HP-34C

The Challenge of an HP-34C Restoration

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HP Handheld Conference 2026

Nashville, TN

Oct. 31 & Nov. 1, 2026

HP-34C Restoration

- A brief history of the Spice series of HP calculators
- Challenges with restoration of Spice calculators
- The Challenge of opening a Spice calculator
- Intermittent HP-34C's
- HP's design approach to the Spice series
- How to Solve Problems with a 47-year-old calculator
- Battery Chargers for Spice Calculators
- Summary
- Appendix
  - Opening a Spice calculator
  - Repair parts for battery flex circuit
  - HP-34C Schematic
  - Flex circuit reference



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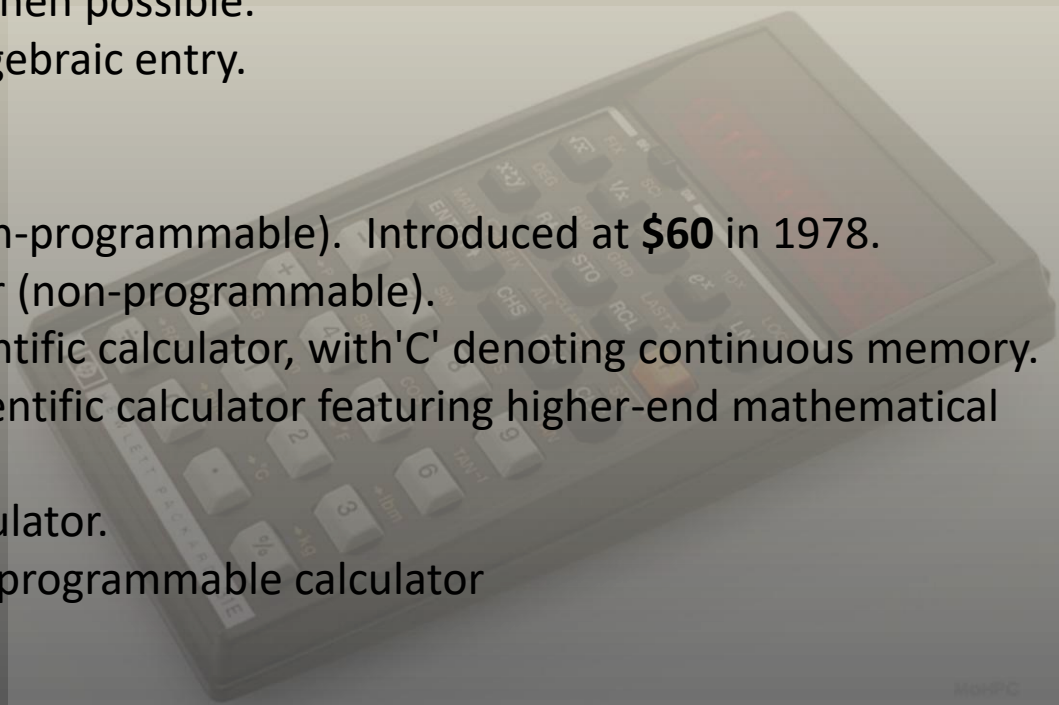
The Hewlett-Packard "Spice" series is a family of handheld, Reverse Polish Notation (RPN) scientific and financial calculators introduced in 1978.

Overview of the Spice Series

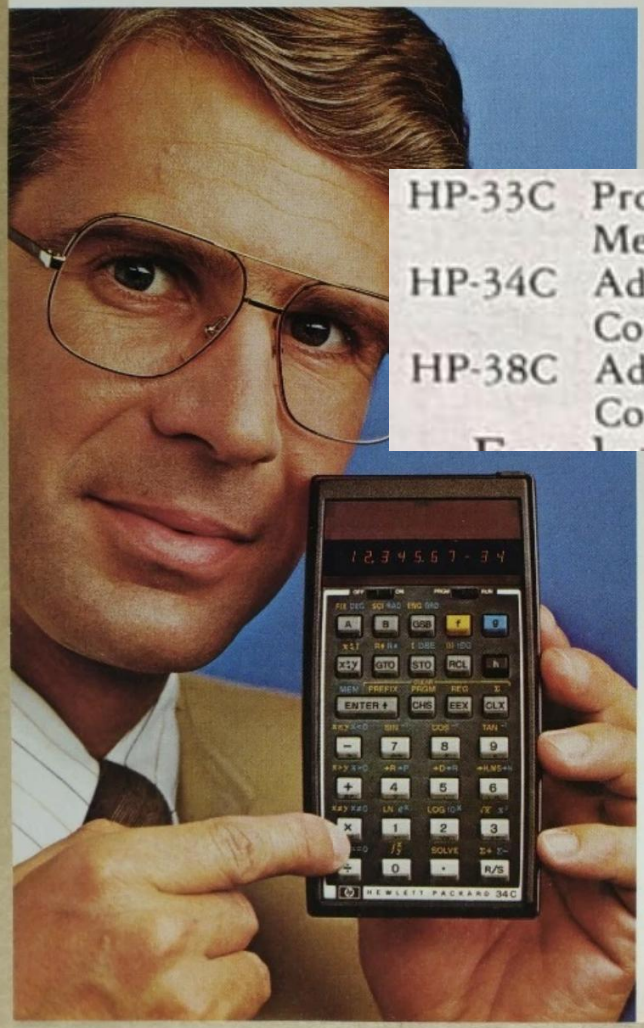
- **Design & Display:** They feature red LED displays and a streamlined physical case design that succeeded HP's earlier "Woodstock" series.
- **Power:** They generally run on two rechargeable NiCd batteries sized similarly to AA cells. Standard modern AA cells with protruding positive terminals can damage the internal contacts. Use button-free batteries when possible.
- **Logic:** They utilize RPN logic versus algebraic entry.

Key Models in the Series

- **HP-31E:** Basic scientific calculator (non-programmable). Introduced at **$60** in 1978.
- **HP-32E:** Advanced scientific calculator (non-programmable).
- **HP-33E / HP-33C:** Programmable scientific calculator, with'C' denoting continuous memory.
- **HP-34C:** Advanced programmable scientific calculator featuring higher-end mathematical functions and root-solver capabilities.
- **HP-37E:** Financial programmable calculator.
- **HP-38E / HP-38C:** Advanced financial programmable calculator



HP-33C, 34C, & 38C with Continuous Memory. They're ready when you are.



These advanced programmable calculators from Hewlett-Packard retain your data and programs even after they've been turned off. Just think how much more quickly and easily you'll be able to solve your business or scientific problems.

