

Journey Planet





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Editorial

Steven H Silver

The first memory I have can be dated almost to the minute. It was of my father carrying my downstairs so I could watch Neil Armstrong take one small step for [a] man onto the moon. Between that and having a grandmother who encouraged an interest in astronomy, space exploration has always been of interest to me.

Fast forward to July 20, 1979. The Adler Planetarium in Chicago was hosting a celebration of the tenth anniversary of the first moon landing. David Scott, the Commander of the Apollo 15 mission, would be on hand to loan a lunar rock to the planetarium, which is still on display. As an avid space buff, I was a member of the museum and attended the celebration with my father. One of my father's friends is married to a woman who, at the time, was in charge of PR for the planetarium. She encouraged my interest and was sitting at a table talking to us when I mentioned how much I was looking forward to meeting Scott. She suggested I turn around. A man was sitting alone at the table behind me, wearing a suit and looking pretty much like anyone else. But *he was an astronaut and had walked on the moon and flown a Gemini mission with Neil Armstrong*. I was introduced to him and he told me that yes, someday I would have the chance to go into space.

Over the years, I've met other astronauts and moon walkers...having the

connection to the Adler publicity department got me on television the following year to appear with shuttle astronauts John Young and Ken Mattingly. Young is the only person to have flown in four classes of spacecraft, two Gemini missions (one with Gus Grissom and a corned beef sandwich, one with Michael Collins), two Apollo missions (Apollo 10 and Apollo 16), the lunar module for Apollo 16 (and the Lunar Rover), and the space shuttle. Ken Mattingly, who was grounded from Apollo 13, flew with Young to the moon and also flew the shuttle, making them the only people to have flown to the moon and flown on the shuttle.

I met Alan Bean (Apollo 12) at BookExpo America, have occasionally bumped into Jim Lovell (Apollo 8, Apollo 13) near my home, including at his son's restaurant, and Gene Cernan when he was promoting his book about flying on Apollo 17. And later in this issue, you can read about the time I spent four days playing chauffeur to Buzz Aldrin.

Clearly the Apollo program has had an enormous influence on my life and with the fiftieth anniversary of that first step and my first memory (and the 40th anniversary of meeting my first astronaut), I found myself wondering how it impacted and influenced other members of my community. I invited several authors and fans to write about the first lunar landing. In the following pages you can read stories like Brenda Clough talking about her grandparents who lived from before the first Wright brothers flight to witness the first lunar landing, Alma Alexander, who knew about the landing, but didn't have a chance to see the famous footage until 2005, Joseph L. Green, who in addition to being a science fiction author, worked for NASA and hosted launched parties, and many others.

I hope you enjoy these articles we're collected. It isn't the same as seeing Armstrong and Aldrin and their all too few successors bounding around on the moon. With luck humans will soon return.

And I have forgiven David Scott that promise/lie he made to me, but would still jump at the chance.

A Note From Chris

No human has walked on the Moon in my lifetime. That bums me out. I've watched the first landing on the Moon on video a half-dozen times over the years. My Dad was a big space nerd, and we had books, SO MANY BOOKS, about Apollo and space in general. I grew up with Space as something we'd done, but were only kinda doing now. There was a Space Shuttle, but yeah, not nearly as cool.

I'm so glad I get to work with Steven and James on this issue. Steven's one of my favorite people, and James is... well, y'all know how I feel about that maniac. It's a great time to tell these stories, and I'm glad I'm here.

I also lost my job. That's sad after 20 years, and it's been rough.

But, then again, we're up FOR THE FREAKING HUGO!!!!!! And I was named the Editor Guest of Honor for the 2020 NASFIC in Columbus!!!!!! This makes me think of a saying about doors and windows...



A Note to Our Readers from James Bacon

Dear Readers.

I've been rather busy this year but want to thank you for the nominations you sent in, that saw Journey Planet placed as a finalist for the Hugo Award for best fanzine. That's very gracious of you and it is an honour, but also a joy to have had such a terrific time last year crafting and working with phenomenal co-editors.

I love that Journey Planet has become such a conduit of Fannish thought, and that we have successfully given voice to many fans who previously were not published in zines, on subjects that interest, enlighten and excite us.

Last year was phenomenal and I'm grateful to 'team journey planet' the Editors who did such a great job were Sarah Gulde, Chuck Serface, Anthony Roche, Merlin Roche, Michael Carroll, Pádraig Ó'Méalóid, John Coxon and, of course, my continual pal and anchor Christopher J. Garcia.

This year, we'll its hectic. It's been very busy for me as a chair of a World-con and challenging. It's an unbelievable undertaking, a huge learning process and total existential event for me, and even if one were then to Chair a second one which would call upon experience, it's such an impact upon life, that it would need both time and space, where one might forget the tough and unpleasant sides and

also the things you should remember. A monstrous life achievement, which I never imagined I would do and never imagined even being able to help a Worldcon occur in Ireland and all going well, it will all go ok, despite the mistakes and errors and all the inevitable human things that occur on such a journey. Not there yet of course.

Time has not been my friend, but I'm really pleased I've had a hand in this issue, indeed at one stage I had Apollo 11 footage continually on during a variety of Dublin meetings, just running silently in the back ground, shaving or preping or checking or eating, or doing busy things, that astound me as they look at a wall of switches or dials and I think how incredible their sharpness must have been to remember everything.

We've many ideas and thoughts about future issues and I expect I will immerse myself into some zine projects when Dublin 2019 is over.

Meanwhile, an article about Flann and Railways from the Half Pint of Flann issue is the basis for a paper I will be giving at University College Dublin at Palmipests a Flann O'Brien conference. That's new. I did a diploma in work. So a paper is exciting. I'm an 'independent scholar', although really I'm a train driver.

As ever though. Just a note to contributors, co-editors and readers.

It is an honour to work with such amazing people, thanks for your support and thank you for considering Journey Planet to be worthy of being nominated as a Finalist in the Hugo Awards. I'm proud, proud of all our co-editors phenomenal work and grateful and honoured.

Thanks

James



Walter, Frank, Jules, My Grandfather, and Me by David M Stein

May, 2019

I was a space happy kid. Even before I was old enough to remember the events, I was in front of the TV watching rocket launches. My mother, too, was a Space Geek, and she wasn't going to miss a launch on TV, and I was there, on her lap, watching too. TV was our window into the historic events of the space program.

I cannot remember any of the Mercury mission, was just too young. But I do remember Gemini, starting with Gemini 3, the first manned mission of the program which took Grissom and Young into space for three orbits.

There was no question that I was going to be glued to the TV for Apollo. In those days, it was very hard to monitor TV's schedule. Luckily the major networks all ran ads in the newspapers highlighting their space mission special broadcasts.

The next major issue was "Which channel am I going to watch?" Most US cities had three options, CBS, NBC, and ABC. But here in Detroit, we had one more option...CBC, The Canadian Broadcasting Corporation.

CBS meant...Walter Cronkite. Walter was very much "The Fifth Beatle" of the space program. Walter was a story teller. His ability to paint a word picture was honed as a war reporter starting in WWII. His confidence of voice, and intelligence made him "The Most Trusted Man in America." And he



LOVED the space program. He took the time to learn whatever he could, and used his position to gain access that few other could. Walter was the be-all and end-all of the coverage on CBS. He would have side reports from various reporters, he was fond of having knowledgeable people at his side, like Astronaut Wally Schirra. CBS also partnered with the CBC (Canadian Broadcasting Corporation), and shared reporter Lloyd Robertson with them. Robertson was known for his crisp reports from the ground and the pad. He understood the ground systems, the crawler, the pad and gantry...he was the best “Big Hardware” guy.

NBC meant...Huntley and Brinkley. Primarily known for their power politics reporting and business system analysis, they focused a great deal on the workings of NASA, the people behind the scenes, the impacts of the space program, the effects on world politics and business. If you wanted to go bigger picture, the impact of going to the Moon...Chet and David, where your guys.

NBC's gem was Jay Barbree. Barbree was the on the ground reporter. He was friend to all the pad workers, mission control controllers, ground engineers. This friendship and trust gave him unprecedented access to the nuts and bolt guys. Because of Barbree we got to know guys like Gunther Wendt, Sy Liebergot, John Aaron...the guys who KNEW all the things.

ABC meant...Frank Reynolds. Frank was honest, and earnest. He brought the story close to home, he was us, and he explained the space program like an elementary school teacher and able to explain the most complex to anyone. He wasn't the most charming of reporters, some thought him dull, but you would completely understand what he was reporting.

But no one was tuning into ABC for Reynolds, they were tuning in for Jules Bergman. Bergman had the personality of dry toast, but the mind of an engineer. Bergman knew more about the Apollo systems than anyone outside of NASA itself. If you wanted to understand the emotion, the honor, and the drive of the event, you



went to Cronkite. If you wanted to understand the reverse carbon reclamation system on the AL-7 Apollo EVA suit, you went to Bergman.

CBC meant...Percy Salzman. He was fairly formal in his delivery, but was very knowledgeable and was an expert at asking just the right questions. His partner, who was shared with CBS was Lloyd Robertson, who when he wasn't working the ground with Cronkite, was doing Q&A with Salzman. CBC and CBS partnered up, mostly showing Canada the Cronkite feed, but added many excellent reports of their own, many of which were shared back to the CBS feed in the US.

One of the best thing the CBC carried was the amazing James Burke's special segments produced for the BBC. Burke would be later known for his amazing series *Connections* and *The Day the Earth Changed*.

One of my hobbies back in those days was repairing TVs. I *loved* garbage day, especially if I could find someone tossing out a TV. While pretty much every house in 1969 had a TV, some might have two. We had five or six, and a few more in various states of repair. We had our good color TV that also got UHF. I brought in three more sets, put two on top of the big TV and one on a table next to it...sort of picture-next-to-picture-above-picture. The color TV was set to whichever channel was showing the best reports, and the other three, with the volume down, were monitoring the other channels. My job was to play director, keeping the show going.

The other great resource I had was my Dad's old friend, John Lavery. John had worked with Dad back when they were making industrial films in the late 50's and was a photographer and camera operator for *National Geographic* in Washington. John knew I loved space and he would collect and ship off to me everything he would get his hands on from the *NatGeo* offices. I had full sized posters of all the control panels from both the CM and LM. I had maps of the moon, on which I had researched and mapped the landing sites. I had exploded drawings of vehicles and suits and flight plans. And I had all of these taped all over the walls of our den around my multi-TV station.



I also wasn't going to be pried away from my own little mission control. If there was coverage, I was there. I ate there, slept there, and my parents never stopped me.

I never actually remember asking my parents if I could do any of this, I just did it and wasn't going to be told no in any case. I assume my parents just knew this and didn't say anything.

For missions that had major events while school was on I simply carried this small TV I had to school with me. Once my teachers realized I would fight them tooth and nail to watch, they started just letting the whole class watch. Sometimes it was just on, sound off, while we did normal school work, but as the "director" I would pipe up if I spotted something that looked interesting on the screen. Again, I didn't get much push back.

This culminated in that fateful day, July 20, 1969

My parents were jazzy, hip, 60's people. We had an awesome whole house hi-fi sound system, the keenest of round wicker furniture and boy did they love to

throw cocktail parties. The Moon Landing was a great chance to do just this. They had been working on the details and got very excited when NASA and the Apollo 11 crew decided to move up the operational time for the moon walk. For them, this just made the party more exciting. And thanks to my “mission control” set up, they had the perfect rig for a house full of people to enjoy the breaking events, and I got to be the MC, and monitor the situation, and alert the party when something worth stopping and watching was happening.

I didn't mind the houseful of people cause hey, a chance to show off and be the expert and have people listen to what a nine year old had to say. Also I loved the party fare my mom laid in.

The actual moon landing was exciting as hell, of course. As was my habit, every call out, every gauge or readout or switch or control call out I took great glee in pointing out on my charts where that thing was. I answered questions when someone behind me in the group asked about this or that. Of course I, like most everyone else, had no idea what a “1201” or a “1202” message was. I knew many of the common messages were, I had a list. I did point out where the Astros would read that out and where they would enter commands that were called up.

But mostly, it was breath holding and shutting out everything else but what was being shown on those three black and white and one color TVs.

The cheer that went through the house, the neighborhood, the city, state, country, and world was unlike anything that I had even conceived of.

Hands were shaken, hugs were shared, cigars and cigarettes were lit...it was the 60's every one of the adults smoked. Drinks were poured and chatter was loud. This pissed me off. I cranked the volume of the TV. There was still a lot of business going on, both on the moon and in Houston and I needed to keep up. And these adults didn't seem to understand that.

But after a while, things settled and I monitored the prep for EVA. A small group of people settled around me and the TVs, now including my grandfather.

Grandfather was Eugene Harold Stein, my Dad's dad. He was born in the late 1800's in Chicago and had grown up in Nebraska. He had been a telegrapher on the railroad, and was one of the first 100 employees of AT&T and



remained with them till he retired. He was a stoic man, not given to emotion. He was very interested in the events unfolding on the moon and got the seat of honor closest to the TVs...I was on the floor, of course. It felt like he was my co-pilot on this mission. It was probably our greatest bonding moment.

As time ticked by and the EVA approached things got tense, and I was on pins and needles. I pointed out the elements of the moon suits as they were getting kitted up.

Then, just before he opened the hatch, just before I called out for people to gather around, grandfather put his hand on my shoulder and squeezed. When I looked to him, I saw a tear in his eye. He leaned in close and spoke.

“When I was your age,” that being about nine, “I had my first paying job. I was around the telegraphy office at the railroad station, slowly learning the key. And when a telegram would come in, I'd take it, and hop on my bike and go and deliver it in the town. It paid a few pennies, and normally got a tip on top of it. For a nine year old, it was a pretty solid job. One day I delivered a telegram to the newspaper office. Two brothers from Ohio had successfully build and flown an aero craft and landed safely. And now, in one life time we've gone from that, to men on the moon. I never would have even dreamt such a thing could, or would happen.” And he smiled and nodded his head in a satisfied approval and slapped me on and shoulder. Then leaned back and toasted the TV and sipped his drink, still lost in his thought.

And for that moment, the important event was right there, in our den, here on Earth.



The Apollo Guidance Computer of Phenomenal Computing Power in Itty-Bitty Living Space by Chris Garcia

Let me describe the Apollo Capsule. It was tiny, something like 160 cubic feet. It was smaller than a storage shed you might buy at Lowe's if you just got kicked out of your apartment and had a friend with a bunch of property who didn't want someone sleeping on their couch. That tiny space had to contain three grown-ass men, plus all the stuff they'd need to interact with. You know, life support, controllers, seats, and stuff. So, you may be shocked to know that they included a computer in the capsule, that computer had far less power than your iPhone, even if you're on an original iPhone, and that the computer they used really made the iPhone you're comparing it to possible.

Let us go then, you and I, to the 1960s. There are computers. Big, monstrous, potentially-humanity enslaving computers. The computer had gone from gigantic vacuum tube-based devices the size of large houses, to transistor-based machines the size of small houses. These gave way to machines that were ever-so-slightly smaller, mini-computers, that you could almost sleep in. Now, these computers were great for use on the ground, determining the trajectories and such, as well as doing the massively complex equations for the actual design and fabrication of the Saturn V rockets and capsule, but what they weren't great for is putting on the capsule. Too big, too heavy, too much power consumption. This required a solution that would revolutionize computing, and eventually just about everything.

The team designing the Apollo program initially thought that a system controlling the capsule from the ground was a good idea, or at least they did until they accounted for the periods when it would be out of contact. Plus, this would theoretically leave the maneuvers of the capsule control up for hijacking by foreign governments. This meant there needed to be a computer inside the capsule itself. It also had to be comparatively tiny. The typical methods of transistors really wouldn't have been a great choice, but since the end of the 1950s, a breakthrough had been bubbling up through the major semiconductor manufacturers.

Two dudes, Robert Noyce and Jack Kilby, had each independently developed a way of putting the equivalent of more than one transistor on a single element. This was called the integrated circuit. The integrated circuit was obviously about



to become a big deal, but it also wasn't quite ready for prime time. The process of making them was not fully mature, and they were incredibly expensive, and only about 1 in 10 of those that were made actually performed as intended. That's a 90% failure rate. No company in their right mind would spend that sort of money to make a ton of integrated circuits with that sort of waste percentage.

No company would, but a government should as hell would do it!

NASA contracted with MIT's Charles Stark Draper Lab to design the Apollo Guidance Computer. It would use integrated circuits designed by Fairchild, again with a high failure rate. This gave Fairchild, formed by the Traitorous 8 who left the monster that was Nobel Prize winner William Shockley's company behind, a serious bit of cash and allowed them to pump money into R&D. That would be huge... and you'll find out why in the last paragraph!

The physical design of the computer was so important because it would be both the workhorse that would help to get the astronauts to the Moon, but would also serve as the focus for the effort to get the astronauts to the Moon. It did the work, but it also gave the astronauts a sort of sense not only of control, but of contact. It would have been easy, some say much easier (and certainly cheaper), to just put a paper tape reader and have a punched control program, turning the capsule into a space-faring equivalent of an automaton. This would have left the astronauts with no way to alter course, to make adjustments. In fact, in that scenario, Apollo 11 would never have landed. The computer was key both technically, and psychologically, as a way to give the astronauts both literal and symbolic control.

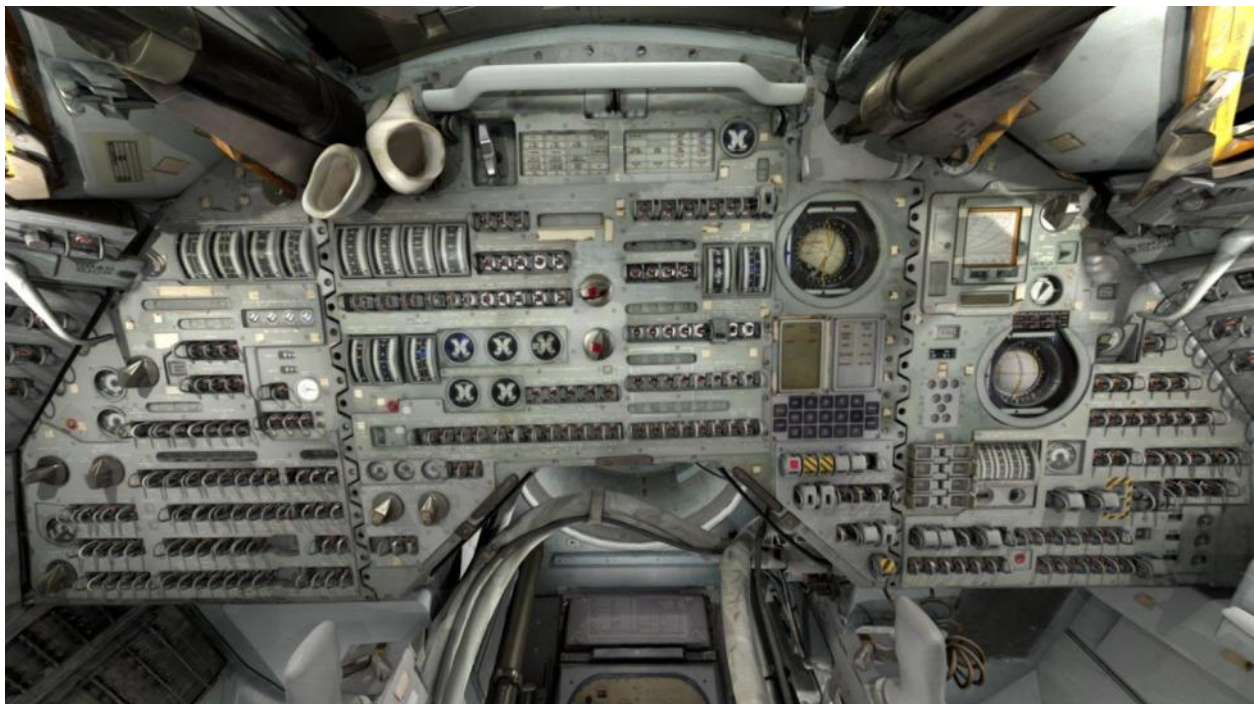
But astronauts ain't computer scientists.

The history of computers is really the history of how many people have access to computers. In the 1960s, the circle of users was small. There were fewer than 10,000 computers in the world, and most only had a very limited number of people allowed to touch them. If you look at the pool of Apollo astronauts, you'll see that only one, David Scott, had any sort of formal computer training. The Apollo Guidance Computer's design team consulted with Scott on the design of the system, making sure that the technical considerations matched up with the human-computer interactions that would be required for astronauts to use the machine. Remember, it was only a few years prior that John Glenn had demanded that Katherine Johnson (2019 Computer History Museum Fellow!) check an IBM computer's trajectory for the Friendship 7's flight to ensure that it was correct because he wasn't going to put his life in the hands of a computer. The astronauts were an

important part of the equation, and Scott helped to ensure that the device was usable by the astronauts.

One of those considerations was the question of on-board computer memory. Would the AGC have any sort of user-side memory, or simply ROM. The Read-Only Memory was called “Rope Memory”, and consisted of small ferromagnetic donuts, each pre-magnetized to allow for the storage of ones and zeroes. The typical form of memory at that point was Core memory, which was similar, except had a pair of wires that allows the donuts to be changed. The question of whether there should be any user end memory came down to a simple argument – did they want to open up the AGC to a serious fuck-up by a lightly trained astronaut? As silly as it sounds today, it was a possibility that a user could put the AGC into a loop condition, and that could tie up vital cycles on the machine. The argument for including user end memory was the unforeseen circumstances that would almost certainly arise when sending humans on a mission to a celestial body where no one had ever gone before. In the end, the users were given 2K of core memory, which came in handy a few times, especially during Apollo 13.

Next, it was important to have a way to interact with a computer that was easy for astronauts to grok. The trip to the moon and back required more than ten thousand commands, and while there had been some computer languages that didn’t require a user to memorize an entire series of manual, such as BASIC, most were overly-complex for use by astronauts in space. Software lead Margaret Hamilton (another Computer History Museum Fellow) was interested in how the astronauts would use the AGC, and more importantly, how they would mess up. She began to look into the potential ways that astronauts could cause problems, and to predict the errors. This sort of engineering was a key part of why the AGC was such a well-designed system. They settled on a system of commands in the verb-



noun form. There were several dozen two-digit codes that represented actions and things. So, if you wanted to restart the Celestial Body Unit used to determine position, you'd enter 69-88. That was just about as simple a programming language as you could get.

The AGC didn't take up too much space, and since integrated circuits use so much less power, are smaller, and lighter, the system was fairly powerful for the amount of space it took up. One of the things the deniers of the moon landing always seem to bring up is the lack of computing power. This is both true, the AGC was basically as powerful as the Apple II computer from a decade later, but also misses a major point. It didn't have to be a powerful computer. It would have been possible to get to the Moon with no computers on-board, and even weaker computers on the ground. The Russians managed to get into space with far less computational power, and though they never landed on the Moon (that we know of...), they did some incredible feats of space-work.

The AGC worked almost flawlessly, with the errors almost all being ones that Hamilton completely saw coming down the pike like a run-away delivery van. The AGC was an amazing piece of engineering, and considering the technology of the day, it was an amazing piece of work.

Now, about those integrated circuit. Fairchild put all that money to good use, developing the crucial techniques required to bring integrated circuits to maturity. Fairchild would lead to many other companies, usually called Fairchildren, including INTEL.

INTEL would take the next logical step, and put an entire computer processor on a single chip – the micro-processor. That changed the world, allowing smaller and smaller computers, and integration of processors into everything we use today. A major advance, and one that has changed the world, and the Apollo program was a major part of why it could happen.





One small step for man, one giant leap for ...

Little green Trekkies!

Yoo-hoo! Earthers! Welcome to the Moon! We're holding a con and you're our GoHs!

Gosh! Y'think maybe Earthers don't know what cons are?

Luna Trek 69
Welcome Earthers

Maybe they're neos.

Ke ©2019



Apollo 11 and the Volvo

By Jack Clemons

July 16, 1969, launch day, Apollo 11 had made it safely into Earth orbit. Except for a few intensely lit moments, the next eight days are a blur to me now. At NASA's Manned Spacecraft Center in Houston, planning for reentry started immediately. Our task manager at NASA called over to our TRW offices across the street with the latest timeline for trans-earth injection, the specific time six days hence when Apollo 11 would fire the Service Module engine to take them out of lunar orbit to start their journey home, and the resulting time and location of the start of reentry two days after that. We checked that against the nominal timeline we'd been using to see if our reentry specifics needed to be tweaked. We'd need to do that several more times as the flight progressed. Every reentry roller coaster ride was different.

July 20, the day scheduled for lunar landing, was a Sunday. The undocking of the Lunar Module from the Command Module, the beginning of the long circular descent to the lunar surface, would happen around noon Houston time, and final touchdown at 3:15 PM. There were a lot of people working that weekend, but I wasn't one of them; my next duty would start when the astronauts got ready to return. So I had planned to stay home and watch it.

I was still early in my career and my take-home pay reflected it. We had a small color TV, a 12-inch RCA that we'd bought for a few hundred dollars, perched on a TV stand that was pressed against one wall of our living room. Our sofa was pushed against the opposite one. Moving that television around wasn't an option; it was connected to a rooftop antenna by a flat wire lead that ran up through the wall – this was well before cable or satellite TV: all the programs were broadcast. I pulled the TV stand as close to our sofa as I could, maybe four feet out from the wall, leaving the power cord stretched behind it like a flea circus trapeze wire, so we could sit down to watch NASA's compressed, grainy, black and white transmission of Neil Armstrong stepping onto the Moon that Sunday. I did that on Saturday morning, since we'd be glued to the TV all weekend.

Anyone who knows me will tell you I get clumsy when I hurry, which I do quite a lot; that wasn't a trait I developed with age. For a reason I can no longer recollect, at some point that day I rushed around the back of that TV stand, the power cord caught my shoe as I stepped over it, and the cord snapped off. I remember trying to catch my balance and keep the TV from toppling at the same time.

Fortunately I was successful at both, but I now owned a lifeless TV on the most important viewing weekend of my life.

In those days, an owner could open the back of a television set and make minor repairs and replace some parts at home, and by that time I'd finally grown more confident and experienced in doing so. It's amazing that being unable to afford a repairman can motivate you to learn to do it yourself (a skill that has since atrophied through disuse). Radio Shack was the place get those parts and one of their stores was located a couple of miles from where we lived. I jumped into my car and drove over there.

I should describe that car. It was a dark blue 1969 Volvo 142S two door stick shift sedan. We'd bought it new, the original price was about \$3,000 (about \$20,000

today). Though my salary was modest, about \$7,500 a year, I splurged on the car for one reason - then, as now, Volvo was one of the safest cars on the road.

The trip to Radio Shack was successful; they had the replacement power cord for my TV and tutored me on how to install it. My weekend saved, I paid for the part and left. NASA Road 1 was narrow, heavily treed, two-lane, and winding. It was also, however, a major artery for the surrounding towns, and many small businesses and restaurants were tucked in along it on both sides. The speed limit was probably too high for the traffic, about 40 mph as I recall, and I was doing all of that in my rush to get home. I was about halfway there when a large Cadillac sedan emerged from a driveway on my right, hidden by trees and about 100 feet in front of me. The driver stopped in my lane, his car broadside to mine. I think he was waiting for traffic coming the other way to clear so he could turn left. As I caution kids in my talk on "Why Science Matters", a car going 40 miles per hour is traveling about 60 feet a second, which means that even if it takes you only one second to slam on the brakes, you've already gone that far.

I discovered the physics for myself that day. I hit my brakes and left a stretch of matching tread marks in my wake. The Volvo skidded but didn't spin out, I collided head-on into the driver's side of the Cadillac, and from that point on everything seemed to happen in an unnaturally protracted instant. The front end of my car collapsed, ramming the bumper into the grill, the grill into the radiator, and the radiator into the engine. Both front fenders accordioned, bowing outward and absorbing much of the impact. I wasn't wearing my seat belt, so when my car stopped, I didn't. My chest slammed against the steering wheel and it gave way. The round outer rim folded down and away from my arms like a limp pancake, and the center column collapsed through the firewall into the engine compartment, absorbing the blow to my chest. When my Volvo finally came to rest, its engine quiet except for the hiss of escaping steam, I was dazed but, as far as I could tell, unhurt. Time restarted at its accustomed pace and I tried to clear my head. The Cadillac was shoved sideways several feet from the impact, the driver's window was shattered and the door panel caved inward. I couldn't see the driver. I tried to get out but my door wouldn't open. I slid across the seat and tried the other one but it was jammed closed too. I managed to roll down the passenger window and crawled out through it. Once outside I had to grab the edge of the roof to keep from swaying. I don't know if anybody stopped to help out; they probably did.

I do remember that a police car showed up. The cop asked me questions, which I tried to answer, and then he went over to talk to a passenger in the Cadillac, maybe the driver's wife. He came back again, walked past my Volvo and stepped off the lengths of my skid marks. He came up to talk to me some more. Two tow trucks showed up. I don't remember where I got a pencil and paper, but someone wanted to see my insurance card and asked for my address and phone number, that might have been the tow driver assigned to me, but my hands were shaking so badly I couldn't hold the pencil steady to write. My Volvo was winched up onto the truck, the entire front section bent and shattered, and towed away. Despite my shock, I was thinking clearly enough to retrieve the Radio Shack bag with

my replacement power cord in it.

