TRAINING

SUBJECT: SpO2 Fault Diagnosis

The following procedure is primarily for use by "Repair" personnel – this procedure is to be used in conjunction with other relevant, specific Operating Procedures (where applicable).

The equipment required is as follows:

D.V.M., Soldering Iron, Solder, Wire Stripper, Flush Cutter, Snipe Nosed Pliers, Helping Hands, 1 Set of Jewel Screwdrivers, Dremel tool, Clear Silicone, White Silicone, Superglue, Primer (loctite 770), Drying Rack.
Refer to the relevant Operating Procedure (or technical drawing) for the wiring diagram.

Switch on the soldering iron and ensure that it is set at 240°, and clean the tip.

At all times the Quality of the soldering must be as per: SpO2 Testing & QC – Stage 4 – Section 1.

N.B. Due to the age and design of a probe it may be advisable to replace the components with compatible Viamed components in order to ensure that the probe will outlast any warranty.

Any parts to be reused should be cleaned thoroughly with isopropyl alcohol.

Section 1 – Initial Check

1. Lay the Probe on the workbench, and read the paperwork to ascertain whether there is any indication, noted of the possible fault to the item.

2. If the paperwork indicates a possible fault, then address that area first. In all other cases follow the procedure detailed below.

Determination of Fault:

3. First, visually check for the following:

    i) Physical damage to the clip.
    ii) Physical damage to the cable.
    iii) Physical damage to the connector.

    Physical damage can be such as: cracked or broken shells, torn or scarred pads, cuts or kinks to the cable, cracked or broken connectors, bent or broken connector pins.
    If any of the above is found however, an electrical check still needs to be performed as per "Sub-section 4" below. If there is no damage to the connector, it can be reused.
4. Then, using the Test box, check for the following:

i) Intermittent or non-existent component connection.
ii) Intermittent circuitry at points of strain i.e. clip and connector strain-relief.
iii) Break in cable.
iv) Low, High or intermittent readings on the relevant SpO2 Monitor.

5. When testing for electrical faults use the testing process as detailed in "Section 2" below.

Section 2 – Component / Probe Faults Testing

Prior to any testing, the operative / QA must ascertain their individual human finger reading using the "Standard Test Finger Probe" with the Nellcor N200 Monitor.

1. Attach the connector to the QA Test box in the relevant socket (Fig 1.1 "example").

2. Switch on the Test box and the Oscilloscope. If the Led is being tested then, the Red Switch must first be rotated to position "1" (red Light) and then to position "2" (infrared). If the Detector is being tested then the Red switch must be rotated to the "DET" position (sensor).

