From Parachutes to Petticoats
Early Apollo Parachute Testing

Summer 1964: Just days after joining LRD my boss, Milt Windler, assigned me the task of Flight Engineer for a test that involved dropping a payload from a C-119 cargo aircraft. As a result, I found myself part of a crew gathered under the wing of a C-119 airplane parked in front of a hangar at Ellington Field early one morning. We were there for the customary pre-flight briefing. It was my first flight on a C-119, and I had been fitted with a parachute earlier that morning. There were eight of us including the pilot, the co-pilot, a flight engineer, two Air Force equipment riggers, two NASA technicians, and me. The two technicians were Ken Easily and Jean Waldron from Tech Services, as I recall. We all had been issued fire retardant jump suits and paratrooper boots along with our parachutes, and we stood there listening to the Pilot (Frank Herbert) give the requisite briefing. We all had our parachutes slung over our shoulders so Frank could be sure that we each had one. As part of the briefing, he went over the flight plan and then said we would all need to put our oxygen masks on as soon as we got strapped in and to be sure to check the regulator operation since we would be flying at 24,000 feet and would experience hypoxia without supplemental oxygen. He then told us that if there was an in-flight emergency, he would ring an alarm bell one time and we should prepare to bail out if we heard it, and, if we heard the bell come on without stopping, we should bail out ASAP. He also cautioned us not to get between him and the door if there was an emergency, because he was not going to waste time getting out of the airplane himself. I happened to be standing under the right engine at the time, and while listening to Frank I noticed an engine oil leak. Not a slow drip - - - drip type oil leak; it was what I considered a steady leak. So after the briefing, I got Frank's attention and pointed out the engine leak. Frank studied it for a moment, looked at me and said something like, "A leak like this is a good sign for an older C-119. It means there is still some oil in the engine, and the engine needs oil to run." With that he smiled as he turned to climb aboard.

Frank was a NASA engineer (he worked in the Apollo Program Office as I recall), and he flew C-119's mostly on weekends for the Air National Guard. His oil leak explanation didn't make me feel much better, but I figured that if he was willing to fly on that day, I would be willing to go along and do my job, too.

The C-119 cargo airplane featured booms that extended back from the engines to support the tail, and the whole back part of the fuselage had been removed so cargo inside the airplane could be air-dropped while in fight. In addition to being a basic cargo plane, the Air Force used the C-119 to air deliver large items to ground troops. (Google "C-119 airplane" to read more.) It made an ideal airplane to air-drop heavy payloads and test big parachutes for NASA.

Our C-119 (the last three digits of her tail number were 111 - we called her "Triple Ace") was loaded with a 10,000 pound test vehicle that was fitted with three early Apollo test parachutes. NASA needed to test parachute designs that were being developed for the Apollo Command Module at that time. Our test vehicle was about 12 feet long, about two feet thick, and about 8 feet wide, and it was painted red with a large white cross on top and bottom. (The cross provided a target for theodolite cameras that were used to track the trajectory of the test vehicle after it was dropped. Acceleration and velocity could be derived from the camera data.) The test vehicle included on-board instrumentation, and it was chained to the floor of the C-119 cargo bay until it was ready to be dropped. With the 10,000 pound test vehicle, the associated test equipment, and a full load of fuel, old Triple Ace was near, or above, her maximum gross load limit.

With a great deal of belching and back-firing, the engines were started creating large clouds of smoke as they came to life. Meanwhile, in the back of the airplane the technicians and I checked the test vehicle one last time, and then we strapped ourselves into small paratrooper jump seats along the

sides of the cargo bay in the back.

Frank slowly taxied along the taxiway that paralleled the runway while I sat there thinking about my job. It was uncomfortable in there. There was no seat padding, and my parachute was tightly strapped on (as it should have been) so that I couldn't exactly sit upright. As we taxied out I thought of just how I had managed to get myself into that situation. It was not comfortable in there, but I wanted to fly airplanes, or at least fly in airplanes so I asked NASA to assign me to LRD where engineers got to go to sea in ships and fly in airplanes, so on that bright summer morning, I found myself in the back of an old C-119 with an oil leak. I also thought of something that I had forgotten to mention to Frank when we spoke after the briefing. The tires - they looked very low. Either they were low on pressure or we were very heavily loaded. I should have told him. But, then, on second thought, he probably already knew about that since he was required to do a pre-flight inspection of the old bird.

We stopped where the taxiway intersects the main runway at Ellington AFB, and after a long engine run-up and check-out, Frank turned and taxied to the very end of the runway where he turned around - - there he paused for a long moment - Frank was a religious man (Baptist I think) and the long pause was probably for a short prayer in the cockpit. He then pointed the old bird down the runway center stripe, and advanced the throttles to full speed while holding the brakes on.