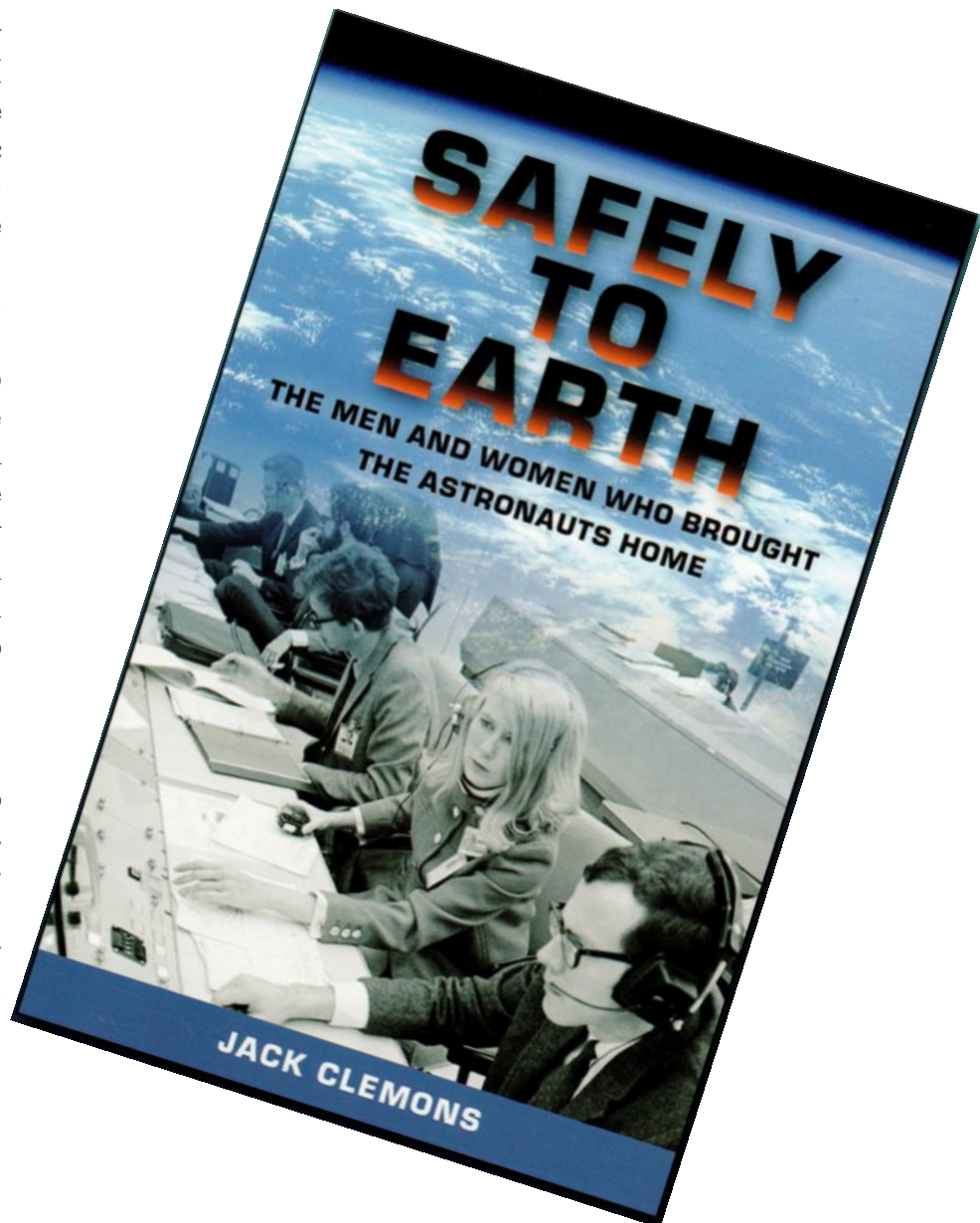
The policeman finished his investigation and asked if he could give me a ride home. I hadn't considered how I was going to get there otherwise, this was well before cell phones, and anyway, we didn't own a second car, so I was grateful for his offer. On the drive home, he asked me if I'd been speeding. I told him I didn't think so, and he sort of shrugged and said, in any case, the driver of the Cadillac was at fault since he'd pulled out into traffic and stopped, so he wasn't going to cite me. I was relieved. He dropped me off in front of our duplex. Barbara was waiting for me on the porch; she'd been alarmed when I hadn't returned from my errand, and even more so when the cop car pulled up outside.

We went inside and I tried to tell her what had happened, but even then I was still foggy. I was sore, I had some bruises, mostly on my arms, my body ached for several days afterwards. But I was all right. I'd been through a horrific accident and yet I was unhurt. That Volvo had behaved exactly as it had been designed to do in an accident, and it rescued me from serious injury and maybe even death. I never found out how the man driving the Cadillac had fared, but he was conscious when the ambulance carried him off.

Later in the afternoon of the day of the accident, after I had time to calm down, I replaced the power cord on the TV and we got our news coverage back. Then on Sunday, July 20, at 9: 56 PM, we watched the live broadcast as Neil Armstrong stepped out onto the Moon.

THE END

Adapted from *Safely to Earth: The Men and Women Who Brought the Astronauts Home* by Jack Clemons. Gainesville: University Press of Florida, 2018. Reprinted with permission.





Moon Shots **by John Scalzi**

In addition to writing science fiction I am also a fairly avid amateur photographer, and one of my regular subjects to essay in photos is the moon. That being the case, and for his special 50th moon landing fanzine, Steven asked me to send along a few favorite photos of the moon, as well as talk a little about how I took the pictures.

Let me do the latter first, because with nearly all the photos the process is the same. First, generally speaking, I use my digital SLR, which for the past few years has been a Nikon d750. The d750 has a “full frame” sensor (which means that the picture is imaged across a sensor whose size is roughly equivalent to that of a 35mm film image) and can image at 24 megapixels (an about 6000 x 4000 pixel resolution photo, which is substantially better than your 4K TV). This allows the camera to capture a lot of detail, and means that I can crop the photo quite a lot and still have a useful picture. The camera also shoots in “RAW” format, which means the information in the digital file of the photo is quite extensive and easily manipulated in a photo editing program like Photoshop. Remember this, it’s important.

With the d750, I use a telephoto lens, specifically the AF-S Nikkor 28 – 300mm 1:3.5 – 5.6 G lens. For most people that’s letter and number salad, but what it means is that the lens can zoom in a whole hell of a lot and still let a decent amount of light in, which makes for pretty good pictures of distant objects, like, say, the moon.

So, to get the picture of the moon at the top of this article, here is the photo I started with, with the telephoto lens on full zoom and all other camera settings on automatic:



You'll notice a couple of things: One, the moon is a lot smaller and the details less distinct, and two, I shot the picture in the daytime. The first of these is just an artifact of the size of the moon in the sky – it's not actually all *that* big, so even fully zoomed in with this particular lens it's not going to be very large. Fortunately, as noted earlier, the d750's sensor is large and the camera takes detailed photos, so I can crop down the photo and still have a lot of detail.

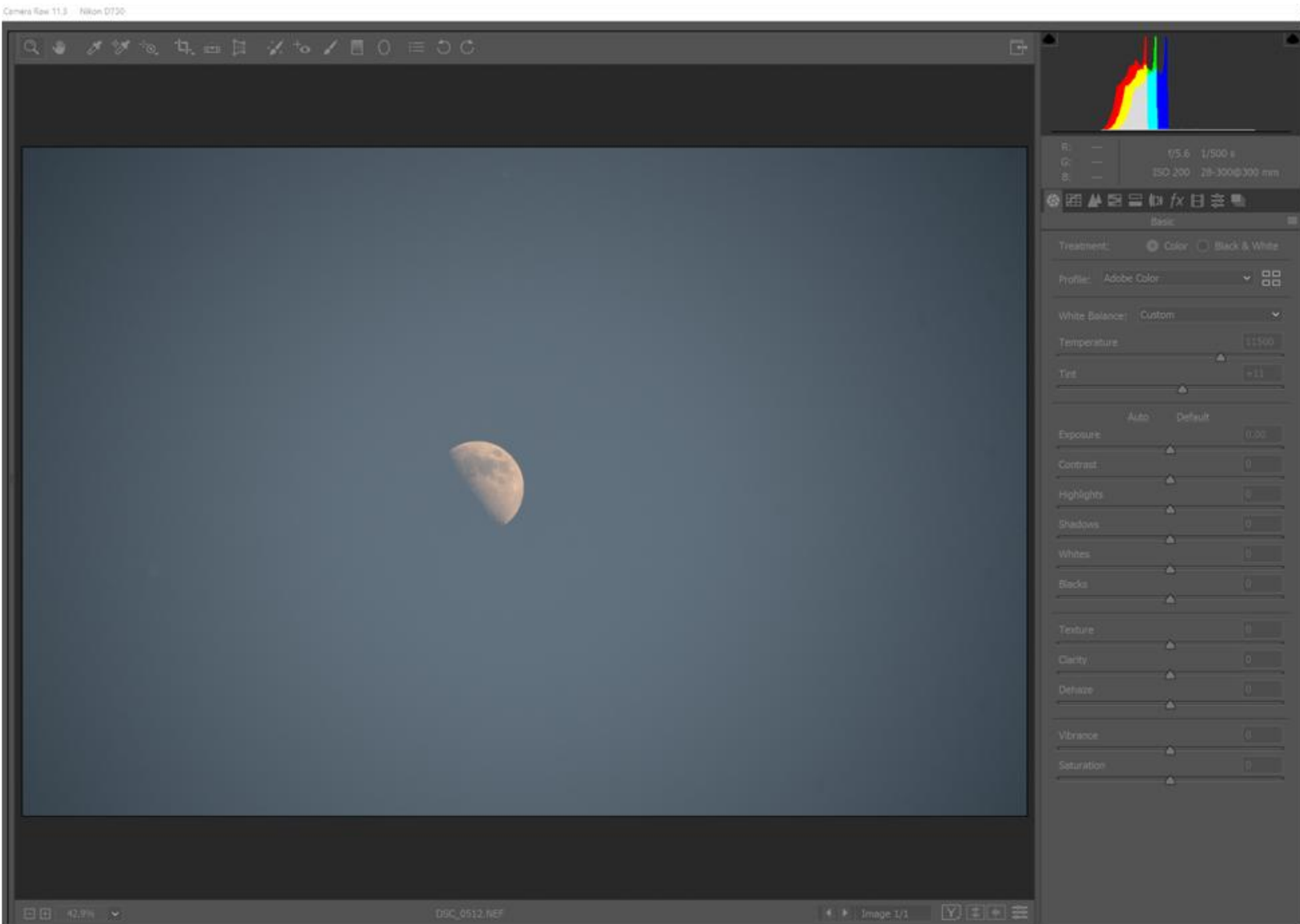
The reason I took the photo in the daytime is twofold. One, I tend to be an opportunistic photographer; I don't usually go out with a tripod or other equipment and wait for a perfect shot. I point and shoot. Taking a photo of the moon during the daytime helps with this sort of photography; there's enough ambient light around that the camera can use a faster shutter speed, which reduces the amount of "shake" that longer exposure times will add to pictures taken with a handheld camera. Two, shooting the moon in the daytime lowers the contrast between the moon and the surrounding sky, which means details of the moon's surface are more easily captured and preserved. If you shoot the moon in the dark (without compensating lens filters) then all the details are blown out. So for the lazy moon photographer, shooting the moon in the day is the way to go.

One drawback to this is that it means you are less likely to get a picture of the full moon – it's not impossible but it takes planning. But it turns out I find fractional moons more interesting to shoot anyway, so there's that. But if you're really wanting to capture a full moon without filters or tripods, allow me to suggest



Once I've taken a picture of the moon with the camera, my job is only half done. The other half of the job is pulling out the details of the moon with a photo editing program. I use Photoshop, because it is the most advanced general photo editing program out there – there are programs that are better for specialized situations, but **a)** I'm not going to invest in those generally, and **b)** many of those are available as Photoshop “plug ins” as well as stand-alone programs, so if I *do* want to use them, I can just add them to Photoshop.

Photoshop isn't cheap – I have it as part of an Adobe subscription that's \$60 a month, although you can get a specific Photoshop-only subscription for \$10 a month – but if like me you take a lot of digital photos and also do most of your photo-tweaking out of the camera rather than fiddle with f-stops and ISOs on the camera itself, then it's worth it if you can afford it. That said, there are a number of other photo programs that are cheaper and have the same basic capabilities in terms of photo editing. I do suggest that whatever photo editing program you use, you have it able to handle RAW photo format and not just JPEG or PNG, both of which are “lossy” photo formats, which means you lose photo data you can use to better tweak your photos.



At this point it's about moving the sliders around to pull out detail and to add contrast in some places (the surrounding sky) and decrease it in others (the moon's surface). Note where the sliders are in this next photo.



For extra detail I'll sometimes but not always turn the photo into black and white. Then at that point it's just a matter of cropping the picture to bring the moon itself into clearer focus.



Mind you, other photographers will have other advice on how to properly take a moon shot, and they probably won't be wrong. The way I do it is specifically tuned both for the tools I have as a photographer and also who I am as a photographer. But whoever you are and whatever you do, here are some things to keep in mind:

* Understand what you have to work with. If you're using a phone camera, for example, you probably won't be able to get a highly detailed shot of the moon even if you're shooting in the day to lower contrast. So make a picture that uses what the camera can do. For example, I took this picture of moon rings using my Pixel 3 smartphone and its "night sight" function:



The moon is utterly blown out, of course. But the rings! Super visible in a way I couldn't image with my Nikon without a tripod and a long exposure (and as a bonus, there's the constellation Orion to the left as well).

* Don't worry about taking perfect photos. One, digital imaging is super cheap – you can basically take as many photos as you like and then find the best one (for every photo I show off, there are sometimes dozens of less perfect ones, taken at almost the same time, that no one sees). Two, taking good photos is a skill, like any other, and one you'll get better at the more you do. Sooner or later, you'll get moon shots you like.

* Likewise, don't feel bad about using Photoshop, or photo filters, to refine or to just play around with photos. The camera's eye and the human eye aren't the same anyway, and unless you're practicing photojournalism, there's no harm in tweaking a photo to be something that pleases you.

And now, some more pictures of the moon I've taken, with short additional comments about the photo.



I love taking photos of the moon at sunset, and of course generally speaking when the moon is near a sunset, it's going to be a crescent, which gives it a little dramatic flair. This picture was taken out the window of my office, and I tweaked the picture to saturate the sunset colors and to darken the clouds. The moon is pretty much how it came out of the camera.



In this photo the “lit” crescent of the moon is entirely blown out, but that allowed me to image the “dark side” of the moon in evocative detail (the spooky clouds and the fact this photo is in black and white are a nice touch, too). This is again a reminder **a)** the camera sees different things than humans do and **b)** playing with photos to discover the best image is fun.



This image captures a barely crescent moon, which is pretty in itself, but also captures the usually-very-hard-to-spot planet Mercury, which is that speck to the upper right. It's fun to photograph the moon in conjunction with other heavenly phenomena. Also, this was the first time I was ever able to image Mercury, so I'm especially proud of this photo.





Two photos of the moon, photographed through the trees in my yard. I don't think I need to explain how these are highly impressionistic photos, heavily treated in Photoshop.



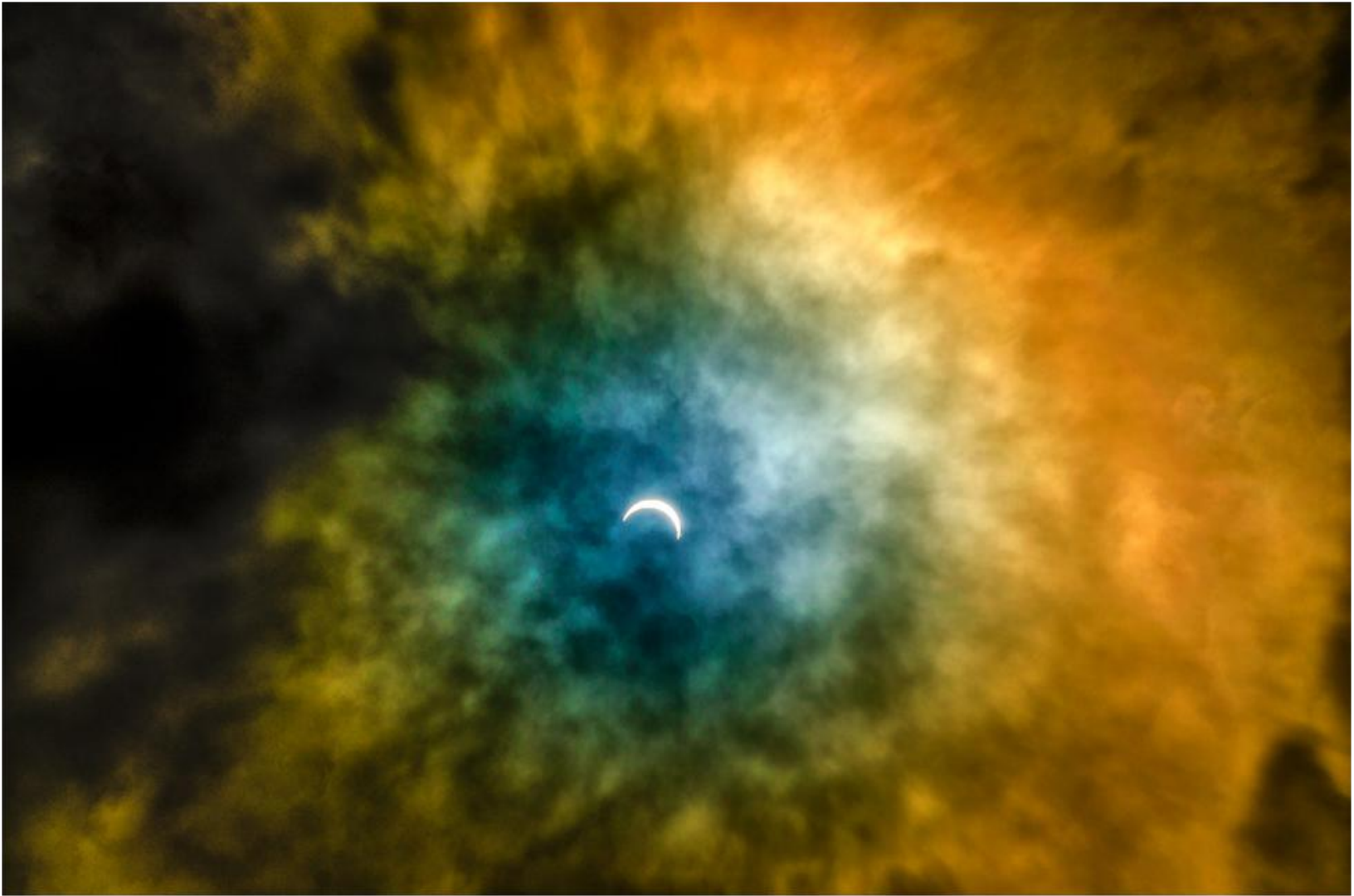


This photo of the moon was taken in the morning, just before sunrise. I like it because it shows a different side of the moon than I usually image, and it captures a pinkish hint of the clouds in the sky at the time. Note that in drawing out the details of the moon for this picture, I turned the sky grainy and pixelated. These are the choices one sometimes makes in order to focus on one particular subject.



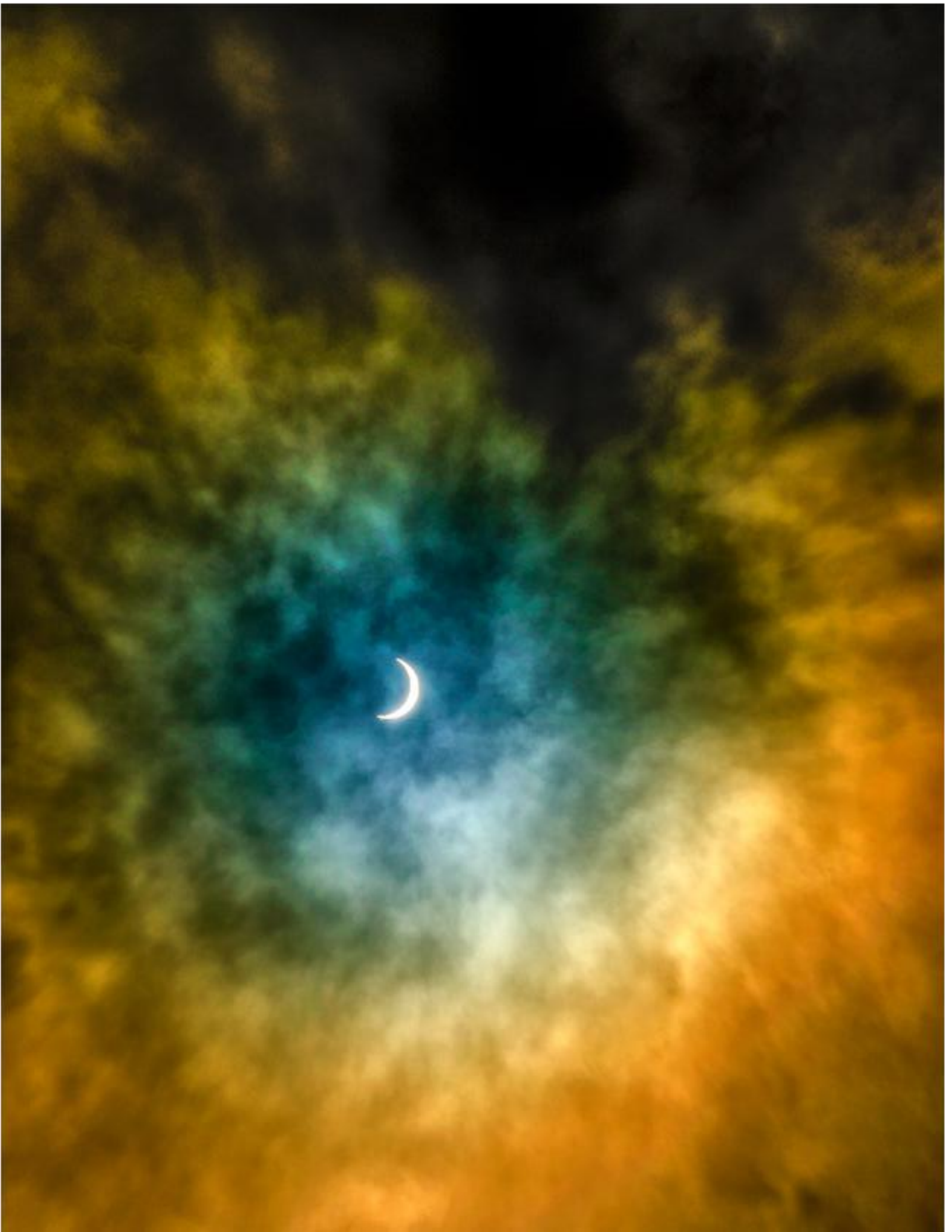
Finally, two images of 2017 solar eclipse, which was a partial eclipse from my house, and which we saw mostly through clouds, which made for some striking photos. Here's a fairly naturalistic one, with the moon near its full coverage (from my house, anyway):





The short version of all of this is that there's no one way to shoot the moon. You'll find it's an interesting subject in so many different ways. So get out there and snap away.







The Hasselblad and the Space Program

The Most Revolutionary Photograph of Our Era

by Richard Man

The Most Revolutionary Photograph of Our Era

Billions of photographs are taken every day on smartphones and other cameras. Still, few if any can compare to this majestic image of Planet Earth rising above the horizon of the Moon, taken on Dec 24, 1968, by William Anders, an astronaut aboard Apollo 8:

Nature photographer Galen Rowell later called this *Earthrise* photo "the most influential environmental photograph ever taken".

In 1990, the astronomer Carl Sagan described another image of Earth, captured by the Voyager spacecraft, as the "Pale Blue Dot." All of humanity, from "Lucy" to everyone alive at the dawn of the Space Age, would live and (most probably) die on the Pale Blue Dot depicted in this historic photograph.

It can be sobering, and certainly awe inspiring for some, to see *Earthrise*, the *Pale Blue Dot*, or other similar photos for the first time. However, for the camera buffs among us, *Earthrise* holds another specific point of interest—it was taken on a Hasselblad camera. Indeed, Hasselblads were for many years the only type of camera used in space missions, a fact Hasselblad naturally exploited to its advantage in its advertising:

NASA told us: We'll get you up there. You do the rest.

The rest is history.



500 EL
The Camera
that took the pictures
on the moon.

For a free 48 page booklet on the Hasselblad 2 1/4 Reflex Camera System, write to Paillard Incorporated, 1900 Lower Rd., Linden, N.J. 07036.
For the name of your nearest Hasselblad dealer, call (800) 553-9550 free. In Iowa, call collect (319) 242-1867.

Hasselblad

Paillard Incorporated: Bolex, Hasselblad, Hermes.

So: how did Hasselblad actually become The Camera that eventually went to the Moon?

In the Beginning...

In 1885, Victor Hasselblad's father, Arvid Viktor Hasselblad, met a man named George Eastman. With just a handshake agreement (those were the days!), the Hasselblad company became the sole distributor of Eastman (later renamed as Kodak) products in Europe. In 1909, Victor Hasselblad was born, and designated as the heir to the family photographic business.

Young Victor enjoyed photographing birds and he dreamed of having a small high-quality camera that he could take into the field. During WWII, the Swedish military recovered a German aerial camera in 1940. Seeing that an aerial camera would aid in their war efforts, they asked Victor if he could make a camera "just like it." It is said that Victor replied, "No, I cannot—but I can make you a better one." Thus, the HK-7 aerial camera was born, and at least two HK-7s were delivered to the Swedish Air Force a year later.

After the War, using the expertise Victor had gained from designing the HK-7, the Hasselblad company launched its first consumer model camera. Victor Hasselblad traveled to New York in October 1948, and, at a press conference, unveiled the 1600F system to the world. Photographers were excited by its compact size and capabilities, and quickly made Hasselblad a household name in the photography world.



The 1000F camera was introduced in 1952, replacing the 1600F. It utilized lenses from the German optic powerhouse Zeiss instead of the Kodak Ektar lenses used in the 1600F. Thus began a long working history between Hasselblad and Zeiss. Indeed, most people knew these lenses simply as “Hasselblad lenses” despite Zeiss’s role. In 1957, the 1000F was replaced by the 500C which used leaf shutter lenses, again from Zeiss. After the 500C, Hasselblad made a number of refinements and improvements to the Hasselblad cameras. In 2001, Hasselblad retroactively designated this set of cameras as the “V System” when they introduced a completely new design scheme called the “H System”. The family DNA of the V System is strong, as the last Hasselblad V camera ever made, the 503CW in 2014, looks and operates much like the first 1600F from 1948.



Since its introduction in 1948, Hasselblads were well received by photographers. Ansel Adams offered to test the cameras, and gave advice to the company in his many years of working with them. Mr. Adams’s famous image *Moon and Half Dome*, was taken with the Hasselblad 500C.

Modular Design Principle of the V System

The iconic design of the Hasselblad V camera system is based on modular design principles:

1. The camera body contains the shutter and the mirror (the mirror is what gives this class of camera the name “single lens reflex” camera). The front of the camera body has a lens mount for attaching lenses.
 2. A number of interchangeable lenses with different focal lengths and maximum apertures are available.
 3. Different types of viewfinders may be used with the camera body, the most common one being the waist level finder (WLF).
- Film is loaded into the “magazine” back which attaches to the back of the camera body. Film normally comes in rolls of 12 6x6 exposures (120 film), or 24 exposures (220 film). Magazine backs can be removed at any time allowing different backs (with different film types) to be used.

This modular approach also made the cameras appealing to NASA, as we shall see shortly.

The mechanics of the Hasselblad cameras and their parts were superb in both operation and finish. In fact, many of the original 1600F designers and builders were watchmakers by trade; a detail that actually caused some initial operational problems with the 1600F, as the designers were not used to making products which were required to withstand a fair amount of abuse by the consumers! In any case, given both their beauty and precision operation, combined with the unexcelled Zeiss lenses, Hasselblads rapidly became the favorite tool of both professional and well-heeled amateur photographers.

Race To The Moon

On October 4, 1957, Americans woke up to the shocking news of signals coming from the first artificial satellite, *Sputnik*, launched by the Soviet Union, America's Cold War enemy. In response, the US launched the *Explorer I* satellite in January 1958, and created the National Aeronautics and Space Administration (NASA) in the same year. Later, in April 1961, Yuri Gagarin became the first person to orbit the Earth in the *Vostok 1* capsule, once again beating the Americans in the "Space Race." It wasn't until February 1962 that Americans were able to send John Glenn up to orbit the Earth.

In May 1961, President John F. Kennedy made the bold promise that America would land a man on the moon and safely bring him back by the end of the decade. With that declaration, the race to the Moon was on. It consisted of three NASA programs: Mercury (1958-1963), Gemini (1964-1966) and Apollo (1961-1975), with lunar flights from 1968 (Apollo 8 first circumlunar flight) to 1972 (Apollo 17, last landing on the Moon). The Apollo program finally "concluded" in 1975, after budget cuts eliminated 3 additional flights to the Moon.

The first camera that made it to space was...*not* a Hasselblad! It was actually a Minolta Hi-Matic 35mm camera (or rather, one rebadged for sale as an "Anso"), carried by John Glenn aboard the *Friendship 7* (part of the Mercury program) on Feb 20, 1962.



When astronaut Walter Schirra flew on the *Sigma 7* (also part of the Mercury program) in Oct 1962, he chose to take into space the Hasselblad 500C which he had purchased in Houston a few years earlier. The Minolta Hi-Matic was a 35mm camera with an image size of 24mmx36mm, whereas the classic Hasselblad V was (and still is) a medium format camera with an image size of 56mmx56mm (sometimes referred as 6x6 format). With an area about 3.5 times as large as the 35mm film, the Hasselblad produces higher quality images with better level of detail and color fidelity. While most of Schirra's images ultimately proved unusable due to incorrect exposure, NASA immediately saw the potential of the Hasselblad, and officially made the camera a part of their future space missions, collaborating with Hasselblad until 2003.



As the Race to the Moon initiative approached the Apollo 11 launch, it was imperative that NASA be able to gather as much information as possible on the moon's topography, as every detail could possibly be important to the astronauts' survival and the mission's success. The high quality of the photos taken with Hasselblad cameras and Zeiss lenses from inside the Apollo capsules allowed them to make huge enlargements of the images and glean as much information as possible from them.

Stripped to the Bare Minimum

Schirra had stripped the leatherette off his 500C, painted the body black to reduce reflections, and used the camera without a viewfinder. In subsequent missions, to keep the weight of the device to a bare minimum, NASA removed the mirrors, viewfinders, and everything else not needed from the cameras.

Special magazine backs were developed to hold up to 70 exposures of 70mm film (IMAX size film). Kodak then developed a special Ektachrome ISO 160 film with a thinner emulsion, allowing the special magazine back to hold 200 exposures and reducing the number of magazine backs required for the mission. For the Race to the Moon, every less gram of weight mattered—in fact, all but one of the cameras that went to the Moon stayed on the Moon to save weight on the return-trip; the astronauts only brought the film magazines back to Earth.



The Big Dumb Button

<https://petapixel.com/2017/06/30/big-dumb-button/>

In 2007, a Hasselblad enthusiast named Sid happened to have gotten a special deal on a used Hasselblad 500C (cobbled together from parts of several cameras) from John Kovacs, a master Hasselblad technician who had worked on modifying the cameras for NASA. The following anecdote describes Sid's meeting with John after learning who the latter actually was:

Two days later, John came back into the camera store with a prism for me. I immediately jumped into asking him questions about all this stuff that I found online.

"Yeah," he said with slight irritation, "that's me."

"Space! You worked on the cameras that went to the moon!! That's amazing!"

John got even more irritated.

*"Space," he dryly said. "F**king Armstrong couldn't operate the camera with his big stupid moon gloves on, so I had to create a big dumb button that he could bang to take the exposure."*

It was one of the most surrealistic moments I've ever been [a] part of. Listening to someone irritated about the part they played in documenting people landing on the moon. There is a whole documentary film in his angry statement.

