VAN ALLEN BELTS

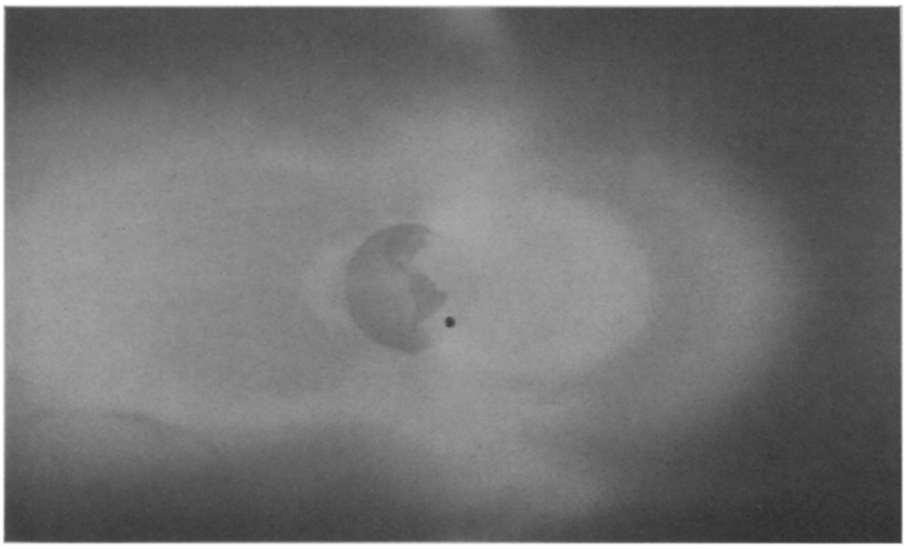
## Mapping the dip

Between the east coast of South America and the southwestern coast of Africa lies a region where the earth's magnetic field is relatively weak. For the bands of particles trapped in that field—the Van Allen belts—this means a closer approach to the planet, forming a dip in the belts known as the South Atlantic Anomaly. Particles that would descend to an average height of 250 miles above the earth over most of the belts' area (and in some places get no closer than 550 miles) might, in the dip, sink as low as 90 or 100 miles.

Unfortunately for space scientists who want to map the belts, this is below the altitudes of most satellites, leaving a blank spot in the charts equivalent to the uncharted parts of the ocean below. It is not, however, below the altitude of many manned orbital flights. Much of the little that is known about the anomaly, in fact, came from experiments aboard Gemini spacecraft.

**The space agency** is planning to put men in orbit for extended periods of time as part of the Apollo Applications Program. Information will be needed for AAP, if that is ever funded, or for the Defense Department's Manned Orbiting Laboratory, which is more likely to be so. There is increased interest in finding out just what the anomaly is really like. Launching men into space so that they pass briefly through the belts may not be particularly hazardous, but a lengthy stay in orbit might be a different matter. The three-day flight of various animals, plants, spores and individual cells aboard Biosatellite 2 last September indicated that prolonged exposure to weightlessness combined with radiation can produce genetic and growth changes.

**Last week,** the space agency took its first detailed look at the dip. About a 20-minute drive from the sleepy Brazilian town of Natal is the small, barren Barreria do Inferno launch site of Brazil's space agency, the Comissão Nacional de Actividades Espaciais. From there a Canadian Black Brant sounding rocket lofted an 80-pound instrument package on a long, curving trajectory which carried it some 475 miles up through the belts before it splashed into the South Atlantic. The unusual flight—with American control, a Canadian booster and a Brazilian launch team—was planned as one of the highest sounding probes ever launched by the National Aeronautics and Space Administration, and was only the second time that the agency has used the Black Brant.



NASA

*Simulation of the Van Allen belts: The dot marks the South Atlantic dip.*

Among the instruments aboard were three ion-chamber dosimeters to measure the overall radiation rate. Electrically, all three were the same. One, however, was enclosed in a shield designed to match the wall thickness in the Apollo command module crew compartment; another was shielded like the Apollo lunar module, while the third was an unshielded control.

In addition to the practical value, there is also considerable scientific interest in the belts in the vicinity of the dip, which largely accounts for the extreme height of the probe. Besides the dosimeters, the payload contained magnetometers for magnetic field measurements, a spectrometer to measure electrons at five different energy levels, and a heavy ion detector to measure low-energy particles.

Though the belts are fluctuating somewhat all the time, the probe was designed to take a quick look that largely ignores these relatively small variations to measure the present general contours of the dip. A year from now, a second probe will be sent up to see what broad changes there have been, followed, 12 months later, by a third. "We're looking at the general climate up there, as opposed to the weather," a space agency scientist says.

GOOD NEWS GONE BAD

## Gossip and the TMV

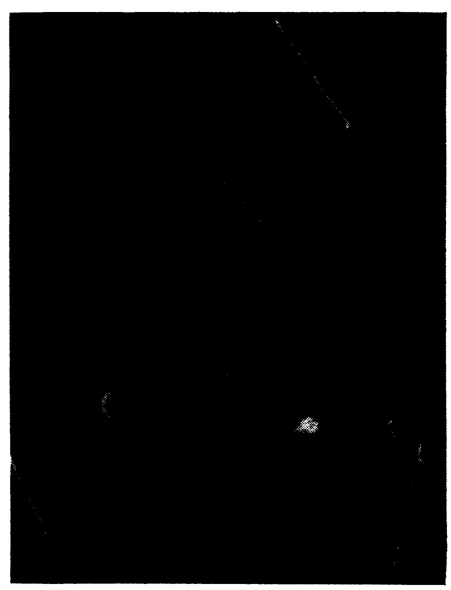
Since the publication of Nobelist James D. Watson's book "The Double Helix" (SN: 3/2, p. 210), almost everyone is aware that scientists gossip as much as the rest of humanity. Often, in fact, gossip and rumors are the media through which scientists first learn of major accomplishments about to be announced.

That the rumor generating process can sometimes be very unsatisfying was demonstrated amply last week.

That was when many scientists were predicting a major announcement from molecular biologists at Cambridge University in England: the discovery of the atomic structure of the tobacco mosaic virus.

**This virus particle** contains upwards of a million atoms. Delineation of its atomic structure would be a great technical tour de force and would reveal much of the methods and forces by which large assemblies of atoms are held together.

"If an exact structure for so large a particle were obtained," says Dr. R. A. Plane, head of the department of



Dr. Russell Steere

*TMV, × 50,000; structure promised.*