SPEEDY v7.1

May 31, 2008

Index

What is Speedy?

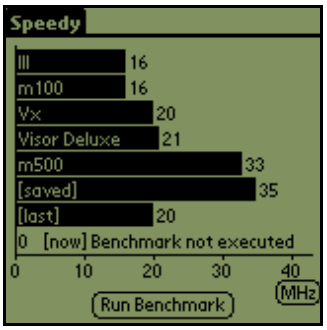
Speedy is a benchmark utility for Palm OS based devices.

Speedy performs three resource taking routines (calculation, memory access and graphical display) to measure the real performance of your device.

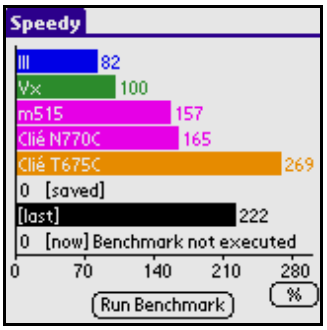
Speedy is especially useful in different cases:

- to check that your Palm OS based device behaves and performs like it should;
- to see the impact of CPU down/over-clocking upon your device's performance;
- to see how a specific software or hardware modifies your device's performance;
- to really compare different devices and benchmark them.

Your device's performance is ranked on several charts against baseline measurements of other common Palm OS compatible devices. Speedy reports both a CPU frequency and a relative index (100% is for the Palm Vx at 20 MHz).



CPU frequency view



Relative index view

Contact Information

- ✓ World Wide Web main download Site : http://www.aldweb.com
- ✓ Author e-mail : info@aldweb.com

Donate…

Speedy is free to use. However, if you like it, please consider making a donation to show your support. Any amount will be highly appreciated.
To proceed, just connect to:
http://give.aldweb.com/ (secured PayPal transaction)
For your information, the usual donation amount is of US$ 10 = EUR 10

Please let me express here a personal thought: very few people donated for Speedy so far. I think that this is a pity given the number of downloads and of people using it on a regular basis: http://trackerdog.a0soft.com/ reports Speedy as one of the TOP 50 popular Palm software! (**ranking number 21** "all time" as I write this sentence - October 25th, 2005)
I hope that you can understand the feeling of a developer who spent so many hours, as a hobby, to provide you this software for free and who feels to receive very little consideration in return...

Therefore, I thank from the bottom of my heart all people who donated, as well as all of those who sent me an e-mail to say thank you or to participate by providing their device's benchmark values (see paragraph "Speedy's database relies on you!" at the bottom of this user manual).

Advertisement

I decided to add a not too boring advertisement screen to Speedy (it can even be inactivated in the options if you'd rather have the standard "Please wait…" message), while waiting for the Speedy's initial processes being operated. This is a way for me to promote my other applications.

I am open to discuss for eventual partnerships & sponsoring to provide advertising for other companies.

How to install Speedy?

There is nothing special to say here.
Speedy is a PRC file that is installed like any other Palm file using HotSync.
So, extract **Speedy.PRC** from the ZIP archive file.
Double-click on it and the Palm install tool will popup.
Speedy.PRC will be transferred to your Palm device next time you synchronize your Palm with your PC with HotSync.

Avoid installing the current version of Speedy over a previous one. I do not guarantee that it will work fine doing so. Please, uninstall any previously installed version of Speedy before installing this one.

Speedy 6.0 recognizes part of the saved preferences in previous releases (benchmark results), so you may install it over an existing version. From version 6.0, an upgrade compatibility is assured.

- ✓ **Minimum Palm OS requirement for Speedy is version 2.0**
- ✓ **Speedy is Palm OS version 5 compliant**

- ✓ **Speedy works like a charm in the StyleTap platform for Windows Mobile devices (www.styletap.com)**

How to use Speedy?

User manual

I'll be very quick in these explanations because Speedy behaves like all Palm OS based applications, so it is very intuitive to use.

Speedy is very easy to use. Just press the **Run Benchmark** button to launch the benchmark routines. Result will be stored in the [now] line. Last result is stored in [last] line, so as for you to remember the previous benchmark result.

You can also save the [now] or the [last] result in the [saved] line.

By taping on any line, you can see the details of the benchmarks of the different devices.

By taping on 'MHz' (Frequency) or '%' (Relative timing) written at the right of the X axis, you switch between these two chart types.

