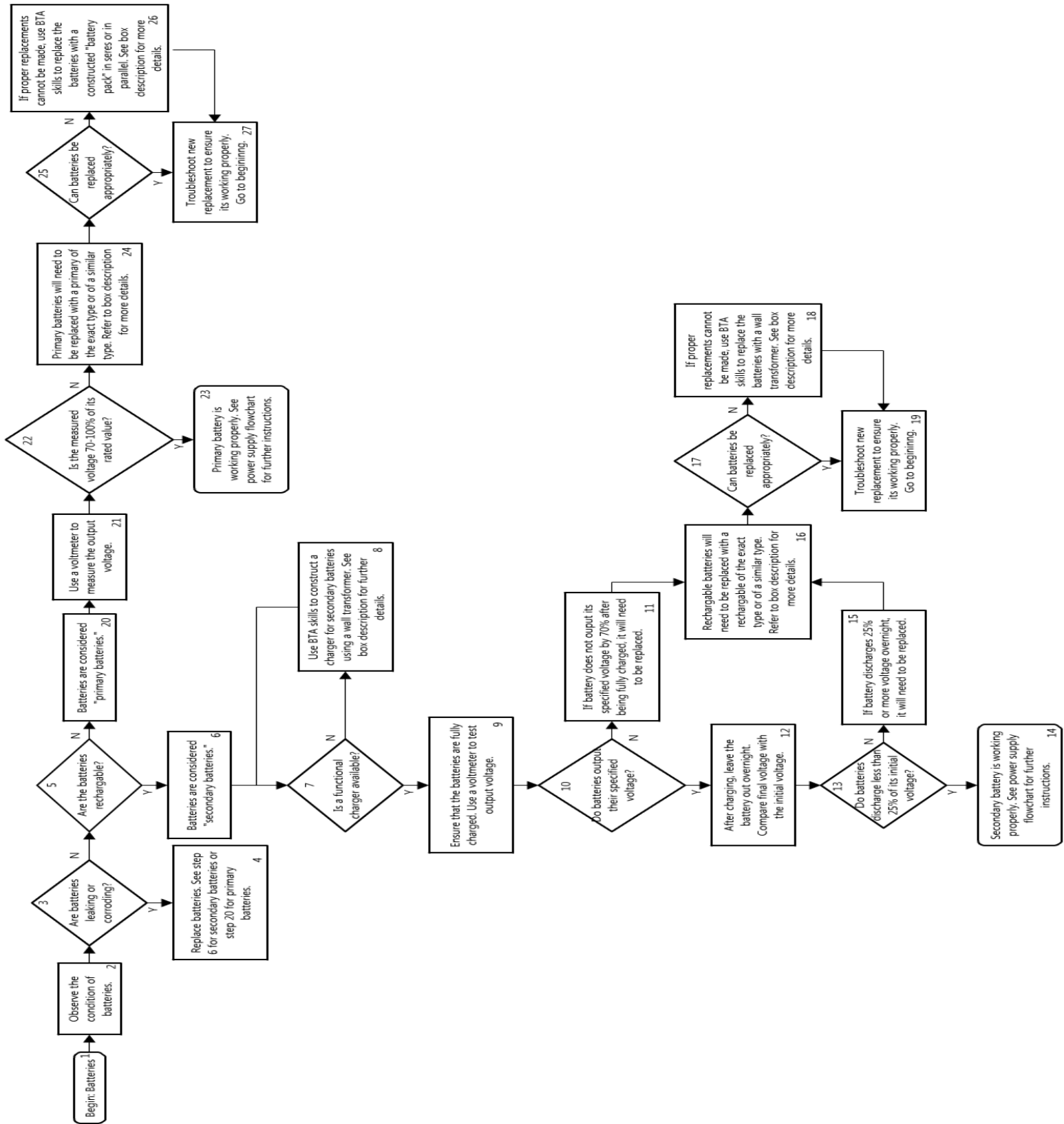


Power Supply Battery Repair and Troubleshooting



Description

#	Text Box	Comments
1	Begin: Batteries	Begin diagnostic process for a work order for Batteries. Testing and maintenance is advised when a device using batteries fails to turn on.
2	Observe the condition of batteries.	Are there any signs of leaking, rust, corrosion? These obvious faults should clearly indicate any problems within batteries.
3	Are batteries leaking or corroding?	If any batteries are not found to be in good condition, they should be discarded and replaced.
4	Replace batteries. See step 6 for secondary batteries or step 20 for primary batteries.	The identified problematic batteries should be discarded and replaced following the guidelines for their type.
5	Are the batteries rechargeable?	NiCd, Lead Acid, NiMH, Li-ion batteries are common chargeable batteries. Lithium or carbon-zinc are not rechargeable.
6	Batteries are considered "secondary batteries."	Secondary batteries have the ability to be recharged.
7	Is a functional charger available?	Chargers typically accompany types of rechargeable batteries.
8	Use BTA skills to construct a charger for secondary batteries using a wall transformer. See box description for further details.	If no charger is available, use BTA skills to construct an appropriate charger. BTA protocol states that this can be done using a wall transformer with a female coaxial cable connector. Transformer must match the input voltage (110 vs. 240 V), the output voltage, voltage type (AC/DC), and the output current capacity of the batteries. If the original charger is not available, connections to the batteries can be made by opening the device and wiring in new connections. Alligator clips should suffice.
9	Ensure that the batteries are fully charged. Use a voltmeter to test output voltage.	Fully charge batteries before assessing their ability to hold their charge over time.
10	Do batteries output their specified voltage?	Measure and note the initial voltage before leaving them to sit overnight.
11	If battery does not output its specified voltage by 70% after being fully charged, it will need to be replaced.	If this initial voltage is not at least 70% of its rated value at full charge, it is not acceptable and should be replaced.

12	After charging, leave the battery out overnight. Compare final voltage with the initial voltage.	Let the battery sit overnight (connected to nothing) to assess its ability to hold a charge over time.
13	Do batteries discharge less than 25% of its initial voltage?	If more than 75% of charge is maintained, the battery is suitable for use.
14	Secondary battery is working properly. See power supply flowchart for further instructions.	Move on to the next step of the power supply flowchart if device still does not turn on. Be sure to troubleshoot, calibrate, and appropriately test medical device before releasing to clinician.
