August 2013

Z-100 LifeLine
Since 1989

#124

A Professional Journal Exclusively for the Heath/Zenith Z-100 Computer

Z-100 LifeLine Web Site: **https://z100lifeline.swvagts.com (new effective September 2019)**

HOWGOZIT

Well, seven full months plus since my last issue! Am I trying to set a record?

No, but the best laid plans of mouse and man often go awry. And once again I find myself having to apologize. I am sorry.

As I briefly mentioned last time, Myra and I began our kitchen remodel on New Year's Day. I had expected the project to take nearly 6 months. And it would have, if I had not been called away for some unforeseen family medical emergencies.

On a brighter note, I finished the kitchen in late July, with only some shelving to make for the corner of the family room and some cabinets to make for an entertainment center along another wall in the same room.

But the kitchen is gorgeous. We installed natural red oak cabinets, a unique granite countertop of dark greens and black with hints of orange streaks in areas. We removed most of a wall to create a peninsula cooking and eating area which opened the kitchen to the family room. A freestanding stainless steel range hood with arched glass also highlights the area over the peninsula.

Pocket doors now replace the ugly folding doors to the laundry room and dining room. Finally, we left the original beige tiles on the floor.

In the family room, I removed the entertainment center along the kitchen/family room wall for the peninsula counter and I will have to construct a new one on the opposite wall. The ugly beige family room carpet has been replaced with red oak flooring that carries the kitchen colors into the family room. I installed a 13" stripe of darker harvest oak flooring that surrounds the perimeter of the floor about 12" from the walls. I also installed the same darker flooring as the kick plate under the kitchen cabinets.

I saved 80% of the old kitchen cabinets and installed them in our garage. So now my Z-100 workshop out there has plenty of storage and free space for dedicated work benches for the several different models of specialized Z-100's that I have. What a joy to have them out of storage boxes!

I hope to display the finished pictures on our website when I get the chance.

Needless to say, I have not worked on the CP/M project at all and have limited my Z-100 work to IDE support and troubleshooting advice for some new customers.

One question that did come up, however, was the old Parity Error, which I address next.

Error - Memory Parity or Buss

In April, I received an e-mail from an individual having boot problems with his Z-100. But after passing him the usual tips to troubleshoot, he reported another problem that he thought may be related - the infamous Parity Error. All his memory tests work fine.

He happened to be running Zenith's MS-DOS v2, which meant that the error was always terminal, finishing with a System Halt.

As it turns out, my testbed computer also gets the Z-DOS v4 version of this same message occasionally, but thanks to John Beyers, Z-DOS v4 permits me to continue operating with parity disabled. My computer would then continue operating fine for the rest of the session.

Still, it irritated me also and I had spent entire days replacing motherboard parts in numerous attempts to find the fault. But the infrequency of the errors made such problems very difficult to troubleshoot. I did find, however, that if the delay line at U149 and clock timing chip at U236 are mismatched, the error's frequency increases dramatically. Still, I wish that I could find a fix.

Anyway, this time I did some digging in the technical manual and found some information that may help others with this problem:

-- I found no means to kill parity during bootup in the earlier versions of DOS - I was hoping that it could be done in CONFIG.SYS or AUTOEXEC.BAT or by a jumper on the motherboard. However, if you are handy with programming or using the IN/OUT commands, I think that it can be done. The KILL_PARITY option disables the parity checking circuitry by writing a 0 to bit 5 of the MEMCTL Port (0FCh). It also clears a parity error by first writing a 0 to bit 5, and then a 1. If you were so inclined, you could probably write an OUT command in CONFIG.SYS to boot without parity enabled. I would try an IN command first to see what the present byte is, then use OUT to change only bit 5.

-- For troubleshooting purposes, the parity circuits consist of U153, U101, U117, U137 and U152. U101, U117 and U137 store 1 bit of parity info for each address location on RAM. U151 assists in processing the parity data. U158 processes the S-100/Parity error and generates an error interrupt at U208. So, try changing these last few chips that process the information first. If you lack the parts, at least check for proper chip insertion and corrosion on the pins.

Of course, if you had another good motherboard, it would be much easier to just swap motherboards and leave the bad one as a spare parts locker. Just be sure to label it as having parity errors.

Please let me know if you have found a solution to this irritating error. I've changed ALL the ICs on the affected motherboard a few times in the past with no luck.

