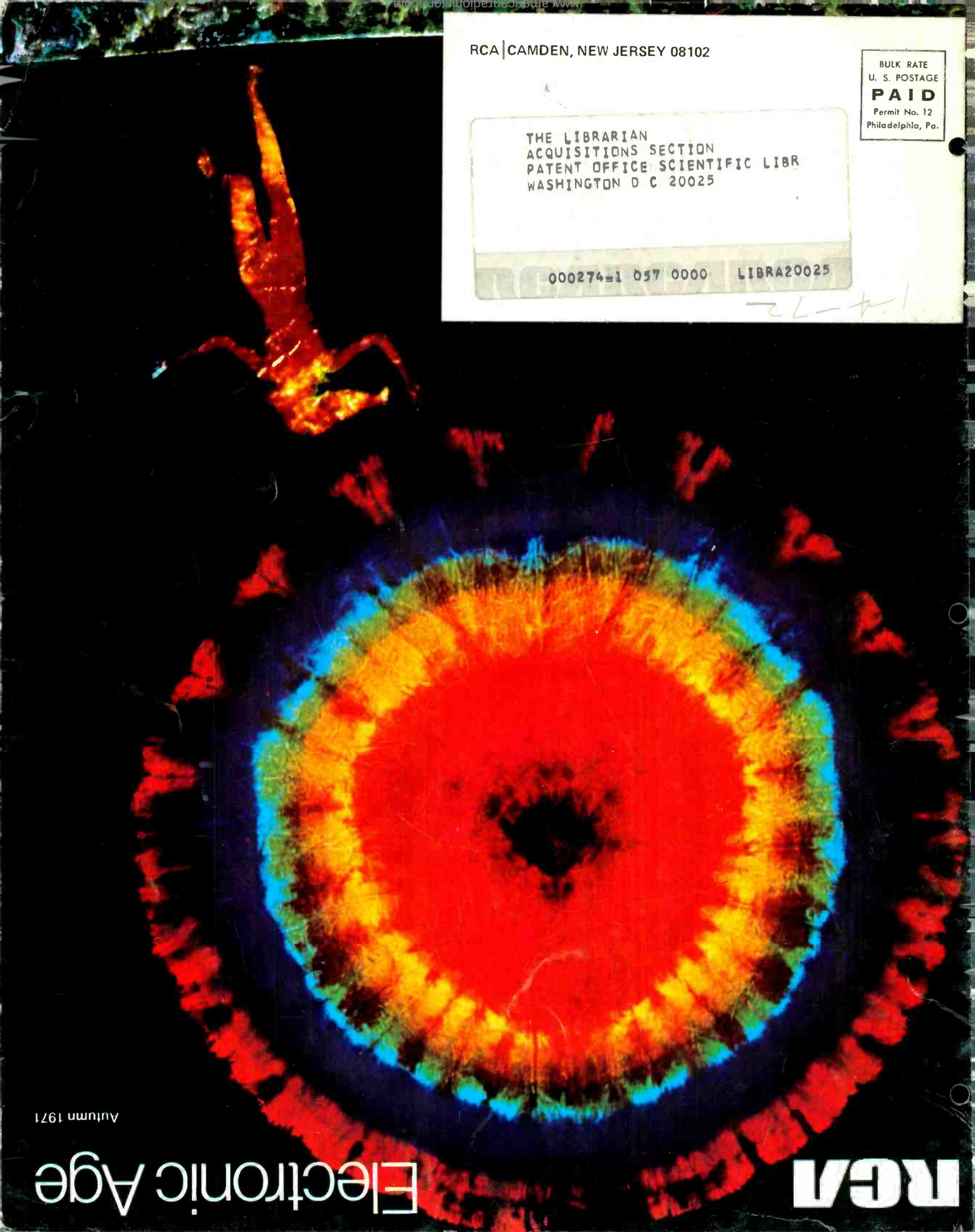

Autumn 1971

Electronic Age

RCA

Cover: Although Freudian psychoanalysts and laymen alike are most interested in the content of dreams, it is the physiological parallel that leads to the most intriguing discoveries. One theory is that dreaming serves as the "programming mode" for the brain during the sleep cycle, when the brain is not coping with problems and can undergo reorganization. An article on this and other biological rhythms begins on page 2.

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To Our Readers:

As an economy measure, the publication of *Electronic Age* is being suspended, effective with this issue.

The editors regret the necessity for this decision and hope that an improved economic climate in the future will permit an early resumption of publication.

Jules Koslow
Director, Publications and Communications Services

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rupted the sunlight in a rhythmic manner, inducing disorientation. Perhaps automobile accidents on certain stretches of road might be explained by similar effects caused by the rhythm of oncoming headlights through fenceposts or trees. The spacing of lights in long tunnels is being studied to avoid the same problem.

The EEG also is used to help classify the different stages of sleep. One stage of sleep that occurs at approximately 90-minute intervals is accompanied by rapid eye movements (REM). REM correlates closely with the amount of time spent in dreaming.

This 90-minute period of sleep is one of the most informative phenomena of the brain's physiological activity. Although the content of dreams is what seems to concern most people, it is actually the physiological parallel, even though imperfect, that leads to the most interesting discoveries. The REM state involves a large number of physiological changes that occur more or less together, such as very low muscle tension in the "anti-gravity" muscles, a low-voltage and very rapid EEG, irregular heartbeat and breathing rates, rapid eye movements (supposedly not made to "look" at the dream), and some evidence of sexual arousal.

William Dement, a pioneer in sleep research, made one of the earliest experiments to see what happens when a subject is deprived of REM sleep. It was found that subjects allowed to sleep normally after several nights of selective REM deprivation showed a tendency to make up for lost REM — the "REM rebound effect."

Two other findings are relevant here. First, the percentage of time spent in REM sleep was found to be highest in the young and to decrease with age. A newborn baby spends about 50 per cent of his sleep time in REM; by adulthood, REM has decreased to about 25 per cent and continues to decrease into old age.