Camera Geekery

Adaptations for Space

As explained earlier, anything that could be removed from the Hasselblads that went to space was removed in order to reduce the weight load. The fact that Hasselblads used a modular design made this simple. The mirrors and the viewfinders were removed, and the astronauts used "scale focusing" (e.g.: a guesstimate of distance from the camera to the subject). With most subjects being from 10 feet to "infinity" away, this was not a problem. Without a viewfinder to frame the image, they trained to visualize what the frame would approximately cover. Later on, they would sometimes use a wireframe "finder," similar to the one on the modified

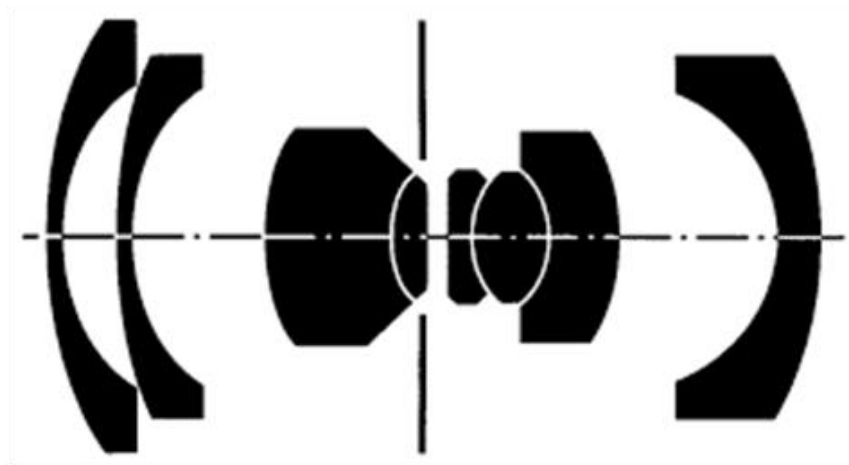
Hasselblad SWC camera shown below.

Multiple cameras were used so that the astronauts would not have to change lenses while in space. With the Hasselblad 500EL's built-in motor drive, the astronauts did not need to wind the film either. The 500EL was stripped and painted in silver to minimize internal temperature changes. NASA called the 500ELs "Data Cameras" or "Electric Data Cameras," abbreviated as EDC or HEDC.

Initially, the 500EL cameras were equipped with a 50mm Distagon, a moderate wide angle lens, and later also with a Sonnar 250mm, a telephoto lens, which was used to capture the *Earthrise* photo. (Note: internet users being what they are, at least one clueless forum poster once asked whether the 250mm Sonnar was "a good lens." If only he knew of the lens's role in the space program!!) The Moon missions also saw the use of the Planar 80/2.8 lens, but the best lens by far was the Zeiss Biogon.

The Legendary Zeiss Biogon Lens

On the Biogon lens, the Zeiss company has been quoted as saying, "First we'll design the lens, then Hasselblad can build the camera around it." Gemini and the Apollo missions used the Hasselblad SWC (Super Wide Camera) designed to work with the Biogon 38mm/4.5 lens, and Hasselblad 500ELs equipped with the specially-designed 60mm/5.6 Biogon lens. The Super Wide Camera was so named because a 38mm lens on 6x6 film is...well, super-wide. The SWC was first used inside the narrow cockpit of the *Gemini 7*, to take photos of astronauts Thomas Stafford and Eugene Cernan inside the spacecraft, taking advantage of the SWC's wide-angle capability. The SWC was also used to get panoramic shots of the Moon and the Earth's surfaces. With its large depth of field, at F8 everything from 5 feet to infinity would be in acceptable focus.



Biogon 38mm lens diagram

I am a huge fan of the Biogon SWC (I have the SWC/M variant). Some of my best images have been shot with this lens. Biogon is a tour-de-force lens designed by Zeiss' Ludwig Bertele in 1951, and adapted by Zeiss designer Hans Bauer to create the 38mm/4.5 Biogon for the 6x6 format in 1954. The Biogon 38mm features minimum pincushion and barrel distortion. Its lack of distortion, as well as the ability to make sharp, high resolution, and contrasty images, is unsurpassed by all but one or two wide-angle lenses that have been designed since then.

The Biogon is a symmetrical lens design, meaning that both halves of the lens are similar, and the film must be placed fairly close to the lens. Note the protruding back end of the Biogon 60mm in the image below: the Biogon 60mm can only be used on modified Hasselblads without a mirror, otherwise, the lens back would hit the mirror. The SWC Biogon camera itself does not have a mirror box, so it is not a problem to begin with.

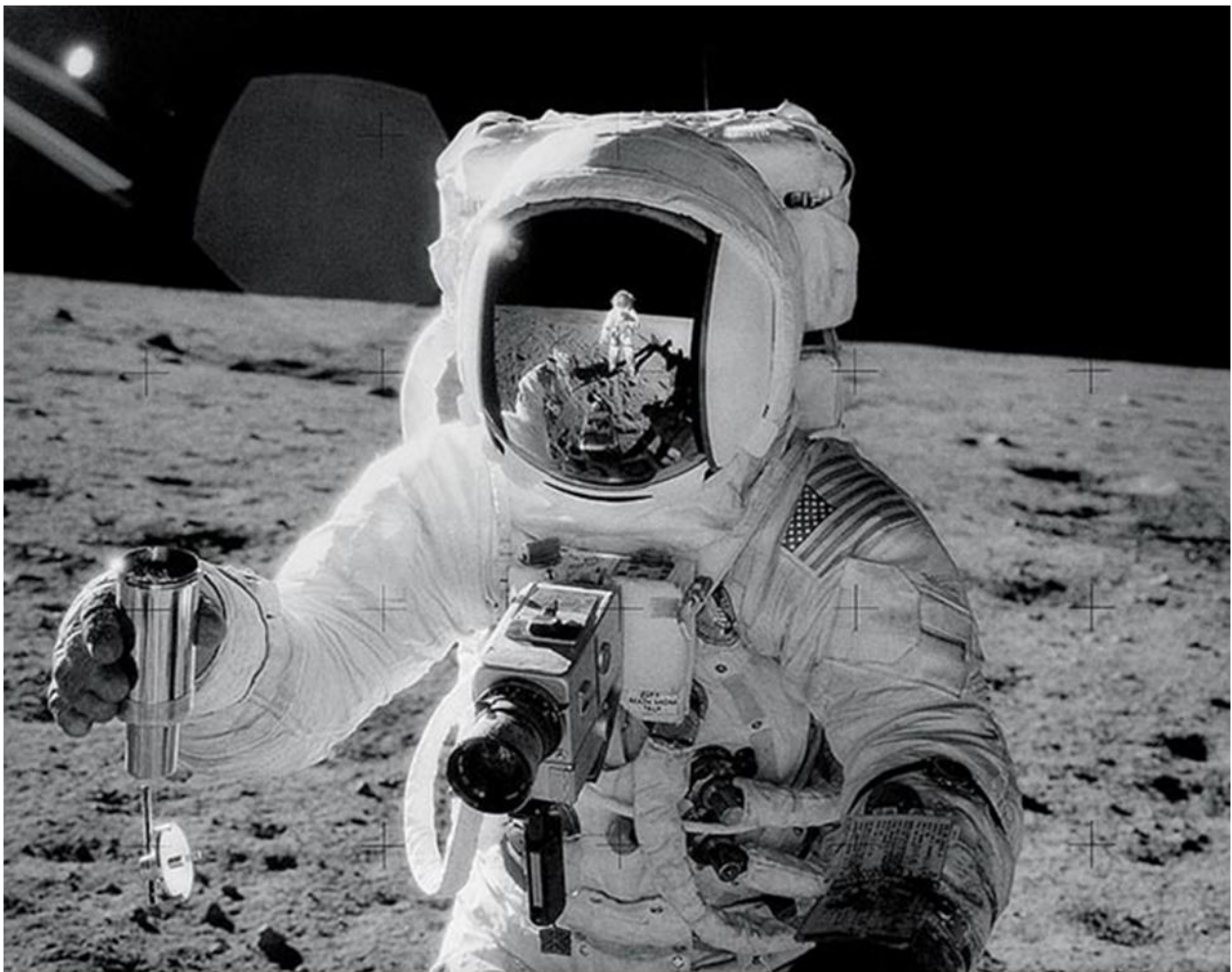


The Biogon 60mm/5.6

The Biogon lenses on the SWC and the 60mm Biogon were the lenses which NASA relied on to make very large prints of the moon's surface, to ensure as complete an understanding of the moon topography as possible prior to the Apollo 11 Moon Landing mission.

Reseau Plates

Some of the Moon cameras were equipped with a Reseau plate, a glass plate with a crosshair grid marking that was placed in front of the film. This allowed the scientists to later analyze the size and location of the objects recorded on the film images. Using a Reseau plate in photography was not a new idea. However, as with everything else, the Moon missions presented new challenges: static electricity normally build ups as the film is wound. On Earth, this static electricity would be dissipated by a combination of the metal components in the film magazine and the atmospheric moisture surrounding the film. A Reseau plate is made of glass and there is no atmosphere on the Moon, so this electricity buildup presented a real fire danger. To solve this, a thin conductive layer of silver was deposited onto the side of the glass that touched the film to allow the static electricity to dissipate.

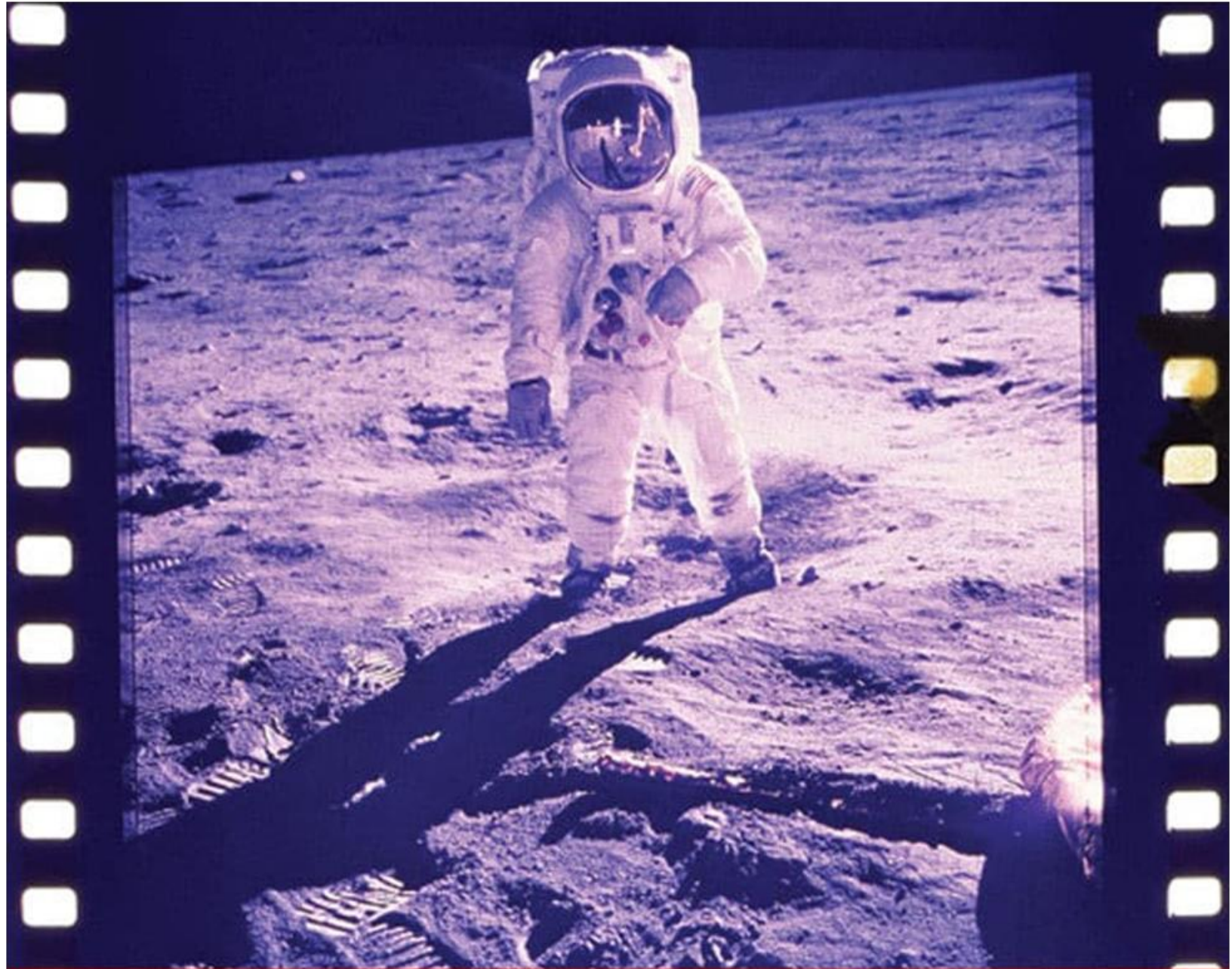


This photo shows the crosshairs from the Reseau plate. The astronaut has the 500EL with probably the Biogon 60mm/5.6 fixed to his chest. To take a photo, he only needed to bang on the "Big Dumb Button".

Film magazines used on Space missions were preloaded with film. Indeed the first *Earthrise* picture was taken by Frank Borman, the commander of Apollo 8, with B&W film in his film magazine. Looking out from another window, William Anders took the color version later.



A rare auction in 2019 offered for sale the original film roll containing the famous “Buzz Aldrin on the Moon” photo (one would think that should rightfully belong in a museum instead). You can see the sprocket holes on this image, which are not present in normal medium format roll film.



THE SPACEY SHOTS

LAUNCH GALLERY



RR Auction

Prior to the Apollo 11 flight, they made a few test exposures on the film after they were loaded onto the film backs. When the film backs were returned for processing after the mission, they cut off the test shots and developed those shots first. These shots were compared against accurate color charts to ensure that there would be no defects in developing the rest of the film, and that the colors would be the most accurate

Glamour Shots: the Space Hasselblads

THE Walter Schirra Hasselblad 500C

Popular Mechanics reported in November 2014 that Walter Schirra's 500C, the one he took aboard the *Sigma 7*, had been sold at auction for two hundred eighty one thousand dollars.



Hasselblad SWC

The Hasselblad SWC (Super Wide Camera) (1954-2006, various incarnations) is a camera specifically built for the purpose of using the Zeiss Biogon 38mm/4.5 lens. Hasselblad made 25 specially modified SWCs for NASA, and ac-

According to a vintage 1966 ad, one of these (from a Gemini mission) was accidentally left to orbit the Earth (presumably it burned up in the atmosphere since then). None of the SWCs ever made it to the Moon's surface.

This SWC has the wireframe finder, which can be used to visualize approximately what will be recorded on the film:



Hasselblad 500EL

The "Data Cameras," modified Hasselblad 500ELs (1965-1970), were used on the Gemini and Apollo missions. Thirteen 500ELs were taken to the Moon; twelve were left there (see location map below). All of the photos taken on the Moon were taken with these cameras. One 500EL was returned to Earth because the film had jammed. NASA sent it to Hasselblad for diagnosis, and Hasselblad found that a piece of moon dust had become stuck inside the camera, preventing it from operating.



Hasselblad MKWE

Occasionally on EBay, you might find what sellers refer to as “NASA Hasselblads,” which is not actually an official designation. Hasselblad called these cameras MKWE (Metric Kamera, Wide angle, Electronic winder). These were designed and used in the 70s *after* the Apollo missions, and are modified SWCs with a Reseau plate, a 70mm magazine, and an integrated motor drive. Due to the high precision required to manufacture the MKWE, they were not made in the regular Hasselblad factory but at a special unit named Hasselblad Engineering AB, which manufactured high-precision industrial and military cameras.



The Hasselblad MKWE, which seems to only come in yellow.

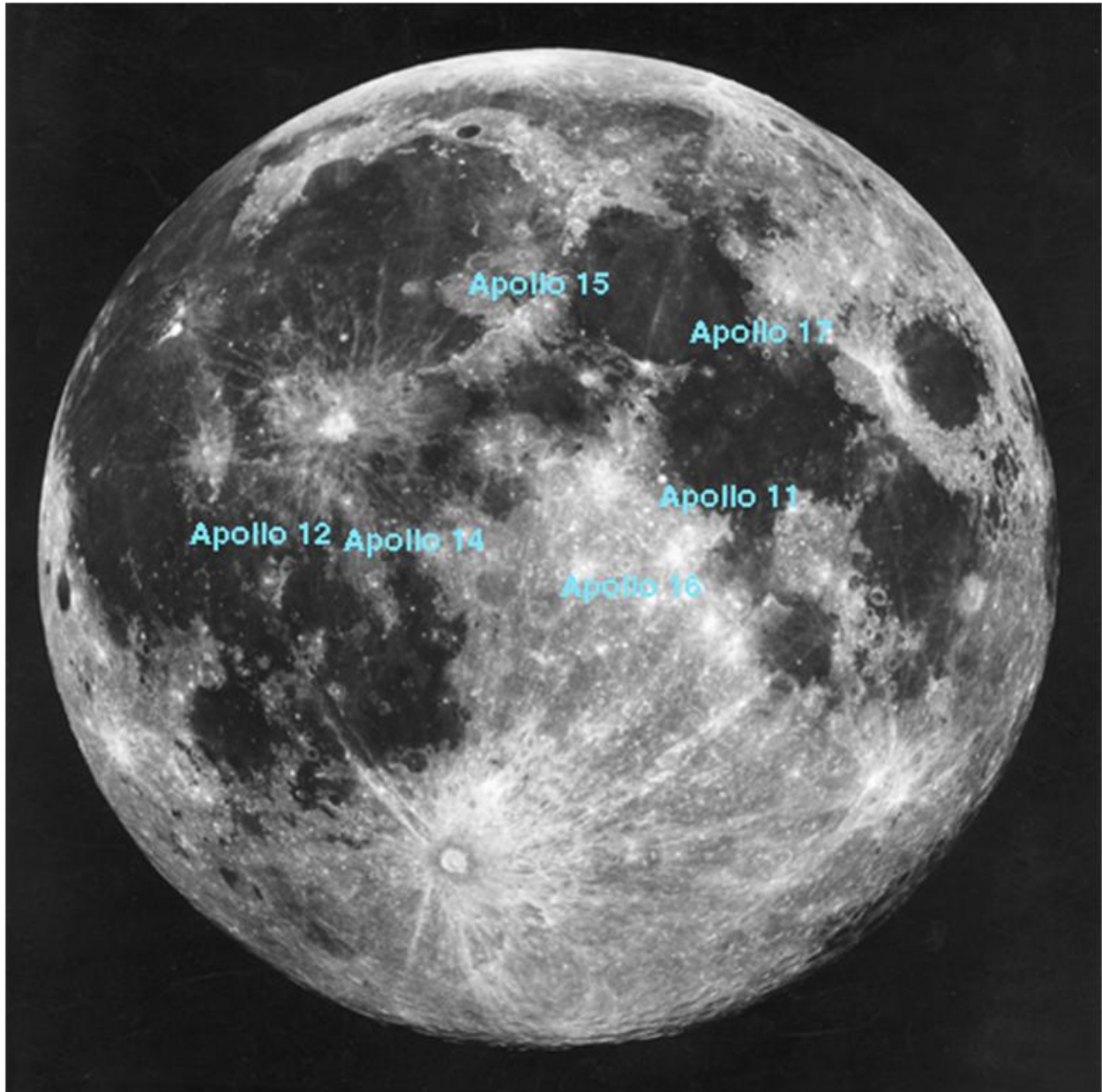
Hasselblad 203FE

The post-Apollo era 203FE (1994—2004) is one of the finest medium format cameras, and my favorite Hasselblad. The 203FE has automatic exposure, finally updating Hasselblad cameras to 1970s-level technology (albeit in the 1990s :-)) The lens shown below looks to be a 50/2.8 Distagon, and the camera has the optional winder attachment. At least one modified 203FE went into space, aboard the space shuttle *Discovery* on October 11th, 2001.



The Abandoned Hasselblads

There are twelve Hasselblad 500EL cameras and lenses on the surface of the Moon, waiting for future space archeologists or intrepid space travelers to retrieve. Only six were used on the Moon's surface; presumably the other six never left the Lunar Modules. Here are their approximate locations:



Space Camera Recreations

Hasselblad tried to sell a few space-related “special releases.” You can fake your own moon pictures with the camera below. It’s unknown how many of these were made, and this is probably the only way one can get a hold of a Biogon 60mm lens.



Footnote 1: So, where are all the SPACE PHOTOS?!

I could have filled this entire publication with lots and lots of glorious space photos, taken with Hasselblads and other cameras. However, there is no need for me to do so; all NASA images are free for everyone to download and enjoy. Recently, NASA made it even simpler to find the space images online by adding a search function. So, just jump to this URL and go wild!

<https://nasasearch.nasa.gov>

Footnote 2: (OT) Imposter Symptom

A tangentially-related story told by Neil Gaiman:

Some years ago, I was lucky enough to be invited to a gathering of great and good people: artists and scientists, writers and discoverers of things. And I felt that at any moment they would realise that I didn't qualify to be there, among these people who had really done things.

On my second or third night there, I was standing at the back of the hall, while a musical entertainment happened, and I started talking to a very nice, polite, elderly gentleman about several things, including our shared first name. And then he pointed to the hall of people, and said words to the effect of, "I just look at all these people, and I think, what the heck am I doing here? They've made amazing things. I just went where I was sent."

And I said, "Yes. But you were the first man on the moon. I think that counts for something."

Other Links and Stuff

These are some of the links I used in researching this article

<https://www.hasselblad.com/history/hasselblad-in-space/>

<https://gearpatrol.com/2019/04/14/hasselblads-history-in-space/>

https://www.history.nasa.gov/apollo_photo.html

<https://www.flickr.com/photos/projectapolloarchive/albums>

<https://www.clubhasselblad.com/hasselblad-and-nasa>

<http://elrectanguloenlamano.blogspot.com/2018/08/hasselblad-lunar-surface-swc-with-carl.html>

<https://www.facebook.com/notes/photo-workshop-adventures/hasselblad-swc-supreme-for-50-years/189066224478660/>



THE FIRST TIME, ALL OVER AGAIN

Alma Alexander

In 2005, after returning from a trip to Europe for Worldcon in Glasgow, I indulged in an embarrassment of riches and attended the NASFIC that year, CascadiaCon, in Seattle. It was quite the convention, memorable in many ways – for example, it was literally the maiden science fiction convention for a good friend of mine who, while he was standing in line with myself and my husband to enter the Heinlein Award Banquet, suddenly stared at me wide-eyed and said, “I don’t *believe* it – Greg Bear, Larry Niven and Jerry Pournelle are having an argument *right behind me!*”(ah, the moment in which you first discover that the people who wrote books you love are real human beings just like yourself...)

The banquet to which we were heading was about to celebrate the bestowing of the Heinlein Award to two of the people in that argument, as it happened – that year, it was handed to Niven and Pournelle. But before they received it... the banquet did something extraordinary.

The house lights went down. A silver screen flickered to life.
And they showed the Moon landing.

The original TV coverage of the Moon landing. Walter Cronkite, and everything.

Now, you have to realize one thing. I am star-struck – always have been. I have always lifted my face to them and dreamed about them. But possibly the most impactful event of my lifetime concerned with space exploration – the first landing of human beings on the surface of the moon – happened before I had any opportunity to know about it, participate in it, wax lyrical about it, even understand it. For a start, when Apollo 11 landed on the moon I was a three-year-old toddler who lived in a different country – a different continent – from the United States, where the hub of the excitement was. I certainly didn't see anything "live" back then. If I saw bits of it on weird little snippets of videos and in soundbytes, it really was just bits taken out of context. I knew all the big beats, of course, when I grew up enough to fall in love with this idea. "Tranquility Base here, the Eagle has landed" became a password to wonder. "One small step" for Armstrong was more than just a "giant leap" he promised all mankind – when he put his foot on the moon, even before I knew anything real about it about it, he had changed my world forever – I was now a child who lived in a world with people who had walked on THE MOON.

“Through books you will meet poets and novelists whose creations will fire your imagination. You will meet the great thinkers who will share with you their philosophies, their concepts of the world, of humanity and of creation.”

Neil Armstrong, Letter on the opening of the Troy, Michigan, Library

That mattered a ridiculous amount.

But I had never seen the full thing, watched it in its entirety, as people must have done back in the day when it was happening real-time.

They showed. Me. The. Moon. Landing. They took me back in time. I, the grown up adult, I who was a card-carrying science fiction nerd, who wrote books in the SF&F genre now, who actually knew people like Greg Bear were real people, *that* I, the one with all my adult passions and knowledge and consciousness, was given an opportunity to watch one of the seminal space events of the age *as though it was live*, as though I was watching it all as it happened, for the first time.

There they were on the screen, the blurred people on another heavenly body, the people in the TV studio who were being interviewed on the whole thing (Arthur C Clarke? Heinlein? I felt much like my friend had done. Robert Heinlein, Arthur C. Clarke, and Walter Cronkite were "having a discussion", as it were, "right behind me"). This was no longer just a piece of hoary history. I was being shown it real-time and I really felt a little like I was verily down a time travel funnel, the

full “wibbly wobbly timey wimey” experience, taken back so I could stand in a place I could never have been and see things I could never have seen and hear things I could never have heard in my own personal reality. Time fell away entirely. It was all real, it was all here, it was all NOW.

I had grown up looking at a full moon on clear nights and thinking, “We’ve BEEN there.” It remained, in some ways, even though it was touched with awe, a purely intellectual exercise – an idea that was a firm fact of my Universe, that was just a thing that had had happened, and I was rooted in the truth of it. I just... knew it. Now, on this night, for the first time all over again. I *found it out*. And oh, it made a difference.

I have no real idea how other people in that room reacted. For me, it was a hammer. I sat at my banquet table and I just wept, tears running down my face, barely able to breathe, even though all of this had already happened decades ago and I knew every beat of it and I knew exactly what happened when it happened what was said and who said it – I knew everything, and yet, and yet, and yet, I sat there crying, I could hear my heart beating and the blood rushing in my ears. I was broken on this, and re-made. I could feel myself dissolving into that starstuff which my physical atoms consist of, and I could see those atoms shimmer star-like in the darkness of that prosaic hotel banquet hall where we all sat at tables with white tablecloths and dessert forks and plates smeared with remains of dinner and half-drunk glasses of wine. I was no longer just myself. I was everything.

My friend had come to his first science fiction convention.

I was here for my very first moon landing.

I think I win.





APOLLO XVI
LIVE FROM THE MOON

**WAITING FOR SOMEONE FROM CHINA,
OR MAYBE CALIFORNIA**

By ALLEN M. STEELE

Earlier this year, 2019, I was on a space panel at a SF convention with a couple of scientists and another SF writer. I've done countless panels like that, but this time was unusual; the place was Beijing, the convention was the second Asian Pacific Science Fiction Convention (APsfcon 2019), the writer was my Chinese colleague Teng Ye, and the two scientists were Liu Tongjie, the deputy director of the country's lunar exploration center, and Zheng Yongchun, the director of geochemistry at the National Astronomical Observatories of China.

The topic was familiar, though: the prospects for lunar exploration in the 21st century. I've lost count of how many times I've spoken on that subject at SF conventions, science conferences, in radio and TV interviews, even as Congressional testimony. I suppose this goes with being one of the few remaining American SF authors to have written frequently and seriously about returning to the Moon and colonizing it. Every previous time I've had public discussions on this topic, though, there has been a strong tint of nostalgia coupled with uncertain hopes for the future. This time was different; no one was pining for a lost frontier of the past, and at least three people on the panel had every right to be optimistic for their country's future in space.

Just a couple of months earlier, China accomplished a major space milestone. Chang'e 4, their fourth unmanned lunar probe, had successfully soft-landed on the far side of the Moon. Not only had no other country ever done this before (yes, including the U.S.), but the small Yutu-2 "Jade Rabbit" rover it carried with it was motoring about, taking high-resolution pictures of a rocky terrain no one had ever seen before at ground level. So Dr. Liu and Dr. Zheng were bursting with pride, and Xi said that he couldn't wait to write more SF stories set on the Moon, while I...

Well, what could I say? I congratulated the two scientists for their achievement, and told them and our audience (we were in the largest room of Beijing's Museum of Urban Design, the site of APsfcon 2019; the Chinese don't settle for beat-up suburban motels for their cons) that I hoped this would soon lead to something I've been wanting to see for many years, another manned mission to the Moon. And then I went further by saying that, while I wish that my own country would return men to Luna, I'd be just as happy if China got there first, so long as *someone* accomplishes this.

Everyone applauded, both on stage and in the audience. From their reactions, I think some were surprised to hear an American say this. But I wasn't stroking anyone's ego or being patronizing; I really meant what I said. A little while later, while having lunch downstairs in the convention green room, the subject came up again in conversation with American and Chinese pros and fans, and I expanded on my remarks, a little more forcefully this time. I said that I watched the final moonwalk of Apollo 17 back in 1972, and since then I've been waiting 47 years to see men walk on the Moon again, and I'm sick and goddamn tired of waiting, and I don't really care *who* gets to the Moon anymore just as long as they do so before I die.

And then I apologized for the rant and went back to eating lunch. But even

as I did, with my Chinese hosts regarding me with surprise and my American colleagues exchanging knowing glances with one another—*yeah, there goes Allen again*—I amused myself by imagining the reaction of some MAGA-hat moron back home: “How *dare* you tell the Chinese that you hope they’ll beat us back the Moon? Don’t you remember...we got there first!”

Oh, I recall Apollo 11 quite well. Fittingly, I was 11 years old on July 20, 1969, and was already a solid, hard-core space buff, able to give specific technical information about the LEM, the landing site, and even the suits Armstrong and Aldrin were wearing to the adults my parents had invited over to watch the TV coverage. Like just about everyone else, I thought this was just the beginning; I was already daydreaming about the day when I’d be able to board a Pan Am space clipper and take a ride into orbit, just like in *2001*.

But memories of the last moonwalk are stronger than my memories of the first, and more poignant. By 1972, when my mother let me skip school to watch the final moonwalk of Apollo 17, I was no longer as optimistic as I’d been just a few years earlier. For I knew that President Nixon—the first of a long line of White House residents to give little or no support to space exploration—had already killed Apollo 18 and 19, that no further lunar missions were being planned for the foreseeable future, and that it would be a long time before I saw astronauts on the Moon again. Maybe as long as 25 years...

Forty-seven years is longer than I was expecting.

NASA isn’t going to get us back to the Moon. I once thought so, but I know better now. I’ve visited the space centers in Houston and Huntsville, seen the high-tech mission control rooms and the components of giant boosters being assembled in vast clean rooms, and they’re very impressive...until you also notice the elevators installed around 1965, the water fountains that are unused and bone-dry, and high grass growing in the pavement cracks of abandoned engine test sites. The



American space program has been on the skids since the shuttles were grounded and sent to museums, but I don't blame NASA for this. I blame NASA's boss, the self-serving political hacks of both parties, liberal and conservative and everything in-between, who proclaim themselves to be in full support of space exploration when they're campaigning at Cape Canaveral (lot of voters in Brevard County, Florida), then slash budgets and cancel major initiatives when they don't think anyone is watching. In this and this alone, the difference between Clinton, Bush II, Obama, and Trump can be measured by only microns (I'll give Bush I some credit; at least he tried).

