

THE AMAZING RASPBERRY PI4 (rev 10/04/23)

One tends to think of the tiny Raspberry Pi as a toy or novelty item. It is inexpensive and is as small as a pack of cigarettes. One also thinks of using a Pi as a dedicated controller for some device or other, like a repeater controller, and this of course is a very good use. Don't sell it short though.

The newest (as I write this) model of the Raspberry Pi, is the Pi4 and I am here to tell you that it is a full Mini-Computer. It has a quad-core processor and a high-speed internal data buss. Depending on the model you order, you can have as much a 8GB of RAM and the microSD chip (changeable) of desired size. The microSD is used as a Solid State Hard Drive (SSD). The standard microSD chip is 32 GB however other sizes can be used. That may seem small by today's standard however it is usually enough. You can use almost any capacity, or even a bootable external drive up to 1 TB, but more about this later.

The Pi has an SD card copier which allows one to create a backup, and it also will take a 'large capacity' microSD chip and not only make a bootable copy but it will also format the entire chip, so you may, for example, be running low with space with the standard 32 GB unit so you copy to a 64 GB chip and you have just doubled your 'SSD' capacity. One thing though, to do the backup or copy you do need to have a way to plug in the second microSD chip and the Pi does not have a second slot. One can obtain an inexpensive USB3 to microSD chip adapter. The Pi-4 has two USB3 ports.

There are some other choices as we find the copier program is not fussy, it will clone to different size media, including to an external USB3 drive. The copy is bootable and the Pi will boot from the USB drive, in fact currently I have no microSD chip installed at all, I now use an external M.2 SSD chip in a USB3 adapter and it is super fast and I still back it up (using the built-in copy program) to a 128 GB microSD chip that I can also boot from if I wish. Size does not matter, as long as the media has enough capacity, it will clone to it. In fact, a 64 GB chip is more than enough for almost any system. One added comment here, the microSD chips are not real fast, in fact it is slower than the old SATA 1 standard but with the speed of the processor, being what it is, I doubt it matters, but if you want the fastest speed possible, use an external M.2 device with USB3 adapter and put it in one of the two USB3 connectors.

Another interesting thing about the microSD being used like an SSD is that you can have different SD chips with different configurations or even other operating systems, and you can swap them and boot up on the desired one. One does not need to open the case to swap the microSD chip as the slot is accessible outside of the case.

The operating system is called Pi OS and is in fact Linux Debian and the system comes all loaded up with LibreOffice software (similar to Microsoft Office) and even printer capability.

The unit has built-in Bluetooth, WiFi, Sound, and so on. On my system I am running a wireless printer, I also have plugged in a Signalink unit to operate my Amateur Radio transceiver in the digital modes. It supports all of the digital programs I use including the Fldigi series of programs and wsjtx. The unit has two USB2 and two USB3 ports, and I use an external USB3 bootable SSD disk as well. Plug-n-

Play. I have a 2 TB external (USB3) drive which works well also, so I have in effect, unlimited storage capacity if I choose to use it. (note: drives larger 1 TB or larger are problematic with the copy/backup feature). The Pi-4 will work with drives of greater than 1 TB but the backup feature does not produce a bootable copy.

While I do have a monitor, keyboard and mouse (wireless KB and Mouse) attached, (some of the time) I mostly access my Pi via remote desktop from one of my other computers. I use NoMachine, or Dwservices software, or SSH. Oh yes, every program I have is free. All downloadable from the web.

There are few programs I run on my normal Linux computer, that I cannot also run on the Raspberry Pi4. Of course there are several mail programs that work well... Thunderbird, Claws and others. I have discovered TeamViewer does not support the Pi the last time I checked, so I do not have that. I use NoMachine (nomachine.com) for my remote desktop program, or SSH for console level, but again, one has several choices.

This is an ideal computer for someone on a very tight budget or the occasional computer user. One handy tip I will give you to make adding a printer much easier; install the printer control choice to the menu using the following command from the terminal mode:

sudo apt-get install system-config-printer and this will add the program to the menu in the “Preferences” section and it will read “Printer Settings”. You *may* also need “CUPS” installed as well. Use this command for this: **sudo apt install cups** (from the terminal mode as well).

Late note: if you install the full version of Pi OS all of this stuff is already installed and you do not have to do the printer install things, it is already built in.

One of the greatest features of this system is that IT IS NOT MICROSOFT and there are no fees, no annual licenses cost, and all of that nonsense.

