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DREAM MACHINE 2015

Out of this world PC performance

- ✔ 4x Titan Xs
- ✔ Intel 5960X
- ✔ 5K gaming

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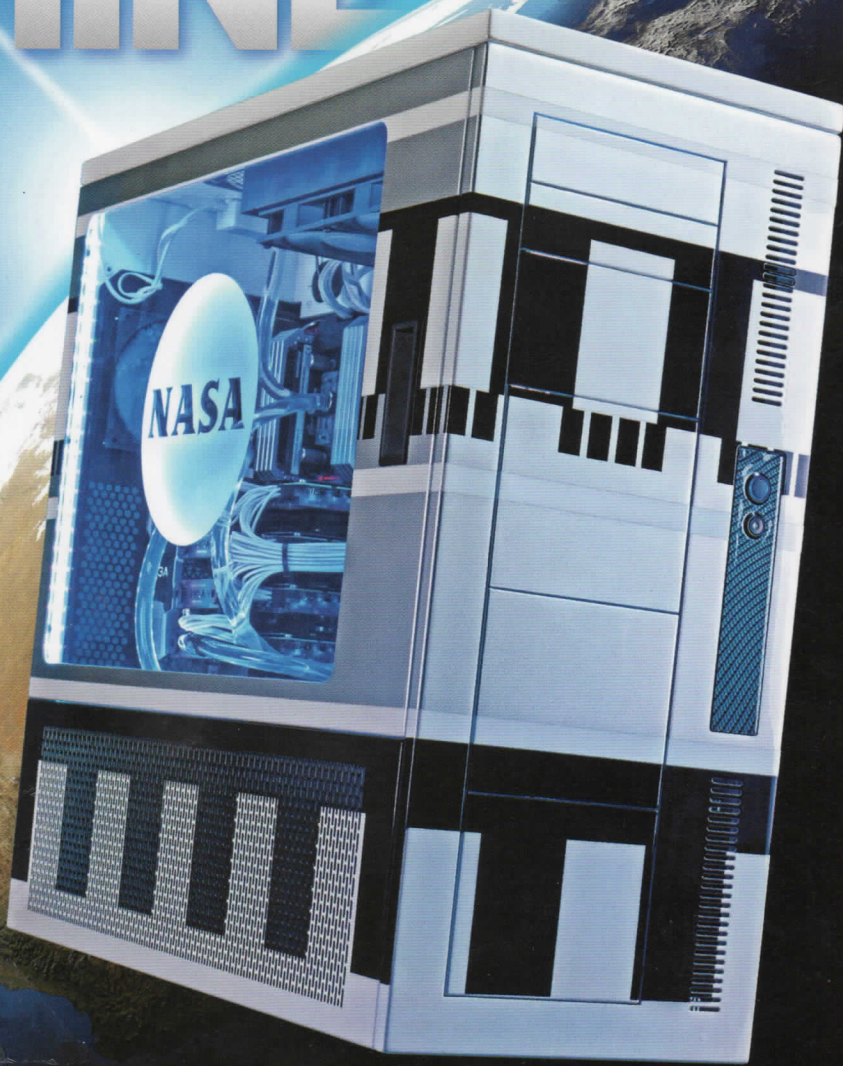
ALEX CAMPBELL **ASSOCIATE EDITOR**

Rocket Science

Dream Machine 2015 was pitched at the Moon; this rig aims for low-Earth orbit

LENGTH OF TIME: 1–3 HOURS | **LEVEL OF DIFFICULTY: MEDIUM TO CHALLENGING**

THE FLIGHT PLAN

WHEN WE BUILD the Dream Machine every year, we don't hold back. We get the best parts, regardless of the price. If a part is a tier higher in price, but only renders a performance increase of 5 percent, we go for it. And this year, we really, really went for a Moonshot.