But these remarkable calculators do

HP-33C	Programmable Scientific with Continuous Memory	$110*
HP-34C	Advanced Programmable Scientific with Continuous Memory	$150*
HP-38C	Advanced Financial Programmable with Continuous Memory	$150*

HP-33C, 34C and 38C with the most comprehensive instruction manuals and software solutions to problems for science, engineering and business applications.

Visit a Hewlett-Packard dealer now and experience the advantages of Continuous Memory in one of these outstanding calculators.

HP-33C	Programmable Scientific with Continuous Memory. *New low price*	$90*
HP-34C	Advanced Programmable Scientific with Continuous Memory	$150*
HP-38C	Advanced Financial Programmable with Continuous Memory	$150*

For details and the address of your nearest HP dealer, CALL TOLL-FREE 800-547-3400, Department 214K, except from Hawaii or Alaska. In Oregon, call 758-1010. Or write to Hewlett-Packard, 1000 N.E. Circle Blvd., Corvallis, OR 97330, Dept. 214K.

*Suggested retail price excluding applicable state and local taxes—Continental U.S.A., Alaska and Hawaii. Display photographed separately to simulate typical appearance. 610/13

HEWLETT PACKARD

Circle 203 on reader service card

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A WORD OF





Use great caution when attaching the charger of a Spice series unit to the calculator since it may be damaged if the battery is not making good contact. The battery acts as a load to the charging circuit and lowers the input voltage to a safe level....**IF**....the battery makes good electrical contact and if it can accept a charge.
The best solution is to charge the batteries with an external charger. Don't risk frying your CPU by charging the batteries in your Spice calculator.



From the Owner's Handbook - page 270:
"Note: Do not attempt to operate the calculator from an ac line with the battery pack removed."

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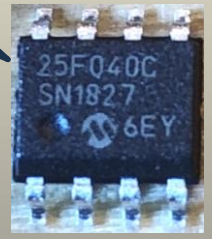
Challenges

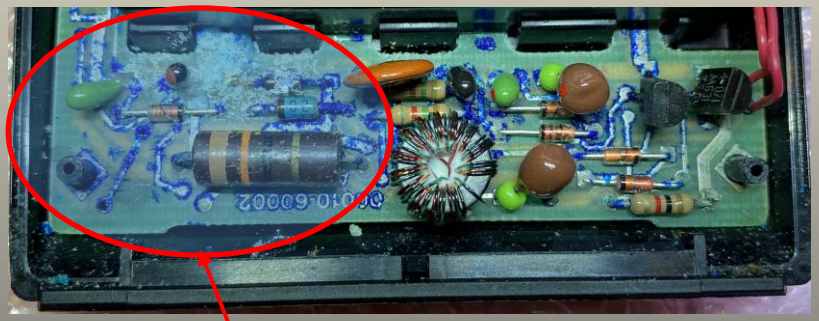
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What are the problems?

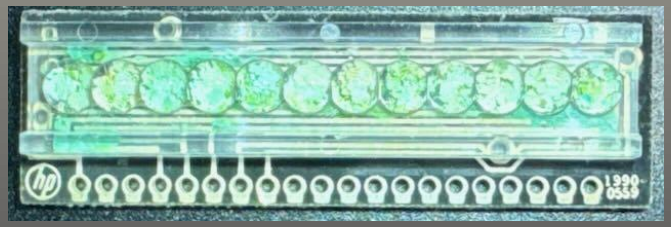
Many Spice series calculators (HP-31E, HP-32E, HP-33E, HP-33C, HP-34C, HP-37E, HP-38E, HP-38C) may have encountered problems such as battery leakage, faulty integrated circuits, electrical overstress due to connecting to a charger without a battery installed or just old age.

EOS

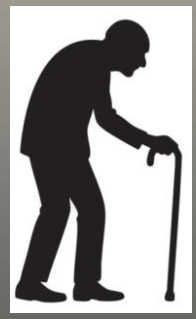




Corrosion



Old Age



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Challenges

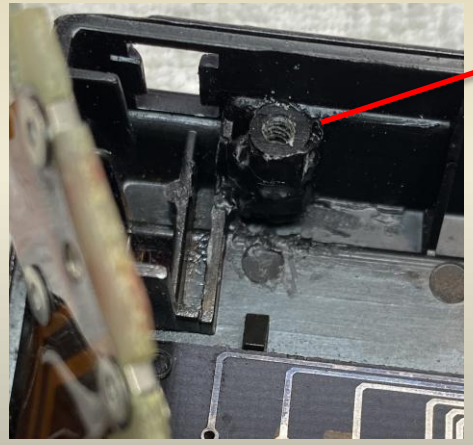
HP Spice Design Issues

- Press-fit and Flex PC Board design
- Foam Interposer
- Plastic tab design
- Metal clip PCB holder
- Battery charge/overvoltage design
- Flex charging cable
- Difficult case to open