C-119 Pratt-Whitney R4360 engines develop 2,650 horsepower each, and there is a water injection option that a pilot can use for additional power. With that option, water is injected into the engine carburetors to drastically increase air density and pressure in the combustion chambers and develop maximum, but unsustainable, engine power. As a passenger on later flights, I could always tell by the sound of the engines when water was injected. To me a C-119 airplane seemed to jump ahead when the brakes are released and the water injected.

But that time Triple Ace didn't jump ahead - she just roared louder and started to roll like an overloaded truck. The engines shook and blew great clouds of smoke with a tempo that sounded like a low scream as all of that horsepower was applied to the whirling propellers. Everything was vibrating inside, and the guys that were in the center of the cargo bay with seats in line with the propellers could not keep their feet on the floor it was vibrating so much, but this was it - - -

"Balls to the Wall" as pilots say.

We seemed to be picking up speed, but after a period, I noticed out the side window that the control tower was about in line with us which meant we were about half-way down the runway but without nearly enough speed to fly.

But we kept accelerating. Faster - - - Faster - - -.

Other buildings went by. I couldn't see out the front, but by then I knew the end of the runway was in sight. At that time I began to think about was was beyond the runway - we were headed South so just past the end of the runway and the runway lights is Texas Highway 3. There are telephone poles along Highway 3.

Triple Ace continued; engines straining while making clouds of smoke, much noise, and vibration. We seemed to be going pretty fast by then.

I was holding on tight - white knuckles.

We pitched up slightly. We didn't seem to gain much altitude, but the wheels came up.

In a flash, Highway 3 went by. - We were just above the telephone wires. I could see wide-eyed drivers in cars as we roared passed trailing stripes of smoke behind the engines.

We, in the back of the airplane, all looked at each other with relief in our expressions.
Triple Ace was airborne with her load.

It took about 90 minutes to reach Fort Hood, Texas, our parachute test drop zone, and by that time we were at our assigned drop altitude - twenty four thousand feet - with both engines at still near full power.

Fate protects fools, little children, and ships named Enterprise.
- - Commander Riker, Star Trek

There is an area in the West part of Fort Hood called Antelope Mound, and a contingent of engineers, technicians, photographers, Army personnel, and equipment was waiting in place for the planned NASA Apollo parachute test that morning. The group included a parachute engineering design team from the Apollo parachute contractor, plus a system engineering team from the NASA E&D and a team of LRD engineers from Houston that had organized and were conducting the parachute test that was in progress that morning. My co-workers, Fred Koons and Jim Burkett, were in charge of the operation. In addition, technicians from the Technical Services Division probably including Charlie Rogers, Sonny Porter, Billy Drummond and others were there. Jim and Fred had set up a communication base at Antelope Mound that included UHF and VHF military radio equipment. The equipment was mounted in the back of a white Dodge pickup truck with the call sign “Snowball 1.” Armond Lucero and his crew of photographers were also there, I’m sure.

“Snowball 1, Snowball 1. Triple Ace. We are about 10 minutes out and we are at the assigned altitude. Are you guys ready for the test this morning?” “Roger that, Triple Ace. The wind is Westerly and a little strong this morning. It is near our wind limit, but OK for now. We’ll have release point coordinates for you by the time you get here.”

Army personnel had used a weather balloon to accurately measure the wind velocity profile (a plot of the wind speed on the ground and at altitude intervals up to the parachute opening altitude), and with that information the Army had calculated release point coordinates that were well to the West so that when the test parachute opened it would drift with the wind over to, and land on, Antelope Mound, where the cameras and observers were set up to record data.

While final instrumentation and camera preparations were completed on the ground, the test vehicle onboard instrumentation was powered up and calibrated in the airplane. I worked with Ken and Jean so I was busy with checklists and general vehicle check-out. In addition to the instrumentation that measured load and other data, they checked and readied pyrotechnic systems that controlled the sequence of events that would happen after the test vehicle was dropped. Also during that time, the air force riggers removed the chains and armed the airplane drop system. Meanwhile, Frank flew a rectangular pattern over the drop zone, and he would count down over the radio to the exact place in the sky where he had been instructed to drop the vehicle. He flew several “dry runs” each with a countdown so observers on the ground would know exactly where to look and the photographers exactly where to point their cameras. All of this activity took about 30 minutes, and then everything was ready.

We flew the final approach: “Triple Ace here. - -- - Ten seconds until drop. Nine. Eight. Seven. Six. Five. Four. Three. Two. One. DROP!”