Next, the amount of REM sleep is lower in animals below the mammal class. It is a fraction of a per cent for birds and zero at the level of the turtle. Thus the ontological progression (young to old) goes in the opposite direction from the phylogenetic progression (lower to higher animals). When first discovered, this aspect of REM was considered mysterious, since any biological change usually goes in the same direction in these two progressions.

These three observations suggest what might be the function of REM (or dreaming, to temporarily equate the two). The most likely answer seems almost intuitive. In fact, during a lecture on REM to a group of sixth graders, I asked, "Why do you think children dream more than adults?" The students reacted almost instantaneously: "Children learn more than adults." . . . "Children have much more interesting lives than adults." . . . "Children are always doing different things every day, but adults just do the same thing." . . . "Children don't have to worry about going bankrupt."

The indications are that REM may play a crucial role in organizing and reorganizing our current and previous experiences so that we can use the information to cope with our current pressing problems. Very likely, we use as much of our brain as is accessible to us for our immediate needs. As we mature and our needs change, the brain also changes to adapt to the new demands we make of it. In short, the brain seems to undergo a continuous and spontaneous reorganization, somewhat like the programming and reprogramming of a computer as it is called upon to solve different problems.

Since the brain is not engaged in coping with problems during sleep, programming of the brain is most likely to occur at that time. But in what stage of sleep would it be most likely to occur? The brain is "turned on" during REM in the sense that the EEG is active. At the same time, the output of the muscles (muscle tension) and the input of the senses are at very low levels. Therefore, it is tempting to guess that some conscious aspect of this programming process is going on during REM rather than some other stage of sleep.

Moreover, since newborn babies spend much more of their sleep time in REM than do adults, one might expect REM to be 100 per cent at some point in embryonic development. This would occur at about the 30th week of gestation, and it implies that the embryo is dreaming in order to organize and program its nervous system so as to be ready at birth with all "instinctive" processes intact.

Without speculation about prenatal dream content (on which there are some curious ideas), it may be said that an embryo will have an EEG when it begins to dream. The EEG, therefore, could be used to determine the point at which life begins — the time when an embryo makes the transition from biologically functioning tissue to a consciously dreaming human being. This may well be considered in any meaningful discussion on the rightfulness of birth control and even abortion.

Sleep researchers once thought that dream deprivation could cause a subject to become psychotic. In time, REM deprivation alone was not found sufficient to cause psychosis, but many other observations have been made, some of which definitely relate dreaming to certain kinds of mental illness. These suggest that one can regard dreaming, or REM, as the "programming mode of operation of the brain," and that, in pathological circumstances, some aspects of this mode can "leak through" during wakefulness. Thus a psychotic, schizophrenic, or drug-intoxicated person might be considered to be in a dreaming or partially dreaming state, even though he is awake.

It has been demonstrated that the amount of REM is about the same in a schizophrenic as in a normal person. The difference is that REM deprivation in a schizophrenic does *not* result in a rebound. Therefore, there might be some sort of REM "leakage" during the day to relieve REM "pressure." Furthermore, patients whose schizophrenic symptoms have recently subsided — remissed schizophrenics — have shown an exaggerated REM rebound after REM deprivation. There is also some indication that, just before a person enters a psychotic state, there is an abnormally high amount of REM during sleep.

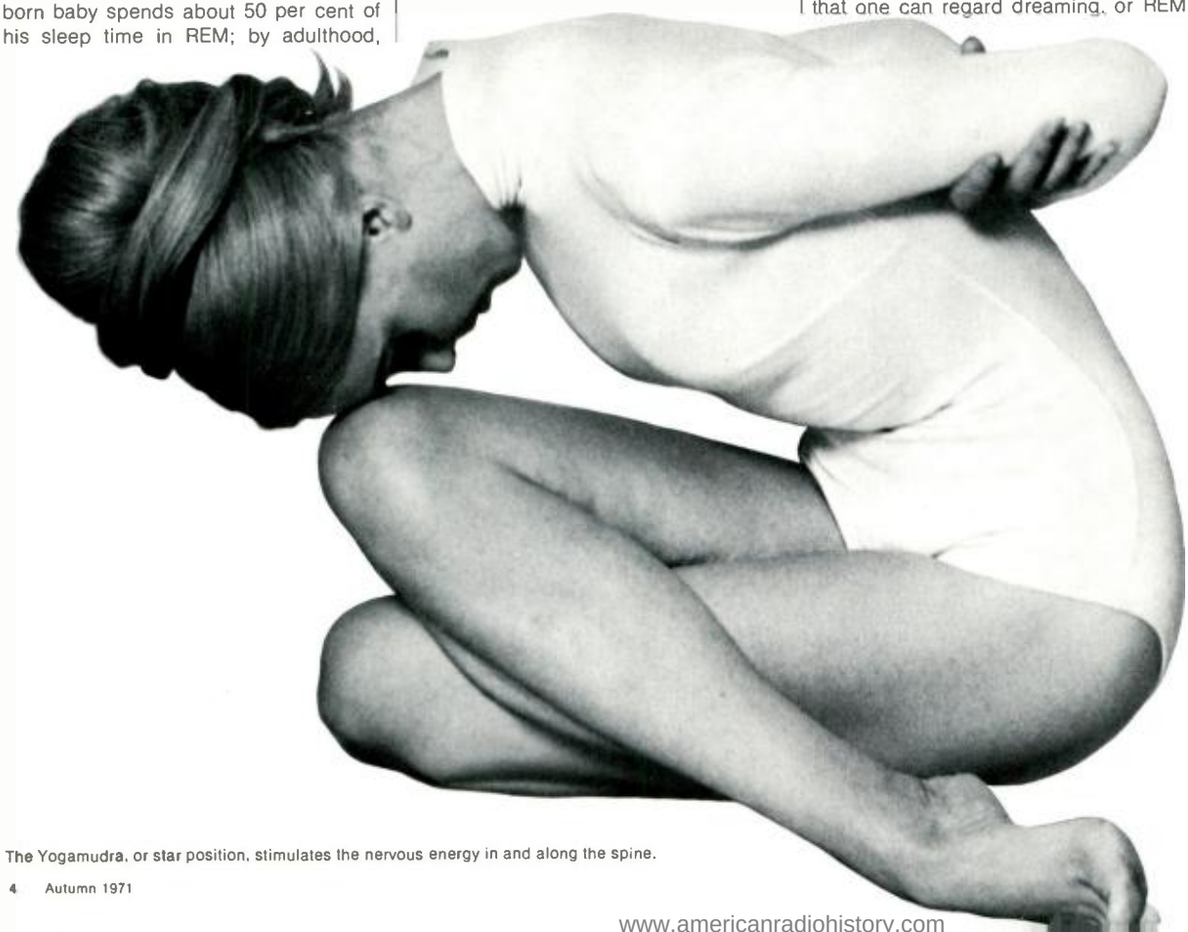
Dement's most recent work with drugged animals seems to support this line of thought. When a certain drug, PCPA, is administered to cats, it causes them to show certain aspects of REM behavior during wakefulness. The theory is that a substance in the brain called serotonin prevents REM from occurring during wakefulness. Since PCPA removes serotonin, it should make the brain unable to "resist" the occurrence of REM.

