

**Section (iv) Calibration Checks and Accuracy certification.**

**Table (a) Equipment Required:**

Equipment Reference	Description.	Value / Specification.
T1	<b>16A Variac Variable Transformer</b>	<b>With output voltage metering.</b>
R1	<b>Calibrated 100mΩ resistor.</b>	<b>65 Watt rating.</b>
R2	<b>Calibrated 1.0MΩ resistor.</b>	<b>3000 Volt rating @ 2.0 Watt</b>
R3	<b>Calibrated 9.0Ω resistor</b>	<b>2 Watt Rating</b>
R4	<b>Calibrated 1.8Ω resistor.</b>	<b>65 Watt rating</b>
R5	<b>15kΩ (⇒ 230V / 15mA)</b>	<b>300 Volt rating @ 4 Watt</b>
R6	<b>47kΩ (⇒ 230V / 5mA)</b>	<b>300 Volt rating @ 2 Watt</b>
R7	<b>Calibrated 40MΩ</b>	<b>600 Volt rating @ 0.1 Watt</b>
R8	<b>Calibrated 7M Ω</b>	<b>600 Volt rating @ 0.5 Watt</b>
R9	<b>Calibrated 0.1M Ω</b>	<b>600 Volt rating @ 0.5 Watt</b>
R10	<b>7.5kΩ (⇒ 110V / 15mA)</b>	<b>300 Volt rating @ 2 Watt</b>
R11	<b>22kΩ (⇒ 110V / 5mA)</b>	<b>300 Volt rating @ 1 Watt</b>
R12	<b>200kΩ resistor. (⇒ Class 1 Flash)</b>	<b>3000 Volt rating @ 3 Watt</b>
R13	<b>400kΩ resistor. (⇒ Class 2 Flash)</b>	<b>1500 Volt rating @ 3 Watt</b>
R14	<b>2MΩ resistor. (⇒ Class 2 Flash)</b>	<b>1500 Volt rating @ 3 Watt</b>
P1	<b>3kW Load @ 230V.</b>	<b>Power Resistor or Heater</b>
P2	<b>1.5kW Load @ 230V.</b>	<b>Power Resistor or Heater</b>
P3	<b>60W Load @ 230V.</b>	<b>Power Resistor or Lamp</b>
P4	<b>1.5kW Load @ 110V.</b>	<b>Power Resistor or Heater</b>
P5	<b>500W Load @ 110V.</b>	<b>Power Resistor or Lamp</b>
P6	<b>60W Load @ 110V.</b>	<b>Power Resistor or Heater</b>
M1, M2	<b>Digital Multi-meters (i.e. M2008)</b>	
M3	<b>100GΩ / 3000Volt Meter</b>	<b>High Impedance voltmeter or divider for M1</b>
PL1	<b>13A Plug Top</b>	<b>5Ω resistor connected between Live &amp; Neutral</b>
PL2	<b>13A Plug Top</b>	<b>100kΩ resistor connected between Live &amp; Neutral</b>
PL3	<b>13A Plug Top</b>	<b>47kΩ resistor connected between Live &amp; Neutral</b>
PL4	<b>110V Plug Top</b>	<b>5Ω resistor connected between Live &amp; Neutral</b>
PL5	<b>110V Plug Top</b>	<b>47kΩ resistor connected between Live &amp; Neutral</b>
TL1	<b>13A Plug to IEC Socket</b>	<b>Correctly wired</b>
TL2	<b>13A Plug to IEC Socket</b>	<b>Live &amp; Neutral Swapped at the 13A Plug.</b>
TL3	<b>13A Plug to IEC Socket</b>	<b>Live &amp; Neutral Shorted together at the 13A Plug</b>
TL4	<b>110V Plug to IEC Socket</b>	<b>Correctly wired</b>
TL5	<b>110V Plug to IEC Socket</b>	<b>Live &amp; Neutral Swapped at the 110V Plug.</b>
TL6	<b>110V Plug to IEC Socket</b>	<b>Live &amp; Neutral Shorted together at the 110V Plug</b>
TL7	<b>2 Standard Bond Test Lead</b>	<b>Hook Spade to 13A Plug top (Earth Pin Only).</b>
TL8	<b>2 Standard Bond Test Lead</b>	<b>Hook Spade to Hook Spade</b>
TL9	<b>2 Standard Bond Test Lead</b>	<b>Hook Spade to 110V Plug top (Earth Pin Only).</b>
TL10	<b>Custom 13A Plug to 13A Socket.</b>	<b>Ammeter between Live in and Live Out</b>
LK1	<b>Shorting Link</b>	<b>2 pole shorting link 0.1" pitch</b>
LK2	<b>Insulation Test Calibration Lead.</b>	<b>2 pole 0.1" pitch connector to 4mm plugs fly lead.</b>

- (a) Change the PAT4 from normal mode to calibrate mode as follows:

Supply 230V to the PAT4 from supply **T1** whilst holding down the '**SHIFT**' and '**1**' keys. The buzzer should sound briefly.

PAT4 will prompt for the value of the 0.1Ω test resistor **R1**.