Be careful not to tap with the stylus on the screen while the benchmark runs, otherwise the results will be depreciated by up to 10% (about 10% if you keep the stylus pressed against the screen).

This remark applies especially to Palm OS 5 devices. As the screen can be inactivated with previous releases of Palm OS, Speedy does inactivate it for a better accuracy. This option is badly no more offered by Palm OS 5.

Would you wish to see how your device answers when compared to the reference value stored for this device in Speedy's database (also see paragraph "Speedy benchmarks' reference table"), you may select it together with 4 other devices in the Devices option screen. This allows you not to stick with the 5 default devices.
You may also change the colors of the bar graph to your liking.
Don't hesitate to try the various options offered in the application. All are easily accessed through the menu as well as on board help.

Understanding Speedy's benchmark results

Speedy performs three tests to EVALUATE how your device performs compared to other devices.
Its goal is to evaluate the overall hardware behaviour (not only the processor's frequency) by performing a Calculation test (processor's AVAILABLE speed), a Memory test (main board's speed and memory access speed) and a Graphical test (graphical chipset's speed).

Just like for a PC, the overall performance of your device is not given by the only processor's beat, but by all components of the hardware: processor, main board, memory access, screen...

Like any benchmark tool, Speedy takes some hypothesis. Indeed, it assumes that an average software will spend one third of its time accessing the processor, one third reading and writing into memory and one third displaying some stuff on the screen. Of course, these relative values will change from software to software, from a basic memopad application to a real time strategy game for example. But, on the average, my tests showed that an average software would be answering as explained above.

The overall Speedy benchmark tells that your device runs at a RELATIVE SPEED of n% when compared to a Palm Vx. And THAT IS the important information.
It does not tell you that the processor device runs at a frequency of nn MHz, BUT it tells you that an average application runs at a speed that is equivalent to the one it would have on a fully equilibrated theorical device of about nn MHz.

Some software, like TealEcho for instance, are known to decrease drastically the performance of a device, when others, like Hacks, have little impact on a device's performance. See the paragraph "Software and performance" for further explanations on this topic.

As well, a device like the Sony Clié NR-70 has a virtual grafiti area which is estimated to use about 15% of the processor's power.

So, please, do not send me emails asking for things like how come Speedy gives a 53 MHz result when you know that you have bought a device with a 66 MHz processor. For sure, your processor runs at 66 MHz, but the overall device behaves like a 53 MHz one that would have no hack, no TealEcho, no virtual grafiti area...

CPU Frequency versus Timing

ⓘ The following two paragraphs were written back in 2001. Since then, things have evolved a lot: Speedy has become the reference benchmark software for Palm OS based devices, Palm OS version 5 was released, devices with an ARM processor came on the market. But, the topics they address and findings remain unchanged with the new devices.

All collected datasheets and graphs shown here under are available in a QuickSheet file

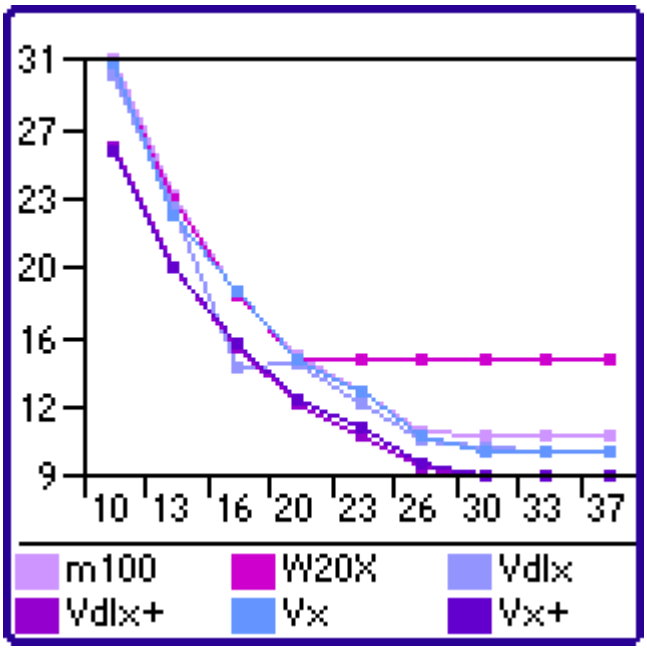
(http://www.cesinc.com) : ***BenchSpeedy.PDB*** (sent together with this Speedy.pdf file).