When a cat is under the influence of PCPA, its behavior becomes dramatically abnormal and atypical. However, the brain of a cat is too small and simple to allow one to say that the cat is in a state equivalent to psychosis in a human being. A monkey under PCPA behaves as if it were having hallucinations. Experimentation with a human volunteer had to be stopped because of ensuing psychosis.

To what extent do the effects of PCPA resemble schizophrenia? Neither PCPA cats nor schizophrenics have REM rebound after REM deprivation. Also, schizophrenic patients taking Thorazine, a tranquilizer, can show marked alleviation of their symptoms, as do PCPA cats. Not only does the REM rebound effect return when Thorazine is administered but even the exaggerated rebound seen in remissed schizophrenics is duplicated.

Investigators are extremely cautious in drawing conclusions about drug research with REM. Quite possibly, however, a breakthrough is taking place that may demonstrate that psychosis, schizophrenia, and other kinds of mental illness are different forms of dreaming while awake. It might also explain drug-induced psychoses, such as those caused by the effects of LSD. A secondary consequence of long-term illnesses that involve "waking dreams" would be a breakdown of all the processes that depend on programming in the brain — everything from attention, motor activity, visual understanding, and emotion to stability of temperature and blood count. The general observation that homeostatic processes are abnormal in schizophrenics is more easily understood in this context.

Human beings usually have a regular rhythm of sleeping and waking. Most of us keep more or less in step with the earth's rotation by sleeping at night and



The Yogamudra, or star position, stimulates the nervous energy in and along the spine.

waking in the morning. Ours is a "circadian" cycle (*circa* — about; *dies* — day) of approximately — though not exactly — 24 hours.

Experiments have shown that, if a person were put into a cave and deprived of any external indication of time, his cycle would usually be a bit longer — more like 26 or 27 hours. People who tend to have longer cycles when they are "free-running," as in the cave experiments, function best when they can get up late and go to bed late. Those who rise cheerfully at an early hour but find it painfully difficult to stay up late have a shorter free-running cycle compared to the norm. The significant fact about this oscillation, or rhythm, is that it runs spontaneously. It is locked in, or synchronized, to the earth's rotation by certain external influences.

It is of great consequence that all oscillations, whether occurring naturally or created artificially, are observed to obey certain mathematical laws in connection with the phenomenon of synchrony. These laws describe the ways in which cycles affect each other when they interact. The process through which the oscillations become synchronized into a stable phase relationship is called entrainment.

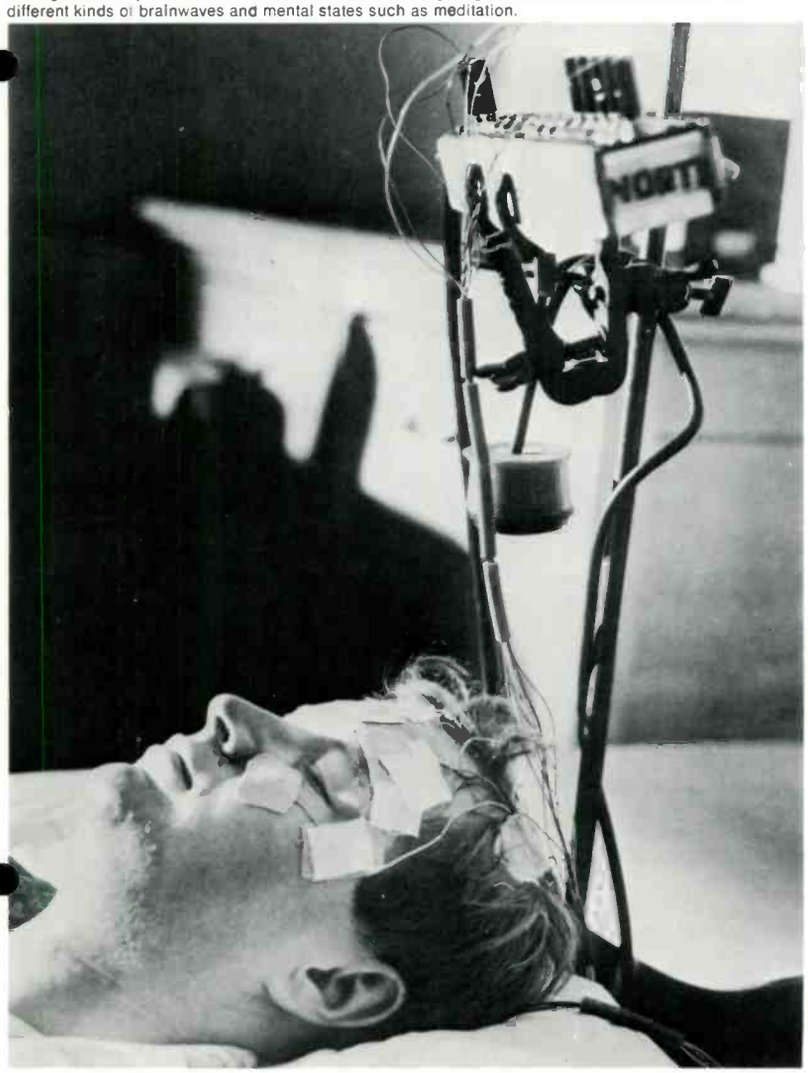
Oscillations may be synchronized, or entrained, in two ways. The first is through entrainment to an external signal in the environment. Circadian rhythm in human beings is entrained to the alternating rhythm of day and night. The increasing amount of daylight in the spring is the entraining factor in plant growth. An example from the area of technology is television. A TV picture is created by two oscillators, responsible for the vertical and horizontal scanning of the electron beam that lights the front of the tube. Both oscillators must be synchronized to the transmitted signal for the picture to remain stationary on the face of the tube.

