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The True Story of Apollo 12's Near Abort Less Than a Minute After Launch

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ISSUE 295 SEPTEMBER 13, 2011

Lightning Really DOES Strike Twice!

The True Story of Apollo 12's Near Abort Less Than a Minute After Launch

By Bart Hennin

November 14, 1969 11:23:33 am EST
(Mission Time T plus 1 min. 33 sec.)
Moments after launch...

How things had gone to hell so quickly was anyone's guess. Mission rules said Apollo 12 should have already aborted.

Pete Conrad, mission Commander (and veteran test pilot) continued to hold his hand firmly on the spacecraft's 'abort handle'. His mind raced. How could an electrical "short" have caused such widespread failures of so many systems so quickly? The spacecraft's interior had fallen into darkness for lack of power, save the illumination provided by the myriad of flashing alarm lights!

The 3 man astronaut crew couldn't even tell in which direction their rapidly accelerating machine was heading. They had lost all their "8 balls" - the gyroscopes that track the spacecraft's position. Yet Conrad resisted flicking his wrist the 1/4 turn that would abort the mission.

That small snap of the wrist would instantly set off a series of violent events. The 4 nozzles of the 33 ft. long solid fueled escape rocket (mounted atop the Apollo space capsule) would immediately fire with a total of 551,000 lb-seconds of impulse, accelerating the tiny manned capsule rapidly away from the gargantuan flame spewing Saturn V below. A separate pitch control motor and canard assembly atop the escape rocket would (theoreti-

Pete Conrad - With 'nerves of steel' he refused to abort Apollo 12's mission prematurely in spite of 'mission rules' to the contrary.

Two lightning bolts struck Apollo 12 at T+36 sec. (at 6500 feet) and T+ 52 sec (at 14500 feet) crippling the fragile space craft's electronics and putting the mission into far graver danger then was acknowledged at the time.

The two bolts of lightning then followed the space vehicle's ionized exhaust plume right down to the launch tower .

Apollo had now become the world's tallest and fastest moving lightning rod!

Continued on page 3

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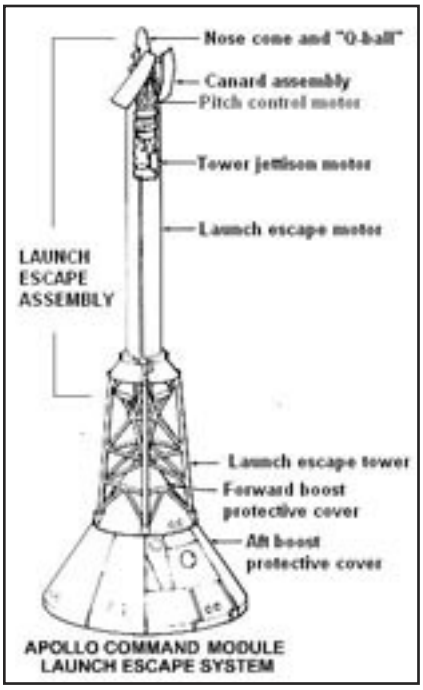
Continued from page 2

Lightning Really Does Strike Twice!

cally) steer the capsule back towards the Florida coast. Pyrotechnics would then blow, releasing the capsules three main parachutes...(hopefully) prior to impact!

One small reflexive movement on Conrad's part would (with luck) bring the Apollo capsule back to the Florida coastline and leave ground controllers to self destruct the Saturn V in a glorious fireball, making Apollo 12 the shortest spaceflight in history.



As Conrad held off aborting, mission controllers on the ground were working frantically. They had lost all telemetry with the Apollo spacecraft as well as with the Saturn V rocket that accelerated it. According to the crew, virtually every system on the spacecraft had failed. The fragile Apollo command module was essentially dead. And if something wasn't done quickly, the 3 even more fragile human beings inside would die too.

Even in the midst of this crisis, the Saturn V with its five giant first stage engines, each with its own Earth shaking thrust continued its relentless multi-g push, accelerating the crippled spacecraft ever higher and ever faster. Which direction the Saturn V was pushing the astronauts was no longer clear.

In spite of the obvious hopelessness of the emergency, Conrad instinctively resisted aborting for as long as possible. His flying skills and steel nerve had been honed over years of experience first as a navy test pilot and flight instructor, and then as a Gemini astronaut. His vast experience didn't remove the fear. It just allowed him to control it... and at present, his fear was just BARELY controlled! But, like any test pilot worth his salt (and Pete Conrad was worth his salt) he didn't want to give up his flying machine one nano-second earlier than he absolutely had to, even in the face of catastrophe!