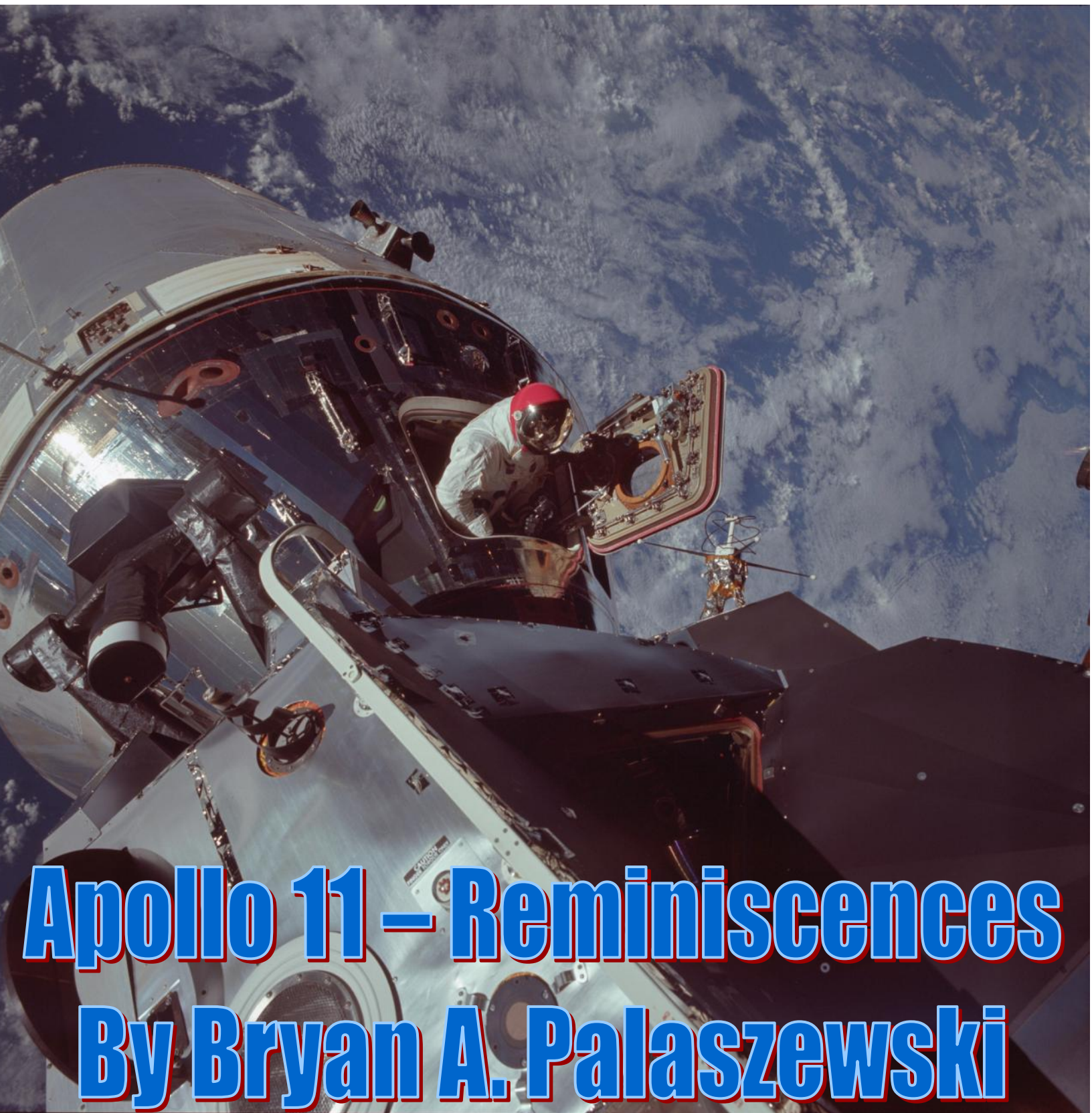
Which leaves us with the privates, SpaceX and Blue Origin. SpaceX is the revolution long-awaited by everyone who cares about this stuff; among my fellow space-cadet SF writers, we've been forecasting companies like this for a long, long time now, and it appears that Elon Musk may be the guy who'll make it happen, if he doesn't trip over his own hubris and try to go too far too fast, which has killed other start-up private space ventures going back to the post-Apollo 70's. Elon, if you're reading this, please take it from a fellow traveler: put away the weed, man, it's no good for you.

Blue Origin has lately revealed a scale-model mock-up of a manned lunar lander, and what little we've seen of it seems plausible; Jeff Bezos's company is famously secretive about its plans, a wise idea that's nonetheless frustrating for those of us in the peanut gallery. But my office library is full of books with pictures of other prototype orbital spacecraft and moon ships, every one of them projected at the time to be sending people out there in ten, twenty, twenty-five, thirty years...and meanwhile, I'm still waiting.

That brings us back to China. Yeah, I'm cheering them on: go, taikonauts, go. All the same, though, their space effort is unlike any of the other contenders in the new space race in that we probably won't know what they're doing until they actually do it. The boys and girls at the NSA will know that China is preparing for a manned moon mission when American spysats catch sight of a larger-than-usual booster being hauled out to the launch pad; the public won't know until a press release is issued, probably about ten minutes before primary ignition.

And what will be the reaction here in the U.S. when people wake up one morning to find that the People's Republic of China has a manned craft on the way to the Moon? I'd like to think that it would be the same sort of wake-up that the American people had when Russia put their first Sputnik into orbit. On the other hand, our complacency and lassitude may have become so deep, the only way most people in this country would get interested is if they learned that Kim Kardashian is aboard, too, and she's going to do a zero-gee strip-tease in lunar orbit.

No. The Chinese have more class than that...I hope.



Apollo 11 – Reminiscences

By Bryan A. Palaszewski

It was the 1960's. I was born in 1959, and at a very young age, all I wanted to do was to help design and build rockets and spacecraft. The Gemini IV mission is one of my earliest memories. The TV news coverage showed how Ed White would exit the Gemini spacecraft and take the first American spacewalk. In school all of my friend and I ate, drank, slept, and dreamt spaceflight. There was

certainly no other possible direction for my life. How would you not want to be part of this incredible adventure? Human beings were leaving Earth's atmosphere and discovering what was in orbit and what was out there.

As 1968 ended and 1969 approached, the first human beings had entered lunar orbit. For 20 hours, the crew of Apollo 8 circled the Moon and completed photo documentation of the possible landing sites for future Apollo missions. The Earthrise photo was awe inspiring. Though robotic spacecraft had captured the Earthrise on previous missions, the first humans to see it with their own eyes were returning to Earth to share their observations on incredible event.

March 1969

Apollo 9 –

After the success of the Apollo 8 mission, with the first people to orbit the Moon in December 1968, the cadence of the human lunar flights was set. Apollo 9 was the mission to test the lunar module in low Earth orbit. A Saturn V rocket would loft the combined Command and Service Module and the separate Lunar Module into orbit. We followed every maneuver with great anticipation, via newspaper accounts and TV reports. *Spider* and *Gumdrop*. *Spider* for the spindly but appropriate lunar lander legs and *Gumdrop* for the blue anti-static wrapping in which the Command Module was wrapped for shipping to the Kennedy Space Center.

The transposition and docking maneuver, crucial to the lunar mission was to be tested. Once docked, two of the astronauts would transfer to the Lunar Module. We were stunned by the clarity of the TV pictures from orbit. Every dial on the instrument panel was clearly denoted. The mission was alive for the Earth-based audience.

The two vehicles would be separated and perform many maneuvers to assure the reliability and safety of the lunar module. Their successful rendezvous and docking and crew transfers paved the way to understanding the Moon.

May 1969

Apollo 10 –

The Apollo 10 mission would be the first to test the lunar module (LM) in orbit about the Moon. The LM would swoop down to less than 9.5 miles above the lunar surface. It was made clear that this LM did not have the propellants, oxidizer, and fuel to allow a landing. So, there would be no issue with the astronauts accidentally upstaging the Apollo 11 crew. *Snoopy* and *Charlie Brown*; they were the LM and Command Module call signs. *Snoopy* had become the face of the NASA Safety Program; make it safe so that the astronauts come home.

July 1969

Apollo 11 –

July was to be a spectacular month. We anticipated each Apollo 11 mission moment every day; both TV and newspapers provided extensive coverage of the preparations. *Eagle* and *Columbia*. The mission patch showed an eagle carrying an olive branch to the Moon. Hope for peaceful, long term lunar exploration was in that air and the vacuum.

The launch day brought a new giddiness. The Saturn V stood on the launch mobile launch platform. The cryogenic oxygen was almost constantly venting from the tanks as the vehicle was filled with liquid oxygen and liquid hydrogen. Though we are only watching on TV, the vehicle seems alive, gases swirling about it, a sleeping behemoth. The launch was successful. Over 7.5 million pounds of thrust from the first stage. It took an agonizing 9 seconds for the Saturn V to clear the tower.

On Landing Day, we were aware that the astronauts would land at about 4:17 PM Eastern. We read and re-read the timeline for the day. Separation. Powered Descent Initiation. High Gate, Low Gate. Contact Light. Touchdown. After landing, immediately ready the lander for an emergency ascent back to lunar orbit, just in case.

We read that the astronauts would have a sleep period before the moon walk. Sleep?!? How could *anyone* sleep after the first landing on the Moon?

Soon, we heard the first step would be that evening. No sleep period. Thank goodness the landing was in July; school was out and a young man was allowed to stay up for the entire moonwalk. The moonwalk was televised live to the world. A TV camera was placed in a structure called the MESA package: the Modularized Equipment Stowage Assembly. We had memorized the details.

Armstrong opened the hatch and began to carefully guide his bulky suit and portable life support system through the square hatchway onto the LM porch. We watched as the TV picture was upside down when the first TV images were transmitted. Would we watch the entire moonwalk while standing on our heads? No, thank goodness. NASA Mission Control and its engineers corrected the glitch. Down the 9 rungs of the ladder step by step. The TV images were eerie, stark, in black and white. The ladder and the astronaut were in shadow, but the camera was adjusted for the low light. Beyond the LM, in contrast, the Moon's surface was a blinding brightness.

Armstrong stopped at the foot of the ladder. He stood in the gold foil wrapped footpad. He paused. Then the first step of a human being onto the Moon. At 10:56 PM Eastern, all of us on Earth and in space were changed. A cheer went around the planet. People from Earth had arrived. With hope, we stay for the benefit of all mankind.

The Apollo Art of Dave Hardy





David Hardy is one of the finest artists working today. His astronomical art is incredibly distinctive, and one of the images I most associate with him is the one above.

Dave was kind enough to send several of these magnificent pieces for this issue!

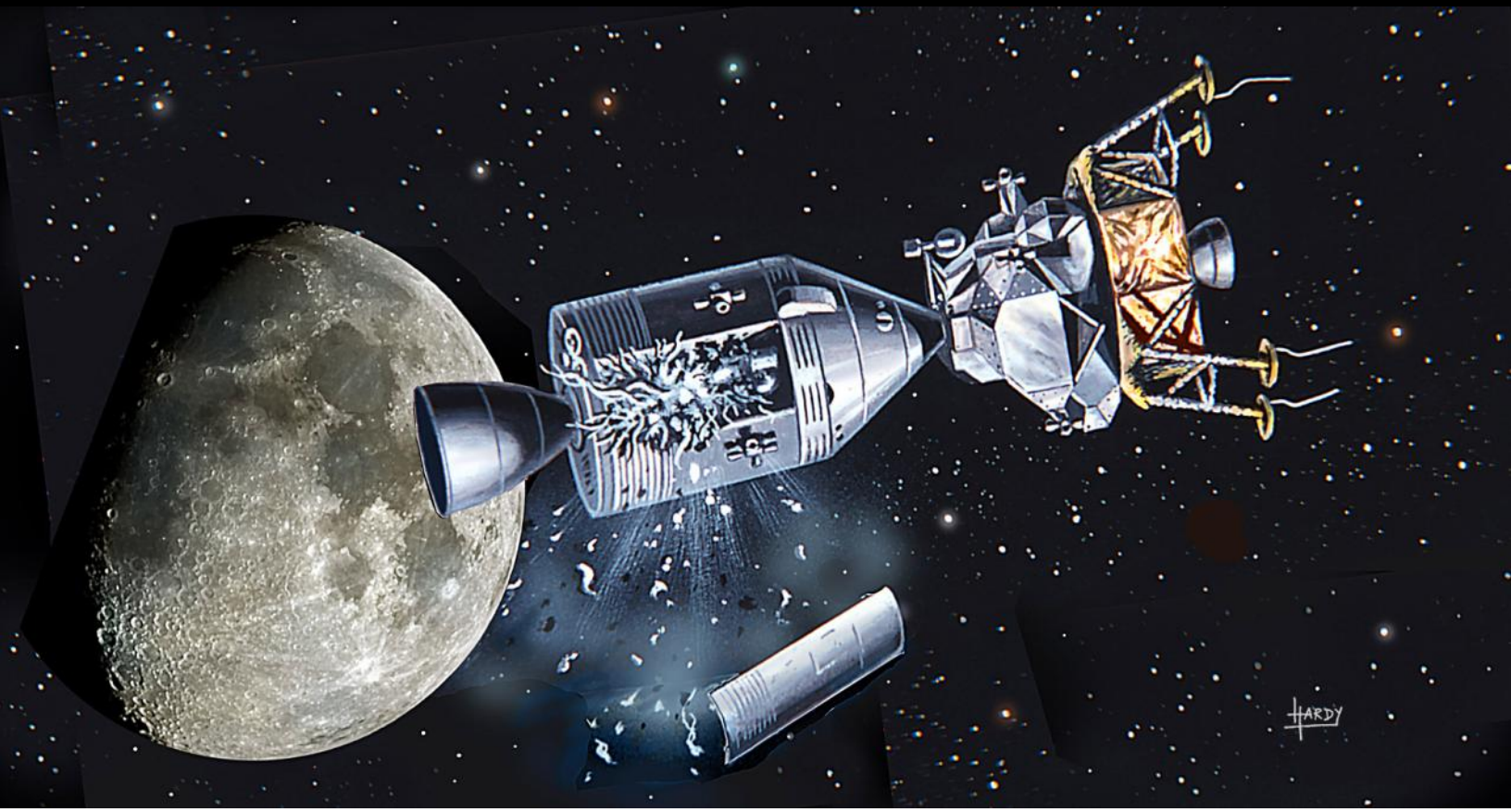
Above—Apollo Astronauts

Page 69

Top—Apollo 15

Bottom—Apollo 13

Page 70—The Missing Apollo







Neil Armstrong, Buzz Aldrin, and the Moon, Reflected in a Still Lake

John Donat

I may be one of the few people in the US not to see the EVA live...

July 1969 is when our family would go to the North Woods of Wisconsin for a few weeks, to get away from Chicago, and enjoy being on our lake without stuff like TV's, telephones, etc. My mom and I were the space nuts in our family—she sat with me for every launch and EVA and splashdown during the Gemini and Apollo missions previous to Apollo 11. I knew that my great aunt and uncle, who had a TV in their cottage would probably let my Mom and me watch the EVA with them, so I felt pretty confident that we were good.

There was one TV station in range of the cottages—an NBC affiliate in Rhinelander, WI. It would work. We left on the 17th, so I did see the liftoff. So, we get up there, and I ask my great uncle about watching the EVA on his TV.

Disaster!

A light airplane hit the tower a week or two before, and the station would be off the air for the landing, and EVA. We tried to tune in other stations (Wausau, Duluth, etc) but no go. The nearest town was Ironwood, MI, and they used a primitive cable system...If I could figure out how to get up there and stay with one of my other aunts and uncles up there, I would be golden. Didn't work. I was pretty upset. I had no idea what I was going to do.

So, my mom and I figured out a workaround. The EVA *was* being broadcast on many, many radio stations around the USA. The Ironwood MI station was off the air in the evening by that time, so we had to find an AM station we would tune in from a distance. We would take the radio out to the dock we had into the

lake...Mom and I grabbed some towels and blankets, and a LOT of mosquito repellent, and headed out to the dock. The lake was calm, so we had a beautiful reflection of the moon on the lake. So, Neil took his famous first steps, and Mom and I listened to the whole EVA until Neil and Buzz got back in the LM. We would be listening to the EVA, and then we'd look at each other and go "naaaaaaaaaaah" and then laugh hysterically.

It took Mom and me 6 years before we got to see the EVA—we were at the Smithsonian Museum of American History, and it was playing on one of the exhibits.. There were chairs available, and I told my Dad to find me in an hour or two, as I was going to watch some of the EVA.





The Apollo 11 Pre-launch Party

By Joseph Green

Sometime in early 1969, it dawned on me that I was the only science fiction writer working at the Kennedy Space Center.

Astronauts Borman, Lovell, and Anders had spent Christmas of 1968 in orbit around the Moon, on Apollo 8.

Astronauts Stafford, Cernan, and Young were scheduled to orbit the Moon again in May, this time with Stafford and Cernan flying the Lunar Module, the lander, to within about eight miles of the surface. But there were no plans to attempt a landing. In fact the fuel tanks on the Lunar Module would be short-loaded. Regardless of official explanations, the real reason was to keep the notably independent astronauts from changing the mission goals in-flight and going for it.

Apollo 11 would be the final step in this three-stage process, astronauts Neil Armstrong and Buzz Aldrin actually piloting the Lunar Module to the surface, while Michael Collins manned the command module in orbit.

If all went well on what was admittedly a very dangerous mission, with lots of unknowns and potentially fatal mishaps, this would be one of the most momentous events in the history of human exploration. And little me, a charter member of the Science Fiction Writers of America (formed by Damon Knight and Lloyd Biggle in 1965) found myself in a unique position to help my fellow writers experience this launch, and its two days of prior tours and educational briefings, close-up and personal.

NASA had a strict policy of not recognizing free-lance writers as reporters. Even Robert A. Heinlein and Arthur C. Clarke didn't qualify. (Heinlein attended the Apollo 11 launch as the honored guest of a major contractor, Rockwell. Clarke co-hosted launch coverage with Walter Cronkite on CBS TV.) I got the word out to my colleagues interested in experiencing the *real* manned space flight program on how to qualify as a news-person. You needed to get an assignment from your local small paper to cover the launch, and a signed letter of accreditation. What this usually required was agreeing to cover your own expenses, and accepting the paper's standard puny rate of pay for free-lance material. Any editor in the country would jump at the chance to have his/her personal reporter on the ground for such a miniscule expense. (In fact, close to 3,000 accredited reporters attended the Apollo 11 launch. I accounted for several of them.)

Several SF writers announced they were going to attend the launch as reporters. So then-wife Juanita and I decided to throw a big pre-launch party for them. Strictly for fellow writers, colleagues; not an event for fans. I invited all the pros I knew were coming, and started planning for the drinks and food. And we offered beds and three days of hospitality to a few close friends, and several others for whom this trip might otherwise have been impossible.

The "no fans" policy lasted for maybe a month. I violated it myself, by inviting four fan friends from New Orleans. I invited a close friend who was a professional photographer, with no interest in science fiction. In addition to all the local SF fans, Juanita and I invited several local friends who were not members of the SF community. The guest list swelled to overflowing, with all beds in the Greenhouse (our name for our little four-bedroom waterfront home) occupied, and sleeping bags on the floor.

It was quite a party. Here we were, some of the most avid but little-recognized advocates of manned space flight, prematurely celebrating the first landing by humans on another planetary body. The guest list included, among many others, writers Robert Heinlein, Arthur C. Clarke, Dan Galouye, Russell Seitz, and Richard Meredith. My four fan friends from New Orleans, John Guidry, Rick Norwood, Justin Winston, and Don Walsh mingled with what seemed fifty others, names now forgotten. Dany Frolich and his beautiful wife Mary, also from New Orleans, were there, along with local friends and others who will remember their attending much better than I do. The party went on long into the night, and the cases of beer and magnums of booze we had provided drained away like a light rain on desert sand. But next morning not a soul I knew of failed to get out of bed and board the various NASA buses that would take them to the News Center on

KSC, three miles from the launch pad and the closest place where civilians were allowed.

Several of my friends had arrived without credentials, and I had to use a little chicanery to get them inside (though even from 10 to 15 miles away, along the beaches and causeways around KSC, the liftoff was still quite spectacular). For some, I hung cameras around their necks and got them badges as photographers, assisting someone with a legitimate credential. For others, whatever means I could come up with that would qualify them. The boldest was probably the last. A friend of mine working behind the counter at the NASA Press Center in Cocoa Beach sneaked me a badge bearing the name of a real reporter. The person who got that one wore it in fear for the three days of the launch experience, always afraid the real owner (for whom the Press Center had certainly issued a replacement) would spot his name on the badge and raise a ruckus. But that didn't happen. Almost 3,000 busy, bustling reporters makes for a very large crowd.

The whole world watched as this very ambitious, dangerous journey unfolded, and myself and perhaps a billion others were watching "live" as Neil Armstrong took that first step onto the lunar surface. No prior great adventure had ever been so well documented, or had the avid attention of the entire world as it happened. The first Asians who crossed the land bridge into North America forgot to write down the details of that journey, for their descendants to find later. Columbus stepped ashore in what became the Americas without benefit of camera or recorder. Burton and Speke documented discovering the source of the White Nile in notebooks.

That first three-day mini-convention and prelaunch party was so successful (doubtless the free food, beer, booze, and beds helped) that Juanita and I did it again for all the remaining manned Apollo launches. But that's a longer story, for another day.





ARMSTRONG
AIR & SPACE MUSEUM

A Visit to the Armstrong Air & Space Museum

Steven H Silver

The village of Wapakoneta, Ohio is the county seat of Auglaize County, adjacent to I-75, but not near much else. Founded near the site of French Fort Au Glaize in the 18th century, this rural community had a population of 5,378 people according to the 1930 census. A few months after the census was taken, Viola and Stephen Armstrong gave birth to a son, Neil, on August 5, at the family farm. Neil, of course, would become the first human being to set foot on another world when he stepped out of the Eagle onto the Sea of Tranquility on July 20, 1969.

In March, 2019, as we approach the 50th anniversary of Armstrong’s landing on the moon, I was planning a road trip that included a leg from Pittsburgh to Chicago. Realizing that a reasonable route, although by no means the most direct or logical route, could take me through Wapakoneta, I made arrangements to spend the night in Neil Armstrong’s home town and visit the Armstrong Air and Space Museum, which has been in Wapakoneta since July 20, 1972.



When you approach the building, the first thing you notice is the design. The two wings rise out from the center, like a pilot’s flight wings. Above them is a large white dome, representing the moon Armstrong explored. When we were there, a replica of a Gemini capsule sat on the lawn, designed for kids to climb into and play on. There was also a small memorial stone in honor of the astronauts killed in the Apollo 1, *Challenger*, and *Columbia* disaster.

The entry to the building is lined with a timeline of space exploration on one wall and a collection of photos of Ohio-born astronauts on the opposite wall. If you look at the reverse side of an Ohio state quarter, you’ll see an image of Neil Armstrong, but he’s only one of more than twenty astronauts born in the Buckeye state, including Judith Resnik, John Glenn, James Lovell, Charlie Bassett, Donn Eisele, and more. Ohio astronauts have flown on Mercury, Gemini, Apollo, space shuttle, and Soyuz missions.

The museum is quite inexpensive, only \$8 for adults. It is divided into four parts. The first part focuses on Armstrong’s life and role in the space program, the second part is a film, the third part looks at the post-Apollo space program, and the final part of the museum is, naturally enough, the gift shop.

Greeting the attendee as soon as they pay their admission is a five foot tall blow up of the cover of the November, 1928 issue of *Amazing Stories*, chosen, I expect, for the Frank R. Paul cover for Frank J. Brueckel’s novelette “The Moon Men,” which is set on Ganymede rather than our moon. There is no explanation for the presence of the cover or why this particularly cover was selected.

The museum then includes documentation from Armstrong’s life in Wapakoneta: yearbooks, newspaper articles, the Aeronca Champion airplane, in which he learned to fly when he was 15, suspended along one of the walls, as well as paraphernalia from the space program. A full-size model of Sputnik hangs from the ceiling, Armstrong’s backup lunar suit, flight suits, the Gemini 8 capsule which

carried Armstrong and David Scott on a shortened mission to dock with an Agena target mission on March 16, 1966.

There are newspapers from around the world on display, celebrating Armstrong and Aldrin's accomplishments, with the Cleveland *Plain Dealer* focusing on an article about Armstrong's parents. There is a case full of various medals presented to Armstrong as well as a piece of the moon Armstrong brought back with him.

This first part of the museum is the most interesting as it has a view of Armstrong that no other museum can have: a local, known to the community as an individual, not just as a celebrity. It is presented well, guiding the visitor past all of the displays with a narrative that tells the story not only of Neil Armstrong the man, but of the space race and his role in achieving John F. Kennedy's goal "of landing a man on the moon and returning him safely to the Earth."

The museum is designed so everyone passes through the auditorium where a 25 minute documentary film discusses the flight of Apollo 11 and provides additional context for the displays which the visitor has just viewed. The film gives a better feel for the mission and who Neil Armstrong was than the recent film *First Man*, starring Ryan Gosling. When it



THE APOLLO 11 MOON ROCK

This lunar sample was collected in July 1969 by Astronauts Neil A. Armstrong and Edwin E. Aldrin, Jr. It is composed of fragments from the moon's original crust, which is over four billion years old. Scientists call this type of rock vesicular basalt.



The Apollo space suit

This is Neil Armstrong's back-up suit. It weighs 135 pounds on earth but only 22 pounds on the moon.

Acquired by National Space Science Museum, Washington, D.C., 1970

was finished, I heard a young voice behind me exclaim, “So that’s why going to the moon was important.”

Beyond the theatre, there’s a poorly designed bottleneck into the second half of the exhibits. While people arrive on their own schedule and move through the first half of the museum in a leisurely way, the second half has an entire theatre’s worth of people enter it simultaneously through a narrow walk-way. This means these exhibits, which are more general in nature, also feel more crowded and, in some ways, less important. There’s a copy of Robert Heinlein’s *Stranger in a Strange Land* on display. Although *The Man Who Sold the Moon* would seem like a more apropos choice, this copy was read by Janet Voss aboard Discovery during STS-63 in February 1995.

The shuttle program is the main focus of this second room, which includes a tire from *Endeavour* mission STS-68 in September 1994 and examples of foods eaten by astronauts on the space shuttles, including specially designed cans of Coke and Pepsi which work in zero-G.

The entire museum takes about 90 minutes to go through, one third of which is in the theatre for the movie and probably 40 minutes in the first half and 20 minutes in the second half. The only remaining part of the museum is the necessary gift shop, which includes clothing, books, videos, and various other trinkets to commemorate your visit and remember that a man from tiny little Wapakoneta, Ohio walked on the moon fifty years ago.

On the way from Toledo to Dayton (or Cincinnati) and not much else, if you happen to be traveling through northeastern Ohio and aren’t in a rush to get to your destination, a detour to Wapakoneta and the Armstrong Air and Space Museum is well worth the time, and a shorter trip than Armstrong made back in July 1969.

As it happens, from 1979 to 1984, the Holiday Inn located next door to the museum hosted a small science fiction convention, Spacecon. Fen Bill Bowers and Rusty Hevelin determined that fans traveling along I-75 from Michigan to Ohio (or vice versa) tended to have strange breakdowns near Wapakoneta. They decided that as long as fans were going to break down in the “Wapakoneta Triangle” anyway, they should have something to do, so they established a small re-





Company in Quarantine

Steven H Silver



When Buzz Aldrin, Neil Armstrong, and Michael Collins returned for their jaunt to the moon, the first thing a grateful nation did as to put them into quarantine

Quarantine meant initially living in a converted Airstream known as the Mobile Quarantine Facility for three and a half days until the MQF could be flown from the USS Hornet to Houston, at which time the astronauts were moved to the Lunar Receiving Lab. The MQF was not much larger than the *Columbia* command module, but it must have seemed like a mansion to the three astronauts. The purpose of the quarantine was to prove that Armstrong and Aldrin had not picked up any spaceviri while on the moon.

However, Armstrong, Collins, and Aldrin were not alone in the MQF. The film of the three astronauts leaving Helicopter 66 and entering the MQF shows a fourth man walking in with them. His name is William Carpentier.

Carpentier was a Canadian physician who joined NASA as a flight surgeon trainee in 1965 and later became a staff flight surgeon. He wanted to apply for the astronaut corps, but his Canadian citizenship disqualified him and the process of renouncing his Canadian citizenship and becoming an American citizen would have taken long enough that he would have missed any chance to become an astronaut for the Gemini or Apollo program anyway.

He was named to the medical support team for several Gemini missions as well as Apollo 11 and Apollo 13.

In order to make sure the astronauts were healthy, Carpentier was assigned to fly on Helicopter 66, a Sikorsky Sky King that was the primary rescue helicopter used to retrieve the astronauts. He would remain with the astronauts and monitor them until they arrive at NASA in Houston and can be transferred to the LRL.

Following quarantine, the media demands on the astronauts were so great that NASA was having a difficult time meeting the requests. A publicist from the US Department of State decided that Carpentier was “famous enough” and had a close enough tie to the astronauts that he could be sent to do press on their behalf. When traveling on Air Force One, he was often identified by the initials WFP, which stood for World Famous Physician.

Carpentier left NASA for private practice in 1973, but following his retirement in 2003, he went back to work for NASA as a consultant on astronaut cardiovascular systems.

Michael Collins noted that Carpentier had an offbeat sense of humor, noting

that “A flight surgeon is someone to hold your hand until the doctor gets there.” Carpentier also took on the very important role as bartender to the astronauts.

Four men in an Airstream for three days, even if three had just returned from a trip to the Moon in an Apollo command module seems rather cramped.

There were not four men in the Airstream.

John Hirasaki was a NASA engineer who was tasked with the handling the samples from Columbia and the propulsion and other systems.

Hirosaki was hired by NASA’s Landing and Recovery Division in 1966. With the concern over spaceviri, NASA called for experienced engineers with recovery experience to volunteer to be inside the MQF during the quarantine period and to remove the lunar rocks that had been recovered from the Apollo 11 mission. Four engineers volunteered for the assignment and shortly before the recovery of *Columbia* they drew straws to see who would perform the tasks. Hirasaki drew the short straw.

Part of Hirasaki’s role was to make sure the rocks were kept in a sterile environment and after showing them to the astronauts and Carpentier in the MQF, he sealed them up and passed them to the outside world through an airlock built into the Airstream. Hirasaki also served as the primary cook and housecleaner of the Airstream. Collins described Hirasaki as “quiet, flexible, and unobtrusive.”

Although Aldrin, Armstrong, Carpentier, Collins, and Hirasaki were the primary inhabitants of the quarantine unit, that didn’t mean that they were the only ones. A Andrew Chaikin wrote in *A Man on the Moon*, “They had company, including doctors, a NASA public affairs officer, and some unexpected arrivals—a few scientists who were accidentally exposed to lunar samples.”

As quarantine would be used for Apollo 11, 12, and 14 before it was ended. The Apollo 11 Airstream is on display at the Udvar-Hazy Center of the Smithsonian Institution outside of Washington. The Apollo 12 Airstream was lost for several years before being found used as a fishing cabin in Marion, Alabama and is now on display at the US Space and Rocket Center in Huntsville, Alabama. The Apollo 14 Airstream is at the USS *Hornet* Museum in Alameda, California.

The LRL wasn’t a bad place to spend their time, but it was tedious. The astronauts, who had been separated from their families since before the mission could only play so many games of cards. As Michael Collins said quietly at the end of one of their debriefings when asked if the astronauts had any other comments, “I want out.”