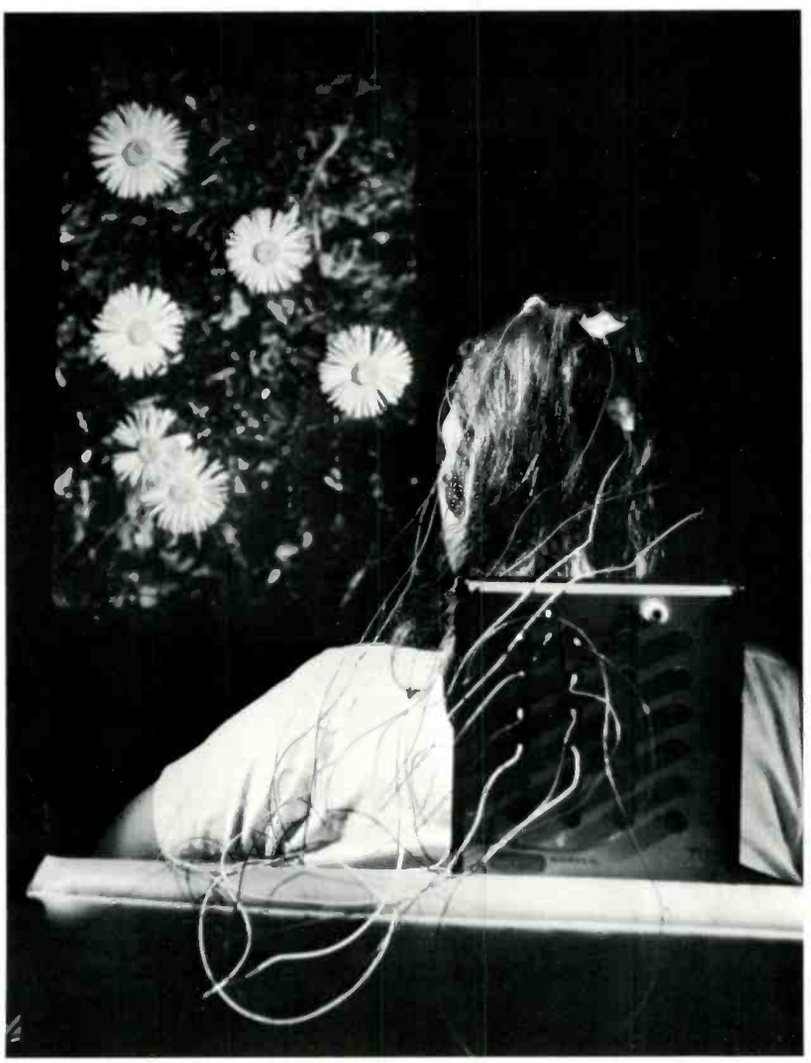
Second, there is mutual synchronization. The internal organization of cycles within the body depends mostly on mutual entrainment. In the embryo, for example, heart cells contract individually at first and only synchronize later as the embryo develops. Long-distance jet travel through different time zones not only displaces one's temperature and sleep-wake cycles in relation to the environment but also appears to disrupt various oscillations of body chemistry, causing them to be "out of sync."

Through the mutual interaction of cycles in a system, a superior type of control emerges, be the system natural or technological. This type of control does not exist in the usual sense that it has a precise physical location. It is more properly regarded as a property of the system as a whole.

Take a power grid network for a large region. Each generator is stabilized individually by a governor. When the generators are connected in parallel in a

Interest in brainwaves has generally centered on their practical value in diagnosing forms of brain damage. Recently, however, scientists have been investigating possible correlations between the different kinds of brainwaves and mental states such as meditation.





grid and begin operating under normal conditions, they synchronize mutually in a self-organizing fashion. If one of them gets slightly out of phase and starts leading, it experiences a retarding force. Conversely, a lagging generator will be accelerated so that all pull together in phase and frequency. It is as if a virtual "governor" emerges over the whole system, making each generator far more stable when it operates in a grid than when it operates alone.

Among the most interesting types of oscillations are those associated directly with biochemical processes in the body. Some can be detected by urine or blood analyses or by reactions to various types of drugs as a function of the time of day. There are also circadian changes in susceptibility to disease, pain, epileptic seizures, and allergic reactions. Indeed, the body can be regarded as a biochemical factory whose activity depends upon the time of day.

Many drug-sensitivity experiments have been performed on mice, since the metabolism of a mouse is similar to that of a man. It has been shown that, when a mouse awakening from its rest period is given an amount of alcohol equal to a quart of vodka for a man, there is a 60-per cent probability that the alcohol will kill the mouse. In contrast, the fatality rate is only 12 per cent if the mouse is given the alcohol at the onset of its rest period. It has also been found that the fatality rate for the anesthetic halothane was 76 per cent when given in the middle of the mouse's activity period — the time when the mouse was least sensitive to most toxins — but only 5 per cent in the middle of the rest period. The way an anesthetic is used may be one of the factors influencing a person's response to major surgery.

Thus research on biological rhythms in medicine points to one dramatic possibility in the future: the crucial role that timing seems destined to play in both the administration of drugs and in diagnostic procedures. This may lead to a "new medicine" in which the body's own dynamics are used and manipulated. Very tiny amounts of a drug, administered at just the right times in a person's daily cycle, would have maximum effect, and some of the side effects of "standard" dosages prescribed at present could be avoided.