In many ways, Linux is better than Windows. With Linux you do not need anti-virus programs, nor are any available. Windows is relatively easy for hackers to compromise, but this is not so with Linux. The very structure of Linux makes it very difficult to hack. There is also a large group of support people to help the Linux user. In any case, the Raspberry Pi4 is a good way to get started with Linux, and the Pi just keeps getting more capable with each passing day, and more and more software is available for the Pi. Not every Windows program is available for Linux however more and more software writers are providing for the Raspberry Pi, and of course there are many “work alike” programs written just for Linux. The perfect example is the LibreOffice package that is almost identical to Microsoft Office. If you are running word processing and/or spreadsheet, there are very few differences and the created files are interchangeable with the Microsoft files. Programs like Firefox and Chrom/Chromium are identical so all Internet functions are the same and in my opinion, better than Microsoft’s Internet Explorer.

The Pi with the full install is not a stripped down version of software, it is a full version of Debian based Linux, so it can be treated like a full desk-top type of system. When using the Pi it is easy to forget you are not on a normal Linux desk-top system, howbeit slower.

I purchased my Pi4 on Amazon.com and got the full kit with case, power supply, cables and such. I recommend this, since you will need the accessories anyhow. You can find all of this stuff on Amazon.com and I recommend you **do not** order a Pi3 by mistake. The Pi3 is a lot less expensive but not nearly as good, and slow by comparison. I notice the new kits include a fan, mine did not have a fan and I had no problems with overheating, but I did get a new case with fans just to be safe. Anyhow for \$100, or a bit over, you can have everything you need, except monitor, keyboard, and mouse but most of us already have that stuff. If not, add another \$100 or so (depending on the monitor) and you can buy that also for a total investment of around \$200. This will give you a serious Mini-Computer. Oh yeah, I have two monitors on my Pi4.

(Note: The Pi computers are so popular that it is difficult to find a source that has stock, and between availability and inflation, and lack of manufacturing capacity, the Pi's are in very short supply so many are selling them at prices several time the normal price)

Another note is the Pi-4 can be purchased with 2, 4, or 8 GB of RAM. I purchased one with 8GB and it is in service on the Internet (qso.com) as a full Internet server hosting several domains, and we have discovered in monitoring memory usage, that we normally use only 2 GB of the available RAM. You can pay for 8 GB however it is a waste of money as the memory mostly sits unused. I have another unit with only 4 GB of RAM and performance is exactly the same as with 8 GB

Added note: The latest Pi, if you are a computer hardware guy, is the new Pi Pico. The computer itself is only \$4.00, and is great for repeater controllers and such. Build it into a system.

Another note: The unit works very well using an external SATA disk and a USB3 adapter. The microSD chips work fine but the Pi will work well with an external SSD or Passport type USB3 drive as well. To make a bootable external drive, use a USB3 adapter and plug the cable into either one of the USB3 ports. Using the menu "SD Card Copier" copy your existing system microSD chip to the new, external drive. When it is done the external drive will be ready and bootable. Another great thing is you can do a live clone/backup while the system continues it's normal function, it is not necessary to take it off-line to do a backup.

To make the Pi4 boot from the USB port, open a 'Terminal' window and type "**sudo raspi-config**" then when the window opens select "**Advanced Options**" then select "**Boot Order**" and highlight the desired setting, and 'OK' (or just hit enter). Shut down the Pi, remove the SD chip, make sure your new external USB3 drive is plugged into the correct USB port (the ones with the Blue tab). Power on and you will boot from the external drive. You are done, up and working with the external drive (of whatever capacity).

When you boot the first time you may get some messages about not finding the SD chip, but it will pass and it will only do that once.

Interesting tool

I have found that the Pi4 can be used to clone other drives. Plug the source drive in one USB3 slot and the destination drive in the second USB3 slot. Boot using the microSD chip then use the disk copy

feature to clone the source drive to the destination drive. The limiting factor being power requirements for the drives. Two SSD drives work but there is not enough power to support two full-size SATA hard drives. Since the copy is sector by sector, it does not matter what kind of data is cloned.

More Notes:

It is hard to keep up with advancing technology and inflation. New models are introduced and prices change, do take that into account. At his moment (11/18/21) the “latest” computer is the Pi-Zero-2 with a motherboard that is priced at \$15 if you can find one in stock. It is quad core, 64 bit but has only 500 Mb of RAM. The low memory limits it’s usefulness however if the GUI (desktop) is turned off and you operate at the command line level (Bash) it is quite capable.

Yet another Note: (Oct 4, 2023)

The latest offering from Raspberry Pi is the Raspberry Pi5. I do not have one, in fact, as I write this, they are not yet available. the first units ship in November 2023. Twice the cost and at least twice the performance as compared to the Pi4. I only mention it because the Pi4 is no longer the “latest and greatest”.