

EduCALC TECHNICAL NOTES

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HP-41 SPEED-UPS Is a Faster HP-41 Worth the Cost?

Users of computers never seem to be satisfied with the speed of their machine. They take on larger and larger tasks and want them done sooner. Handheld calculator users are no exception, especially when using machines like the HP-41C/CV/CX, which are programmable. In engineering circles, a significant increase in speed is usually twice the previous value. In the binary computer world, the next size is twice the previous one. HP-41s that are speeded up are usually referred to as $2\times$ machines even though the actual speed may range from 1.4 to 2.4 times normal. HP-41 owners familiar with a speeded-up machine immediately notice a normal speed machine.

When the microprocessor is speeded up, the tone frequency will increase by the same ratio. Pressing BEEP is one way to determine if an HP-41 is speeded up. Not only will programs run faster, but the output to printers, disc drives, modems, etc. through HP-IL will also be faster. A faster HP-41 has some disadvantages, however. Not all modules or peripherals will operate at $2\times$. The main problems are writing magnetic cards, continuing a program from track 1 to track 2 on the digital cassette drive, and extended memory modules. For this reason, all speed-ups should have some means to resume normal speed when these operations are performed. The time module is not affected by a fast HP-41 because it has its own time base. Many optical wands perform better at $2\times$.

The early HP-41C calculators would not speed up very much—perhaps 1.3 to 1.6 times. As Hewlett-Packard improved their manufacturing process, the ability of the processor to run at faster speeds also improved. In September, 1985, HP started shipping a redesigned HP-41 that was able to run up to 5 times faster than normal. This is too fast and not practical, but this development did mean that all post-September 1985 HP-41s could be speeded up to the practical limit. This super speed HP-41 is called 'halfnut', an internal name used by HP engineers to describe the redesign project. Machines produced with serial numbers earlier than 2549 are halfnuts. See Figure 1 for a description of the HP serial number system. Some machines with date codes of 2545 to 2549 may be halfnuts. One machine with a serial number of 2540 is known to be a halfnut. One method of identifying a halfnut is to look at the display. If there appears to be a $1/16$ " black line 'frame' around the inside of the glass display, the machine is a halfnut.

Figure 1: HP Calculator Serial Number Coding Format

Serial Number Format: YYWWCSSSSS

Where:

- YY - Year manufactured in years since 1960
- WW - Week manufactured (divide by 4.3 for month)
- C - Country of Manufacture:
 - A = USA B = Brazil Q = United Kingdom S = Singapore
- S - Sequence number starting with 100 each week

Serial number location: Near the top 'behind' the ON key on the back.

Note: The week code is set ahead by about eight weeks to allow time for the machine to flow through the sales channel to the customer.

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EduCALC offers two commercial speed-up services. The fastest is the HYPER-41. This is a kit that is designed to be installed by the user. EduCALC will install the kit for a nominal charge. The HYPER-41 is the Corvette of HP-41 speed-ups. It uses a special oscillator circuit that does the switching when the speed is changed. Using this design the speed may be changed at any time. The switch is mounted on the AC tunnel cover located on the right side of the machine just below the SST key. Because the switch has two small wires attached to it you should not plan on frequently removing the cover to plug in the HP 82120 Ni-Cad recharger (HP 82059). The switch is a small button you press with your finger nail to change speed. The nominal speed of the halfnut HYPER-41 is 2.2 to 2.4 \times . Pre-halfnuts are set to about 1.7 \times . All tools re-quired to install the HYPER-41 are included with the kit, including conductive epoxy for making the electrical connections. If you are experienced in soldering you should consider soldering the joints for maximum reliability.

If the HYPER-41 is the optimum in speed and thought of as the Corvette, the S.O.S. speed-up is the Mustang. It is set at about 1.7 \times . This is an optimum speed that is fast enough to be worth the effort, and slow enough that most of the speed problems are reduced to a minimum. The S.O.S. speed-up is not a kit and you must send in your machine to have the work done. The speed change is achieved using a magnetic switch mounted inside the case between the two bottom conductive rubber feet. A magnet is required to operate the switch and S.O.S. provides one glued to the inside of the AC tunnel cover. Speed changes are seldom required. Users should exercise caution when using the speed change magnet around magnetic cards to avoid erasing recorded information. Compared to the HYPER-41 the S.O.S. is lower in cost and performance. Delivery times may also be shorter for S.O.S. speed-ups because S.O.S. is physically closer to EduCALC and shipping takes less time.

Both speed-ups modify the machine and void HP's warranty. A 90 day limited warranty applies to both. The normal HP warranty runs for one year from purchase and some users wait until the warranty runs out to speed up their machines.

Conclusion: Two speed-up services are available. One is the high performance approach used by the HYPER-41, which tries for the fastest speed and speed change. The second method is the consevative approach used by S.O.S., compromising speed for maximum compatibility with all applications. The physical location of the HYPER-41 speed change switch precludes the use of the AC tunnel for charging the HP 82120 battery pack. The magnet used by S.O.S. is less convenient and a potential problem for magnetic card users. Any speed-up done on an HP-41 voids HP's warranty, but the increased speed is worth the effort for serious users.

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