- (b) Enter the exact resistance of the test resistor R1 as above to four decimal places.  
(E.g. 0.1038)  
**Press OK Key.**

**N.B PAT4 Mk 1 models do not support the above instructions.**

For early models a separate Calibration EPROM must be used (AVO Pt. No.6139-138).

**Table (b) Calibration Menu**

Menu Option Number 0:	Calibrate <b>Insulation test.</b>
Menu Option Number 1:	Calibrate <b>Circuit Test.</b>
Menu Option Number 2:	Calibrate <b>Earth Continuity Test.</b>
Menu Option Number 3:	Calibrate <b>Earth Bond Test.</b>
Menu Option Number 4:	Calibrate <b>Earth Leakage Test.</b>
Menu Option Number 5:	Calibrate <b>Extension Lead Test.</b>
Menu Option Number 6:	Calibrate <b>Operation Test.</b>
Menu Option Number 7:	Calibrate <b>Flash Test.</b>
Menu Option Number 8:	Calibrate <b>Real time clock.</b>
Menu Option Number 10:	Run <b>Insulation test.</b>
Menu Option Number 11:	Run <b>Circuit Test.</b>
Menu Option Number 12:	Run <b>Earth Continuity Test.</b>
Menu Option Number 13:	Run <b>Earth Bond Test @ 10 Amps</b>
Menu Option Number 14:	Run <b>Earth Bond Test @ 25 Amps</b>
Menu Option Number 15:	Run <b>Extension Lead Test.</b>
Menu Option Number 16:	Run <b>Operation / Earth Leakage Test.</b>
Menu Option Number 17:	Run <b>Flash Test Class 2.</b>
Menu Option Number 18:	Run <b>Flash Test Class 1.</b>
Menu Option Number 19:	Display Time and Date.
Menu Option Number 21:	Adjust contrast.
Menu Option Number 22:	Change PAT4 Model.
Menu Option Number 23:	Change individual calibration constant. !!
Menu Option Number 24:	Test Serial and Parallel Ports.
Menu Option Number 25:	Change to Diagnostics menu.
Menu Option Number 100:	Store default calibration constants. !!

!!!! Must be used with care.

**1.0 Insulation Test**

**(1.1) Checks Insulation Test at 230V supply**

- (A) Supply 230V power to PAT4 from a stabilised supply.  
(B) Select **Option "10"** from the menu. **Press OK Key.**  
(C) Check that the measured values on the PAT4 correspond with the table below:

5% ± 100kΩ

PAT4 13A Socket. Live to Earth	MIN READING	MAX READING	M1 or M2
M1 (1000V dc)			<b>500 to 600V</b>
O/C	<b>&gt;50MΩ</b>	<b>&gt;50MΩ</b>	
R7	<b>R9 - ( R9*0.05) - 0.1MΩ</b>	<b>R7 + ( R7x0.05) + 0.1MΩ</b>	
R8	<b>R8 - ( R8x0.05) - 0.1MΩ</b>	<b>R8 + ( R8x0.05) + 0.1MΩ</b>	
R9	<b>R9 - ( R9x0.05) - 0.1MΩ</b>	<b>R9 + ( R9x0.05) + 0.1MΩ</b>	
R9 & M2 in series (3mA dc)			<b>1.5 to 1.9mA</b>
S/C	<b>0MΩ</b>	<b>0.1MΩ</b>	

- (C) **Press and Hold the OK Key** To return to main menu.  
 (D) Remove 230V Supply from PAT4.

**(1.2) Checks at 110V supply.**

- (A) Supply 110V power to PAT4 from a stabilised supply.  
 (B) **Select Option "10"** from the menu. **Press OK Key.**  
 (C) Check the measured values on the PAT4 correspond with the table below:

5% ± 100kΩ

PAT4 110V Socket. Live to Earth	MIN READING	MAX READING
O/C	<b>&gt;50MΩ</b>	<b>&gt;50MΩ</b>
R7	<b>R9 - ( R9*0.05) - 0.1MΩ</b>	<b>R7 + ( R7x0.05) + 0.1MΩ</b>
R9	<b>R9 - ( R9x0.05) - 0.1MΩ</b>	<b>R9 + ( R9x0.05) + 0.1MΩ</b>
S/C	<b>0MΩ</b>	<b>0.1MΩ</b>

- (D) **Press and Hold the OK Key** To return to main menu.  
 (E) Switch Off Stabilised supply.