But not everyone can afford a $22,000 Dream Machine for their home. So, in the spirit of our NASA-inspired theme, we decided to go a little smaller. It's pretty much a miniature Dream Machine, with a price point that's a little more down to earth.

We gathered up parts that didn't make it into the Dream Machine for some reason, or that would be a little more sensible in terms of price. Make no mistake: This machine still soars and climbs for excellence. An out-of-this-world PC is still within reach for many enthusiasts who save up their credits. It's not cheap, but no respectable space program is.

Since this is the Dream Machine's little brother, we felt the need to do a little overclocking as well. We weren't able to be as aggressive with our overclocks as the EK custom loop allowed us to be in its big brother, but we still got respectable and stable overclocks. Giving this PC enough extra thrust to leave the atmosphere.

VEHICLE ASSEMBLY

WE BASED THIS BUILD on a case that was meant for the Dream Machine, but ended up being too small for the custom water loops we used. The case was a prototype of Antec's S10 that we had custom painted by Smooth Creations to replicate a Titan II Gemini Launch Vehicle on a launchpad. We went with a Core i7-5930X CPU. It's two cores lighter than the Dream Machine's 5960X, but friendlier to overclocks and your wallet. The 5960X is nearly $500 more, meaning you're paying $250 per extra core. We got a nice stable overclock with our 5930K, bumping it to 4.5GHz from the stock 3.5GHz with the help of 1.31 volts. We kept the main engine cool with an NZXT Kraken X61.

The GPUs are a pair of EVGA GTX 980 Ti Superclocked ACXs in SLI. We overclocked these already factory-overclocked rockets further, adding 150MHz to the core clocks and 300MHz to the memory clocks using EVGA's PrecisionX software. We powered the overclock with an overvolt of 31mV. We used 16GB of 2,800MHz DDR4 memory in a kit of four 4GB modules. We ran into problems at 2,800MHz, so underclocked to 2,666MHz for stability.

For storage, we halved what we had in the Dream Machine. We put the 1TB SSDs in RAID 0 for the OS, and kept the 6TB spinning drives in reserve. We mounted all of these goodies onto Gigabyte's X99 SOC Champion mobo, which has more overclocking options than we knew what to do with. We powered our ship with an 80 Plus Gold certified Enermax 1,350W Maxrevo modular PSU.
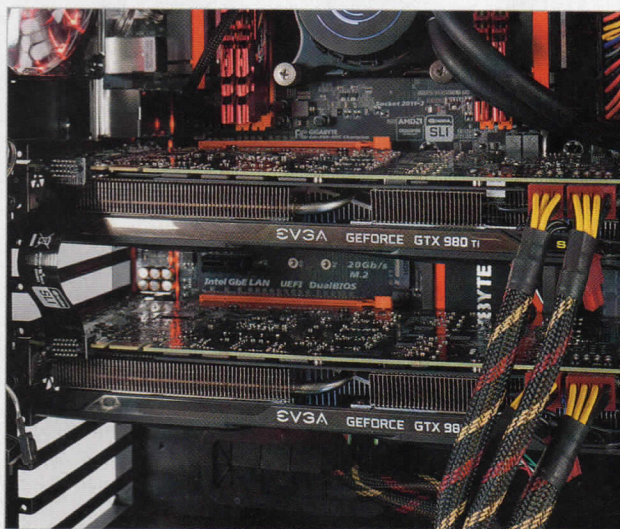
INGREDIENTS

PART		PRICE
Case	Antec S10 Prototype Custom	$500
Motherboard	Gigabyte GA-X99-SOC Champion	$270
CPU	Intel Core i7-5930K	$580
Memory	G.Skill Ripjaws 4 Series 16GB 2800 DDR4	$140
GPU	2x EVGA GeForce GTX 980 Ti SC ACX 2.0	$1,340
PSU	Enermax Maxrevo 1,350W	$320
HDD	2x Western Digital Black 6TB	$700
SSD	2x Samsung Pro 1TB	$1,000
CPU Cooler	NZXT Kraken X61	$140
Fans	3x EK Vardar F4 120mm 2,200rpm fans	$54
Total		**$5,044**

