

Part #:	TTS Touchless Switch	 
Description:	Optical technology precisely programmed for contactless, hygienic switching. Designed for indoor/outdoor public use to prevent the spread of pathogens	 Download Datasheet

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January 03, 2022, 07:13:17 pm

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Author

Topic: Sencore LC102 lcr meter (Read 2158 times)

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bubbatech

Contributor

Posts: 5

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Sencore LC102 lcr meter

« on: March 05, 2018, 07:26:47 pm »

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I bought a Sencore lc102 meter at a hamfest for an insane good price. I calibrated it and it worked flawlessly for month.

Now, it says "error 7" when one attempts to zero it, or measure capacitance below 2uF (but not above). Inductance and ESR measurements are fine. The onset of the problem was sudden as if something folded. I have been working on this thing for about a month now, trying to diagnose the problem and it is absolutely kicking my ass. I have replaced the relays, the lm319 comparator, and for awhile suspected IC12, a flip-flop that addresses the current sources for capacitance measurements since only measurements below 2uf were affected (therefore, I suspect, screwing the ability to zero compensate). One theory was a power supply issue, but all the rails are nominal, except for the 12 volt unregulated rail which is at 13.8 volts, but I think that is normal. My most recent theory has been that there is a problem with one line in the control buss, but swapping the IC and checking all the components on that buss (F5) yielded nothing. 🤔

In fact, though, I am still guessing. I still don't even know which section of the circuit is problematic. If someone who has some familiarity with this instrument could throw me a bone, it would be very grateful. I am running out of ideas.

This is such a nice instrument. I refuse to give up. 😞

Report to moderator Logged

Johnny10

Frequent Contributor

Re: Sencore LC102 lcr meter

« Reply #1 on: March 05, 2018, 08:23:37 pm »

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Yes I had 13 something on mine.
I have to dig up my notes.

I had the most problems with those "split the wire" connectors.
And you have cleaned and measured the resistance through the Combination fuse/BNC input ?

My favorite LC meter!

« Last Edit: March 05, 2018, 08:27:45 pm by Johnny10 »

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bubbatech

Contributor

Posts: 5
Country:



Re: Sencore LC102 lcr meter

« Reply #2 on: March 06, 2018, 12:39:25 am »

[Say Thanks](#) [Reply](#) [Quote](#)

Thanks for your reply. Yes, I checked the usual culprits. The input connections are clean and, prior to the failure, an error 4 indicating resistance out of spec did not occur. I have the full, original schematics for it, which are quite nice, but they do not specify nominal voltages and there is no discussion of the theory of operation, so it is not clear if some of the measured voltages are what they should be, since I never measured them before the unit failed.

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Johnny10

Frequent Contributor



Posts: 864
Country:



Re: Sencore LC102 lcr meter

« Reply #3 on: March 06, 2018, 11:33:27 am »

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Tell me which measurements you are looking for and I will check on mine.
I have had a few of these units and repaired two.

Repairing the display on one of these was my first foray into electronics repair 4 years ago.

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Johnny10

Frequent Contributor



Posts: 864
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Re: Sencore LC102 lcr meter

« Reply #4 on: March 06, 2018, 04:31:06 pm »

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Looking over the specs of the LC102 pg 7.
There is range switching of Capacitor ESR :

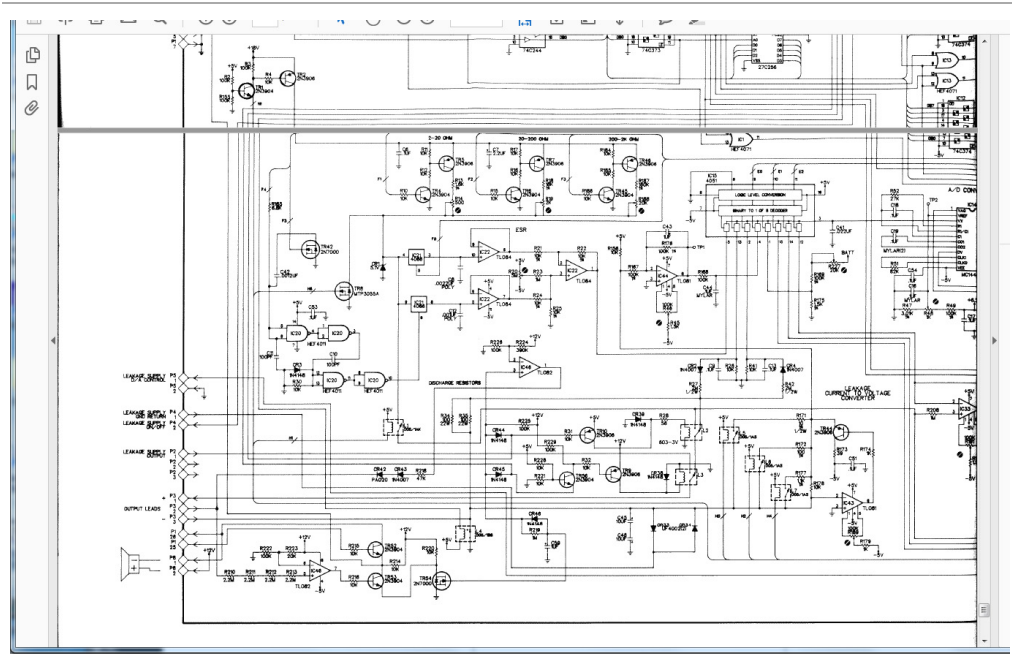
Your problem must be related to that circuit.