Closing

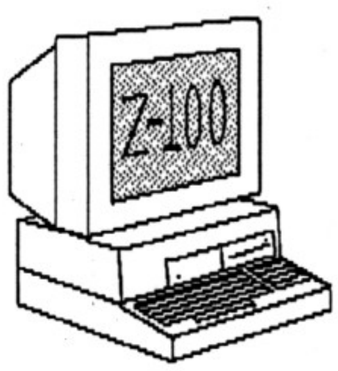
My thanks to Charles Hett for his article on replacing a dead battery in the Dallas DS1216E SmartWatch. He is commended for his determination, detailed instructions, and well-written article. Because of the importance of his article, I left his pictures in color and thickened the paper slightly to reduce bleed through. I hope you enjoy his article as much as I did. I'm just sorry for the delay in printing this timely article.

Please note however, doing modifications and grinding around a supposedly dead lithium battery cell is dangerous. If nicked or damaged, the cell may short out, overheat and explode. As an alternative, check out the modifications described in issue #120.

I hope to resume the CP/M project this fall. If you have a desire to assist, please reread the last LifeLine and let me know if there is anything that you need.

Cheers!!!

'Til next time,
happy computing!



Z-100 LIFELINE
Supporting the H/Z-100 Community Since 1989

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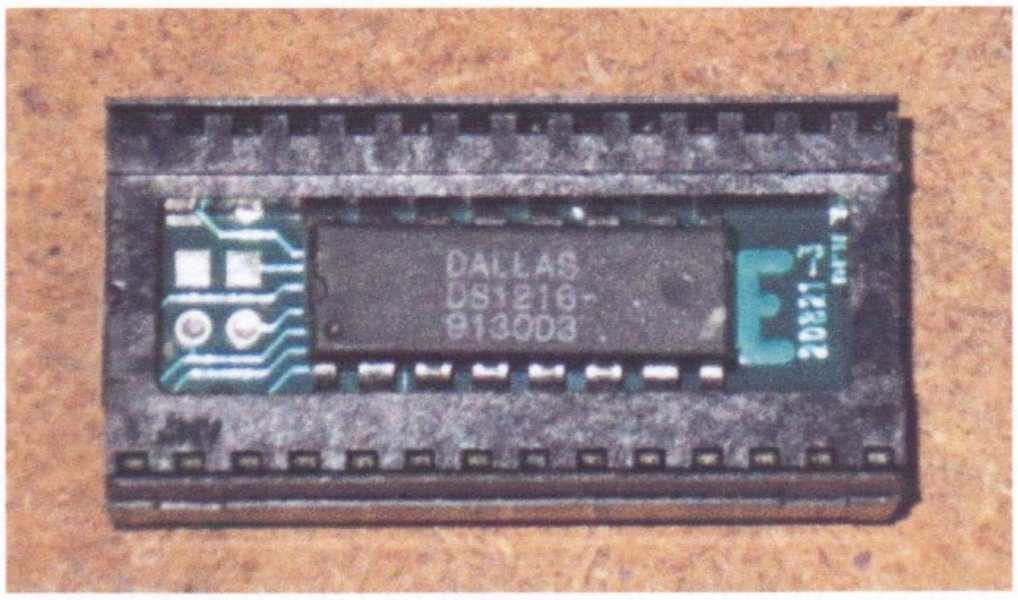
Substitute Backup Battery for Dallas Semiconductor DS1216E Smartwatch

Description by Charles Hett Lenexa, KS February 19, 2013

I have noticed that the Smartwatch function implemented with a DS1216 part in one of my Zenith Z100 computers has stopped working. It does not save the clock/calendar data any longer. This is not surprising as the part is probably at least twenty-five years old although I don't know for sure. So I set out to see what I could do about it as new ones are pretty expensive if they can be found at all and then, they may have very old batteries in them.