**Why Haven't We Been Back to the Moon?
And why that's about to change.
by C. Stuart Hardwick**

Down in Clear Lake Texas, south of Houston but not too far to drive for a dinner cruise, you can find one of the world's most expensive museum exhibits. A giant sign painted on the wall reads, "Rocket Park," but I know a barn when I see one. Inside, under a cavernous steel roof more appropriate to a welding supply shop than a museum, lays a travesty, an honest crying shame, a crime against human genius and the gods of common sense, some might say. Inside that barn is a real, working moon rocket that never got to fly.

Not that it isn't an improvement. When I first saw Houston's Saturn V, it was out in the open, splayed across a grassy rise like a stack of building blocks toppled by the children of giants. Cliff swallows nested in the Instrumentation Unit and filled the interstages with guano. Kids hopped the barricade wire to climb on the transport carriages and get fading paint all over their fingers. Salt air corrosion ate at anything not made of aluminum or titanium. Even beleaguered as it was, it was a marvelous thing to see, but it seemed as if it had been dragged there, wagon train style, and that was where the oxen had died.

At its peak, the Apollo Program consumed almost five percent of the U.S. Federal budget. Now it had taken a dozen charities, firms, and government programs to scrape together the \$5 million for a barn and a coat of paint. There was more involved than that, of course—and the restorers did a fine job that will add many many years to the rocket's remaining display life, but why is it on display in the first place?

Houston's Saturn is a Frankenstein rocket stack, built up of finished and nearly finished components from what would have been Apollo flights 18, 19 and 20. But none of those missions ever flew, and the story of why, and why half a century later, the old bird remains unrivaled, is an important and instructive part of the history of spaceflight.

On my second visit to Lady Saturn, I knew what I was looking at—not a rocket, not a relic, but the life's work of a half million contemporaries of my parents. In two generations, they'd seen the world progress from global depression to global war to the global conquest of one biblical plague after another—and from horse-drawn wagons to airline travel to rocket ships to the moon. Their collective genius is staggering even now, as is the sentiment, heard over and over through the years, that not one of them was going to be the sad sack who screwed up mankind's greatest adventure.

Now here we are. Nine visits, six landings, and we've never been back.

As I hurried about marveling at cables and fittings imperfectly remembered from archival diagrams, a pretty young lady put the question succinctly. Looking up at the great cluster of F-1 booster engines the way a child might gape uncomprehendingly at the Eiffel Tower before announcing "It sure is big!" she waited for the NASA retiree acting as our guide to pause, then asked, "If they really went to the moon, why haven't they been back?"

Why indeed?

When Kennedy committed the US to a moon shot, we had a grand total of 15 minutes spaceflight experience. No one had ever maneuvered in space, docked in

space, navigated in space, slept in space, or had a bowel movement in space. We knew the moon was technologically within reach, but were about as prepared to reach it as the Wright Brothers were to build the Concord. You can build anything, of course, for a price, but while it's often forgotten today, Kennedy invited the Soviets to share in the adventure and thereby reduce Cold War tensions—and hoped they would split the bill.

That didn't happen, and Apollo was undertaken on a war footing—and not unjustifiably. Soviet leaders had promised to “bury the U.S.”, Soviet scientists seemed always to best us in space, and Soviet propaganda proudly declared that, fifty years hence, Soviet citizens would be living on the moon. American leaders were not entirely paranoid to think that an enemy they saw as hell bent on world domination might have its sights on other worlds as well, and Lyndon Johnson famously declared that the American people would not accept going to bed “by the light of a communist moon.”



With existential motivation, Kennedy gave the nation a clear deadline and a bold objective on a distant and uncertain shore—right up the alley of American historical identity. To reach it, however, would take a bit more than the *Niña*, the *Pinta*, and the *Santa Maria*. For a start, it would take a huge amount of energy just to climb out of low orbit and push anything substantial onto a trajectory high enough to reach the moon. To bring that much fuel to bear without the uncertainties of on-orbit rendezvous and in-space refueling would require a mammoth rocket, and such a rocket would take a long time to develop. Fortunately, we had one large rocket engine that had already been in development for 5 years—the Rocketdyne F-1. The Saturn V grew out of the schedule constraints, uncertainties, and realities of the time—it was simply the biggest rocket we could reasonably expect to fly in time to make the end of the decade deadline. It quickly became obvious that the rest of the mission would have to be squeezed to fit it.

And that was just the beginning. There's a popular myth that NASA wasted millions developing a ballpoint pen that would write in space while the Russians just used a pencil. In fact, the Fisher Space Pen was one of only a handful of privately developed, off-the-shelf, mass-produced items carried on the Apollo missions (and the Russians use it too). Every part of the Apollo stack was hand-made master-crafted bleeding-edge technology. And our limited experience with spacecraft to date told us that any manned mission with a hope of success would require multi-layer protection against every risk.

No one had ever gone to the moon, so we didn't know how crews would navigate. MIT had designed a guidance system for intercontinental missiles, so it was hired to build one for Apollo. In case that didn't work out, provisions were made to fix spacecraft speed and position using radio ranging from Earth. And in case that didn't work, the crew were provided with a sextant and eye patch like 16th century pirates, and markings on the window against which to site reference points on the Earth and moon. MIT also designed a computer—really more of an automated controller—for Apollo, but in case that failed, other companies supplied simpler computers sufficient to bring the crew home, every part of the spacecraft could be manually controlled, and a global communication network ensured that at any time, mission crews could access advice and analysis from ground based main-frame computers.

No one knew how to control fluids in zero-g, so NASA experimented with magnetic ferro fluids, surface tension based devices and other innovations, but ended up using a pressurant to squeeze propellant from elastomeric bladders like those used to make World War II aircraft more gunfire resistant. There was no such thing as a robotic laser-sintering machine, so each mighty F-1 engine was made from hundreds of parts carefully forged of just-invented refractory alloys—welded and finished by master craftsmen who were inventing the craft as they went. Modern computer memory didn't exist yet, so Raytheon hired seamstresses to operate semi-automated looms weaving computer code into “rope memory.” No one on Earth knew how to weld perfect 40 foot seams in aircraft aluminum—so Boeing invented the technology. To support and safely separate liquid hydrogen and oxygen, North American enlisted surf board makers to help with bulkheads of phenolic resin honeycomb.

Parts of the mission that might seem simple turned into major engineering projects in practice. To make spacesuits flexible enough to keep a fallen astronaut from dying helpless on the lunar surface, Hamilton Standard teamed up with ILC Dover—the Playtex bra people. To save spacecraft power, NASA contracted for what (a decade later) would become the compact fluorescent bulb. To control moon dust, they contracted Black & Decker to make what—a decade later—would become the cordless Dustbuster vacuum cleaner. TV cameras weighed 400 pounds, so Westinghouse designed miniature versions two decades before the camcorder and RCA made custom gear to convert the signals for broadcast.

With slide rules and analog computers, missions were “backwards planned” so that by taking off from Florida at the right time, the pilot wouldn't have the sun in his eyes at an inopportune moment three days later in space. Seconds-wide abort opportunities were calculated months in advance. Without CAD and CAM, every nut, bolt, and turbopump had to be designed by hand, tested with mechanical models, and described on paper by an army of draftsmen and then—somehow—made into flight capable hardware.

As our knowledge grew, components cycled back to the factories again and again for upgrades. This is not uncommon in wartime, but it raises the cost tremendously, and on Apollo, revisions were made all the way out to the pad like last

minute lines stapled into a play on opening night. Every change had to be controlled, catalogued, communicated and evaluated—all without email or cell phones or laptops.

As calendar pages turned and the challenges climbed the stack, weight became ever more at a premium. Direct ascent gave way to lunar orbit rendezvous. Out went the panoramic window glass; carefully placed view slits would do. Out went the chairs; the crew would stand, restrained at their stations by Velcro socks and spring tensioned cables. Aluminum bulkheads were machined down like fine French racing bicycles, till there was just enough substance left to hold in the air for the mission required number of pressurization cycles—and no more.

Everything, from cameras modified for the lunar environment to bags used to collect feces in zero-g, had to be invented, adjusted, tested, tinkered with, modified, redesigned, certified, manufactured, tracked, provisioned—and then run through all those steps again when someone found a problem with it.

Meanwhile, NASA needed a test craft to simulate the flight of the Lunar Module. In what was really a whole other aircraft development program, Bell supplied the “flying bedstead” LLRV and LLTV which flew nearly a thousand flights, giving the astronauts the comfort they needed to fly in the strange new environment of space. And of course, the craft carried—and needed—one of the very first ejection seats usable at zero altitude and speed.



And that was only one of the many simulators and technical subsystems NASA required not only for Apollo, but for the smaller Gemini program needed to work out techniques for rendezvous, docking, and working in space that would be needed to get to the moon. They hung a complex, one-of-a-kind rendezvous and docking simulator from the rafters of a hanger at Langley. They built rigs to test capsule landing designs—in water and on land. They tested high-speed parachutes, launch escape towers and recovery techniques, lunar exploration tools and nuclear thermoelectric batteries, uprated ablative heat shield materials suitable for the high speed return from the moon, new lightweight insulation and cryogenic storage tanks and, and, and...every little piece cost a small fortune.

Congress paid for it as a battle in the Cold War, but the American people fell behind it for the best of all possible reasons—because as Kennedy had said, it would “organize and measure the best of our energies and skills.” And so it did. Where the Soviet Union had made headlines with stunts and firsts, NASA had engineered a system meant to open a new frontier in space. The first 20 Saturns were the service test run, like the first 14 B-29s order during World War II. Next would come the Apollo Applications Program—two week explorations in campers built from modified Lunar Modules and a solar observatory on the moon. These campers would anchor lunar bases supported by LM-derived freighters and supplied with

open cockpit “lunar chariots” and emergency escape vehicles.

In the beginning, this all seemed very reasonable. In 1959, the Army Ballistic Missile Agency had released a study calling for a permanent lunar military base provisioned by a fleet of fairly modest rockets and equipped with greenhouses to supplement the food supply and shotguns and claymore mines to prevent Soviet attack. If that all seems absurd, remember that the blue ribbon inter-agency panel who put it together had never seen the moon landing—or its price tag. They, like science fiction authors of the day, were extrapolating what they knew of aircraft and other early 20th century technical progress to the moon. And why not?

But by 1969, we all knew better. All told, the Apollo Program cost \$25 billion, a seventh as much as the Vietnam War, four times the cost of the B-29 Superfortress that dropped the atomic bomb, and after the war we still had the bombers to show for it. NASA had achieved the impossible, and more than that, had opened the door to the science fictional, but the price was as “over the moon” as the achievement, and now NASA wanted to build space stations in low Earth orbit and use the new nuclear thermal rocket engine developed by Los Alamos to send a manned mission to Mars.

This was all rather more than Kennedy had asked for, and as it became clear that the USSR lacked the means to seize “the high ground of space” even if they wanted to, the last thing Congress or the new Nixon administration wanted was another expensive space race.

So NASA was given a body blow. The last three lunar missions were sacrificed in order to get a tiny subset of “Apollo Applications” flown in low Earth orbit. If they weren't getting the lunar bases and space stations they wanted, Nixon would at least pay for the space shuttle they needed to build them...because in the weird world of government procurement, that actually made sense. But in that same world, the shuttle morphed under Air Force requirements and Congressional parsimony into something that could never be the reusable space truck we needed.

But...maybe it's all for the best.

The ancient Egyptians built the greatest edifices in the history of Earth, and then knocked it off for four thousand years. The Great Pyramid remained the tallest structure on Earth until the new spire of the Cathedral in Lincoln, England was completed in 1311, and buildings of such height didn't become commonplace for many generations, until the rise of the modern skyscraper. What took a national effort with sandstone, sledges, and copper tools, is now routine in the age of steel and electricity. Maybe fifty years isn't really that long after all.

The simple fact is, the moon shot was a century ahead of its time, technologically speaking, and it's taken this long for industry and engineering to catch up. One can argue the merits of the shuttle and armchair quarterback what NASA might have accomplished had it taken this or that other approach, but this misses a fundamental truth: these programs were built with the technology of the time and within the budget that was available—and were a necessary prerequisite to today.

And where are we today? Throughout the shuttle era, the biggest customer

for launch services was the Department of Defense, which has very little motivation to reduce costs or, frankly, increase access to space or the size of the industry beyond a trusted few oligarchs. But over the last 20 years, NASA has in some ways gone back to the economic roots of its progenitor, the N.A.C.A. While continuing the Big Space initiatives of Constellation and now the SLS that are the public face of the agency, NASA has been not so quietly incentivizing the creation of a whole new private space infrastructure.

Competitions in the vein of the old Guggenheim aviation prizes (only with a lot more oversight and technical assistance) have given rise to Space-X, Blue Origin, Sierra Nevada, and a dozen lesser-known new players in the launch services market—and have given the spur to the old players, who must now leave behind the old cost-plus accounting of military style procurement and compete on a brave new entrepreneurial frontier. In this new market, companies like Space-X don't compete for the chance to sell the government rockets—they compete for contracts to launch government payloads on their own rockets, and the cheaper they can do that, the more they can make.

Today, the Space-X Falcon 9 can put a pound into orbit for \$2,500, and the Falcon Heavy may break an even thousand. Compare that to the \$5,000 per pound charged until recently for Delta Heavy IV launches, or the \$8,000 per pound for the space shuttle. Better yet, analysts now speculate that credibly, the Space-X BFR might be able to put a pound into space for between \$40 and \$200 a pound. Its hard to see how even a light gas cannon or electric rail gun could compete with that, and those would liquefy passengers!

The importance of such a development cannot be overstated. The feats of Apollo, like those of the pyramid builders, were accomplished by fiat and subsidy. The developments we all hope to see in space must ultimately be driven by the same force as every other meaningful cultural advance since mankind first looked out over the horizon and made for a new land—the hope of a better deal. After four decades of technological back building, we suddenly find our species on the cusp of the very space age our parents thought they were entering. Our rocket science hasn't improved radically, but our development and fabrication methods have, and with them, the price we must pay for a given performance.

Today, rocket components are mostly designed and modeled on computer—using Computational Fluid Dynamics technology paid for by NASA for the shuttle. They are built of composite materials—using data compiled by NASA for the shuttle. They are assembled using robots and what might colloquially be called “3D printers,”—developed over recent decades with help by NASA contracts.

New financial rules are being written and markets being created to decouple the venture capital investment lifecycle from the often two decade long cycles of development and risk that accompany new space hardware. This is turning up the economic fire under the pot stirred up by NASA's stewardship. Over 2,000 firms in the U.S. alone are actively developing what investors call “frontier enabling” technologies—new habitat and radiation shielding technologies, economical private space stations, innovative launch services, in-situ resource utilization, zero-g refu-

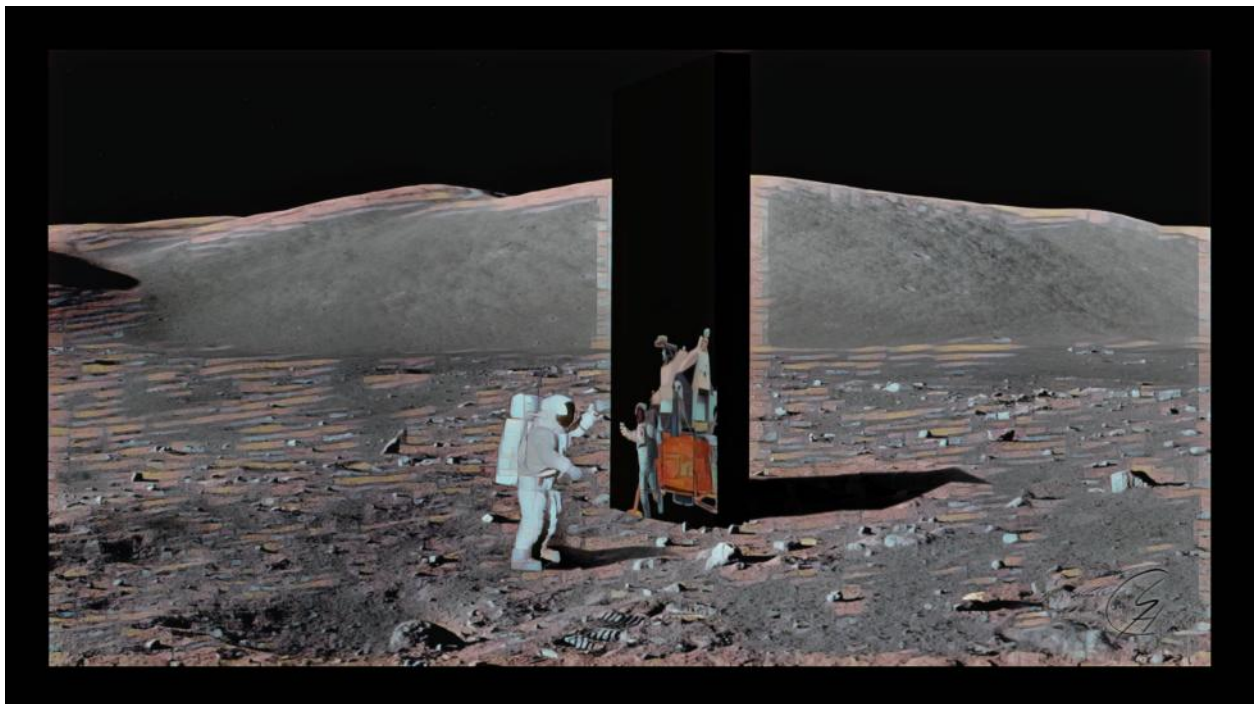
eling, and much, much more.

This public private partnership has pushed us to the dawn of that space age Robert Heinlein had in mind when he wrote “A Tenderfoot in Space,” or *Rocketship Galileo*, and from this vantage point, we can finally put Apollo in its historic technological perspective. This monumental program arose at what we can now see as the space age’s equivalent of the aeronautical 1860s, when mechanical flight was a well established possibility, but the Wrights and Langleys and Von Zeppelins of the world had not yet worked out how to do it. It is as if, having seen Jules Henri Giffard’s steam powered airship in 1850, Napoleon III had spurred his nation to overfly the pole in something like the Spruce Goose, inventing a practical but uneconomical form of gas turbine engine in the process. It would have been a fabulous achievement, but it wouldn’t have brought the Jet Set any closer than industry and engineering could make it.

Arguably, the Apollo moon landings were the greatest single achievement in the history of mankind, but they were so great in part explicitly because we had so little to gain directly from them. Sir Edmund Hillary didn’t climb Mt. Everest to get an endorsement deal. Neil Armstrong didn’t leap for a chance to pitch Tang. The real value of Apollo is that after decades of war and conflict, we reached for a common dream. The real value was in getting there, and in building the systems it took to do it, and in having the maturity, once we got there, to leave behind scientific instruments and not only a flag.

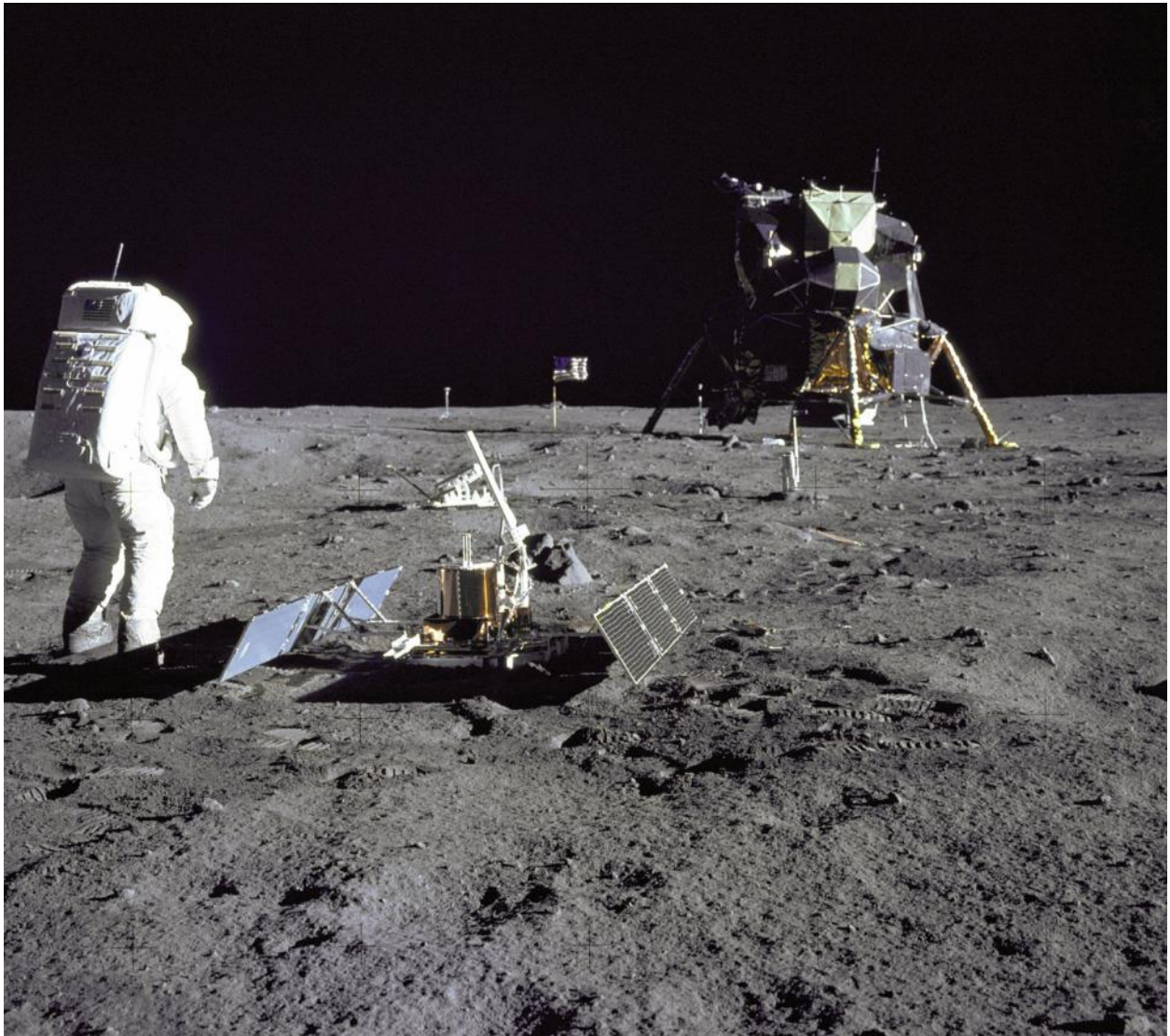
Had NASA gotten its way during the 1970s, its debatable how much more we’d have gotten for the public investment. There was no threat to be countered, no resource within reach, and our industry and financial markets just weren’t ready for sustainable, private space development. But now it is.

So consider, the next time you chance to visit one of the two remaining Sat-



urn rockets, that perhaps the museum isn't such a waste after all for the grand old bird. The Apollo program galvanized a nation, and for a little while at least, the world. It showed us our world as it really is, a tiny bubble of life in the vast desert of space. It advanced the microcomputer age, contributed to a hundred fields of science, and pushed fifteen thousand subcontractors into the age of precision engineering—which today benefits each of us every time we drive our modern car in for a trade-in without its ever having needed an overhaul, or buy a new power drill for a sixth what one cost in 1969 in constant dollars.

The Apollo program was human imagination incarnate, but it overshot our practical abilities as only a government program can. We did what every previous generation had assumed was impossible, and did it so well, we had moon rockets to spare. Now they are in the museum, inspiration for the next generation, and the next after that—whatever world they live on.





Church and Space

By Nancy Jane Moore

I used to pray with the people who put Neil Armstrong on the Moon.

It wasn't that space exploration made me feel religious; it was that I went to church with many people who worked in the space program, including Chris Kraft, the flight director who shaped Mission Control. My memories of the push to put a person on the Moon in the 1960s are entangled with memories of the community at the Episcopal Church of the Good Shepherd in Friendswood, Texas.

Friendswood, as its name implies, was founded by Quakers. It was a tiny town in the 1950s in which life revolved around the Friends Church. This being Texas, the second church in town was Southern Baptist. We Episcopalians came third, after a missionary-minded priest from a nearby town decided we needed our own church. At the start, we were a tiny group, so tiny that our family of four didn't dare skip church for fear there might not be anyone else there. It was touch-and-go that our little mission would survive, even with financial support from the diocese.

In 1961, the government announced that the Manned Spacecraft Center (now the Johnson Space Center) would go in just a few miles up the road from us in what was then a cattle pasture. The announcement came not long after Hurricane Carla, which had left that pasture and much of the surrounding area under water over Labor Day weekend. It brought change even more dramatic than a cate-

gory four hurricane.

People who worked for NASA moved to Friendswood, most of them engineers of one sort or another, and many of them Episcopalians. Our church went from a small collection of native Texans to a multi-state mix. Kraft was from Virginia, with a Tidewater accent. We also got NASA folks from Boston, Georgia, and, to make us somewhat international, England. Just the conversation at church was delightful: so many smart people who talked so differently.

It was an Anglo culture, for the most part, though it differed from the Texas Anglo culture. The only family of color was the Sharmas, who were Indian. Grace Sharma, who had trained at Juilliard, made our choir something to behold instead of the rag-tag collection of kids like me and the few adults who could carry a tune, while her husband did his part in making space exploration happen.

The NASA culture was very male, though not more than most other professions and businesses in the early 1960s. We knew nothing of the women computers—much less the African American mathematicians like Katherine Johnson—who made the technical side happen. What we saw in our community were those classic male engineers in their crisp white shirts, many of them still carrying their slide rules (pocket calculators came along at the end of the decade).

The Episcopal Church had not yet allowed women in the priesthood, but the overall culture of our local parish was mixed by gender because women did the underlying tasks that make churches work. This influx of new people came together to make our church not just survive, but thrive.

Every time one of the space missions took off, I thought of those men at church, of what they did, of how important their work was to the process. We sometimes saw the launches on TV screens at school—every launch was a big deal in the 1960s. And when the first tragedy happened—the fire in the capsule that killed Gus Grissom, Ed White, and Roger Chaffee in 1967—I worried about the people I knew whose job it was to set up the missions.

I watched the launch of Apollo 11 on TV from the city room at the *Houston Chronicle*, where I was working that summer. I recall looking at images of the Mission Control room, trying to see the people I knew from church. I was already leaving religion behind at that point, but the connection to the people remained. And while it thrilled me a couple of days later to hear Neil Armstrong's "giant leap" words, I kept thinking about the people I knew, along with all the other people who worked for NASA, the ones who made it possible for him to take that first step.

We humans tend to worship heroes. But between being part of a community that built a church and knowing so many of the people who made it possible for astronauts to become our heroes, I realized that no one ever succeeds on their own. Humans are not just a social species; we're a cooperating one (for all the infighting that goes on). The good things that happen in our world are not just the result of the one person who takes the risk to cross the mountain or sit atop explosive devices in a tiny capsule, but of the efforts by the many others who provide the supplies or build the ship.

Yes, we need visionary leaders to inspire us in new directions and yes, we

need people who are willing to take the risk of doing something very dangerous for the first time. But we also need that larger community of support, those people who do the calm detail work that makes a project successful, the people who provide the food and supplies and set up the chairs, the people who want to see this adventure succeed.

One other thing that growing up with the space program taught me: when people unite behind something, we can make things happen fast. The United States sent our first person into space in 1961; by 1969 we had put someone on the Moon. And, yes, I know the space program was an arm of the Cold War with the Soviet Union; that doesn't make the achievement any less remarkable.

The 1960s were a time of great turbulence in the United States and in the world. The Civil Rights and anti-war movements made important and necessary impacts on this country, and similar political upheavals were happening elsewhere. But exploration of space drew most of the people together, at least to watch the launches. We were inspired and made hopeful by aiming for the Moon.

I look at what those people I knew from church did in a short period of time, using mainframe computers that couldn't do what the one in my pocket does today, and I know that we human beings are capable of fixing the many problems that we face right now. We don't need leaders and individual heroes, though people who can impart some inspirational vision would help. Instead, we need millions—billions—of people each doing their work in conjunction with others, figuring out how to pull it all together and making something larger than any one person, or group of people, can.

We built a church that way. We sent humans to the Moon that way. We can come to grips with climate change and wealth inequality that way. And—because I also learned to dream big dreams by going to church with the space program—we can explore the universe that way.

Let's keep going.





The Gift I Never Got For Christmas by Bill Higgins

Fifty-five years later, in a basement in Minneapolis, I found The Gift I Never Got For Christmas.

But I'll begin my story in the fall of 1962.

America was headed for the Moon. President Kennedy had told us so. Astronauts, and sometimes cosmonauts, were in the news.

I was in the third grade. The Higgins family had just moved to Detroit. We had new TV stations to explore—during the times of the week we were allowed to watch TV, afternoons and weekends—and new children's TV shows.

As a science-crazed kid, I was fascinated by atomic energy, and supersonic planes, and submarines, and such. So it will not surprise you to learn that I was *extremely* interested in spaceflight as well. I watched some Project Mercury flights on TV. I learned the names of the astronauts.

Autumn came to Detroit. Our tree-lined street turned brown and orange and red. On weekends, dads raked yards. The smell of burning leaves filled our neighborhood. And the toy commercials began.

To be sure, on our TV we saw commercials for toys at any time of the year. It's just that in the month or two preceding Christmas, there are *more* of them. Dolls. Games. Guns. Among the 1962 ads, one stood out.

Land on realistic model of moon with U.S. space team

Play to witness the arrival of the first man on the moon as astronaut climbs from space capsule. Watch space platform whirl overhead and help scientists fire rockets from underground silos..track enemy missiles

65 pieces \$888

Sturdy molded plastic moon base 29x22x7-in. high. Hand crank revolves space platform in 12-in. circle. Mountain explodes when spring is released. Moon ship fires 6 rockets. 2 launchers with 3 rockets ready to fire. Also includes jumping rocket; radar, helical and disc antenna; blinker; solar generator unit; 12 astronauts; 2 space suits; 6 moon men; 2 telescopes; ray gun; missile carrier; fuel wheels. 20 other pieces. All molded in 3-D plastic.

79 N 5953L—Shipping weight 10 pounds \$8.88

This ad was magnificent. The manufacturer was Marx—Louis Marx and Company, the largest toymaker on Earth. The product: **Operation Moon Base**.

Operation Moon Base was a sprawling “play set.” It had missiles, satellites, a Mercury capsule, dozens of astronaut figures, Moon tractors, fuel tanks, radar antennas, a lunar landscape with an underground control center and launch silos...it had everything.

Everything a space-mad kid could want.

It was the best toy I had ever *heard* of.

I really, really wanted it.

Christmas being imminent, I let my family know of this desire.

I don't really recall the details of the conversation I had with my parents that autumn. All I know is that they gently led me to, shall we say, a new understanding of the generosity of Santa Claus. I think I already knew that at Christmas, not every child gets everything he or she might ask for. Now I began to learn more of the reasons for this. In a family with four children such as ours, every child



found several gifts under the Christmas tree, some big, some small. Some toys are more expensive than others. There are limits on a family's resources. There must be a balance.

Operation Moon Base was large and elaborate and the TV commercial made it seem like a lot of fun. But it was also very expensive.

So I came to understand, well before Christmas 1962 arrived, that I would not receive Operation Moon Base. And I made my peace with that.