The formula which links frequency (F) and timing (T) is:

F = 1 / T

This formula was tested at different CPU clock speeds using the AfterBurner hack (http://www.palmgear.com) on several Palm devices :

- Palm m100 (***m100***) – normal CPU speed is 16 MHz
- Workpad 20X, clone of the Palm III ***(W20X***) – normal CPU speed is 16 MHz
- Visor Deluxe (***VdIx***) – normal CPU speed is 16 MHz
- Visor Deluxe with with 0-ws Core, Fast Mpx and Fast Page options set. (***VdIx+***)
- Palm Vx (***Vx***) – normal CPU speed is 20 MHz
- Palm Vx with with 0-ws Core, Fast Mpx and Fast Page options set. (***Vx+***)

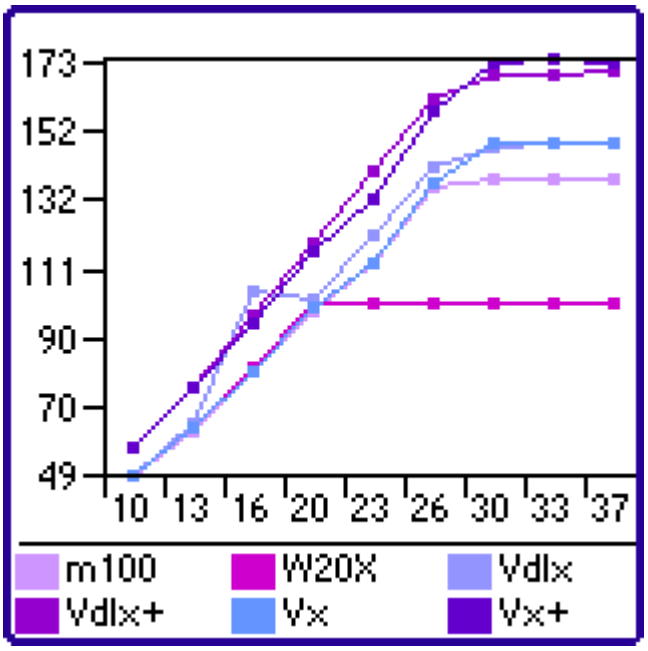


X axis: Speed that the CPU is asked to reach (in MHz)
Y axis: Relative returned speed by Speedy (in seconds)

All curves follow the F = 1 / T formula with 2 artifacts that can be easily explained:

- Visor Deluxe artifact:
  At the normal clock speed of 16 MHz for this device, we can see on the graph that the value point is not normal.
  This is because the Visor Deluxe has the three 0-ws Core, Fast Mpx and Fast Page options set by default. If you use AfterBurner at this speed, inactivating these three options will have the curve behave back at it should.
  This is a wise way found by Handspring to accelerate this device without overclocking it!
- Workpad 20X artifact:
  This older Palm device cannot stand more that a 20 MHz overclocking.

Performance increase with overclocking



X axis: Speed that the CPU is asked to reach (in MHz)
Y axis: Relative returned speed by Speedy (in %)

This graph clearly shows that, upon a given overclocking, the Palm devices do not speed up anymore. So, you do not need to overclock your Palm device above a given CPU speed. Speedy is very useful to find this overclock limit.

Software and Performance

Some applications, like TealEcho for instance, are known to decrease drastically the performance of a device, when others, like Hacks, have little impact on a device's performance.

I will show you with two examples how Speedy can help you evaluate such influence.

1st case: skinning applications:

Not long ago (I wrote this sentence on October 25th, 2005), I discovered 2 great applications for changing the way the user interface looks, in other words for "*skinning*" my device. These applications are:

PalmRevolt http://www.3gxsoft.com/palmrevolt/
SkinUI http://palmpowerups.com/modules.php?name=Content&pa=showpage&pid=1

I decided to try both of them and to run Speedy when using either of them on my Tungsten C device, choosing their similar Apple OS X skin for both of them.

- ✓ With PalmRevolt, Speedy returned 1852% / Palm Vx
- ✓ With SkinUI, Speedy returned 1829% / Palm Vx
- ✓ With none of these applications, Speedy returned 1974% / Palm Vx, and not 2000% (which is Speedy's reference for the Tungsten C) because of all other applications installed in my device that are running in the background

So, these "*skinning*" applications decrease the overall performance of the device by about 6.2% or 7.3%.

