

# Computer Build Saga

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[Pete Matthews Jr](https://3nt.xyz/ideas.htm) – <https://3nt.xyz/ideas.htm> © May 6, 2020

When it comes to a new computer, these are my goals:

1. Rock solid stability. (No overclocking.)
2. Quiet.
3. Fast and powerful
4. Sensible cost.

Stability became a problem with my old computer in early July, 2019. I started building that old system in May, 2011. As I was then still employed, I took over a year, in fits and starts, to switch over to that system. The only reason I did it at all was that I had to get off of Windows XP. The original configuration was:

MSI H67MA-E35 Micro-ATX motherboard [using onboard graphics]  
Intel core i5-2500K 3.3GHz 95W Quad core CPU [no HT]  
Cooler Master Hyper 212 Plus CPU cooler with Nexus 120mm fan  
8GB RAM  
mirrored 128GB SATA III SSDs  
mirrored 750GB HDDs  
Seasonic 380W 80 Plus Bronze PSU  
Antec Solo case with Nexus 120mm exhaust fan  
Kingwin KF-91 mobile rack  
Existing Sound Blaster Audigy 2 EX

By July, 2019, the boot SSDs had been upgraded to 250GB (one had failed, and the other saved my butt). The data HDD mirror had been replaced with two WD Red (NAS) drives that I used to test and reject a Synology NAS. I was using a 4K-capable fanless ASUS NVIDIA 1030 graphics card. The sound card had been replaced and replaced again with an external Sound Blaster X-Fi HD.

Beyond normal web activities, I research and write articles. While I do not play action games, I do run simulations related to the game of bridge. Some of these have run for days, so CPU performance is important. I store and organize the family photos and music collection. It turns out we now have more movie storage (mostly taken by my wife) than still photos, and a mess of photography still out on Google.

In hindsight, the old computer may have been good for another year or two, had I only removed IDrive backup software from the system. I think IDrive would not play nice with Crashplan, which was superseding it. (For that saga,

see “Crashplan vs. Backblaze vs. IDrive” at <https://3nt.xyz/ideas.htm>). However, after extended efforts, I decided I needed to replace the old system promptly. This was only the first of my flawed choices.

My plan for this article is to present my conclusions (Lessons Learned) by topic and then overall. After that, I’ll present the gory details in chronological order.

Over the years, I have kept notes about computers in a series of AMPAD Gold Line Computation Books. (Book 6 is the Roaring Spring equivalent.) I do this on paper to assure that I’ll have access to my notes during any computer outage, and to sure it cannot be hacked into. The basis for this saga has consumed much of the fifth book, as I have been taking increasingly detailed notes over the past couple of years. First, here is the final spreadsheet for the purchase:

<b>23-Oct-2019</b>	<b>Price</b>	<b>Note</b>
AMD Ryzen 7 3700X 3.6 → 4.4GHz 65W 8C-16T CPU.	329.99	Microcenter: \$50 off CPU/Mobo bundle.
GIGABYTE X570 Aorus Pro [WiFi]	219.99	Microcenter. (incl 2 M.2 heatsinks)
Noctua NH-U14S Premium CPU Cooler with NF-A15 140mm Fan (Brown)	63.75	Wraith Prism (comes with Ryzen) proved to be quite noisy.
ASUS GeForce GT 1030 CSM	69.99	Alt: GIGABYTE GeForce GT 1030 Silent
Corsair Vengeance LPX 16GB DDR4 3200 (2 x 8GB) SDRAM	84.99	Certified for use with this mobo.
Microsoft Windows 10 Home   Download	129.99	Retail edition (download).
Keyboard		Have Logitech wireless.
Mouse		Have Logitech wireless.
(2) Samsung 970 EVO Plus 500G	219.96	M.2 NVMe (Larger = faster & lasts longer.)
RAID 1 (mirroring)		on mobo & CPU (AMD supports M.2)
RIITOP NVMe Adapter M.2 SSD → PCIe-3 x4/x8/x16 Converter Card with Heatsink for M.2 M Key	17.95	Appears identical to description/pics of QNINE, except possibly instructions.
Crucial MX500 2TB 3D NAND SATA 2.5 Inch Internal SSD	223.48	Primary data disk (D:)

Toshiba 3TB HDD 7200 rpm		Internal backup disk (M:), previously used only as a backup disk.
ALC1220 sound		on mobo
Soundblaster X-Fi external		already have, but imperfect
Fractal Design Define R5 Gaming Case FDCAEFR5BK	137.53	have extra Antec Solo Black/Silver tower case with suspension mounts
Seasonic FOCUS Plus Series SSR-550FX 550W 80+ Gold Intel ATX 12V Full Modular 120mm FDB Fan Compact 140 mm Size Power Supply	74.99	Gold: 90% eff @ 50% load. 10 yr warr for Focus+. Received in July. 650W better investment: more headroom & comes with all needed cables.
CPU power cable (2x 4-pin connectors). Seasonic SATA power cable.	19.25	Mobo won't boot without this power cable. BTOS Integration (BTOSinte.com) is authorized dealer for both cables.
Asus 24x DVD Burner	19.90	
Transcend TS-RDF5K USB 3.0 SD & microSD reader	7.99	Pink - easy to find the cap. (Fixed multi-port readers slow down booting.)
New batteries for CP1350PFCLCD UPS	71.00	Have old Cyberpower 1000; older, problematic 1350.
(5) Arctic F14 PWM PST case fans	25.99	Took a flyer on well-reviewed fans.
(10) 1-1/2 x 6/32" screws, for front fans	1.28	Arctics thicker than Fractals. (Lowes)
Kingwin KF-91 Mobile Rack	19.98	New model claims SATA III support.
Altec Lansing ADA 885 speakers		Classic speakers, occasional issues.
Crucial MX500 2TB SSD	223.48	Second, to mirror data disk.
TOPSELL 5-pack 16GB USB3	21.99	For bare metal restore
<b>Subtotal</b>	<b>1,738.00</b>	
<b>MA Sales Tax (6.25%)</b>	<b>108.80</b>	
<b>Total</b>	<b>1,846.80</b>	

Except as noted, all items from Amazon. With free Prime shipping, a Prime credit card discount and 30-day Amazon returns, Newegg was not competitive.

## A. Lessons Learned

### From the Past

#### Printer

When I was running the bridge club at MIT, I needed a laser printer to print hand records. While I mostly used black and white, I occasionally needed color. With the possible exception of Epson EcoTank printers, inkjet printers are expensive to use and the print generally smears when wet. However, replacement color toner cartridges tend to cost as much as the printer.

My strategy has been to buy an efficient Dell color laser printer with full size cartridges, use color only when required, and then plan to replace the printer when the color runs out. Black toner is generally affordable. I budgeted the printer for four years; my Dell 3110cn printer from 2006 lasted over six years, a big win. I did manual duplexing of single-sheet hand records every week. My replacement Dell C3760DN printer from 2012 has automatic duplexing for the same \$400 I spent on the earlier printer.

The color toner ran out, but the printer is still good. (An obscure part broke, so now the printer reports Paper Jam when paper runs out, no big deal.) With nothing to lose, I switched to third-party toner, saving about 90%. The brand I chose is LD. It is very good, except that the default “highlighter” yellow from Microsoft Word comes out dingy. I have color printing enabled all the time now. (Printing photos at Costco is cheaper & better than any home printer.)

#### Scanner

My Canoscan 9000F flatbed scanner was acquired in 2012. Scanner technology has been mostly stable since before then, with cheap scanners often built into printers now. The 9000F is a high quality unit for scanning negatives and photos, which it does well. I also use it once a week or so to scan text, checks, etc. While a sheet feeder would be handy, I had a photo sheet feeder on my previous scanner; the mechanics were not great. In March, 2020, I embarked upon a project of scanning all the photos of my parents and grandparents, which the 9000F is handling nicely.

#### Graphics Card

The old system was designed for use with onboard graphics, which worked fine for years. In November 2017, I got greedy and decided to try a 4K display. First, I needed a graphics card capable of driving a 4K monitor at 60 Hz. (A lower refresh rate would have visible flicker.) I selected the ASUS GeForce GT 1030,

the best fanless (quiet) model, then and now. I had used the lower-res GT 710 in my bridge simulation computer, and was happy with that.

## Monitor

My old monitor was a classic, the Samsung 2443BWX. This 24-inch display has better than 1080p resolution. It still works fine; I used it for setting up new systems and for troubleshooting problems.

First, I tried a 40-inch Samsung 4K TV from Costco, with their 90-day return policy on electronics. After various experiments and a new graphics driver, I finally got the display to work by switching to HDMI2. The display was too squinty at the 4K resolution of 3840 x 2160. I switched to 1440p, 2560 x 1440. Once I had it working, I decided the TV was just too big for a desktop monitor, so I took it back.

Next up, a Samsung U28E510D UHD monitor from Costco. Scrolling *The New York Times* on screen made the page pinker at the top of the screen, which was annoying. Various adjustments did not help. There was a tornado-shaped area left of center that was dim/gray. I took back this unsatisfactory display. I decided I needed a display based on IPS technology.

Next, a trip to Micro Center in Cambridge. Still trying to do this for about \$300, I examined all sorts of monitors that would not serve. About to leave, I saw a stack of boxed monitors, **LG 27UD58-B**, \$300. I had to get a salesperson to set one up for me to test; then I brought one home. This IPS screen is much sharper and crisper than the Samsung was, at both 1440p and 2160p, and has no artifacts, tornado or otherwise. I have a note that it is “NTSC 72%” so it is not supposed to be great for photo work, but I really like this display for everything. It has no “eye-care” setting purporting to reduce harmful blue light, but it has a “reader” setting that I do find easy on the eyes. I run it at 1440p, which is comfortable for my old eyes. On occasion, I have switched temporarily to 4K, when I needed more screen real estate to look at something. It’s handy to have that option.

