

**TM8B ASSEMBLY and TEST PROCEDURE CHECKLIST  
DOCUMENT NUMBER I-2008  
REFERENCE DOCUMENT NUMBER I-2006**

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Date			
Lot no.			
Board no.			

		Initial
<b>II.</b>	<b>INSPECTION</b>	
	A. Thoroughly inspect the board.....	
	B. modification.....	
	C. software version.....	
<b>III.</b>	<b>ALIGNMENT AND TEST</b>	
	A. Mount board.....	
	B. 3.00vdc power.....	
	C. Install current software.....	
	D. Connect remote record switch.....	
	E. Connect 5-lead ECG cable.....	
	F. Apply power.....	
	G. Measure the dc voltages.....	
	H. Subcarrier VCO adjustment.....	
	I. Input amplitude adjustment.....	
	J. Input overload recovery test.....	
	K. Lead fault test.....	
	L. Low battery test.....	
	M. Remote Record test.....	
	N. Defibrillator test.....	
	O. Apply a small amount of nail polish.....	

# TM8B ASSEMBLY AND TEST PROCEDURE

DOCUMENT NUMBER: I-2006

SCOPE: The purpose of this document is to define the requirements for testing and assembling the TM8B patient transmitter, part number I-1003. It is divided into three sections:

1. I-106 Alignment and Test Procedure.
2. M-102 Alignment and Test Procedure.
3. I-1003 Final Assembly and Test Procedure.

## APPLICABLE REFERENCE DOCUMENTS:

21 C.F.R., Part 820	Current Good Manufacturing Practices
ASTM D 3951-90	Packaging, Commercial
ANSI/ASQC Q9002	Quality Systems Model
ANSI/J-STD-001, Class 2	Requirements for Soldered Electrical and Electronic Assemblies
EIA RS-471	Symbol and Label for Electrostatic Sensitive Devices
ANSI/ASQCZ1.4	Sampling Plans for Attributes
47 C.F.R., Part 95	Personal Radio Services

## I-106 ALIGNMENT and TEST PROCEDURE

### I. TEST EQUIPMENT REQUIRED

#### **NOTICE**

**ALL TEST EQUIPMENT WITH STATED ACCURACY MUST BEAR A CURRENT CERTIFIED CALIBRATION NOTICE**

- A. Digital Multimeter, True RMS (AC volts), 4 1/2 digit minimum, 1% accuracy.
- B. DC ammeter, 5% accuracy.
- C. Oscilloscope, DC-10MHz minimum, 1% accuracy.
- D. Signal Generator, Sine Wave capable, .1-1MHz minimum range, 100ppm accuracy.
- E. Frequency Counter, DC-1MHz range, 10ppm accuracy.
- F. Power Supply, minimum 0-5 volt range at 100mA, maximum ripple, 5mV, 100ppm stability.
- G. Philips 8xLPC76x programmer.
- H. Standard 9-pin male-to-female pin-to-pin serial cable.
- I. I-108 programmer-to-board interconnect cable.
- J. PC with Win95 or later OS.
- K. MT2051 Defibrillator test set.

### II. INSPECTION

- A. Thoroughly inspect the board for possible assembly errors, such as defective or unsoldered joints, bridged pads/vias, component orientation and value or type, etc.

- B. If a modification suffix appears on the current bill of materials, determine that the mod level on the applicable subassembly is correct by referring to the applicable DCN file for details concerning the modification.
- C. Verify that the software version as listed in the TM8B console software program I-107 agrees with the version specified on the current bill of materials.

