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Paper Session I-A - The Von Braun Team, From the Beginnings of Modern Space Flight to the Future, This is How We Go!

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Paper:

From the beginnings of modern space flight to the future,
This is how we go!

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With the desire to help bring the world's space programs into the future it is helpful to study successful people who have contributed significantly in space endeavors, and see how they made their contributions. The two great men who contributed the most to modern space flight are Wernher von Braun (pronounced: von Brown) and Russian born Sergei Korolev. Werner led the development of the Saturn 5 moon rocket. I believe the Soviet military did Korolev in, more about him later. From the foundations of space exploration these great men laid, the future of human space exploration will be built! My predictions for the future are at the end of this paper.

Werner led the greatest technical accomplishment of all time, the landing of men on the moon. (von Braun: 1912 to June 16,1977) It has taken me awhile to "fully" appreciate the inspiration and accomplishments of this great man. The more I research, the more impressive his work truly is. The landing of men on the moon has been compared to the great pyramids in Egypt and the great China wall. But the landing on the moon was more than a massive project, it expanded man's mind about ourselves, our planet, our universe, and of technology.

December 1998 I traveled to Peenemunde Germany by myself and then again in September 1999 with von Braun "Operation Paperclip" team member- Konrad Dannenberg, his son, and grandson. Peenemunde is in northeastern Germany on the Baltic Sea, and is where the von Braun team launched the first rocket to escape earth's atmosphere. In September we attended an old timers reunion in Peenemunde. This gave me an insider's view of the cradle of space flight. Konrad and I later toured Kummersdorf, Germany where von Braun had his first rocket engine development test stands in the 1930s.

Today great pain remains in Germany from World War II. The Berlin wall fell only 10 years ago. Rejoining a divided nation has taken years of hard work. The capital of Germany just moved back to Berlin in September 1999. I wondered why more of the historic sites of space flight were not being preserved better and the answer is "there is no support to preserve anything to do with the war".

I can distinguish between "technical achievements" and the "atrocities" of this period. Terrible atrocities occurred. With today's peacekeeper satellites may we prevent any nation from committing such acts again! Sadly the pain is still great to many. Many devices we use today were developed for the military, such as the jet aircraft to the microwave oven. Today we can make technological advancements from space endeavors and do not need war for advancements.

Von Braun always dreamed about space exploration. For example as a young lad on February 15, 1927 he published "Journey to the Moon: Its Astronomical and Technical Aspects" in the Deutsche Jugendzeitung (Journal for the German Youth). In general technical people pursue their technical dreams and political persons use these technical products defensively or aggressively. Again, I stress the importance to study how technical leaders created their achievements. Let us be part of expanding humanity's knowledge through space exploration. I will have to let others report on actions of political people!

The Saturn moon rocket had its beginnings in Kummersdorf, Germany. All that has paved the way to mankind's next great technical achievement, the International Space Station. The first lesson is for people of 16 nations to work together for the common good of all. Elements launched from Russia and the United States now stand vigil over us in low earth orbit as production for the remaining Space Station elements are in full swing. It is an exciting time to be alive and to witness or partake in such undertakings!

Technology spin offs continue to be generated such as the Lithium Ion (LiIon) battery pack for NASA's Power Ratchet Tool (PRT). This tool was flown on board Space Shuttle Discovery, STS-103, in support of the Hubble Space Telescope (HST) Servicing Mission on December 19th, 1999. The Airforce and NASA have developed this battery for manned space flight and this battery is twice as powerful as a comparable sized Nickel Cadmium (NiCad) battery. The LiIon battery has other favorable characteristics such as it holds a charge for a longer time and can be charged over 500 times. LiIon also provides a significant margin of safety over other lithium-based batteries since there is no metallic lithium, just lithium ions. Metallic lithium batteries are very hazardous because the lithium metal is very reactive and can cause fires and explosions when short-circuited, for instance.

Industry does not have the resources to develop such inventions as the LiIon battery on its own. It takes the focused might of a space-fairing nation to compile the resources to develop this level of technology. Who will benefit? All of us who use a battery operated device, for this example! Focused research for a purpose such as space flight is where the majority of major technology breakthroughs come from. The alternative is to revert back to war and the need for new war technology. May we of the good planet Earth have the vision to expand our thinking through peaceful space exploration!

So how does one go about creating a Moon Rocket, mankind's greatest technical accomplishment? This knowledge can be used to push the program further ahead. Wernher von Braun used Vision, Compassion, and Inspiration. So did Sergei Korolev, the great Soviet rocket designer. Information is just now being made about Korolev, and from what I've learned, he was very much like von Braun. Von Braun was a pioneer and had more experience, but both men were inspiring to be around.

Ernest Stuhlinger and Fred Ordway wrote about von Braun's strengths in their book "Wernher von Braun, Crusader for Space". They wrote: "...one of his traits, well known to his co-workers, but rarely recognized by those who knew him only from a distance. This was his relentless analytical dissection of a failure, and his constructive suggestions for a repair of the damage.

From the beginnings of modern space flight to the future, This is how we go!

