

## **OPERATIONAL CHECKOUT PROCEDURE**

This procedure tests all features of the Model 7A to verify that it is functioning properly. If the Model 7A appears to function improperly during use, perform this procedure to determine the cause of the problem.

### **Test Equipment**

The following test equipment is required to perform the Operational Checkout:

- Bourns trimpot adjustment tool
- Oscilloscope and probes
- Test Cables
- 1K ohm 1% load resistor
- Function Generator
- Rubber band

### **Procedure**

1. Connect the load resistor across the front panel OUT jack (J2).
2. Connect the oscilloscope across the load resistor.
3. Set the DURATION control to 6 ms.
4. Set the CURRENT control to 20 mA.
5. Turn the POWER ON/OFF switch ON.
6. Turn the PACE ON/OFF switch ON.
7. Verify that the LOW BAT LED is not lit. If it is lit, replace the batteries.
8. Set the RATE control to 60 BPM.
9. Measure the actual rate on the oscilloscope. It should measure within 10% of full scale.
10. Repeat steps 8 and 9 for the following RATE settings, leaving the CURRENT and DURATION settings unchanged:
  - 100 BPM
  - 140 BPM
  - 180 BPM
  - 220 BPM
  - 260 BPM
  - 300 BPM
11. Secure the X1/X2 momentary toggle switch in the X2 position by looping the rubber band from the X1/X2 switch over the EXT IN + and - jacks on the rear panel.
12. Repeat steps 8 and 9 for all of the indicated RATE settings, and verify that the observed rate is double the RATE switch setting in all cases.

13. Remove the rubber band.
14. Set the RATE control to 180 BPM.
15. Set the CURRENT control to 20 mA.
16. Set the DURATION control to 2 ms and observe the oscilloscope.
17. Verify that the observed duration is within  $\pm 1$  ms of this setting.
18. Repeat step 17 for the following DURATION settings:
  - 4ms
  - 6ms
  - 8ms
  - 10ms
19. With the RATE control set for 180 BPM, set the DURATION control to 6 ms.
20. Set the CURRENT control to 5 mA.
21. Observe the oscilloscope and verify that the actual measured current is within 10% of full scale.
22. Repeat step 21 for the following current settings:
  - 10mA
  - 15mA
  - 20mA
  - 25mA
  - 30mA
  - 35mA
  - 40mA
23. Set the function generator for a square wave output, with amplitude of 5 volts and a minimum pulse duration of 0.3 ms.
24. Connect the function generator to the EXT IN + and - jacks on the rear of the Model 7A.
25. Set the EXT / INT switch to EXT.
26. Set the DURATION and CURRENT controls to their maximum settings.
27. While observing the oscilloscope, adjust the amplitude of the function generator until the Model 7A output is triggered.
28. Increase the output frequency of the function generator until the Model 7A output starts to degrade.
29. The Model 7A output should not start to degrade until the external input frequency exceeds 10 Hz (600 BPM).
30. Disconnect all test equipment and turn the Model 7A off to avoid wearing out the batteries.

## **CALIBRATION**

Calibrate the Model 7A if it fails any portion of the Operational Checkout procedure. When calibration is completed, repeat the Operational Checkout. If the Model 7A cannot be calibrated to within tolerance, return to CardioCommand, Inc. for servicing.

1. Remove the top cover of the Model 7A by removing 2 Philips-head screws. Carefully slide the cover up and off of the Model 7A.
2. Connect the 1K $\Omega$  load resistor across the front panel OUT jack (J4).
3. Connect the oscilloscope across the load resistor.
4. Turn the POWER ON/OFF switch ON.
5. Turn the PACE ON / OFF switch ON.
6. Verify that the LOW BAT LED is not lit. If it is lit, replace the batteries.
7. Verify that the X1 / X2 switch is in the X1 position.
8. Set the RATE control to 60 BPM.
9. Adjust minimum-rate trimpot R1 until the oscilloscope displays a period of one second.
10. Set the RATE control to 300 BPM.
11. Adjust maximum-rate trimpot R18 until the oscilloscope displays a period of 200 mS.
12. Repeat steps 8 through 11 until no further adjustment is necessary. If the Model 7A cannot be calibrated, check U5, U6, rate potentiometer and associated circuitry.
13. Set CURRENT control to 20 mA.
14. Adjust the current trimpot R12 until the current measured across the load resistor is 20 mA  $\pm$  10%.