

RADIO ASTRONOMY

Daddy Longlegs in the Sky

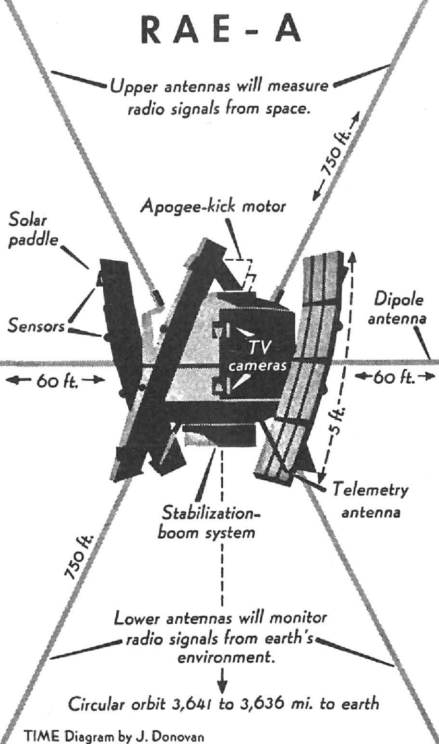
Some time this week, the newest NASA satellite is scheduled to perform a complex series of operations in orbit. If all goes well, Radio Astronomy Explorer-A will unree a collection of booms and antennas until it turns into a veritable space spider, with two pairs of appendages reaching 1,500 ft. from tip to tip—a distance greater than the height of the Empire State Building (which is 1,472 ft.). With those great legs foraging for information, RAE-A will act as a flying radio telescope capable of monitoring signals that even the largest earth-bound installations cannot detect.

Releasing the Yo-Yos. Lofted from the U.S.A.F.'s Western Test Range at Lampoc, Calif. on July 4, the daddy longlegs in the sky is a masterpiece of technological ingenuity. It is guided from the Goddard Space Flight Center at Greenbelt, Md. NASA scientists there had to perform a series of intricate maneuvers before they could call for the unreeling of the satellite's four main antennas. First they had to nudge the 417-lb. satellite into a circular, near-polar orbit about 3,640 miles above the earth with precisely timed bursts of a small rocket called an apogee-kick motor. The operation evened out the varying gravitational tugs of the original elliptical orbit, which would have bent and distorted the antennas. Next, RAE-A's masters had to stop its 92-r.p.m. spin, which would have wrapped the antennas uselessly around the exterior of the satellite. Two ¼-lb. "Yo-yo" weights were released at the end of 27-ft. wires, reducing the satellite's rate of spin like a whirling skater who slows himself down by extending his arms. Their task accomplished, the Yo-yos were cut loose to drift in space. RAE-A's remaining rotation was stopped when three electromagnetic coils were energized and the spacecraft lined up with the earth's magnetic field. To eliminate oscillations caused by gravitational pull on the extended antennas, a 630-ft. boom will also be deployed, much like a tightrope-walker's balancing pole.

Mapping the Milky Way. This week the satellite will receive a radio command from earth and begin to unfurl its giant antenna system. Carried as flat ribbons of silver-plated copper alloy coiled on spools within the satellite, the tubular legs will be formed as the outer edges of the unwinding ribbons curl towards each other and meet. Tiny tabs along the edges of the ribbon will hook together as the tube forms, adding rigidity. At first, the antenna legs will be extended only 355 ft. from the craft, to test their stability. Then they will grow to their full length—750 ft. apiece. Already oriented towards the earth by

magnetism, RAE-A's lower V antenna will also be pulled earthward by gravity, which will further stabilize the spidery satellite.

After the onboard television cameras have checked out the legs, the upper V will begin monitoring long-wave radio signals from the universe; the underside V will listen for radio emissions from the inner Van Allen radiation belt and from the earth itself. In addition, a dipole antenna in two 60-ft. sections will be deployed to monitor short bursts of radio energy on the same frequencies from various points within the solar system. Such long-wave signals are reflected by the earth's ionosphere and are lost to ground-based radio astronomers. But the in-



formation that is gathered and re-broadcast to earth by RAE-A should provide U.S. scientists with the first low-frequency radio map of earth's home galaxy, the Milky Way.