**(2.0) Continuity Test .**

- (A) Supply 230V power to PAT4 from a stabilised supply.  
 (B) **Select Option "12"** from the menu. **Press OK Key.**  
 (C) Connect meter **M1** (Volts dc) between PAT4 13A Socket & 200mA terminal.  
**N.B.** This connection is in addition to resistors listed below.  
 (D) Check that the measured values on the PAT4 correspond with the table below.  
 (E) Connect using **TL7 and TL8:**

	$0 < R > 999 \text{m}\Omega \ 5\% \pm 5 \text{m}\Omega$	$1.0 < R > 9.9 \Omega \ 5\% \pm 10 \text{m}\Omega$	
PAT4 13A Socket to 200mA Continuity Socket	MIN READING (PAT4)	MAX READING (PAT4)	M1
TL7	<b>0.000<math>\Omega</math></b>	<b>0.005<math>\Omega</math></b>	-
R1	<b><math>R1 - (R1 * 0.05) - 5 \text{m}\Omega</math></b>	<b><math>R1 + (R1 * 0.05) + 5 \text{m}\Omega</math></b>	<b>15.1 to 18.5mV</b>
R3	<b><math>R3 - (R3 * 0.05) - 10 \text{m}\Omega</math></b>	<b><math>R3 + (R3 * 0.05) + 10 \text{m}\Omega</math></b>	-
(O/C)		<b>&gt;10</b>	<b>3.6 to 4.4V</b>

(F) **Press and Hold the OK Key** To return to main menu.

### (3.0) Bond Test.

#### 3.1 Checks @ 230V & 25A.

- (A) Supply 230V power to PAT4 from a stabilised supply.  
 (B) Connect meter **M1** (Volts ac) between PAT4 13A Socket and Bond Test Terminal.  
**N.B.** This connection is in addition to resistors listed below.  
 (C) **Select Option "14"** from the menu. **Press OK Key.**  
 (D) Check the following readings are obtained on the PAT4 and readings on **M1**.  
**N.B.** All connections must include **TL7 + TL8**.

	$0 < R > 499 \text{m}\Omega \ 5\% \pm 5 \text{m}\Omega$	$500 < R > 1999 \text{m}\Omega \ 5\% \pm 50 \text{m}\Omega$	M1 Min	Max.
PAT4 13A Socket to Bond Test Terminal	MIN READING (PAT4)	MAX READING (PAT4)		
TL7 + TL8	<b>0.000<math>\Omega</math></b>	<b>0.005<math>\Omega</math></b>		
R1	<b><math>R1 - (R1 * 0.05) - 5 \text{m}\Omega</math></b>	<b><math>R1 + (R1 * 0.05) + 5 \text{m}\Omega</math></b>		<b>23/R1 to 27/R1</b>
R4	<b><math>R4 - (R4 * 0.05) - 50 \text{m}\Omega</math></b>	<b><math>R4 + (R4 * 0.05) + 50 \text{m}\Omega</math></b>		
(O/C)	<b>&gt; 2.0<math>\Omega</math></b>	<b>&gt; 2.0<math>\Omega</math></b>		

(E) **Press and Hold the OK Key.** To return to main menu.

#### 3.2 Checks @ 230V & 10A.

- (A) Supply 230V power to PAT4 from a stabilised supply.  
 (B) Connect meter **M1** (Volts ac) between PAT4 13A Socket and Bond Test Terminal.  
**N.B.** This connection is in addition to resistors listed below.  
 (C) **Select Option "13"** from the menu. **Press OK Key.**  
 (D) Check the following resistance readings are obtained on the PAT4 and current readings on the test box:  
**N.B.** All connections must include **TL7 + TL8**.

**0<R>499mΩ 5%± 5mΩ                      500<R>1999mΩ 5%± 50mΩ**

PAT4 13A Socket to Bond Test Terminal	MIN READING (PAT4)	MAX READING (PAT4)	M1 Min Max.
TL7+TL8	<b>0.000Ω</b>	<b>0.005Ω</b>	
R1	<b>R1 - ( R1*0.05) – 5mΩ</b>	<b>R1 + ( R1*0.05) + 5mΩ</b>	<b>8/R1 to 12/R1</b>
R10	<b>R10 - ( R10*0.05) – 50mΩ</b>	<b>R10 + ( R10*0.05) + 50mΩ</b>	
R4	<b>R4 - ( R4*0.05) – 50mΩ</b>	<b>R4 + ( R4*0.05) + 50mΩ</b>	
(O/C)	<b>&gt; 2.0Ω</b>	<b>&gt; 2.0Ω</b>	

(E) **Press and Hold the OK Key.** To return to main menu.

### **3.3 Checks @ 110V & 25A.**

- (A) Supply 110V power to PAT4 from a stabilised supply.  
 (B) Connect meter **M1** (Volts ac) between PAT4 110V Socket and Bond Test Terminal.  
**N.B.** This connection is in addition to resistors listed below.  
 (C) **Select Option “14”** from the menu. **Press OK Key.**  
 (D) Check the following resistance readings are obtained on the PAT4 and current readings on the test box:  
**N.B.** All connections must include **TL8 + TL10.**

**0<R>499mΩ 5%± 5mΩ                      500<R>1999mΩ 5%± 50mΩ**

PAT4 13A Socket to Bond Test Terminal	MIN READING (PAT4)	MAX READING (PAT4)	M1 Min Max.
TL8 + TL10	<b>0.000Ω</b>	<b>0.005Ω</b>	
R1	<b>R1 - ( R1*0.05) – 5mΩ</b>	<b>R1 + ( R1*0.05) + 5mΩ</b>	<b>23/R1 to 27/R1</b>
R10	<b>R10 - ( R10*0.05) – 50mΩ</b>	<b>R10 + ( R10*0.05) + 50mΩ</b>	
R4	<b>R4 - ( R4*0.05) – 50mΩ</b>	<b>R4 + ( R4*0.05) + 50mΩ</b>	
(O/C)	<b>&gt; 2.0Ω</b>	<b>&gt; 2.0Ω</b>	

(E) **Press and Hold the OK Key.** To return to main menu.

