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Technical bulletins

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	:980301
Change Note Ref	0521
Date	:27 May 1998

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 lk_ 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.

2. SI 980302 Ventilator oxygen cells (N2191)

Regarding	:Ventilator oxygen cells (N2191)
Model	:2000 and 2000 HFO Infant Ventilators
For Serial Numbers To	:All ventilators :
Service Information Number	:980302
Date	:16 March 1998

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 accomodated.

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

3. SI 990101 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 ventilators built before 1999
Service Information Number	:990101
Change Note Ref	0610
Date	:7 January1999

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 lk_ 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.

4. SI 990302 Possible inadvertant solenoid failure messages

(80C31/32 Microcontroller logical 1 to 0 transition currents on port 3)

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	:990302
Change Note Ref	:0626
Date	:2 March, 1999

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.

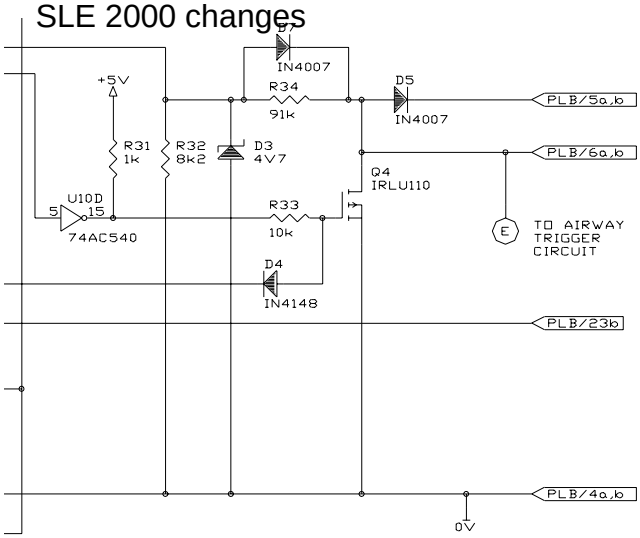
Connect a diode (1N4007) in parallel with R34 with its cathode (+ve) connected to the drain of Q4(IRLU110) on all A0702 boards.

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

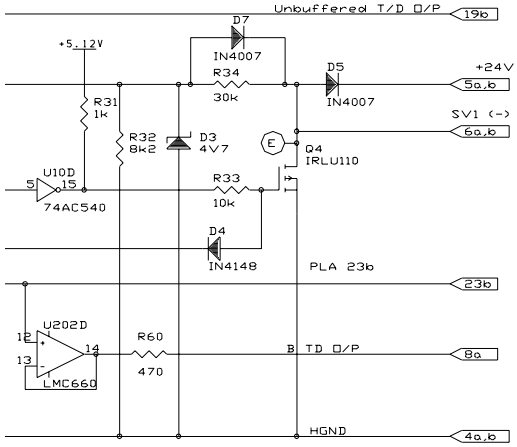
Rationale: The diode will be reverse biassed when Q4 is turned off. When Q4 is turned on it has a value of Rds of 0.5W, giving a Vds of <0.1v. The diode voltage is added to this which shall result in the microcontroller i/p being pulled down to <0.8v.

Circuit Diagram changes

SLE 2000 changes



SLE 2000 HFO & HFO 'plus' Chan



5. SI 000201 Leak Alarm Trigger Threshold.

Subject	Leak Alarm Trigger Threshold.
Equipment	2000, 2000HFO & 2000HF0+ Ventilators
Serial Numbers	All
Service information Number	Si000201
Change Note Ref	CN 700
Date	10/02/2000

Introduction

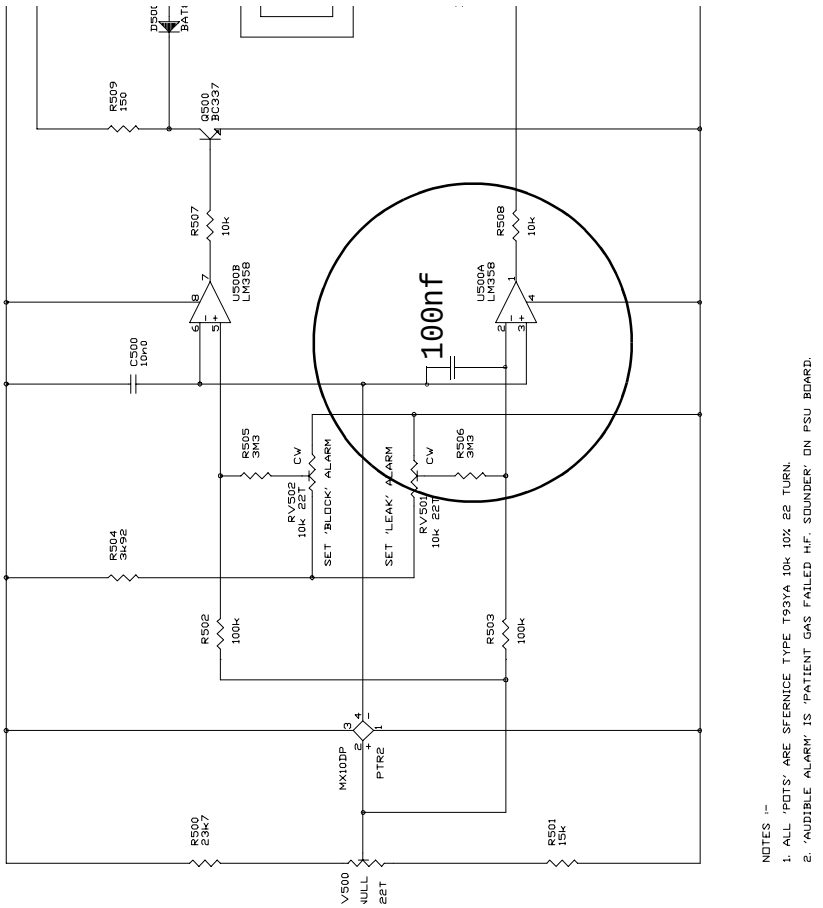
It has been notice during final test on some ventilators, that the leak alarm trigger threshold is unstable causing the leak alarm “LED” to flicker and the alarm sound to be intermittent.