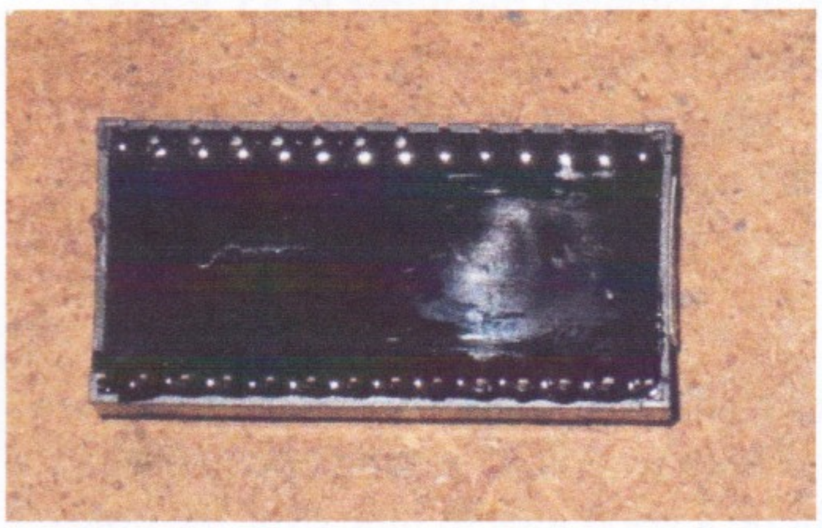
Warning: This modification requires soldering skills and the use of a small rotary tool. Use CAUTION when working around the lithium batteries because puncturing through the case or excessive heat can cause a fire or small explosion. Use eye protection when working directly with the battery.



The DS1216E consists of a twenty-eight pin IC socket with a printed circuit board on the bottom that contains a round 3v battery possibly similar to the CR927 which is 0.37" in diameter and a clock controller integrated circuit probably like the DS1315 chip although the chip on the board is marked with the overall assembly part number. The top side of this chip is readily accessible. The bottom where the battery is located is potted with epoxy.

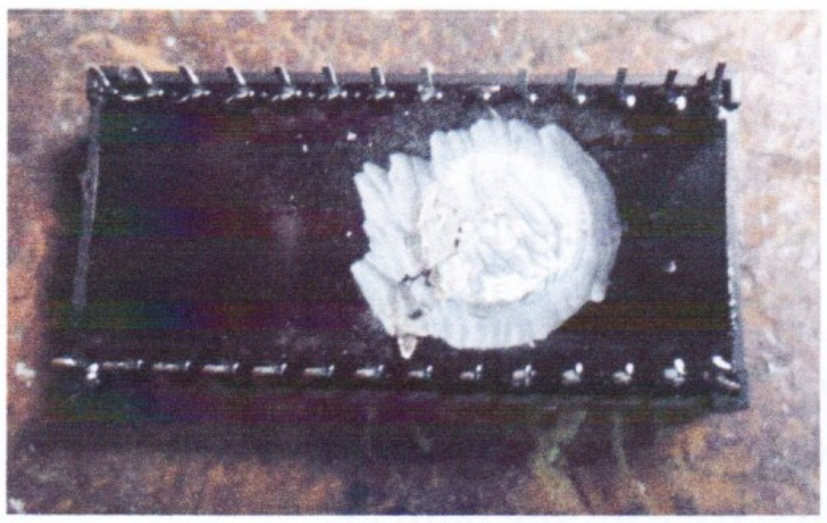
The positive terminal of the battery is connected to pin 4 of the controller via the pc board. The negative terminal is connected to pin 8 or ground. I measured the voltage at pin 4 and it was 0.47 vdc. No wonder it didn't work.

There appeared to be a couple of ways to approach this problem. One, I could rout away the potting and remove the battery and replace it on the bottom. Two, I could cut the BAT1 pin 4 and solder in wires leading to an external battery. I decided I would try option one but ended up with a slightly different version of option two. Note: It is OK to leave one terminal of the battery connected but at least one terminal **must** be disconnected before attempting to connect another battery in the circuit.