It was a good Christmas in our new home. My sisters and my brother and I received many fine toys.

* * *

You know, I never got to see Operation Moon Base at all. I never encountered another kid who owned one. I didn't happen to see it in any store I visited. Except for the memory of that exciting TV commercial, Operation Moon Base might as well never have existed.

Time moved on. 1963 saw the final Mercury flight. That year, the Soviets put the first woman into orbit. Over the years, I followed the Race To The Moon in the news. Apollo 11 landed. The Sixties ended. Apollo ended.

* * *

Dreamhaven is Greg Ketter's bookstore in Minneapolis. It's a landmark. Greg deals in science fiction books, both new and used, and related items: comics, fantasy, games, movie posters. Though I've known Greg and his wife Lisa Freitag for most of forty years, I had never visited this store.

In 2017, I had an opportunity to see it at last. I was in town with a group of friends; Greg opened Dreamhaven just for us. Lisa, along with Alice Bentley, another old friend who was working

there at the time, conducted a tour for us.

A labyrinthine basement lies beneath the store most shoppers see. There Dreamhaven's people work on packing and shipping to fill mail orders. We moved from room to room. More shelves, and more books. And a lot of collectibles are stored down there.

So we came to a room lined with books, like the others. And like some of the others, it held stacks of toys and games from the Sixties and Seventies and Eighties.

One stack contained Operation Moon Base.

I was amazed. It was the first example I had ever encountered. My companions were somewhat surprised by my excitement. I attempted to tell them what I have just told you (albeit in more condensed form). I asked if I could examine it.

Lisa kindly permitted me to open the box. I removed the game boxes on top of it and set them aside. I carefully removed the lid. And got out my camera.

* * *

The drawing on the Operation Moon Base box illustrates many, though by no means all, of the wonders within. In the background are slim missiles and a fat moonship made of spherical tanks. Nearer, we see a pair of tracked vehicles crawling the landscape. In the foreground is an astronaut wearing a peculiar-looking suit that resembles a trash can. An alien Moon Man offers a list summarizing the contents. Far above in the sky, a Mercury capsule whizzes past a ring-shaped space station.

Upon opening the box, I found the grayish-green lunar mountain, spotted with craters. It was large enough to fill the width of the box. It was made from thin vacuum-formed polystyrene. Seems rather fragile for a plaything, though Greg's was in good shape. Lifting out this landscape revealed a fantastic jumble of toys. I'm sure that when it was new, the innumerable parts of the play set had been well organized, but this set had been played with.

I began to examine the components, remov-



ing one or two at a time from the box. Lithographed metal walls formed the underground headquarters. They pictured caverns, tunnels, and control panels. Missiles and spring-loaded launchers would occupy the silos, shooting through apparent craters at the top of the mountain. Storage tanks, towers, radar antennas, and so forth formed the infrastructure.

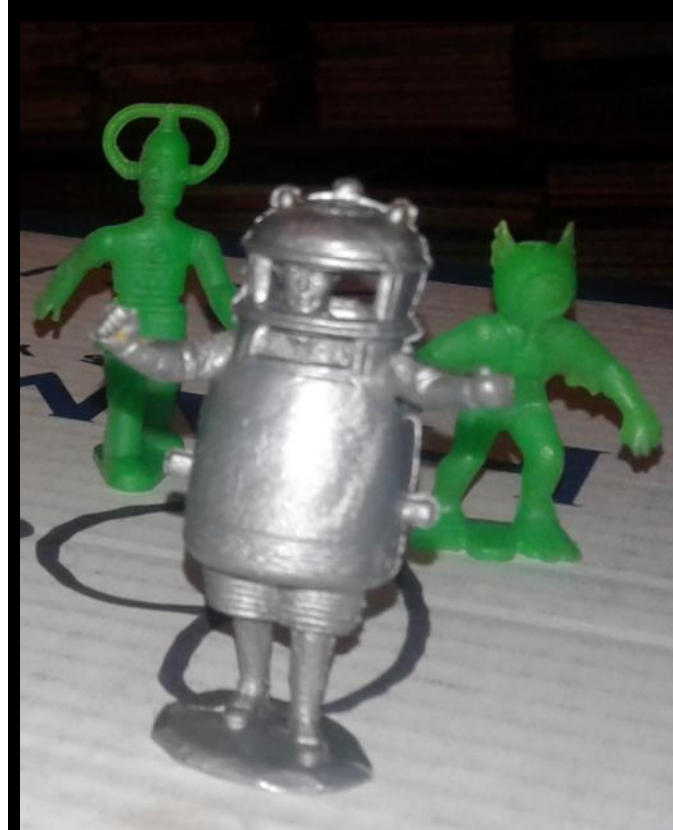
There was a cool-looking triangular spaceplane, a lifting body, equipped with spring-loaded launchers for small missiles.

There were numerous ground vehicles. Three appear crawl on tank-like tracts (but in truth the toys roll on concealed wheels): a tow-tractor, a crane, and a tanker carrying cryogenic rocket propellants. These have small pressurized cabs. A “motor home” with a bigger pressurized volume rides on four pairs of bogie wheels, a bit reminiscent of Mars rovers that would come later. There’s also a trailer consisting of two enormous balloon tires, which, the instructions say, are supposed to carry fuel.

The green aliens are superfluous. By 1962, nobody expected the Moon to harbor living creatures, and a Space Age kid would have known that. I imagine I would have viewed them with disdain. But perhaps saved them for use in interstellar adventures.

More interesting are the silvery astronaut figures. Injection-molded from polyethylene, they are about 1:32 scale, in a variety of poses. All but one wear space suits identical to those of NASA’s Mercury astronauts. The suit manufactured by B. F. Goodrich for NASA gave toy designers an example to follow and they made the most of it. The figures are quite detailed; one can make out the webbed harness across the astronaut’s shoulders. The long vertical strap running over the astronaut’s navel splits into two lanyards that restrain the helmet from rising up when the suit inflates.

In orbit, Mercury pilots never left their capsules. Marx’s sculptors extended Goodrich’s design. Floating Wrench Guy, who is obviously





working in weightlessness, has an oxygen hose connected to the accurately-placed port on the left side of his abdomen. Rock-Hopping Guy, posed in mid-leap, is equipped with a pair of aqualung-type tanks on his back.

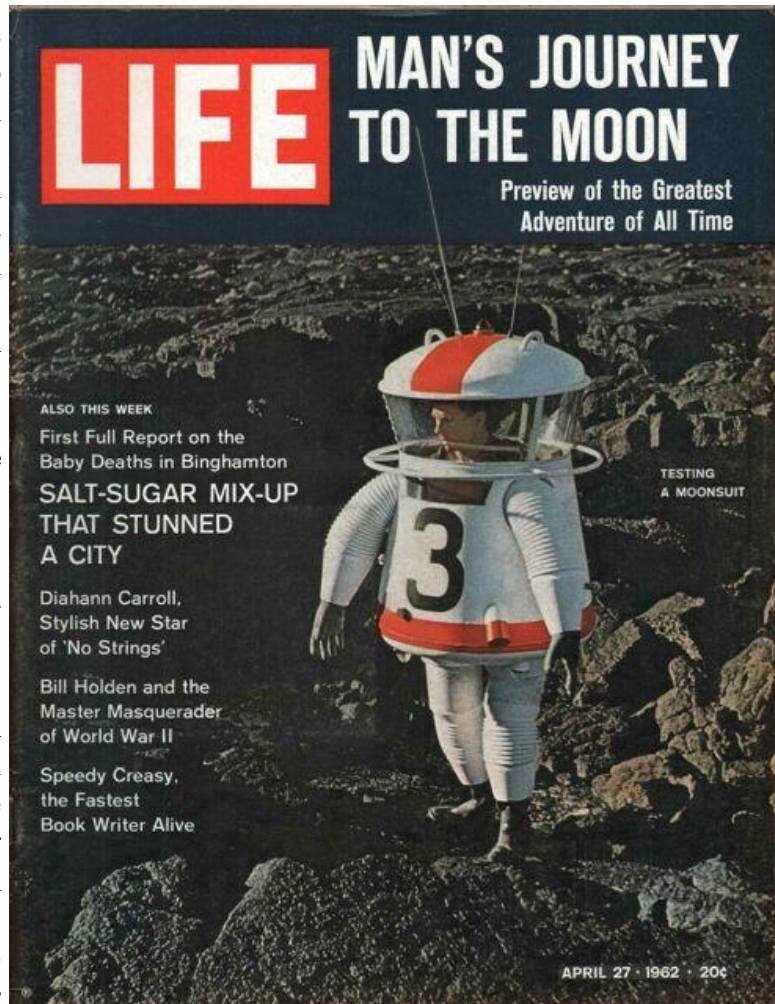
One astronaut, Seated Guy, isn't carrying any equipment, but he is special. He fits into the seat of a 1:32-scale Mercury capsule, the only astronaut who is given a spacecraft to ride.

Long Underwear Guy stands, arms outstretched, without a Mercury suit. NASA's contractors had been experimenting with "hard suits" for working on the Moon. Fishing around among the parts in the box, I found the two halves of an hourglass-shaped suit that snapped into place around Long Underwear Guy. This design, by Allyn

Hazard for Space General, is bizarre-looking, but also cool enough that it had been pictured on the cover of *Life* magazine (April 27, 1962 issue). The play set box illustration indicates that another hard Moon suit, the domed-cylinder design of Republic Aviation, had also been part of Operation Moon Base.

I can't identify the inspiration for the ground vehicles or spaceplane, but the costumes of the astronauts are clearly based on up-to-date research. Though they don't much resemble the space suits Apollo's moonwalkers would wear, those suits did not yet exist.

All these figures represented men. Though press coverage sometimes speculated about women astronauts, and female pilots had already participated in a physiological study, and Valentina Tereshkova would fly into orbit six months after Christmas, children were not given any indication whatsoever that the Moon base crew were not masculine. Research tells me that, in an earlier wave of space-cadet toys, Marx's science fiction play sets had included a few space-women. After NASA got going, only military test pilots were selected as astronauts, so for a long time, all NASA's crews were to be male. Toy designers, apparently without much thought, reflected this reality.



By the way, the astronauts are not the same scale as the Moon tractors. The tractors are designed to be operated by much smaller people, who, though not in evidence, seem to be an inch tall or less. The underground architecture doesn't seem to match the scale of either the people or the tractors. Ditto for the space-plane. Marx play sets gaily disregarded such questions of scale. Children were expected to follow suit. Although, now that I think about it, it might be fun to play "Lunar Lilliputians vs. the Giant Astronauts."

* * *

I wish I could show you the dazzling TV commercial for Operation Moon Base, but it is not (yet?) to be found on the Internet.

Chances are it would not impress you much today—I imagine you have seen innumerable toy commercials all your life. But in my frame of mind at the time it aired, Marx's ad seemed targeted directly at my personal psyche. And other forms of advertising existed...

There's a site called WishbookWeb.com where one can view vintage catalogues from such retailers as Sears Roebuck and J. C. Penney. The Sears Christmas book for 1962 features, on page 455, Operation Moon Base.

Louis Marx made a lot of play sets. Each contained buildings, vehicles, and plenty of plastic figures. I'm sure the Farm Set and Fort Apache were reliable sellers. Also available were the International Airport, the Army Combat Set, the Flintstones' hometown Bedrock, and—in the time of the Civil War centennial—"The Blue And the Gray."

According to the Sears catalogue, the price of Operation Moon Base was \$8.88.

Allow me to turn to the "NASA New Start Inflation Index to Be Utilized in Fiscal Year 2019," which begins: "The inflation tables are provided for the purposes of estimating new efforts and for normalizing historical cost from prior missions." Surely this is the appropriate document to use when estimating the cost of a major space project such as Operation Moon Base.

It recommends an inflation value for converting FY 1962 expenditures to 2019 dollars of 12.742. Applying this factor to the price of Operation Moon Base, the retail value of this play set would be \$110.75 in 2019.

Yeah, if I had had four kids, and were aiming to put them all through parochial school, I also would not have spent \$110.75 on a single present for one nearly-nine-year-old boy. Wistful though I may be at the prospect of owning this fabulous toy, I must agree that my parents made the right call.

* * *

What I *did* get for Christmas 1962 was something else.

The Marx company, having invested in tooling to make, say, cowboys or soldiers, marketed them in many different products. They were part of those large play sets in the Sears wish book. But the same plastic cowboys might also turn up in a bag in the drugstore for 99 cents.

My parents managed to find another, smaller, less expensive play set Marx made: "Space Capsule and 13 Astronaut Figures." It had Pointing Guy. It had

Floating Camera Guy. Two Visor-Opening Guys, two Floating Wrench Guys, three Rock-Hopping Guys. Two different instances of Long Underwear Guy, with a Republic Moon suit that snapped together over one, and a Space General suit for the other.

Its centerpiece was a bright reddish-orange Mercury capsule in several pieces: heat shield with retrorocket engines, couch, truncated cone body with skin featuring Mercury's distinctive corrugated texture, cylindrical parachute section. And two instances of Seated Guy, who could be snapped right into the capsule's couch, ready for adventure.

These became my favorite toys, right through 1963, and quite a while afterward. They staffed my own space program. Maybe I didn't have Marx's lunar landscape, but my astronauts could still explore the folds of my bedspread. I could design my own Moon base with my set of blocks, or build my crews exotic vehicles using my Erector Set. Seated Guy in particular could fit into a number of toys in addition to his Mercury capsule. Versatile dude.

We had a lot of fun together. And during those years, NASA's astronauts were climbing into Gemini capsules, climbing *out* for spacewalks, and docking with other spacecraft, practicing the skills they would need for Apollo missions. As I watched them on TV, my own polyethylene astronauts were never far away—even on family vacations, when I was permitted to choose a small number of toys to bring along, Seated Guy always made the cut.

Therefore, in the basement beneath Dreamhaven, in 2017, I was experiencing not only the wonder of the unfamiliar Moonscape and tractors and missiles, but also a reunion with old friends. It was a very sentimental moment.

You're wondering: Greg Ketter *sells* collectible toys. Did I buy Operation Moon Base?

Standing in that basement, I did consider it. This play set is pretty uncommon, so it would probably command a high price...maybe several hundred dollars? But I probably could come up with the money if I really wanted to.

I debated with my Inner Nine-Year-Old, with whom I am very much in touch. Together we decided that, in my sixties (I mean *my* sixties, lowercase, not JFK's Sixties), I really wouldn't play with toy astronauts much, if I owned them. Buying Operation Moon Base just for the sake of owning it did not seem like a good idea. Let someone else have a chance to enjoy it.

After all, though I did not grow up to command my own Moon base, nor even become an astronaut, I did make the most of my opportunities. As an adult, I was an eyewitness to the first mission to Neptune, and later to the first mission to Pluto. I have dined with astronauts, laughed with astronomers, and sung with someone from Mission Control. I've been invited to explain spaceflight to audiences, many times, in many different places. My nine-year-old self—who, in the end, did get to play with some pretty good space toys—would probably have been pleased to know these things.



“When you do a stamp, think big, but draw small.”
James Bacon

Stamps are beautiful, they are the postage paid indicator, that sees a letter delivered to your home from near or far. Receiving post is nice, it is a wonderful thing, and as you talk to friends and family about Apollo 11, I would ask that you go out and send a piece of post, and mention it.

Commemorative Stamps were well established by 1969. The United States Postal Service had already had stamps commemorating space elements, such as the Centenary of Fort Bliss in 1948, Communications for Peace, with the launch of Echo 1 in 1960, Project Mercury in 1962, Robert H. Goddard in 1964, the Gemini 4 Capsule spacewalk, in 1967 and on the 5th of May 1969, Apollo 8.

There was of course an element of the secrecy about what was occurring. This had also been the way for Mercury Friendship 7, although the secrecy was such for that stamp that people only found out on the day of it being issued!

For Apollo 11 there was more notice given. The issuance of a stamp was announced to the public on the 9th of July 1969, a week before the launch of Saturn V with the Apollo 11 mission.

Apollo 11 marked so much for so many, a huge achievement. While the USSR also had stamps, and many countries (although not Ireland so much) have had and marked various important space achievements, my focus here is on the USA and the USPS 10 cent commemorative stamp.

Apollo 11 was special. The Apollo 11 commemorative 10c United States Postal Service stamp is one of the nicest, at the time one of the largest and upon inspection, one of the most beautifully detailed stamps by artist Paul Calle. The stamp has many colours, the gold of Eagle, a vivid blue of the earth, and the surface of the moon and the Eagle itself is exceptionally detailed. The astronaut, the space suit, the pockets, and the use of a pale blue as shading, all works so well. The red and blue of the first man on the moon and United States are really very good, the focus is the achievement but it is done so well. It would not be lost on some that the 10c stamp was airmail.

Paul Calle was the NASA artist on the job. Calle had been given special access first to photos and then to observe the practising that the astronauts went through, this allowed him to watch Neil Armstrong exiting the Eagle Lunar Module and so he was able to work this accurately, with a clear picture of the foot being placed on the moon surface.

Calle a New Yorker, born March 3, 1928 went to the Pratt Institute in Brooklyn and worked as an illustrator for the army in the Korean War. A cover artist, his work appeared in *Galaxy*, *Fantasy Fiction* and *Super Science Stories*, as well as *The Saturday Evening Post*. In 1963 he joined the inaugural NASA art programme which set out to document the space programme. He drew the 1967 Gemini spacewalk stamps, commemorating Ed White making the first US spacewalk in 1965.

He was allowed incredible access, and captured the astronauts Neil Armstrong, Michael Collins, and Buzz Aldrin, on the day of the launch, getting ready, in ink sketches. Calle designed more stamps, over 40 USPS stamps and in 1994 with his son Chris, they designed a 29-cent first-class stamp and a \$9.95 express-mail stamp — commemorating the moon landing's 25th anniversary.

There was a federal law that persons living should not be on stamps, but NASA evaded that issue by saying it was a “spaceman” and the law has since been rescinded.

Calle is quoted as saying: “When you do a stamp,” he said, “think big, but draw small.”

The process of determining what was best for the stamps, can be seen on the Chris Calle Website, as a large number of sketches exists for the stamp. The Gemini Twin Stamp has a huge variety of insightful sketches, showing visually what must have been the process, but the Apollo 11 sketches show that there was a clear vision, but position, and orientation was considered.

Calle unfortunately passed away in 2010, but the family story of Paul and Chris Calle, is told through incredible photographs, on Paul Calle's website, and it is beautiful, father and son working and growing together, through an incredible time.



The Postmaster General said: "Apollo 11 will mark America's first mail run to the moon." and so it was, mail was on board, but there was more. The master die for the 10c stamp was included in the inventory and went with the astronauts to the moon. They also had a special piece of mail, this had a "die proof" stamp on it, and the plan was that they would use a very special "Moon Landing" cancellation during the mission. It was planned that this would occur on the moon, but in actual fact it

occurred on the return journey.

In *Carrying the Fire*, by Michael Collins, he wrote "We also have a stamp kit, including a first day cover commemorating the issuance of a new 10c stamp showing an astronaut at the foot of the LM ladder about to sample the lunar surface. With the envelope is an ink pad and a cancellation stamp which says 'Moon Landing, Jul 20, 1969, USA.' 'never mind that it is July 22, this is the first chance we have had to get to it. We try the cancellation out first, inking it and printing it in our flight plan three times until we get the hang of it, and then we apply it gingerly to the one and only envelope, which we understand the postmaster will put on tour."

The envelope was plain, and the die proof colour, but recognisable as unusual as there is no perforations. The date stamp is larger than used for the FDC's and, to be honest the envelope actually looks like it went to and from the moon. This letter was amongst the things that were placed in the decontamination area of the Mobile Quarantine Facility on board the *USS Hornet*.

This letter, is one of the rarest in the world.

The stamp was issued and shown on the 9th of September, 1969 in Washington DC at the National Postal Forum's third annual meeting. The three astronauts were there, along with the Postmaster General. 4,000 people applauded for 2 minutes when the astronauts came into the International Ballroom at the Hilton. This was not the usual affair, and indeed, there was much humour.

Air Force Lt. Col Michael Collins, pilot of *Columbia*, was presented as he "who went 99.99 per cent of the way and is probably the only American who didn't watch the success of the Apollo mission on television." The astronauts were of course celebrities, and this was a wonderful time, and so the distance travelled, delay in quarantine and cost, were all mentioned. Mr. Blount the PMG was pleased that NASA was paying the freight for the letter and Neil Armstrong noted that he had been unable to collect postage for the letter so there was no revenue for the department, but that he and his colleagues had checked postal regulations and dis-

covered that carriers in small offices were entitled to charge by the mile. He hadn't figured the charge for a 468,000-mile delivery route...

Three events took place for the first day of issue. As well as this invitation only event at the Hilton in the morning, then there was special event at The White House and a Splashdown party at the Shoreham hotel. It was as huge as it deserved to be.

There were 8,743,070 first-day covers cancelled.

152,264,000 stamps were printed. One hundred and fifty two million.

This was a huge increase on the previous record, of 3 million FDC cancellations for the Mercury Commemorative Stamp issued on the on the 20th of February 1963 for the orbital flight of Colonel John Glenn, first American in space, in the *Friendship 7* capsule (the super secret one). Collectors from over 100 countries requested the Apollo 11 FDC, orders were huge, collectors knew a good thing and they inundated the Washington City Post Office with their orders.



As well as the stamp itself being larger, there were two cancellation date marks on the FDC. The date of issue, being the 9th September 1969 Washington DC with "First Day of Issue" and 20th July 1966 Moon Landing U.S.A., which was a reproduction of the cancellation used, on the 22nd of July, but marking the landing on the 20th.

Machine and hand cancellations occurred. There were no shortage of variations. The City of Apollo, had an event and communities celebrated with whatever connections they had.

The variety of designs that one could find on covers was impressive. A printed design, or inscription other than the cancellations which commemorate a postal or philatelic event are known as cachets, and both Postal Authorities, and private companies design them. Artcraft cachets, seem to be the one I have turned up most often, but this could lead one to think there were not many. There were hundreds. Moonlanding; Historical Account and Cachet Listing of #C76 by Harry L. Anderson and Monte Eiserman, the 2014 Revised Edition by David S. Zubatsky has gives many details and a total of 372 cachets listed.

The opportunity that presented itself was incredible, and so, companies bought heavily into the concept of sending their customers a very affordable piece of history, Pan Am's Clipper Club members, got sent them for instance and quite nice they are too.

There was more post on the space flight, crew were allowed to carry 214

postal covers with them. This was approved by Deke Slayton, and they were stored in the CSM Columbia as part of their Personal Preference Kit. They remained there for the 8 days and were quarantined for 18 days upon their return. The covers were hand stamped with "Delayed in Quarantine" in red ink and Aldrin numbered and coded them all. The crew signed and apportioned the covers out, Aldrin got 104, Armstrong 47 and Collins 63 and upon release they arranged for Matthew Radnofsky to take them to the Webster Post Office south of Huston for cancellation.

Interest in post worldwide in 1969 was huge. This was clever and brilliant.

Today, thrift and charity shops are full of stamps, the interest and fascination has waned, but this is not to denigrate or imply anything wrong, indeed, if you collect or enjoy stamps, now is a good time to be a buyer. The rarities are still very very rare but it is a good time to seek out regular stamps. At the World Stamp Show in Boston, I managed to buy a quarter sheet of Apollo 11 stamps, at face value. I also was lucky that a number of Stamp shops, have sold covers very cheaply, and up to recently, they were incredible value.

The idea that in 2019 one can buy and use a 10 cent Airmail stamp commemorating the Apollo 11 moon landing, or rather buy 14 of them and post a letter as cheaply as buying the commemorating modern day 50 year stamp is far from what most collectors or onlookers would have expected.



Notes and references of interest

The Race to the Moon Chronicled in Stamps, Postcards, and Postmarks A story of puffery vs the pragmatic edition by Umberto Cavallaro

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Paul Calle - http://www.callespaceart.com/Calle_biography.html

NYT Paul Calle, "Postage Stamp Designer, Is Dead at 82" By Margaret Fox December 31, 2010

Where No Man Has Gone Before: A History of Apollo Lunar Exploration Missions

By William D. Compton (Page 1140 on Appollo 15) <http://www.spacerepics.com/inventory/apollo11.html>

http://www.chriscallefdc.com/Philatelic_-_Postage_stamp_Designs.html

http://www.chriscallefdc.com/US_Moon_Landing_Stamp_Sketches.html

<http://www.afdcs.org/resources/c76-moon-landing.pdf>

I have worked hard to not use copyrighted material in this piece, as NASA work and USPS are happy to allow use such as an article as this, but if I have we apologise.

UPDATED at time of press (July 2019), it appears that there has been an increase in demand for Moon Landing stamps, and FDC's. \$12 seems to be the norm for an FDC. Last year, this was not so, as evidenced by actual purchases at face value. So maybe there is money to be made yet, or one could just use them to send mail.

The achievement of the Moon Landing was not lost on people, and neither was the beauty of the stamp. The 20th anniversary saw a a \$2.40 stamp designed by Chris and Paul Calle and the USPS Cachet featured a Paul Calle image similar to the one on the 10cent stamp. The 25th anniversary set was also designed by Chris with input from Paul and there was a 29cent and \$9.95 stamps. It is with a small note of disappointment that the 50th anniversary stamps do not have a Calle involved, but that does not mean that I will not be posting some post that day, using a Calle Stamp.





As Buzz Is My Passenger

Steven H Silver

I was sitting at work one day when my phone rang. “We need to get VIPs from O’Hare to the hotel for the International Space Development Conference. What company should we use?” the frantic voice on the other end of the connection asked.

I had been chairing the conference until a reëvaluation of my responsibilities caused me to step down, so I knew exactly what they were looking for. I responded with the name of a company, noting, “That’s for most of them, for Buzz Aldrin, I’d use the Silver Limousine Service.” He asked me for the phone number and I explained that he had just called it. He told me he would check with the powers that be in Washington to make sure it was all right and let me know.

I hung up and wandered over to my boss’s desk.

“Kate, I may need to take a long lunch next Wednesday so I can pick Buzz Aldrin up at the airport.”

How could she say “no”?

Eventually, approval came through. I’d wind up playing chauffeur to Buzz Aldrin and his step-daughter for four drives. Two airport pickups and two airport drop offs. Although Buzz would be attending the ISDC, he had to fly out in the middle to serve as grand marshal for a parade in one of the Carolinas.

This would not be my first encounter with Buzz. Several years earlier, I had contacted his office about making an appearance at a science fiction convention. He called back and left a voicemail indicating that he wouldn't be able to make the appearance. We kept his name and number on our caller ID and his voicemail for over a year until my wife accidentally deleted it. My children (and I'll admit, I) bring the accidental deletion up when appropriate. My wife still feels bad about it. The first day, I was all business, dressing up nicely (it was in the middle of a work day, after all). I parked the car in the lot and went in to the baggage area of O'Hare, carrying a sign with his last name on it. As I waited for him to come down the escalators, one traveler came up to me and said, "I was sitting next to him on the plane. He should be coming out in a few minutes."

A few minutes later, I was greeting Buzz and his step-daughter. While we waiting for their luggage to arrive, we talked a little about his week. The evening before, he had been in Los Angeles for the finale of *Dancing with the Stars*, on which he had performed. He had left the wrap party early because he had a morning flight to catch.

When I was chairing the ISDC, my wife had suggested that since Aldrin was appearing on *Dancing with the Stars*, perhaps we could raise some money for charity by auctioning off the chance to dance with him. That idea wound up surviving the change in chair, getting approval from everyone who needed to approve it. It also turned out to be less than successful. There is a big difference between a choreographed dance with a professional partner and a spur of the moment dance with a stranger at a conference. Of course, Aldrin was the second person eliminated from the competition. I did not let him know where the idea for the dance auction came from.

As I helped Buzz into the hotel, I worked out the arrangements for picking him up on Friday. I mentioned that since Monday was Memorial Day, my 9 year old daughter, Melanie, only had a half day of school on Friday. Would it be okay if I brought her with me. Buzz pointed out that he had his step-daughter with him (granted she was serving as his manager), so what was one more daughter. He also agreed that if I brought some books he had written, he would be happy to sign them on Friday.

So, on Friday, my younger daughter got to meet Buzz Aldrin. My older daughter, not so much.

Of course, Buzz asked where my older daughter was.

Robin was participating in a competition in Knoxville, Tennessee that weekend, called Destination Imagination. DI is a problem solving competition designed to promote STEM among students from elementary school through high school. Students form teams and compete locally, on the state level, and at Globals, if they get that far. Each team selects a type of competition they want to participate in, which is accompanied by blind challenges. Robin's team managed to make it to Globals the first year she participated. They had made a robotic hand that they had to demonstrate during a skit. If you've never heard of DI, you aren't alone. Buzz had never heard of it either. He asked a lot of questions and I told him about

the program.

I like to think that Buzz was really intrigued by our conversation enough that he remembered in in 2015 when he was a speaker at the DI Globals the year that Melanie's team made it to Knoxville.

He also signed several books for us that day. Unfortunately, I was under strict orders from my wife. Under no circumstances was I allowed to ask him to autograph the dashboard of the car. I pointed out that it would add tremendously to the resale value of the car eventually. She held firm and hid all the metallic pens that would have been appropriate. Nine years later, the dashboard remains free of Buzz Aldrin's signature. Melanie, however, still tries to get me to have a plaque made that says "Buzz Aldrin Sat Here" to affix in the appropriate spot in the car.

When I dropped Buzz and his step-daughter off at the airport, I warned him about the Saturday guest. My wife and I were scheduled to work as ushers in the city on Saturday afternoon for a production of *The Million Dollar Quartet*. She would be in the car if that was okay. By now precedent had been set. There wasn't anything he could really say.

By the time Elaine and I picked up Buzz and his step-daughter on Saturday,



we were old friends. Rather than parking the car, Elaine circled the airport while I went in and found Buzz. We came out, hopped in, and took off for the hotel. I told Buzz that the Apollo 11 landing was my first memory. He paused and complained that I was making him feel old. During this ride, we talked about space policy and where things were going wrong as well as where Aldrin disagreed with the opinion of some of his fellow Apollo astronauts, some of whom were attending the conference. At this point, I realized that if I had played my cards right, I could have been driving for three other Apollo astronauts as well as Buzz.

All week long, I had been fielding phone calls from my father, asking when he would have a chance to meet Buzz Aldrin. I kept putting him off. I wasn't exactly a social event. I wasn't taking Buzz out to lunch or bringing him up to the house. It wasn't something I really felt was appropriate. On the other hand, I had brought my daughter and wife along with me for some of the drives.

I mentioned above that my earliest memory was watching the Apollo 11 moonwalk. Let me elaborate.

When Neil Armstrong and Buzz Aldrin walked on the Moon, I was 27 months old, just over two years old. I remember my father carrying me downstairs after I had been put to bed and I remember standing next to our couch (the old goldenrod one, not the newer one that I mostly grew up with). On the old console television, there was a grainy black and white image. My father is inextricably linked to that first memory, as much as Neil Armstrong is. How could I refuse him the chance to meet Buzz Aldrin.