When Frank pushed a button in the cockpit a small weight (we called it a bean bag) that the

parachute riggers had hung from the back of the airplane was dropped. It pulled a small drogue parachute out of the airplane and that drogue parachute, in turn, pulled out a large extraction parachute which deployed just behind the airplane. That extraction chute was so strong it would cause the 10,000 pound test vehicle to almost stop in mid-air while the airplane flew away. (See the attached photo. The small, red, drogue parachute is just behind the bigger, green, extraction parachute in the photo. The test vehicle has just cleared the back of the C-119 cargo platform in the photo. The bar going across the photo just above the parachute is the C-119 horizontal tail.)

When the 10,000 pound test vehicle left the C-119, the airplane essentially became 10,000 pounds lighter in an instant. Think of an old goose being kicked in the tail while in flight. That is what it was like to be in the C-119 - the airplane shot skyward and pitched nose-down rather quickly. It was a ride.

Large parachutes used to recover heavy objects have to be opened very carefully or they will quickly rip themselves to shreds. The Apollo parachutes were designed to be opened slowly, in two stages, so they would not be overloaded while slowing the Apollo spacecraft at high speed in the earth's atmosphere. Each stage employed reefing lines around the skirt of the parachute to reduce the effective diameter of the parachute and limit the load. The problem facing the NASA engineers at that time was trying to decide how much to reef the parachutes and how to time the parachute opening events so as not to overload the parachutes.

But the parachute opening sequence that was tested on that day didn't work so well.
There were three parachutes to be deployed, but one of them got a little ahead of the other two. It opened first stage and it tried to hold that load momentarily, but it couldn't hold - - - it failed with parachute shreds and parts trailing behind. The second parachute began to open - - - It, too, couldn't hold the load by itself so it failed the same way. The test vehicle accelerated with the force of gravity as the third parachute came out. It didn't stand a chance at that point.

So now we had a 10,000 pound NASA test vehicle passing through 20,000 feet altitude with extreme velocity and accelerating toward the speed of sound at 32 feet per second squared.

I was told the following narrative days after the drop test when the ground crew and I had a chance to gather in the JSC cafeteria:
The ranch next to Fort Hood had been in the rancher's family for generations, and it had not changed much in all that time except that they, the ranchers, had had to sell several hundred acres to the U.S. Government when WWII began in order to accommodate the expansion the Fort Hood Army Base that bordered the ranch property on the East side. But they had used the money wisely and had built a nice ranch-house not far from where the rancher was working on the morning of the drop test. Except for the occasional sound of big guns and the sound of tanks and trucks being used to train solders for Viet Nam, the Army had been a good neighbor. They had even paid for most of the material that he used to maintain the fence along Fort Hood.

Ted, the rancher, was mending the fence that morning, the quiet of the morning was interrupted only by the sound of the wind which was blowing about 20 MPH from the West and by the usual sounds that the meadow larks and cattle make. Ted did not hear the sound of the C-119 airplane approaching from the South at high altitude. He was still working on his fence and probably thinking about lunch at that time.

There is no record of the sound the test vehicle made or what exactly Ted thought when it hit the ground, but it landed about halfway between Ted and his ranch house on top of a small hill.

(Earthquake instrumentation around the Great State of Texas probably recorded the event.)

There it was when Ted looked up - - - a large red object with a white cross half buried in the ground at the top of the hill between him and his house. Being a religious man, Ted probably thought it was Judgement Day or maybe the Second Coming. And there were parachute parts descending all around - some as small as snowflakes on that summer day.

And then from the other side of the fence in a cloud of dust and noise came the NASA engineers and the U.S.Army recovery troops with their jeeps, trucks, and recovery cranes.

The Army cut the fence to get their recovery equipment through and everyone including the rancher gathered around what was left of the test vehicle. Ted's wife heard the impact and all of the commotion and also came out to see what was going on. The engineers and the Army guys were all worried about what legal action Ted could take so when Ted's wife said that she liked to sew, and some of that parachute material strewn around the field could be used for clothing, she got all that she could carry. Daughters and maybe granddaughters got new petticoats out of the deal. They probably thought of it as a singular benefit from the space program.

The Army filled in the hole for Ted.

It is possible to commit no errors and still lose.
That is not a weakness.
That is life.
- - Captain Picard to Data.
Star Trek: Generations

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Photos:

C-119 with Gemini Boilerplate (Photo Credit: NASA S-62-8112)

Test Vehicle being extracted from C-119 Payload Bay
(Photo Credit: NASA S-68-36925)

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