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Profile of Yvonne Brill

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Yvonne Brill is presently a consultant specializing in satellite technology and space propulsion systems. Since retiring from the International Maritime Satellite Organization (INMARSAT) in 1991, she served from 1991-2007 as a member of several U.S. National Research Council Committees evaluating pertinent space transportation systems. She is presently a member of the National Research Council Space Studies Board. From 1994-2001 she was a member of the NASA Aerospace Safety Advisory Panel, an independent senior advisory panel reporting to NASA and the U.S. Congress, on technical issues effecting NASA. She also provided extensive technical support services on commercial communication satellites to Telenor, Oslo Norway and Shinawatra Satellite Co. Ltd., Bangkok Thailand during their procurements of satellites in the U.S.

Ms. Brill received her BSc in Mathematics from the University of Manitoba, Canada and her MS in Chemistry from the University of Southern California. Her career began in the aircraft industry but shifted into the new field of rockets when Douglas Aircraft, her employer, was awarded the Project RAND contract. She became a Research Analyst in the Missiles Division with the Project, which later became the RAND Corporation. She participated in pioneer studies which defined rocket propellant performance and derived high temperature thermodynamic properties for rocket exhaust gas species. The data from these studies were incorporated into the tables which provided the first industry standards. Following RAND, Ms. Brill worked for a number of different corporations on the design and testing of a variety of ramjet and turbojet engines which used hydrocarbon and experimental high energy propellants. In the early years of the "Space Race" she worked as a consultant evaluating proposed new rocket fuels and oxidizers.

In 1966 she joined the staff of RCA AstroElectronics initially as a senior engineer in propulsion systems responsible for launch vehicles and on-orbit satellite propulsion. Her patented invented while at RCA, the electrothermal hydrazine thruster, manufactured by Primex Aerospace (now Aerojet) and initially flight proven in 1983, currently has a wide representation in space. More than two hundred of these rocket engines have been flown on both low earth orbit and geosynchronous satellites. At RCA as Manager NOVA Propulsion she managed the fabrication through qualification and flight of theTeflon Solid Propellant Propulsion System (TSPPS) flown on the RCA/US Navy NOVA spacecraft. Successful flight of the first TSPPS system in 1981 brought electric propulsion to an operational status in the United States. The TSPPS enabled three NOVA satellites to make precise ephemeris data available in real time to users of the US Navy Navigational Satellite System for many years until that system was phased out in favor of the Global Positioning Satellite System. Additionally, Ms. Brill has held other engineering and managerial positions during her career. From 1981 to 1983 she was at NASA Headquarters in Washington, DC as Manager, Solid Rocket Motor, Space Transportation Systems. From 1986 to 1991 she was employed by the International Maritime Satellite Organization (INMARSAT) in London as Propulsion Manager for the INMARSAT-2 satellite system.

Ms. Brill is an Honorary Fellow of the American Institute of Aeronautics and Astronautics (AIAA) and a Fellow of the Society of Women Engineers (SWE). She is a member of the National Academy of Engineering and the Women in Technology International Hall of Fame.

Among her awards are the AIAA 2002 Wyld Award in Rocket Propulsion, the IEEE 2002 Dr. Judith A. Resnik Award, and the NASA Distinguished Public Service Medal in 2001. In 1993 she received the SWE Resnik Challenger Medal, and in 1986 the SWE Achievement Award, that organizations highest honor. In April 2009 she was invited to give the Gardner Lecture at MIT; her talk was on "Megabites for the Masses". Also in April 2009 she received the American Association of Engineering Societies (AAES) 2009 John Fritz Medal.

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1) How did you get started in the satellite business?

In 1966 I was hired as a propulsion engineer by the RCA AstroElectronics Division in Princeton, NJ which was the space arm of the RCA Corporation. RCA Astro was building and launching the TIROS weather satellite at this time for NASA and also a classified military weather satellite. None of their spacecraft had propulsion on board, and I was the only propulsion engineer on the staff. I had never worked on satellites before this, but I had a dozen years of experimental and analytical experience on rocket engines, both liquid and solid rockets. One of my first RCA assignments (1967) was to do a design analysis of propulsion systems for a parametric series of communication satellites which ranged in mass from 700 to 4500 lbs. After evaluating all of the suitable propulsion systems that had been demonstrated in flight, and several yet to be flight proven, I proposed a dual thrust level hydrazine propulsion system for the spacecraft series because my analysis showed it offered a significant cost, weight and complexity advantage for geostationary spacecraft missions up to ten years in orbit. The proposed system utilized the moderate thrust capability of at 5.0 lbf catalytic hydrazine thruster to provide initial velocity demand for canceling launch vehicle dispersions and acquiring station at Isp=230 seconds combined with a low level millipound thrusting of a hydrazine electrothermal thruster to provide long term station keeping and attitude control at a calculated Isp=320 sec.

2) How have you been involved in changes brought about in or by this business (innovations, technologies, services)?

The electrothermal hydrazine thruster did not exist when I proposed it for the "Voice Broadcast Study" mentioned above. RCA pursued a US patent for this propulsion system which was granted in 1972. The patent is in my name, assigned to the RCA Corporation. A joint electrothermal hydrazine thruster development/qualification between RCA Astro and Rocket Research Co. resulted in the first successful flight demonstration of an electrothermal hydrazine thruster on an RCA Americom geosynchronous spacecraft in 1983. The achieved Isp for the electrothermal hydrazine thruster was Isp=300seconds. To date more than two hundred of these thrusters have been flown on a number of different spacecraft.

3) What do you think was the greatest event/situation/opportunity you experienced?

One of two significant events I have experienced is the successful first flight and subsequent adoption of the electrothermal hydrazine thruster by the satellite industry. The second is the successful flight of the pulsed plasma thrusters that I managed and built for the US NAVY/RCA NOVA spacecraft. Both types of rocket thrusters were innovative technologies.

4) What was the greatest obstacle?

When I was hired, my immediate colleagues at RCA Astro did not see the need for a propulsion specialist on the staff and thought I should work towards becoming a systems engineer. I strongly believed that what the company needed was a propulsion specialist. They were disappointed in my inability to adapt to systems engineering, but after two years on the job were kind enough to state that they agreed that my point of view was the correct approach.

5) What do you see happening in the next five years in this industry?

The satellite industry has had its ups and downs, but it will continue to grow because there is no other way than satellites to provide the capacity growth required to accommodate increasing data and voice transmission, use of personal data assistants, and etc.

6) What advice do you have for women interested in entering the industry?

Satellites are a very exciting field in which to work, especially at a company that builds the satellites. It is hard to imagine any satisfaction greater than being able to identify with hardware that you have built, or assisted in building, that is launched on an operational satellite.