## Sound

Sound cards don’t last. The Audigy 2 in the old computer was replaced with an internal Soundblaster X-fi. When that died, I got an external Soundblaster X-fi, which has been adequate. (I selected a motherboard with the best available sound for the new system, but I have yet to try it.) I’m still using my classic Altec Lansing ADA-885 speakers from the 90s. They have occasional issues that I am adept at getting around. There may be a whole new sound setup in my future. Last year, Audioengine had a major Black Friday sale on a pair of HD3 speakers

and the optional subwoofer, but I balked, having already dropped a bundle on the new computer.

## UPS

Most power failures are short, sometimes just a flicker of the lights. A UPS provides battery backup to span the short gaps, so that you don't lose work. A top quality unit with PFC power support also protects the computer from damage. I have a CyberPower 1350PFCLCD UPS, used daily since April 2012, for which I ordered new batteries. In the interim, I deployed a lightly used CyberPower 1000PFCLCD UPS, bought in June 2013 for a bridge simulation computer; it's back on that system. Since a laptop has built-in battery backup, all we use for my wife's laptop is surge suppression.

## New Lessons

### AMD vs. Intel

On paper, AMD has Intel beat, up, down and sideways:

	AMD	INTEL
<b>Passmark higher is better -s = single thread</b>	Ryzen 9 3900X: 32025 (2903-s), 105W, \$500. Ryzen 7 3700X: 23926 (2934-s), 65W, \$330.	Core i9-9900K: 20216 (2898-s), 95W, \$485. Core i7-9700K: 17188 (2819-s), 95W, \$380. Core i5-2500K: 6478 (1896-s), 95W, (my old system).
<b>NVMe RAID</b>	RAID 0/1/10 via CPU with any PCIe-connected devices, such as in M.2 NVME slots on mobo.	RAID 0/1/5/10 through & limited by 4-lane DMI (unless VROC or Highpoint RAID card).
<b>PCIe</b>	PCIe Gen 4 (2x raw speed).	PCIe Gen 3.
<b>RAM Speed</b>	DDR4 3200 maximum without overclocking.	DDR4 2666 maximum without overclocking.
<b>ECC RAM</b>	Validated on ASUS AMD PRO WS X570-ACE. Available on X570 from Gigabyte & ASRock. DDR4 3200 ECC unbuffered not yet available.	Not available on Core systems (Xeon only).
<b>CPU Cooler</b>	Wraith cooler included with Ryzen 7 & 9 CPU.	Must add CPU cooler.
<b>Graphics</b>	No onboard graphics with Ryzen 7 & 9 CPU.	Onboard graphics (all except F models), but not 4K @ 60Hz.

**CPU:** The AMD Ryzen 7 3700X CPU that I chose has a TDP of two thirds that of its Intel competitors (65W vs. 95W). Its total throughput scores substantially higher than the best two Intel competitors (at that time), it edges them on single-threaded performance, and it costs less than either. However, it turns out that AMD only provides that single-threaded performance on one core, perhaps on one specific core. My main CPU-intensive application is single-threaded, but I sometimes try to run one such process on each core. The rest of the time, any of the contending CPUs should work about the same for me. AMD wins, but not by as much as it appeared.

**PCIe:** With an X570 board, AMD supports PCIe Gen 4, theoretically twice as fast as the Gen 3 that Intel supports. However, Gen 4 actually provides a benefit as small as 1%, and the devices are very expensive. For the present, this is a tie.

**RAID:** AMD supports RAID (spanning or mirroring) directly, using up to four PCIe lanes per NVMe SSD. Achieving this on Intel is wildly expensive; otherwise, you can only do NVMe RAID through the DMI, which uses 4 lanes for all connected storage devices. AMD only supports this speed through one motherboard M.2 slot; the second goes through the chipset, sharing its four lanes with all connected storage devices. To achieve this speed for the second NVMe SSD, you need to put it into an adapter in a PCIe slot. While an NVMe SSD is theoretically about seven times as fast as a SATA III SSD, it may actually be only twice as fast. That SATA SSD is likely to actually be seven times as fast as a spinning HDD. That's where the main speed boost arrives. AMD is better for NVMe RAID, but maybe this option should be avoided. For bootable SATA RAID, Intel wins. For non-bootable SATA RAID, I like the Windows software RAID that I used on my old system – it should work for either architecture, but is not in Windows 10 Home. My AMD system lost my SATA RAID, causing me to waste a day. I was inches away from rebuilding the array and reloading the data from cloud backup, another few days. Having used Intel Matrix Storage Manager and other Intel RAID solutions for years, I find them quite stable. AMD RAIDxpert2, not so much. The RAID issue is complicated, but I prefer Intel.

**RAM Speed:** AMD supports to DDR4 3200 vs. DDR4 2666 for Intel, without overclocking wither. However, the AMD RAM will actually run at 2133 unless you enable the higher speed with a special profile in the BIOS, and that setting was forgotten once by my system. While the higher speed is typically permitted

under the manufacturer's warranty, some folks consider the special profile to be overclocking. Assuming Intel always uses 2666 when the RAM supports it, I give Intel a tie on this one.

**ECC RAM:** Intel does not support ECC RAM on Core systems, only on costly Xeon workstations. With the correct motherboard and RAM, AMD can use ECC RAM and support error correction. Sounds good to me, but most motherboards do not support it, and the ECC RAM available at time of purchase was slow. Since I did not (yet) buy ECC RAM, another tie.

**CPU Cooler:** The AMD CPU comes with a Wraith CPU cooler, an apparent plus. The fan is way too loud for use in a quiet system. Replacing a CPU cooler, which I had to do, carries a significant risk of damaging the CPU or mobo. I consider the Wraith to be a pit-trap, out of which I was lucky to climb, so I give Intel the win on this one.

**Graphics:** If you want 4K @ 60Hz graphics, with either architecture, you must either buy a graphics card or a specialty motherboard. For 1440p, Intel on-board graphics is an option.

**Boot Time:** This evening, I shut down my system, and timed a boot: 41.11 seconds; it took 24 seconds for the AORUS logo to appear. I cannot find the number for my old Intel i5-2500K system, but it was much better. I know I slowed it down by five seconds or so, when I added a multi-way card reader to the system, and it may still have been 25 seconds or less. Each device (and each slot on that reader) seems to slow down booting. I believe it still booted much faster than this AMD system. The number of devices on the two systems was similar. I had expected this wicked-fast system to boot faster than the old one, but no. Although the evidence is not conclusive, I'm giving Intel the win here.

**Overall:** A provisional win for Intel. Read on.

## Power Supply Unit

In the old days, you bought a good PSU with the desired power rating, and you were all set – not so any more. My old PSU 380W 80 Plus Bronze. I expected the same load or less on the new system, but I jumped up to Seasonic Focus Plus Series 550W 80+ Gold to hedge my bets. This fancy PSU was fully modular – only connect the cables to it that you actually need.



Unfortunately, two cables that I needed were not present, and I had to order them separately. This PSU came with one dual 2x2-connector cable. My X570 motherboard required a third 2x2-connector to boot at all, and really fancy X570 mobos require two more 2x2s. I also needed an additional SATA power cable.

In the process of sorting out the cables, I discovered the Seasonic Wattage Calculator online. It recommends the 650W version for my use; it comes with those cables. I paid about the same, in total, but got a lesser unit.

**Conclusion:** Check out your actual power and cable requirements before purchasing a PSU. For an X570 mobo, I highly recommend the Seasonic Focus Plus 650W 80+ Gold PSU, or larger.

## NVMe RAID

Tests I have read give little performance benefit to spanning (RAID0) on NVMe. However, if you need to protect against a single-disk failure – either a highly-configured boot disk or a sizeable data disk – mirroring (RAID1) is worthwhile.

To extract the best performance from an NVMe mirror, install the first SSD into the first M.2 slot on the mobo. Install the second into an adapter such as the RIITOP NVMe PCIe adapter, and then into a PCIe slot, where it will get its own four PCIe lanes. (The second M.2 slot on the mobo runs through the chipset, sharing four lanes with most other storage devices.)

## System Case

The Fractal Design Define R5 case is highly flexible. It may not be perfect for anybody, but it should work for most mid-size applications. It is substantially larger than the Antec Solo cases that I used for my previous three builds. It offers these main improvements:

- Access behind the mobo, for neat routing of cables;
- 140mm case fans (Antec had 120mm in the back, 90mm in front); and
- Comprehensive filtering to prevent most dust from getting in.

However, like the Antec case, it came with inferior fans. On speculation, I bought a 5-pack of Arctic case fans with the system. The noisy Fractal fans were thinner than the Arctic ones by one or two mm, so I had to go out and buy

machine screws to use them. I expect Noctua fans, particularly with rubber screws, would be a little quieter, but the Arctics are fine.

## Reusing RAID Disks on a RAID System

Before attaching a disk that has been used in a RAID configuration to a RAID system, I highly recommend sanitizing it on a non-RAID system. You need to connect it up, initialize it as non-RAID, legacy, or Basic (not RAID or Dynamic), and put a Simple Volume onto it with Windows. Once you can use it by drive letter on that system, it's safe to use on a RAID system.

If you don't go through this procedure, you put your current RAID at risk.

## Poor-Man's RAID; Storage Spaces

My plan had been to merely make an overnight copy of my data disk to a HDD inside the box. That way, I would have my cloud backup in reserve, but would be able to do a quick restore from the HDD, without downloading all that data.