### **3.4 Checks @ 110V & 10A.**

- (A) Supply 110V power to PAT4 from a stabilised supply.  
 (B) Connect meter **M1** (Volts ac) between PAT4 13A Socket and Bond Test Terminal.  
**N.B.** This connection is in addition to resistors listed below.  
 (C) **Select Option “13”** from the menu. **Press OK Key.**  
 (D) Check the following resistance readings are obtained on the PAT4 and current readings on the test box:  
**N.B.** All connections must include **TL8 + TL10.**

0<R>499mΩ 5%± 5mΩ

500<R>1999mΩ 5%± 50mΩ

PAT4 13A Socket to Bond Test Terminal	MIN READING (PAT4)	MAX READING (PAT4)	M1 Min Max.
TL8 + TL10	0.000Ω	0.005Ω	
R1	$R1 - (R1 * 0.05) - 5m\Omega$	$R1 + (R1 * 0.05) + 5m\Omega$	8/R1 to 12/R1
R10	$R10 - (R10 * 0.05) - 50m\Omega$	$R10 + (R10 * 0.05) + 50m\Omega$	
R4	$R4 - (R4 * 0.05) - 50m\Omega$	$R4 + (R4 * 0.05) + 50m\Omega$	
(O/C)	> 2.0Ω	> 2.0Ω	

(E) **Press and Hold the OK Key.** To return to main menu.

#### (4.0) Extension Lead Test.

##### (4.1) Checks @ 230V.

- (A) Supply 230V power to PAT4 from a stabilised supply.
- (B) **Select Option "15"** from the menu. **Press OK Key.**
- (C) PAT4 will request "Connect Ext. Lead Plug and Socket to PAT".
- (D) **Press OK Key to repeat test.**
- (E) Check that each of the given conditions is displayed:

Connection between PAT4 13A Socket & IEC Plug	PAT4 MESSAGE
TL2	<b>L &amp; N Transposed</b>
None	<b>Lead is O/C</b>
TL1	<b>Lead is O/K</b>
TL3	<b>Lead is Shorted</b>

- (E) **Press and Hold the ESC Key.** To return to main menu.
- (F) Disconnect the Stabilised supply and the test leads.

##### (4.2) Checks @ 110V.

- (A) Supply 110V power to PAT4 from a stabilised supply.
- (B) **Select Option "15"** from the menu. **Press OK Key.**
- (C) PAT4 will request "Connect Ext. Lead Plug and Socket to PAT".
- (D) **Press OK Key to repeat test.**
- (E) Check that each of the given conditions is displayed:

Connection between PAT4 13A Socket & IEC Plug	PAT4 MESSAGE
TL5	<b>L &amp; N Transposed</b>
None	<b>Lead is O/C</b>
TL4	<b>Lead is O/K</b>
TL6	<b>Lead is Shorted</b>

- (D) **Press and Hold the ESC Key.** To return to main menu.  
(E) Disconnect the Stabilised supply and the test lead.

### (5.0) Operation Test

#### (5.1) Checks @ 230V.

- (A) Supply 230V power to PAT4 from a stabilised supply.  
(A) **Select Option "16"** from the menu. **Press OK Key.**  
(B) Connect Power Loads detailed below to the 230 V socket on the PAT4.  
(C) Check the following readings are obtained on the PAT4.

**0<VA>99VA 5%± 5VA    100<VA>999VA 5%± 10VA    1.00<VA>3.0kA 5%± 100VA**

Load resistor	MIN READING (PAT4)	MAX READING (PAT4)
P1	<b>P1 - ( P1*0.05) – 100VA</b>	<b>P1 + ( P1*0.05) + 100VA</b>
P2	<b>P2 - ( P2*0.05) – 100VA</b>	<b>P2 + ( P2*0.05) + 100VA</b>
P3	<b>P3 - ( P3*0.05) – 5VA</b>	<b>P3 + ( P3*0.05) + 5VA</b>

- (D) **Press and Hold the OK Key.** To return to main menu.  
(E) Disconnect supply T1.

#### (5.2) Checks @ 110V.

- (A) Supply 110V power to PAT4 from a stabilised supply.  
(A) **Select Option "16"** from the menu. **Press OK Key.**  
(B) Connect Power Loads detailed below to the 110 V socket on the PAT4.  
(C) Check the following readings are obtained on the PAT4.