Ron Caswell

There was no useless fault-finding and blaming, no breast-beating, no futile lamentation, no ashes on the head, only a sober assessment of the situation, a charting of new courses, a dropping of unnecessary ballast, an upbeat proposal for action, and then a plea for full speed ahead.”

In June 1999, I attended a reception for the children of Magnus and Nan von Braun, at the Space and Rocket Center in Huntsville, Alabama. Magnus is Wernher’s younger brother. There were several of the original “Operation Paperclip” von Braun team members at this reunion. They all have very fond memories of Wernher. The following story was wonderful to experience.

That night as we left the reception, several of us walked by Wernher’s office that is on display in the museum. One of the original team members, Rudi Beichel, stopped and was standing in front of the oak desk with the big brass nameplate “Dr. Wernher von Braun”. (Beichel: 1913 to Nov 1999) Rudi’s son-in-law Larry asked; “Rudi, did you ever get called on the carpet in front of this desk?” Rudi smiled, and in his wonderful way said “**No, Wernher never scolded anybody!**” Wow, what a powerful moment, seeing Rudi’s warm glowing smile, and von Braun’s memorabilia, and hearing Rudi’s answer. You could have knocked Larry and I over with a feather. This great man who achieved the greatest technical accomplishment in the history of humanity, did it by inspiring his team with love and respect. He did not threaten people. Wernher made sure you knew you were an important member of the team and brought the best out in people.

One more story to share here took place in December 1972. A friend of mine, Dan Cryer, was a college student and had the opportunity to interview Wernher von Braun for a half-hour. Wernher sensed that this young man did not know what to ask, so he asked the questions himself and then answered them! To this day that half-hour was a powerful moment in Dan’s life.

Sergei Korolev’s first rocket after World War II was a copy of captured German V2 rockets. Korolev’s rocket was called the R1. To me, the drawings of the R1 look identical to the V2. He wanted to design an improved rocket at first but was told by Soviet leaders to make a copy of the successful V2. After the R1, rocket Korolev led the design of several rockets including the Soyuz.

The Soviet leaders were afraid to say whom their chief engineer was, fearing for Korolev’s life, so his name was classified. Sergei never received any public recognition. Soviet officials were asked who the designer was who launched Yuri Gargarin, the first man in space. The official answer was “the Soviet people!”

Under Korolev’s supervision the Soviet Union had stunning firsts with the launch of Sputnik the first satellite, the first animal in space- the dog Leika, the first man in space, the first space walk, the first woman in space... The Soviet military generals were furious with Korolev because they wanted him to build intercontinental ballistic missiles, but he kept creating spectacular space missions. In the 1960s Sergei went in the hospital for a routine operation and died from it. After his death, it was safe to announce his name so he was buried a state hero in the Kremlin wall. I wonder how he really died! The Soviet Space Program did not have any more great firsts after Korolev’s death.

From the beginnings of modern space flight to the future, This is how we go!

Ron Caswell

October 3rd, 1942 the first rocket to escape earth's atmosphere was launched from Peenemunde East's Test Stand 7. The rocket was called an Aggregat #4, or A4. The A4 was later named the V2. Aggregat rockets number 1, 2, 3, and 5 were development programs that led up to the A4. The A5 rocket was actually launched before the A4. The A3 had guidance control problems and the A4 name had been already assigned. A5 was then developed as an interim step from the A3 to the A4, and successfully flown, correcting the guidance problems.

After attending the Peenemunde reunion, Konrad and I traveled to Kummersdorf just south of Berlin. In the early 1930s von Braun belonged to the rocket flying field of Berlin and then got a job with the Army to develop rockets. He was employed at the Kummersdorf Army Research Center. After the war, the Russians occupied Kummersdorf, and then it was a former East German military base. For 60 years this property was off limits to civilians. Through Konrad's contacts we were able to tour some of the old Engine Test Stands. I took many pictures of the areas we visited and Konrad has since shown these pictures to his friends, who worked there in the 1930s. None of the people Konrad showed the pictures to recognized the places I had taken pictures of. There are many questions of what we saw and what took place there. It is rumored the Test Stands I took pictures of might have been built after von Braun was there. We do know that von Braun started his work in Kummersdorf, but what remains there today is sketchy.

History is an interesting thing and I now know most things we read must be taken with a grain of salt. Today we have historians writing as we go but that is an invention of modern time. Early rocketry was developed out of peoples garages and then under military secrecy. There was no reporters documenting who did what on certain days. These early pioneers were trying to solve problems, not document history. They probably did not even realize how historical their work was.

Space historians I met in Germany are now taking every piece of information they can get, from published documentation, to drawings, to photographs, memories, and are trying to sort out the order and truth of what happened. The generalities of what happened can be determined but the specifics are less refined.

Von Braun led the creation of modern rocketry in Germany. People liked working with him because he was always helpful. His work in the United States was just an expanding of the ideas that were developed from the V2. Every time I go to Germany I learn of things that were done there before here. Kennedy Space Center's giant Vehicle Assembly Building (VAB) is just an upsized Assembly Hall at Test Stand 7. Both buildings served the same function and were created by the same people.