In a world where "eternity" is measured in seconds, he wanted to give ground controllers every possible chance to fix this.

But on the ground, mission controllers knew that 'seconds' would not be enough. They were faced with an impossible situation - NO telemetry, an essentially dead spacecraft, and a crew being accelerated at up to 10 g's in which direction God only knew!

So far Project Apollo had been lucky and skirted the odds. But today, the cards had gone decidedly back in favor of the house. Surely this would be the day the words *Recommend Abort!* were uttered NOT in the simulators, but for REAL!

November 14, 1969 9:33 am EST (Mission Time: T minus 1 hr. 48 min. 55 sec.) Earlier that day...

"This is Apollo Saturn Launch Control at T minus 1 hour, 48 minutes, 55 seconds and counting. We are still Go with our countdown for Apollo 12 at this time. We are aiming toward our planned T-zero of 11:22 am Eastern

Continued on page 4

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Continued from page 3

Lightning Really Does Strike Twice!

Standard Time....

For the crew of Apollo 12, the morning of November 14, 1969 started as very routine. Assuming you can call *going to the Moon* routine! Still, Apollo 8 had previously made the trip to Lunar orbit. Apollo 10 had ventured down to just below 50,000 ft over the Moon's surface. And just 4 months earlier, Apollo 11 had made the first manned landing on the surface of the Moon.

Apollo 12 was the encore. The proof that Apollo 11's landing wasn't just a fluke. Already a portion of the US, and world general public was losing interest. *Been there, done that, let's move on* seemed to be the call of a small but growing segment of the population, as well as more than a few politicians!

"Going to the Moon" was indeed becoming 'routine'...or more correctly, it was APPEARING to be routine.

On this overcast morning, the three member astronaut crew was in high spirits. Mission Commander Pete Conrad, Command Module Pilot Dick Gordon, and Lunar Module Pilot Alan Bean were all in good humor and their demeanor was relaxed as they went through their pre-launch check list. They were a close knit crew and well prepared for their mission. Through countless spaceflight simulations, they had gained valuable experience under a wide range of 'contingencies'. *Contingencies* was a euphemism for "emergencies" and was basically 'NASA-speak' for what to do when things "flubbed up!".

The astronauts had worked their various simulations relentlessly and effectively. They were confident.

Likewise, mission controllers were confident on this glorious morning too. Every last one of these controllers, these 'kids' (the average age of a flight controller in the 1960's was just under 32 years old and most were in their 20's) were consummate professionals to the point of obsession. They and the astronauts had been through death and life together. They trained relentlessly through 'sims'. Approximately 60% of these 'practice scenarios' were fiendishly designed to 'kill' the astronauts (figuratively speaking), but together, mission control sorted out all of the simulated "glitches" and kept their precious astronauts alive.

Granted, mission control's HEAD flight controller Gerry Griffin was brand new. Apollo 12 would be his very 1st 'live' launch. But his own confidence, as well as the confidence of all of his flight controllers was high. And Chris Kraft, Gerry's boss. 'the old man' who had cut his teeth as a primary flight controller himself during the Mercury and Gemini days, was respectful of Gerry and his abilities.

The countdown and launch that morning was uneventful... at least it was as uneventful as climbing aboard and riding a 363 ft. tall monster (capable of producing some 7.6 million pounds of golden fiery thrust) could be!

Everything this day was normal. Though the weather was overcast, NASA officials decided it wasn't a showstopper and proceeded with the countdown. In order to meet it's "rendezvous" with the Moon, Apollo 12 had to launch within

Continued on page 5

Continued from page 4

Lightning Really Does Strike Twice!

a very narrow 'window' of time. So even though the astronauts reported "raindrops" on their craft, NASA officials made the decision to launch. After all, commercial airlines flew through storms everyday!

Little did anyone realize, Apollo 12 was about to become the world's tallest and fastest moving lightning rod!

The initial launch was textbook perfect. It occurred exactly on time at the precisely 11:22 am EST. Atop a spectacular pillar of flame and smoke, the enormous moon rocket cleared the tower successfully and everything was looking good! At 30 seconds into the launch, all data was still appearing normal and the crew was jovial...for about 6 more seconds...

November 14, 1969 11:22 am EST (Mission Time T plus 30 sec.) The Crisis...

