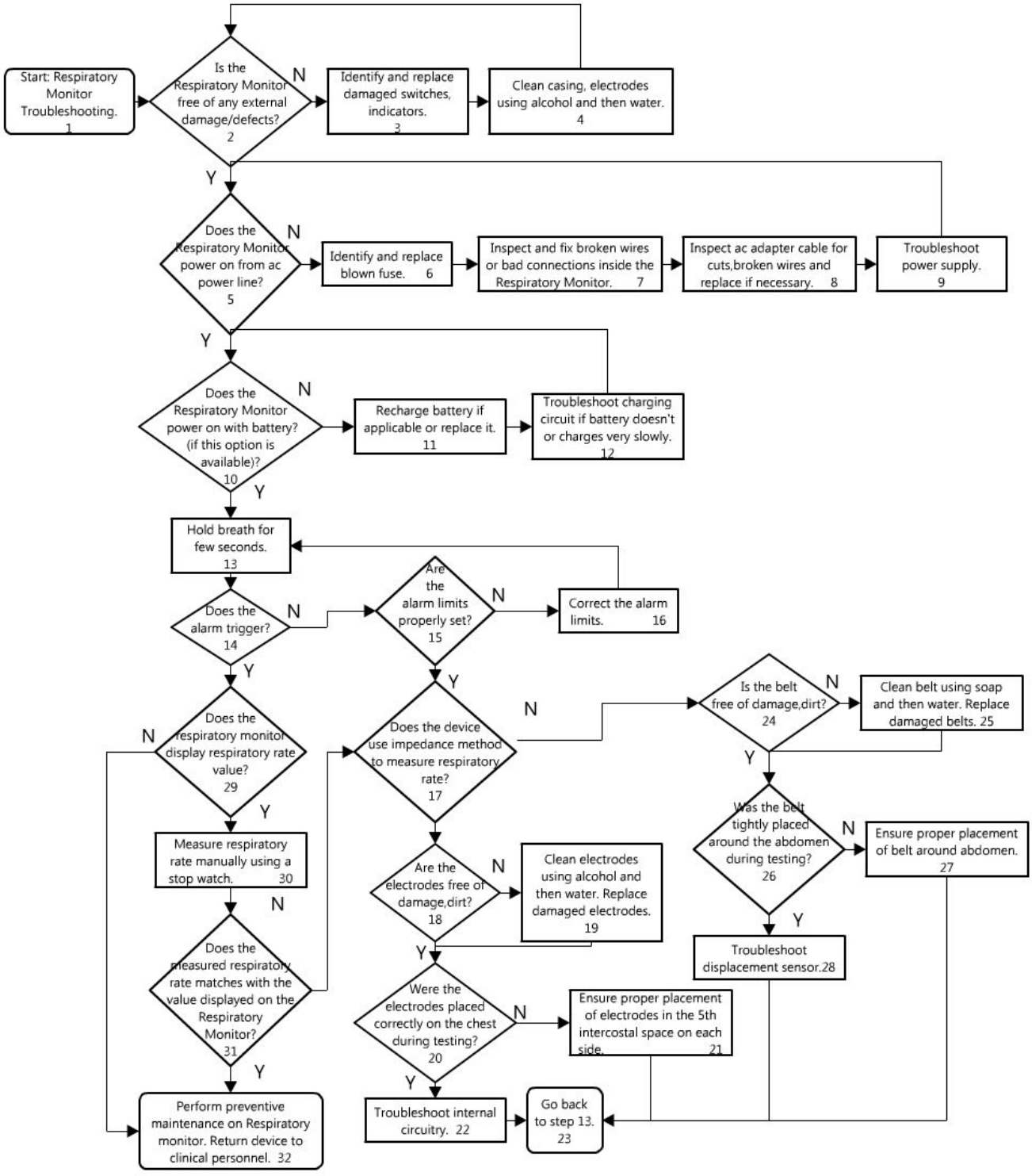
Respiratory Monitor Repair and Troubleshooting