Fooling with this got boring in a hurry. Every such kludge carries with it an additional risk of failure, further administration tasks, etc. I ponied up for a second SSD and build a real mirror. That was a big deal, and I would have been much better off starting with a real mirror.

Windows 10 Home does not have software RAID. It does have Storage Spaces, but I ran into trouble with that and gave up. Indications on the web are that it is problematic, and Microsoft is not fully behind it on the desktop. Note the common kludge theme.

## RAIDXpert2

AMD's RAID solution is RAIDXpert2. It has a BIOS component and Windows components. Motherboard device drivers get installed onto the Windows install media. During the Windows install, you must specify to install these device drivers, and in the correct order.

However, important Windows software does not get installed then. You must come along afterward and install the Windows RAIDXpert2, which will monitor storage devices and allow you to explore and address problems.

Any disk drive that you install on the system, and then subsequently remove, will be flagged by RAIDXpert2 as being a problem. See the Chronology below.

## Simultaneous Multithreading (SMT)

SMT is AMD's answer to Intel's hyperthreading. In its infancy, single-threaded applications would run slower with hyperthreading – sometimes at half speed – especially under Linux. This is my first multithreading-capable system at home. I ran some benchmarks of my favorite single-threaded applications with SMT enabled (the default) and disabled in the BIOS. Disabling SMT improved performance slightly on my most CPU-intensive jobs. Otherwise, SMT was a big win. I turned it back on, and have only looked back now.

## Lost RAID

If you lose a RAID, first check your BIOS to see if it reset itself. If so, fix those settings, as described in the Chronology below.

## Mobile Rack; SATA Ports on Gigabyte X570 Pro WiFi

The new system contains a new Kingwin KF-91 mobile rack which supports SATA III. All other systems where I have used a KF-91 were Intel-based. Unlike them, this system does not support hot insertion of disks. You must reboot for the system to see the disk.

The manual for this mobo says there are only four SATA ports; there are six on the mobo. The combo manual for the WiFi and non-WiFi models says there are six SATA ports. It may be that the WiFi disables port 5; however, I did not test again, after I got the KF-91 to work) on port 6 – with a reboot, of course.

## Windows Configurations

Various configurations of Windows, including the dreaded Cortana and Edge, appear in the Chronology below, as do other gory details.

## An Intel SATA Alternative

Old Desc	Old Price	New Desc	New Price	Price Change
AMD 7 3700	330	Intel i7-9700	380	+50
X570 Pro WiFi	220	Z390 Pro	190	-30
16GB DDR 4 3200	85	16GB DDR4 2666	81	-4
(2) 970 EVO+ 500	220	[RAID5 only]		
(2) MX500 2TB	447	(3) MX 500 2TB	670	+3
550W 80+ Gold	75			
(2) extra cables	19	650W 80+ Gold	89	-5
TOTALS	1396		1410	14

New prices are estimated for back then. PSU costs appear to have risen since.

NVMe may not provide substantial benefit, so SATA SSDs may be sufficiently fast. Instead of the complexities of two mirrors and the potential cramp of only 2TB of data storage, we can easily have 4TB of total storage on only one RAID. This could be done on either architecture, of course, but it makes more sense on Intel, where NVMe performance is already compromised.

Intel supports RAID5 on the mobo, and the proposed configuration leverages that. Three 2TB disks in a RAID5 configuration will provide 4TB of storage with the ability to survive the failure of a single disk. RAID5, however, is slower than RAID1.

Replacing the three 2TB SSDs with a pair of 4TB SATA SSDs adds \$390 or \$630 to the cost. That's with WD Blue or Samsung SSDs, respectively, at today's prices of \$530 or \$650 each. The only other SSD larger than 2TB that I found is a 4TB NVMe from Sabrent for \$850 each. Performance increases on this plan are expensive.

After looking this over, the AMD configuration looks better – though more work. However, because AMD does not provide RAID5, if I need more than 2TB data storage, I'll be into a major change.

## B. Chronology

### 2019-06-17 Installed Crashplan for Trial

Fed up with IDrive.

### 2019-07-07 System Unstable

Boot code B2. Removed 1030 video card, put old lower-res monitor onto mobo, worked. Reinserted 1030 video, boots. Put good monitor on, fine. Cleaned front air filters, could be a cooling problem. Possible issues with CP1350PFCLCD UPS as well.

### 2019-07-15 AMD vs. Intel for New System

[The chart that appears above was in this location.]

So, I have decided to build a new AMD system. This being Prime Day, I ordered a Seasonic FOCUS Plus 550W 80+ Gold fully modular PSU (had been in my cart for months, for use with a likely Intel system) and a CORSAIR Carbide 100R Mid-Tower Case – Silent Edition. Order in haste, repent at leisure.

### 2019-07-24 Computer Case

Watched videos of installing a system into the Corsair Carbide 100R case. This case does not have filters in the front of the case, so the innards will get dusty. The Antec Solo was that way, and good filtering is a major reason for upgrading. Sending the current case back, unopened.

### 2019-07-25 System Crashing Intermittently, VSS Errors

Backup programs implicated, investigated for several days, no useful conclusions. Want to keep both programs until IDrive expires Aug 26.

### 2019-08-01 Serious Investigations for New System

Knowing this day would come, I had been keeping up with options generally for a while.

As a guide, it appears that the raw speed of a SATA III SSD is about seven times that of a 7200 rpm HDD. A PCIe version 3 NVMe SSD is roughly seven times the speed of a SATA SSD. A PCIe version 4 NVMe SSD is about twice the speed of version 3.

However, other factors can cause bottlenecks that prevent the potential of devices from actually being realized. As the theoretical speed increases, so do these bottlenecks. The actual speed increase for version 4 NVMe may be as little as 1%, and for version 3 is no more than a factor of two. NVMe 3 seems a worthy investment, but not much costlier NVMe 4, at this time.

Having decided on a Ryzen 7 3700 CPU, I have three potential motherboard architectures: B450, X470 and X570. General advice that I found:

If you don't overclock, every board is fine.

If you need PCIe 4, go for X570.

If you need SLI, go for X470.

All others, go for B450.

However, there are other factors. The components and features tend to be better on more expensive boards and with newer architectures. I quickly discarded the idea of B450 mobos, which are budget options. The choice between X470 and X570 was not so easy.

### 2019-08-02 X470 vs. X570; Motherboard Investigations

	X470	X570
<b>Cost</b>	Lower	Higher
<b>Chipset Fan</b>	No	Yes
<b>Direct PCIe Generation</b>	3	4
<b>Chipset PCIe Generation</b>	2 (half speed)	4

The first M.2 slot on the motherboard is connected directly to the CPU and therefore runs at full PCIe speed. Additional M.2 slots operate through the chipset, sharing bandwidth with SATA and USB and limited by the overall chipset speed. I decided to go with X570, despite the fan on the mobo. Here are the comments I found, regarding the mobos on my short list:

ASROCK X570 Steel Legend: chipset fan is LOUD – fix in fan control, also turn off RGB in BIOS (possibly fixed in 1.6 BIOS). People are having memory damage with Steel Legend. Puts large heatsinks such as NH-U14S up against the GPU. Chipset fan blocked by GPU.

ASROCK X570 Taichi: Chipset fan under GPU, RGB is on when system is off. Front panel header blocked by GPU (adapters coming). Loud fan as with Steel Legend. CPU coltage way tooo high; Amazon user had a VRM catch fire. It can be hard to find certified memory. One user had to reboot after sleep; vendor said to “turn off fast startup.” Cover interferes with GPU releases, which broke.

GIGABYTE X570 Aorus Pro Wifi: large compatible memory list. Two users had the BIOS reset after a power-down. The Wraith cooler blows hot air down onto the M.2 slot; replacing cooler makes sense. Boot problem with 1080ti, black screen for a minute; the solution is to turn off CSM support in the BIOS (boot time reduces from 70 seconds to 18). Amazon reviewer 5\*, 3700X CPU, Crucial Ballistix 16GB (2x8GB 3200 CL16 not on list) RAM, worked without hassles. There is a BIOS update to silence the fan.

ASUS Prime X570-Pro: Installs Armoury Crate on booting Windows (have to opt out on mobo). Has list of compatible PSUs. Ram slot releases on only one end, cannot remove safely. No heat sink for second M.2 slot. One guy had DIMM slot A1 fail, could not get board swapped. One user had 3 BSODs, BIOS update failed for LED firmware; single BIOS means he could not jump back, so he RMA'd it.

### **2019-08-04 Case Fans; Main Order for Parts**

Noctua case fans move air at the same volume and noise levels. The difference is the number of pins: FLX models have 3 pins, and PWM models have 4. 3-pin fans are appropriate for using a switch on the case to control fan speed.

Ordered these parts from Amazon:

ASUS GeForce GT 1030 2GB GDDR5 HDMI DVI Graphics Card  
Corsair Vengeance LPX 16GB (2x8GB) DDR4 DRAM 3200MHz C16  
Microsoft Windows 10 Home | Download  
(2) Samsung 970 EVO Plus Series 500GB PCIe NVMe M.2 SSD  
Fractal Design Define R5 Gaming Case  
Asus 24x DVD-RW SATA OEM  
Transcend TS-RDF5R USB 3.0 SDHC/microSD reader  
Kingwin KF-91 Single Bay Hot Swap Mobile Rack  
Arctic F14 PWM PST Value 5-Pack Low Noise Case Fan 140mm

### **2019-08-06 Windows 10**

Downloaded Windows 10 Home and built installation on a 16GB USB key using my purchased installation/upgrade key code. (I had such a build fail previously on an 8GB key.) I later copied the necessary drivers onto the USB key.

