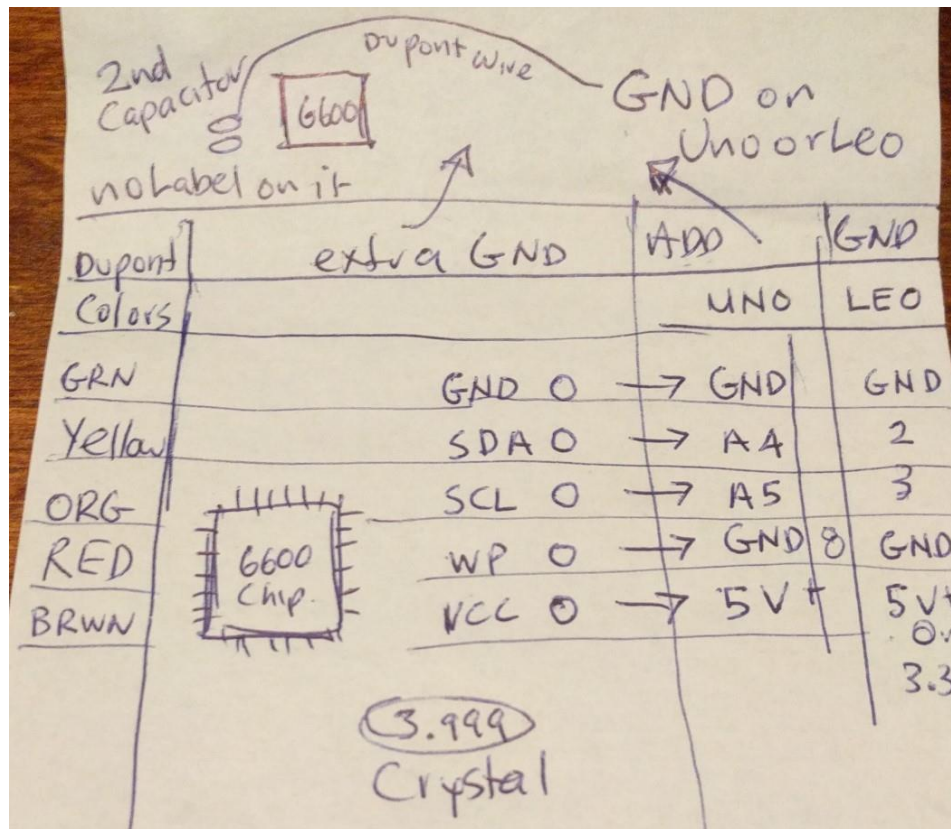# UNI-T 210E Hacking Info : Part 2

Found online at EEVBlog, Kerry Wong's Website etc.

My Wiring (KBird)

I held a grounded jumper wire on the side of the capacitor shown in diagram. No need to solder to it. It only takes 3 seconds to dump/flash.

Switch UT210E to ~V mode then plug in Arduino into the USB. Open the attached i2cArduino210E.ino sketch in Arduino IDE. Open Serial Monitor window (CTRL+SHIFT+M). Now upload the sketch. You should see your eeprom dump in Serial Monitor window. You better Copy/Paste it for backup.

Now you must edit line 9 and 10 by using data from your dump.
Code: [Select]

```
//Dotless mode calibration data, copied from 0x50, 0x51
writeByte(I2C_ADDR, 0x56, (byte) 0x83);
writeByte(I2C_ADDR, 0x57, (byte) 0x75);
```

If all good, you can edit MODeeprom() as you like, uncomment the //MODeeprom() inside setup() function and Re-Upload to Arduino. Arduino will reset and flash the eeprom. You will see ...Flashing EEPROM... between Before/After dumps in the Serial Monitor window. I hope others will find this useful.

Thank you everyone!

The changes I've done to my eeprom so far:

ADDR | OLD | NEW
6200 Count
Code: [Select]

12:	98	38
13:	08	18

All Alarms disabled
Code: [Select]

16:	3D	FF
17:	3D	FF
18:	3C	FF
19:	3C	FF
1C:	0A	FF

2A Dotless mode calibration data device specific, copy yours from 0x50 to 0x56, 0x51 to 0x57. Required if you enable Dotless 2A mode.
Code: [Select]

56:	00	??
57:	80	??