1 BOOSTER IGNITION

THE PAIR OF 980 Ti'S that we used really push this machine into the ionosphere. The main thing to keep in mind is that they're air cooled. Maintaining good airflow was a top priority when we went into the realms of overclocking. Luckily, the SOC Champion's PCIe x16 slots are numbered (from top to bottom) 1, 4, 2, 3. That means that for the best performance, we had to put the second GPU in the third slot from the top. This gave us a nice gap where air could flow freely, in comparison to the 2–5mm it would have if the cards were in adjacent slots.

We also upped the fan speeds in PrecisionX to 90–100 percent when we were searching for a stable overclock. To be sure, there was a lot of air flowing around these two cards. If you look closely, you'll see that spacing these cards farther apart means that you can add an M.2 SSD if you prefer storage speed over a potential third GPU.
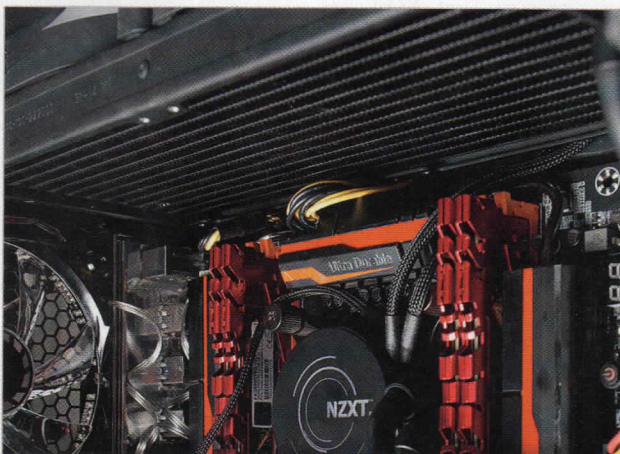

2 CRAMPED QUARTERS

SPACESHIPS AREN'T EXACTLY ROOMY. Engineers cram the most equipment into the tiniest space available to save on weight and profile. This machine was no different. When we attached the Kraken to the top mounting bracket, we had to really push the bracket into place, smashing the CPU power cables a bit. It's secured by two thumbscrews, and lining up those screw holes was a test of mettle and patience.
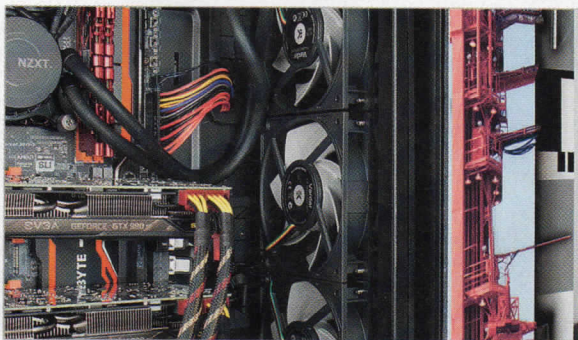
We could then place intake fans to the front of the case's main compartment to pull in lots of air for our GPUs. The X61 kept our CPU at a cool 25 degrees Celsius at idle, and at 57 degrees while under a 90 percent load, running our Premiere Pro CS6 benchmark.