We can get a little bit deeper in the analysis and check the detailed Calc, Mem and Graph tests results as returned by Speedy:

Speedy Test	"Vanilla" device	with PalmRevolt		with SkinUI	
Calc	0.40 sec	0.40 sec	**100%**	0.40 sec	**100%**
Mem	0.17 sec	0.18 sec	**94.4%**	0.18 sec	**94.4%**
Graph	0.19 sec	0.23 sec	**82.6%**	0.24 sec	**79.2%**
Total	0.76 sec	0.81 sec	93.2%	0.82 sec	92.7%
/ Palm Vx	1974%		1852%		1829%

Here we confirm that the Graph Test is the one that is the most concerned by these two applications, which is a result that was to be expected as these applications mainly deal with the user interface!

When using these software, my Tungsten C runs at a speed that Palm Tungsten T5 or Zire 72 owners know… well, in most cases, I do not really notice the change!

2nd case: listening to music in the background:

Another example of how some applications can have an influence on a device's overall performance is listening to music while doing something else. For the purpose of this test, I used pTunes (http://www.pocket-tunes.com/palm/) which is shipped in standard with the Palm Tréo 680 that was the device used.

The test is simple: run Speedy once, then exit it, launch pTunes and have it play some music in the background, launch Speedy one more time and compare results.

Speedy Test	"Vanilla" device	with pTunes running in the background	
Calc	0.54 sec	0.75 sec	**72.0%**
Mem	0.17 sec	0.23 sec	**73.9%**
Graph	0.33 sec	0.44 sec	**73.2%**
Total	1.04 sec	1.42 sec	73.2%
/ Palm Vx	1442%		1056%

Listening to music decreases the performance available for other applications of about 27%, this is true in all areas of the device since the 3 Calc, Mem and Graph tests are affected by having pTunes running in the backfround.

When running pTunes in the background, the Tréo 680 runs at a speed that Palm Tungsten T3, TX (in landscape mode) or Sony Clié NX70V owners know… in most cases, listening to music while working on another topic in the foreground is well worth the little decrease of performance!

Is Speedy efficient? (analysis for DragonBall based devices)

(in other words : how does Speedy compare to Benchmark v2.0 ?)

ⓘ This paragraph was written back in 2001. Since then, things have evolved a lot: Speedy has become the reference benchmark software for Palm OS based devices, Palm OS version 5 was released, devices with an ARM processor came on the market. But I leave it unchanged to give you explanations about how this benchmark application has been developed and it will give you the clues of why its accuracy has remained so stable over time. ☺

What a strange question, isn't it? But, you have to be aware that, as with any benchmarking program, the numbers returned by Speedy can be misleading if you do not understand what is being measured and how to interpret the results.

Indeed, the performance of a given application fully depends on the mix of operations (calculations, memory accesses, database accesses, display on screen...) performed by that application. All benchmarking utilities will use their own mix of operations and try to be as close a possible from the average mix of operations that most applications will have.

Speedy has been clearly and very carefully designed to perform three high resource taking routines (calculation, memory access and graphical display) to give numbers as close as possible to a standard Palm OS application's running speed, whatever the CPU frequency of the device is, down/over-clocked or not.

This being said, let's see how Speedy compares to another well-known benchmarking utility for Palm OS devices.

Benchmark v2.0 (http://www.quartus.net) was written and compiled by Neal Bridges on-board a Palm IIIc using Quartus Forth in 1999, in order to be a freeware demonstration program of Quartus Forth's ability to produce compact, fast, stand-alone applications.

Benchmark has been until now and the arrival of Speedy almost the ONLY benchmarking utility for the Palm OS platform and it therefore became the widely accepted standard benchmarking tool for this platform.

I have written Speedy because it was a good opportunity for me to understand how to program a benchmarking tool. I then discovered that I had built what I believe to be a more reliable benchmark tool for the Palm OS based devices, in the way that Speedy seemed to give numbers closer to the real speed of the devices. My objective here is not to criticize Benchmark v2.0 as it has been very useful in two ways : prove that Quartus Forth is a good development language (and believe me, it is!) and give quite a good benchmarking tool for Palm OS devices two years back from now.