The patent is available 4795966

"the present invention a new and improved method for measuring the equivalent series resistance of a capacitor by charging the capacitor from a constant current source"

So problem must be in the ESR circuitry.

Schematic on left hand bottom of 2000 Board



LC102- ESR Schematic.jpg (346.66 kB, 1368x896 - viewed 384 times.)

01 uA 0.01 uA to 19.99 uA
 1 uA 20.0 uA to 199.9 uA
 1 uA 200 uA to 1999 uA
 0.1 mA 2.00 mA to 19.99 mA

CAPACITOR ESR
 (Test patented)
 ACCURACY: +/- 5% +/- 1 digit
 CAPACITOR RANGE: 1 uF to 19.99 F
 RESOLUTION AND RANGES: .10 ohm to 2000 ohms, fully autoranged
 .01 ohm 0.10 ohms to 1.99 ohms
 .1 ohm 2.0 ohms to 19.9 ohms
 1 ohm 20 ohms to 1999 ohms

CAPACITOR D/A
 (U.S. Patent #4,267,503)
 ACCURACY: +/- 5% of reading +/- 1 count
 RANGE: 1 to 100%
 CAPACITOR RANGE: .01 uF to 19.99 F

INDUCTORS (In or out of circuit)
INDUCTANCE VALUE
 (U.S. Patent #4,258,315)
 A dynamic test of value determined by measuring the EMF produced when a changing current is applied to the coil under test.
 CURRENT RATES: automatically selected
 50 mA/uSec 0 uH to 18 uH
 5 mA/uSec 18 uH to 180 uH
 .5 mA/uSec 180 uH to 1.8 mH
 50 mA/mSec 1.8 mH to 18 mH
 5 mA/mSec 18 mH to 180 mH
 .5 mA/mSec 180 mH to 1.8 H
 .05 mA/mSec 1.8 H to 19.99 H
 ACCURACY: +/- 2% +/- 1 digit
 RESOLUTION AND RANGES: .10 uH to 20 H, fully autoranged
 .01 uH 0.10 uH to 19.99 uH
 .1 uH 20.0 uH to 199.9 uH
 1 uH 200 uH to 999 uH
 .001 mH 1.000 mH to 1.999 mH

TEMPERATURE: operating range: 32° to 104°F (0° to 40°C) **range for specified accuracy** (after 10 minute warmup): 50° to 86°F (10° to 30°C)
POWER: 105-130V AC, 60Hz, 24 watts with supplied PA251 power adapter. Battery operation with optional BY234 rechargeable battery. 210-230V AC operation with optional PA252 Power Adapter.
AUTO OFF: Removes power during battery operation if unit sits idle longer than 15-20 minutes.
BATTERY LIFE: 8 hours typical inductor testing; 7 hours typical capacitor testing.
SIZE: 6" x 9" x 11.5" (15.2cm x 22.9cm x 29.1cm) **HWD**
WEIGHT: 6 lbs. (2.7kg) without battery, 7.6 lbs (3.4kg) with battery
GOOD/BAD INDICATION: Functions on all tests. Requires user input of component type and value, or input of desired limits.
IEEE: Requires the use of Sencore IB72 Bus Interface Accessory.
 The following interface codes apply: SH1, AH1, TS, LA, SRO, RLO, PPO, DCO, DTC, CO. All readings are test accuracy +/- 1 count.

Specifications subject to change without notice

ACCESSORIES
SUPPLIED:
 39G219 Test Leads
 39G144 Test Lead Adapter
 39G201 Test Button Hold Down Rod
 64G37 Test Lead Mounting Clip
 PA251 AC Power Adapter/Recharger
OPTIONAL:
 39G85 Touch Test Probe
 FC221 Field Calibrator
 BY234 Rechargeable Lead Acid Battery
 SCR250 SCR/Triac Test Accessory
 CC254 Carrying Case
 CH255 Component Holder
 CH256 Chip Component Test Lead
 IB72 Bus Interface Accessory
 PA252 220V AC Power Adapter/Recharger

LC102- ESR Spec.jpg (390.17 kB, 1209x932 - viewed 259 times.)

