

From THE EXPLORATION OF SPACE, Arthur C. Clarke, Harper & Brothers
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After this digression—which is fully justified by the importance of the subject—let us return to our rocket in free orbit outside the atmosphere. It is carrying a crew and payload, but its fuel tanks have been practically emptied during the attainment of circular velocity.

Now another, and similar, rocket climbs up from Earth into the same orbit. Its payload consists simply of more fuel: one could call it a tanker. By the use of its steering jets, it comes to rest relative to the first ship and not far away from it.

It is this operation which causes a certain raising of eyebrows among those who do not realise the peculiar conditions in space. How, they ask, could two machines travelling at no less than 18,000 m.p.h. possibly make such a rendezvous?

The answer is given by the fact that this speed of 18,000 m.p.h. is purely relative to the Earth. An observer in the satellite spaceship would consider himself at rest and the planet below would seem to be spinning round. As the tanker rocket climbed up to meet him, it would automatically have to match his speed in order to stay in the same orbit. The whole operation would be exactly similar to that of flight refuelling in the air—the actual speeds of the aircraft being of no importance as long as they are equal. In the case of orbital refuelling, the problem of contact should be considerably easier. There is no air resistance to worry about and to affect the connecting pipe-lines: one would always have perfect visibility, and there would be plenty of time in which to make the manœuvre. If the tanker rocket aimed at a point a hundred miles away from the first vessel, and had an error in speed of a hundred miles an hour in the direction of the satellite, it would have at least an hour in which to correct this by low-powered rocket thrusts.