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# science news

## LIFE ON THE SHIFTING SANDS

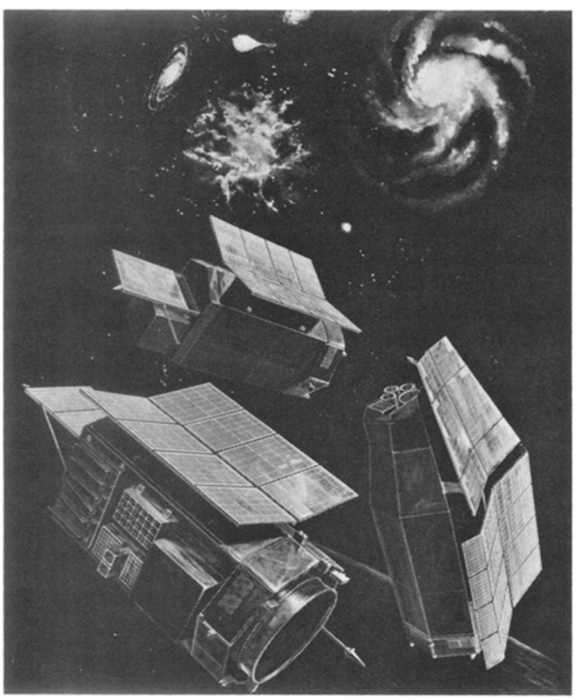
# Conversation Pieces

## *Probing the High Energy Universe*

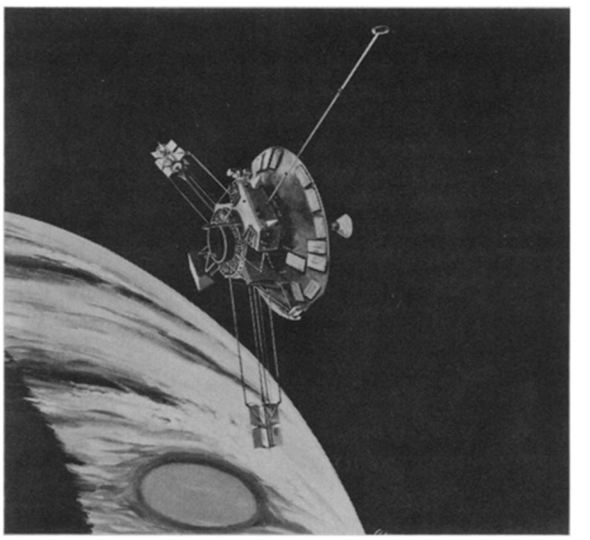
Since radio astronomy began, only a few decades ago, some brand new words have been added to the dictionary. Pulsar, quasar, black hole . . . these are only the most talked about objects and there are more questions about them than answers. How do these largely invisible but annihilatingly powerful generators of electromagnetic energy fit into man's basic theories of physics? Or do they fit? Are we on the verge of fundamental changes in scientific thought?

To find preliminary answers, instrumented balloons and rockets were sent above most of the Earth's atmosphere, starting soon after World War II. Then, small satellite observatories made better measurements. But the need for more prolonged observations and bigger instruments, with wider apertures, was obvious.

Now, NASA has given TRW the task of building a series of High Energy Astronomy Observatories and integrating their complex and massive experiments. HEAO-A will systematically map all significant high-energy sources over the entire celestial sphere. HEAO-B will point its wide-aperture X-ray telescope at objects of particular interest and measure their emissions with about 10,000 times the sensitivity of any previous instrument. HEAO-C will scan for cosmic and gamma-ray sources. The results may give us new insights into the physical processes which produce such interesting objects as pulsars, quasars, black holes, and other exotic astronomical phenomena.



The HEAO program is only the latest in nearly two decades of TRW projects designed to help NASA explore the solar system and the universe beyond. Back in 1958 our Pioneer 1 was the first spacecraft ever built by a private firm and the first of a whole series of low-cost, and highly reliable, interplanetary spacecraft. During the 1960s, TRW built the Orbiting Geophysical Observatories for NASA, to map the Earth's magnetosphere and provide data on phenomena that affect long-distance communications, In 1970-71, we built Pioneer 10, which made the first transit of the asteroid belt, the first close-ups of Jupiter, and, in 1987, will become the first man-made object to leave the solar system. Pioneer 11 has now swung round Jupiter and is heading for Saturn.



Space instrumentation is another long suit at TRW. Our Viking Lander Biology Instrument, a masterpiece of miniaturization and automation, is scheduled to reach Mars on July 4th, 1976, and start analyzing soil samples for signs of life. Another TRW instrument on Viking will make meteorological measurements.

If you'd like to know more about TRW in general and our HEAO work in particular, write:

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