### **2019-08-09 Building New System**

Open case, remove middle (5-bay) 3.5" disk bracket, store in basement.

Remove both dust filters.

Install PSU, intake down (will draw air in through bottom filter).

Carefully installed the CPU onto the mobo.

Mounted the Wraith cooler onto the mobo/CPU – tricky:

1. Thermal paste was on the cooler.
2. Hook bracket without latch over tab.
3. Open latch to left, hook bracket over tab.
4. Close latch.

Install RAM in recommended two slots, A2 & B2 (see manual or mobo printing.)

Remove bottom disk bracket (3-bay). Move front fan down to bottom. Replace bottom disk bracket.

Remove rear fan and install on bottom center as an *intake* fan. Plan to run these on the case controller, likely at lowest speed. Fans are 1000 rpm max.

Manual is ambiguous: says M.2 NVMe cannot be RAIDed with SATA in one place, and cannot be RAIDed in another. Opened a ticket with GIGABYTE.

### 2019-08-10 Build Continues

New Arctic fans arrived. The plan was to install them in front (intake) and back (exhaust) to be ganged with the CPU cooler. These fans are one to two mm thicker than the Fractal fans that came with the case. The case screws won't mount them in the front of the case. Moved the Fractal fan from bottom center to front center.

Put Arctic fan in bottom as intake, so that it does not blow air to PSU intake and does not allow other intake fans to exhaust there. Plan to replace that fan with a plate, about 5.5 x 8 inches. Cut a piece of Masonite to fit, spray painted it black with a can I had in the basement. Black marker on the screw heads.

### 2019-08-11 Build Continues

Installed power connectors on mobo. No problem with 2x12 main power. Next, 2x4 connectors installed into 8-pin ATX\_12V socket, leaving ATX\_12V1 (4-pin) empty. Removed ganging of rear fan to CPU fan.

Mobile rack installed into lower drive bay. Wrong-side up, I could only use two screws, one on each side. Reversing it, installation with four screws was easy.

Optical drive installed in upper bay, not bad.

Connected SATA power to both the mobile rack and the optical drive using the longer, 4-connector cable – needed the extra length to reach. Still have the second, 2-connector cable, which will be fine for any two drives. If yet another drive is needed, I'll either get a splitter/extender for an existing cable or order another 4-connector cable from btosinc.com.

Connected cables from case to mobo for front panel:

- HDAUDIO
- RESET
- POWER SWITCH
- POWER LED+
- POWER LED-
- HDD LED
- USB 3.0



## USB 2.0

The mobo has a 3.1 Type C (Gen 2) connector for the front, but the case does not. NBD.

Installed NVMe into M2A\_SOCKET, between PCIe16 and the CPU:

1. Remove cover.
2. Install standoff at length 80.
3. Insert NVMe fully at 30 to 45 degree angle.
4. Press down and check standoff registration.
5. Screw down.
6. Remove tape on heatsink and reinstall.

Changing the NVMe won't be an attractive option. It cannot be disconnected, except perhaps in the BIOS.

Install graphics board: remove cover from pins at bottom. Careful, heatsink fins are sharp!

Connect case fan power connector to available SATA power.

Reinstall back/rear panel: tip in, smack screw end with heel of hand, tighten screws.

## 2019-08-12 Initial Test

To get to the BIOS when power is turned on, press DELETE during the power-on self-test (POST). To update the BIOS, use @BIOS or GIGABYTE Q-FLASH.

We need a BIOS update to silence the chipset fan. Initial BIOS is version F3. We need F4F. Version F4J is available, but adds things that don't interest me.

On old system, downloaded software from

[gigabyte.com/us/Motherboard/X570-AORUS-PRO-rev-10/support#support-dl-driver](http://gigabyte.com/us/Motherboard/X570-AORUS-PRO-rev-10/support#support-dl-driver)

There are 17 utilities. One is App Center, required by the others, and which itself requires Microsoft .NET. Interesting utilities include SysInfo Viewer/Smartfan 5, @BIOS, Fast Boot, Auto Green, Smart Backup. (Investigated much later.)

These drivers are planned to be installed:

AMD\_RAID-mb\_driver\_Chipset...  
AMD\_RAID\_Preinstall-mb\_driver...  
AUDIO-mb\_driver...  
BIOS\_F4f-mb...  
CHIPSET-mb\_driver...  
LAN-mb\_driver...

First, POWER ON – FAILED.

### **2019-08-13/14 Experiments, Trying to Boot**

Splitting the power into two 2x4 connectors, I plugged one into ATX\_12V and one into ATX\_12V1, leaving a 4-pin gap between the plugs. No go. I tested the PSU with a paper clip, per Seasonic video – PSU is OK.

I posted a full problem description, including my research, at

[linustechtips.com/main/topic/1094058-x570-system-wont-start-to-boot-with-seasonic-focus-550](https://linustechtips.com/main/topic/1094058-x570-system-wont-start-to-boot-with-seasonic-focus-550)

No replies, too detailed, I guess. I checked all power connections at both ends, and that the CPU fan was connected to its header. I cleared the CMOS, but did not accept the risks of reseating the CPU.

### **2019-08-19 Boot Problem Resolved; NVMe RAID Query**

I found the answer, which I posted:

My Seasonic Focus+ 550 lacks two cables that the 650 and higher models have: a second 8-pin to 2 x 4-pin CPU cable, and a second 4-connector SATA cable. I ordered both, because the existing 2- and 4-connector SATA cables might not reach everywhere I need them to. Cables from BTOSinte.com are approved by Seasonic; generic cables will void the PSU warranty. Cost of cables: \$5 for SATA and \$5.35 for CPU. Do NOT order the 4-pin to 4-pin, which is for older units and only saves a buck or so, anyhow. I upped the \$6.60 shipping to \$8.90 for priority mail, not clearly a win, but I did get USPS's confusing tracking.

The system boots with the two 2 x 4-pin cables!!! (On one use only the one 4-pin connector that fits.)

Conclusion: for an X570 mobo, be sure you have two 8-pin to 2 x 4-pin CPU cables, in addition to the usual 24-pin power. Most mobos only require three of the four 4-pin connectors, but the highest-end mobos use them all. Be smarter than me, and get a PSU with sufficient connectors in the first place! I took too much for granted.

During investigations a few days earlier, I discovered the Seasonic Wattage Calculator online. It recommends the 650W version for my potential use, so I definitely got it wrong.

Still not sure about NVMe RAID, before opening the second package, I inquired of GIGABYTE. They said yes, either RAID 0 or RAID 1 will be bootable. Included were screen shots of setting it up in the BIOS.

## 2019-08-20 Data Mirror Considered

Looking for more robust data storage, I considered 2TB SATA SSDs from Crucial, WD and Sandisk. All have 5-year warranties. The Crucial MX500 has the highest limit of terabytes written (700) and the lowest cost (\$223.48).

Before absorbing the cost to mirror the data disk, I decided to get one Crucial SSD and also use a 3TB HDD that I had previously used only for backup. I would then use Macrium Reflect Free to back up the data SSD to the HDD overnight. At the same time, I ordered a RIITOP NVMe PCIe adapter, to extract the maximum speed from the second NVMe.

## 2019-08-22 Proceeding with Install

First, on the old system, I inserted a 2TB HDD into the mobile rack, and copied the entire data mirror to it. Still on the old system, I extracted the compressed F4f BIOS update, and put the file X570APW.F4f onto a USB key.

On the new system, I used Q-Flash within the BIOS to update the BIOS from the USB key. Examining the status looked good (I copied it into the log book), except that the RAM was running at 2133 MHz instead of the 3200 I paid for. The solution was to turn on X.M.P. in the BIOS. This automatically bumps the speed to 3200. This RAM has a lifetime warranty which covers use in this manner. The default is the lower speed, so that it won't crap out on incompatible systems.

First, I loaded optimized defaults, as recommended for the new BIOS, and then turned on the only choice presented by the BIOS:

XMP Profile 1: DDR4-3200 16-18-18-36-54 1.35V

Five drivers were copied to the Windows 10 USB key.

To configure RAID in the BIOS, double click on "IO Ports" (go figure). Then SATA configuration, where the SATA mode was already RAID, and I enabled NVMe RAID mode. It was necessary to save the settings and reboot before continuing.

## 2019-08-23 Configuring the Boot Mirror and Installing Windows

Getting the boot mirror (RAID 1) was complicated by the confusing BIOS. I wound up deleting things and starting over, more than once. Here is how I finally got it.

1. Settings > IO Ports > RAIDXpert2 > Array Management > Delete Array. Check "All". Delete Array > Change "Confirm Disabled" to "enabled" > yes. Should see "There are no arrays found in the system."
2. Esc [ =Settings > IO Ports > RAIDXpert2 ] > Physical Disk Operations > (select a disk) > Initialize Disk. Repeat for second NVMe.

3. Esc > Array Management > Create Array > Select RAID Level: RAID 1 > Select Physical Disks > Check “All” (both become enabled) > Apply changes.
4. Esc > Array Management > check that the array is RAID 1 and of the correct size (~500GB). (If not, delete the array again, and reboot.)

Turned off CSM (legacy BIOS) support, under Boot. Fast Boot was disabled already, “has no effect for RAID boot options.”

Begin OS and Application Installation and Configuration

### 1. *Windows 10 Home*

Insert the prepared Windows 10 USB key (including AMD/GIGABYTE drivers) into a USB port on the system, and reboot. Enter the Microsoft license key, if and when prompted.

Custom: Install Windows Only (Advanced), no upgrade.

Where do you want to install Windows?