Systems were functioning normally and the crew was enjoying the best thrill ride of their lives as their Saturn V raced them to orbit. They were just entering the first Cumulus layer. Things were about to go very very wrong...

LMP (Lunar Module Pilot/Astronaut Alan Bean) - "30 seconds"

CDR (Mission Commander/Astronaut Pete Conrad) - "Looks Good...Roll's complete"

LMP - "Thing really moves doesn't it?"

CAPCOM (Capsule Communications/Mission Control) - "Roger Pete"

"Static burst" (unknown to the crew or mission control, at 36 seconds into the flight, a bolt of lightning suddenly strikes the spacecraft - its effect is immediate and alarming!)

CMP (Command Module Pilot/ Astronaut Dick Gordon) - "What the hell was that??!"

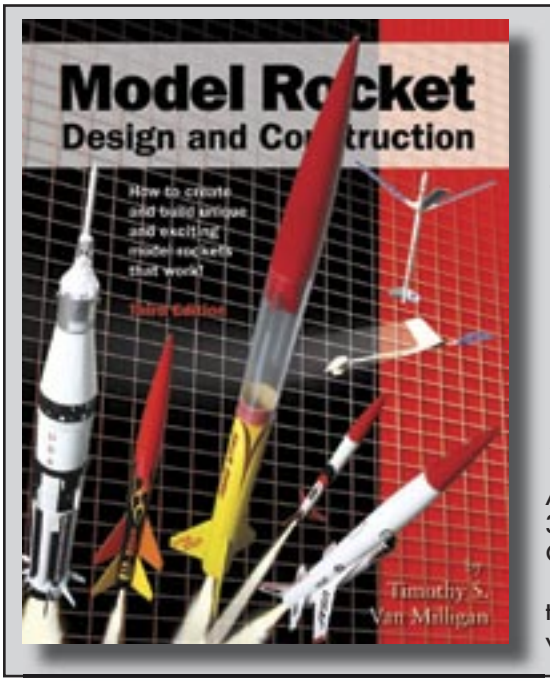
The first lightning strike hits Apollo 12 and continues down to strike the launch tower.

CDR - "huh?" (multiple alarms wailing)

CMP - "I lost a whole bunch of stuff; I don't know - -"

CDR - "Turn off the busses"

Continued on page 6



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Continued from page 5

Lightning Really Does Strike Twice!

CAPCOM - "Mark....One Bravo"
CDR - "Roger. We had a whole bunch of buses drop out"

The lightning strike knocked out Apollo's three power producing fuel cells. The spacecraft was now on 100% battery power. These batteries did not provide nearly enough power to keep all the command module's vital systems running as Apollo 12 climbed to orbit. Voltages on all the electrical BUS lines instantly plummeted to unbelievably low levels and virtually every electrical system on board suddenly droped offline!

At the same time, Mission control loses ALL telemetry from the spacecraft and the Saturn V rocket!! Everybody's screens just went blank. Flight controllers now had to rely totally on what the crew radioed to them, but all the crew can do is report alarms!

In short, neither the crew, nor ground control had any idea what has happened!

LMP - "there's nothing - - It's nothing - -"
CMP - "It's a circuit - "
CDR - "Where are we going??"
CMP - "I can't see; there's something wrong"
CDR - "AC BUS 1 light, all the fuel cells - -"

Pete Conrad at 51 seconds into the flight is confirming they've lost all electrical power.

Meanwhile...

"Static burst" (at 52 seconds the spacecraft takes a second lightning strike! Both strikes follow the Saturn V's ionized exhaust trail back to the launch tower which itself is struck by the same two bolts.)

CDR - "I just lost the platform! ... yes... ok... we just lost the platform gang... "

Pete Conrad at 56 seconds into the flight confirms that they've lost the command module guidance platform. At less than a minute into the flight the crew can no longer tell where they are going or how fast! Since ground control has no telemetry, they can't see where the Saturn V

A second lightning strike hits Apollo and continues downward to strike the overhead launch tower crane, travel through the tower and strike the ground.

Continued on page 7

Continued from page 6

Lightning Really Does Strike Twice!

is taking them either!!

CDR - "I don't know what happened here; we just had the whole world drop out....I got 2 FUEL CELL (alarm) lights, an AC BUS (alarm) light, a FUEL CELL DISCONNECT, AC BUS overload one and two, MAIN BUS A and B out"

The crew saw and heard more alarms than they had ever experienced in any 'sim'! Back on the ground, mission controllers were scrambling to comprehend the depth of the crisis.