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 on next page.

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 Nº: C0481. Alternatively it can be ordered from your local component supply using the Philips
part Nº: CW20C 104M


R509
150
Q500
BC337
R507
10k
R508
10k
U500B
LM358
U500A
LM358
100nf
C500
10n0
R505
3M3
CW
RV502
10k 22T
SET 'BLOCK' ALARM
SET 'LEAK' ALARM
RV501
10k 22T
CW
R506
3M3
R504
3k92
R502
100k
R503
100k
MX10DP
PTR2
R500
23k7
R501
15k
V500
PULL
22T
NOTES :-
1. ALL 'POTS' ARE SFERNICE TYPE T93YA 10k 10% 22 TURN.
2. 'AUDIBLE ALARM' IS 'PATIENT GAS FAILED H.F. SOUNDER' ON PSU BOARD.

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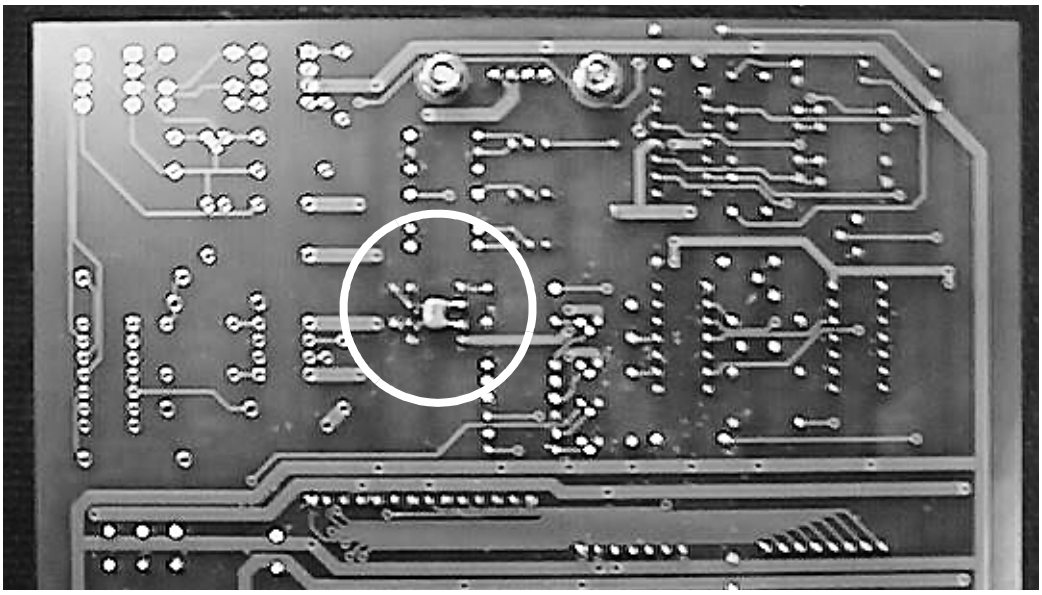

6. SI 000302 Replacement of Solenoid Valve

Subject	Replacement of valve (Spare parts)
Equipment	SLE 2000 Infant ventilator
Serial Numbers	All non CE marked ventilators
Service information Number	SI 000302
Change Note Ref	CN 712
Date	16/03/2000

Introduction

This service information is for reference only, no remedial action has to be carried out on the ventilator.

The existing solenoid valve N2195 used in the SLE 2000 (NON CE Version) has been superseded by solenoid valve N2195/08. The reason for this change is the availability of the N2195 valve.

Existing valve N2195

Replacement valve N2195/08

The new valve although looking different, has the same electrical and pneumatic properties as the old valve. The new valve is interchangeable with the old valve within the ventilator.

Note: When fitting valve ensure that the knurled locking ring is tight and that the electrical connections are on the opposite side to the port identification numbers 1,3,2.

7. 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
Number	:TB990603
Change Note Ref.	:CN0574
Date	:03 June 1999

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.

8. 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	TB000201
Change Note Ref	CN616
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

9. 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 Nº	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 Nº	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.

Display firmware**.**

Firmware version	**Date of change**	**Change note Nº**	**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 Nº**	**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 Nº**	**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.