I told him that I needed to pick Buzz Aldrin up at 6:00 AM on Sunday morning. If my father could be at my house by 5:30, he could join me. I don't think he's woken up that early since he retired. There was no way he would make it. And he didn't. I did get a call at 5:25 from my father asking if I could pick him up on my way to the airport (he isn't that far out of my way). I still don't think he's woken up at 5:30 since he retired. I think he stayed up all night, giddy in anticipation of meeting Buzz Aldrin.

And, of course, I'm an idiot. We have a picture of Buzz, my wife, and me. We have a picture of Buzz, my father, and me. We never took a picture of Buzz, my daughter, and me. Having met Buzz Aldrin and having him ride in our car absolved my wife of her accidental deletion of his voicemail. Forgetting to get a picture of Buzz with my daughter has given her something to forever hold over my head.

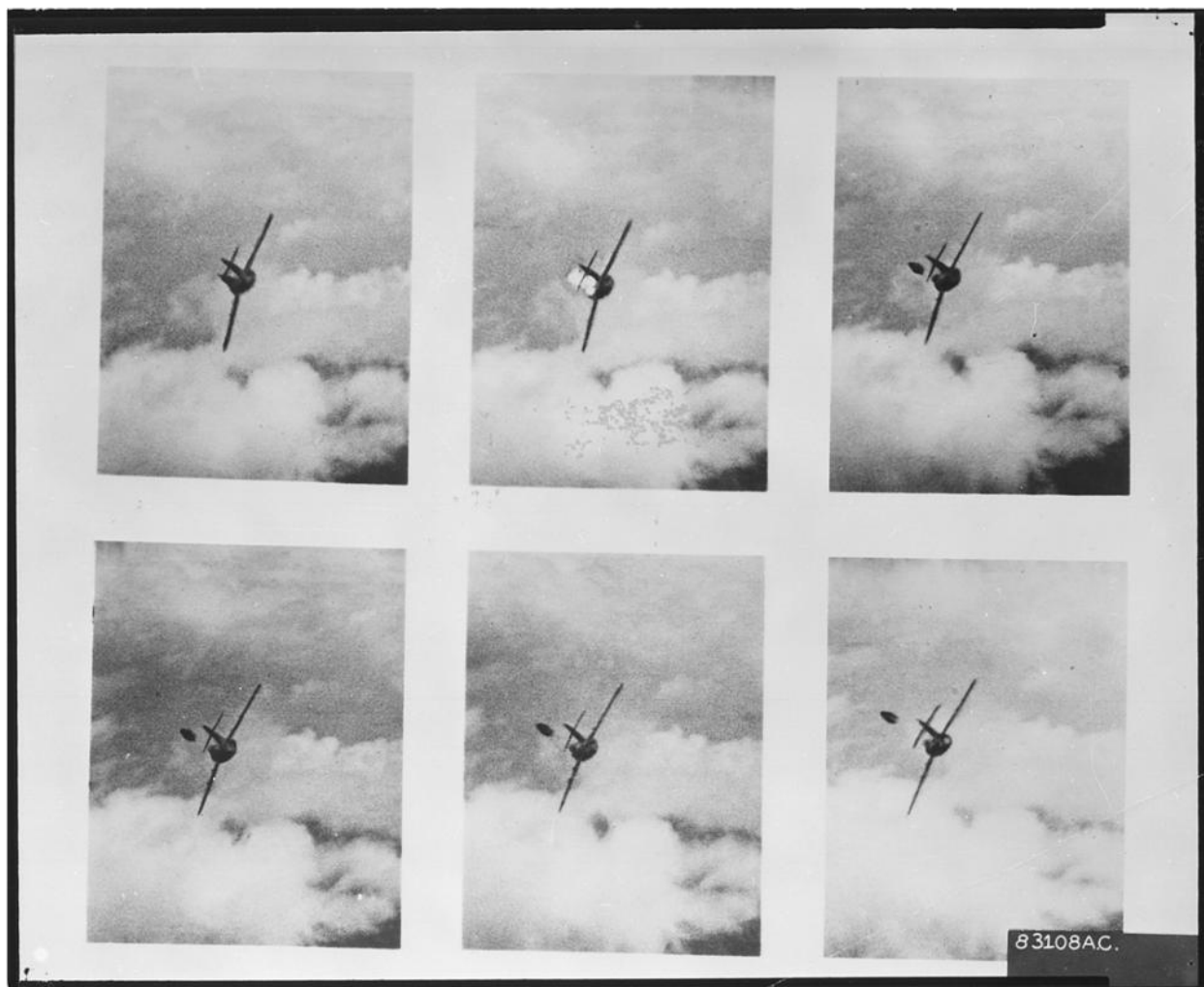


KNOWING BUZZ
Gregory Benford

I peered at the framed photo from LIFE magazine, June 8, 1953, issue. It dominated the wall near the front door, one of the first things you saw coming in. I recognized the Soviet MIG aircraft against a cloud background and a pellet beside it, a pilot ejecting. (Below, the last frame.)

“Your gun camera, right?”

“Yep,” Buzz Aldrin said proudly. “They didn’t even ask my permission. Not that they had to. It’s Air Force property.”

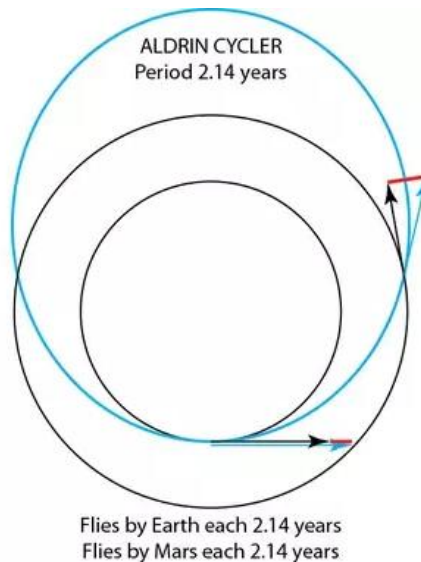


He talked about how jet fighter aces had to have fast, accurate reflexes. The Soviets were good enough but flying steel planes overpowered to make up for the weight vs. aluminum. He knew the North Korean pretense that their pilots were in the many MIGs shot down because he could hear the Russian spoken over radio. “We didn’t say that publically, of course. Kept up the fantasy that there were no Soviets in the war. I shot down two MIG-15s in sixty-six combat missions. I killed a lot of them on the ground, too. But that guy--” his hand flicked at the LIFE cover—“I met decades later. He survived that bail out. We laughed and put away a lot of vodka.” A shrug. “That was on the moon tour.”

All this factual, straight, as I watched Buzz walk over to the bar in his

home, with a catlike grace I could never master. “Hold out your hand,” he said. I expected a glass of wine but he stared at my hand and said, “That’s why you’ll never be a high level pilot. Hand tremor.” Then I got the glass and held it gingerly.

Chastened, I sat, sipped the wine. I knew he had gotten a PhD at MIT, doctoral thesis *Line-of-Sight Guidance Techniques for Manned Orbital Rendezvous*, in three years (!). He wanted to better his odds in getting into orbit. That worked. Other astronauts call Buzz “Doc Rendezvous” and he moved up the mission ladder. “I was the only one with a PhD. I knew how to match orbits and did it a lot and it got me to the moon.”



Further, he published in 1985 the Aldrin orbit, a cypher that loops between Mars and Earth, using flyby kinematics to curve around, so a ship can travel between the worlds with nearly no fuel used. We talked about that and Buzz said, “After the moon, I figured we needed a cheap way to get to the planets. I wanted to go on a cypher myself, a way to get back into space big time. The next big goal—Mars!”

He added that his father wanted him back in space, after he was second to set foot on the moon. “He didn’t quite get that to be first, I’d have had to climb over Neil! In a space suit.” He laughed.

I was in his home because he called me up (!) to ask, on his agent’s advice, if I wanted to write a novel with him. “We can meet regularly, hash things out, while you do the words.”

He handed me an outline, two pages long. We find evidence of an intelligent alien species that visited Earth long ago and left an encyclopedia with the collected knowledge of their culture. One is buried at the Moon’s South Pole, another in a crater on Mars. The race is on to find, recover, and read it.

This reinvigorates the American and international space program. A message from the stars! The history of the Tiberian species, from a planet orbiting Alpha Centauri, its desperate reach into space, the failed attempt to colonize our solar system. Humanity’s united effort to recover an alien artifact of immense value from Mars. A meticulous program for how to set up a permanent human presence—first in orbit, then on Luna, and eventually on Mars. Speculative descriptions of somewhat plausible future interstellar travel. The technology was quite familiar to anybody who has read Robert L. Forward, I thought. Plus nearly off-the-shelf technology which is much more robust and much less expensive than Shuttles.

Buzz said he would contribute heavily to this section. Then, the outline combined two classic SF themes: the future of spaceflight and alien contact. The aliens’ desperate efforts to colonize our habitable planet 9000 years ago, before their own is destroyed, runs up against a host of obstacles. Folly, prejudice, petty rivalries and bureaucratic befuddlement are common to both races. “I’d like you to

show the aliens and our similar troubles with wit and empathy.”

I said I would think it over and study the outline. I was still running the high energy density lab at UCI and getting grad students through their theses, in both theory and experiment. Plus my wife’s kidney disease was worsening. And I had a multiple-novel contract with Harper Collins.

So I passed. I recommended instead a good writer, John Barnes. Not without regret, though, for Buzz was a great character.

My old high school friend Al Jackson had run the flight simulator at Houston so knew all the astronauts. He recalled that Armstrong was well liked but Buzz got the laughs. He proved that with a line from the eventual novel, written with John Barnes and issued in 1996, *Encounter With Tiber*: “The International Astronomical Union may go to the devil, and undoubtedly they have the address.”

Encounter With Tiber was a long book, 570 pages plus a foreword by Arthur C. Clarke. Buzz loved tech and gear, so the level of detail was not needed to advance the plot or understand the characters. But it did give a realistic feel for being an astronaut in space. Buzz’s fingerprints are all over the first section of the book. Not only does it give you an up-close and highly personal look at the inner workings of NASA; it dramatizes an uncomfortably intimate view of the politics of America’s space program. The book sold well, an engineer’s dream embodied in really serious expository lumps.

He wrote another with John Barnes, *The Return*, in 2000. It heavily supports the view that tourism is needed to drive the space industry, which I have discussed with Buzz a lot since, and we agree. So does Elon Musk; I asked him just this spring. But the tickets will be steep, many millions.

Buzz lives in the shadow of Apollo 11 and makes the most of it to promote space. I was at a Planetary Society event in Pasadena about two decades ago when he came over to me and asked for a ride home. It was a great chance to catch up with a more mellow Buzz than I had known. He liked my car, a 1985 Mercedes 560SL, remarking that “I went to the moon but could never afford a buzz bomb like this.”

On the way down to Laguna Beach, I pumped us up to ninety miles an hour for a short stretch and he whooped with glee. He recounted how Bradbury had asked him about the sensation of riding into orbit. “Most of it is being pressed down and shook up.”

Ray had avoided airplanes for decades and never drove a car, but had overcome most of that and now could fly as a passenger. Ray said to Buzz, “I just need two martinis to get in the mood.” Buzz thought this was a lot to drink onboard but Ray said, “Those are just to get me *onto* the flight.” Buzz figured most people would feel the same about riding a rocket. But simple Dutch courage would not be enough, and nobody should use booze in space.

“I hope I’d be an exception, about the fear,” I said. I still hope so, when I see us climbing back up our gravity well, bound for where Buzz wants to be.



Coolock is Full of Spacers

By Pádraig Ó Méalóid

It's often the case that, inside one mystery, there are several other, small, mysteries trying to get out. Take the case of the Woodville Estate of Coolock.

We all know that, on 20 July 1969 the Apollo Lunar Module, known as Eagle, touched down in the Sea of Tranquillity on the Moon, containing American astronauts Neil Armstrong and Edwin “Buzz” Aldrin. Orbiting above them was the command module, known as *Columbia*, piloted by Michael Collins, which they would rendezvous with once they had completed their mission, twenty one and a half hours later. I was, at that time, nine years old, and absolutely obsessed with the whole thing, as was my father. As was, it seemed, everybody else as well. It was all over the newspapers, and all over what television we had, back in those dim, dark, black & white TV days. So far, so good.

We move now from the surface of the Moon to the largely working class Dublin suburb of Coolock. This was, until the 1950s, no more than a small village roughly five and a half miles north-east of Dublin City—although parts of its history got back much further than that, with a 3500-year-old Bronze Age burial site on the grounds of the old Cadbury’s Chocolate factory. And, more recently, Coolock and neighbouring Darndale featured heavily in the film *The Commitments*, based on the book of the same name by Roddy Doyle.

However, Coolock was developed on a continuous basis from the 1960s until the 1980s, to help cope with the rehousing of displaced people from ongoing slum clearances in Dublin's inner city, making it one of Dublin's largest residential areas. And all those streets needed names.

A few years into the redevelopment work—a date I cannot yet pin down beyond knowing it was probably in the early second half of the 1970s—a small group of residential streets, known as the Woodville Estate, was built in the space bordered on the north by Oscar Traynor Road and on the west by Kilmore Road. These were, for reasons I have not yet fully explored, named after the aforementioned Apollo 11 Moon Landing. There is, coming off Kilmore Road, a main feeder street called Tranquility Grove, from which issues, in turn, Eagle Park, Apollo Way, Woodville Court, Armstrong Walk, and Aldrin Walk. Armstrong Walk leads onto Oscar Traynor Road, but otherwise the streets are all cul-de-sacs, albeit having lanes at their ends, also leading onto Oscar Traynor Road—presumably to make access to the nearby, and almost legendary, Northside Shopping Centre, whose radio ad jingle in the 1980s informed all of our lives, easier.

Now, at least two things present themselves here as mysteries to be solved, besides my as yet unsuccessful attempt to nail down a construction date for these. Firstly, who was responsible for naming them? And, almost more importantly, why is one of them called Woodville Court? Research into the question of who gets to name the roads, streets, and estates that are built led me to an article from the *Irish Times* in 2014, which says “*Most councils have ‘naming committees.’ Elected representatives, advised by officials, are expected to ensure that street names and new estates reflect local and Irish place names.*” So, nameless civil servants in smoke-filled back rooms, essentially. But in this case nameless civil servants with a fondness for NASA, it would seem. If the names were chosen in, let us say, 1976, then we are forty three years beyond that, so the likelihood of finding anyone who had actually been present in said smoke-filled back room is remote, by now. Perhaps there are minutes from meetings, tucked away in some archive somewhere? Time constraints prevent me seeking those out now, what with deadlines and all that, but I will be returning to this, largely for my own satisfaction, if nobody else's.

I am fond of quoting Winston Churchill's description of Russia: “*It is a riddle, wrapped in a mystery, inside an enigma.*” And that is what this final mystery, nestled inside all the other mysteries, like a set of Russian dolls, is. Quite literally right in the middle of the five streets leading off Tranquility Grove we have Woodville Court, which most definitely has no relation to the Apollo 11 Landing. Also, if you've really been paying attention, you might have noticed that there one important name missing from the list of street names, that of command module pilot Michael Collins. But this was not always the case, it seems. There are numerous places online where you can find out that what is now Woodville Court was once Collins Rendezvous, but that one or more residents objected to the name, and that, following a plebiscite—either by the residents of the entire estate, or just those in the street under consideration—the name was changed to the plainer one it bears



today.

But this raises more questions than it answers, it seems to me. Firstly, if it's the Woodville Estate, wouldn't it be more likely that all of the streets therein would be called Woodville something-or-other? An otherwise undated 1977 report in the *Evening Herald* on the names says "*Small wonder then that some residents at Woodville Estate got slightly moon-sick and called for the names to be changed to the more down-to-earth names like Woodville Way and Woodville Avenue.*" This leads me to wonder if it might not actually have been the other way around, that the streets might have started out as the Woodvilles Way and Court and Avenue, but that some imaginative souls made a bid to make their home ground more exotic, quite literally out of this world.

Why, though, might someone object to Collins Rendezvous? The thing is, here in Ireland, if you mention Michael Collins, roughly a hundred people out of a hundred will presume you mean Irish politician and revolutionary, rather than the astronaut. And, in the mid-1970s, the Irish Civil War, and the assassination of *our* Michael Collins, was little more than half a century gone, and still figured large in the imagination of the Irish people. Added to this is the fact that the Irish Collins was, and remains, a controversial figure, and you have a situation where supporters of Collins's actions at the time might see a name like Collins Rendezvous as a reference to his death by ambush at Béal na Bláth in County Cork in 1922. And his detractors, of whom there are also many, still, would likely object to living on a street that most people would presume was named in tribute to him. Either way, the name was too contentious to stand, probably. As one Tweeter said, "*If there had been a Michael Collins Avenue in Coolock, would anyone have assumed it was named after the astronaut?*"

But there is much further research left to be done, and I am fully confident that at least some of what I've conjectured above will prove to be incorrect. None the less, the existence of the Woodville Estate, and its lunar connotations—known locally as the Moon estate, or the Space estate, or the Moonies, or the Spacers—is true, and a wonderful thing.





Passing the Torch

Brenda W. Clough

My father worked for the Foreign Service in the US State Department, and in the late 1960s we were stationed in Vientiane, Laos. Due to the war next door in Vietnam, there was a considerable American presence in Southeast Asia. In 1969 we had home leave, back to the US for the summer, and we flew like homing pigeons back to New York City to stay with my mother's parents in their little apartment on the Upper East Side.

I was 13 that year, young enough so that all these ructions were simply part of normal life. Every family that I knew got onto airplanes every now and then and flew around the globe for a month, a year, or a decade.

My grandfather, H.W. Chan, was the founder of the Chinese Air Force under Chiang Kai-shek. There is a photograph of him, in a leather helmet and a long silk scarf, standing beside his biplane at Wright-Patterson Air Force Base. Along with many other Republic of China officials he blew out of China in the '50s to the US. Born in China at the tail end of the 19th century, the old people had already made the inconceivable leap from the century of Lincoln to the presidency of Nixon, from coal power to jet travel. But the moon landing was a bridge too far. Since it wasn't their first language neither of my grandparents understood English well, especially the rapid-fire speech of the TV announcers. They relied upon us, the American-born grandchildren, to sit in front of the huge walnut-console television and explain what was going on.

On July 20, 1969 I remember sitting cross-legged on the green living room carpet, watching the Apollo moon landing while my grandfather pestered me in Cantonese to tell him what this was. I knew the English for "lander" and "rocket" but to this day I do not know the Chinese words.

With his aviation background my grandfather knew this was important (I am not certain my grandmother ever got a grip on it). Alas, my minimal Chinese wasn't fluent enough to convey the wonder of what they were seeing, in black and white on a 20-inch screen. There is a tremendous chasm that separates each generation from the younger one. I knew I was on the one side of this one, and they were on the other, even though we were sitting in the same living room. At that moment it seemed entirely possible that I too would walk on the Moon. When you are thirteen the universe is an open door and you can go anywhere. But not to them. In that living room we embodied the huge progress human beings had made.

Today, fifty years later, I find myself on the wrong side of that chasm. There's discussion of a lunar colony, a Mars colony. If they ever have an off-planet settlement I won't be going; they're going to want colonists with better eyesight, sturdier knee joints. I can only travel to another planet through books.

My grandparents didn't have this option. There was no science fiction in China at that period. If they glimpsed what they would never have, they saw it only dimly, through the TV image and my halting explanations. We do not yearn for what we can't imagine. But that's our job, the job of the writers—to imagine it. We imagine it and hold it up. And when others want it enough, they can bring it to reality.

So, my grandfather didn't go to the moon, and I'm not going to Mars. But you can. You do it. Go, and stand on Mars, and look out. Do it for all of us, making the dream real, making that giant leap that will allow your great-grandchildren to see yet further. We'll be with you, all of us, all the way.



A Trip to Columbia Steven H Silver

Since 2017, the National Air and Space Museum has been undergoing renovations. Because they have had to take the display of the Apollo 11 command module out of the hall in which it is typically displayed, they have sent it on a tour of a select few museums around the country (it is currently in Seattle, Washington at the Museum of Flight).

Last year, it was domiciled at the St. Louis Science Center in Forest Park, the closest it would be displayed to my home port in Chicago. The trick was to find the time to make the five hour trek down to St Louis to see it.

While I was trying to figure out a time to go down to St. Louis, my wife was planning a trip to Kentucky. What wound up happening was after the Kentucky trip, my daughters and I made a detour to St. Louis instead of coming directly back up to Chicago, for the chance to see the display.

The display opens with a recreation of what a typical suburban living room would have looked like in July 1969. Well, typical if the family that lived in the house was somewhat focused on the space program. In addition to the requisite couch, coffee table, television, record player, etc., the room also contained a large number of magazines with pictures of spaceships and astronauts on the covers.

From there, we were able to go into a room to see a video about the St. Louis connection to the Apollo program, although I expect that video is different in each of the cities the exhibit traveled to in order to highlight each city's own connection. The video focused on the McDonnell Douglas Aircraft plant in St. Louis, which had built the Mercury and Gemini capsules. When the film ended, I talked to my daughters about a portion of St. Louis's legacy with the astronaut program that the film hadn't covered, notably the tragic deaths of astronauts Elliott See and Charles Bassett on February 28, 1966 when their T-38 crashed into McDonnell Aircraft Building 101. One of the results of their deaths was a shuffling of flight crews which meant that Buzz Aldrin had the opportunities to fly on Gemini 12 and later Apollo 11.

For those who were interested in reading the text displays, the exhibit provided solid background on the Apollo program and the efforts made by the men and women who worked for years to ensure that the astronauts could achieve "the goal, before this decade is out, of landing a man on the Moon and returning him safely to the Earth."

The exhibit also contains numerous artifacts from the mission, including pieces of the heat shield (both burnt and unused), Buzz Aldrin's helmet and glove, a survival kit, a moon rock, a medical kit, and the hatch to the command module.

Of course, the main focus of the exhibit was the actual Apollo 11 command module, *Columbia*. Standing near the back of the exhibit, the command module is both enormous and tiny. It dwarfs everything around it, but when you consider that three men lived in it for eight days (okay, for 22 hours of that time it only housed Michael Collins), it is a small space. Being in 0g opens up some of the space, but it still seems like it would be a cramped place to spend a week. (The shortest Apollo mission was 13, cooping the astronauts up for 5 days, 23 hours, the longest was 18 at 12 days, 14 hours).



The display was set up so you could make your way around the entire module and although the hatch had been removed (and was on display nearby), there was no way to climb high enough get a good view of the interior of the module, as opposed to the display of the command module for the Apollo 8 mission (which

took Frank Borman, James Lovell, and Bill Anders around the moon in 1968) at the Museum of Science and Industry in Chicago, where you can climb a ramp to look through a Plexiglas cover at the interior of the space craft.



Although the set up at St. Louis was not optimal for a full viewing experience, there is something special about being in the presence of *Columbia*. There aren't so many Mercury, Gemini, and Apollo modules that have flown into space that they aren't all special, but in truth, some of them are more special than others. Alan Shepard's *Freedom 7* was America's first manned spacecraft. Gus Grissom's *Liberty Bell 7* was lost at sea and for years the idea of being able to see it was nothing more than a dream. John Glenn's *Friendship 7* was the first American spacecraft to orbit the Earth. The *Molly Brown* was America's first two-man mission, Apollo 8 was the first spacecraft to leave LEO and travel to the Moon. *Gumdrop* was the first time the Apollo command module was crewed by a single astronaut when James McDivitt and Rusty Schweickart took *Spider* for a test drive in Earth orbit. *Charlie Brown* was the first to house a single person in orbit around the Moon when Tom Stafford and Eugene Cernan took *Snoopy* for a test flight.

Yet *Columbia* is special because it repeated so many of the firsts achieved by Apollo 8, *Gumdrop*, and *Charlie Brown*, but in the end it was the home for the first two men who walked on the moon. It was the first command module to actually be used to transport pieces of the Moon back to Earth.

In some ways, the layout of the exhibit in St Louis was a mistake. Although *Columbia* was at the back of the room, it was in the middle of the exhibit. After seeing the command module, you would walk past the hatch, medical and emergency equipment, and other things that were carried aboard the mission. Interesting in their own right and with well written descriptions, they still came about as anti-climactic after being in the presence of *Columbia*. On the other hand, I'm sure that many people hurry past the earlier exhibits in their rush to see *Columbia*. On the gripping hand, those who are so focused on just the command module probably aren't too concerned about the rest of the exhibit.

One of the things museum exhibits need to do is tell a story based on the artifacts and relics they exhibit. Putting them on display with a simple placard that doesn't connect the item to the larger context is no longer enough. Through the use of the placards and panels of information, the exhibit centering on *Columbia* is successful by this criterion.

The exhibit ends with a couple of interactive exhibits. There is a mockup of the interior of *Eagle* that people can stand in. It is only about two feet deep, so



doesn't really give a feel for the space Armstrong and Aldrin had, but it does provide an understanding of the views they had as they stood in the Lunar Module on the way down to Mare Tranquillitatis. There is also a version of the early video game *Lunar Lander*, although much more complex than the arcade version from 1979 and a display that allows visitors to set the parameters for a launch and see if they would be able to achieve orbit. Both of them were complex enough to limit the number of successes.

The exhibit was enjoyable and informative, even for someone who has a reasonable amount of knowledge of the space program. Readers who are in the Seattle area during the next few weeks before the exhibit closes down on September 2 should take advantage of the proximity to head down to the Museum of Flight. After September 2, the exhibit travels to Cincinnati, the last stop on its tour, before it will be placed on display, once again, at the Smithsonian.



LUNAR SAMPLE 15050,188 (024)

This Apollo 16 lunar sample (moon rock) was collected by
astronaut James Irwin at Station 8 adjacent to the lunar module
Lunar Module 15. This rock weighs 189 grams. It is a fragment of the
lunar rock which weighed 2,672 grams when returned to
Earth. The sample is a mare basalt. Lunar basalts are very old,
about 10,000,000 years, older than 98% of all earth surface
rocks. Scientific research is being conducted on the balance of
this sample at NASA's Johnson Space Center and at other
laboratories in the United States and certain foreign
countries. A continuing program of investigation involving
this sample was conducted during the Apollo Program.



Instant Fanzine

As ever we are grateful to all the fans here who took part and responded to our instant fanzine request, we love to hear what you have to say.

Scott Hipp

What's the significance of the moon landing to you?

I was 11 and remember lying in front of the TV watching Apollo 8 circle the moon. I was extremely pissed off because I wanted to be the first to walk on the moon and realized at that moment someone else would beat me to it.

The following year I was attending an Obon Festival at a local Buddhist temple with my family. The booth raffling off various items had several 19" black and white TV's tuned to the moon landing. Reception was poor and grainy but viewable for the time. Dozens if not a hundred were gathered around to get a view and I was at the front feeling very excited and proud.



Sarah Gulde

What personal connections, memories or shared memories or trinkets do you have of the moon landing?

I visited Historic Mission Control at Johnson Space Center a few years ago, and I'll always remember sitting in the room where it all happened. I also have my grandma's copy of *The Oregonian* (our local paper here in Portland) from the first and second day after the landing framed in my living room. "AMERICANS WALK ON MOON! 'GIANT LEAP FOR MANKIND'". There's nothing besides moon landing news on the front page the first day. The second day is really interesting, juxtaposing reactions to the moon landing with other national news such as race riots in Ohio.



Why do you think this human achievement is cherished so much and where should humanity strive to go to next?

I think the world watching something so important together was an inspiring moment for us. As an American I tend to be a bit cynical and think a lot of it was nationalism, but then I hear about folks' experiences watching from around the globe and am reminded that it was so much more. At NASA we met some folks from Australia who said the teachers dragged their TVs into school so all the kids could watch, because not everyone there had TVs in those days. As for where to go next: Mars, Mars, Mars!

What would you have liked me to ask - feel free to answer a question of your own making....

Random tidbit I heard at NASA and nowhere else: we almost didn't get footage of the first steps on the moon, because there was some debate at NASA as to whether bringing cameras was worth the extra weight! Can you imagine?

Rob Hansen

What's the significance of the moon landing to you?

The biggest event of my life.

What personal connections, memories or shared memories or trinkets do you have of the moon landing?

See attached. Laying out that stuff to photograph it I was surprised I still have the instructions for the Airfix Saturn V. The model itself is long gone.

FREE WITH FANTASTIC

APOLLO SPACE CAPSULE

DESTINATION - MOON!

Some time between now and 1971, three men will climb into the Apollo space craft atop the giant Saturn V rocket. First step—the moon! As the count down reaches zero the first-stage will ignite and 7 1/2 million pounds of thrust will lift the 400 ft. 3,300-ton vehicle into space. Then 21 minutes later, the first stage will fall away and the second stage will boost the moon ship to a height of 100 miles. When stage two is jettisoned after five minutes, stage three will nudge the ship into a 17,500 m.p.h. orbit around the earth, then shut down.

After some hours of intensive check-outs, the third stage will fire again. In five minutes Apollo will have reached a speed of 25,000 m.p.h. and will head out into deep space.

In the diagram on the right, you can follow the sequence step-by-step as the moon ship speeds towards her destination.

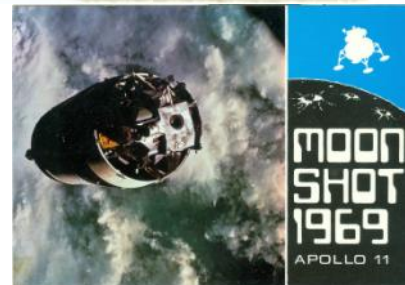
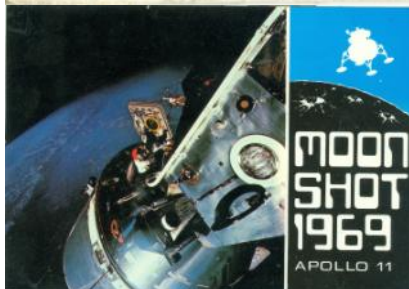
Some 75 hours later, the Apollo moon ship will enter a Lunar orbit 100 miles above the moon's scarred surface. Two astronauts will then climb through the air lock into the Lunar Excursion Module (LEM). Meanwhile, 240,000 miles away at the mission control Houston, Texas, technicians will be checking and double checking the information coming in from the moon-ship's various systems. The LEM will break away from the command ship and, after 2 or 3 exploratory orbits, descend to the lunar surface, leaving the other half of the space craft in orbit around the moon.

After 24 exciting hours of exploration and research, the two men will blast off from the cradle of LEM's undercarriage and rendezvous with the orbiting ship. Guided automatically to within sight of each other, the astronauts will then dock the ships together by manual control.

The return flight will be uneventful, but the final stages could be the most dangerous part of the entire mission. The manned capsule must hit the earth's atmosphere at just the right angle. If it is too shallow, it will bounce off like a flat stone skipping over water. Too steep, and the air will clutch, burn and vaporize both men and machine!

At 25,000 ft., a drogue chute will stabilize the falling capsule. This stage is illustrated in our large open-out picture, which shows you the layout of the returning space capsule. At 15,000 ft., the main chutes will be streamed in a "rolled up" position, and will crack open at 10,000 ft.

Man will have made his historic journey to the moon—and returned!





