

TRANSMATION Products Group	111 FIELD CALIBRATION PROCEDURE	DOCUMENT NO.	REV.
		1-1061	A
Created by: P.J.McGURN		Date: 2JAN97	Sheet 1 of 5

Rev	Date	Appd	DCN								
A	2JAN97	RPC	---								

SCOPE:

This procedure covers the final testing of a model 111.

TRAINING NEEDED:

1. Test equipment: DMM, Power supply, Current Source
2. 111 operation

REFERENCE DOCUMENTS:

None needed

EQUIPMENT NEEDED:

1. 6½ digit DMM with accuracy of 0.006% of reading at 400mV (HP34401A or better)
2. 9V Power Supply
3. Current Source with accuracy of 0.018% of reading at 1mA and 0.019% of reading at 2mA (Fluke 5500A or better)
4. X11 Read Mode Box

TEST PROCEDURE:

NOTE:

- i) The following tests are done with the 111 in test mode and setup for OHMS. To start a 111 in TEST MODE, ALL DIP switches must be up. The unit can only be put in test mode when turned on.
- ii) Make sure that the unit is OFF when the battery is being removed or installed.

A) LCD Display:

- 1) To test the display, keep the reset button pressed when turning the unit on. All the segments will stay on as long as the reset button is pressed. Verify there are no weak, missing or distorted segments on the LCD. Also make sure the LCD is centered in the display.

B) BATTERY DRAW TEST:

- 1) Connect an ammeter in series with a 9V Power Supply and the 111.
- 2) Turn the 111 on in source mode. Wait for the "alpha =" symbol on the LCD to turn off. Verify the ON CURRENT is below 13mA
- 3) Turn the 111 off and verify that OFF CURRENT is below 50uA.
- 4) Slowly lower the supply voltage. The LOBAT indicator should come on at approx 7.3V. The unit should shut off at approx. 6V.

C) CALIBRATION: (SOURCE MODE)

- 1) Connect the inside leads of the 111 (1 & 2) to the Current Source. Connect the 3rd wire (3) to the negative of the DVM and connect the Positive lead of the DVM to the TP on the 111. See

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Figure1.

- 2) Set the Current Source to 1.00000mA.
- 3) Turn the 111 on in source mode and scroll to Ohms mode.
- 4) Dial the 111 to 5.00 Ohms and wait for "SIM" to stop flashing.
- 5) Put **DIP2 down** and dial the 111 to 400.00 Ohms. Adjust **R7** (digital PCB) until the DVM reads **400.00mV ±2.0mV**.
- 6) Put **DIP2 up** and allow time for "SIM" to stop flashing.

High Gain:

- 7) Place **DIPs 1 & 2 down** and allow the unit to settle for 10 seconds.
- 8) Adjust **R108** (top pot analog PCB) until the DVM reads the same as the 111 LCD **±0.10mV**. Allow the ohmmeter and the 111 to settle (10 seconds).
- 9) Place **DIPs 1 & 2 up**

LO Gain:

- 10) Dial the 111 to 200 Ohms.
- 11) Set the Current Source to 2.00000mA.
- 12) Place DIPs 1 & 2 down.
- 13) Dial the digipot so DVM is as close to 400.00mV as possible.
- 14) Adjust **R117** (bottom pot analog PCB) so the LCD reads 200.0.
NOTE: the LCD reacts slowly to tweaking R117
- 15) Place DIPs 1 & 2 up.

Calibration Check:

Dial the 111 and set the Current Source to the following values:

111 (Ω)	Current (mA)	DVM (mV)	Spec. (mV)
10.00	1.00000	10.00	
100.00	1.00000	100.00	±0.10
400.00	1.00000	400.00	
10.0	2.00000	20.00	
100.0	2.00000	200.00	±0.20
400.0	2.00000	800.00	

D) EXCITATION CURRENT

0.1mA

- 1) Set the Current Source to 0.1mA.
- 2) Set the **111** to source 400.00 Ohms
- 3) "SIM" should stop flashing and the DVM should read **40.000mV ±0.010mV**

5.8mA

- 4) Set the Current Source to 5.8mA
- 5) Set the **111** to source 400.00 Ohms
"SIM" should stop and DVM should read **2.3200V ±.00058V** (2.31942- 2.32058)

E) READ MODE

- 1) Disconnect the TP lead from the 111 and connect the 111 to the 400 Ohm position on the X11 Read Mode Test Box. Turn the unit on to Read mode (allow 4 seconds for unit to settle).
Tolerance: ±0.10A Noise: ±0.02A

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- 2) Connect the 111 to the 100Ω position and verify the 111 is reading within **0.10A** of the value. Allow time for the 111 to settle.
- 3) Toggle the MAX/MIN switch and verify that the maximum and minimum values that were read by the 111 have been stored.
- 4) With the 111 in read mode, connect the leads to a current meter. The current reading should fall between 0.85 & 1.05mA.