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Challenges



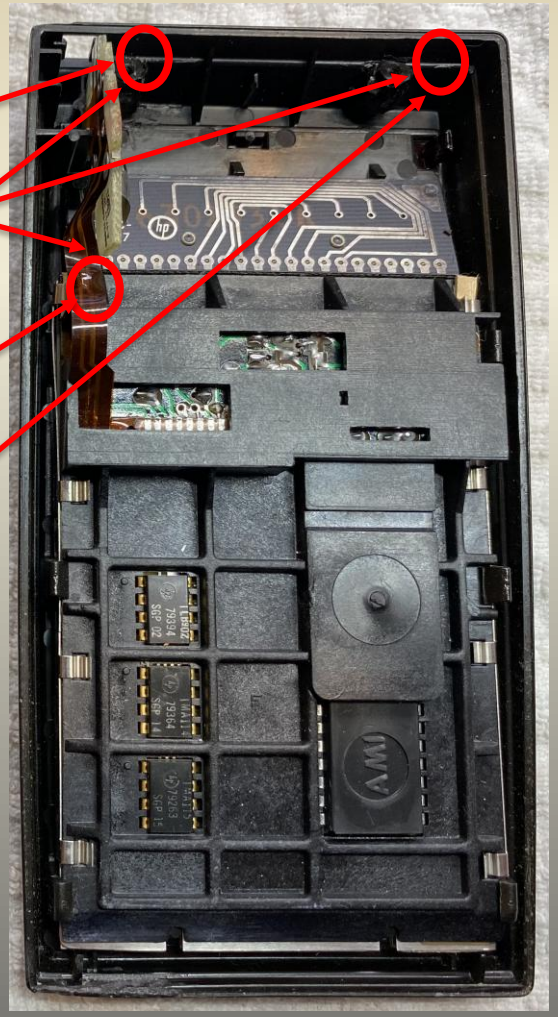


Poor repair on mounting holes



Broken tab

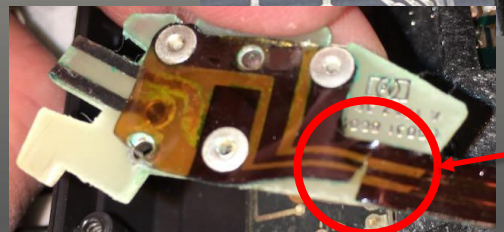
Areas of concern





Broken battery contacts





Broken flex cable

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Opening the HP-34C Case

Remove 2 screws





Plastic Clip

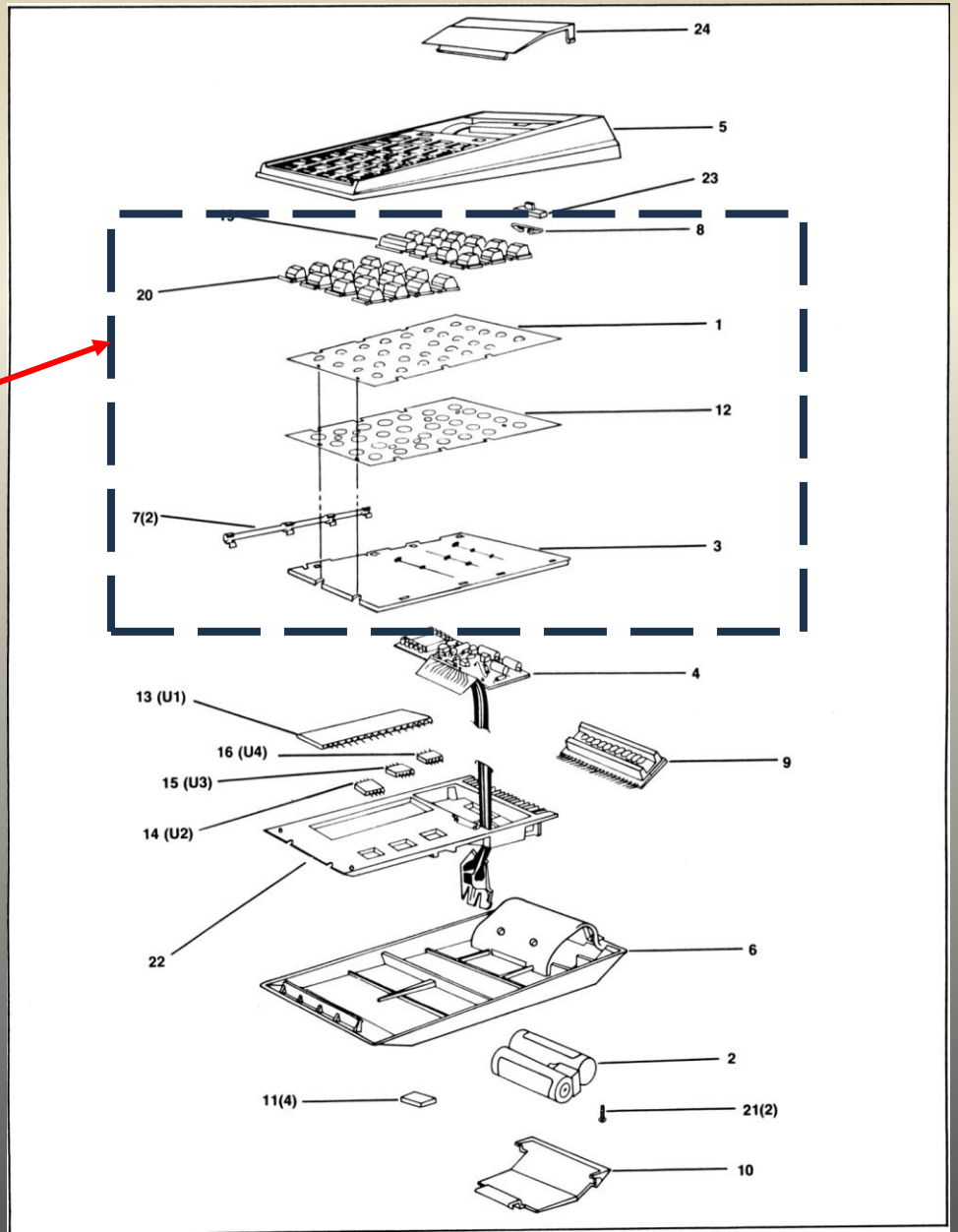




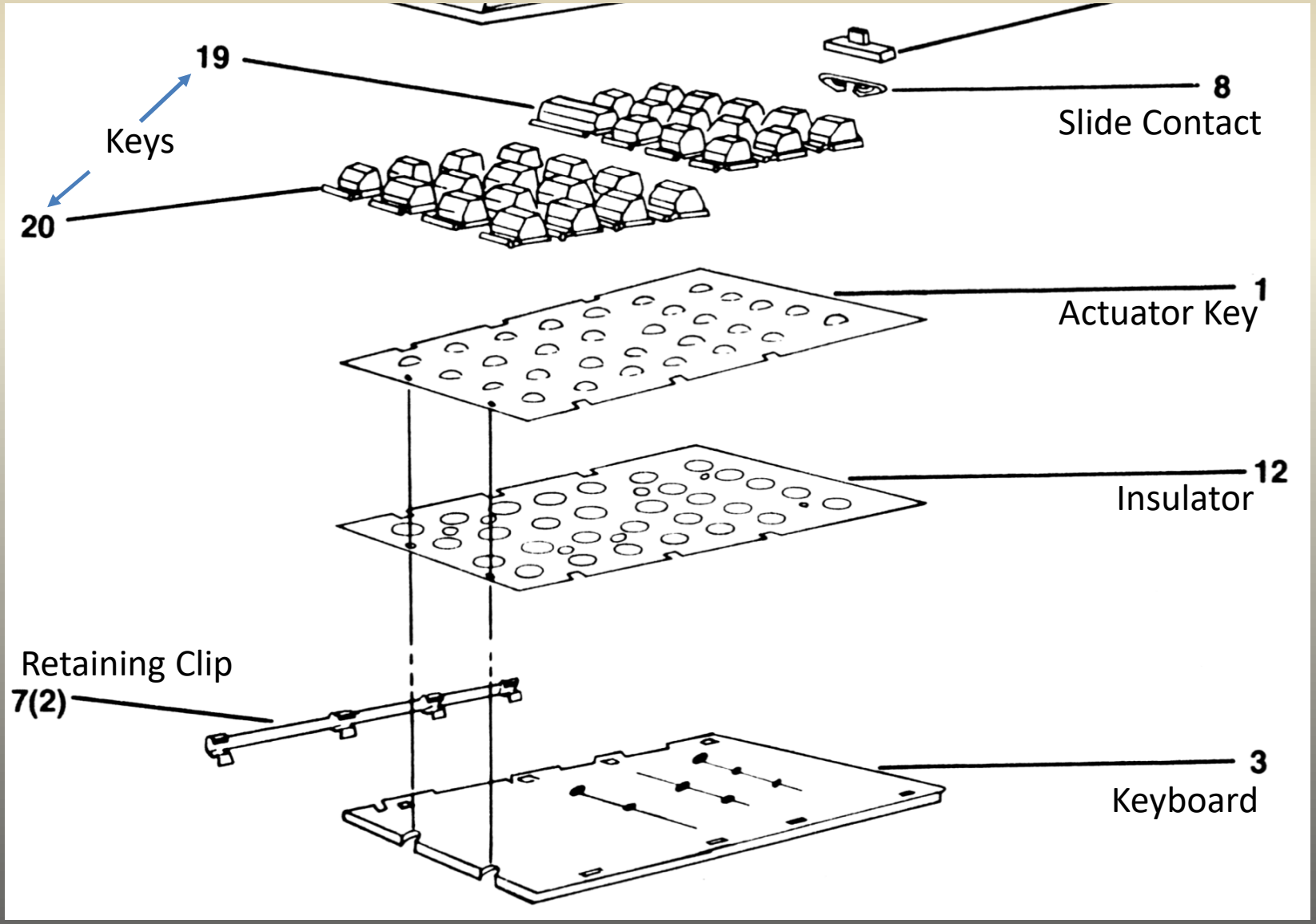
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Exploded diagram of a Spice calculator