2A modes: 1. Dotless DCA, 2. Dotless ACA, 3. Dot DCA, 4. Dot ACA
Code: [Select]

87:	17	1C
97:	16	1D
A7:	00	16
B7:	00	17

20A modes: 1 Dot DCA, 2. Dot ACA
Code: [Select]

8B:	19	18
9B:	18	19

100A modes: 1 Dot DCA, 2. Dot ACA
Code: [Select]

8D:	1B	1A
9D:	1A	1B

V modes: 1. DCV, 2. ACV, 3. DCmV, 4. ACmV

Code: [Select]

8E:	04	03
9E:	05	04
AE:	00	05
BE:	00	06

NCV, NCV mV

Code: [Select]

9C:	00	02
AC:	00	1D

30 min Auto power off

Code: [Select]

FB:	0F	1E

3 min Backlight off

Code: [Select]

FC:	0F	B4

credits: People in this thread and on Russian and Chinese forums.

Anyone willing to test two new eeprom mods? It gives two new functions in 2A mode. Its reported on the Russian site that these functions still have the full count even after zeroing out (i.e. doesn't go back to 2000). The LCD does not show a "." in the read out.

Update: Tested the DCA 0000 function in 2A and it truly works even after zeroing out.

Code: [Select]

	old	new	
A7:	00	1C	- DCA 0000 in 2A mode / SELECT slot 3
B7:	00	1D	- ACA 0000 in 2A mode / SELECT slot 4

Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00000000	FF	FF	FF	FF	FF	00	80	E8	03	E8	03	FA	00	00	BE	03
00000010	70	17	38	18	BE	00	3D	3D	3C	0B	FF	FF	0A	FF	40	FF
00000020	7A	98	06	81	64	00	96	00	00	80	17	80	FB	7E	38	75
00000030	4E	02	09	5A	02	09	A0	FF	0A	3D	13	0A	5D	03	0A	00
00000040	00	01	00	01	00	07	98	00	64	00	64	00	64	00	00	00
00000050	83	75	EC	70	00	80	00	80	00	00	00	00	01	00	00	00
00000060	E3	7F	48	7E	01	00	BA	2A	00	00	00	00	00	00	00	00
00000070	C2	7F	00	80	0A	80	E0	7C	07	06	00	00	00	00	00	00
00000080	00	00	00	00	00	00	00	16	00	00	00	18	1E	1A	03	07
00000090	00	00	00	00	00	00	00	17	00	00	00	19	02	1B	04	09
000000A0	00	00	00	00	00	00	00	1C	00	00	00	00	1D	00	05	0A
000000B0	00	00	00	00	00	00	00	1D	00	00	00	00	00	00	06	0B
000000C0	0D	00	02	30	0D	00	03	20	20	00	03	20	20	00	03	10
000000D0	41	00	03	08	41	00	03	05	41	00	03	05	0D	00	02	30
000000E0	00	80	00	80	00	80	00	80	00	80	49	02	E5	03	59	05
000000F0	4A	02	EB	03	6E	05	00	80	5A	C7	EF	0F	B4	80	00	00

Another interesting mod is at address 19h. It turns on beeping warning alarm when you hit 60x.x volts on display (default 3C value = 60). I've changed it to 0B which is 11x and now it starts beeping when checking mains voltage .One negative side affect is its starts beeping in 2A 0000 function when it reads 11xx. Oh well.

Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00000000	FF	FF	FF	FF	FF	00	80	E8	03	E8	03	FA	00	00	BE	03
00000010	70	17	98	08	BE	00	3D	3D	3C	3C	FF	FF	0A	FF	40	FF
00000020	7A	98	06	81	64	00	96	00	00	80	17	80	FB	7E	38	75
00000030	4E	02	09	5A	02	09	A0	FF	0A	3D	13	0A	5D	03	0A	00
00000040	00	01	00	01	00	07	98	00	64	00	64	00	64	00	00	00
00000050	83	75	EC	70	00	80	00	80	00	00	00	00	01	00	00	00
00000060	E3	7F	48	7E	01	00	BA	2A	00	00	00	00	00	00	00	00
00000070	C2	7F	00	80	0A	80	E0	7C	07	06	00	00	00	00	00	00
00000080	00	00	00	00	00	00	00	17	00	00	00	19	1E	1B	04	07
00000090	00	00	00	00	00	00	00	16	00	00	00	18	00	1A	05	09
000000A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	0A
000000B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	0B
000000C0	0D	00	02	30	0D	00	03	20	20	00	03	20	20	00	03	10
000000D0	41	00	03	08	41	00	03	05	41	00	03	05	0D	00	02	30
000000E0	00	80	00	80	00	80	00	80	00	80	49	02	E5	03	59	05
000000F0	4A	02	EB	03	6E	05	00	80	5A	C7	EF	0F	0F	80	00	00