In Munich, Konrad and I visited the German Museum and had the privilege to go to the document section and review many original Peenemunde documents. Here is a list of some of the topics studied and developed during this period:

- Thermodynamic analysis of combustion gasses.
- Preparation of rocket test using nitric acid.
- Super sonic range measurement on sheet metals.
- Photo documentation of rocket launches.

From the beginnings of modern space flight to the future, This is how we go!

Ron Caswell

- Balancing of gyros.
- Investigations on bearings with small friction.
- Arrangement of linear dipole arrays and dipole groups as longitudinal radiators.
- High frequency cable with solid insulation.
- Investigation of the equation $x^4 + 3x^3 + 2x^2 + A = 0$ and determination of the optimum constant of the Steering Equation.
- Investigations on steering control, report 85: an application of the principle of resistance-reaction plots (Theory of amplitude Loci) to steering control problem.
- File of correspondence between HVP and different firms concerning hollow light metal castings.
- Ejection of residual A4 fuel after cut-off by means of residual nitrogen or compressed air pressure.
- Improvements of rockets in order to avoid explosions at the tail section.
- Instructions for the use of the A4 firing table.

These examples are to mention only a “few” of the subjects written during this period. The accession list of German documents pertaining to guided missiles, is three thick volumes listing only the title and very brief subject of each document. Several of the old timers told me this was a very exciting period to have worked in rocketry. Once again, this period can be referred to as the cradle of modern rocketry. Von Braun was the technical director during this period too. His charisma and focus kept programs on track.

One thing I must be clear on, is there were many great people who brought mankind to the moon. Many talented people developed great things during the Mercury, Gemini, and Apollo projects. But I keep coming back to a fact that one man was the technical and inspirational orchestra conductor for all the programs, Wernher von Braun.

Wernher also promoted the Space Program to Congress, any organization who would have him come talk, made TV programs about space with Walt Disney, and wrote many published articles. Not only was he the great technical leader but he kept the general public tuned in to the advancements being made. This inspiration is something that will always be needed.

Dr. Herman Oberth was von Braun’s teacher throughout his life about space. (Oberth: 1894 to Dec 28th, 1989) Oberth was a theoretician, mathematician, and wrote books about space flight. He inspired von Braun to take more mathematics classes in school. Oberth tried to contact American rocket pioneer Robert Goddard, but Goddard would not share his information with anybody. Most of Goddard’s knowledge died with Goddard.

On our trip Konrad and I stopped at the Oberth museum in Feucht, Germany. Oberth’s daughter, Dr Erna Oberth, let Konrad and I stay in her father’s home, which is next door to the museum. I slept in Herman Oberth’s bedroom! There are pictures of great men such as von Braun visiting at Oberth’s home. I was so glad that I was exhausted from a long trip, or else I would have not been able to sleep thinking about these great minds who conceived man’s trips to the moon. Much of this thinking took place in this home. These minds are equal to Einstein, Mozart, and Newton... This inspiration will always be with me.

From the beginnings of modern space flight to the future, This is how we go!

Ron Caswell

Another stop on Konrad's and my adventure was at the Alpen Hotel, in southern Germany, at the town of Oberjoch, in the Bavarian Alps. What a beautiful area! This was the hotel where Wernher von Braun and Walter Dornberger were staying at the end of WWII. As Germany collapsed, the von Braun team drove for days to get to the Oberjoch area. They did not trust the Russians or the French, and they did not think England could continue their work after the war, so they surrendered to the Americans. They correctly predicted they could continue their rocket work in the United States. There were 500 Peenemunders that came to southern Germany but the U.S. Army agreed to only bring 100 to the United States. So as they looked through the files and tried to decide whom to bring, they put paperclips on the files of the people they wanted to bring. Hence the name "Operation Paperclip"!

From the Alpen Hotel Wernher's brother, Magnus von Braun, rode his bicycle several miles to where the Americans were. Magnus was elected to surrender the team because he spoke English. The Americans did not understand who fell into their laps at first, so Magnus had a hard time surrendering!

So where is mankind going with space exploration? As the Wright Brothers would not be able to predict the Boeing 747 from their humble first flight, we cannot predict exactly where we will go in space either. A precedent has been set, and we can see how far mankind's knowledge is capable of expanding. Over 30 planets have been detected in the Milky Way Galaxy and astronomers are searching for more planets every day. What is out there, we do not know and that wonderment is what will spur on our exploration. If we were not to know, we would not have been given the ability to wonder.

It is going to take all the people of the good planet Earth to work towards significant space exploration. The precedent is being made with the International Space Station. No one nation has the resources to accomplish great space exploration. By working together on a project for the good of all, we will learn to work and live in harmony on Earth. Work on international space endeavors is already bringing us together, helping us to understand one another. This is more powerful than anything else in history.

Compassionate visionary leaders are required. We can all do our part to keep the dream alive and share this with our youth. Space Congress is one of the mechanisms to keep this dream alive!

God bless you and all of us in this corner of the Milky Way Galaxy!