**0<VA>99VA 5%± 5VA    100<VA>999VA 5%± 10VA    1.00<VA>1.6kA 5%± 100VA**

Load resistor	MIN READING (PAT4)	MAX READING (PAT4)
P4	<b>P4 - ( P4*0.05) – 100VA</b>	<b>P4 + ( P4*0.05) + 100VA</b>
P5	<b>P5 - ( P5*0.05) – 10VA</b>	<b>P5 + ( P5*0.05) + 10VA</b>
P6	<b>P6 - ( P6*0.05) – 5VA</b>	<b>P6 + ( P6*0.05) + 5VA</b>

- (D) **Press and Hold the OK Key.** To return to main menu.  
(E) Disconnect supply T1.

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**(6.0) Earth Leakage Test.**

**(6.1) Checks @ 230V.**

- (A) Supply power @ **254V** from **T1** to the PAT4.  
**N.B.** This test displays the effective leakage current that would be present at high mains (254 Volts)
- (B) Connect meter **M1** (30mA ac) in series with resistor specified. Connect series combination between PAT4 13A Socket Live and Earth Pins.  
**N.B.** Do not use a supply incorporating a 15mA RCD during this test.
- (C) **Select Option "16"** from the menu. **Press OK Key.**
- (D) Compare the readings on meter **M1** with those displayed on PAT4.

**5%± 100mA**

M1 in series with	M1 READING	PAT4 MIN READING	PAT4 MAX READING
O/C		<b>0mA</b>	<b>0.1mA</b>
R6	<b>I<sub>1</sub></b>	<b>I<sub>1</sub> - (I<sub>1</sub> * 0.05) - 0.1mA</b>	<b>I<sub>1</sub> + (I<sub>1</sub> * 0.05) + 0.1mA</b>
R5	<b>I<sub>2</sub></b>	<b>I<sub>2</sub> - (I<sub>2</sub> * 0.05) - 0.1mA</b>	<b>I<sub>2</sub> + (I<sub>2</sub> * 0.05) + 0.1mA</b>

- (E) **Press and Hold the OK Key.** To return to main menu.
- (F) Disconnect supply **T1**

**(6.2) Checks @ 110V.**

- (A) Supply power @ **121V** from **T1** to the PAT4.  
**N.B.** This test displays the effective leakage current that would be present at high mains (121 Volts)
- (B) Connect meter **M1** (30mA ac) in series with resistor specified. Connect series combination between PAT4 110V Socket Live and Earth Pins.  
**N.B.** Do not use a supply incorporating a 15mA RCD during this test.
- (C) **Select Option "16"** from the menu. **Press OK Key.**
- (D) Compare the readings on meter **M1** with those displayed on PAT4.

**5%± 100mA**

M1 in series with	M1 READING	PAT4 MIN READING	PAT4 MAX READING
O/C		<b>0mA</b>	<b>0.1mA</b>
R10	<b>I<sub>1</sub></b>	<b>I<sub>1</sub> - (I<sub>1</sub> * 0.05) - 0.1mA</b>	<b>I<sub>1</sub> + (I<sub>1</sub> * 0.05) + 0.1mA</b>
R11	<b>I<sub>2</sub></b>	<b>I<sub>2</sub> - (I<sub>2</sub> * 0.05) - 0.1mA</b>	<b>I<sub>2</sub> + (I<sub>2</sub> * 0.05) + 0.1mA</b>

- (E) **Press and Hold the OK Key.** To return to main menu.
- (F) Disconnect supply **T1**

**(7.0) Circuit / Load Test.**

**(7.1) Checks @ 230V.**

- (A) Supply 230V power to PAT4 from supply **T1**.
- (B) **Select Option "11"** from the menu. **Press OK Key.**

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- (C) Check that the appropriate message appears when the requested plug is applied.

Plug fitted to PAT4	PAT4 INDICATION
None	"O / C"
PL3	"OK"
PL1	"S / C"

- (D) **Press and Hold the OK Key.** To return to main menu.  
 (E) Disconnect supply T1

**(7.2) Checks @ 110V.**

- (A) Supply 110V power to PAT4 from supply T1.  
 (B) **Select Option "11"** from the menu. **Press OK Key.**  
 (C) Check that the appropriate message appears when the requested plug is applied.

Plug fitted to PAT4	PAT4 INDICATION
None	"O / C"
PL5	"OK"
PL4	"S / C"

- (D) **Press and Hold the OK Key.** To return to main menu.  
 (C) Disconnect supply T1

- (8.0) Flash Test Class 1. This section is omitted on PAT4DV models!!!**

**(8.1) Checks @ 230V**

**Warning ! 1500V is applied during this test:  
 3000V is applied to the flash test socket. Ensure probe is not connected.**

- (A) Supply 230V power to PAT4 from supply T1.  
 (B) Connect meter M1 (30mA ac) in series with resistor specified.  
 (C) Connect series combination between PAT4 230V Socket Live and Earth Pins.  
 (D) **Select Option "18"** from the menu. **Press OK Key.**  
 (E) Check the following are obtained. To energise the flash test :  
**Press and hold the shift key.**

**5%± 100µA**

M1 in series with	M1 READING	PAT4 MIN	PAT4 MAX
O/C		0mA	0.1mA
R2	I <sub>1</sub>	$I_1 - (I_1 * 0.05) - 0.1mA$	$I_1 + (I_1 * 0.05) + 0.1mA$
R12	I <sub>2</sub>	$I_2 - (I_2 * 0.05) - 0.1mA$	$I_2 + (I_2 * 0.05) + 0.1mA$
S/C	I <sub>3</sub> =2.7 to 3.0mA	$I_3 - (I_3 * 0.05) - 0.1mA$	$I_3 + (I_3 * 0.05) + 0.1mA$

- (F) **Release the shift key** To stop the test before changing resistors.

