New operational warnings.

4. Audible and Visual warning alarms indicate a potentially harmful condition to the patient. However when ventilating a patient with a 3mm or smaller size endotracheal tubes, in case of patient extubation or the ET tube disconnecting from its ET connector, only the monitoring of flow (module SLE 2100), or of SpO₂, or PtO₂/PtCO₂ will dependably alert the medical team to an alarm situation, not the monitoring of pressures.

SLE 2000 HFO PLUS

New operational warning.

2. The SLE2000 HFO+ is a more powerful ventilator than the SLE2000 HFO and greater care must be taken as the higher pressures and volumes available can cause harm to the patient if misused. It is recommended to constantly monitor either flow, or pulse oximetry (SpO₂), or transcutaneous PO₂/PCO₂ (PtO₂/PtCO₂) for alerting the medical team in case of patient extubation.

5. Audible and Visual warning alarms indicate a potentially harmful condition to the patient. However when ventilating a patient with a 3mm or smaller size endotracheal tubes, in case of patient extubation or the ET tube disconnecting from its ET connector, only the monitoring of flow (module SLE 2100), or of SpO₂, or PtO₂/PtCO₂ will dependably alert the medical team to an alarm situation, not the monitoring of pressures.

19.2.6 TB 040401 V0226 Potentiometer

Subject	:V0226 Potentiometer
Equipment	:SLE2000, SLE 2000 HFO & SLE 2000 HFO PLUS
Serial Numbers	:Units manufactured after March 2004
Technical Bulletin Number	:TB 040401
Change Note Ref	:CN 0983
Date	:05/04/04

Introduction

This technical bulletin is to inform the users of the SLE2000, SLE2000 HFO & SLE2000 HFO+ Infant ventilators that the design of the V0226 potentiometer has changed.

The potentiometer has changed from a Spectrol 149SXN48S103SP to a Spectrol 149SXN40S103SP.



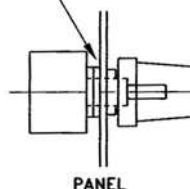
149SXN48S103SP



149SXN40S103SP

The change in design requires that the 149SXN40S103SP is fitted with two shake proof washer between the body and the front panel.

Washers x 2





20. Issue Revision Record

Issue 1: Initial issue CN 0347.
Issue 2: CN 0533, CN 0536, CN 0435, CN 0599, CN 0492, CN 0515, CN 0521, CN 0419.
Issue 3: CN 0560, CN 0619, CN 0625 CN 0626, CN 0629, 0634, CN 0638, CN 0648
Issue 4: CN 0647, CN 0698, CN 0700
Issue 5: CN 0722
Issue 6: CN 0711
Issue 7: CN 0738, CN 0765
Issue 8: CN 0797
Issue 9: CN 0911
Issue 10: CN 0921, CN 1001, CN 1005, CN1022



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