3 AUXILIARY THRUSTERS

ATTACHING OUR X61 allowed us to mount three fans up front to draw in air. We chose a trio of EK's Vardar static pressure fans, 120mm versions of what's in the Dream Machine. These babies spin at 2,200rpm and push 77 cubic feet per minute (131 cubic meters per hour). We hooked up the top fan to the CPU PWM fan connector (our X61 is hooked into CPU_OPT), and the bottom two to the two spare connectors on the X61. It's worth noting that the retail S10 has a PWM fan hub on the back of the motherboard tray, so doing things this way wouldn't be required.
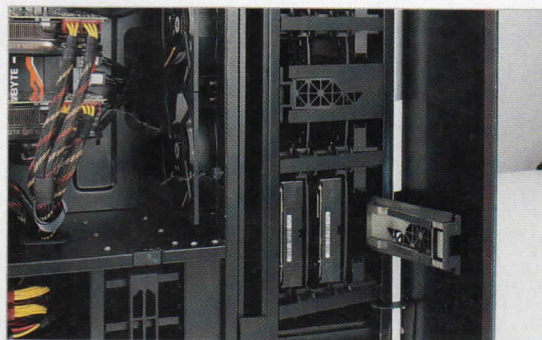
For benchmarking, we cranked up the power to get air flowing over the 980 Ti's. Boy, did that air flow. The S10 also features a removable filter on the outside of the main compartments in front of the fans. A tab near the base of the S10 releases the filter for removal.

4 MANUAL IGNITION

WHEN WE WERE FIRST TRYING to get Dream Machine parts to fit into this case, we accidentally pulled the front-panel wires loose of the panel buttons and LEDs. Whoops. Luckily, this mobo came with a power button on the board itself. Many modern mobos feature a power button, and they come in handy for things beside compensating for screw-ups, for example, if you're building on a test bed or want to test a particular feature without connecting the front-panel buttons.

There are also buttons to reset the BIOS to defaults, and a toggle that switches to the backup BIOS as well. That sounds trivial, but when you're using all the overclocking features this mobo has to offer, messing up is very possible. Having an easy way to switch to an alternate BIOS or reset to defaults is a good move for tinkerers and overclockers who want to push limits.

5 OPEN THE POD BAY DOORS, HAL

ONE OF THE THINGS that will first catch your eye is the S10's separate tower for hard drives. It seems excessive, but it has a real-world purpose: keeping the ambient temperature of the main compartment low. The tower's doors swing open in the front and rear of the case, making installation easy. The slots for the toolless brackets are rubberized, so drive vibration is absorbed, resulting in longer drive life and less sound from platters spinning at 7,200 RPM.
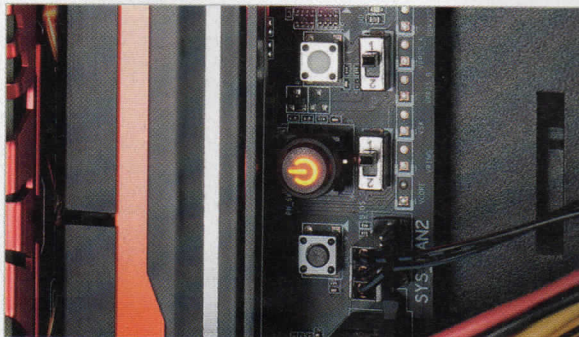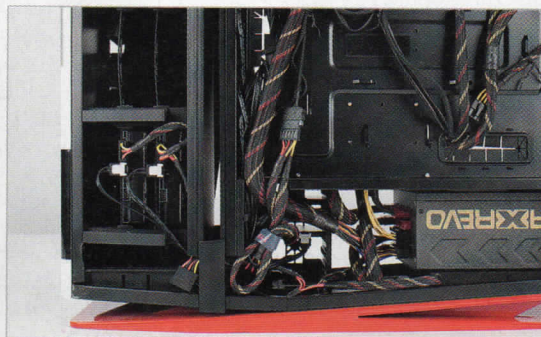
Our pair of 6TB drives were happy, kept plenty cool by a dedicated fan. The fan draws air from under the tower and pushes it up, across the surfaces of the vertically mounted drives. We hooked this fan to the SYS_FAN3 PWM fan header on our mobo, and set the speed to maximum. It stayed quiet at that speed.

6 CONTROL CONDUITS

WE DON'T OFTEN show cable management in our builds. It's not always pretty. But there's good reason to this time. The first thing to notice is how SATA power and data cables get into the hard-drive tower. A tab at the bottom of the case can be released. But this tab covers the cable pass-through, where all your SATA cables must go. We positioned the WD drives on the bottom row to stay within our cables' reach.