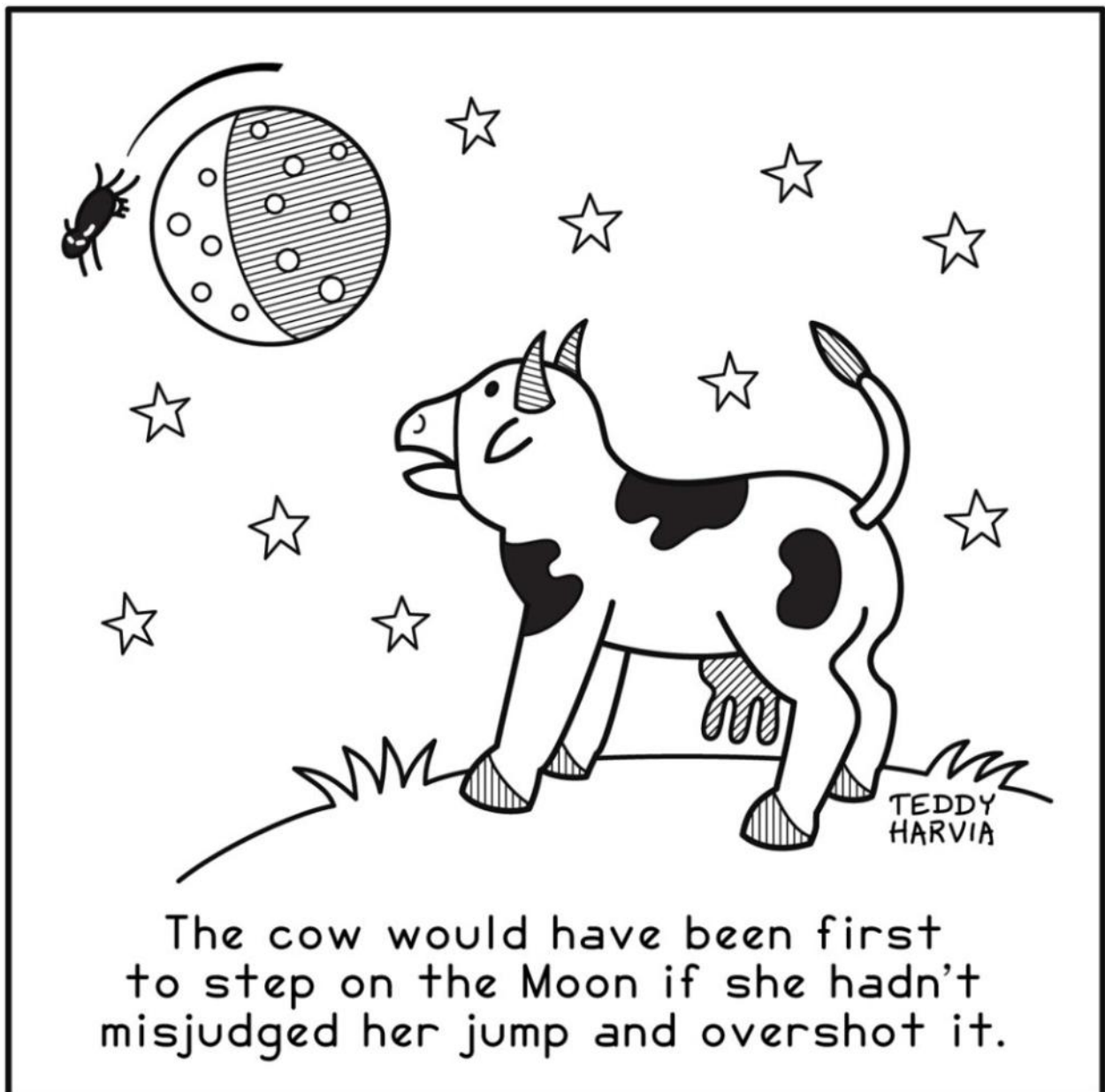
Why do you think this human achievement is cherished so much and where should humanity strive to go to next?

It should be more cherished than it is. It amazes me there is a moon-hoax cult out there. Next: Mars, obviously.

Pádraig Ó Méalóid

What personal connections, memories or shared memories or trinkets do you have of the moon landing?

I was three months short of my tenth birthday, when Armstrong and Aldrin walked on the moon. It was everywhere, and we were all watching it. You might have heard me before now talking about how it wasn't the greatest thing in my life to be a pupil in the same school where my father was a teacher, but in this one in-





stance it all paid off. He had brought a TV set into his classroom to let his class watch the landing, and I got special dispensation from whatever class I was in to go watch it in his room. Most of the time the picture was just grey snow and the like, but occasionally something came into focus. It's one of the reasons I'm 100% behind Buzz Aldrin punching out those people who say it never happened—like him, I *know* they were

there.

Patty Wells

What's the significance of the moon landing to you?

When I read James's email I got to "significance," and said rather loudly, "Significance, it was only the most important thing ever." I knew it was loud, as Charlotte, the timid rescue dog who glues herself to me, looked aghast and left for another room.

But seriously, it was, at least to me. I had just turned 14 in a tiny town on the Oregon coast—Port Orford—no, you've never heard of it. But pre-Internet it was very like the moon in terms of isolation and desolate beauty, all ocean on one side and forest on the other. Science fiction was the one real escape. Asimov's *Foundation* Trilogy was my favorite galactic empire, but any SF I could get my hands on and any that involved humans spreading out through the galaxy spoke to me in a way you all understand.

I watched all the television coverage available and had a radio going as well (given it being the olden days of three not very clear TV channels where I was). Even my cynical father was excited as we discussed where the space program would go from this first landing on another world. Having watched the space program progress, it seemed to me that there would be a permanent base in another decade, then onto Mars. It seemed like my dreams of raising children on the moon was only a little crazy, and having grandchildren on Mars seemed like just common sense. Watching the landing was surreal, wonderful, and the realization of the space program my older brother had started me following as a small child.

It looked like the first tiny step to one of those galactic empires, and what could be more exciting than humanity spread across the stars. Anything seemed possible. As you can imagine, the past few decades have been a vast disappointment to me in terms of escaping the planet.

I have been following the recent announcements of the Artemis project and still hope. A recent headline on CNN stated that NASA planned to put the first woman on the moon in 2024, and the same geeky teenage SF reader thrilled at the thought, and still wished it could be me, or my daughter Zoe. Am I optimistic? Not so much, given the costs projected to do it safely. Have you seen the tin cans that the original astronauts went up in? The Air and Space Museum will show you just how brave and crazy an enterprise it was. I had mechanical toys for my kids that

were less flimsy and had much more computer support.

I still have dreams because teenage SF fans never get older in their heads. I see humans getting to Mars more as climate disaster refugees than as the conquering empire builders, but it's still hope.

Regina Kanyu Wang

What's the significance of the moon landing to you?

As to all SF fans, moon landing is a symbol of aspiration, exploration and possibility to me.

What personal connections, memories or shared memories or trinkets do you have of the moon landing?

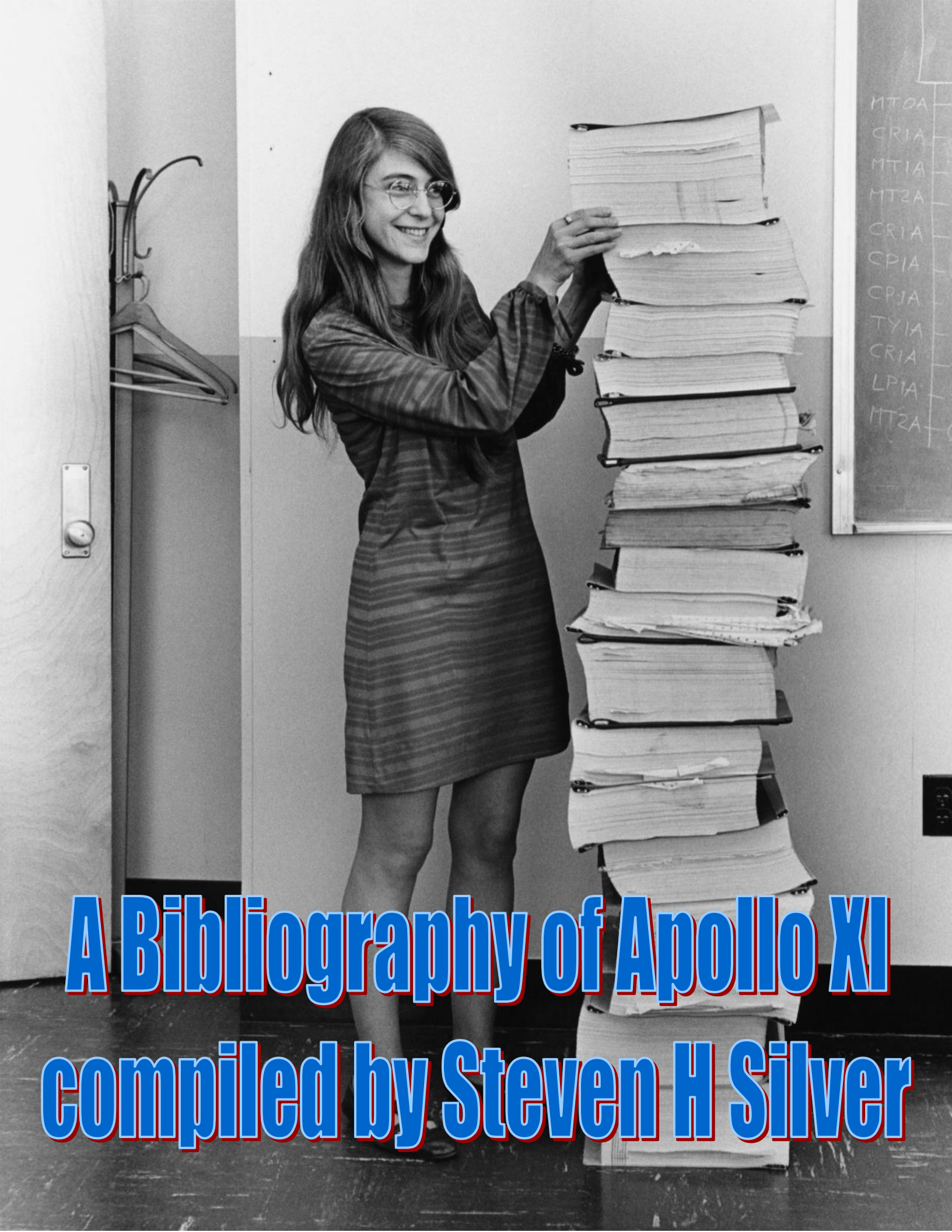
I was too young to witness it live, but I heard so much about it. I hope I can see human beings landing on moon or even Mars in my life.

Why do you think this human achievement is cherished so much and where should humanity strive to go to next?

It's the first time human stepping on another astronomical body in history. We have been observing them, imagining about them and dreaming about them for so long, but actually being on it is so different. Maybe Mars next? I believe that is what everyone is aiming at.

What would you have liked me to ask - feel free to answer a question of your own making...

This year, China launched Chang'e 4 to land on the far side of the moon, where no one has gone before. So glad to see that proves no Nazi military base there!



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A Bibliography of Apollo XI
compiled by Steven H Silver

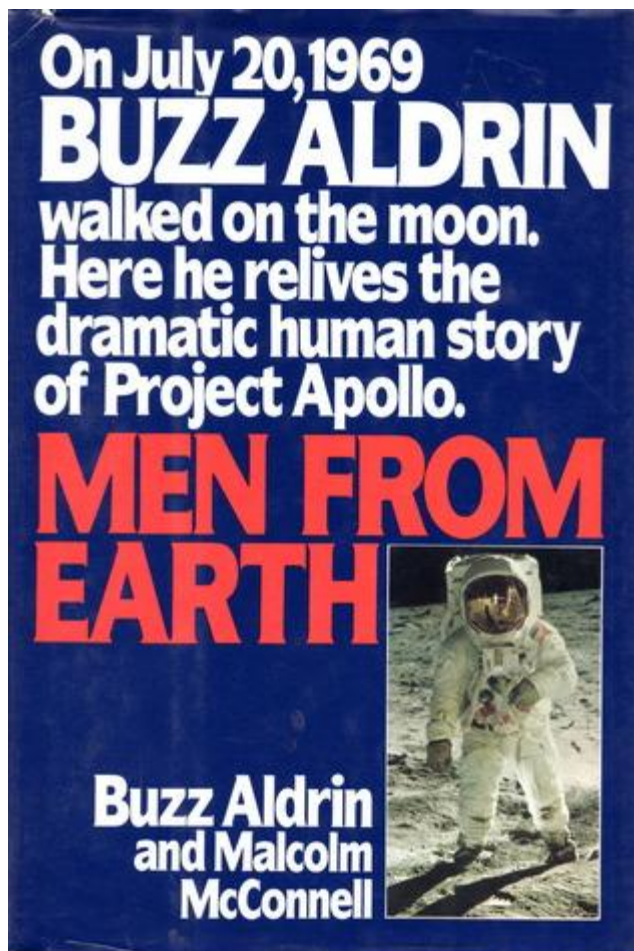
This is in no way a complete list of books about the Apollo missions, let alone the man spaced program. It focuses on the flight of the Apollo XI, although some of the books cover the Mercury, Gemini, and Apollo missions that led up to it or the subsequent Apollo, Skylab, and Shuttle missions. There are several excellent books by members of other Apollo crews which are not included since the focus of those books is on their own flights.

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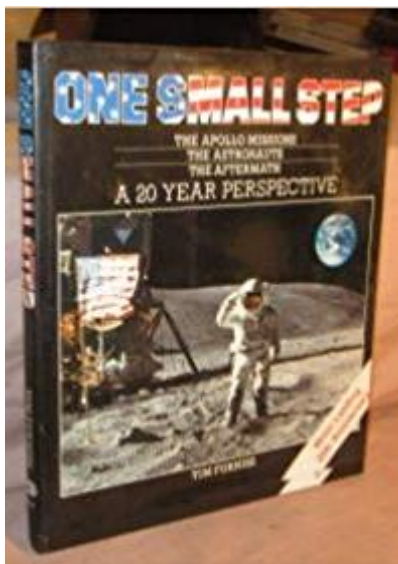
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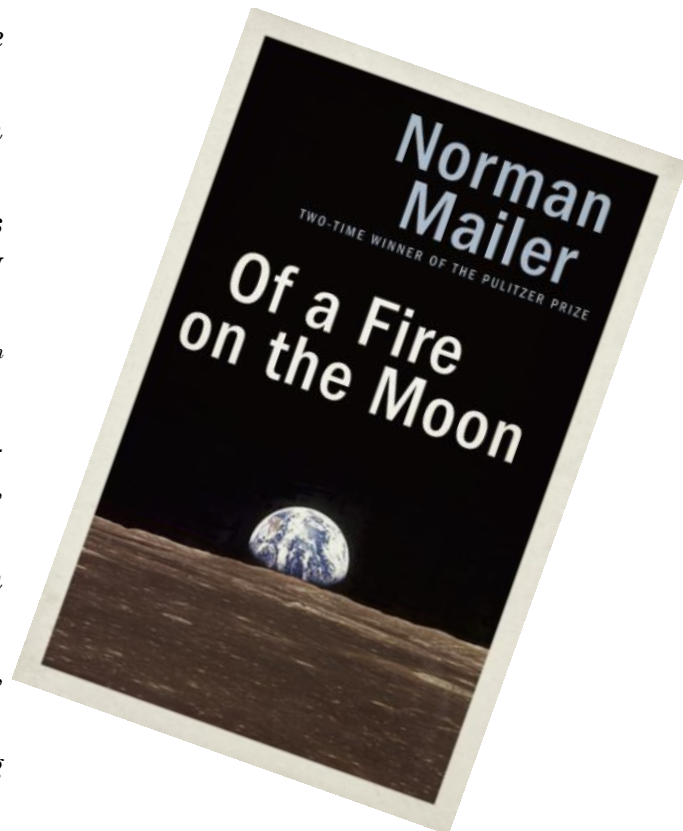
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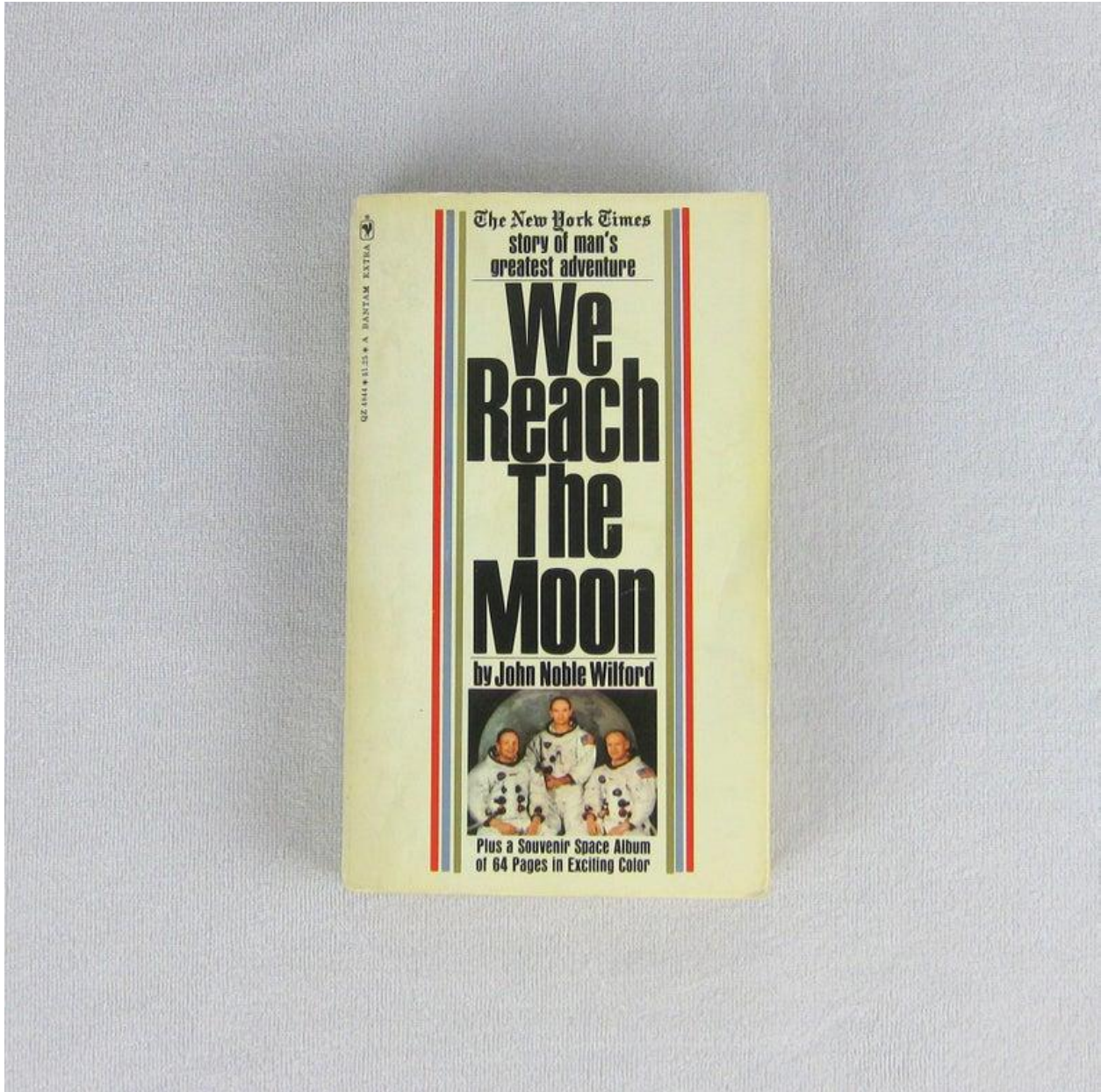
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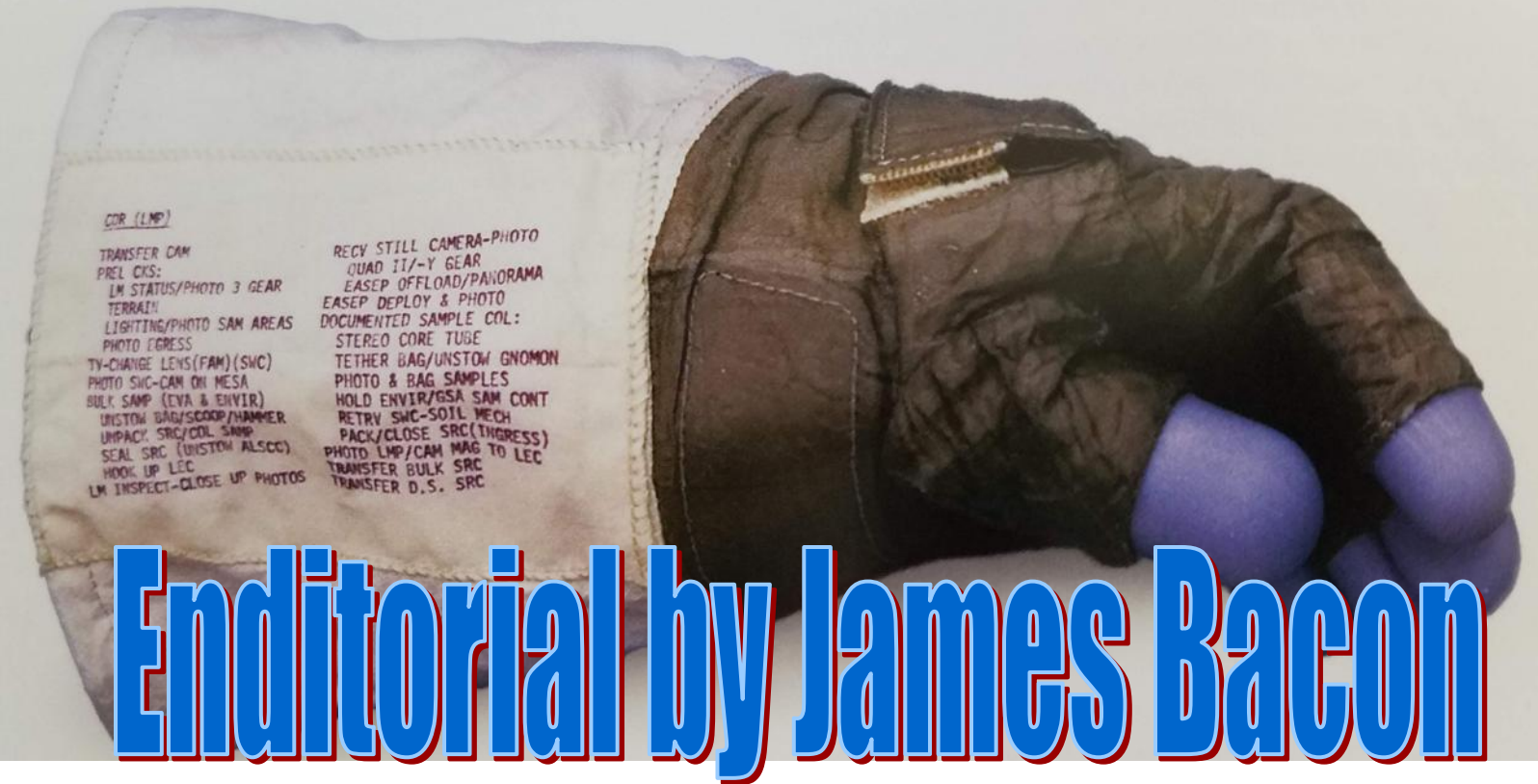
Guenter Wendt & Russell Still, *The Unbroken Chain*, Apogee Books, 2001.

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Note: Opener image of Computer History Museum fellow Margaret Hamilton with Apollo Guidance Computer code.



I hope you all enjoyed this issue.

The moon landing marks such a human achievement. While without doubt, there are many milestones along the way, and the Wright brothers obviously led the way, it is amazing to think that sixty six years after their first incredible flight, that men were propelled to the moon, landed and returned to earth successfully. In 2032 there will have been as much time between those achievements as the moon landing and I wonder, if we have some fantastical strides ahead in the next thirteen years.

Astronauts are amazing people. Having met Cady Coleman and Story Musgrave in person and seen how wonderful they are, especially as educators and enablers of young people, I understand how the yearning for learning can be captivated by something like the moon landing. I do feel though, and hope that current generations have their moon landing.

My childhood memory of space, as an Irish lad was mostly science fictional, and the waning days of the late 70's into the days of the shuttle, was not as exciting, and it all felt far removed, to be honest, I never felt that connection, that I know many US fans have had, and I was too young to understand fully or appreciate the moon landing, it was another piece of fascinating history.

A tiny piece of moon rock went on display at the US Embassy in Dublin in 1970 and more than 4,000 queued to have a look.

Ireland was gifted four small pieces of moon rock along with an Irish flag that travelled to the Moon with Apollo 11. It was stored at Dunsink Observatory, but lost following a fire in the late seventies. The luck of the Irish wins out though. Although those pieces were never recovered, Captain Eugene Cernan, Commander of Apollo 17, had previously presented a piece of moon rock to President Childers upon his visit in 1973 and this is still with the National Museum of Ireland.

There is so much about the lunar landing, so any connections, so much that at the time occurred, that anyone who lived through it of course must have felt connected. I am very lucky, in that over the last few years, I had the chance to come by some amazingly cheap philatelic material, all featuring space, mostly featuring the moon landing and due to it being of interest, picked them up, I am a dreadful collector, I like various themes, but am not rigid, so of course, the Civil War, World War II, and other historical as well as pop culture elements interest me, and I pick up what I

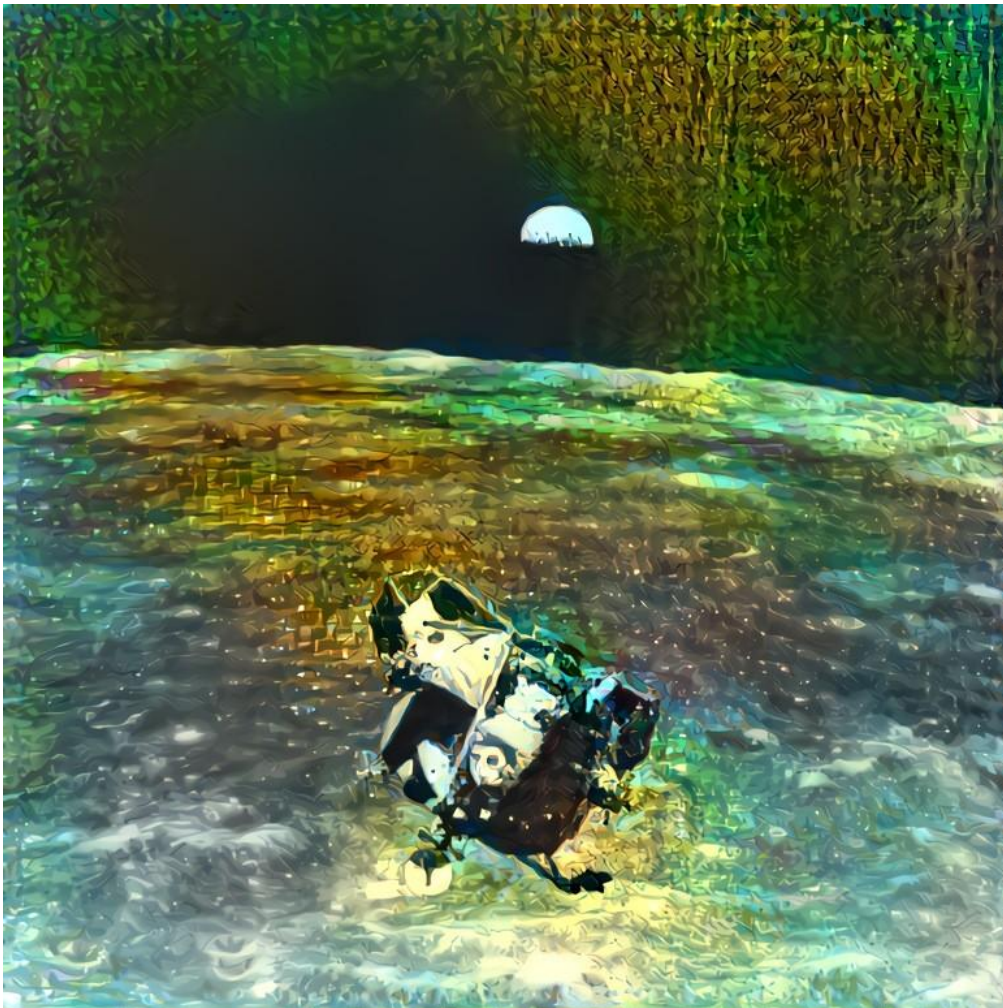
can, and so I have some stamps, but there were millions, so they do exist.

As well as stamps, I am fascinated by the jackets that the lunar crew wore on the flight. I was watching various videos, on YouTube, raw footage of the trip to the moon, the press conference (Collins had a 'stache!), moon walking, and just running things in the background and I was taken by the jacket that was worn by Neil Armstrong and company for some segments of the Apollo 11 mission. They changed from the full pressure suit they wore during launch, into inflight cover garments, including what I thought was a jacket, which I played forward and back. The jacket was white, with a big plastic edged hole on the right side of the body where medical connectors went. It was made with teflon-coated beta cloth, super light and super slippery and fire resistant. Adorned with the US flag on the left shoulder and a NASA logo on the body and the Apollo 11 mission patch on the left, it looks so cool and sure enough, I was not alone and when they made replicas as Moon Suits once did, they were \$700...

Costly business.

I think we really do need more scientific achievements that capture the imagination, no one can deny that science has produced amazing things, but as one looks on and sees how many countries yearn and strive for space exploration and achievements, it is hard not to want more. Of course, I will hope that Norah Patten, Ireland's astronaut scientist, achieves her dreams, and gains entry into the elusive and exclusive club of people who have travelled into space, and I wish that she gets to watch the silent stars go by.

As ever my very best



"But why, some say, the Moon? Why choose this as our goal? And they may well ask, why climb the highest mountain? Why, 35 years ago, fly the Atlantic? Why does Rice play Texas?"

We choose to go to the Moon! We choose to go to the Moon...

"We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard; because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win..."

President John F. Kennedy

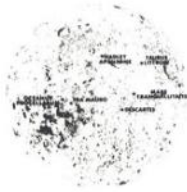
1969

2019



"Because of what you have done, the heavens have become a part of man's world. And as you talk to us from the Sea of Tranquility, it inspires us to redouble our efforts to bring peace and tranquility to Earth. For one priceless moment in the whole history of man, all the people on this Earth are truly one: one in their pride in what you have done, and one in our prayers that you will return safely to Earth."

President Richard M. Nixon



**HERE MAN COMPLETED HIS FIRST
EXPLORATIONS OF THE MOON
DECEMBER 1972, A.D.**

**MAY THE SPIRIT OF PEACE IN WHICH WE CAME
BE REFLECTED IN THE LIVES OF ALL MANKIND**

Eugene A. Cernan

EUGENE A. CERNAN
ASTRONAUT

Ronald E. Evans

RONALD E. EVANS
ASTRONAUT

Harrison H. Schmitt

HARRISON H. SCHMITT
ASTRONAUT

Richard Nixon

RICHARD NIXON
PRESIDENT, UNITED STATES OF AMERICA