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- (G) **Re select Option "18"** to perform next value. **Press OK Key.**
- (H) Connect meter **M3** between PAT4 230V Socket Live and Earth Pins.
- (I) **Re select Option "18"** to perform next value. **Press OK Key.**

	MIN	MAX
<b>M3 READING</b>	<b>1400 V</b>	<b>1600 V</b>

- (J) **Release the shift key** To return to main menu.

**(8.2) Checks @ 110V**

**Warning ! 1500V is applied during this test:  
3000V is applied to the flash test socket. Ensure probe is not connected.**

- (A) Supply 110V power to PAT4 from supply **T1**.
- (B) Connect meter **M1** (30mA ac) in series with resistor specified. Connect series combination between PAT4 110V Socket Live and Earth Pins.
- (C) **Select Option "18"** from the menu. **Press OK Key.**
- (D) Check the following are obtained on the PAT4. To energise the flash test **press and hold the shift key.**

**5%± 100αA**

<b>M1 in series with</b>	<b>M1 READING</b>	<b>PAT4 MIN</b>	<b>PAT4 MAX</b>
<b>O/C</b>		<b>0mA</b>	<b>0.1mA</b>
<b>R2</b>	<b>I<sub>1</sub></b>	<b>I<sub>1</sub> - (I<sub>1</sub> * 0.05) - 0.1mA</b>	<b>I<sub>1</sub> + (I<sub>1</sub> * 0.05) + 0.1mA</b>
<b>R12</b>	<b>I<sub>2</sub></b>	<b>I<sub>2</sub> - (I<sub>2</sub> * 0.05) - 0.1mA</b>	<b>I<sub>2</sub> + (I<sub>2</sub> * 0.05) + 0.1mA</b>
<b>S/C</b>	<b>I<sub>3</sub> =2.7 to 3.0mA</b>	<b>I<sub>3</sub> - (I<sub>3</sub> * 0.05) - 0.1mA</b>	<b>I<sub>3</sub> + (I<sub>3</sub> * 0.05) + 0.1mA</b>

- (E) **Release the shift key** To stop the test before changing resistors.
- (F) **Re select Option "18"** to perform next value. **Press OK Key.**
- (G) Connect meter **M3** between PAT4 110V Socket Live and Earth Pins.
- (H) **Re select Option "18"** to perform next Test. **Press OK Key.**

	MIN	MAX
<b>M3 READING</b>	<b>2700 V</b>	<b>3000 V</b>

- (I) **Release the shift key** To return to main menu.

**(9.0) Flash Test Class 2. !!!! This section is omitted on PAT4DV models!!!!**

**(9.1) Checks @ 230V**

**Warning ! 3000V is applied during this test:**

- (A) Supply 230V power to PAT4 from supply **T1**.

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- (B) Connect meter **M1** (30mA ac) in series with resistor specified. Connect series combination between PAT4 230V Socket Live and 3kV Flash Probe.  
**N.B.** An actual Flash Probe must be used as it contains a 27kΩ resistor.
- (C) **Select Option “17”** from the menu. **Press OK Key.**
- (D) Check the following are obtained on the PAT4.
- (E) To energise the flash test **press and hold the shift key.**

**5%± 100mA**

M1 in series with	M1 READING	PAT4 MIN	PAT4 MAX
O/C		<b>0mA</b>	<b>0.1mA</b>
R14	<b>I<sub>1</sub></b>	<b>I<sub>1</sub> - (I<sub>1</sub> * 0.05) - 0.1mA</b>	<b>I<sub>1</sub> + (I<sub>1</sub> * 0.05) + 0.1mA</b>
R13	<b>I<sub>2</sub></b>	<b>I<sub>2</sub> - (I<sub>2</sub> * 0.05) - 0.1mA</b>	<b>I<sub>2</sub> + (I<sub>2</sub> * 0.05) + 0.1mA</b>
S/C	<b>I<sub>3</sub> =2.7 to 3.0mA</b>	<b>I<sub>3</sub> - (I<sub>3</sub> * 0.05) - 0.1mA</b>	<b>I<sub>3</sub> + (I<sub>3</sub> * 0.05) + 0.1mA</b>

- (F) **Release the shift key** To stop the test before changing resistors.
- (G) **Re select Option “18”** to perform next value. **Press OK Key.**
- (H) Connect meter **M3** between PAT4 230V Socket Live and Flash Probe.
- (I) **Re select Option “18”** to perform next value. **Press OK Key.**

	MIN	MAX
M3 READING	2840 V	3160 V

- (J) **Release the shift key** To return to main menu.