Load Driver – USB key is not usable with ZIP files – extract the files to the key on the old system and come back.

D: is the USB key. Browse Folders. Repeat until done.

*Caution:* The process of loading device drivers for a bootable NVMe RAIS system is finicky. Load them in this specific order:

- a. AMD\_RAID\_preinstall... > NVMe RAID. Two identical listings for “bottom” driver; choose the first.
- b. AMD\_RAID\_preinstall... > NVMe RAID (again). Now shows “AMD-RAID Controller...”, select that.
- c. AMD\_RAID\_preinstall... > NVMe RAID (again). Now shows “AMD-RAID Config Device” above the “Controller” line. Select Config Device.

It showed: Drive 0 unallocated space 465.2 GB.

Other drivers were all .exe files; not installed at this time.

Connected Ethernet port to the home network router. Made a *local account*, same as usual. Refused Cortana and all that other crap. Install completed, but using 1024 x 768 screen resolution. (Using the Samsung 2343BWX test monitor to configure the system.) Reboot.

Did not work right... After five minutes of probing, the screen flickered and switched to full resolution, 2048 x 1152. Rebooted again to check – good.

Checked for updates – downloading... installing Windows 10 V 1903 cumulative update.

## **2. Norton Security**

Logged into Norton on the old system and sent a Norton email to my email address at gmail. I brought up Edge, opened gmail, and used the Norton message to install Norton Security. (I currently have 10 licenses.) I also took this opportunity to give the system my preferred name.

## **3. Chrome**

Downloaded and installed Chrome. I don't sync Chrome across all my devices; I deferred installing my bookmarks to Sep 9.

## **2019-08-23/24 Windows Configurations Continue**

I changed the desktop background color to “cool blue” under Personalizations.

This system is NOISY! Changed time zone to Eastern US/Canada. Copied the rest of the drivers from the USB key to the desktop. Installed the drivers. The chipset fan is off.

The noise is the CPU fan. Ordered Noctua NH-14S Premium CPU cooler, eschewing cheaper solutions from Arctic and Cooler Master.

Installed and configured 3TB HDD disk from storage as an internal backup disk (M:). Installed 2TB SATA SSD as data disk (D:). Did not mount the data disk at a folder on C: as on the old system – usable with Backblaze and more generally usable via drive letter. Skipping details.

On the old system, I removed some software I won't put onto the new system, captured a list of all apps on the old system, and pasted the list into my logbook as a checklist. Copied my massive Source folder from the old system to the new (two copies using a 16GB USB key). This was slow loading the key on the old system, but fast with USB 3 to SSD on the new system. Before installing a package, I'll fetch a new version, if available. I've been toting this stuff around for decades!

## **2019-09-01 Replace CPU Cooler**

Noctua NH-U14S cooler arrived, with its excellent 140mm fan. I obtained a bottle of 91% isopropyl alcohol from CVS.

Moved the lever on the Wraith Prism cooler to the other side.

Using a long-handled screwdriver, levered the cooler first off the bracket on the lever side, then on the far side. *Twisted the cooler without lifting* until free, as recommended online.

Loads of goop were on the CPU. I cleaned the cooler some; as usual, I put it into storage, in case I want to throw it away.

Using first a dry paper towel, and then a microfiber cloth with alcohol, I cleaned the CPU and surrounding area. I also used a wet cloth around the head of a screwdriver, as needed. To get the goop off of the lever arm, I had to carefully raise the arm (freeing the CPU), clean the arm, and lower it. The cloth was destroyed, so I discarded it.

When I removed the old brackets, the AMD backplate fell off the mobo. With the case vertical, so I could reach both sides, I attached the new brackets to the AMD backplate with the screws provided, double checking that the provided spacers were around the standoffs from the backplate. Squeeze 4-5 mm drop of the provided, highly-rated NT-H1 thermal paste onto the CPU. Install cooler per directions. Install fan, blowing into and through the cooler to the back of the case. Install attenuator, slowing the fan to a maximum of 1200 rpm.

## 2019-09-02 Software Installation and Configuration Continues

### 4. *Motherboard Drivers*

Exploring the drivers previously copied to a folder on the desktop, I found they were of type 7z SFX, verified publisher GIGABYTE. Each of the Audio, Chipset and LAN drivers either reboots or asks to.

### 5. *7-zip*

Latest version of 7-zip obtained and installed, needed to install those drivers.

### 6. *Firefox*

Need to install Firefox before LastPass, so I can get the extension into it, for occasional use. When Norton asked, I installed only Norton Safe Web. The installed Firefox was version 68.0.2 (64-bit).

### 7. *LastPass*

Installed LastPass with extensions for Chrome, Firefox, and (ugh) Edge. Had to authorize Edge specifically, and then reject a Microsoft account.

### ***8. Active Perl***

Created an account at Active State, surprised I did not have one yet. Downloaded and installed free Active Perl 5.28.1, “typical” install.

### ***9. Active TCL***

Downloaded and installed Active TCL 8.6.9.8609.2

### ***10. Acrobat Reader DC***

Downloaded and installed Adobe Acrobat Reader DC and the Google Chrome extension for it. This installed an older version which was then upgraded to 19.012.20040.

### ***11. Photoshop Elements 8.0***

We have a couple of licenses for PSE 8. It came free with devices and it does all I need, so that’s what I use. When my wife got her current system, I bought PSE 14 for her. The only component of PSE that we use is the editor.

### ***12. BreezeBrowser Pro & Downloader Pro***

These are fine products that we have used for years. I have an old version that meets my needs. Karen has a later one, but not the latest. I installed the products, but won’t configure them until I have some work to do.

## **2019-09-03 Replace Fractal with Arctic Fans; More Software**

Yesterday, I discovered that the two Fractal fans that came with the case and I had located at the front, were by far the noisiest remaining in the box. I bought a 10-pack of 1 ½” x 16/32” machine screws at Lowes. Then I replaced the two Fractals with two Arctic fans from stock. I painted the screw heads black with an ultra-fine Sharpie. The front filter bulges out slightly on the left, nothing to do about it. I plugged both fans into SYSFAN2; they are much quieter, but not perfect.

### ***13. Bridge Composer***

I have license # 153 of this outstanding bridge writing-dealing-and-more software. I installed version 5.67 from Source, then updated to the latest, 5.76. I checked a box (Help > Check for updates) to check automatically for updates, which I had not done on the old system. The program already includes DDS, the double dummy solver.

### ***14. System Settings***

System > Power & Sleep: Screen, when plugged in, turn off after 15 minutes; system goes to sleep never. Additional Power Settings... AMD Ryzen Balanced.

System > Storage: Change where new content is saved; Manage Storage Spaces.

Devices > Bluetooth...: Turned off Bluetooth, show notifications.

Devices > Autoplay: removable drive: open folder to view files. Memory card: download images (DLpro).

Network: Changed from public to private, turned off WiFi, turned off mobile hotspot.

Cortana: turned off using Cortana when device is locked. (Would like to cut out Cortana and stab it to death!)

Privacy > General – turn off use of advertising ID and access to my language list. Lots of app permission/access settings not changed.

Search: all cloud content permissions turned off. Kept Searching Windows at Classic setting, not Enhanced.

Update & Security > For Developers: changed settings to show file extensions, hidden system files, full path in folders. Changed policy to show Run as different user in Start. Changed settings to show empty drives.

### ***15. Ghostscript***

Downloaded Ghostscript 9.27 for Windows (64-bit) AGPL Release from [ghostscript.com/download/gsdnld.html](http://ghostscript.com/download/gsdnld.html). Installed.

### ***16. Ghostview (GSVIEW)***

Ghostview was available from [ghostgum.com.au](http://ghostgum.com.au), which produced 5.0 64-bit. I got my copy in 2012, now discontinued. Artifex took it over, then discontinued support for 6.0. I installed 5.0, which met my needs for working on the BridgeMats program. Artifex has GhostPDF, which might be necessary, going forward.

### ***17. CutePDF Writer***

Mine came from 2011. I got new version 3.2 (CuteWriter) and converter (GPLGS8.15) from [cutepdf.com/products/cutepdf/writer.asp](http://cutepdf.com/products/cutepdf/writer.asp). The converter is PS2PDF. Reference: [cutepdf-editor/support/writer.asp](http://cutepdf-editor/support/writer.asp) to get free PDF editor. Installed both (ran the files). converter.exe installed GhostScript 8.15. We'll see.



### ***18. Evernote***

Evernote 6.20.2.8626 was running on the old system. I installed the same, latest version on the new system. I run the free version, which allows only two systems, currently the old system and my phone. When I switch over to the new system, I'll remove the license from the old.

### ***19. Dell 3760DN Printer***

Installed the driver for network use of the Dell 3760DN printer.

### ***20. Bridge Buff 19***

The latest version of Bridge Buff remains 19, the version I bought. I seldom use it, but will keep it since I own it.

### ***21. Cards Font***

Installed the free cards font from Source.

### ***22. Cygwin***

Ran Cygwin installer 2.897, stashing the downloaded files under Source.

### ***23. Big Deal***

Copied C:\BigDeal from old system to new, unchanged. I then ran bigdeal.exe to generate bigdeal.ini, which I should have done in the past. Oh, well. See readme.txt.

### ***24. GIB***

Installed GIB (Ginsberg's Intelligent Bridgeplayer) from the ancient CD. Then IU updated it to 6.2.0/6.1.5 from Source.

### ***25. Java***

Installed the latest JRE from Oracle – GIB works!