In other areas of research, new findings have related some diseases to rhythms. For example, the one property that seems to distinguish cancer cells, even minimally modified cells, is their complete disregard for the circadian rhythms of the normal cells in the vicinity. In other words, they break loose from the entraining agents of the organism — like generators that destroy one another's synchrony before a large-scale blackout. This decoupling, or breakdown, of cycles might affect larger rhythms in the body, such as the temperature rhythm.

The relationship between cycles of different frequencies has an analogy in technology called demultiplication, which refers to a faster rhythm controlling a slower one. A number of cycles of the faster rhythm might be synchronized with one cycle of the slower rhythm. In this way, the longer cycles in the body may be related to, or even "driven" by, the shorter ones.

It is possible that a better understanding of the individual rhythms of cells may play a crucial role in the future in controlling cancer. The importance of cell rhythms in cancer is made more credible by fundamental research on the development of the embryo. Modern studies of cell differentiation and large-scale organization of cells might explain how oscillations enable cells to cooperate in forming an embryo with the correct number and proportion of cells for each organ, ultimately resulting in correct over-all structures.

Fertility involves another important cycle. Despite the many advances in birth control, the methods available today leave something to be desired. Cost, educational requirements, cultural factors, and the need for medical attention make pills and devices unacceptable to many people in developing countries, often the areas that suffer most from the current population explosion. The rhythm method does not have these disadvantages; its only disadvantage is that it frequently doesn't work. This is because of the irregularity of the human fertility cycle. It appears that the only way to make the rhythm method perfect is to make the rhythm itself perfect. This may actually be possible.

The fertility cycles of many animals are entrained to the moon. The synchrony between the sexual cycles of sea urchins and phases of the moon was known at least as early as the time of Aristotle. The grunion fish, which are numerous in waters off the California coast, time their 30-day spawning cycle to the full moon (and highest coastal waves) to an astonishing accuracy of five minutes. Laboratory experiments on other sea animals, made by using a very low-wattage bulb to simulate the moon, also show that moonlight serves as the entraining signal for their sexual cycles.

Work on light-induced estrus, or menstruation, in rats as well as on light-induced ovulation in chickens and ducks has led to research on the pineal gland in vertebrates. The pineal gland, which Descartes considered the seat of the soul, provides a mechanism that makes it possible to draw inferences about the effects of light upon reproduction. In such animals as the frog and the lizard, the pineal gland has a light-sensitive retina and is close enough to the surface of the head to act as a "third eye."

In human beings, the pineal is deep inside the brain. It is affected by light by means of an accessory optical-nerve tract that descends into the neck and is linked there to another nerve center. Impulses received by this nerve center presumably affect the sympathetic nervous system, which relays light information to the pineal gland. (Research is made more difficult by the fact that this mechanism does not function in quite the same way in all the animal species that have been investigated.)

"As research into biological rhythms probes closer to the mysteries of 'life' and 'consciousness,' our concepts of ourselves and our technological society will change—lending, perhaps ironically, a new significance to the question, 'What makes a person tick?'"

However, in contrast to other glands, which are usually stimulated by hormones transmitted through the blood, the pineal gland acts as a neurohormonal transducer, receiving bioelectric information through nerve cells and giving off biochemical (hormonal) responses. In this way, it initiates a series of events in the hypothalamus and pituitary glands that result in a release of hormones, among which is the luteinizing hormone that induces ovulation.

This information leads to a number of new observations. For example, scientists in Finland have shown that a higher percentage of twins are conceived during the season of the "midnight sun" than during the rest of the year. They attribute this to the effects of light on the pineal. It has also been observed that menarche, the onset of menstruation, occurs earlier in girls who have been blind from birth. Studies have shown that female rats kept in constant light went into a state of constant estrus. Males were also affected by light. In constant darkness, gonads of the male hamster — an extremely fertile animal — shrank to about a quarter their normal weight, significantly reducing fertility.

All this suggests a very interesting theory — that the length of the menstrual cycle is not an accident. More likely, it is a result of evolution; and, at one time, there may have been an advantage to survival if women ovulated in phase with the moon. If this were true, studies of fertility cycles in the equatorial zone, where climate permits human beings to live in the open, would support the theory. Do women in primitive tribes at the equator ovulate in phase with the moon? Also, do female monkeys living there ovulate in phase with the moon? The evidence seemed sufficient to warrant theorizing whether biological oscillations could be synchronized deliberately to environmental signals — specifically, whether light used at critical times could regularize the menstrual cycle and enable a woman to predict exactly when ovulation would begin.

In one experiment with a subject who had a history of menstrual irregularity, the light was left on in her bedroom (to simulate moonlight) during the entire nights of the 14th, 15th, 16th, and 17th days of her cycle, counting the first day of menstruation as day one. There was no light on at night for the rest of the cycle, since it was considered important to have a definite regime with a clear entraining signal. The result, over several months, was a significant regularization of her menstrual cycle, presumably by the effect of light.

A subsequent experiment also was performed by the author in collaboration with Dr. John Rock and Mrs. Miriam Menkin of the Rock Reproductive Clinic, using the same procedure on 16 women volunteers in the Boston area. Again, the results were very encouraging, and a more massive experiment is in planning stages at this time.

If light could be used to control ovulation in a manner that would make the rhythm method a practical and reliable technique, then a drugless, low-cost, and "natural" method of birth control would become available. Since the light need not be bright (the minimal level of brightness has not been determined), a candle or battery-powered light might be suitable. An accurate method for controlling ovulation could be used as well to increase the possibility of conception.

It is evident that the science of biological oscillations impinges on what are perhaps the most important problems in medicine. Yet the implications of such study are broader. As our pace of living increases, we tend to become out of tune with our own rhythms and those of our environment in ways that may affect such seemingly intangible factors as our moods, attention, energy, and productivity. Moreover, many people feel that technological society, for the sake of convenience, tends to treat individuals as if they were all like one another and the same at all hours of the day.