Code: [Select]

```
     old   new
19:     3C        0B
```

Adding bytes 1C and 1D to locations A7 and B7 will add 6000(/2000)DCA and 6000(/2000)ACA modes to 2A switch position. these modes revert back to 2000 counts after zeroing, because

these modes are not used in the meter, unlike the lower ranges. The IC doesn't actually know if it measuring 6 or 6000 amps, rest of the circuit will handle scaling the input... Tell IC that you are measuring higher range, but don't change anything else -> decimal point moves, making reading 10x, 100x, 1000x higher/lower.

Turn the meter back off and on, then again select the 2A mode. Select AC, the decimal is shown. Now select DC, the decimal goes away. Don't zero out the meter and place more than 2A through the meter. It does not over range and reads the correct value. However the meter now starts beeping at about 600mA.

Turn the meter back off and on, then again select the 2A mode. Select AC and then DC. Zero out the meter and place more than 2A through the meter. It does not over range and reads the correct value. However the meter still beeps at about 600mA and there is no decimal.

So it's not a real clean setup IMO.   Maybe I missed something.

In post #182 I wrote some info about beeping. Perhaps you can try set FFh at address 19h. Are you sure its starts beeping with 600mA or 6000 which is actually 6A?

Correct location would be 0x1C. That sets the alarm limit in hundreds of milliamps for "dotless 2A" mode. Value is originally 0x0A or 10, making the limit 10*100mA = 1A = "1000" on the display.

*So you **can** have the alarm in volts mode when measuring mains, without having ridiculously low alarm limit in current mode. It was probably just coincidence that original value was so close to the value you set for voltage mode.*

Thanks for clarifying it. I test the address 19h is for V mode. Now I wonder what 16h to 18h affect?

16h - "OL" limit for DCV.
17h - "OL" limit for DCA.
18h - Alarm/beep limit for DCV.

For each of those, limit = value * 10V.

I still had it set to 1A.   Turned off all the alarms. Too bad the thing just didn't handle the zero in normal without reverting back to 2K counts.   Not a bad work around (the dotless mode).

There appears to be another difference with the dotless mode. Curious if this is normal.

Using a fixed current source of 2.0A. Power up the 210E. place into DCA 2A scale. Zero as

normal and attach the clamp. Write down your reading.   Remove the clamp and set to dotless mode. Zero and attach the clamp and write down this reading.

Now power cycle the meter and go back to 2ADC range. Don't zero and attach the clamp. Take the reading. Now without disconnecting the clamp, switch to dotless mode and take the reading.

It appears there are different calibrations for dotless and normal. With dotless mode and 1A applied I get about 38mA of error.

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I would have totally missed that, if you hadn't mentioned it!

Copy bytes from 50h and 51h (locations of 2A calibration data) to locations 56h and 57h (2000A/ dotless 2A calibration data). That should fix it.

Had to ground WP and Reset in order to write to the EEPROM.
I am using the MiniPro programmer.

I've tried the 8000 count mode by changing 10H --> 40 and 11H --> 1F
by it is still in the 6000 count mode! I've only tested Volts and Resistance.

Do I have to change any other byte as well for the 8000 count mode?

I've also changed 19H to 3C because the alarm was a bit annoying...

I think you should change 12H and 13H as well. They are range-up threshold.
On the VC921 multimeter I use 12H = 4A and 13H = 1F. This gives range-up at 8010.

