OPERATING INSTRUCTIONS

GENERAL DEVICES

MODEL EIM 105-3M

PREP-CHECK ELECTRODE IMPEDANCE METER

1 OVERVIEW

The EIM 105-3M is a hand-held, battery powered device intended to measure the electrical impedance of bio-potential electrodes applied to patients. Impedance readings, measured at 10 Hz. (with no D.C. polarizing current), are presented on a large liquid crystal display, and assisted by "GOOD" and "POOR" lamps. By means of a lead selector switch, impedance is measured between selected electrode and the two other electrodes, which are automatically placed in a parallel combination. This feature simplifies the identification of a bad electrode, electrode site or lead wire. Powered by a common 9 volt battery, battery life is enhanced by an Auto-Off feature. The meter also includes a built-in 100K precision test impedance.

The EIM 105-3M also includes a X1/X10 range switch, extending the range of the meter to 1.99 MOhm, and an ON/OFF slide switch, protecting against accidental turn-on of the unit.

2 CONTROLS AND INDICATORS

2.1 "ON" BUTTON

The ON button turns the Prep-Check on. The Prep-Check automatically turns itself off after approximately seven (7) minutes.

2.2 "ON/OFF" SWITCH

The ON/OFF slide switch, mounted on the side of the instrument, operates such that with the switch in the ON position, the "ON" button and timer function is normal and with the switch in the OFF position, power to the unit is always off.

2.3 "RANGE SELECTOR" SWITCH

The X1/X10 RANGE SELECTOR switch, mounted on the end of the unit, changes the range of the instrument from 199,000 (X1) to 1,990,000 (X10) Ohms. The X1 is the OUT position, and the X10 is the IN position.

2.4 "GOOD" LIGHT

With the range selector in the X1 (OUT) position, the green GOOD light flashes at impedances BELOW 5,000 Ohms, indicating an acceptable electrode impedance.
With the range selector in the X10 (IN) position, the light flashes at impedance below 50,000 Ohms. The light flashes brighter as impedance decreases (improves).

2.5 "POOR" LIGHT

With the range selector in the X1 (OUT) position, the red POOR light flashes at impedances ABOVE 15,000 Ohms, indicating poor electrode contact OR a defective wire or patient cable.

With the range selector in the X10 (IN) position, the light flashes at impedances above 150,000 Ohms. The light flashes brighter as impedance increases (worsens).

The light flashes momentarily for an intermittently defective lead wire or patient cable.

2.6 LEAD WIRE/PATIENT CABLE JACKS

The three color-coded safety DIN (shrouded 0.060") jacks marked "+", "C" and "-" accept standard safety DIN lead wire connectors.

2.7 "LEAD SELECTOR" SWITCH

The four position LEAD SELECTOR switch selects ONE of up to THREE electrodes to be checked. The two remaining electrodes are connected together (in parallel) and used for a "return patch".

The impedance of the parallel combination of two electrodes is always LESS than either electrode.

An example of how the lead SELECTOR switch works is as follows:

When the lead selector switch is pointing to the "+" position, the meter is assessing the "+" electrode impedance. The impedance measured represents the SUM of the "+" electrode and the PARALLEL COMBINATION of the "C" and the "-" electrodes (the "C" and the "_" are connected together). If the "+" electrode had an impedance of 2K Ohms, the "C" electrode an impedance of 3K Ohms, and the "-" electrode an impedance of 150K Ohms (a bad electrode), the meter would read (approximately) 5K Ohms for both the "+" and the "C" positions. When the switch was moved to the "-" position however, the reading would be 150K Ohms.

The "T" (TEST) position introduces an impedance of 100,000 Ohms and is used to test the unit.

In the TEST mode (range switch X1), the digital display must read between 97.0 and 103.0 and the red "POOR" light must be ON. The digital display must read between 097 and 103.

2.8 CONTACT IMPEDANCE DIGITAL DISPLAY

The CONTACT IMPEDANCE display indicates impedance in K Ohms (thousand Ohms).

With the range selector in the X1 range, a reading of "50.0" indicates 50,000 (50 K) Ohms. The highest reading is "199.9" (199,000 Ohms). Impedances above 199,000 (199K) Ohms read "1. ".

With the range selector in the X10 range, a reading of "500" indicates 500,000 (500K) Ohms. The highest reading is "1999" (1,999,000 Ohms). Impedances above 1,999,000, 1,999K or 1.9M Ohms read "1 ".

The legend "LO BATT" will appear in the upper left hand corner of the display when the Prep-Check's battery requires replacement.