My objective is only to try to explain you why according to me the newer program Speedy (written with another very good development language being HSPascal) is just a little bit more accurate in its results than Benchmark.

For doing so, I timed a few programs' execution on a Palm Vx at three speeds using the AfterBurner hack (http://www.palmgear.com) :

- 10 MHz
- 20 MHz
- 30 MHz

The timed programs were:

- **SCells**, a modified version of my Cells freeware program (source code available both for SCells and Cells) with automatic timing of one cells board evolution.
- **SMatches**, a modified version of my Matches freeware program (source code available both for SMatches and Matches) with automatic timing of a few games played by two computer players.
- **SNumerus**, a modified version of my Numerus freeware program (source code available both for SNumerus and Numerus) with automatic timing of hundreds of calculations.
- **PrefMngr** (http://tc.palmgear.cn/Soft/showsoft.asp?softid=1525) with manual timing.
- **PC-cillin** (http://www.antivirus.com/wireless) with manual timing.
- **InoculateIT** (www.ca.com/products/**inoculateit**/**palm**.htm) with manual timing.

Note: SCells, SMatches and SNumerus derivate from versions of the current Cells, Matches and Numerus programs which are Palm OS v5 compliant.

These programs can run for a period of time with no user interaction (no ticks), a condition needed for timing execution speed.

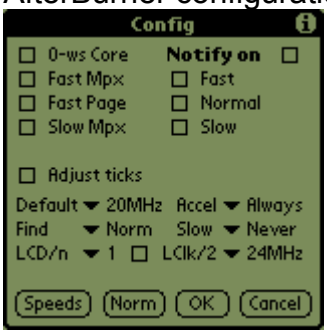
Of course, automatic timing as reported by the Palm is much more precise than manual timing which implies coordination between my eye, my brain and my hand to start and stop the timer!

The use of a shareware program like SysInfo (http://www.aldweb.com) was needed to disable the auto-off timer of the Palm device, as some programs execute in more than 3 minutes (which is the maximum auto-off timer that can be entered in the Palm Preferences).

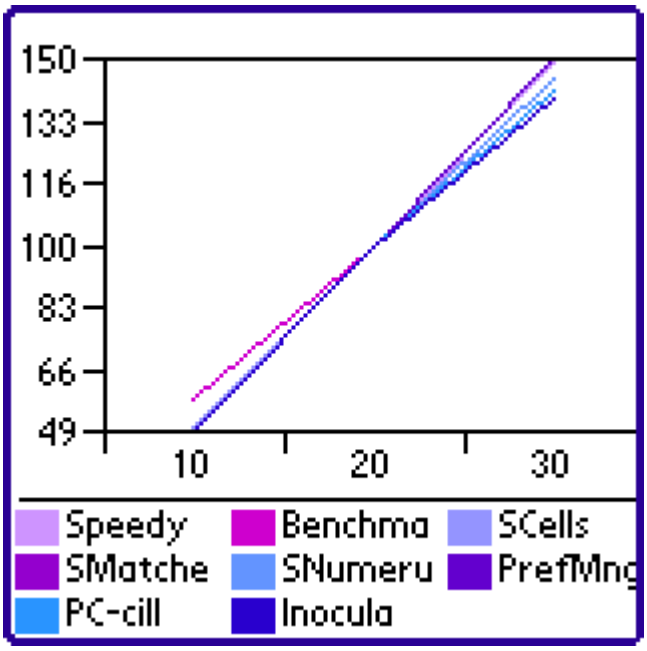
All collected datasheets and graphs are available in a QuickSheet file (http://www.cesinc.com) : ***BenchApplis.PDB*** (sent together with this Speedy.pdf file).

1st case: simple overclocking

AfterBurner configuration:



Results, all brought back to be at 100% for Palm Vx at 20 MHz (standard speed) with no additive acceleration option (0-ws Core, Fast Mpx and Fast Page) set.