F) RESET TO NORMAL:

Turn the 111 **off** making sure all **dips** are in the **down** position if shipping in the **U.S.** (If shipping out of the **U.S.**, **dips 1, 2, & 3** should be in the **down** position while **dip 4** is in the **up** position.) Then turn the 111 back **on** in **SOURCE** mode and **scroll** the unit to **1.3850 DIN**. Let the unit go to its **normal display** and then turn the unit **off**.

UUT FAILURES:

Documents needed: 111 Analog and Digital PCB Schematics

1. Try repairing any units that failed
2. If the unit is not feasible to repair, see drawing 1-XXX (Non-conforming material)

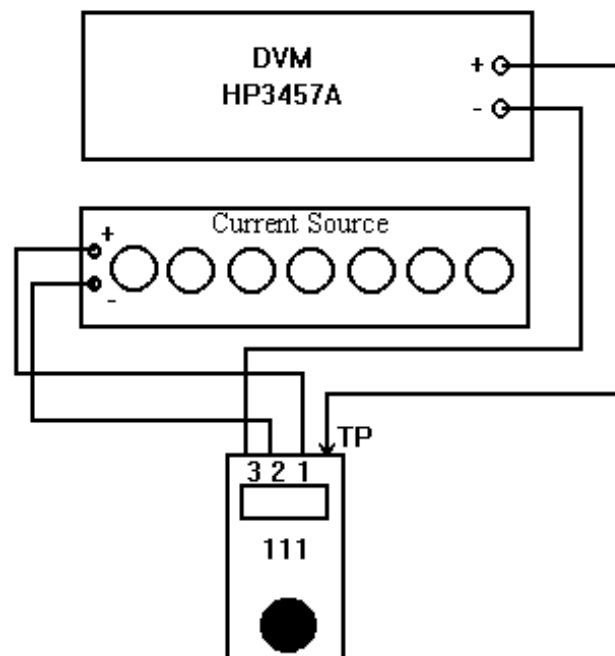


Figure 1

CHECK LIST:

SECTION A: LCD AND ANNUNCIATOR TEST

1. Check LCD for weak, missing or distorted segments.

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SECTION B: BATTERY DRAW TEST

1. On current < 13mA
2. Off current < 50 μ A
3. Lo Bat 7.2V -- Off 6V

SECTION C: CALIBRATION

1. Connect the unit to the Current Source (1mA) and DVM
2. 111: 5.00 Ω "SIM"
3. DIP2 down 111: 400.00 Ω R7: DVM = 400.00mV \pm 2.0mV
4. DIP2 up "SIM"
5. DIPs1 + 2 down
6. R108: DVM = LCD \pm 0.10mV
7. DIPs1 + 2 up 111: 200.00 Ω
8. Current Source: 2mA DIPs 1 + 2 down
9. 111 digipot so DVM = 400.00mV R117: LCD = 200.0
10. DIPs 1 + 2 up
11. Current Source: 1mA 111: 10.00, 100.00, 400.00mV \pm 0.10mV
12. Current Source: 2mA 111: 10.0, 100.0, 400.0mV \pm 0.20mV

SECTION D: EXCITATION CURRENT

1. Current Source: 0.1mA
2. 111: Source 400.00A "SIM"
3. DVM: 40.000mV \pm 0.010mV
4. Current Source: 5.8mA
5. DVM: 2.32000V \pm 0.00058V (2.31942 - 2.32058)

SECTION E: READ MODE

1. 111: Read mode; connect to 111 Read Mode Box. Noise \pm 2 counts at 400 Ω .
2. 100.00, 400.00 \pm 0.10A
3. Check MIN/MAX
5. 111: connect to current meter 0.85 - 1.05mA

SECTION F: RESET TO NORMAL

1. USA: 111: All Dips down
2. Outside USA: 111: Dips 1,2,3 down DIP 4 up.
3. 111: Source scroll to 1.3850

UUT FAILURES:

1. Try repairing all units that failed.
2. For units not feasible to repair, see Dwg # 1-XXX (non-conforming material)

Accuracy Statement:

Using the suggested equipment (HP34401A and Fluke 5500A) for the High

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Gain cal (1mA) gives a Test Uncertainty Ratio (TUR) of 2.1. Altek has accepted this TUR for the calibration of the Model 111.