### ***26. Exact Audio Copy (EAC)***

Was running EAC 1.0 beta 3 from Aug 2011. Downloaded and installed version 1.3. EAC Options > disabled two plugins not previously present. I investigated LAME switches in detail, and added the following to \Source\EAC\PDM.txt, also pasting it into the log:

```
EAC > File > Compression options > External Compression
```

```
As installed with EAC 3.100 on MASH:
```

Parameter Passing Scheme: User Defined Encoder  
Additional command-line options: %islow%-V 5%islow%%ishigh%-V 2%ishigh% -  
-vbr-new %source% %dest%

As running on old system:

Parameter Passing Scheme: LAME MP3 Encoder  
Additional command-line options: --preset standard

[http://wiki.hydrogenaud.io/index.php?title=LAME#Recommended\\_encoder\\_settings](http://wiki.hydrogenaud.io/index.php?title=LAME#Recommended_encoder_settings)

--vbr-new is the default.  
--alt-preset [which I used formerly] means the same as --preset.  
--preset switches are now aliases to -Vx switches.

Very high quality: HiFi, home, or quiet listening, with best file size:  
-V0 thru -V3 are recommended.  
"These VBR settings will normally produce transparent results.  
Audible differences between these presets may exist, but are rare."

Technical details of the recommended settings

Switch	Preset	Target Kbps	Typical Kbps	Y Switch enabled by default
-b 320	--preset insane	320	320	Y
-V 0	--preset extreme	~240	220-260	
-V 1		~220	190-250	
-V 2	--preset standard	~190	170-210	
-V 3		~170	150-195	Y
-V 4	--preset medium	~160	140-185	Y

The -Y switch tells LAME not to encode the highest frequencies accurately, if doing so causes disproportional increases in bitrate.

Sticking with --preset standard.

## ***27. .NET Framework 3.5 (includes 2.0 & 3.0)***

EAC required this, so I accepted the download and install from Microsoft.

## ***28. LAME***

Downloaded 3.100 64-bit from rareware.org and installed it in C:\Program Files (x86)\winLAME. Extracted files, placed in C:\Program Files\LAME. Copied settings and adjusted them. (See EAC above – how I use LAME.)

## ***29. Deal***

\Source\Deal (Andrews)\deal319win.zip is the latest. To use Deal, you extract the files and put them where they are to be used, so nothing to do now.

### ***30. Dealmaster Pro***

Installed CD version (4.2) to C:\dmpro. I already had the 6.0 update in Source, which I extracted into C:\DMpro, replacing duplicate files (per instructions). I noted that bigdealx.exe was already there. Right-click on dmpro.exe > Properties > Compatibility >  Run this program as an administrator. DMpro limits the number of deals that can be used. I stored 100,000 deals at a time in its file, until I reached the limit of 999,999. I don't know what that really means – I just go for the max. [I have switched to Deal for new simulations; the time for DMpro has mostly gone.]

### ***31. EXIF Date Changer***

Downloaded and installed the latest free version, 3.8.0.0, from Rellik Software. The old one was 3.5.5. (I used this after returning from Italy with wild times on our cameras. Since, I have mostly used an equivalent feature of BBpro.)

### ***32. Filezilla***

Downloaded V3.44.2 (all except language files). I completed the configuration and used the program 8 Nov 2019.

### ***33. DOS Games***

The old 16-bit games that I wrote in the 80s do not run on 64-bit Windows 10. No plans to do anything about this; they might run in a 32-bit Windows VM.

### ***34. Junior Icon Editor***

This is the tool I used to create the white 3NT on teal background favicon for 3nt.xyz. I installed the software, but did not configure it, as I have no plans to do another icon.

### ***35. MS Money Sunset***

I installed this from source, but won't do anything to it until I switch over from the old system. As long as this works, I'm sticking with it. I have refused to use software from Intuit since they installed a rootkit on my system.

### ***36. Photo Rescue***

Installed version 3.1.1 and entered the key for it. I don't have a key for a later version, and it has not been used recently. See Recuva, which has been used.

### ***37. Polaroid Dust and Scratch***

Installed version 1.0, which I have, and have used when scanning negatives in the past – worked fairly well – negatives are always dusty. Since I have no immediate plans to scan negatives, I did not look for a later version.

### ***38. PuTTY***

Downloaded & installed 64-bit V0.72 of this SSH/SFTP client. Configured later.

### ***39. VIM***

Downloaded & installed gvim 8.1, which I configured 8 Nov 2019. This is the text editor that I use to edit HTML, Perl, Deal, and other programs I write. The vi editor is available on most Unix/Linux systems, which is what I supported for the last 25 years of my career. The modern GNU Vim understands and color codes the syntax of those languages. If you are a Windozer, you will likely find Vim to be too arcane.

### ***40. Spybot Search & Destroy***

Downloaded & installed version 2.7.64.0. Selected options for less control and more automation. Updated program signatures and ran a scan. I had to remove Spybot S&D when I installed Bitdefender on 2 May 2020.

### ***41. WBridge 5***

Installed (no other notation).

### ***42. WinMerge***

Installed version 2.14.0, the latest, which I already had.

## **2019-09-07 Software Installation and Configuration Continues**

### ***43. Tag & Rename***

Installed version 3.9.15 (same as June 2018 release). Not installed: audioshell 2.3.6 (freeware) that allows editing and viewing ID3 tags in Windows Explorer. I'm fine with doing that stuff in Tag & Rename, which I paid for.

### ***44. Wave Corrector***

Downloaded & installed version 3.7 of this fine software, which is now free, although it requires a code until the next version (User: Free User, Key:

DDHRMEFWJIG). However, I installed with my keys from LastPass, anyhow. I use this to rip LPs, assuming I can get my turntable to work with the danged SB X-Fi again. It stopped working a few years ago on the old system.

#### *45. Recuva*

This software was used used 8 Jun 2018. The latest version is 1.53.1087, which I got at that time. Recuva Pro costs \$20 (\$40 with CCleaner). Just installed the free version.

#### *46. LibreOffice*

Installed 6.2.7.1 (latest stable); had to install the help separately. I have stopped using this, but I have some old stuff I created with it. MS Office is better, sorry to say.

#### *47. Logitech Harmony*

My LastPass entry says:

pmatthews@alum.bucknell.edu WEBSITE LOGIN HAS BEEN PHASED OUT!!! Use MyHarmony desktop software already installed, copy password from above as needed. Choose EMAIL! (not facebook or google)

Well this is confusing, so I am reinvestigating as I write. A popup told me there was an update to Silverlight that I should install. After investigating I decided to do it, but

Microsoft Silverlight is a deprecated application framework for writing and running rich Internet applications, similar to Adobe Flash. A plugin for Silverlight is still available for some browsers.

What we seem to have is a combination of a desktop app and a web account. Presumably, I installed that desktop app as item 47.

Start > Logitech > MyHarmony > Login with Email. The app was already remembering my current email address, so I clearly fixed that as part of item 47. Because the app is not itself a web app, the LastPass plugin cannot supply the password automatically – I must copy and paste it. I did that today, and my current and former Harmony remotes appeared. I am updating the LastPass notes and pasting this section into the current log book.

#### ***48. unix2dos***

This is now part of a unified dos2unix package. I downloaded and unpacked it to \Source\dos2unix\dos2unix-7.4.0-win64. These are DOS (perhaps Cygwin) executables. I also found a unix2dos.exe, a GUI, in the bowels of my system.

#### ***49. SweetHome 3D***

Version 6.2 is available. I used version 4.6 to plan the use of our dining room as an office with regular furniture. We eventually hired Beyond Closets to do it with builtins. The version on the old computer would not open the office file, but it did open another. I downloaded and installed the free version, although I have no immediate plans to use it.

#### ***50. Double Dummy Solver by Bo Haglund (DDS)***

Bridge Composer seems to contain its own copy of DDS; there is a DLL available for such use. I got the whole distro, just to be sure, from [privat.bahnhof.se/wb785135/bridge/dll.html](http://privat.bahnhof.se/wb785135/bridge/dll.html). DDS 2.9.0 is current, released 21 Aug 2018. Note that a combo dealer and DDS is there, using Thomas Andrews' Deal. I discovered that DDS can start at a point in play, which I expect to want to do via Deal.

#### ***51. Microsoft Office Professional Plus 2010 (mostly Outlook)***

I had this in \Source for the old system, and installed it on the new system; the old system will eventually be shut down. I did a default install. This will let me get at my old Outlook mail, which I do every few months or so.

### **2019-09-07 Get Ready for Changeover**

Not installing these applications – wait until needed:

- ACBLscore (and Bridgemats movements) [I'm out of that biz]
- H&R Block 2012 to 2018 [hopefully, no need to revisit]
- OTAR Retirement Calculator [I'm retired & confident]
- ACDScore 2018 [removed everywhere, did not meet my needs]
- Brother PT-1950 labeler [current software worse than device keyboard]

Checklist, wait until changeover [all items now checked]

- Canon 9000F Scanner
- Macrium Reflect Free

- ☑ MS File History & Macrium on clients
- ☑ File Sharing Access (including mapped drive\_ on clients)
- ☑ Crashplan
- ☑ Sound Configuration
- ☑ Outlook (for old messages)
- ☑ Windows Media Player (point to D:\Music, tweak settings)
- ☑ AMD RAIDXpert2 installation on Windows

## 2019-09-07 Begin Changeover: Copy Data to New System

First, I tried putting the new SSD into my Kingwin dock, and connecting via USB-2 to the old system; this proved way too slow, only 30 MBPS.

Next, I put a 1.5TB HDD (WD15EARS) from storage into the mobile rack on the old system. The disk was not visible, even after a reboot. This disk had been last used as part of the boot mirror (another long tale). It showed up as an offline member.