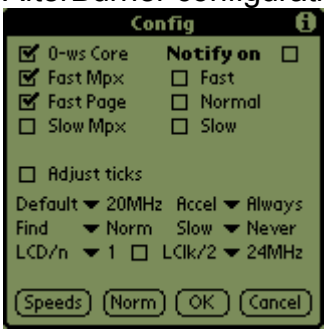


X axis: CPU speed (in MHz)
Y axis: Relative speed (in %)

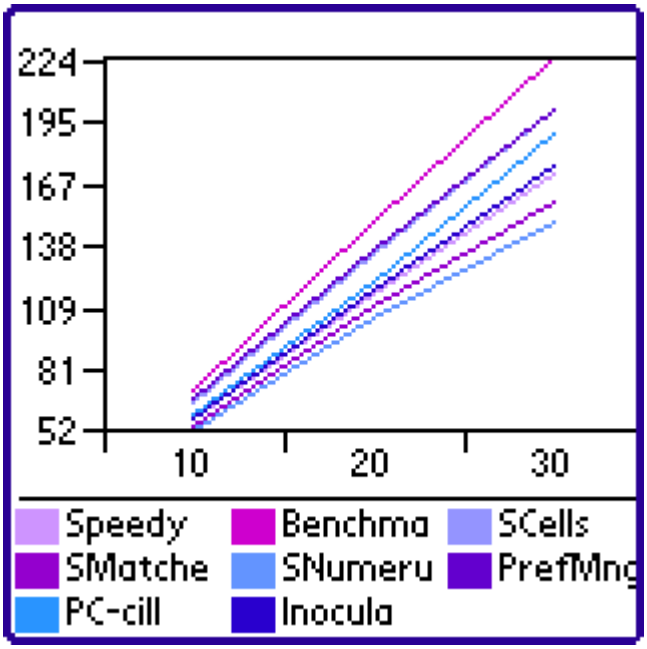
The results are very clear: both Speedy and Benchmark give accurate results.

2nd case: overclocking + additive accelerating features (0-ws Core, Fast Mpx and Fast Page)

AfterBurner configuration:



Results, all brought back to be at 100% for Palm Vx at 20 MHz (standard speed) with the 0-ws Core, Fast Mpx and Fast Page options set.



X axis: CPU speed (in MHz)
Y axis: Relative speed (in %)

According to the programs' use of calculations, memory accesses or screen display, the execution speeds can be very different from one program to another. If Speedy is about in the middle of the range thus giving an average execution speed, we can see on the graph that Benchmark results in the highest line, thus giving a much too positive trend.

This means that Benchmark is very "enthusiastic" and overestimates the speedup due to the set up of the 0-ws Core, Fast Mpx and Fast Page accelerating options, whereas Speedy will give a more accurate idea of the real gain of these options.

What about new ARM devices running Palm OS5?

Speedy was initially designed to work with the former generation of Palm OS based devices running a DragonBall processor.

In its current version, Speedy has been upgraded to take into account the specificities of the new ARM based devices and to re-evaluate the accuracy of the results returned.

But, when the benchmark would run during 15 seconds for a 20 MHz DragonBall device, it runs in less than one second for the new high speed ARM devices. As a consequence, accuracy is a little bit depreciated with the new devices.
For example, running Speedy on a Palm Vx (with a 20 MHz DragonBall EZ processor) and on a Palm Tungsten C device (with a 400 MHz ARM processor) will provide these kinds of results:

- Palm Vx
  - 15.02 seconds ~ 20 MHz
  - 15.04 seconds ~ 20 MHz
- Palm Tungsten C
  - 0.75 second ~ 400 MHz
  - 0.77 second ~ 390 MHz

As you can see, a 0.02 second benchmark speed difference will return with a 0 MHz difference for the Palm Vx and with a 10 MHz difference for the Palm Tungsten C. This is no big deal, the Palm Tungsten C really is a fast device ☺

This is why it is run 5 times with the ARM devices, to get the best accuracy as possible. But, accuracy is nevertheless a little bit depreciated with the new ARM devices. On the other hand, Speedy allows benchmarking and comparing all generations and families of Palm OS based devices which is a great view on how these nice devices evolved over time! ☺

If we now compare Benchmark 2.0 and Speedy again, but for the new ARM devices, we get these results for the Palm Tungsten C:

- Speedy: 2000% / Palm Vx = 20 times faster than Palm Vx
- Benchmark: 539% / Palm IIIe ~ 481% / Palm Vx ~ 5 times faster than Palm Vx

Since the Palm Tungsten C runs a 400 MHz processor and the Palm Vx a 20 MHz processor, we could roughly expect the Palm Tungsten C to run approximately 20 times faster than a Palm Vx. This is the result returned by Speedy ☺