3 OPERATION

The PREP-CHECK is used to test electrode contact impedance as follows:

3.1 Prepare electrode site using recommended procedures.
3.2 Attach lead wires to electrodes.
3.3 Apply electrodes to prepared sites using recommended procedures.
3.4 Place lead wires in the appropriate jacks of the PREP-CHECK. Set POWER switch to "ON", RANGE selector to desired position (X1 or X10). The normal range setting is X1.
3.5 Measure impedance.
3.6 Good contact is indicated by the green "GOOD" light. The digital readout should read less than 5,000 (5K) Ohms (05.0). Poor contact impedance is indicated by the red "POOR" light (impedance GREATER that 15,000 (15K) Ohms (15.0).
3.7 Electrodes indicating poor may have to be replaced or the site prepped again. A defective lead wire will also indicate poor.
3.8 Lead wires are tested by stretching the lead wire with moderate force. A defective lead wire will cause the red "Poor" light to flash or stay on continuously.
3.9 Lead wire snaps may be tested by moving them around on the electrode. A bad snap will cause the RED light to flash briefly or stay on continuously.
3.10 Remove lead wires from the PREP-CHECK and connect to the monitor cable.

4 MAINTENANCE

The PREP-CHECK needs no maintenance other than routine battery replacement and periodic calibration. The Zero and 100 K Ohm controls, located on the side (near wrist strap ring) are provided for calibration. GOOD and POOR level adjustments are located near the ON/OFF switch.

4.1 BATTERY REPLACEMENT

Replace the battery (standard 9 Volt alkaline battery when the "LO BATT" legend appears in the digital display. The battery is located beneath a sliding panel on the underside of the instrument.

4.2 ZERO ADJUSTMENT

To adjust the ZERO reading, place a wire between the "+" and the "-" jacks and set the LEAD switch to the "+" position. Using a fine screwdriver, adjust the ZERO control through the RIGHTMOST hole on the LOWER side of the instrument for a reading of 00.0. Do not force the control as this will cause damage.

4.3 100K OHM CALIBRATE ADJUSTMENT

Place the LEAD SELECTOR switch in the "T" (TEST) position and the range selector switch to the X1 position. Adjust the CALIBRATE control through the LEFTMOST hole

on the LOWER side of the instrument for a reading of 100.0. Do not force the control as this will cause damage.

The X10 range calibration is factory set by an internal potentiometer. This adjustment should be performed only by a skilled electronics technician.

4.4 GOOD IMPEDANCE LEVEL ADJUSTMENT

Connect a resistance decade box to the "+" and "C" jacks. Set the LEAD SELECTOR switch to the "+" position and the range selector switch to the X1 position. Adjust the decade box to 5,000 Ohms or to the desired GOOD impedance value. Using a screwdriver, adjust the GOOD impedance level control through the small RIGHTMOST hole on the left of the top side of the instrument. Adjust such that the GOOD light just begins to blink. Do not force the control as this will cause damage.

4.5 POOR IMPEDANCE LEVEL ADJUSTMENT

Repeat above instructions for the GOOD level adjust using desired POOR impedance level and LEFTMOST hole on the left of the top side of the instrument. Do not force the control as this will cause damage. Adjust for 15,000 Ohms or to some other desired impedance value.

5 TECHNICAL SPECIFICATIONS

Measurement Range:	X1 Range: 100 to 199,900 Ohms X10 Range: 1,000 to 1,999,000 Ohms
Accuracy:	X1 Range: +/- 3% of reading, +/-300 Ohms X10 Range: <1 MegOhm: +/- 3% of reading, +/- 3k Ohms >1 MegOhm: +/-10% of reading, +/-3k Ohms
Test Current:	X1 Range: 9uA(RMS), +/-10%, @ 10Hz, +/-10% X10 Range: 0.9uA(RMS), +/-10% @ 10Hz, +/-10%
Direct Current:	0.0 uA DC
Displays:	3 1/2 digit LCD readout GOOD LED @ Z<5K (X1) or 50K (X10) POOR LED @ Z<15K (X1) or 150K (X10)
Self Test:	Internal 100K Ohm 1% resistor
# Electrodes Tested:	3 (each measured with respect to the other two)
Electrode Selection:	4 Position Lead Selector Switch
Electrode Connections:	Three safety DIN (0.060" shrouded pins)
User Available Adjustments:	Zero, Cal, Good and Poor Levels
Power:	9 Volt alkaline battery, type MN1604
Operating Current:	<21 mA
Battery Test:	Continuous, LO-BATT indication on LCD
Battery Access:	Slide-off cover
Cabinet:	ABS Plastic, 3.6" x 6" x 1.9"

Note: Specifications subject to change without notice.