UFO UpDates Mailing List

It's Just 2.5 Miles of Yarn

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c The Associated Press

By MARCIA DUNN
CAPE CANAVERAL, Fla. (AP) - For nearly a year, America's ``other space agency'' - the super-secretive National Reconnaissance Office - has been monitoring a bright, white object streaking through the night sky.

Don't fret: It's not a UFO. It's 2 1/2 miles of knitting yarn.

The single strand of reinforced acrylic yarn has been orbiting Earth, unwound, since last June.

The National Reconnaissance Office is intrigued by the possibility of using tethers to connect clusters of small satellites so they can communicate, much like a computer network.

Other tantalizing applications: using tethers to power spacecraft by generating electricity as the conductive cords sweep through Earth's magnetic field, to propel spacecraft into different orbits and to drop experiments from a space station.

This is the longest-lasting space tether yet, a $4 million experiment to demonstrate the motion and survivability of tethers in low Earth orbit, littered with micrometeoroids as well as space junk.

It's also the first unclassified, ongoing space project in the 36-year history of the National Reconnaissance Office.

The NRO typically flies spy satellites.

``It's really fantastic to call people up on the phone and say, `Hi, I'm Scott Larrimore and I'm with the NRO and I'd like you to track my spacecraft. It catches a lot of open mouths,'' said Larrimore, an Air Force captain who is program manager for the tether experiment.

Still, the NRO has some things to be closemouthed about.

The NRO refuses to say how or when the shoestring-like tether was rocketed into orbit or how or when its next tether experiment will fly. Until December, all NRO launches were classified for so-called national security reasons.

What it will say, on the record, is this:

The Tether Physics and Survivability experiment, called Tips, was ejected from a classified military satellite on June 20, 1996,

into a 635-mile-high orbit that swings as far north as Alaska and as far south as Chile's Cape Horn. A few hours later, the yarn - all 2 1/2 miles - was unreeled from a spool. The tether, which weighs 12 pounds, was bowed and swung like a jump rope, but eventually straightened and became more perpendicular to Earth.

Nine months later, the yarn still is orbiting Earth, intact. The NRO knows so because of ground-based laser, radar and telescope observations. Amateur astronomers also keep unofficial tabs on the tether. (It's visible with binoculars on a clear night, although you need to know exactly where and when to look.)

Tips has outlived its predecessors by months. NRO officials say if the tether isn't broken by a micrometeoroid or other debris, it could orbit for as long as 27 years before plunging through the atmosphere and burning up.

The last time a tether flew, aboard space shuttle Columbia in February 1996, the 12-mile conductive cord snapped within five hours because of an electric discharge. The satellite-on-a-string drifted away like a lost balloon. On the first flight of the $400 million NASA-Italian Space Agency system, aboard Atlantis in 1992, a protruding bolt caused the tether to jam a mere 840 feet out.

Despite all the trouble, the two missions proved electricity could be generated by a tether system - easy power for spacecraft. And the unintended severing of the tether demonstrated that the higher of two objects goes up when a tether is cut and the lower one goes down slightly - a fuel-free way to boost spacecraft into longer-lasting orbits.

A shuttle, for example, could depart from the future international space station via a tether. Once that tether is cut, the shuttle would drop and the station would rise - a win-win situation.

NASA successfully flew three simpler and cheaper tethers on unmanned Delta rockets in the early 1990s. The third test ended abruptly, however, when the 12-mile line was severed, most likely by a micrometeoroid, just three days and 17 hours after it was unreeled.

The only other orbiting tethers to date: 100-foot cords linking manned capsules and Agena boosters during Gemini 11 and 12 in 1966.

NASA's next shot at a tether? Not until 1999 and most definitely not on a space shuttle, where astronaut safety is paramount. The space agency dumped a tether experiment that was to have flown on Discovery this July.

``Things have really been ramped back because of the squeeze on the budget and the bad experience we've had with tethers,'' said NASA project manager Jim Harrison.

Added astronaut Jeffrey Hoffman, who flew on both tethered-satellite missions: ``It's an emotional impact. What can you say? It would have been better if it hadn't broken.''

Unlike NASA, the NRO wanted as plain a tether system as possible.

The 2 1/2 miles of white yarn is wrapped in braided Spectra 1000, a tough, white fiber used in bulletproof vests and fish lines. The resulting nonconductive cord is about one-tenth of an inch thick.

On either end of the Tips tether is an aluminum, hexagonal box covered with 18 laser reflectors. The box containing the NASA-donated unreeling device and long-dead electronics has a mass of 83 pounds. The other box is 23 pounds.

The names of the boxes: Ralph and Norton, respectively.

Remember Ralph Kramden and Ed Norton of ``The Honeymooners?''

``It tickled my funny bone and I got away with it,'' said Bill Purdy, program manager for the Naval Research Laboratory, which designed and managed the Tips experiment for the NRO.

The NRO and NRL aren't the only ones picking up where NASA left off.

The engineer who developed the Tips tether, Joe Carroll of Tether Applications in Chula Vista, Calif., has a 22-mile cord that's supposed to ride on a European Ariane 5 rocket later this year. He's also working on a tethered capsule that might be used to return experiments from the future international space station.

And Rob Hoyt of Tethers Unlimited in Seattle is working on a fishnet stocking-type tether. Why fishnet? If one string breaks, the tether still holds.

Hoyt's most far-flung project: rotating tethers that work like a bola to hurl payloads from Earth orbit to the moon.

As for the space elevator envisioned by science fiction writer Arthur C. Clarke, lifting people and cargo to geosynchronous orbit 22,300 miles up, that's farfetched - for now.

No material currently exists that's strong enough, yet affordable, for such a long, long tether.

``You get on an elevator and you push a button to go to geo,'' Carroll said. ``That's the 10-millionth floor. That's going to take a while.''

A brief look at the eight orbiting tethers to date:

September 1966: 100-foot Dacron cord links manned Gemini 11 capsule and Agena booster.

November 1966: 100-foot Dacron cord links manned Gemini 12 capsule and Agena booster.

August 1992: 12-mile conductive tether with satellite on end jams 840 feet out while being unreeled from space shuttle Atlantis.

March 1993: 12 1/2-mile tether launched on Delta rocket, intentionally cut two hours after being unreeled and re-enters atmosphere and burns up.

June 1993: One-third-mile conductive tether launched on Delta rocket, orbits for 1 1/2 months to two months before re-entering atmosphere and burning up.

March 1994: 12 1/2-mile tether launched on Delta rocket, severed three days and 17 hours after being unreeled, most likely by micrometeoroid. Remaining tether and booster segment orbit for 59 days before re-entering atmosphere and burning up.

February 1996: 12-mile conductive tether with satellite on end breaks while being unreeled from space shuttle Columbia. Tethered satellite orbits for 23 days before re-entering atmosphere and burning up.

June 1996: 2 1/2-mile tether ejected into orbit from classified military satellite, still intact and flying.

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