ⓘ Since I wrote the above paragraph, Neil released an updated version 3.0 of his Benchmark (released in September 2005). Here is the result found with Benchmark 3.0 on a Palm Tungsten C:

- Benchmark: 657% / Palm IIIc ~ 692% / Palm Vx ~ 7 times faster than Palm Vx

DragonBall versus ARM…

If you are interested in understanding what the change of processor architecture implied for Palm OS devices, you may refer to the **Palm Knowledge** area of my web site, and especially to the paper that I called "*Comparison attempt between Palm devices equipped with a DragonBall processor and those equipped with an ARM processor*" and that can be found here: http://www.aldweb.com/articles.php?lng=en&pg=5082

Speedy benchmarks' reference table

Speedy's database relies on you!

Thanks to all people who e-mailed me their device's results.

There is still quite a substantial list of devices for which full benchmark information (Calc, Mem, Graph Tests and Total results) is currently missing in Speedy's database.
As expected, the information is given for the most widely spread devices. But it would be great to also have the benchmark value for the rare devices.

So, please, keep sending me results for your devices!

The latest version of this reference table, with an enhanced presentation (color coding according to processor type, graph view) can always be found on my web site, at the following URL: http://www.aldweb.com/articles.php?lng=en&pg=6921

Notes:

- ✓ All times are given in seconds.
- ✓ [P] stands for **P**ortrait screen mode and [L] for **L**andscape screen mode
- ✓ [f+] stands for **f**requence **plus**, this is the benchmark value as returned with the best processor overclocking (using Lightspeed, www.clievideo.com)
- ✓ [WM] behind the brand name means that the device is a **W**indows **M**obile based device, running Speedy within the StyleTap Palm OS Emulator (www.styletap.com). The device model is then followed either by [66%] or [100%], which means that Speedy was run in the original Palm 160x160 pixels screen resolution (with no screen distortion) or in full screen mode (width of 240 pixels, so with a 3/2 distortion factor)
- ✓ In **blue** are provided the results added in the last version of Speedy

Device	Brand	Calc	Mem	Graph	Total
Tungsten C[f+]	**Palm**	**0,30**	**0,06**	**0,14**	**0,50**
Tungsten C	Palm	0,40	0,16	0,19	0,75
Tungsten T3[P]	Palm	0,38	0,16	0,25	0,79
Tungsten T5[P]	Palm	0,38	0,15	0,27	0,80
Zire 72	Palm	0,49	0,12	0,24	0,85
LifeDrive[P]	Palm	0,38	0,17	0,35	0,90
Treo 755p	Palm	0,52	0,16	0,31	0,99
Treo 700p	Palm	0,52	0,16	0,31	0,99