Let's examine this area more closely

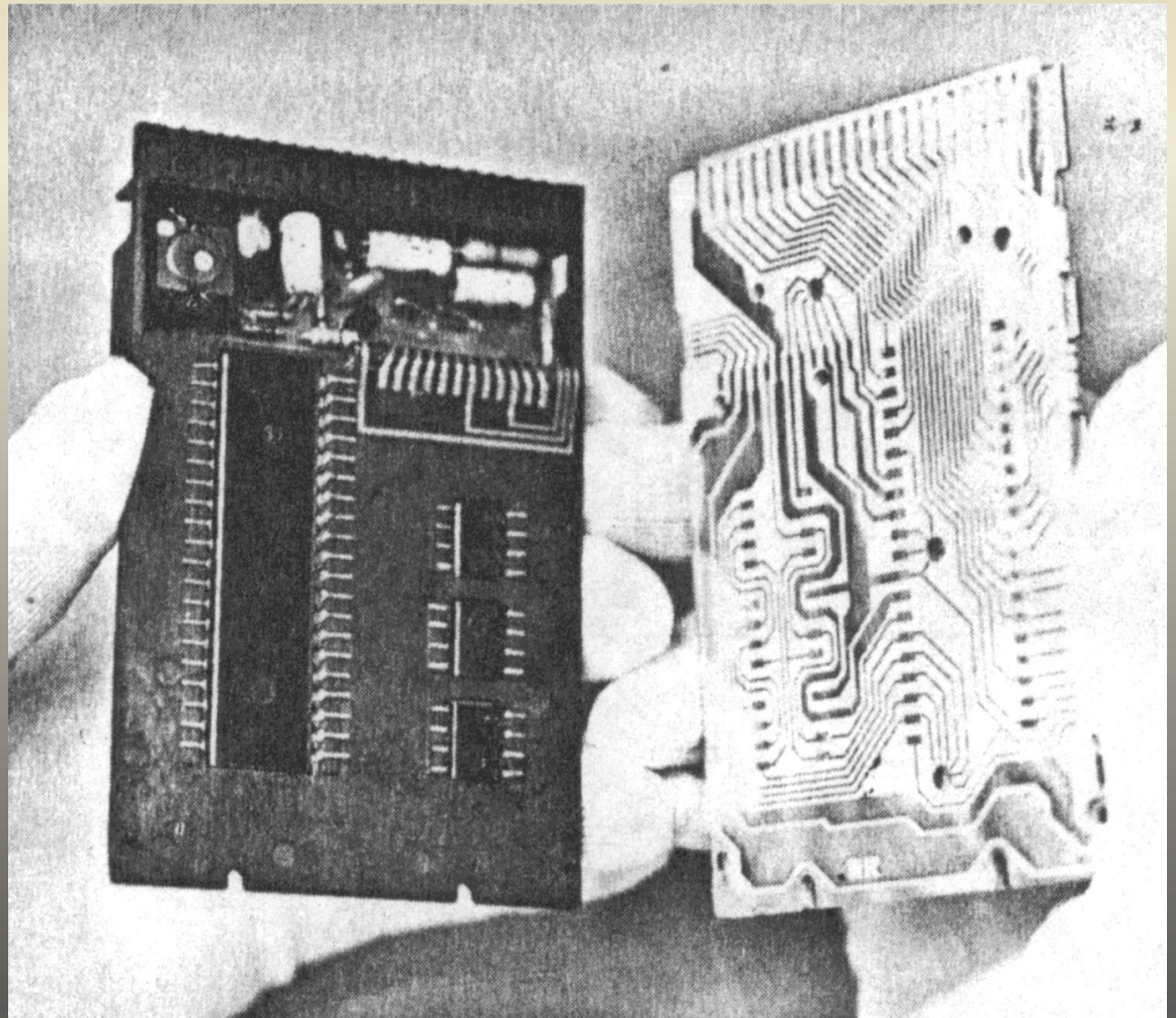


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HP-34C Restoration

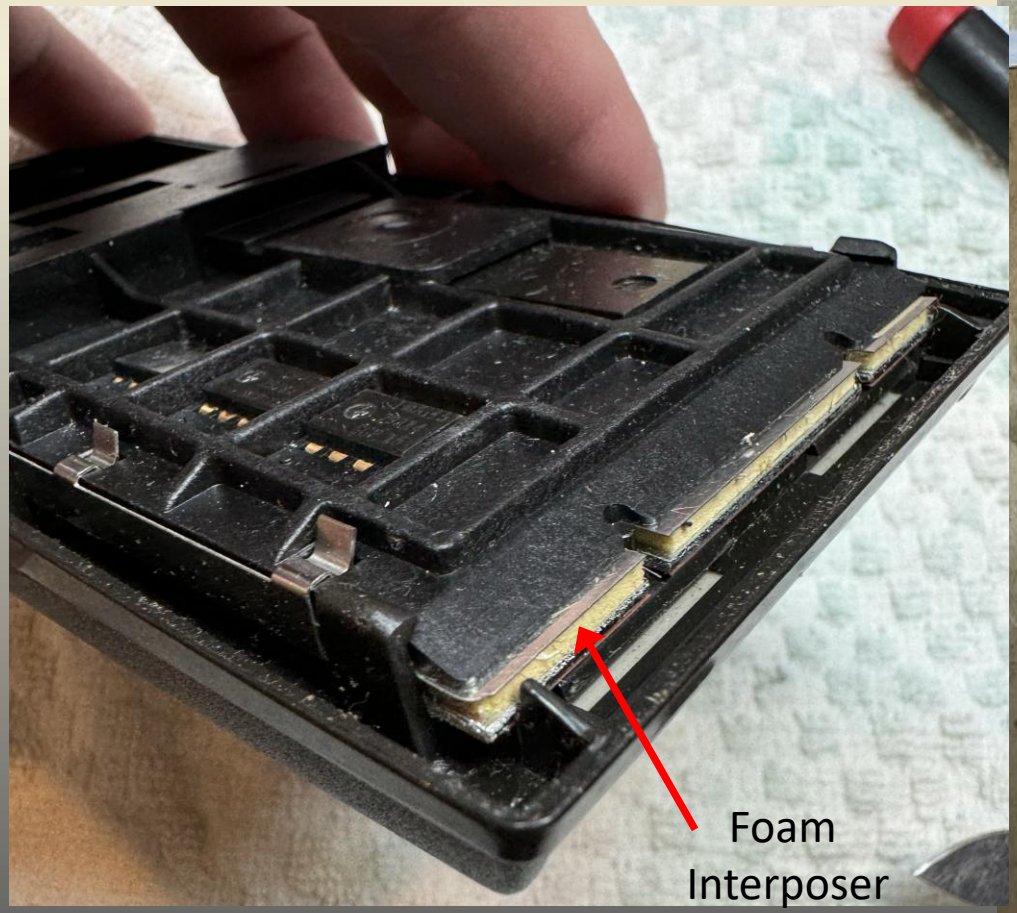
Internal “Solderless” PC Board

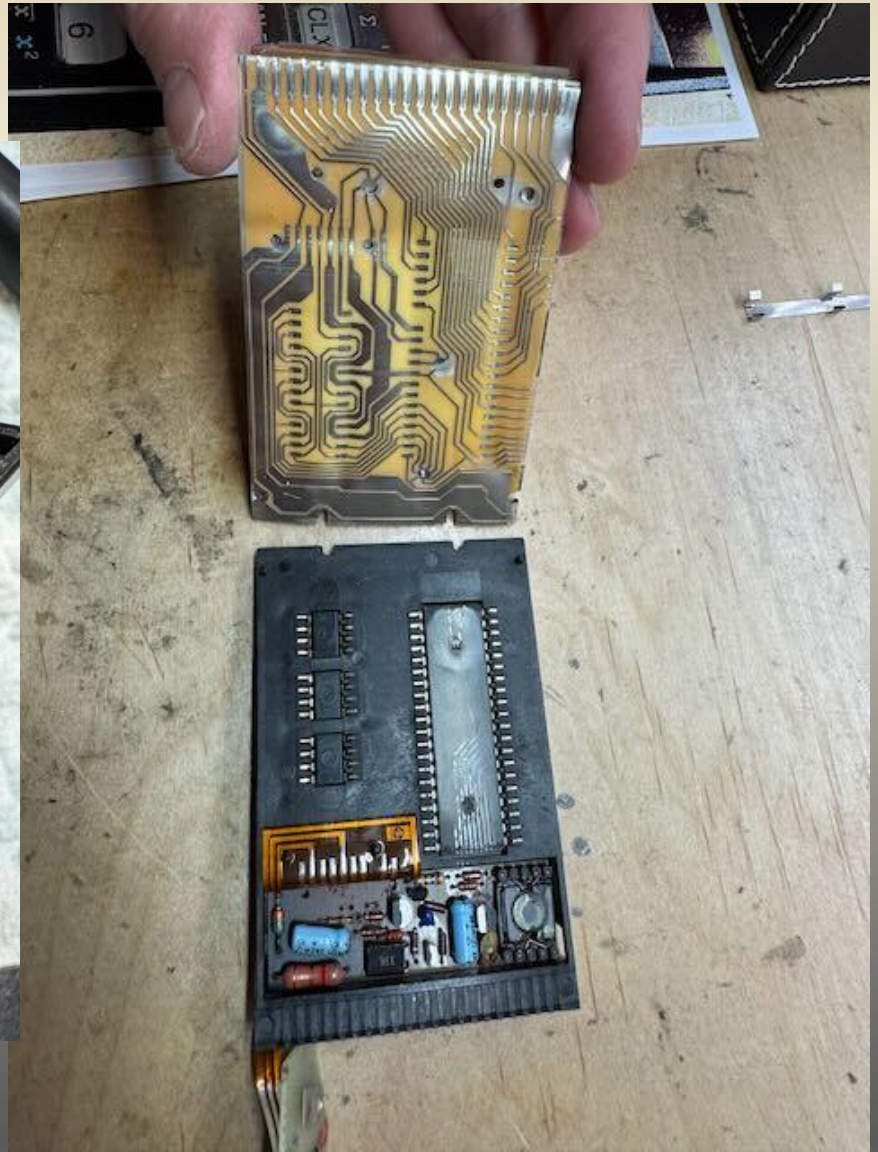


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Open Case

Flex circuit design
with press fit I.C.'s





