as a base for building instrumentation and data processing skills. The researchers began with some simple extrasensory perception exercises — "to establish that we were indeed capable of generating effects to study" — then moved on to designing equipment to measure psychokinesis — a palpable disturbance of a physical system by thought alone.

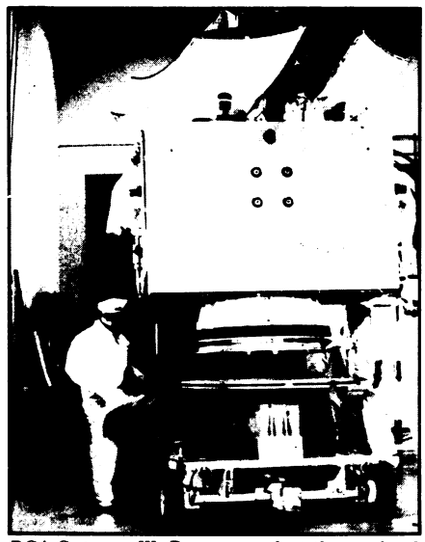
The psychokinesis experiments illustrate well why such research can be both tantalizing and frustrating. Rather than try to reproduce spectacular, "macroscopic" effects, such as spinning a compass without touching it (which has been reported in poorly documented studies), Jahn and Curry concentrated on easily observed "microscopic" phenomena. In one experiment, a subject was to raise the temperature of a thermistor by a few thousandths of a degree. In another, the goal was to change the separation of two mirrors in a Fabry-Perot interferometer by a hundred-thousandth of a centimeter. The observations were specific and even dramatic. Subjects did, indeed, seem capable at times of raising the thermistor temperature or changing the optical pathlength of the interferometer at will. But neither experiment was fully "reproducible" in the scientifically accepted sense: The effects varied unpredictably from person to person and from day to day. Because of this unpredictability, Jahn prefers to call the results of work so far "tutorial" rather than technically conclusive. That is, they should be used as models for more extensive research rather than as any sort of "proof" of the validity of psychic phenomena. Nevertheless, analysis of these experiments has offered two important insights that can be further tested in future research.

First, the ability to produce measurable psychic effects appears to be trainable. Neither Jahn nor Curry was aware of any initial psychic ability and both got better as they went along. An important element in such training appears to be feedback that is "visible and attractive," Jahn says.

Second, Jahn speculates that psychic phenomena may have an *inherently* statistical nature. If so, theories dealing with such phenomena are likely to involve abstruse concepts related to the formalism of quantum mechanics or statistical mechanics, rather than some easily grasped intuitive explanation. In particular, psychokinesis appears to involve a reduction of entropy — a statistical measure of disorder — and the equivalence of physical "information" and energy.

An ad hoc committee of the university has established a charter for Jahn's work on psychic phenomena to proceed and he has brought in developmental psychologist Brenda Dunne to work full time on the program. In an interview Dunne said that a growing number of reputable scientists are becoming active in psychic research, but that "the field as a whole is struggling for recognition as a legitimate science." □

NASA back into talksat R&D



NASA

RCA Satcom III: Due soon, but then what?

Satellite communications, more intimately woven into contemporary life than perhaps any other aspect of Space Age technology, owes much of its solid footing to years of research and development by the National Aeronautics and Space Administration, which was ultimately able to pass on most of the effort to private industry as a self-sustaining enterprise. In 1973, prompted by tight budgets, NASA virtually dropped its R and D program in the field.

Now NASA is back in the game, with a five-year program "aimed at retaining U.S. world leadership in satellite communications research and technology."

Several factors have contributed to the restored effort: Early in 1977, a special committee of the National Research Council's Space Applications Board strongly recommended just such action (SN: 4/9/77, p. 231). A year later, President Jimmy Carter's reorganization plans produced the National Telecommunications and Information Administration, charged in part with easing the way for NASA communications experiments into commercial use. Further support came from various federal agencies and industries in the form of responses to a questionnaire from the White House's Office of Science and Technology Policy. The satellite-allocated portions of the communications spectrum have become increasingly crowded, and, NASA points out, the U.S. is facing more foreign technology competition.

The new NASA effort, based at the agency's Lewis Research Center in Cleveland, is concentrated on the high-frequency, 20-to-30-gigahertz portion of the spectrum known as the Ka band. Lower frequencies are fast approaching saturation, and, says NASA's Donald K. Dement, "this Ka-band allocation is the last potential opportunity for significant new capacity to be developed within reasonable satellite-link power levels." But, he adds, "this band has been inadequately explored, and technology has not been widely developed for use in the United States." The agency will be studying multi-beam antennas, on-board signal-switching and other technologies, but there is far more to the satellite communications problem than the opening of additional frequencies.

As the SAB committee's report emphasized, there are many potential satellite communications users who are too small or widely scattered to form a feasible commercial market. The Ka band is primarily relevant to large-scale, wide-band traffic, while the small users often can use narrow-band, lower-frequency equipment — which is also less costly. Some of NASA's new technologies will be applicable there, but much of the small-user activity is being studied amid a thicket of other agencies and organizations. The matter is thorny — and far from solved. □

Lasker Awards: DNA and the brain

The 1979 Albert Lasker Basic Medical Research Awards were presented to three scientists whose basic research has potential for clinical as well as laboratory use. Roger W. Sperry of the California Institute of Technology received a $15,000 award for his investigations into the workings of the brain's hemispheres, and Walter Gilbert of Harvard University and Frederick Sanger of the Laboratory of Molecular Biology in Cambridge, England shared another $15,000 for their independent development of new methods of rapid sequencing of DNA.

In 1953, Sperry developed the technique of "split brain" research, in which he severed the bundle of nerve fibers that connects the two halves of the brain. He discovered that the two hemispheres function independently in this situation; the right brain does not know what the left brain is learning. Sperry found that the two halves of the brain govern two sets of activities; there is no one "dominant" hemisphere for all mental processes.

The second Basic Research Award was presented jointly to Sanger and Gilbert (a 1949 Westinghouse Science Talent Search winner), whose rapid sequencing techniques will allow molecular biologists to discover the sequence of DNA components in a few days, instead of months. Gilbert's method uses chemical reagents to break the DNA molecules into fragments, and Sanger's employs an enzymatic reaction in its sequencing procedure.

The Lasker Special Public Service Award was presented to Sir John Wilson, President of the International Agency for the Prevention of Blindness. □