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1. SI 980301 Ventilator Alarms and INOSYS Nitric Oxide Delivery System

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 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: All ventilators
To:
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 accommodated.

Note: Do not fit an oxygen cell without the foam pad.
3. SI 990101 Ventilator Alarms and INOSYS Nitric Oxide Delivery System

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 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
Pin 1 (alarm signal)
Pin 2 (0 Volts)screen

7 Pin plug Ventilator
Pin 4 (alarm signal)
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)

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 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.
5. SI 000201 Leak Alarm Trigger Threshold.

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 N°: C0481. Alternatively it can be ordered from your local component supply using the Philips part N°: CW20C 104M
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.

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  

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

<table>
<thead>
<tr>
<th>Ventilator</th>
<th>Software Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLE 2000</td>
<td>V3.3</td>
</tr>
<tr>
<td>SLE 2000 HFO</td>
<td>V1.103</td>
</tr>
<tr>
<td>SLE 2000 HFO+</td>
<td>V1.18</td>
</tr>
</tbody>
</table>
9. TB 000801 Ventilator Firmware Status

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 2000 HFO PLUS ventilators.

SLE 2000
Control firmware.

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

SLE 2000 HFO
Control firmware.

<table>
<thead>
<tr>
<th>Firmware version</th>
<th>Date of change</th>
<th>Change note N°</th>
<th>Details of change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.09</td>
<td>09/03/93</td>
<td></td>
<td>Flashing of I/E Ratio display replaced with hyphens to indicate out of limit values.</td>
</tr>
<tr>
<td>V1.10</td>
<td>17/06/94</td>
<td>CN0078</td>
<td>Airway pressure signal conditioner ranging modified to give RV2(zero) and RV5 (span) greater travel.</td>
</tr>
<tr>
<td>V1.103</td>
<td>15/01/99</td>
<td>CN0616</td>
<td>Removal of the audible indication of machine triggered breaths in patient triggered modes (SIMV and PTV).</td>
</tr>
</tbody>
</table>
## Display firmware

<table>
<thead>
<tr>
<th>Firmware version</th>
<th>Date of change</th>
<th>Change note Nº</th>
<th>Details of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0</td>
<td>17/01/95</td>
<td></td>
<td>Initial release</td>
</tr>
<tr>
<td>V1.1</td>
<td>07/02/95</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>V1.2</td>
<td>08/06/95</td>
<td>CN0056</td>
<td>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.</td>
</tr>
<tr>
<td>V1.3</td>
<td>26/07/95</td>
<td>CN0063</td>
<td>Modification to prevent the screen going blank when subject to 8KV ES discharge.</td>
</tr>
<tr>
<td>V1.4</td>
<td>20/12/95</td>
<td>CN0099</td>
<td>Correction of error in Fail to Cycle detection which caused erroneous triggering at low pressures.</td>
</tr>
<tr>
<td>V1.5</td>
<td>26/03/96</td>
<td>CN0116</td>
<td>Delta P to be displayed for CPAP and HFO modes and ident on oscillator pressure gauge changed.</td>
</tr>
<tr>
<td>V1.6</td>
<td>10/07/96</td>
<td>CN0156</td>
<td>Increased range of display of delta pressures. Addition of display of pressure transducer saturation (positive and negative).</td>
</tr>
<tr>
<td>V1.7</td>
<td>30/04/97</td>
<td>CN0308</td>
<td>Implementation of an HFO disconnection alarm and pressure transducer drift alarm.</td>
</tr>
<tr>
<td>V1.8</td>
<td>15/05/97</td>
<td>CN0362</td>
<td>Modification of High alarm level (minimum setting). Update of SLE logo. Addition of conditional assembly directives for french version.</td>
</tr>
<tr>
<td>V1.9</td>
<td>18/11/97</td>
<td>CN0428 CN0449</td>
<td>Inclusion of display firmware in German. Change in method of setting the Delta P alarm.</td>
</tr>
<tr>
<td>V2.0</td>
<td>18/03/98</td>
<td>CN0495</td>
<td>Modification of the pressure transducer drift detection algorithm.</td>
</tr>
</tbody>
</table>
### SLE 2000 HFO PLUS

Control firmware.

<table>
<thead>
<tr>
<th>Firmware version</th>
<th>Date of change</th>
<th>Change note Nº</th>
<th>Details of change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2.1</td>
<td>26/02/99</td>
<td>CN0632</td>
<td>Inclusion of O₂ 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.</td>
</tr>
<tr>
<td>V1.17</td>
<td>02/10/98</td>
<td></td>
<td>Indication of delivery of a machine breath changed from audible to visual in spontaneous period of SIMV mode.</td>
</tr>
<tr>
<td>V1.18</td>
<td>28/06/99</td>
<td>CN0616</td>
<td>Removal of the audible indication of machine triggered breaths in patient triggered modes (SIMV and PTV).</td>
</tr>
<tr>
<td>V1.20</td>
<td>22/10/99</td>
<td>CN0676</td>
<td>Change to the averaging period of the mean calculation to 4 seconds. Watchdog servicing time changed from 350ms to 20ms.</td>
</tr>
</tbody>
</table>

Display firmware.

<table>
<thead>
<tr>
<th>Firmware version</th>
<th>Date of change</th>
<th>Change note Nº</th>
<th>Details of change.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0</td>
<td>30/09/98</td>
<td>CN0560</td>
<td>Initial release.</td>
</tr>
<tr>
<td>V1.1</td>
<td>08/12/98</td>
<td>CN0589</td>
<td>Removal of mean pressure drop alarm. High delta P converted to alarm condition.</td>
</tr>
<tr>
<td>V1.2</td>
<td>12/02/98</td>
<td>CN0608</td>
<td>The response time of the delta P alarm decreased at slower screen update rates.</td>
</tr>
</tbody>
</table>