15	If battery discharges 25% or more voltage overnight, it will need to be replaced.	If less than 75% of charge is maintained, the battery is not suitable for use and will need to be placed.
16	Rechargeable batteries will need to be replaced with a rechargeable of the exact type or of a similar type. Refer to box description for more details.	Replacements should be an exact match with type, voltage, and capacity. An imperfect match is permitted if substituting with a primary battery of a larger capacity with same type and voltage.
17	Can batteries be replaced appropriately?	Exact replacements may not be realistic or available.
18	If proper replacements cannot be made, use BTA skills to replace the batteries with a wall transformer. See box description for more details.	<p>Here are some additional suitable substitutions:</p> <ul style="list-style-type: none"> -NiCd for NiMH of the same voltage and capacity – matching voltage takes priority -NiMH for NiCd of the same voltage and capacity – matching voltage takes priority <p>The only downside is that NiCd have lower capacities and operate for shorter periods of time before needing to be charged.</p>
19	Troubleshoot new replacement to ensure it's working properly. Go to beginning.	Once an appropriate replacement or substitution has been made, troubleshoot device with new battery solution.
20	Batteries are considered "primary batteries."	Primary batteries are not reusable and cannot be recharged.
21	Use a voltmeter to measure the output voltage.	Check the output of the primary batteries as is.
22	Is the measured voltage 70-100%	If voltage is less than 70% of its rated value, it must be discarded

	of its rated value?	and replaced.
23	Primary battery is working properly. See power supply flowchart for further instructions.	Move on to the next step of the power supply flowchart if device still does not turn on. Be sure to troubleshoot, calibrate, and appropriately test medical device before releasing to clinician.
24	Primary batteries will need to be replaced with a primary of the exact type or of a similar type. Refer to box description for more detail.	Replacements should be an exact match with type, voltage, and capacity. An imperfect match is permitted if substituting with a primary battery of a larger capacity with same type and voltage.
25	Can batteries be replaced appropriately?	Exact replacements may not be realistic or available.
26	If proper replacements cannot be made, use BTA skills to replace the batteries with a constructed "battery pack" in series or in parallel. See box description for more details.	Create a battery pack by adding primary batteries in series or in parallel to achieve the same total voltage and/or capacity ratings. -In parallel: Maintains voltage, Adds Capacities -In series: Adds voltages, Maintains Capacities
27	Troubleshoot new replacement to ensure it's working properly. go to beginning.	Once an appropriate replacement or substitution has been made, troubleshoot device with new battery solution.