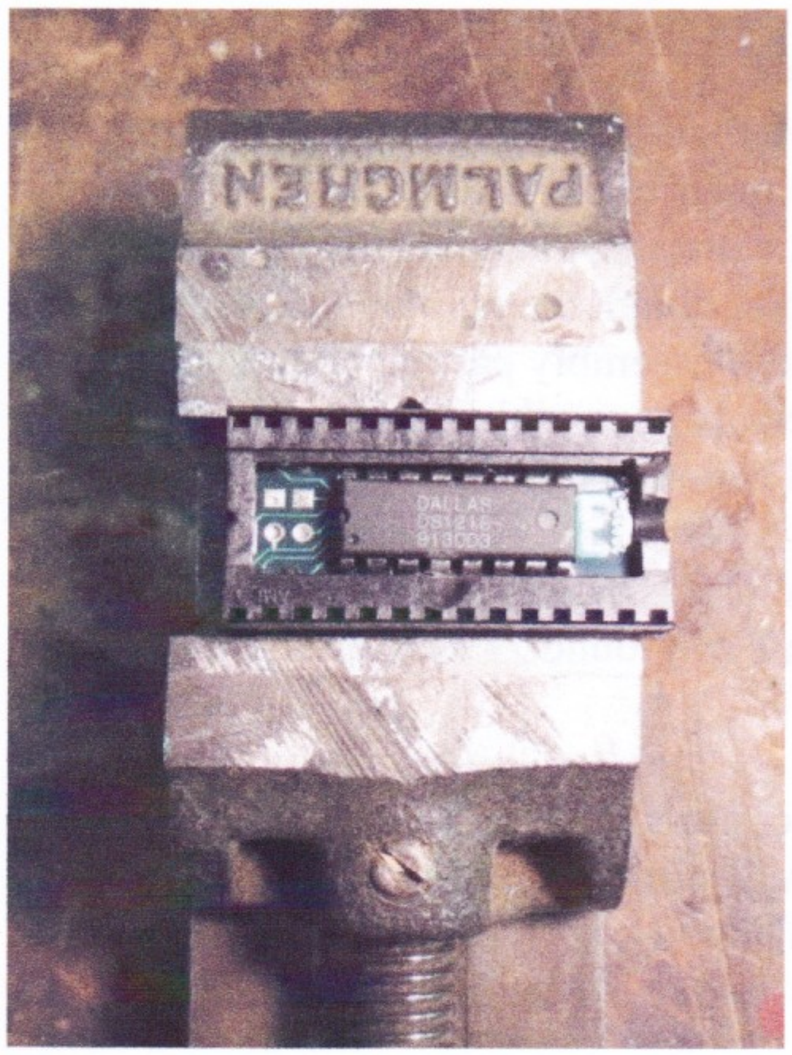


A close examination of the bottom of the DS1216E showed a ghost of the battery and one of its leads. It is difficult to see in this picture but it is there approximately between pins 5 and 23. (Pin 1 is lower right.) I had thought that the battery would be near the other end of the chip but this was not the case.

I began routing with a Rotary Tool and found the battery to be where indicated. What turned out to be the negative lead extends to the seven o'clock position in the photo. A smaller rotary tool router bit would have been better but I didn't have one.



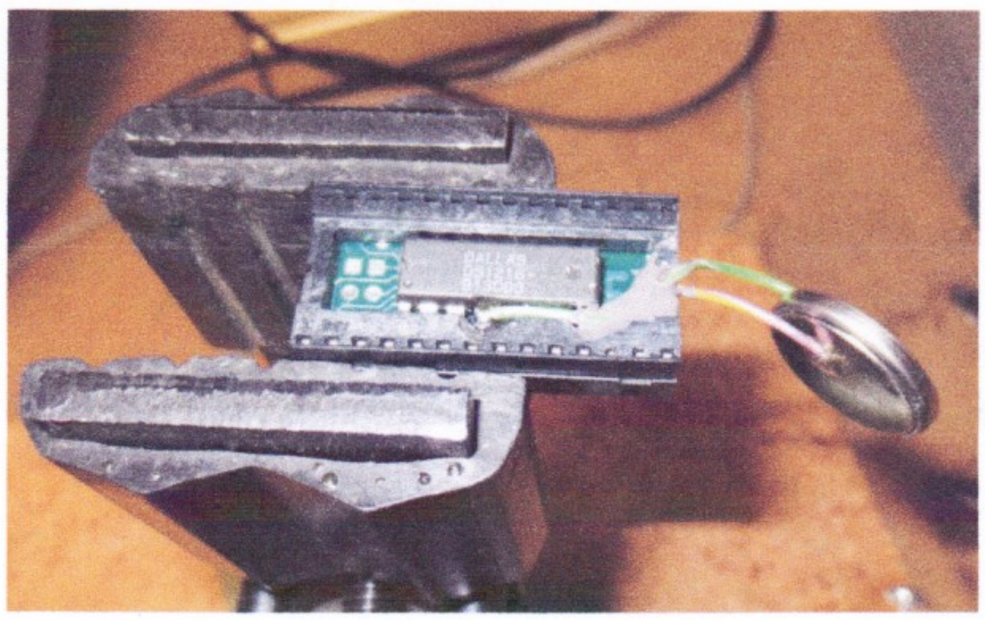
During this process I accidentally cut through the battery negative lead. (I was very careful to not cut through the battery case as I did not want the battery contents to escape.) Be aware it is possible that all DS1216E's are not the same and that the positive lead is the first one you encounter. Cut whichever one you see and proceed. The rest of the description assumes you have cut the negative lead. After thinking about this for a bit I thought why not just leave the battery in place and instead add a couple of wires topside to the clock controller chip BAT1 and GND terminals and keep the battery outboard?



