

2.3 Apollo 4 – The Big Test



It was hard for me to believe that the launch of Apollo 4, the first of the Saturn V launch vehicles, had finally reached its terminal count. For nearly a year men and machines had labored day and night to ready a tremendous collection of advanced concepts, mammoth ideas and sophisticated hardware into this glistening white projectile, standing 363 feet into the Florida night sky, stark and dramatic under the glare of hundreds of searchlights. I stood there in the early hours of the 9th of November (1967) amazed that the 104-hour countdown had progressed to within hours of launch without a single hold or problem. Only a few weeks previous a countdown demonstration had struggled on for two weeks before finally reaching a simulated T-0 and no one expected this first live count to be any different. However, here we were, nine hours from launch, the Apollo spacecraft secured for flight, the mobile service structure moved back to its parking area and my job complete now except for final systems monitoring, launch, and flight support. We began the final clearance of Launch Complex 39A for servicing of the launch vehicle cryogenic propellants, liquid oxygen and liquid hydrogen.

I began the 3-mile drive back to the Launch Control Center (LCC) following the same route as the crawlerway – a massive shingle topped twin concrete roadbed that carries the crawler transporter with its 11 million pound load of vehicle and launcher from the Vehicle Assembly Building (VAB) to the pad. I called in briefly at the LCC, a four-story concrete building that takes the place of the old style blockhouse and which contains four complete independent firing rooms, each the size of a large auditorium. Each room has tiers of checkout consoles for all launch vehicle systems and is faced by 10,000 square feet of five-ply safety glass with an unhindered view across the Florida palmetto scrub to the pad.

Leaving the LCC I noticed the press stand filling up with newsmen from all over the world and wondered how they would fare in their open stand barely three miles from the launch site.

I continued on my journey back to the Manned Spacecraft Operations Building (MSOB), the nerve center for all spacecraft operations, passing the VAB, the largest building in the world by volume and I thought of the weeks and months we had spent up on the 30th level of that structure before we had made the final journey to the pad. Ever since January 27th 1967 when three brave astronauts had died in a simple straightforward simulated “plugs-out” test we had all been low in spirits, low in morale, hounded in the press and overburdened by redesign, over emphatic checkout and safety requirements. The sheer pressure of long hours and management emphasis on maintaining existing schedules despite these added workloads had left the whole Apollo launch team physically and mentally exhausted. An awful lot was riding on this launch – the first of the “Big Shots” and I prayed that all our efforts through this long year would not be in vain. It was, nevertheless, still a big calculated gamble. On this flight we would launch the biggest space vehicle in the world, an untried Saturn IC first stage with its 5 non-flight proven F-1 engines, an untried Saturn II second stage with its 5 liquid hydrogen J2 engines and we would reignite the third stage Saturn IVB in orbit for the first time. If all these launch vehicle unknowns worked out we would still face a detailed spacecraft flight operation requiring dual burns of the Service Propulsion System (SPS), an elliptical flight path 11,400 miles into space and a return at 25,000 MPH for an impact in the Pacific Ocean northwest of Hawaii. None of the top NASA officials were optimistic; most expressed a pessimistic attitude that if 50% of the flight objectives were reached they would be well satisfied.

Reaching the MSOB I made my way to the spacecraft control room, joined my other engineers at our consoles and settled down for the final hours of the count. Numerous cups of coffee were consumed as we nervously ticked off the hours and minutes. No holds were forthcoming from the launch vehicle personnel as they progressed with their cryogenic loading into the final hour. Now the launch crew were talking, still rather hedgedly, of an 0700 hours on-schedule launch. Could it be possible?

The final minutes ticked away, we activated our propulsion systems for launch, finally armed the spacecraft and began to carefully monitor all our data displays for last minute discrepancies. Still the count progressed ... T – 5 minutes, T – 3, T – 2, T – 60 seconds, T – 45, 30, 10 ... automatic engine ignition ... no recycle now. We watched on our TV monitors as the 5 giant F-1 engines lit in sequence, generating 7,500,000 lbs of thrust, an equivalent 160 million horsepower! Flame swept across the launcher like a fiery waterfall, beating into the flame pit and sending showers of concrete particles two miles across the flat Florida landscape onto the fallback personnel located as close as safely possible in case of emergencies. The monster vehicle weighing 3000 tons and longer than a destroyer, slowly lifted on an incredible tail of fire that smashed metal railings, winches and elevator doors off the launcher to the pad perimeter 5000 ft away. The shock wave reached the press site nearly demolishing TV trailers and beating reporters with pulsing waves that hammered and shook at them. The noise, the third loudest ever known – only two natural events being louder, the Krakatoa volcano eruption in 1883 and the Great Siberian Meteorite of 1908 – actually reached us deep inside the MSOB as we held our breath and watched our TV monitors. Quickly the rocket picked up speed, began its roll program out over the Atlantic Ocean and as it began to reach the rarified upper air the incredible pillar of fire beneath it began to spread out sideways and lengthen until it was nearly 2000 feet long. 2 1/2 minutes after lift-off, 38 miles high and still clearly visible the first stage cut off, was jettisoned and the second stage took over the boost. For the next 5 minutes it too worked flawlessly carrying the third stage and spacecraft to a height of 117 miles and a speed of 15,300 MPH. Third stage burn of about 2 1/2 minutes maintained the 117 mile orbit and increased the speed to 17,500 MPH. The orbital objectives had been reached.

We sat back at our consoles, still unbelieving such a successful flight thus far, watching the fire crews attempting to quell the numerous fires still

burning on the launch pad. Ninety minutes later we again monitored our displays as we began to receive telemetered data from the spacecraft during its pass by into the second orbit. At the completion of this orbit the still attached third stage fired a second time to send the spacecraft out into its highly elliptical orbit. This firing, called the “translunar injection” on lunar flights to come, was for nearly 6 minutes, 19 seconds longer would have sent this Apollo 4 spacecraft to the moon! The spacecraft, now separated from the third stage, was on its own. Performing its Service Propulsion System firing to simulate translunar mid course corrections and undergoing deep-space heat and cold soak tests as it headed out to its apogee of 11,400 miles, farther than any other spacecraft had traveled and returned for recovery. Now a second SPS burn to increase re-entry speed to lunar mission return speed of 25,000 MPH. The command module separates from the service module and re-orientes itself to allow its heat shield to bear the brunt of the searing 4,500 degree F re-entry temperatures. We lost all data in the Mission Monitor Room during this re-entry blackout period and had to wait patiently for news from the tracking ships and planes scattered across a 1000 mile landing footprint. This was one of the most critical phases for us and the waiting was interminable. Suddenly a report was received that the prime recovery ship had the spacecraft in sight on its chutes. Unbelievable! Six miles from the carrier. The seemingly impossible achievement of meeting all objectives for this flight had been attained. Subsequent spacecraft analysis revealed that it had survived its ordeal admirably and was capable of a lunar return re-entry.

Now that the excitement of this impressive first launch is over, the teams are settling down, realizing only too well that this launch, as great an achievement as it was, was just the first of many before the one where three men will enter a similar spacecraft on top of a similar booster and journey to the moon and back. Much has still to be done, but the boost in morale and the impetus given to the program by this first major success would go a long way to helping us meet our goal before the end of the decade.

John Tribe, Nov 1967

Written for the “Old Nortonian”, my English grammar school magazine.