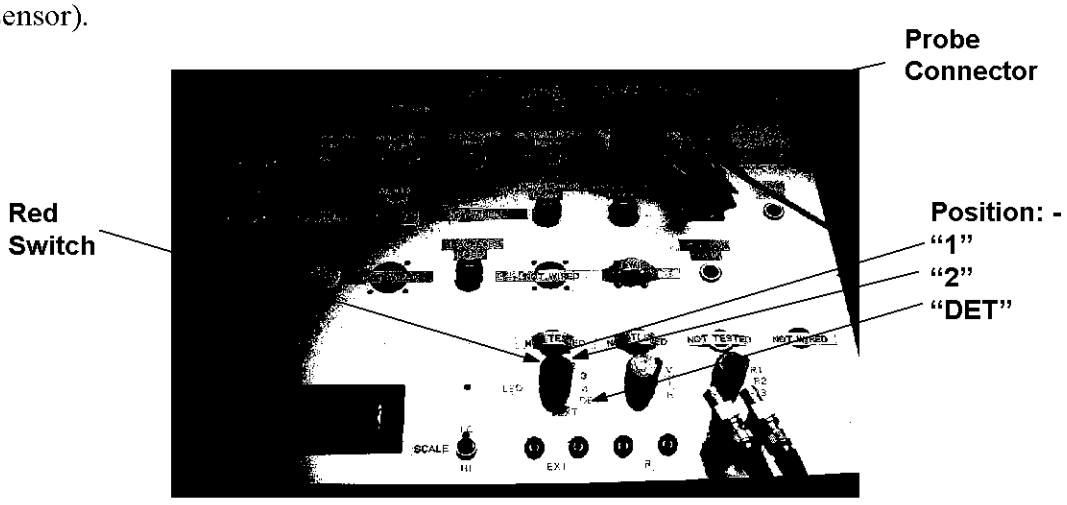

Fig 1.1

3. In all instances, in "Item 2" above, the trace should read as per: "Fig's 1.2, 1.3 & 1.4 respectively. With the trace showing on the Oscilloscope, the relevant component pad must be jiggled with the thumb to check full bonding of the wire and track (the trace should remain constant). The full cable length should also be checked between the component and the connector (the trace should remain constant).


Fig 1.2


Fig 1.3


Fig 1.4

Red Trace **I/R Trace** **Sensor Trace**

4. If there are any anomalies at this stage – i.e. the trace wobbles or disappears altogether, then they should be logged down under the relevant fault found section on the paperwork.

5. With the probe having passed the Test box test, it must now be tested using the DL3000. Select the correct Monitor for the probe (see chart), switch on and, insert the connector to the socket. First test the Clip on Human Finger and record the readings.

6. The Standard readings to be found for all makes of Finger Clip are:
% SpO2: 96 to 99
B.P.M.: 80 (as an average)

7. Situate the clip onto the DL3000 Dummy finger, the LED must be to the underneath (Fig 1.2a & b)

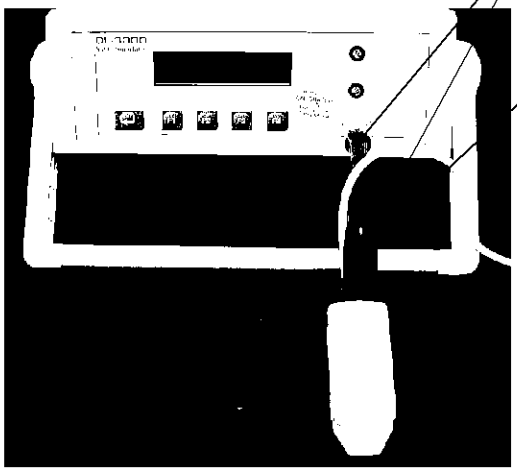

Fig 1.2a

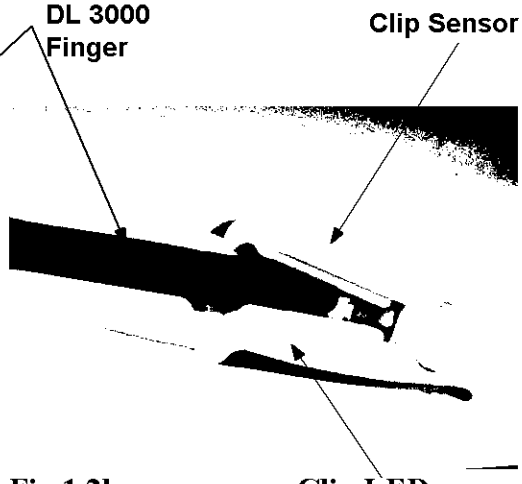

Fig 1.2b

8. On the DL3000, depress button "F1" until the required monitor is displayed on the top line, accept with the "Enter" button. Depress the "F1" button until the appropriate monitor model is displayed on the top line; accept with the "Enter" button. Depress the "F1" button for the Simulation readings.

9. Using the "F1" & "F2" buttons adjust the readings to those quoted on the test sheet, they should be as follows.

[redacted]

10. Check the monitor readings against the simulated readings and note as appropriate. If it fails at this stage then they should be logged down under the relevant "fault found" section on the paperwork, and then it will be cause for repair.

11. Wherever practicable, "service cable assemblies" must be used as part of the repair process to expedite flow through of jobs.