« Last Edit: March 06, 2018, 06:06:34 pm by Johnny10 »

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Johnny10
Frequent Contributor



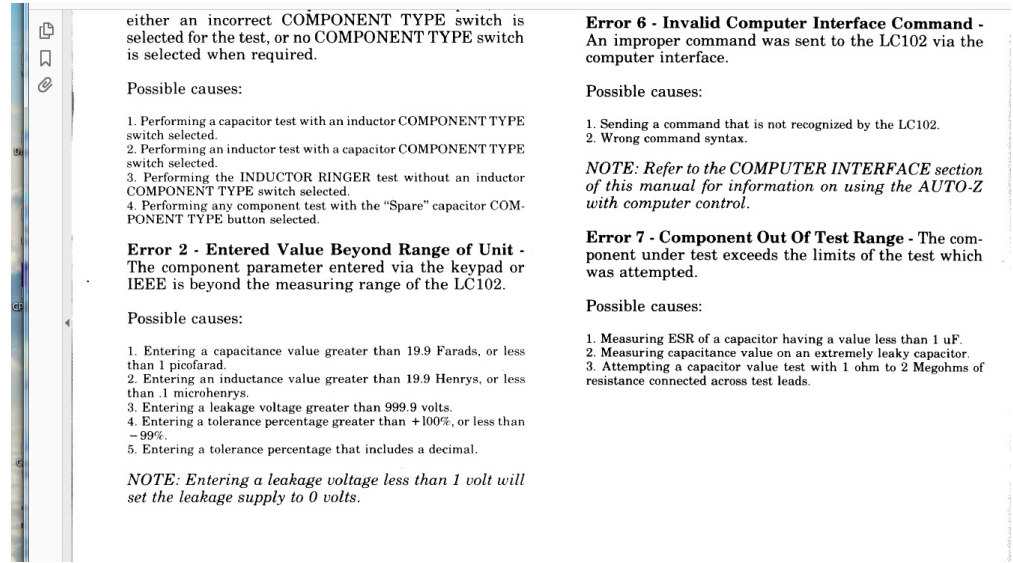
Posts: 864
Country:

Re: Sencore LC102 Icr meter
« Reply #5 on: March 06, 2018, 06:24:40 pm »

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Looking at the Error Code 7 description.

The error code describes a 1uF limit to ESR.



Error 7.jpg (282.48 kB, 1335x747 - viewed 249 times.)

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bubbatech

Contributor

Posts: 5

Country:



Re: Sencore LC102 lcr meter

« **Reply #6 on:** March 07, 2018, 03:35:19 am »

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Thank you very much for your time. I have checked esr measurements by connecting resistors across the leads and it appears to read ok, so that idea is not intuitively obvious to me (which could be why I have so far failed!) However, if the ESR section is involved in capacitance measurements, then it becomes much more plausible. I have looked at ic21 some, but nothing else. Tomorrow evening, I'll try to make some measurements, paying attention to CR1 and some of the lines leading from IC21 to those op-amps to see if any of the capacitors have shorted to ground.

Thank you!

[Report to moderator](#)

bubbatech

Contributor

Posts: 5

Country:



Re: Sencore LC102 lcr meter

« **Reply #7 on:** March 13, 2018, 09:11:09 pm »

[Say Thanks](#) [Reply](#) [Quote](#)

It has been awhile since I worked on the instrument because I have been out of town. I am getting back to it, but there is one critical question. There is a 12V unregulated power rail. On that rail, I find 13.8V. If this is abnormal, it would explain why the current sources for low capacitance measurements never turn on because the base would always remain relative negative. On the other hand, 12V rails in battery powered devices can be as high as 13.8V normally. Do you see this in your working device? Thanks!

[Report to moderator](#)

Johnny10

Frequent Contributor



Posts: 864

Country:



Re: Sencore LC102 lcr meter

« **Reply #8 on:** March 14, 2018, 02:00:02 am »

[Say Thanks](#) [Reply](#) [Quote](#)

Where are you measuring the 12v unregulated line?
I just opened my unit and have it sitting on bench.

« *Last Edit: March 14, 2018, 02:46:38 am by Johnny10* »

[Report to moderator](#)

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bubbatech

Contributor

Posts: 5

Country:



Re: Sencore LC102 lcr meter

« **Reply #9 on:** March 14, 2018, 02:03:22 pm »

[Say Thanks](#) [Reply](#) [Quote](#)

Damn. I wish I had seen this sooner. Sorry.
You could measure it on pin 6 of P4 on the power supply board, or Pin 5 of P6 on the main board. These are connected to the output of the unregulated 12 V supply. It is plausible that this would be

higher than 12V because I think it is used to charge the battery, but I need to make sure so I can rule it out.

In any event, I think the primary problem is that the line that should enable the relevant current sources, which are the cathode side of CR6 and CR7 on the main board should go logical low for at least a short period (I think) when capacitance measurements are made or the instrument is zeroed. When that line goes more negative, it should drive current across R53 and R54, pulling the base of Tr11 more negative, turning it on. I have never seen these lines go low - ever. They stay rock solid at 4.8V. It is my feeling that this can't be right. If it is convenient, can you measure these lines when the capacitance button is pressed (or the zero switch) and tell me if they go low as well? That would be extremely helpful. If they never go low on your instrument, then I am chasing the proverbial wild goose.

Thanks!

Report to moderator Logged

Johnny10

Frequent Contributor



Posts: 864

Country:



Re: Sencore LC102 lcr meter

« Reply #10 on: March 14, 2018, 02:46:33 pm »

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No Problems I cleared the bench for another project.

Pin 6 P4 on 3000 Board

14.77 Volts

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