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PCB Assembly – Spice Series



Flex circuit with press-fit PC Board



Traditional Soldered PC Board

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Solution

Solder display to Flex PC Board

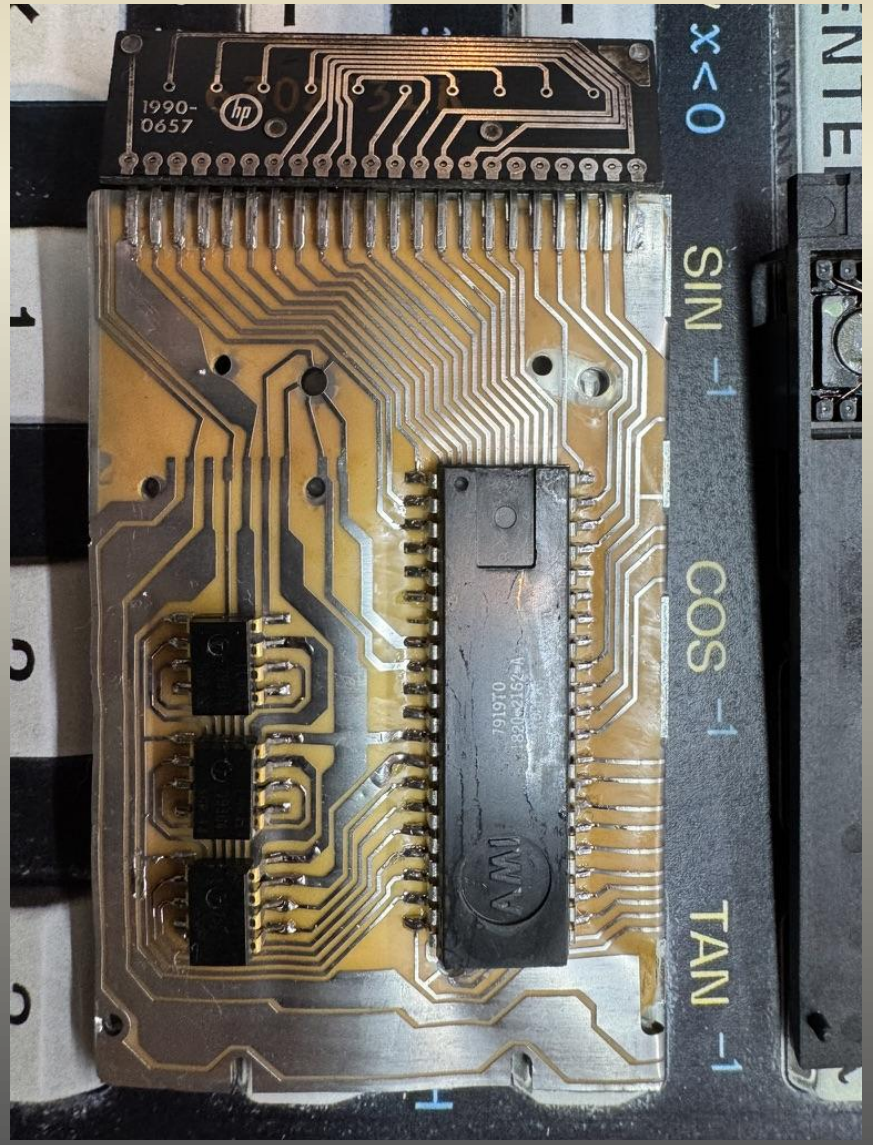


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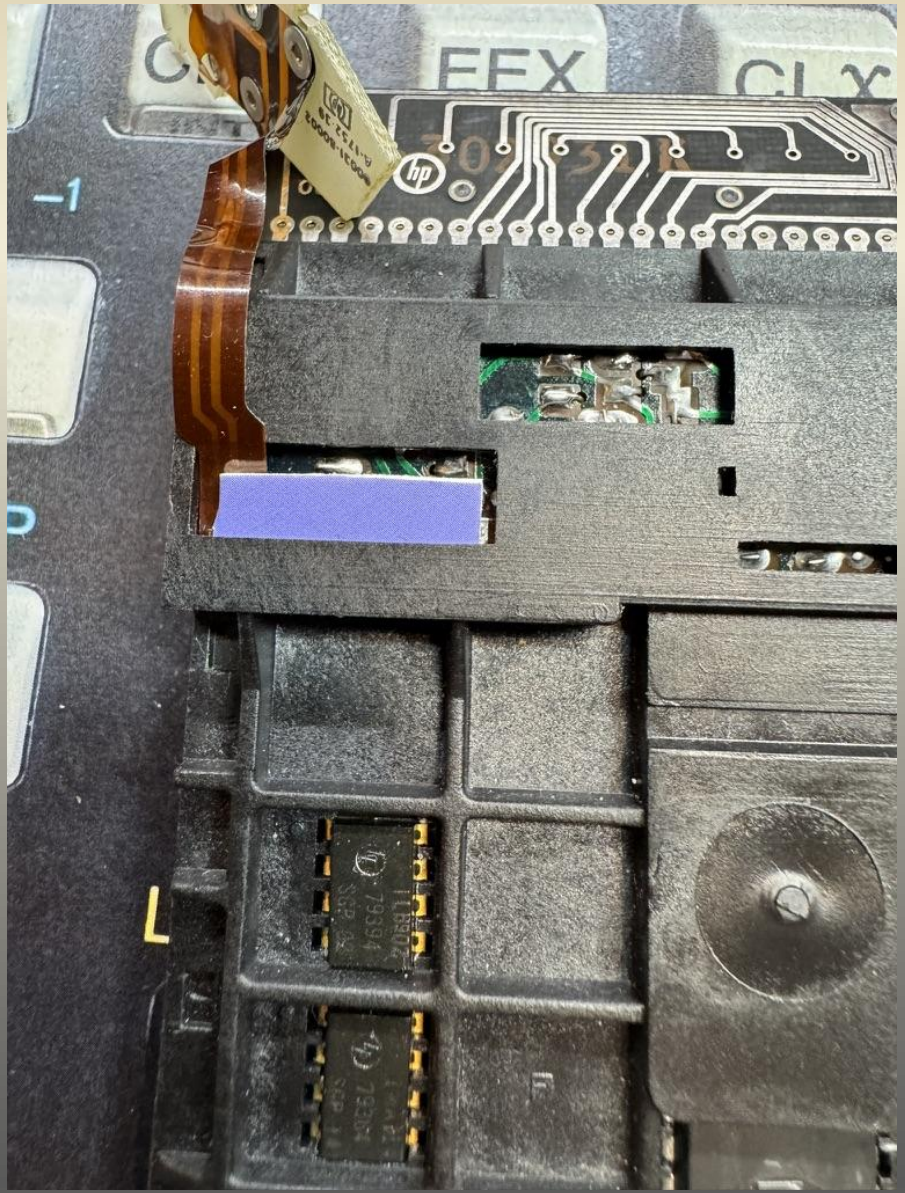
Spice Calculator After Soldering





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Soldered Spice Calculator – Reassembled PCB Assy



Battery Charging

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Battery Chargers



HP 82103A Battery Charger

Since the HP 82103A charger is un-obtainium to charge 2-cell NiMH batteries….

