

Christmas 2018



Ayrshire Astronomical Society Newsletter

Merry Christmas from the AAS committee members

Wishing you and your family a wonderful Christmas and clear skies for 2019! Our next meeting is on 28th January 2019.



50 years today...

Thank you to Marc Charron for this article which he specially prepared for the Christmas Newsletter. Enjoy reading.

Apollo 8



At 12:51 GMT today, it will be exactly fifty years since Apollo 8 lifted off from the Kennedy Space Centre heading towards to the moon. In historical terms, the launch was just over fifty years since the guns fell silent in the Great War and less than a quarter of a century from the end of the Second World War. From the present it looks like a long time ago.

But in those moments a rocket weighing 6.2 million pounds with a thrust of over 7.5 million pounds rose slowly to clear the tower. As smooth as it looked for the cameras, for the astronauts, Frank Borman, James Lovell and William Anders, it was a wild hair raising ride as they were shaken and thrashed about, as the five massive F1 engines on their gimbals struggling to keep the craft upright and push it into the sky. Slowly but surely the craft rose, and with quickening acceleration it reached a height of forty miles in two minutes and forty seconds when the first stage cut out and the second stage was ignited. The second stage would then take them most of the way to orbit, with third stage finally propelling them into a nearly perfectly circular orbit almost exactly 100 miles high.

In April '68 it didn't look good for the moon programme. A major test of the Saturn V on Apollo 6 revealed serious shortcomings. The rocket suffered from pogo oscillations, due to thrust fluctuations, causing other resonances damaging the spacecraft. The second stage also suffered from engine failure due to fuel line ruptures, though it was able to compensate for those losses with its working engines. Cross wiring in the second stage also contributed to the problems. Even so the mission was considered successful, though it meant that a major redesign effort was needed for the next flight, which was to be Apollo 8.

Originally, the goal of Apollo 8 was to test out the lunar module in orbit, however, work had fallen behind schedule and the module would not be ready in time. There was also the worry that the Soviet Union might beat the US to the moon by staging its own orbital mission, so in August it was decided that Apollo 8 would go to the moon, even though this would be the first flight test for the redesigned Saturn V. It was a big risk and the astronauts thought it had only a 50% chance of success.

About two and a half hours after reaching orbit and completing the vehicle checkout, Apollo 8 was given the go ahead to light the third stage for a trans-lunar injection. This accelerated the craft from about five miles to seven miles per second, the escape velocity from the earth. Done properly, this would put the spacecraft on a free return trajectory to the moon, meaning the spacecraft could use the moon's gravity to slingshot around it to head directly back to earth. Had they missed their target, they could be still orbiting the solar system or have been obliterated on the lunar surface. Fortunately, all went well and taking the astronauts just under three days to reach the moon.

The next critical event, which had to be done when they were behind the moon, was the burn to slow the spacecraft down so that it could enter into lunar orbit. Back here on earth we would only know if it was successful when word was received after they came out from behind the moon. If something really bad had happened we might never had known what happened, but again, things worked perfectly.

It was during their fourth lunar orbit that the astronauts first observed the earth rise over the lunar horizon. Having the presence of mind, they scrambled to grab the cameras to take those iconic photographs. Not knowing this at the time, this little digression would ultimately have the largest impact from the mission. The astronauts saw the earth as a beautiful blue and white marble floating in the space in complete contrast to the grey desolation they observed below them. In fact, the earth was the only thing with colour that they could see. These images taken would go on to inspire many in the environmental movement and bring about a change in how we view the world.

On their 9th orbit of the moon the crew sent back a Christmas message, reading first ten verses from the Book of Genesis and finishing with:

"And from the crew of Apollo 8, we close with good night, good luck, a Merry Christmas and God bless all of you—all of you on the good Earth."

On Christmas day, and after ten orbits around the moon, the crew again had to fire their rocket behind the moon to put them on a trajectory back to earth. As with the burn that got them into orbit around the moon, this one had to be just as precise, and so it was. On December 27th, the astronauts returned to earth entering the atmosphere at twenty-five thousand miles per hour, splashing down safely shortly afterwards in the Pacific Ocean where they were picked up by the aircraft carrier the USS Yorktown.

1968 had been a terrible year. In the US, the assassinations of Robert Kennedy and Martin Luther King, along with civil disorder, had diminished hope in the future. The quagmire in

Vietnam got deeper and deeper, and overseas, Soviet tanks had crushed the Prague Spring. A stranger's telegram to Frank Borman summed up one view of the mission: "Thank you Apollo 8. You saved 1968." They then received the ultimate accolade when Time Magazine made them the well-deserved "The Men of the Year."

Though the mission had been to go to the moon, its real significance was to discover the earth, our home, in its place in the cosmos. For that we should be eternally grateful. Merry Christmas to all!