SCIENCE FICTION

Latter-Day Jules Verne

Across the U.S., a superior science-fiction movie called *2001: A Space Odyssey* is playing to packed houses. An engrossing novel expanded from the movie's screenplay and a new nonfiction book called *The Promise of Space* are selling briskly in bookstores. Some 22,000 miles above the equator, communications satellites are relaying TV pictures and telephone calls between the continents. The movie, the books and the satellites all have something in common: they are the brainchildren of

Arthur C. Clarke, a tall, springy and remarkably imaginative Englishman whose writing bridges the gap between the far reaches of science fiction and the intricate realities of scientific fact.

Science-fiction connoisseurs see the precise Clarke as a latter-day Jules Verne. Space scientists who invited him to address the international conference on bioastronautics and space exploration three weeks ago obviously regard him as a peer. That broad acceptance testifies to the validity of the three premises on which Clarke bases all his writing, fiction and nonfiction alike:

▶ "When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong."

▶ "The only way to define the limits of the possible is by going beyond them into the impossible."

▶ "Any sufficiently advanced technology is indistinguishable from magic."

By mining the magic of the impossible, Clarke has uncovered the material for 40 volumes that have sold more than 5,000,000 copies—to say nothing of hundreds of articles in Sunday supplements and magazines ranging from *LIFE* to *Playboy*. His energy is impressive. In Colombo, Ceylon, where he has lived for the past twelve years, the author taught himself to be an expert skindiver. He has explored many tropical reefs, and charted and searched sunken wrecks in the South Pacific and the Indian Ocean. Inevitably, he has also written extensively about underwater exploration.

Wireless World. Clarke, now 50, traces his interest in science to the time he built a telescope while he was still a schoolboy in England. But exposure to such U.S. science-fiction magazines as *Astounding Stories* and *Amazing Stories* in the early 1930s really ignited his imagination, led him to study physics and electrical engineering, and turned him toward the typewriter.

In 1945, during a five-year stint as a radar instructor in the R.A.F., Clarke wrote an article called "Extraterrestrial Relays" for the magazine *Wireless World*. Heart of the piece was a detailed proposal for a synchronous communications satellite. Almost 20 years later, the device became a reality as Syncom 2. After the war, Clarke went to King's College in London, graduated with honors in physics and math, soon turned to writing full time.

In 1949 he published his first book, *Interplanetary Flight*, describing with remarkable prescience the space age that was dawning. He won the permanent allegiance of science-fictioners in 1953 with *Childhood's End*, a novel about the transformation of man after he encounters benign but grotesque visitors from outer space. In 1963, *Profiles of the Future* illustrated his growing confidence in his gift for technological prophecy. He predicted that man would

POP

Tunes for Teeny-Weenies

A dozen years ago, Critic John Mason Brown defined television as chewing gum for the eyes. Now the record industry has come up with bubble gum for the ears. Set to a chink-a-chink beat, bleated out with pep-rally fervor, it goes like this:

*Yummy, yummy, yummy, I got love
in my tummy,
And I feel like a-lovin' you;
Love, you're such a sweet thing, good
enough to eat thing,
And that's just a-what I'm gonna
dooooo.*

Bubble-gum music is the latest confection created for the subteen market, which accounts for about one out of every four single records sold. These customers, who range from high school freshmen all the way down to third-graders, are the displaced persons of the rock revolution. Today's groups sing about such everyday teen-age concerns as war, alienation, racism and narcotics. But to quite a few subteens, especially the more sheltered ones, having a social conscience means worrying about getting home by 10 p.m., grass is just grass, sex is necking, and the byword is don't trust anybody over 13.

Bubble-gum music speaks to them of their own concerns, or rather unconcerns. Since they are at the awkward age, midway between playing house for fun and playing it for real, the music shrewdly looks both ways, combining nursery rhymes with sex. In *May I Take a Giant Step (into Your Heart)*, the lines go:

*I remember how it started . . .
All the kids were out to play,
Then she said, "Hey, let's play
'May I."*

On a forthcoming record, a group called the Salt Water Taffy chants *Sticks & Stones*:

*Nothing you could say could ever
make me leave her. . . .
Save your breath 'cause I'm
ignoring,
But don't forget it's me that's
scoring.*

Simon Says. The bubble-gum trend has been puffed up largely by a 25-year-old former actor and rock-'n'-roll singer named Neil Bogart. Last year, as general manager of the newly formed Buddah record label, he set the formula with a recording called *Simon Says*. It sold 1,700,000 copies. The latest in a line of 28 similar disks is *Yummy, Yummy, Yummy*, by the Ohio Express, which last week was No. 15 on Billboard's bestseller chart of 100. In all, Buddah has piled up first-year sales of \$5,800,000 and has already grown to be the nation's seventh largest producer of single records.