Flywheelz has not mentioned in his page8 post about it. I found about by studying the datasheet
by changing the range down point to be 14h and 15h and posted it in page11. Since I set mine to

range-up at 6200, mine should range down at 5800 so it was set to 244h. (44h at 14h and 02h at 15h).

If you want it to range-down at 7800d, you should put in 30Ch so that would be 0C @ 14h, 03 @ 15h. I think that should do the trick.

Is there some benefit to have it range down at a different value than range up value? e.g. 1900 vs 2200, 5800 vs 6200

When you are testing from zero going up in range, you still get the full 6000 count but when going down, you only get 2000 count.

example: when reading a changing voltage (charging cap etc) it counts from 1.000 to 2.000 …. 5.000 - 6.000 then 07.00 - 08.00 but when going down, it had to go 08.00 - 07.00 …. 04.00 - 03.00 - 02.00 then 1.000. I hope you get what I mean.

Yes I get what you are saying. I set my to range up at 6200 (@12h-13h) and range down at 5900 (@14h-15h) just like they do it on UT211E. After some thinking, I believe they set different limits so that it will not constantly change the range up/down when you are measuring varying voltage at the limit you set.
From the Russian forum a user posted some tests results that caught my eye. If I understand correctly then anything over 7200 counts shows false reading measuring 220ACV. So if you do set 8000 or 10000 count remember not to use with AC high voltage.

So, did you check the down ranging? Does it stay at 8000 counts when the voltage starts decreasing?
I checked the down ranging and it works beautifully. Mine set at 5900 and as soon as voltage drops below that level it switches to 3 decimal digits. I suggest you set the down ranging slightly lower (100 to 300mV) than up ranging so that if you measure fluctuating 8 volts the meter won't be going crazy.

Seems like our friends in Russia have more to tell:

NCV added substate level in millivolts - 9Ch = 02h !!!
NCV mode can now operate as a voltmeter electromagnetic field without sound, can now be more accurately find a wire in the wall. In normal mode, the maximum beeps and can not see how to change values ??after pinning. This feature is found by chance in the search for the frequency!

Just did a mod using your Arduino sketch and schematic. Worked beautifully!

Here's my backup (in case it would be useful for somebody):

...Before EEPROM Dump...
FF FF FF FF FF 00 80 E8 03 E8 03 FA 00 00 BE 03
70 17 98 08 BE 00 3D 3D 3C 3C FF FF 0A FF 40 FF
44 98 8A 81 64 00 96 00 00 80 17 80 FB 7E 38 75
4E 02 09 EF 01 09 01 FE 0A ED 15 0A F2 02 0A 00
00 01 00 01 00 07 98 00 64 00 64 00 64 00 00 00
82 89 B6 83 00 80 00 80 00 00 00 00 01 00 00 00   copy82+89 over 80+00
E3 7F 5B 7F 01 00 A9 2A 00 00 00 00 00 00 00 00   see below
55 80 00 80 5C 80 E0 7C FA 05 00 00 00 00 00 00
00 00 00 00 00 00 00 17 00 00 00 19 1E 1B 04 07
00 00 00 00 00 00 00 16 00 00 00 18 00 1A 05 09
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0A
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0B
0D 00 02 30 0D 00 03 20 20 00 03 20 20 00 03 10
41 00 03 08 41 00 03 05 41 00 03 05 0D 00 02 30
00 80 00 80 00 80 00 80 00 80 F8 01 65 03 B8 04
FA 01 69 03 C5 04 00 80 5A C7 EF 0F 0F 80 00 00

...Flashing EEPROM...

...After EEPROM Dump...
FF FF FF FF FF 00 80 E8 03 E8 03 FA 00 00 BE 03
70 17 38 18 BE 00 FF FF FF FF FF FF FF FF 40 FF
44 98 8A 81 64 00 96 00 00 80 17 80 FB 7E 38 75
4E 02 09 EF 01 09 01 FE 0A ED 15 0A F2 02 0A 00
00 01 00 01 00 07 98 00 64 00 64 00 64 00 00 00
82 89 B6 83 00 80 82 89 00 00 00 00 01 00 00 00
E3 7F 5B 7F 01 00 A9 2A 00 00 00 00 00 00 00 00
55 80 00 80 5C 80 E0 7C FA 05 00 00 00 00 00 00
00 00 00 00 00 00 00 16 00 00 00 18 1E 1A 03 07
00 00 00 00 00 00 00 17 00 00 00 19 02 1B 04 09
00 00 00 00 00 00 00 1C 00 00 00 00 1D 00 05 0A
00 00 00 00 00 00 00 1D 00 00 00 00 00 00 06 0B
0D 00 02 30 0D 00 03 20 20 00 03 20 20 00 03 10
41 00 03 08 41 00 03 05 41 00 03 05 0D 00 02 30
00 80 00 80 00 80 00 80 00 80 F8 01 65 03 B8 04
FA 01 69 03 C5 04 00 80 5A C7 EF 1E B4 80 00 00