The study of biological rhythms is the key to many doors — a narrow, unifying approach that affects all areas of life. In its narrowness lie its strength and beauty and the potential to make possible major breakthroughs in medicine and psychiatry. As research into biological rhythms probes closer to the mysteries of "life" and "consciousness," our concepts of ourselves and our technological society will change — lending, perhaps ironically, a new significance to the question, "What makes a person tick?" ■

A Word From the Sponsor: Some Real-Life Headaches Behind Those TV Commercials

by Peggy Hudson

Hawaiian wrestler Harold Sakata may always be known as "Odd Job." It was in this role — in the James Bond movie, "Goldfinger" — that he first became an international celebrity. Although he made a graphic impression on audiences as the villain's handyman-hatchetman, it was a series of commercials for Vicks Formula 44 cough medicine that indelibly stamped Sakata's Odd Job image on the minds of millions of viewers.

Being the star of cough-remedy commercials has brought many more changes into Sakata's life than his "one-shot" appearance in a highly successful movie. After "Goldfinger," Sakata soon discovered it was more profitable to wrestle under the name of "Mr. Odd Job" than under his previous *nom de mat*, "The

Peggy Hudson is the television editor of Scholastic magazines.

"Men and women making a great deal of money generally don't like to talk about it.... But there are figures available to dispel any lingering notion that making TV commercials is a nickel-and-dime affair."

Great Tosh Togo." Since his mini-roles in the Vicks commercials, he gets letters from all over the world, Sakata says. "Kids, especially, write me. They say, 'Mr. Odd Job, when will your commercial be on?' Fathers write and say they have to get their kids out of bed when my commercials are on."

For the benefit of any TV viewer who may have been accidentally locked in the basement for the last three years, Odd Job's fits of commercialized coughing cause him to flail his right arm in a series of spasmodic — and dangerous — karate chops. Under his hamlike hand, furniture is wrecked, and, in one ad, a car in a showroom was destroyed before Odd Job's wife slipped him a spoonful of you-know-what, immediately ending the hacking and destruction.

Besides the vigorous arm motions, which may come naturally to a former Olympic champion wrestler, and the coughing, not generally associated with a professional athlete, Sakata's dramatizations for Vicks have called only for a beatific smile of relief when the coughing ends. He has had no speaking roles, but that hardly bothers him. As he cheerfully explains, "I cough all the way to the bank." Moreover, these nonspeaking roles in TV commercials were highly instrumental in Sakata's landing a regular part in the new NBC television series, "Sarge."

At the moment, it would seem that Sakata is one of the luckiest men actively engaged in the making of TV commercials. To others whose careers are tied to commercials, life can sometimes seem to be just one big headache.

At best, making commercials often calls for hours far from the routine of the 9:00-to-5:00 worker, since those who make them have to grab whatever time is available to use studio facilities and crews. On a beautiful Saturday morning in August, for example, when many New Yorkers were heading for nearby beaches, Kraft Foods was taping a commercial in NBC's studio 3K. The scene, by 9:00 A.M., was more animated in real life than most of the kiddie shows being aired by the network that morning. The producer, director, and scenic designer, in fact, had been at work in the studio since 5:30.

The hours spent in setting up props, getting the right camera angles and lighting, and making final adjustments for split-second timing in putting together this 30-second commercial were not considered unusual. Those involved in this project were "old pros," some having worked on Kraft commercials for more than 20 years.

Gremlins — no strangers to any TV production — seem especially rife in the field of producing commercials. Under hot lights, not just actors wilt; sandwiches do, too. And no self-respecting cheese manufacturer is likely to admit that his product looks its best after being under TV lights for hours. Since time is money, when the crew is there and ready to go, supply lines have to be kept short. Kraft had its own kitchen right in the studio — and plenty of fresh food ready for the TV cameras.

Wilting cheese was only one of the problems that day. Ed Herlihy, the "voice of Kraft" for almost a quarter-century, was having some trouble getting the right inflection in his voice; and setting up the right camera angles proved technically difficult. Finally, after laboring for almost seven hours on this half-minute taped presentation, the producer and director decided that the video was up to standards. They would add the audio later!

Problems of the kind that the Kraft crew ran into that day are fairly routine. Things can get considerably more complicated for makers of commercials — who are perhaps less likely to cut production corners than are those in other areas of film-making. Consider a surprising, and costly, roadblock run into by those who were set to make a Timex commercial.

For this particular commercial, the crew needed five-to-eight-foot ocean waves. "We had the commercial approved by the client 18 months ago, but we haven't had the right conditions for filming since then," moaned Jim Ellers of Warwick & Legler, the company's ad agency. "We thought the best chance for such waves would be off the coast of California. To get the crew out there and ready to shoot, we'd need six or seven days' warning. We talked to a man considered the best oceanographer in the area, and he thought he could give us a fairly accurate forecast — but only three or four days in advance. So we alerted the crew to be ready to roll on three days' notice. But our oceanographer just can't seem to hit it. Here a commercial has been approved by the client for a year and a half, and so far we've been able to do nothing."

Such undertakings by makers of commercials can be more than a little frustrating. There have been moments of embarrassment, too. Ellers cited a memorable incident that happened some years

"The highest-ranking policeman in the industry, as far as TV commercials are concerned, is the TV Code Authority of the National Association of Broadcasters. . . . If a station wants to keep its membership and the resulting public relations benefits, it goes along with the standards of the code."

ago when the company's commercials were done live. The scene was set to do one of the famed "torture tests" on "The Steve Allen Show."

"We attached a watch to the propeller of an outboard motor and cranked up the motor in a big tank of water," Ellers said. "The motor was stopped, the propeller lifted from the water, and . . . no watch! The watch had fallen to the bottom of the tank. John Cameron Swayze, who was narrating the commercial, somehow covered for us. But I wanted to find a hole to crawl into."

Ellers pointed out, however, that even such unfortunate moments in TV commercial-making can sometimes end happily. That accident, as it turned out, added believability to the torture commercials. As Ellers says, "Viewers decided that, if something like that could happen, we must be honest."