Also note that if you want a clean case, the rest of the system's power must snake through a fairly small cutout, requiring long PSU cables. In our build, only the ATX cable was long enough to get where it needed to go. For the CPU power, we had to route through the floor grommet into the main compartment, back out the grommet under the mobo, and then back in through the grommet above the mobo.

1. This red LED-lit fan came with our power supply. While it uses a typical PWM fan connector, it also has a manual dial for fan speed and a switch to turn the lights on and off.

2. The 1,350W Maxrevo power supply gives us much more power than we need for this build. On the upside, it leaves more than enough headroom for overclocking and adding in more videocards.

3. The 2.5-inch drive cage in the PSU compartment sits right next to a fan, which helps keep SSDs (or 2.5-inch HDDs) cool.

4. The custom paint job by Smooth Creations really made this case a star. The retail case comes with tinted glass doors instead.

REENTRY AND SPLASHDOWN

AT $5,044, this lower-orbit version of the Dream Machine is still plenty pricey, but delivers dreamy performance at less than 25 percent of the cost of our DM's internal parts. This ship is essentially a tier above what we're able to achieve in our Turbo builds.

We had a lot of fun building into this case, which was a prototype that needed a refinement here or there. Even with minor shortcomings, the case presents well, has good airflow in all of the parts that matter, and even had room for our beefy Kraken X61, though it meant a little pushing and shoving to get everything to align. Many of the issues we had have been addressed and fixed in the production case.

When we ran our benchmarks, we really saw the kind of performance the GTX 980 Ti offers with its 6GB of VRAM. The fact that we used factory-overclocked models that we then overclocked some more paid dividends in the frame rate department.

The triple GTX 980 SLI setup in our zero point was outgunned by the higher VRAM the GTX 980 Ti's were packing. Given that a trio of reference GTX 980s cost $1,620 (at $540 each), the pair of GTX 980 Ti's, at $1,340 ($670 each), provides the greater value. Sometimes two really is greater than three.

That performance comes at the cost of power though: Reference GTX 980 Ti's draw 100 watts more than the plain-old 980

reference cards do. That's still less power than the 375 watts the Radeon Fury X draws, and two 980 Ti's will put you just 125 watts over the Fury X's power demand.

The i7-5930K served us well. A hearty overclocker, it got us to the same clock speed we had in the Dream Machine, but was just short two cores. Two cores are a big deal, but with such a huge price difference, the 5930K really delivers bang for your buck.

We could have saved a lot of coin on the hard drives, if that was a motivation, since the lower-capacity WD Black drives are far more affordable than their 6TB brethren. Likewise, builders pay a premium for a 1TB SSD. Opting for 250GB or 500GB models could save hundreds, which could go toward a third 980 Ti, a third SSD for a three-drive RAID array, or a bunch of games on Steam.

All in all, we're very happy with this build, and had a great time assembling this rocket. While still priced at a premium, we feel this mini–Dream Machine reaches for the stars, while remaining a little more attainable. ⏻

BENCHMARKS

	ZERO-POINT		
Stitch.Efx 2.0 (sec)	806	558	
ProShow Producer 5.0 (sec)	1,472	1,163	
x264 HD 5.0 (fps)	33.8	28.5 (-15.7%)	
Batman: Arkham City 1440p (fps)	204	238	
Tomb Raider 2160p (fps)	87.5	101.3	
Shadow of Mordor 2160p (fps)	70.1	105.4	
3DMark Fire Strike Ultra	8,016	8,378	

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

Our desktop zero-point PC uses a 5960X CPU, three GTX 980s, and 16GB of RAM. *Arkham City* tested at 2560x1440 Max settings with PhysX off. *Tomb Raider* at Ultimate settings. *Shadow of Mordor* at Max settings.