the early UT210E uses the same uC of the AN8002 , the DTM0660.

But the latest units are using the same uC of the AN8008 , the DM1106EN.

the ut210e uses the packaged chip - not a blob.

and the newer chip is designed to run at 10,000 so the 6000-8000 limit does not apply - thats for the older 0660 chip.

i made myself some notes! ;D

----

make continuity>ohms instead of ohms>continuity

8f = 09 (normally 07)

9f = 07 (normally 09)

make Vdc>Vac instead of Vac>Vdc

8e = 05 (normally 04)

9e = 04 (normally 05)

make Vdc>Vac(with mv) instead of Vac>Vdc

8e = 05 (normally 04)

9e = 06 (normally 05)

make Vac support mv (dont use with above patch)

8e = 06 (normally 04)

add NCV field level range

9c = 02 (normally 00)

ac = 1d (normally 00) < wtf?

make 2A range dc>ac instead of ac>dc

87 = 16 (normally 17)

97 = 17 (normally 16)

make 20A range dc>ac instead of ac>dc

8b = 18 (normally 19)

9b = 19 (normally 18)

make 100A range dc>ac instead of ac>dc

8d = 1a (normally 1b)

9d = 1b (normally 1a)

expand 100A range to 600A

07 = 70 (normally e8)

08 = 17 (normally 03)

expand 100A range to 1000A - only DM1106 chip

07 = 10 (normally e8)

08 = 27 (normally 03)

2A Dotless mode

*Copy bytes from 50h and 51h (locations of 2A calibration data) to locations 56h and 57h (2000A/ dotless 2A calibration data).

a7 = 1c (normally 00) - DCA 0000 in 2A mode / SELECT slot 3

b7 = 1d (normally 00) - ACA 0000 in 2A mode / SELECT slot 4

kill backlight timeout

fc = 00 (normally 0f)

make auto-poweroff 1hour

fb = 3c (nomally 0f)

make low battery warning 15seconds

fd = 8f (normally 80)

Alarms

For each of those, limit = value * 10V, ff to disable warning.

16 = 3d(61) - "OL" limit for DCV. (10V units)

17 = 3d(61) - "OL" limit for ACV. (10V units)

18 = 3c(60) - Alarm/beep limit for DCV. (10V units)

19 = 3c(60) - Alarm/beep limit for ACV. (10V units)

1b = ff(dis) - mA range warning current. (100mA units)

1c = 0a(10) - A range warning current. (1A units)

make 6000 count

10 = 70 (normally 70) default count:6000??? 2000>8000

11 = 17 (normally 17)

12 = 38 (normally 98) upper switch point 2200>6200

13 = 18 (normally 08)

14 = 44 (normally be) lower switch point 190>580

15 = 02 (normally 00)

make 10,000 count <<< only DM1106 chip, will fuck AC readings on DTM0660 chip

10 = 10 (normally 70) default count:6000??? 2000>10000

11 = 27 (normally 17)

12 = d8 (normally 98) upper switch point 2200>10200

13 = 27 (normally 08)

14 = d4 (normally be) lower switch point 190>980

15 = 03 (normally 00)

« Last Edit: October 06, 2017, 04:59:31 AM by stj »

Nulling the Meter

VR-   = Offset adjustment
VR+   = Clamp Head Nulling Pot
VR4   = Clamp Head Nulling Pot

Turn meter to 2A DC mode , turn meter on and rotate noting varation,
Then adjust VR+ and VR4 until the is no variation , then zero out the Offset with
VR