Of course, such honesty in making TV commercials isn't merely a matter between a client and his advertising agency. There are numerous "policemen" who can "arrest" an offensive, dishonest, or deceptive commercial and ban it from the airwaves. These people sometimes produce many headaches for the makers of commercials. They also suffer from the malady themselves.

Perhaps the busiest policemen of all are the three commercial networks. For example, J. Norman Nelson, Director of Program Practices at CBS, says that his editors review an average of 1,900 commercials a month — as many as 2,200 in heavy months. Not all the commercials scrutinized are aired. "During the month of July," Nelson says, "we saw 1,728 commercials, of which 581 were sent back, either with a request for substantiation of claims or a request for changes of some kind. That means that roughly one-third didn't receive immediate approval. We see about 90 per cent of the commercials in script or storyboard form and make suggestions before the commercial is actually produced."

Nelson's counterpart at NBC, Carl Watson, Director of Broadcast Standards, says his commercial clearance division includes an administrator, a manager, five editors, and three people who handle commercial "traffic." He himself spends 90 per cent of his working hours on the commercial, rather than the program, side of the operation.

Watson, like virtually everyone connected with supervising which commercials are shown on the networks, contends that the industry has done a good job of policing itself. "In how many cases," he asks rhetorically, "has the TV industry actually shown an ad that later turned out to be seriously misleading or deceitful? Not too many." He admits, though, to a certain degree of human fallibility and suggests that additional Federal Trade Commission advertising guidelines could, in some cases, assist network officials who are as interested in the honesty of commercials as anybody else.

This point of view is readily confirmed by adman Ellers: "The networks are definitely looking over things more carefully. We've got to be much more careful, much more aware of little innuendoes. We had one script okayed by the client that included a little business with someone smoking a cigarette. It wasn't really important to the commercial. The networks sent it back, because you can't show smoking in a nonsmoking commercial. That seems a little ridiculous, but it didn't really matter in this case. Other objections make sense. A third party, such as a network, sometimes sees things we miss. We usually have more trouble with our own attorneys than with the networks, though. Usually, by the time we submit stuff to a network, it's been thoroughly screened by our attorneys."

The highest-ranking policeman in the industry, as far as TV commercials are concerned, is the TV Code Authority of the National Association of Broadcasters. Stockton Hellfrich, director of the Code Authority, explains that his office "is not a central clearing office, though people tend to think we are. Every commercial going on the air doesn't come through this office. We're, in the main, a sort of troubleshooter or arbiter." Nonetheless, the TV Code Authority wields a lot of power. Some 60 per cent of the TV stations in the United States subscribe to the code. If a station wants to keep its membership and the resulting public relations benefits, it goes along with the standards of the code.

Hovering over this complex internal policing system is the power of the federal government — as represented by the FTC, the Food and Drug Administration, and other agencies. In the past, the government took something of a hands-off attitude. More and more, however, consumerism is making itself felt. Despite the energy expended by the industry in

keeping commercials honest, claims made for products are being challenged as never before.

Even before the government became such a dedicated TV viewer, the industry was setting up stringent rules that made TV commercials, compared to other forms of hucksterism, as much above suspicion as Caesar's wife. For instance, with little or no nudging from federal agencies, industry watchdogs laid down the "men in white" rule. This amendment to the NAB TV Code, put into effect in 1963, banned the use in commercials not only of physicians and dentists but of any actor wearing a white coat who might be mistaken for a physician or dentist.

Consumerism is riding so high that it causes some of those involved in making commercials to shudder at its possible impact. For example, as a result of the airing of a gasoline manufacturer's ads, WNBC-TV, New York, may have to give free air time to spokesmen opposed to the building of an oil pipeline in Alaska. An ecology group called Friends of the Earth challenged commercials in which the manufacturer described its efforts to protect the environment in Alaska while producing oil there, an alleged discussion of only one side of a matter of significant public controversy. Antipollution forces may have to be given their say.

Increased legal action tends to make broadcasters even more jumpy than before on the subject of the commercials hitting the airwaves. Watson describes network standards men as "consumer activists." A difficult job at best — especially when Watson also admits almost in the same breath, "Our job is not simply to turn commercials down. Our job is to help put them in shape to be accepted and still be effective in selling the product." This dual job keeps men like Watson busy; and, as a result, some network offices today are likely to resemble makeshift testing labs.

"The burden of proof for commercial claims is on the agency," explains Norm Nelson of CBS. "In some cases, we call on our research or legal departments. We also try to duplicate some tests. We go up and use Bob Wood's kitchen [Robert D. Wood is president of CBS-TV] to squeeze soap pads, though we're not set up as a test lab. We're just trying to see if the consumer can obtain the same results at home as those obtained in a carefully controlled lab experiment."

One conscientious network official recently found himself embroiled in a months-long dispute with an ad agency as to whether a certain shaving cream produced less drag on the face, as a proposed commercial claimed. In this commercial, a razor would glide down a glass track lubricated with the new product faster than another would glide down a parallel track soaped with another shaving cream. The basic question the network official asked was, How does a razor "shaving" glass relate to shaving men, who do not have glass chins? In response to other queries, the agency submitted data involving two test sleds zooming down the tracks, but the network man wasn't satisfied by what he considered an apples-and-oranges comparison. At last report, this protracted inquiry was still going on.

The long delay in this case does not relate to the unpredictability of natural phenomena — as in the case of the ocean-wave commercial — but is explained better by human psychology. Once admen get a client's okay on a commercial idea, they are understandably reluctant to "go back to him" and thereby rock the boat. That can cause new problems, the field of making commercials being as lucrative and expensive as it is.

Determining just how lucrative and expensive is usually far from an easy task. Men and women making a great deal of money generally don't like to talk about it, and those making TV commercials are no exception. But there are figures available to dispel any lingering notion that making TV commercials is a nickel-and-dime affair.

According to Ellers, the average 90-second film commercial for Timex costs $30,000-$35,000. "The actual filming is usually done over a one-to-two-day period," he explains, "though the editing and optical work take some time after that. We use both tape and film in making commercials, depending on the nature of the commercial, the location, and so on. Speed is sometimes a factor. If we need a commercial on the air within a couple of days, we'll use tape."