That is what I decided to do. I started by routing beside controller pin 4 (BAT1) and the end of the socket for wire exit under the EPROM when it is plugged into the socket. After I took the photo I also routed beside controller pin 8 (GND). It would have been better to have routed the end of the socket inline with the controller pins 1-8 row but I didn't think of it in time. I routed beside the controller chip in order to gain access to the top of the controller IC pins with a soldering iron. Again, a smaller router bit would have been helpful. Use care to not nick the IC with the router.

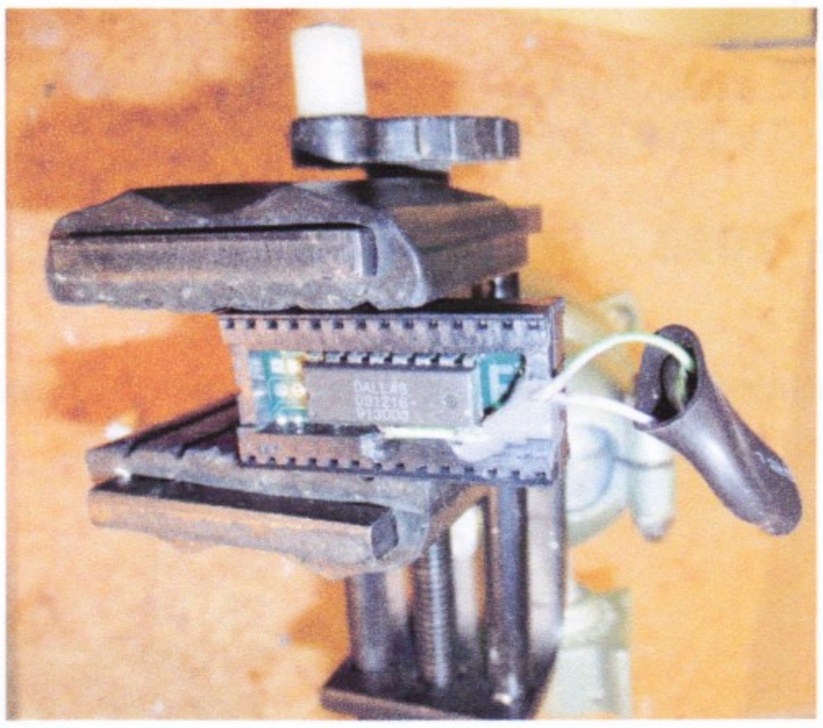
It is not necessary to rout out as much underneath as I did if you don't intend to remove the battery. Just rout enough to cut through the negative battery lead. Verify that it is cut by measuring no continuity from the battery side of the terminal to controller pin 8 (GND). Then measure continuity from the cutoff side of the battery terminal to pin 8.

After routing I soldered wires to the two pins. I used 26GA stranded Teflon covered wire. A smaller gauge would have been better but I couldn't find any. I wanted to use stranded wire to reduce the possibility of fatigue failure. <u>Be careful to get the + side of the battery connected to controller pin 4.</u> I installed the GND wire first, then the + wire as it lays on top of the other one. Then I soldered the wires to a CR2032 3.3v battery. These batteries are easy to find but any 3.0 to 3.3v battery should work fine. It is generally not a good practice to solder directly to any battery but I have done it before. I roughed up the surfaces and then smeared a little rosin flux on before soldering. Try to keep battery heating to a minimum. If you can get a battery with solder tabs spot welded on it would be safer and easier. A local battery supply store may be able to provide this.