BIOS > Ctrl-I (RAID) > 4 reset disks to non-RAID > select that disk & do it. The system would not reboot until I turned off the disk in the rack with the key. Then the system began an automatic repair – apparently I had put my current boot mirror at risk. After the rebuild, I restarted the system, and it came up clean. I turned the disk in the rack back on, but it was still not visible to the system. It appears this the OS thinks this disk is the current boot volume! It is drive C: and I cannot change the drive letter. Further attempts were fruitless. I powered the WD15EARS down, never used it again, and eventually junked it with all others smaller than 2TB. I have since concluded that it's best to wrestle with a RAID-configured disk on a non-RAID system, where it can generally be turned into a clean, non-RAID disk.

So, I opened the case to the old system and connected the new SSD to the power and data cables for the optical drive, hanging free. The rough estimate was 6 hr, looks like 33+ MBPS, kind of the same rate. Something weird here, but does not matter. It ran overnight.

## 2019-09-08 Changed Over: Full SSD Installed in New System

On with the configurations.

## 52. Windows Media Player

Pointed to D:\Music. Playlists are in D:\Music\Playlists. I selected a playlist, turned on the speakers, and it plays.

## 53. Microsoft Office

Copied shortcuts for Word/Excel/Powerpoint/Outlook 2010 to desktop, and from there to the Links toolbar on the taskbar.

Opened Outlook, got a startup error. File > Open > Open an Outlook Data File > D:\Documents\Outlook Files\Outlook.pst. Nope. Need to use C:\Users\Peter\Documents... or change that location. I decided to move D:\Documents there and try it. Basically, I decided that my home files would now live on the 500GB C: mirror, which has four times the space of the original boot mirror on the old system. First I renamed C:\Documents to Documents-old. Similarly, I relocated D:\Temp to C:\Temp.

In Outlook, I turned off "Outlook Today" so mail comes right up. I also deleted all repeating calendar items, all tasks, and all contacts. I emptied the deleted items. The only thing left should be mail. Every once in a while, I fish something out of this archive.

## 54. Crashplan

Log into administrator console, <https://crashplanpro.com/console>, download 64-bit Windows installer for version 7.0.0 (previous was 6.9.4). Run the installer (.msi) and install it for everybody. Login using my email address, paste in password from LastPass. New Device, pasted in my custom encryption key from LastPass.

Manage Files – default is C:\Users\Peter and a little more. Added

C:\Temp

C:\Program Files (x86)\ACBL Convention card editor\ACBL, changed folder to read/write. This antiquated program works, but I still cannot back up the files. I'll need a separate backup. [It turns out there is much more to this issue.]

Add D: and M: to backups, when ready (item resolved later).



After the new destination was added, the first backup started. (I'm now in the hook for a second Crashplan license, another \$10/month.)

I downloaded a new copy of Macrium Reflect Free, version 7.2.4440 (prior version was .4338). Unlike IDrive, Crashplan has no limits on individual file sizes. I planned to stop breaking images into 4GB chunks.

I moved a bunch of data around, much of it with a -old suffix to the name, so I'm not transcribing that. This stuff was either surplus (ACDSee) or living elsewhere, but being preserved for a while as insurance.

I noted in M:\PDM.txt, ONLY Backup and FileHistory are backed up. The rest is temporary or redundant backups. Then I note this was superseded 2019-09-29.

### **2019-09-08 Backup Plan**

Next, I finished up the initial version of my formal backup plan, and pasted it into the log book. I'm only going to list the action items included.

#### ***55. Map a drive (X:)***

On each host, set up a mapped drive (X:) to the backup share on the new system for that host. [details omitted]

#### ***56. Setup File History Backup on Each host***

#### ***57. Establish boot backups with Macrium Reflect Free***

### **2019-09-08 Backup Plan**

#### ***58. Canon 9000F Scanner***

The driver (16.0.5) and software (3.15) versions in \Source were already the latest, so I installed them. Both went on fine, but the software wanted to reboot. I refused, because I did not want to interfere with the backup that was running. The scanner worked anyhow; I did not tweak the configuration.

D:\Source\GIGABYTE X570T\...\AMD\_RAID\_mb-driver-chipset...

There is no evidence of RAIDxpert2 software on Windows itself, so I may need to install this driver. I did not want to interfere with the backup. I eventually resolved the issue on 2019-10-17.

Crashplan says it has 14.3 days remaining, 8% done!?!)

## 2019-09-14

Code42 says the initial Crashplan backup is 36% done, 9.1 days remain.

More Chrome configuration (item 3). Because I don't want Google managing my bookmarks across systems, I moved them manually:

1. Open Chrome on the old system.
2. Type `chrome://bookmarks/` on URL
3. Now on the top right corner click in three dots in the blue area and select Export Bookmark.
4. ... Save them to a USB key.

In chrome on the new system:

5. Click the three dots > Bookmarks > Bookmark Manager > Import Bookmarks and Settings > Bookmark HTML file > Choose File

Enable 2FA for all users of Crashplan. Issue pushed forward until no longer relevant, because Crashplan was superseded.

## 59. ACBL Convention Card Editor

Entries on this program appear on numerous pages, as I tried to cope with the strange behavior of Windows 10 regarding this aged program. I finally resolved all the issues on 2020-02-21.

## 2019-09-14

Crashplan did 6% overnight (42% total). I changed the CPU use "when present" from 20% to 80%. (☑ changed it back 2019-09-29.)

GIGABYTE says the RAIDxpert2 software for Windows is included with the .zip version of the driver, `amd_raid_drivers_v9.2.0.127.zip`. Still not interfering with that backup.

## 2019-09-16

Crashplan still bogged down at 48%, proceeding slowly. It has been cooking since Sep 8; this is day 9. I did not observe this problem with the old system, but I had started that backup just before I left town for a week of bridge. 10:13 PM, 50%.

## 2019-09-17

The LastPass extension was not installed in Chrome – installed.

Crashplan is at 53%, 6.5 days remaining, 10:49 PM. This is day 10.

I ran an online Internet Speed Test: 84.2 Mbps down, 78.5 Mbps upload.  
Rebooted, just for yucks.

Crashplan would not come up, then said Crashplan 7.0.0, which disappeared. I could not find Crashplan to restart it, then I did find it, and 7.2.0 came up. The expected interface then started. An automatic update, after a fashion.

Backup running, still 53%, but says hours remaining.

## 2019-09-18

53%, Day 11, 11:32 AM.  $835 \text{ GB}/11 \text{ days} = 76 \text{ GB/day}$ .  $78.5 \text{ Mbps} = 678 \text{ GB/day}$ . A different, Google internet speed test says 82.5 Gbps upload. Internet bandwidth does not appear to be the limiting factor here.

Backblaze has a speed test: 89.5 down and 83.6 up, with Crashplan running. I disabled Crashplan both at startup and the running process, and started a BackBlaze trial backup. I told it to use four of 16 threads.

## 2019-09-21

Backblaze did about 250 GB/day over the three days. Since I was going away for another week of bridge, I re-enabled Crashplan, and let the two programs go at it simultaneously, on the idle system.

Enough about backups, which I discussed in “Crashplan vs. Backblaze vs. IDrive” at <https://3nt.xyz/ideas.htm>. I ultimately decided to go with Backblaze.

## 2019-09-29

### *60. GoodSync*

The free version of GoodSync was downloaded and installed. I set up a job to automatically sync M:\D\_Mirror to be a copy of D: each night.

## 2019-10-07

The GoodSync job did not run. Apparently, I would have to pay for automation. So much for the poor-man's mirror. I investigated and ordered a second 2TB Crucial MX500 to mirror with the existing one, eventually removing GoodSync.

## 2019-10-10 New Data Mirror

First, I renamed M:\D\_Mirror to D\_Mirror-old, and made a fresh copy of D: with GoodSync to M:\D\_Mirror. I had to clear off some detritus from D\_Mirror-old, for two copies to fit.

Ugh, hassled by hibernation, which I turned off:

```
cmd > run as administrator > powercfg -h off
```

## Windows Edge Security:

- Turned off several optional cruds
- Privacy > Block third-party cookies (medium setting); block popups and Windows Defender Smartscreen were still on. Turned Search History off and cleared the history.
- Advanced > Cortana turned off, Adobe Flash Player turned off, Open sites with apps [maps] turned off.
- Passwords > (turned all options off)

I wish I could remove Edge from the system, or at least prevent Windows from using it.

Now I inserted a disk (N:) into the mobile rack, but File Explorer did not see it. Disk Management saw it and offered to initialize it. I foolishly refused, investigated the disk, and rebooted.

Boot loops! They continued after removing N: from the rack. This disk had been a replacement boot disk on an old system, now gone. It had then been installed in a carrier and used on the old system, perhaps as part of a boot mirror. (I had done lots of making and breaking a mirror, trying to safely increase the usable storage from 128GB to 256GB on replacement SSDs.)

Various investigations failed; I conclude that AMD is less robust than Intel in this context, not that it does me any good. The UEFI BIOS thinks both M.2 slots are

empty. However, both PCIe slots are seen, the RIITOP M.2 and the 1030 graphics card. No bootable device found.

### 2019-10-14

Myriad experiments with BIOS, removing and reconnecting things, diskpart in a DOS box, etc. Ready to reinstall the OS, I reassembled everything first. Windows booted! Unsure what happened or why, I decided to let the system run overnight, to stabilize. Maybe it was rebuilding the mirror.

### 2019-10-15

The new system still looks good. Now I took the offending disk back to the old system, for repair. First, I cleaned the disk using diskpart. When I fired up Disk Management, it said the disk had to be initialized. I did so, made a new simple volume, accepted the maximum size (full disk), assigned drive letter N, etc. This disk still did not work in the new system, and I got it right out of there.

