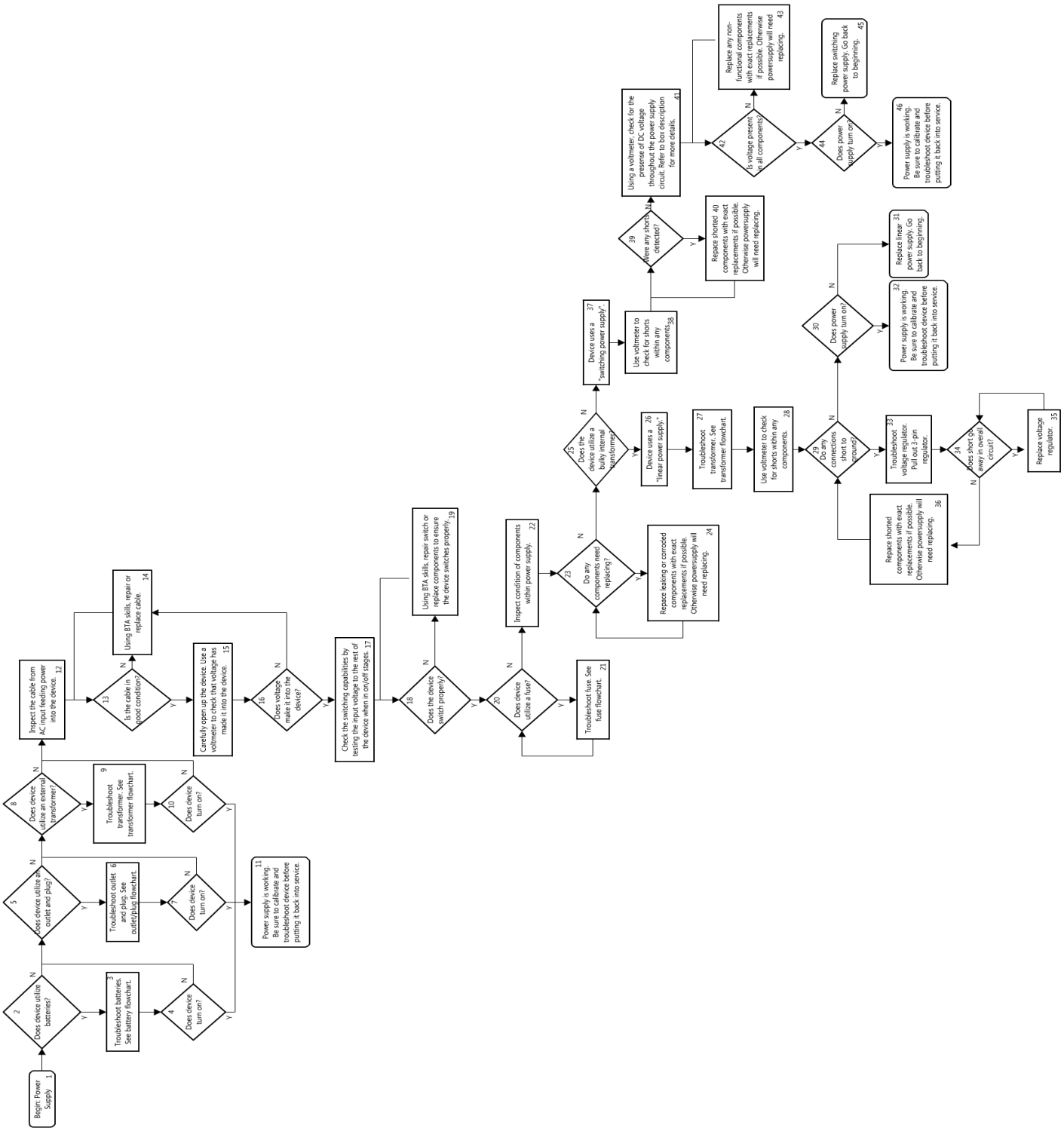
Power Supply (Overall) Repair and Troubleshooting



Description

#	Text Box	Comments
1	Begin: Power Supply	Begin diagnostic process for a work order on Power Supply. Testing and maintenance is advised when a device fails to turn on.
2	Does device utilize batteries?	A device may run on primary or chargeable batteries. This can be in addition to a wall input.
3	Troubleshoot batteries. See battery flowchart.	Refer to the battery troubleshooting guide to ensure the proper functionality of the device batteries.
4	Does device turn on?	If after successfully troubleshooting the batteries, the device power supply problem may resolve.
5	Does device utilize an outlet and plug?	A device may run on the AC voltage input from wall sockets.
6	Troubleshoot outlet and plug. See outlet/plug flowchart.	Refer to the output/plug troubleshooting guide to ensure the proper functionality of the device's input power.
7	Does device turn on?	If after successfully troubleshooting the outlet and plug, the device power supply problem may resolve.
8	Does device utilize an external transformer?	A device may require that the AC wall input is transformed into the appropriate voltage for device functioning.
9	Troubleshoot transformer. See transformer flowchart.	Refer to the transformer troubleshooting guide to ensure the proper functionality of the device's transformer.
10	Does device turn on?	If after successfully troubleshooting the transformer, the device power supply problem may resolve.
11	Power supply is working. Be sure to calibrate and troubleshoot device before putting it back into service.	Be sure to troubleshoot, calibrate, and appropriately test medical device before releasing to clinician.
12	Inspect the cable from AC input feeding power into the device.	Notice any deformities or exposed wires in power cord.
13	Is the cable in good condition?	If any deformities or exposed wires are found, the cable is not in good condition.
14	Using BTA skills, repair or replace cable.	Cable can be resoldered, taped, and assembled such that the cable is functional and safe. Replace it if these methods are not adequate.
15	Carefully open up the device. Use a voltmeter to check that voltage	Follow the power cord into the device. Immediately check the voltage at the point where the cord does not pass through any