**(9.2) Checks @ 110V.**

**Warning ! 3000V is applied during this test:**

- (A) Supply 230V power to PAT4 from supply **T1**.
- (B) Connect meter **M1** (30mA ac) in series with resistor specified. Connect series combination between PAT4 110V Socket Live and 3kV Flash Probe.  
**N.B.** An actual Flash Probe must be used as it contains a 27kΩ resistor.
- (C) **Select Option “17”** from the menu. **Press OK Key.**
- (D) Check the following are obtained on the PAT4.
- (E) To energise the flash test **press and hold the shift key.**

**5%± 100mA**

M1 in series with	M1 READING	PAT4 MIN	PAT4 MAX
<b>O/C</b>		<b>0mA</b>	<b>0.1mA</b>
<b>R14</b>	<b>I<sub>1</sub></b>	<b>I<sub>1</sub> - (I<sub>1</sub> * 0.05) - 0.1mA</b>	<b>I<sub>1</sub> + (I<sub>1</sub> * 0.05) + 0.1mA</b>
<b>R13</b>	<b>I<sub>2</sub></b>	<b>I<sub>2</sub> - (I<sub>2</sub> * 0.05) - 0.1mA</b>	<b>I<sub>2</sub> + (I<sub>2</sub> * 0.05) + 0.1mA</b>
<b>S/C</b>	<b>I<sub>3</sub> =2.7 to 3.0mA</b>	<b>I<sub>3</sub> - (I<sub>3</sub> * 0.05) - 0.1mA</b>	<b>I<sub>3</sub> + (I<sub>3</sub> * 0.05) + 0.1mA</b>

- (F) **Release the shift key** To stop the test before changing resistors.
- (G) **Re select Option “18”** to perform next value. **Press OK Key.**

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**Press OK Key**

- (O) PAT4 will request "Move to Common".
- (P) Remove resistor **R1**.
- (Q) Connect Bond Test leads **TL7 + TL8** between the **200mA terminal & PAT4DV 13Amp socket Earth Pin**.
- (R) PAT4 will request "Continue ?" **Press OK Key.**

**Continuity Test Calibration is now complete.**

**(3.0) Bond Test Calibration.**

**Stabilised 230V supply (T1) must be used for this calibration.**

**Note to prevent operation of the Bond transformer thermal trip this section must be performed without delay.**

- (A) Connect resistor **R1** between PAT4DV Bond Test terminal and 13Amp socket .  
Using **TL7 + TL8**  
*Important: The value of this resistor must have been entered into the PAT4 during section 1.*
- (B) Connect **M1** (ac volts) across resistor **R1**                      Set this meter to read **AC Volts**.
- (C) **Select Option "3"** from the menu.                                      **Press OK Key.**
- (D) PAT4 will request "0.1 Ohms Continue? ...ical25"                      **Press OK Key.**
- (E) PAT4 will request "Input Volts"                      *Type in the voltage indicated on M1.*  
**Press OK Key.**
- (F) PAT4 will request "Change to 1R8".
- (G) Exchange resistor **R1** for resistor **R4 using TL7 + TL8**
- (H) Connect **M1 (AC Volts)** between **Bond Test Terminal** on PAT4 & 9 pin "D" connector shroud.
- (I) PAT4 will request "Measure voltage at PAT4 Continue vcal25?" **Press OK Key.**
- (J) PAT4 will request "Input Volts".                      *Type in the voltage on the meter M1.*  
**Press OK Key.**
- (K) PAT4 will request "Move 1R8 to Common...continue?".
- (L) Connect Bond lead **TL7 + TL8** between the **PAT4DV Bond Test Terminal & 13Amp socket Earth Pin**
- (M) **Press OK Key.**

**Bond Test Calibration is now complete**

**(4.0) Extension Lead Test Calibration.**

- (A) **Select Option "5"** from the menu.                                      **Press OK Key.**
- (B) PAT4 will request "Connect TL3 Lead Continue?"                      **Press OK Key.**
- (C) Connect Lead **TL3** between PAT4DV. 13Amp socket and the IEC Connector.
- (C) PAT4 will request "Connect TL1 Lead Continue?"
- (D) Exchange Lead **TL3** for Lead **TL1**.                                      **Press OK Key.**
- (E) PAT4 will request "Switch to L < - > N".
- (F) Exchange Lead **TL1** for Lead **TL2**.                                      **Press OK Key.**

**Extension Lead Calibration is now complete.**

## **(5.0) Operation Test Calibration .**

### **Stabilised 230V supply (T1) must be used for this calibration.**

- (A) Configure meter **M1** (300V ac) across PAT4 13Amp socket Live to Neutral.
- (B) Configure meter **M2** (20A ac ) in series with PAT4 13Amp socket using Lead **TL10**.
- (C) Supply power (230V) to the PAT4.
- (D) **Select Option “6”** from the menu. **Press OK Key.**
- (E) PAT4 will request “Operation Cal Continue ?” **Press OK Key.**
- (F) PAT4 will request “Input Volts” *Type in the voltage shown on M1.* **Press OK Key.**
- (G) PAT4 will request “Continue?” **Press OK Key.**
- (H) PAT4 will request “Connect 3kW Load Continue? ”.
- (I) Connect Load **P1** to PAT4DV 13Amp socket. **Press OK Key.**
- (J) PAT4 will request "Input Load Amps" *Type in the current shown on M2.* **Press OK Key.**