The new system is running on Disk 0 (465GB). It looks like a single NVME disk, hopefully mirrored [later confirmed with RAIDXpert2 Web GUI].

Windows Properties having proved unreliable, I used WinMerge to compare all folders in D: to M:\D\_Mirror.

### *Storage Space*

Windows 10 Home does not have the software mirroring feature that I used on the old system. I'm supposed to use a Storage Space. I tried that, and ran into trouble. It appears that Storage Spaces are yet another Microsoft mistake. I am not going to transcribe four pages of gory detail from my log. I was pleased when I was able to excise the storage space from the system.

### *RAIDXpert2*

amd\_raid\_drivers\_v9.2.0.127.zip, mentioned Sep 14, finally installed. Finally, Windows is monitoring my RAID. I learned how to use the GUI incrementally, over several months.

Reboot > Del > Advanced > Settings > IO Ports > RAIDXpert2 Configuration Utility.

Physical Disk Management > Select Physical Disk Operations > Initialize a Disk

Only the legacy disk (M:) was offered. I need to clean up those SSDs somehow.

Boot Windows.

Diskpart > select disk 1 > clean. Repeat for disk 2. Disk Management now shows both disks to be uninitialized. [A return to the BIOS shows no change.] In Disk Management, initialize each of those disks as a new simple volume, assigning letters S & T (to avoid conflict later).

Reboot > Del > Advanced > Settings > IO Ports > RAIDXpert2 > Physical Disk Management > Initialize a Disk ... now lists three legacy disks, including the two 2TB SSDs.

Array Management > Create Array

Raid Level RAID 1, Select Physical Disks – both are listed. Check All turns both disks from disabled to enabled. Apply changes (using defaults). Save & Exit, reboot.

Disk Management, Yes, initialize Disk 1, GPT. Right-click Disk 1 > New Simple Volume: Drive D:, name Data Mirror.

Copied data from M:\D\_Mirror to D:. Whew!

### **2019-10-15 Validation; Windows Screen Lock**

The copying of the data has completed. I used WinMerge to compare the source and target by the half dozen major folders. It took a long time, but all is well.

A search turned up an article at [www.windowcentral.com/how-disable-windows-10-lock-screen](http://www.windowcentral.com/how-disable-windows-10-lock-screen). I followed the procedure for the Home version. Result: screen still locks, just no pretty picture. Settings > Personalization > Lock Screen (scroll down) > Screensaver > “on resume, display logon screen” is not checked?

I found another article at [www.onmsft.com/how-to/adjust-windows-10-lock-screen-timeout](http://www.onmsft.com/how-to/adjust-windows-10-lock-screen-timeout), set that up, but did not change the value from 1 minute.

Then I found what I really wanted: Settings > Accounts> Sign-in Options > (scroll down to) Require Sign-in. Change from “When PC wakes up from sleep” to “Never.”

At 11 PM, I discovered that Backblaze was confused about what to back up. I pinged Backblaze support.

## 2019-10-1

Backblaze said to simply check the disks I want to back up, but not to uncheck any of the other, duplicated disks (which included C: from that SNAFU).

I ran a test, turning the SMT (hyperthreading) setting to disabled in the BIOS. Extensive tests of bridge simulations showed this was often substantially slower, though occasionally slightly faster, so I turned it back on. (In the early days, hyperthreading could cause a single-threaded application to run at half speed.)

Configured GIB by taking gib.ini from the old system and putting it in Program Files (x86)\GIB. I also changed the playing strength from 60 to 120 and switched the East-West convention card to 2/1. I then updated Java, per prompt. GIB would not run from Bridge Composer until I acted upon Ray Spalding’s suggestion and configured GIB to run as administrator.

Using the RAIDxpert2 GUI, I deleted disks no longer on the system, to stop the monitor from whining about them. It even whines about legacy (non-RAID) disks.

## 2019-12-21

Configured BreezeBrowser Pro in detail, to support creating photo web pages, as on the old system. Pasted screen shots and annotated templates onto four log pages.

## 2019-12-26 Windows Media Player Not Maintaining Ratings

Two options, the second of which was not checked:

- Maintain my star ratings as global ratings in files
- Write media information changes to files

I found lots of unrated stuff and had been rating it. This seems to be a recurring problem. I believe that Tag & Rename continues to perform flawlessly, but that

WMP has issues. This change is an improvement, but WMP remains unreliable for changing the rating of a file that is being played, and perhaps for a file recently played. Oh, for the old MusicMach, before Yahoo destroyed it.

Checking ratings in files with Tag & Rename disclosed a great many tracks rated differently in WMP, probably ratings changed in WMP that WMP did not write to the files. I routinely play and rate new music in WMP; some of those files may appear unrated to T&R. I also change ratings up and down a star, as my tastes change. Maybe I should be rating music only from T&R, which can cause WMP to play tunes.

### **2020-02-21 ACBL Convention Card Editor**

This install of Windows 10, unlike the former upgrade from 7 to 10, writes convention cards to C:\Users\Peter\AppData\Local\VirtualStore\Program Files (x86)\ACBL Convention Card Editor\ACBL, instead of the corresponding system area, although my old cards are where the program expects. Things seem to work correctly, but I have trouble finding them and backing them up.

New plan: I moved all my old cards into this Appdata location. There was no evidence of conflicting file properties, even though I had to accept the moves. I can see all my old and new cards, just fine.

As I write, I confirmed online that Backblaze is indeed backing up my convention cards from the new Appdata location.

### **2020-03-15**

The new system locked up, and I had to shut it down hard using the switch on the PSU. When I powered it up, the OS booted cleanly, but drive D: (the data mirror) was gone. I tried all sorts of investigations over many hours.

Eventually, I booted into the BIOS, and was greeted with:

“Clear CMOS Information” BIOS has been reset. Please reconfig your BIOS setup items, if needed.



The “System Info” presentation differed from that which I had recorded in the log on 2019-08-20. No M.2 drives were noted. Under NVMe Configuration, “No NVMe devices found.”

Settings > IO Ports > RAIDXpert2 Configuration Utility > Rescan Disks sees NVMe RAID, 2x500GB online. That’s Array 1, noted as normal; Array 2, non-RAID, OKB, offline; Array 3, Raid1, OKB, offline.

These changes fixed the problem:

**Settings > IO Ports > Sata Configuration**

**SATA Mode AHCI → RAID**

**NVME RAID Mode DISABLED → ENABLED**

**Favorites > Extreme Memory Profile (X.M.P.) DISABLED → PROFILE 1**

**Save & Exit**

I had to hold the power button in, to power down for a reboot. AMD is definitely less robust than Intel.

## **2020-03-20 Local Backups**

After the recent scare, I decided I needed to have a local backup of the D: drive. I don’t want to have to download all that data from Backblaze.

First, I went through all my stored disks. I destroyed and discarded most of them, keeping two 2TB and two 4TB HDDs. I assigned the 4TB disks for local backups. These disks had been deployed as the data mirror on the old system, so I knew there would be trouble, if I inserted one into the new system. I connected it via USB-2 to my non-RAID simulation system, using my Kingwin dock. Data Management said Disk 1 was “Dynamic” “Invalid”.

Right-click on that disk > “Convert to basic disk? (data will be lost)” > Yes.

Now Disk 1 “Basic” “Online”

Right-click in the area for Disk 1 > New Simple Volume... > next > Next > Assign the following drive letter: S > Next > Volume Label: Backup Disk S (Quick Format) > Next > Finish.

I then ejected the disk, and installed it into a carrier.

## 2020-03-25 Local Backups Continue

Inserted disk S: into the new system, but it was not visible. The online manual for the Gigabyte X570 Pro WiFi says it has only four SATA ports, implying two are dead. The combo manual for the WiFi and non-Wifi (the model I was unable to buy) says six ports. I switched the cable for the mobile rack from port 5 to port 6, and booted the system. I don't know if this made any difference. I now know that this mobo, unlike all others I have used with the KF-91, does not support hot insertion of a disk. A reboot is required. The rack works now, and I don't plan to fool with it unless I have to.

It came up as disk E:, and I want S:.

Right-click on E: > Properties

Allow files on this disk to be indexed NO

Change to drive letter S:

Renamed volume to Backup\_S

Made a D\_Mirror folder on S:, copied all data from D: to S:\D\_Mirror.

Because M:\D\_Mirror was now stale, I deleted it. I then copied all files on disk M: to S:Backup\_M.

Then I shut down the system, removed disk S:, and stored it in its carrier in a safe place. Next time, disk T:, which I'll need to fully prepare. Meanwhile, I'm keeping it safe, as I could run the old system degraded with it.

## 2020-03-28 Optimizations from Maximum PC (Apr 2020)

(02) First I did my best to lobotomize Cortana: Settings > Cortana > turn all the sliders off. Privacy Settings, turn off Speech, Inking, camera & microphone.

(03) Startup > App Settings, toggle off any apps that you want to start manually, not automatically. I got a bunch, and also removed software I don't want on the system.

(04) I chose to disable these background apps: Groove Music, Microsoft Edge, Microsoft Solitaire Collector, Microsoft Store, Mobile Plans, Movies & TV, One Note, Paint 3D, People, Voice Recorder, Weather, XBOX Console..., XBOX Game Bar, Your Phone.

## 2020-04-06

Backup plan rewritten & pasted it into the log as five 2-up-J sheets, no action items.

This concludes the log entries that I consider to be part of the installation and configuration of this system. While the resulting system is not as good as I had hoped, and I had lots of trouble along the way, the end result is a success.