	has made it into the device.	circuit components.
16	Does voltage make it into the device?	Voltage may not properly conduct through a poorly conducting cable.
17	Check the switching capabilities by testing the input voltage to the rest of the device when in on/off stages.	Using voltmeter to measure voltages in on and off states of the device's power switch.
18	Device should yield the appropriate voltage when switched on and no voltage when switched off.	When turned on and connected, the voltage should conduct. When device is switched off, there should be an open current in which no electrical conduction occurs.
19	Does the device switch properly?	If voltage conducts when switch is on, and fails to conduct when switch is off, the device switches properly.
20	Using BTA skills, repair switch or replace components to ensure the device switches properly.	Mechanical switches require simple observation and repair. An electrical transducer and/or relay will require the engineer uses the voltmeter to determine if an open circuits are occurring in any of the circuit components. These parts will have to be replaced as necessary. See BTA skills on Mechanical Switches and Electrical Simple.
21	Does device utilize a fuse?	Use a mulitmeter to assess whether or not the fuse shorts. A shortage indicates a functioning fuse.
22	Troubleshoot fuse. See fuse flowchart.	If the fuse shorts, it is still functioning.
23	Inspect condition of components within power supply.	Are any capacitors puffy? Are any components melted or burnt? Are there any signs of rust or corrosion? These obvious faults should clearly indicate any problem within the power supply.
24	Do any components need replacing?	If any components are not found to be in good condition, they will need to be replaced exactly. This may not always be possible, and harvesting components from old, dysfunctional equipment is always a safe bet.
25	Replace leaking or corroded components with exact replacements if possible. Otherwise power supply will need replacing.	The determined components should be removed and replaced using solder and a soldering iron. If exact or equivalent replacements cannot be made, the power supply will need replacing.
26	Does the device utilize a bulky internal transformer?	After opening the device, and large transformer with input and output specification should be obvious in a linear power supply.

27	Device uses a “linear power supply.”	Linear power supplies are characteristic of bulky and large devices. These power supplies use a transformer, rectifier, regulator, and filter in series to achieve the desired and necessary voltage signal for the device.
28	Troubleshoot transformer. See transformer flowchart.	Refer to the transformer troubleshooting guide to ensure the proper functionality of the device’s transformer.
29	Use voltmeter to check for shorts within any components.	Using the connection mode on the voltmeter, methodically move through each component of the power supply to determine if there are any shorts to ground.
30	Do any connections short to ground?	It should be clear if a component is not conducting properly by assessing with a multimeter.
31	Power supply is working. Be sure to calibrate and troubleshoot device before putting it back into service.	Be sure to troubleshoot, calibrate, and appropriately test medical device before releasing to clinician.
32	Troubleshoot voltage regulator. Pull out 3-pin regulator.	Voltage regulator handles large spikes in voltages. Pull out the 3-pin to determine if the regulator has failed.
33	Does short go away in overall circuit?	Using the connection mode on the voltmeter, methodically move through each component of the power supply to determine if there are any shorts to ground.
34	Replace voltage regulator.	If the circuit does not short when voltage regulator is removed, the voltage regulator needs replacing.
35	Replace shorted components with exact replacements if possible. Otherwise power supply will need replacing.	The determined components should be removed and replaced using solder and a soldering iron. If exact or equivalent replacements cannot be made, the power supply will need replacing.
36	Device uses a “switching power supply.”	Switching power supplies are characteristically lighter than linear power supplies. They also use a transformer, but less bulky ones. They fit amount the other smaller circuit components.
37	Use voltmeter to check for shorts within any components.	Using the connection mode on the voltmeter, methodically move through each component of the power supply to determine if there are any shorts to ground.
38	Were any shorts detected?	It should be clear if a component is not conducting properly by assessing with a multimeter.
39	Replace shorted components with exact replacements if possible. Otherwise power supply will need	The determined components should be removed and replaced using solder and a soldering iron. If exact or equivalent replacements cannot be made, the power supply will need

	replacing.	replacing.
40	Using a voltmeter, check for the presence of DC voltage after rectification and before the small internal transformer.	Using the voltage mode on the voltmeter, methodically move through each component of the power supply to determine if there the appropriate DC voltage is being conducted.
41	Troubleshoot internal transformer. It's important that the input and output is of the appropriate voltage.	Refer to the transformer troubleshooting guide to ensure the proper functionality of the device's transformer. If the internal transformer in a switching power supply is not functioning, it will need to be replaced.
42	Using a voltmeter, check for the presence of DC voltage after rectification after the transformer.	Using the voltage mode on the voltmeter, methodically move through each component of the power supply to determine if there the appropriate DC voltage is being conducted.
43	Is voltage present in all components?	It should be clear if a component is not conducting properly by assessing with a voltmeter.
44	Replace any non-function components with exact replacements if possible. Otherwise power supply will need replacing.	The determined components should be removed and replaced using solder and a soldering iron. If exact or equivalent replacements cannot be made, the power supply will need replacing.
45	Power supply is working. Be sure to calibrate and troubleshoot device before putting it back into service.	Be sure to troubleshoot, calibrate, and appropriately test medical device before releasing to clinician.