Head flight controller Gerry Griffin on his first manned launch keeps a cool head during NASA's worst in-flight mishap up to that time.

Desperately going around the room, rookie head flight controller Gerry Griffin wasn't getting any answers. With only seconds to make a decision, he called out, "EECOM what do you see."

EECOM was one of the many flight controller stations in mission control, but it was a KEY station. The acronym stood for "Electrical, Environmental, and COMmunications" and on this day it was manned by a very young flight controller, John Aaron. John was looking at a blank screen and he was NOT having a good day!

At just 24 years old John Aaron was considered by many to be a boy genius. He was quiet and unassuming. Yet when he spoke, people listened, because like all good flight controllers, he was virtually always right! But there was something about John that made him not just a "good" flight controller, but a great one. He had an unbounded curiosity about how things worked, even when those "things" were outside his sphere of responsibility.

And his sphere of responsibility was large. Like the acronym said, John Aaron was responsible for all spacecraft "electronics", all spacecraft "environmental systems", and all "spacecraft communications" equipment.

John Aaron - 24 year old "boy genius" and "EECOM" flight controller whose vast knowledge and quick thinking unexpectedly saved the day for Apollo 12.

And right now, Aaron was facing every flight controller's worst nightmare. A "live" manned mission was going to hell fast and the problem laid squarely on *HIS* desk! With no telemetry, it was like being on the edge of the high diving board with no water in the pool.

"Flight" was awaiting an answer...

Everybody knew what the next words from John's mouth would be. Flight director Gerry Griffin and almost everyone in mission control as well as astronaut Pete Conrad (whose fist was still tightly wrapped around the abort handle) was awaiting the inevitable utterance from John... *"Recommend abort".*

But John was thinking of something completely different. He was looking at the strange, apparently meaningless pattern of gibberish on his blank console. It looked.... familiar. He remembered seeing this exact same obscure pattern somewhere before. His brain flashed! Though he'd only seen it only ONCE, and though it was a full year ago,

Continued on page 8

Continued from page 7

Lightning Really Does Strike Twice!

he remembered.

At that previous time, his fanatical curiosity about a strange pattern he had witnessed during a simulation had driven him to discover a little known switch aboard the Apollo command module called the "Signal Condition Equipment" switch (SCE).

The "SCE" converts raw signals from instrumentation to standard voltages for the spacecraft's instrument displays and telemetry encoders. Its switch was never *designed* to be a "reset" but interestingly it could be used as one.

The SCE switch was a single toggle buried among Apollo's hundreds of switches, indicators and lights. John had the SOLUTION!!

He confidently spoke into his mike, "Flight, try SCE to aux". This was techno-speak for "tell the crew to flip the 'Signal Condition Equipment' switch to auxiliary mode".

"SCE to aux" sounded nothing like *"recommend abort"* and thus took mission controllers by complete surprise.

"What?? Flight SCE to aux??" the perplexed head flight controller responded.

"Try SCE to aux" came the firm reply from John. The head flight controller took John's suggestion on faith and immediately signaled to the CapCom (Capsule Communications officer) to relay the imperative message to the Apollo crew. Although neither man had a clue what John was talking about, CapCom urgently radioed the message to the astronauts.

"Apollo 12, Houston, Try SCE to AUXILIARY. Over".

The astronaut crew was just as baffled by the recommendation as the Head Flight Controller, Capcom and most of the people in mission control were. Pete Conrad, obviously not understanding the command, replied, "FCE to auxiliary? What the hell is that??"

"SCE! - SCE to auxiliary" repeated CapCom.

Amongst the confusion, astronaut Alan Bean's brain flashed. He yelled out, "I know what that is!" He had seen that switch a year ago. He promptly reached over his head to the panel behind him and flipped the correct switch. Like turning on a light, *it worked!*

Lunar Module Pilot Alan Bean whose excellent memory saved Apollo 12.

Telemetry to mission control promptly resumed and Apollo's 8-balls came back to life!

Bean's two crew mates were stunned! To think that among the command module's 566 switches, 40 event indicators, 71 lights, and 24 instruments, this

Continued on page 9

Continued from page 8

Lightning Really Does Strike Twice!

The 3rd crew member, Command Module Pilot Dick Gordon.

quiet Lunar Module pilot actually knew off the top of his head exactly where this mysterious "SCE" switch was located was beyond belief! To say Bean's colleagues were flabbergasted was an understatement.