Description

#	Text Box	Comments
1	Start: Respiratory Monitor troubleshooting	Begin diagnostic process for a work order for Respiratory Monitor.
2	Is the respiratory monitor free of any external damage/defects?	Inspect respiratory monitor for external cracks, broken switch etc.
3	Identify and replace damaged switches, indicators.	Refer BTA skill set on Switches and Lighting/Indicators to identify and replace damaged switches and indicators.
4	Clean casing, electrodes using Alcohol and then water.	Examine casing, electrodes and cables for dirt and contamination. Refer BTA skill set on Cleaning to clean the respiratory monitor.
5	Does the respiratory monitor power on from ac power line?	Power the device from ac line and turn it on.
6	Identify and replace blown fuse.	Refer BTA skill set on Fuse to identify and replace blown fuse.
7	Inspect and fix broken wires or bad connections inside the respiratory monitor.	Inspect wires and connections from power supply circuit board to other boards using multimeter. Refer BTA skill set on Connections for identifying and fixing broken wires and bad connections.
8	Inspect AC adapter cable for cuts, broken wires and replace if necessary.	Refer BTA skill set on Connections and Connectors for identifying and replacing damaged cables.
9	Troubleshoot power supply.	Most respiratory monitors can power on from battery and ac power mains.
10	Does the respiratory monitor power on with battery (if this option is available)?	Disconnect respiratory monitor from ac power line. Turn the device on. If respiratory monitor fails to power on then battery is fully depleted or damaged.
11	Recharge battery if applicable or replace it.	Refer BTA skill set on Batteries to replace and identify damaged batteries.
12	Troubleshoot charging circuit if battery doesn't or charges very slowly.	Refer BTA skill set on Transformer and Regulators to troubleshoot charging circuit.
13	Hold breath for few seconds.	Place electrodes/belt as required and turn the device on. Hold breath for few seconds.

14	Does the alarm trigger?	All respiratory and apnea monitors are designed to detect and trigger an alarm when there is a breathing pause for a period of time.
15	Are the alarm limits properly set?	Alarm limits can be modified by the user.
16	Correct the alarm limits.	Refer device manual for correcting alarm limits.
17	Does the device use impedance method to measure respiratory rate?	There are two types of respiratory monitors commonly found in the developing world. *Transthoracic electrical impedance* makes use of electrodes. *Pneumatic abdominal* type makes use of a belt.
18	Are the electrodes free of damage, dirt?	Electrodes should be clean and dry. Inspect the electrode cables and connectors for cuts and broken wires.
19	Clean electrodes using alcohol and then water. Replace damaged electrodes.	Refer BTA skill set on Connections and Connectors for identifying and replacing damaged cables.
20	Were the electrodes placed correctly on the chest during testing?	User error is one of the main reasons for false alarms.
21	Ensure proper placement of electrodes in the 5th intercostal space on each side.	The 5th intercostal space is between the 5th and 6th ribs.
22	Troubleshoot internal circuitry.	Improper functioning of internal circuitry is a common reason for the failure of transthoracic impedance type respiratory monitor. See BTA skills on Electrical Simple.
23	Go back to step 13.	Restart calibration process.
24	Is the belt free of damage, dirt?	Belts should be clean and dry. Inspect the cables and connectors for cuts and broken wires.
25	Clean belt using soap and then water. Replace damaged belts.	Refer BTA skill set on Connections and Connectors for identifying and replacing damaged cables.
26	Was the belt tightly placed around the abdomen during testing?	User error is one of the main reasons for false alarms.
27	Ensure proper placement of belt around abdomen.	Excessively tight belt can lead to complications.
28	Troubleshoot displacement sensor.	Improper functioning of displacement sensor (LVDT or strain gauge) is a common reason for the failure of pneumatic abdominal sensor type

		respiratory monitor.
29	Does the respiratory monitor display respiratory rate value?	Apnea monitors are provided with only the alarm feature. But respiratory monitors have the alarm feature and can also display the respiratory rate value.
30	Measure respiratory rate manually using a stop watch.	Manually count the number of breaths for a period of 20s using stopwatch. Multiply result by 3.
31	Does the measured respiratory rate matches with the value displayed on the Respiratory Monitor?	Improper functioning of internal circuitry or damaged electrodes/belts if there is a mismatch between the measured respiratory rate and the rate displayed on the Respiratory Monitor.
32	Perform preventive maintenance on Respiratory monitor. Return device to clinical personnel.	Respiratory Monitor is working properly. Perform preventive maintenance before returning the device to clinical personnel.