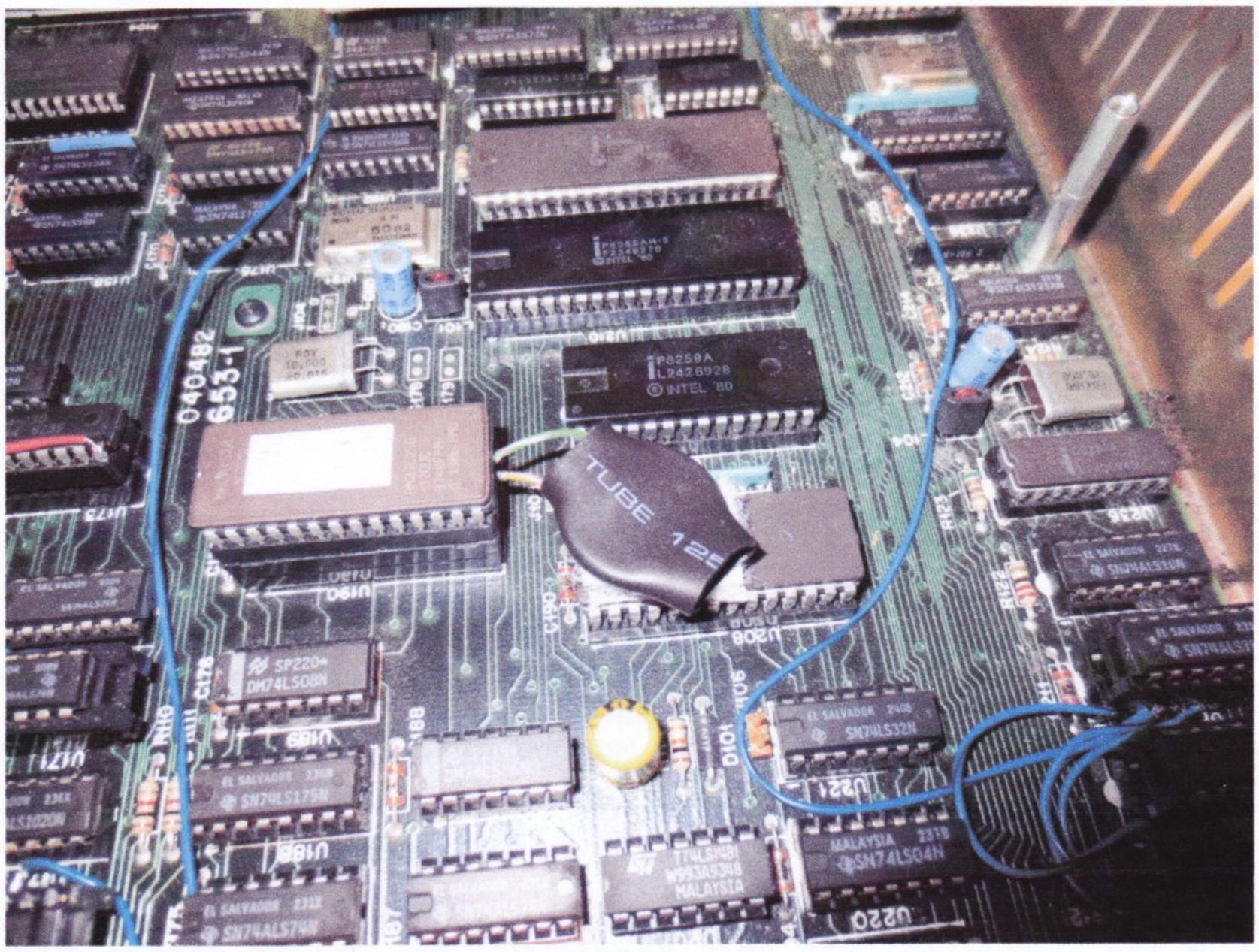
After having everything soldered, I potted the wires in place with JB Weld two part epoxy. Avoid getting epoxy in the socket holes. It might be a good idea to tape over the holes during the potting. Don't ask why I suggest this.

After the epoxy dried about four hours I slipped a short length of 3/4" heat shrink tubing over the battery and shrank it around the battery.