### III. ALIGNMENT AND TEST

- A. Mount board onto the TM8B case header as outlined in the I-2008 TM8B final assembly procedure.  
NOTE: Don't install wires that connect to the remote record switch at E8 and E9.
- B. Connect a 3.00vdc power source to the battery connections.
- C. Install current software using the TM8B console software program I-107 as outlined in document I-2007.
- D. Connect remote record switch wires to E8 and E9.
- E. Connect 5-lead ECG cable to a common, ground isolated signal source. Connect the Red and Brown leads to (+)signal and Green, White and Black leads to (-)signal.  
NOTE: Make shortest connection possible to minimize 60Hz pickup.
- F. Apply power. Ammeter should indicate 2.25 - 2.75mA.
- G. Measure the dc voltages at test points listed below.
  - 1. TP10: 1.625 – 1.675Vdc
  - 2. TP11: 1.49 - 1.51Vdc
  - 3. TP12: 2.90 – 3.10Vdc
- H. Subcarrier VCO adjustment.
  - 1. Attach scope and counter to TP8. Observe clean and relatively stable triangle waveform. Adjust R39 for 3875 – 3885Hz at an amplitude of .8 – 1.0 volt.
  - 2. Attach scope and counter to TP7. Observe clean and relatively stable triangle waveform. Adjust R41 for 2275 – 2285Hz at an amplitude of .8 – 1.0 volt.
- I. Input amplitude adjustment and upper passband test.
  - 1. Set signal source to 10Hz, 4mV sine wave.
  - 2. Attach RMS meter to TP5 and adjust R45 for 180mVrms.
  - 3. Adjust frequency until meter indicates .126mVrms. Verify signal source indication of 80 – 100Hz.
  - 4. Attach rms meter to TP6 and adjust R50 for 200mVrms.
  - 5. Adjust frequency until meter indicates .140mVrms. Verify signal source indication of 80 – 100Hz.

**J. Input overload recovery test.**

1. **Attach scope to TP5 and momentarily remove either the white or red lead. Verify the immediate return of signal.**
2. **Attach scope to TP6 and momentarily remove either the brown or black lead. Verify the immediate return of signal.**

**K. Lead fault test.**

1. **Attach scope and counter to TP9 check for the frequencies listed below:**
  - a. **With all leads connected verify a 400Hz, .6 - .8 volt triangle wave.**
  - b. **Disconnect each signal lead momentarily and verify the following signal at TP9:**
    1. **Red or white or green lead: 330Hz.**
    2. **Brown or black lead: 256Hz.**

**L. Low battery test.**

1. **Attach DVM to TP12 and lower supply voltage until meter indicates 0Vdc.**
  - a. **Power supply should indicate 1.45 – 1.50Vdc.**
  - b. **Verify 512Hz, .5 - .6 volt triangle wave at TP9 after 10 – 15 seconds.**

**M. Remote Record test.**

1. **Set supply voltage to 3.00Vdc.**
2. **Press the Remote Record switch. After approximately 1 second verify a 460Hz, .5 - .6 volt triangle wave at TP9, lasting approximately 2 seconds.**

**N. Defibrillator test.**

1. **Reference document no. LSI-1004 ECG defibrillator test procedure.**

**O. Apply a small amount of nail polish to the potentiometers.**

**This concludes the I-106 board alignment and test procedure.**

## **M-102 ALIGNMENT and TEST PROCEDURE**

### **IV. TEST EQUIPMENT REQUIRED**

#### **NOTICE**

**ALL TEST EQUIPMENT WITH STATED ACCURACY MUST BEAR A CURRENT CERTIFIED CALIBRATION NOTICE**

- A. M-102 test fixture.
- B. M-102 test cable.
- C. DC ammeter, 5% accuracy.
- D. RF signal analyzer/counter, 1GHz range, 10ppm accuracy.
- E. Power Supply, minimum 0-5 volt range at 100mA, maximum ripple, 5mV, 100ppm stability.
- F. DMM, 3 ½ digit minimum, 2% accuracy.

### **V. INSPECTION**

- A. Thoroughly inspect the board for possible assembly errors, such as defective or unsoldered joints, bridged pads/vias, component orientation and value or type, etc.
- B. If a modification suffix appears on the current bill of materials, determine that the mod level on the applicable subassembly is correct by referring to the applicable DCN file for details concerning the modification.

### **VI. ALIGNMENT AND TEST**

- A. Verify switch positions 1 – 7 on the M-102 test fixture set for 611,00MHz.  
Reference document no. I-2009: I-1003 TRANSMIT FREQUENCY SELECTION CHART.
- A. Mount board onto the M-102 test fixture.
- B. Connect a 3.00vdc power source to the battery connections.
- C. Attach M-102 test cable to the LL (red) connector on the M-102 test fixture, and the spectrum analyzer/counter.
- D. Apply power. Ammeter should indicate 28 - 30mA.
- E. Adjust the trimmer capacitor on the M-102 for an indication of 611MHz, +/-500Hz on the counter.
- F. Verify an indication of (-)25 – (-)27dbm on the analyzer at 611MHz.  
Verify that the +/-50KHz sidebands are at least 40db down from the carrier peak, and that all other sidebands to +/-1MHz are greater than 60db down from the carrier peak.

**This concludes the M-102 board alignment and test procedure.**