Zodiac	Tapwave	0,63	0,13	0,26	1,02
Zodiac 2	Tapwave	0,63	0,13	0,26	1,02
Treo 680	Palm	0,54	0,17	0,32	1,03
Centro	**Palm**	**0,54**	**0,17**	**0,32**	**1,03**
Tungsten T5[L]	Palm	0,37	0,16	0,53	1,06
TX[P]	Palm	0,49	0,17	0,40	1,06
Clié TJ25	Sony	0,57	0,19	0,32	1,08
Clié TJ35	Sony	0,56	0,20	0,32	1,08
Treo 650	Palm	0,52	0,24	0,33	1,09
Clié TJ27	Sony	0,57	0,19	0,33	1,09
Clié TJ37	Sony	0,57	0,19	0,33	1,09
iQue 3200	Garmin	0,63	0,14	0,37	1,14
Z22	Palm	0,61	0,26	0,27	1,14
iQue 3600	Garmin	0,65	0,14	0,37	1,16
LifeDrive[L]	Palm	0,38	0,17	0,62	1,17
Zire 31	Palm	0,77	0,18	0,33	1,28
Clié NX73V	Sony	0,68	0,33	0,38	1,39
TX[L]	Palm	0,49	0,17	0,75	1,41
Clié NX70V	Sony	0,69	0,35	0,38	1,42
Tungsten T3[L]	Palm	0,38	0,17	0,90	1,45
SGH-i530	Samsung	0,81	0,20	0,45	1,46
Clié TG50	Sony	0,72	0,35	0,40	1,47
Clié NZ90	Sony	0,75	0,35	0,40	1,50
Tungsten E2	Palm	0,81	0,19	0,51	1,51
Xplore M28	**GSL**				**1,54**
Xplore M68	GSL	0,73	0,38	0,44	1,55
Xplore M70	**GSL**				**1,56**
Clié UX50	Sony	1,18	0,16	0,65	1,99
Clié TH55	Sony	1,20	0,16	0,64	2,00
Treo 600	Handspring	1,11	0,54	0,70	2,35
Zire 21	Palm	1,10	0,50	1,05	2,65
Zire 71	Palm	1,35	0,49	0,86	2,70
Tungsten T	Palm	1,19	0,49	1,07	2,75
Tungsten T2	Palm	1,09	0,49	1,37	2,95
Tungsten E	Palm	1,78	0,56	1,13	3,47
Clié SJ33	Sony	1,94	1,84	1,67	5,45
Clié T675C	Sony	1,95	1,84	1,78	5,57
S710 [66%]	HTC [WM]	0,83	0,35	4,49	5,67
Clié NR70V	Sony	1,90	1,85	1,97	5,72
Wrist PDA	Fossil	2,26	2,39	2,52	7,17
Clié S360	Sony				7,39
m130	Palm	3,08	2,84	1,53	7,45
Meazura	Aceeca	2,73	2,45	3,05	8,23
Clié SJ22	Sony	2,96	2,84	2,51	8,31
Clié SJ30	Sony	2,96	2,84	2,68	8,48
Clié T625C	Sony	2,97	2,85	2,69	8,51
Clié T615C	Sony	2,99	2,86	2,70	8,55
Clié N770C	Sony	3,22	3,12	2,75	9,09
m125	Palm	3,12	2,88	3,20	9,20
Workpad c500	IBM				9,23

m500	Palm	3,13	2,89	3,21	9,23
Visor Pro	Handspring				9,26
Dana Wireless	Alphasmart	2,85	2,67	4,00	9,52
m515	Palm	3,11	2,85	3,62	9,58
Workpad c505	IBM				9,67
m505	Palm	3,21	2,85	3,61	9,67
i705	Palm				9,74
Visor Edge	Handspring	3,14	3,06	3,81	10,01
TRGPro	HandEra				10,34
Visor Platinum	Handspring	3,30	3,24	3,92	10,46
Clié SL10	Sony	3,03	2,95	4,50	10,48
7135	Kyocera	3,26	3,14	4,16	10,56
Clié N760C	Sony	3,22	3,11	4,26	10,59
Tungsten W	Palm	3,08	2,87	4,76	10,71
Treo 90	Handspring	3,50	3,32	3,91	10,73
s10	Acer	3,06	2,82	4,94	10,82
S710 [100%]	HTC [WM]	0,97	0,35	10,06	11,38
Visor Neo	Handspring	3,56	3,38	4,55	11,49
Treo 180	Handspring	3,57	3,39	4,54	11,50
Treo 180G	Handspring				11,50
Treo 270	Handspring	3,52	3,37	4,93	11,82
VIIx	Palm	4,22	4,16	4,00	12,38
330	HandEra	3,04	2,92	7,20	13,16
IIIc	Palm	4,47	4,43	5,32	14,22
Visor Prism	Handspring	4,59	4,60	5,16	14,35
Visor Deluxe	Handspring	5,08	5,69	3,68	14,45
Workpad c3	IBM				15,02
Vx	Palm	5,02	5,00	5,00	15,02
IIIe	Palm	5,67	6,34	4,26	16,27
Workpad 2 (30X)	IBM				16,82
IIIx	Palm	5,68	5,74	5,40	16,82
V	Palm	5,81	5,84	5,45	17,10
Workpad (40U)	IBM				17,10
IIIxe	Palm	5,68	5,64	5,84	17,16
Workpad 2 (22X)	IBM				18,26
III	Palm	6,12	6,23	5,91	18,26
m105	Palm	6,16	6,12	6,12	18,40
VII (DB proc)	Palm	6,12	6,11	6,19	18,42
m100	Palm	6,16	6,14	6,13	18,43
Zire	Palm	6,15	6,12	6,36	18,63
Workpad (10u)	IBM				20,23
Workpad (20X)	IBM				20,23
Pilot Pro	Palm	7,22	8,21	4,80	20,23