### **Operation Test Calibration is now complete.**

## **(6.0) Earth Leakage Test**

### **Stabilised 230V-supply (T1) must be used for this calibration.**

- (A) Connect Resistor **R6** in series with meter **M1** (30mA ac).
- (B) Connect the above network between Live and Earth pins of 13Amp socket on PAT4.
- (C) **Select Menu Option 4.** **Press OK Key.**
- (D) PAT4 will request “Cal Earth Leakage 15mA Continue?” **Press OK Key**
- (E) PAT4 will request “Input Current measured”. *Type in the Current Displayed on M1.*

### **Earth Leakage Test Calibration is now complete.**

## **(7.0) Circuit / Load Test Calibration.**

### **Stabilised 230V-supply (T1) must be used for this calibration.**

- (A) Fit **PL1** to 13Amp socket on PAT4.
- (B) **Select Option “1”** from the menu. **Press OK Key.**
- (C) PAT4 will request “Insert PL1?” **Press OK Key.**
- (D) PAT4 will request “Insert PL2?”
- (E) Fit **PL2** to 13Amp socket on PAT4. **Press OK Key**

### **Circuit Load Test Calibration is now complete.**

**(8.0) Flash Test Calibration.**

**Stabilised 230V-supply (T1) must be used for this calibration.**

**Warning !**

**1500V are applied during this test: 3000V are applied to the flash test socket.  
Ensure probe is not connected.**

- (A) Supply power to PAT4 (230V) No connections to be made to the 13Amp socket on PAT4.
- (B) **Select Option "7"** from the menu. **Press OK Key.**
- (C) PAT4 will request "Keyboard Link required OK?" **Press OK Key.**
- (D) Fit LK1 across PL 12 Relay PCB. (PL11 Micro PCB on PAT4 Mk 1 models)
- (D) PAT4 will request "Cal Flash Test. O/C Volts OK?" **Press OK Key.**
- (E) PAT4 will request "S/C CURRENT Set OK?"
- (F) Configure meter **M1** (30mA ac) across PAT4 13Amp socket Live to Earth .
- (G) **Press OK Key.**
- (H) PAT4 will request "Input S/C current mA "
- (I) Type in the current indicated on meter **M1**. **Press OK Key.**
- (J) PAT4 will request "REMOVE Keyboard Link"
- (K) Remove keyboard Link. **Press OK Key**

**Flash Test Calibration is now complete.**

**(9.0) Date and Time Settings.**

- (A) **Select Option 8.** **Press OK Key.**
- (B) Follow on screen instructions to set up: **Year, Month, Day, Hours, and Minutes.**  
**Press Exit Key.**
- (C) Check clock settings are correct. To exit routine **Press and Hold OK Key**

**(10.0) Watchdog Timer and Model identification Check.**

- (A) **Select Option 22.** PAT 4 will indicate **PAT4 DV, PAT4 DVF, PAT4 DVe or PAT4 DVFe Correct?** **Press Yes or No.**  
Confirm actual model and displayed model agrees - change if required.
- (B) **Press OK Key.** And wait approx. 15 seconds.
- (C) Note PAT4 Resets to menu. If PAT4 is now dead replace 500mA fuse and Insulation Calibration Link.

**(11.0) Fuse Test Check.**

- (A) Place a good 20mm fuse across the fuse test pads.  
**NB a real fuse must be used to verify contacts are accessible.**
- (B) Buzzer must sound.

**(12.0) Communications Check.**

- (A) Connect a Parallel printer to 25 Way "D" Connector.
- (B) Connect a Barcode Scanner to 9 Way "D" Connector.
- (C) **Select Option 24.**

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(D) Scan Barcode. Note PAT4 displays and Printer duplicates the contents of the bar code.



(E) Interrupt the power to the PAT4 to exit this test.

(F) When the PAT4 displays the Calibration Menu, press the ESC key - PAT4 will display 'Rebooting... Please wait'.

### **(13.0) Diagnostic Utilities.**

To aid faultfinding the following diagnostic routines menu can be obtained using Option 25. From the main Calibration Menu.

- Option 0: Return to calibration Menu.
- Option 1: 100mA Continuity Test.
- Option 2: Earth Leakage Test.
- Option 3: Bond Test @ 10A.
- Option 4: Bond Test @ 25A
- Option 5: Flash Test.
- Option 6: A to D Test.
- Option 7: Insulation Test
- Option 8: Display Insulation Attenuator Resistance.
- Option 9: Operation Test.
- Option 10: Extension Lead Test.
- Option 11: Circuit test.
- Option 12: Display Calibration.
- Option 13: Display PAT4 model.
- Option 14: Print PAT4 calibration constants.