

The Space Shuttle Conception

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The United States Space Program as it enters the Seventies is swinging into a new phase that promises to dramatically revolutionize man's role in space.

The Sixties saw the entry of man into space experimentally climaxed by a bold step to the moon, proving that man could survive in space and operate there successfully. The decade to come will see space flights become routine. The cornerstone of operational (as opposed to experimental) space flight is an economical transportation system with principal componants that can be used many times.

The National Aeronautics and Space Administration (NASA) is currently studying a variety of proposals for an economical system to deliver men and payloads to and from earth orbit. The term "Space Shuttle" has been given to this operational system. Current concepts call for a two stage vehicle weighing three and a half million pounds. Both stages would be winged and would land at airfields to be refurbished and used again.

As this report goes to press, the external configuration of the Space Shuttle is still undecided. The fly-back booster appears in almost every proposal as a large delta winged rocket. Some versions show a single tail surface mounted on the after end of the airframe. Our flying model has vertical stabilizers mounted on the wingtips to prevent their being disintegrated by the exhaust gas from the shuttle craft's engine. For the same reason other proposals also have wing mounted tail surfaces. Model Rockets share many of the same design problems with their full scale brothers.

The shuttle craft appears in two different modes. One design type calls for a delta winged shuttle with very little wing area. This type is designed to re-enter at a low angle of attack – nose down meeting the airstream head on. This design would experience severe heating over its entire surface and would require an elaborate cooling system (which would reduce payload capability through the penalty of its own weight). The attractive feature of the low angle of attack shuttle is that it could literally "fly" during the complete re-entry operation and reach any landing point within a range of 2500 miles to either side of the initial flight path.

The second shuttle type was conceived by Maxim Faget, the "father" of the Mercury, Gemini and Apollo configurations. The Faget shuttle would pitch its nose up as it re-entered, presenting its flat underbelly and wing undersides to the airstream. This flat area would have a great breaking effect and the shuttle would lose its speed in the same manner as the re-entering Apollo capsule. After sufficient speed had been lost, the shuttle would pitch its nose down and begin to fly to its landing point. It's landing "footprint" would be considerably reduced over that of the first shuttle described, however, with reduced cooling requirements the shuttle could carry over twice the payload. The accuracy of the Apollo landings would seem to indicate that a huge 2500 mile wide footprint might be unnecessary especially in light of the payload reduction in the low angle of attack shuttle.

For model rocket purposes, Centuri has selected a Faget type shuttle.

Blasting off at Cape Kennedy, the Space Shuttle system would rise vertically for a few seconds and then go into a slow pitch-over programming the system down range. At the edges of space and some 300 miles down range the shuttle craft would separate from the upper body of the mother ship and continue under its own power to orbital speed and altitude. Meanwhile, the mother ship would re-enter, bank away and head back for the Cape. It would probably be assisted in its return by Jet engines. Both stages would be powered by liquid Hydrogen-oxygen fuels during rocket powered flight.

The Space Shuttle could be used to deliver weather, communications and earth resources satellites into Earth orbit. Since the system would be re-usable it would make orbital delivery much less expensive than it is today. Payloads could be orbited at a cost of $20 to $50 per pound. Space Shuttles could regularly service space stations or become small experimental stations themselves. The Space Shuttle would open space to routine use through its flexibility, reliability and high cost-effectiveness.

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