What other options do you have?



You can use 2 - AA alkaline batteries, preferably buttonless or flat tops

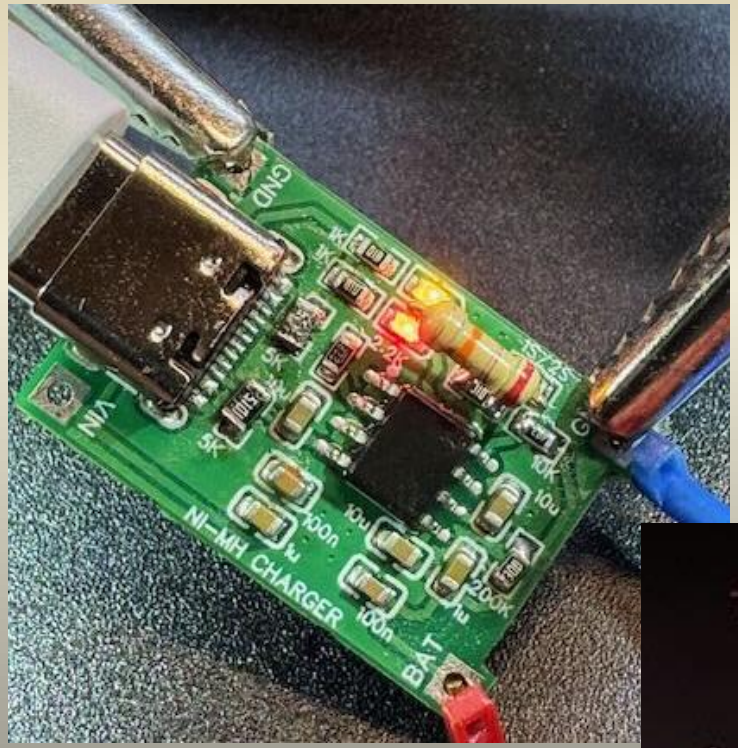
You can use 2 - AA NiMH batteries, preferably buttonless and charge externally

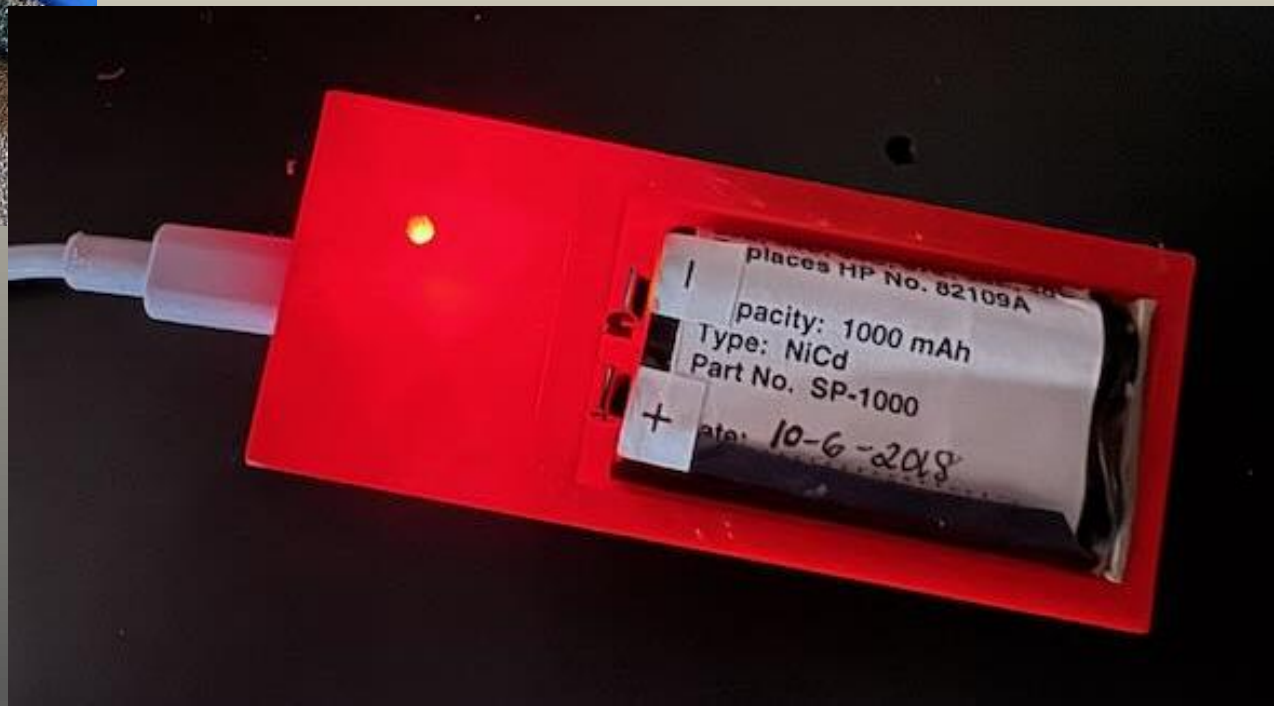
Or you can use . . .

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A Battery Charger Solution for 2-Cell NiMH/NiCD Battery Pack *





*currently in development

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Summary

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- Battery chargers for Spice calculators

Restored HP-34C



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Thank you!

