

Garbage in Space

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SO THEY SAY—let there be a Space Municipal Corporation to take care of floating garbage in Space, and to look for a "Cosmic-bank" to dump those left-overs. It has been predicted that our Universe will have a ring like Saturn by mid Twenty-first Century, consisting of "Nuts and Bolts". Debris numbering high, encircling the Universe, enhances the danger of collision hazard for many a launch in future, especially in the Geo-Stationary Satellite Orbit (GSO), which has a vital role to play and yet to be fully explored for communicable communications—to repeat the old thesis "to run the world closer."

Vertically high above the Equator at a height of approx. 36,000 Kms this imaginary GSO is locable. One third of the earth's surface is visible from this static point. By positioning any satellite in this orbit, one can encourage point to point telecommunication, Meteorological Services, Maritime Mobile Communications and Television Broadcasting. A satellite missioned to remain in GSO has to rotate the earth in such a way as to complete revolution in 24 hours, the time earth takes to revolve around its own axis. This vital GSO is a rare non-renewable resource, which has to be explored by collective calculable measures considering the wider nature of implications and complications.

It is widely accepted that debris consisting of abandoned satellites spent rocket stages, clamps, shroud, ejected apogee motors and fuel tanks pose a real danger of collision to the operational space-crafts. It is understood that at least three satellites had gone out of tracking screen namely Sky-net IB, RCA Satcom 3 and EC S2.

Collision hazard can be columnized under two heads, one is of dead

(abandoned) satellites and the other of operational ones. Untracked debris has free movement in space under natural and unnatural phenomena of cosmic force. Moreover, it is realized that natural force does not remove the object from GSO. If the position of a dead satellite is known with insufficient accuracy, avoidance manoeuvring is a bit complicated specially for large operational satellites.

"Collision" of two abandoned satellites can cause debris depending on size and directional forces of their uncontrolled behaviour. Theoretical studies show that collision risk of two active satellites is low.

On presumption note it is concluded that at least five satellites had suffered relative loss in recent past, as the Solar Panels of GEOS-2 were damaged by unknown space object. COSMOS 954 had run through certain depressurization, for reasons not known. Sudden break-up of COSMOS 1275 on 24th July, 1981 after 50 days of its launch tells the same story.

In the recent past, when an unknown space object hit the windshield of the much celebrated Space Shuttle Challenger at a speed of 71,600 Km. an hour, scientists suspected it was cosmic dust. But on close examination of the crack it was concluded that Challenger must have run into man-made debris.

From telescopic count, it is estimated that around 40,000 tiny parts of left over or exploded satellites orbit Earth posing a grave danger to operating satellites. Orbiting flakes running in billions of numbers are counted as potential hazards too.

It is also argued that meteorite hit is also responsible for space accidents. But space expert Mr Kessler opined "The number of man-made craters was two to five times what we would

expect from meteorite hit," as reported by *Washington Post* service.

To ensure the growing need of of disciplinary tracking of space objects North American Aerospace Defence Command (NORAD) is making efforts to eliminate space hurdles. From existing eight launching stations of the World, more than twenty satellites are added to space every year. Roughly around 200 satellites are moving in GSO. It is known that NORAD and other agencies of similar nature are maintaining about 5000 trackable space objects in order to perform service of tracking, warning and playing the regulatory role.

Debris is not always of accidental formation but of a deliberate nature. Any gunned down satellite can cause a heavy loss to developing nations' satellites. Atleast 19 explosions had taken place during the test of anti-satellite weapons, leaving behind 1000 pieces of man-made debris. So risk of collision hazards is more now, although not yet alarming.

The hypothetical conclusion, regarding deactivated satellites in GSO or near earth space brings out two dimensional alternatives. Before the expiry of longevity of any satellite, it should be removed to a safe orbit zone rather than abandoning the same at its initial placement. According to Space Scientist M G Wolfe, the satellite should be placed above or below GSO altitude before the "end of their operational life time."

European Space Agency speaks in the same stream of chanellization to root-out the debris hazard. The technique is to increase a "Two impulse manoeuvre", by increasing the "Apogee-height" (maximum distance from earth) and by increasing the "Perigee height" (minimum distance from earth) and by magnitudinal jump to the higher plane. This higher orbital zone can be baptised "Garbage-Orbit", for left overs of space objects. These formulae need to be pondered over.

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