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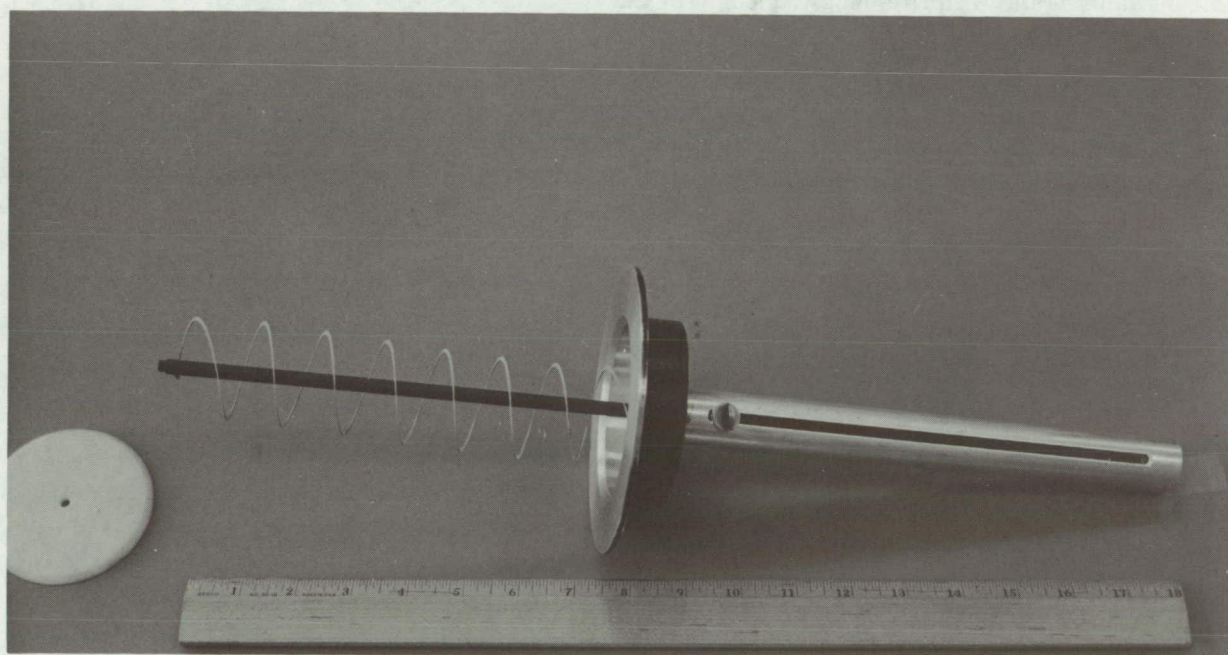
Brief 70-10538

NASA TECH BRIEF



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Lightweight S-Band Helix Antenna



A pyrotechnically operated, S-band helical antenna has been developed in which the helix is deployed subsequent to antenna placement. The new antenna is small, lightweight, and is novel in that the deployable helix is used in place of a fixed dish or horn; an additional advantage is that the antenna element can be shielded or protected when not being used. Applications include use on aircraft including helicopters, in mobile equipment, and in communications systems aboard satellites. This antenna should interest manufacturers of commercial communications equipment.

One prototype developed for S-band frequency (see fig.) is an eight-turn helix designed to give 12 db gain.

The antenna also can be designed to cover L- and X-band frequencies, and in various configurations such as tri-helix and quad-helix. By increasing the number of turns, more gain can be achieved. Other prototype models include one which incorporates a telescopic plunger, enabling the length of the antenna housing to be halved, and achieving a significant decrease in weight.

In operation, a gas cartridge in the end of the antenna housing is activated by passing current through a bridge wire igniting a powder charge. This releases gas pressure which forces the plunger to move forward in the antenna housing until the locking mechanism

(continued overleaf)

passes through the back of the antenna housing. The locking spring arms extend and lock the plunger in place at a predetermined length. Attached to this plunger is a folded helix antenna; by choosing the proper length of the plunger, spacing can be obtained to ensure the desired beam width and antenna gain.

To checkout the antenna, a restoring sleeve is attached to the plunger. A suction cup is pressed over the antenna cover; the plunger must be pulled forward slowly until the locking mechanism is activated. After checkout is complete, the plunger is pulled out approximately one-half inch; the storing sleeve is then pushed over the locking spring arms, making them fold into the plunger rod. The antenna is then pushed forward until it is folded and reseated.

This antenna can also be operated mechanically. The antenna housing has a slot running the length of the housing tube; the plunger face has a locking screw attached to it. To use the antenna in this configura-

tion, the locking screw must be pushed forward, locking it in place at the end of travel; this unfolds the helix to form an antenna with the proper spacing and length.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
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Kennedy Space Center, Florida 32899
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No patent action is contemplated by NASA.

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