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Email: jjohnson873@yahoo.com

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Acknowledgements and Credits

1. Wikipedia: Spice series of calculators.
2. Bernhard Emese (Panamatik) associated knowledge and notes about the HP Spice series and his Spice Low Power Board for Spice calculators.
3. Jacques Laporte's extensive HP calculator power supply schematics and analysis.
4. Eric Smith's development and documentation on HP calculators.
5. Museum of HP Calculators (Dave Hicks) – various notes, comments, dialogues, photos and discussions on the Spice series of calculators.
6. Eric Rechlin's HPCalc.org, amazing repository of everything "HP" (https://www.hpcalc.org/)
7. HPCC notes and schematics for Spice calculators.
8. Spice related repair links:

Repair of an Hp 34C by Geoff Quickfall
How to open a Spice Model Calculator by Geoff Quickfall
How to open a Spice Model Calculator by Karl Schneider
HP Forum discussion about repair keyboard
HP-32E Advanced Scientific Calculator - my first Spice machine by jebem
Spice battery connector by Panamatik

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Appendix A

Opening the Spice Calculator

Different methods described here.
https://www.hpmuseum.org/cgi-bin/articles.cgi?read=925
https://www.keesvandersanden.nl/calculators/hp32e_repair_1.php#links

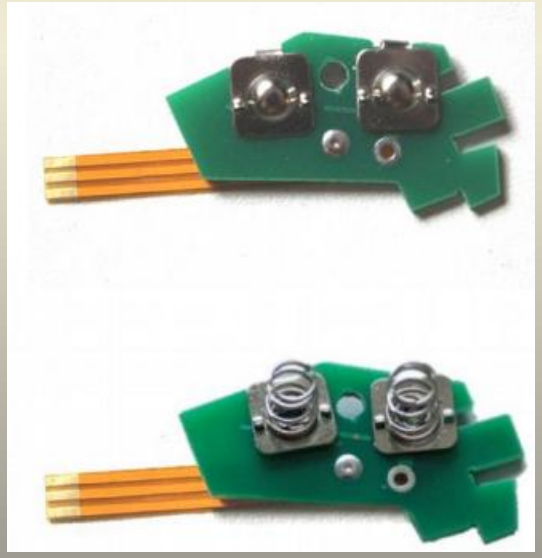
I recommend the method described by Geoff Quickfall, to open a Spice Calculator
https://www.hpmuseum.org/cgi-bin/articles.cgi?read=925

Another method described by Karl Schneider:
Tie a loop of waxed dental floss. After removing the two screws in the battery compartment, place the calc face down and spread the halves apart at the top no more than an inch (watch the battery terminals). Insert the floss between the halves and slide it past all six tabs (three each side) and around the corners at the bottom so that the floss exits through the case seam at two places on the bottom edge. Internally, the floss should wrap around the long-hooked bridge attached to the bottom case half. Hold the main (top) case half in place on the table face down (use a rubber glove if you like) and gently pull the loop of floss away from the calc to detach the smaller back case half.

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Appendix B

Battery Contact Solutions

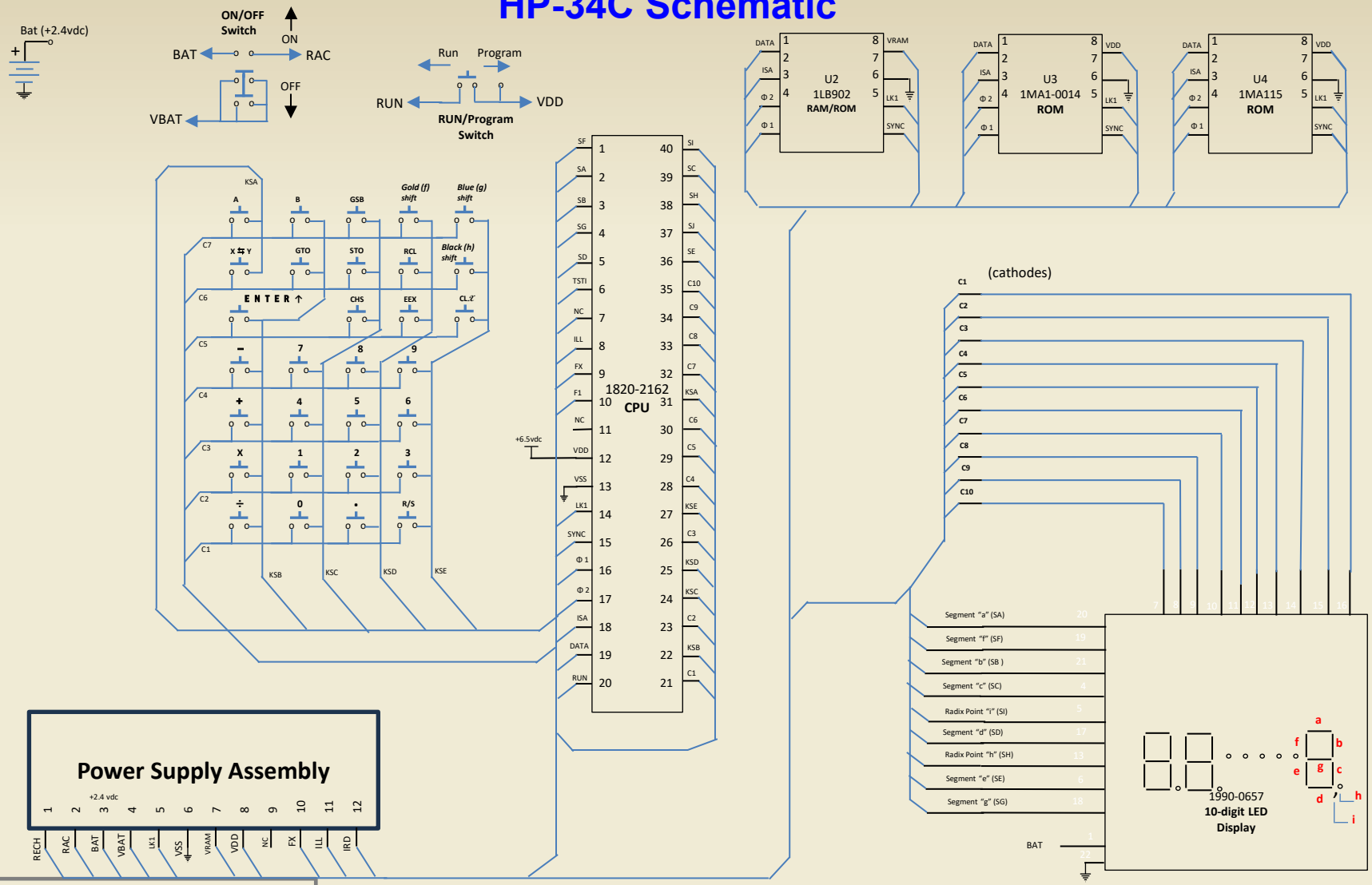


https://www.panamatik.de/SpiceBatteryConnector.pdf

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Appendix C

HP-34C Schematic



HP-34C Calculator
Hewlett-Packard

Page 1 of 1 Created: 2026 October

•drawn by: JAJ – 2026 October 12

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Appendix D

HP-34C Flex PCB Reference

