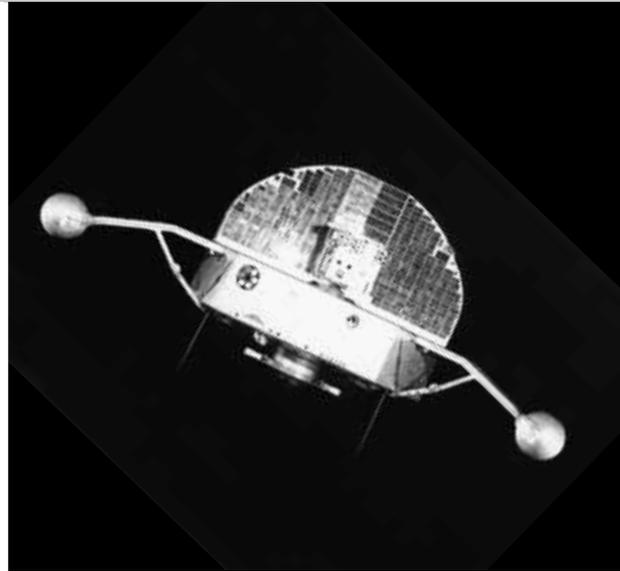
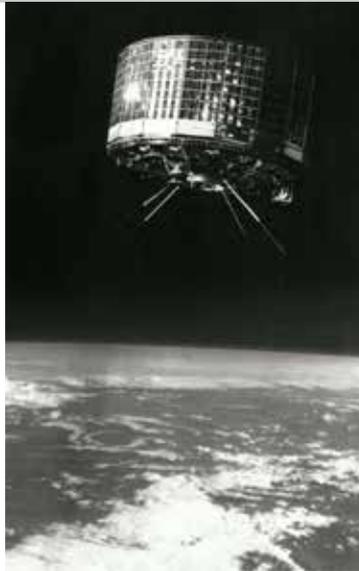


- A JOURNEY THROUGH THE DECADES



Superior Tube Products Leave The Earth's Atmosphere



The 1960s was the decade in which Superior Tube products left the Earth for the first time and headed into space. An early indication that the company had arrived in the Space Age came with examples of the latest rocket engine cooling designs, including tapered tubes, which Superior exhibited at the Astronautical Exposition held in Washington D.C. in December 1960.

Superior was already involved in many aspects of the emerging missile technology market. For example, the company provided hydraulic tubing to operate the ground handling equipment required to assemble and operate missiles. Subsequently, Superior supplied tubing for the surface-to-air Bomarc missile, the first operational, long-range US anti-aircraft missile.

Contracted by its long-time customer, the Raytheon Company of Tucson Arizona, Superior also supplied the tiny tubular container for the infrared detector installed in the famous Sidewinder air-to-air missile. The detector is an extremely sensitive heat-seeking element in the missile's nose that

detects exhaust heat from an adversary aircraft engine.

The company's involvement with rocket power also extended to fighter jet ejection seats. Developed in the 1960s, the F-111's 3,000 pound escape capsule relied largely upon the integrity of Superior's Type 304 stainless steel tubing that contained a rapidly burning but safely controlled rocket propelled charge that enabled the ejection.

It was also during the 1960s that the X-15 rocket research airplane set new altitude and speed records, reaching in excess of Mach 6 (4,500 mph). Superior was responsible for the tubing for the ballistic control system thrusters in the X-15. Each system consisted of two



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small 40-lb thrust roll control rocket motors for which approximately 140 feet of tubing was needed, tubing that had to perform reliably both in and out of the Earth's atmosphere.

This move into the development and supply of tubing for rocketry and space projects was, in some respects, a natural progression for Superior Tube. It happened because the company was already an approved supplier to a number of the key aerospace contractors who were themselves being approached by NASA and other Government agencies to fulfil these ground-breaking, history-making programs.

For Superior, the real journey into space began in earnest with the OSO (Orbiting Solar Observatory) Program which consisted of a series of scientific satellites designed to investigate solar phenomena and to conduct a number of non-solar experiments. OSO 1, launched by NASA in 1962, featured titanium tubing manufactured by Superior for the satellite's compressed nitrogen guidance system and for a methane purging system required for the 'soft X-ray' experiments.

In the same year, Superior also contributed to Telstar 1, the world's first communications satellite, which successfully relayed, through space, the first TV pictures, telephone calls and fax images. For this truly historic project, Superior's customer was the Bell Telephone Company. Then, in 1964, Superior supplied Type 304 stainless steel tubing for the tiny

radiometers in an early weather satellite. From cooling tubes for their launch vehicles to components within the satellites themselves, Superior was a pioneering participant in the earliest satellite technology.

1964 also saw the launch of Mariner 4 spacecraft. The fourth in a series of deep space probes, Mariner 4 was designed to provide close-up observations of Mars and was equipped with three one-inch bright Type 305 stainless steel tubes manufactured by Superior for each of the craft's closed-circuit TV cameras. These cameras then transmitted back to Earth the first ever fly-by pictures of the Martian surface. The metallurgical experts at Superior Tube had chosen the best performing alloy for this mission critical application.

Of course, the most famous space event of the decade was the moon landing by Neil Armstrong and Buzz Aldrin in 1969. But it wouldn't have happened had an earlier spacecraft, Surveyor 1, not landed on the lunar surface in 1966. The electron guns in Surveyor's TV camera tubes once again relied on Type 305 tubes manufactured by Superior. They made possible the taking of the high resolution photographs on which the planning of the Apollo landings depended; those tubes are still there on the moon! Subsequently, Superior supplied tubing to many customers who developed and manufactured the Apollo Lunar Excursion Module (LEM) and other aspects of the Apollo program.

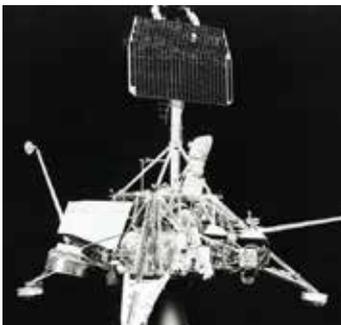


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