I checked the voltage at controller pin 4 with respect to controller pin 8 and it was +3.2vdc. Pay attention to the polarity here. It could be easy to get it backward. When all was ready, I installed the socket in the Z100 and plugged in the EPROM. Then I accepted a great suggestion from my wife and fastened the battery to the top of an adjacent IC with a couple of small strips of Velcro. For now it seems secure. I don't know what will happen to the self-adhesive of the Velcro over time.

This is how it looks installed in the Z100.



The other wires in the photo are for previous modifications to the Z100 motherboard and are not related to this subject.

I temporarily reinstalled enough hardware to boot to DOS and check the clock function. After resetting the clock with the DSCLOCK software, everything should be running fine. It is assumed the reader has DSCLOCK or similar software and understands how to use it. Reassemble the Z100 and enjoy.

This particular Z100 did not have a NVSRAM with clock on the IDEHD card so another clock solution was required.

Caution: I have since found that there may be 2 batteries in the DS1216E! Please see the Smartwatch update in issue #128. (SW Vagts)

Heathkit® Is Back!

If you were to enter the http://heathkit.com address in your web browser, you would find a rather cryptic message; a picture of Mark Twain on an old postage stamp and a cartoon baloon window that said, "The news of my death has been greatly exaggerated."

Below it would be found a typical trademark statement. However, at the end you will find links to their "Privacy Policy" and "FAQ".

The following is a summary of answers to some of their Frequently Asked Questions:

Big Changes, Big Plans

Heathkit is back and they state that they intend to bring back some of the original Heathkit® kits and develop entirely new designs.

They have a link to a survey that they will use to better judge our desires as consumers, then develop new kits or revive some old ones to meet our needs. The survey will ask you to tell about yourself, your favorite past or future Heathkit product, and what you most hope to see and buy from them.

When can you start ordering Heathkit® kits? They respond: They're coming. But it's a long road, and we need every product we offer to be Heathkit® quality. We will communicate with you, here and elsewhere, as we make progress. Thanks for being patient while we rebuild this great company.

About the Company

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Heathkit is still owned by the Heath Company. At Heath Company in 2013, Heathkit's destiny is in new hands, under new management and ownership. We know the value and trust you place in the Heathkit® name, and we are committed to making Heathkit succeed and flourish.

Some thought the name of the company was “Heathkit Educational Systems.” But this was widely misreported and misunderstood. “Heathkit® Educational Systems” is a trademarked use of the Heathkit® trademark, not the corporation name. As devoted Heathkit® fans know, the parent company name and the ownership of Heathkit have changed a number of times in the 80 or so years since Ed Heath founded the business. Over the decades Heathkit has been owned by Daystrom, Schlumberger, and Zenith and has been independent several times. The bottom line is: Heath Company has restarted Heathkit®. High-quality kits, educational systems and instructional products always have been a major line of Heathkit's business, and we remain committed to education and the joy of building and learning as an important Heathkit® value and contribution.

But here's what we want you to know right now: We have enormous respect for the Heathkit® name, and we know you do too. We consider ourselves this decade's caretakers of the most respected name in do-it-yourself and educational electronics and related products over the past century. It's a terrific opportunity and a historical responsibility we take seriously, and we want to preserve and grow this opportunity, together with you. We know we need to earn and keep your trust every day. Meanwhile, to whet your appetite: Our new CEO/President, and every member of Heath Company's Board of Directors, are avid kit-builders and DIYers. We own and use Heathkit® products ourselves. For those with this interest, it happens we all are licensed amateur radio operators. (Also happy with our team will be: car buffs, pilots, musicians & artists, sports/outdoors enthusiasts, parents, educators, and people who value community service.) Our management team have substantial experience as high-tech executives, in startups and public companies, and in technology and finance. We are carefully growing a team of highly experienced industry advisors. Most importantly, we want you to help and advise us too. Ultimately, it is you, with your excitement and enthusiasm and interest in doing great things with great products, who will make Heathkit a success.

As to why we have been in stealth? Efficiency. Here are two business choices. Choice (a) is, early on we spend lots of money, time and energy on press releases and marketing and public interaction. Choice (b) is, we quietly assemble a talented team, learn what our customer community wants, and put all our energy into creating great products for them. Which sounds better?

Heathkit Insiders

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So, take the survey. Then—since the best way to get us to create products you really want is to convince us there's a market for them: Share your enthusiasm—tell your friends to take the survey.

The survey can be found within the FAQ section or by entering the following link address:

http://heathkit.com/heathkit-survey.html