12. Repair of the probe is as per the individual repair procedure.

13. When the probe has been repaired, it must be re-tested as per "Items 1 – 9" above. Once it has passed the above tests, it must be passed to Q.A. for full testing and inspection.

Section 3 – Repair of Clip

1. Remove any damaged parts, and / or faulty components. If replacements are available, then use those to re-assemble the clip, with the existing good parts having been cleaned, using the process laid down in "Stage 4 – Clip Assembly – Section 1 – Stages 2 & 3".

2. If there are no replacement parts available the clip will have to be completely re-built from new, as per the above mentioned stages. In this case, clean and retain the good component parts from the original clip, for re-use at later time on other probes.

3. Where any component parts are overly dirty, and cannot be cleaned by the use of a toothbrush, then these must be cleaned in the "Ultrasonic Cleaner"

Section 4 – Dismantling of Clip

1. With the cable cut off to the strain relief, remove the pads from the shells using a small jewel screwdriver (Fig 1.1). Remove the spring from around the pads (Fig 1.2). Remove the two side buttons and separate the shells (Fig 1.3 & 1.4). Thoroughly clean all parts that are to be re-used, with isopropyl alcohol.

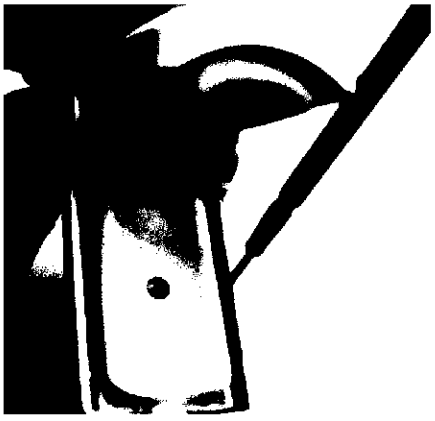

Fig 1.1

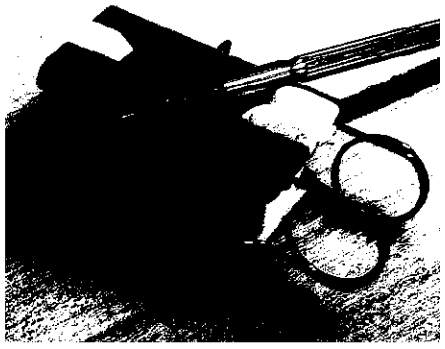

Fig 1.2

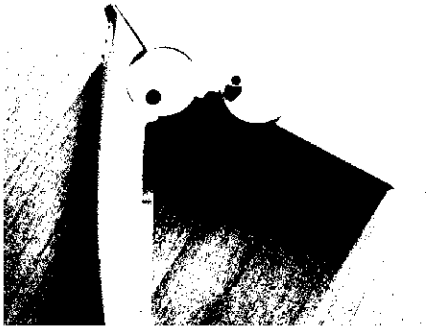

Fig 1.3

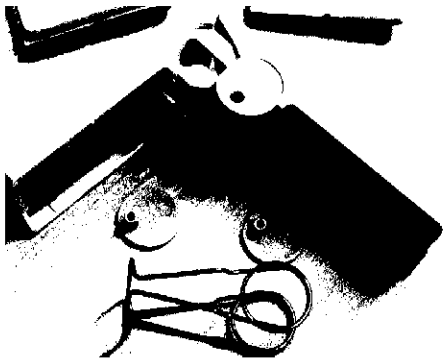

Fig1.4

2. Cut the Emitter and the Detector wires, approximately "1cm" from the pad housing. Then, using snipe nosed pliers, cut the components from within the silicone window (from the rear) - note that this should be done delicately so as not to damage surface of window. (Fig 1.5).

Fig 1.5

3. Clean excess silicone from components, ensuring that the contacts are as clean as possible. De-solder the old wiring from components (Fig 1.6).

Section 5 – Repair of Connector

1. Remove any damaged component parts.

Connector:

1.