But there was no time for congratulations. The emergency wasn't over yet! The three fuel cells that provided electrical power to Apollo were still offline, as were all the BUS lines that distributed that power to all the various systems aboard the craft. Could everything be restarted? Was there any still unknown residual damage endangering the flight?

The GOOD news was, the Saturn V had miraculously kept the spacecraft precisely on course! The monstrous rocket was equipped with its own completely independent guidance system, and luckily the two lightning strikes hadn't affected it.

"Staging" of the Saturn V was now coming up rapidly. This event was often accompanied by a violent jolt that shook the whole Saturn V rocket and in turn the Apollo spacecraft and its human cargo. The crew thus delayed restarting any other failed systems until the Saturn V ejected its fuel drained 1st stage and lit its powerful 2nd stage. This went without a hitch.

The bone jarring staging completed, the fuel cell switches were then recycled and one by one, they came back to life. The crew got the BUS voltages back too.

Moments later, the Saturn V's second stage dropped away and the third stage fired to life. It was only now that Pete Conrad finally released his tight grip on the mission abort handle. Such was his relief that he giggled like a toddler the rest of the way to orbit. Conrad also joked to mission control, "Hey that was one of the better 'sims', believe me".

What followed next was an exhaustive checkout of all the spacecraft's systems while the astronauts remained "parked" in Earth orbit. Apollo 12 had just survived the most dangerous launch in NASA's history. Ironically, NASA's newest flight controller was facing the agency's worst in-flight mishap to date and he was feeling the pressure.

Can we still go to the Moon? Are we sure there's no further damage? Go to the Moon with an injured spacecraft and your decision could very well send 3 men to their deaths. Abort when you don't need to and you've scuttled

Continued on page 10

Continued from page 9

Lightning Really Does Strike Twice!

millions of dollars worth of spacecraft to a failed mission for nothing.

Gerry's boss Chris Kraft was not envious of the new head flight director's position. Chris wanted to offer comfort to Griffin, who in reality was performing magnificently, but there was an unwritten rule at NASA. The head flight controller on duty had the final word. No "bosses" could override him or try to influence his flight related decisions in any way. The final "go / no go" was the flight director's call to make, and his call ALONE to make.

Still, Chris felt the need to reassure his new charge, so he quietly walked over to his tense flight director and gently wrapped his arm over his shoulders. In a soft tone he commented to Gerry, "You know young man, we don't HAVE to go to the Moon today." and he left it at that.

But after agonizing checks, Apollo 12 DID go to the Moon. The crew completed their mission successfully. It was all thanks to a quick thinking, 24 year old flight controller who was curious about a screen pattern, a mission Commander who kept cool and refused to abort prematurely, and a young Lunar Module pilot who remembered the location of an obscure switch!

Incidentally, it was found that the only "possible" additional lightning damage to the spacecraft may have been to the pyrotechnics that opened the parachutes upon re-entry. However, since they would work or not work regardless of whether or not Apollo 12 went to the Moon, the crew were given the go ahead for Lunar insertion and the mission proceeded.

The crew was never told of the potential pyrotechnics problem, since they could do nothing about it in any event. But as luck would have it, on re-entry the parachutes worked flawlessly.

The only slight mishap during splashdown occurred when the impact of the landing dislodged a 16 mm camera from storage. The camera struck astronaut Bean in the forehead knocking him briefly unconscious. He suffered a mild concussion and required six stitches. Bean had traveled all the way to the Moon, walked on its surface and returned home all unscathed, only to get his head bopped back on Earth!

In the end, Apollo 12 survived its two lightning strikes against all odds, and went on to complete its full lunar mission. The mission earned its place in the history books not only for achieving mankind's second landing of men on the Moon, but also for surviving the most dangerous launch

Continued on page 11

Continued from page 10

Lightning Really Does Strike Twice!

ever. Not bad for a mission that should have been aborted.

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About the Author

Bart Hennin graduated in 1984 with a BaSc in Mechanical Engineering from the University of Windsor, Ontario. His senior year thesis was “Optimization Of A Model Rocket For Highest Altitude” which earned a top of the class mark of A+. Following graduation, Bart worked for several years in auto manufacturing engineering, then migrated to technical sales, and eventually ended up in general sales and marketing.

Bart is currently married and is living in New York state. Bart says that his family consists of one obnoxious cat named Thor.