Now other groups and labels are cashing in on the same market, including the Cowsills on MGM (*Indian Lake*) and Manfred Mann on Mercury (*My Name Is Jack*). But Buddah and Bogart hold the original charter. "We are giving kids something to identify with that is clean, fresh and happy," Bogart says. "Let them worry about the world's problems when they get older."

Fair enough. But many parents will find more reason than rhyme in the lyrics of *Bubble-Gum World*:

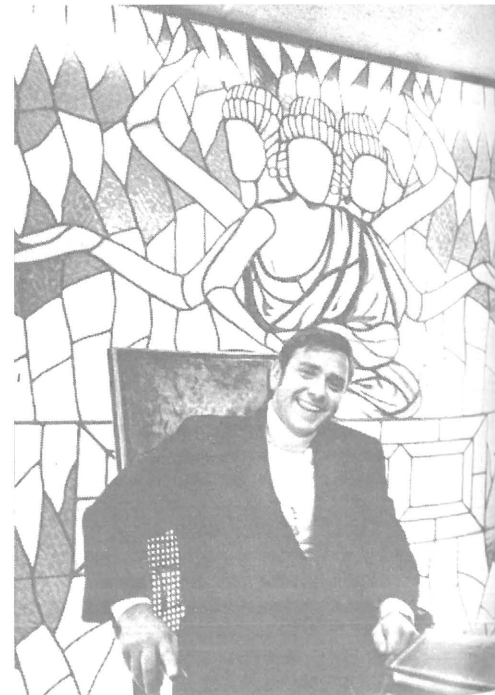
*You think you're in a bubble-gum
world . . .
It is getting to the point, you're go-
ing a little insane.*

Drummer Boy with a Horn

Everybody remembers the name of the fellow who played Moses in the 1956 film remake of *The Ten Commandments*. Right. Charlton Heston. But who was that fellow with his bare back to the camera who played the drum while Charlton strode down the mountain with the tablets? He was a little nobody, a movie extra who just happened to have the kind of graceful dorsal muscles and shoulder blades the director was looking for. Herb Alpert has since become considerably more than a name that everybody remembers, or a man who hires his own drummers. He is a major sound system.

As leading man with his own Tijuana Brass, Alpert has just wound up a U.S. tour that established the group as one of the top handful of pop road shows around. It is equaled only by the likes of Sinatra, Streisand and the

BURTON BERINSKY



BUDDAH'S BOGART
Let 'em worry later.



CLARKE ON "2001" SET
Immortality by 2090.

contact intelligent extraterrestrials by 2030, create artificial life by 2060 and achieve immortality by 2090.

In his latest nonfiction book, *The Promise of Space*, Clarke foresees the ultimate magic of travel to the stars. "It is not difficult," he explains, "if one is in no particular hurry." For flights that will last from decades to hundreds of years, he has worked out a method that will avoid dooming travelers to spend most of their lives in space. Simply send egg and sperm cells on the trip, he says, and have computers mate them some 20 years before the voyage is to end. After that, he suggests, "carry the embryos through to birth by techniques already foreshadowed in today's labs—and bring up the babies under the tutelage of cybernetic nurses who would teach them their inheritance and their destiny."

Ageless Wisdom. In the film *2001*, Clarke's contribution as co-author and technical adviser to Producer-Director Stanley Kubrick is evident in such items as a weird but technologically probable talking computer that is more human than the astronauts. The film's ending, however, is almost pure Kubrick. A surviving spaceman is plunked into a Louis XVI bedroom after a psychedelic zoom through time and space that is mystifying to most moviegoers. But Clarke's novel version of *2001* explains all. As the survivor approached a huge monolith on Iapetus, one of Saturn's ten moons, the astronaut entered a "star-gate" into a different dimension, dominated by a godlike superintelligence. He is first returned to childhood, then transmuted into pure intellect and transported back to earth, carrying with him all the wisdom of the universe.

In the future, Clarke plans to concentrate on science fiction. But he has one unfulfilled goal: a flight of fact. Although he believes regularly scheduled trips to the moon will not begin until after the turn of the century, he hopes to be included on one of the early flights. "some time in the '80s."