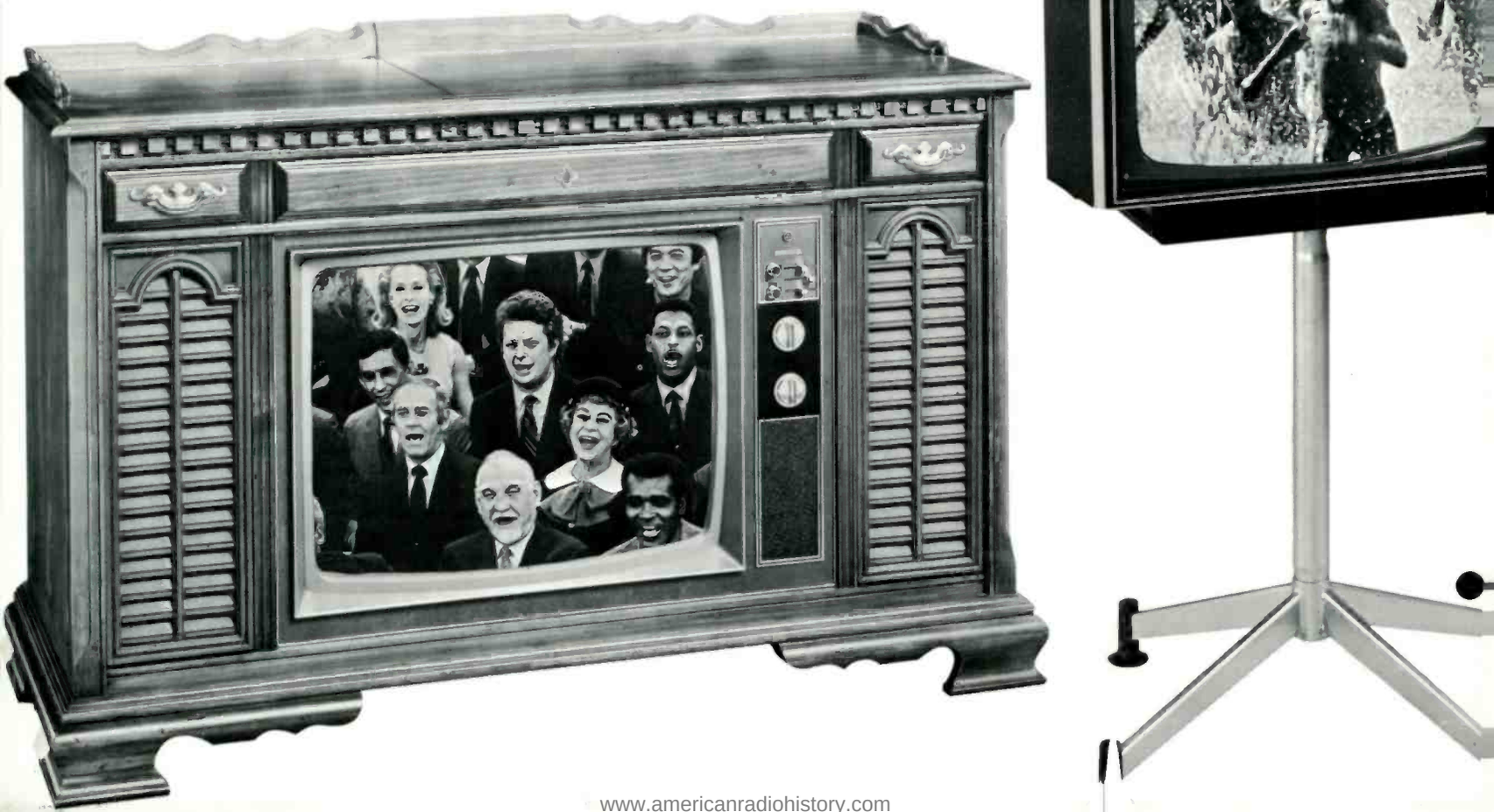
What if the ocean waves in California had cooperated in the making of the unmade commercial? "We would have used film in that case because of the flexibility of the equipment. Tape is still not quite as flexible."

Kraft's producer, Ed Gray, says: "Our costs are figured per day, not per commercial. One day we'll do two commercials, another day as many as seven. Our costs run about $10,000 a day, plus an agency commission of 17.65 per cent."

By comparison, industry sources report that straight production costs on a half-hour TV show run $110,000 to $150,000 a week; hour-long shows cost $170,000 to $200,000 a week. Flip Wilson's hour now runs about $200,000 a week, "Bonanza" $220,000 to $230,000, and "Gunsmoke" about $215,000 per week. Most of the one-hour shows are shot in six days.

That's big money. And sponsors are spending big money to promote their products on those shows. The figure of $30,000-$35,000 per 90-second commercial may be higher than most, but it's clear that a lot is being spent on every second of advertising. The large plums of commercial making are eagerly sought by many who are willing to go to extremes to turn out a satisfactory product — even though their more prosaic friends and neighbors might consider them a trifle wacky.

Take the case Ellers mentioned, in which the makers of a commercial needed rain. (Though makers of commercials can't do much about ocean waves, they long ago learned how to make it rain.) This script called for a disgruntled and rain-soaked commuter to stand at a suburban railroad station waiting for his wife who had forgotten to wind her watch and thus had not met his train. To ensure



that it would rain at the station on the day of shooting, the agency contracted ahead of time with the local fire department to play its water hoses on the station that day. As it turned out, it rained anyway.

"It was just pouring when the firemen drove up," Ellers said. "But a deal's a deal. We used the hoses to supplement Mother Nature."

Despite such enterprise and the care with which commercials are supervised before they are offered to the public, it has become increasingly difficult to make a commercial that somehow won't offend someone. Watson tells of a commercial in which a child asks her mother to make a funny face and the mother crosses her eyes. What could be the harm in that? Or so the advertising agency and the network thought. But a complaining letter from the mother of a cross-eyed child succeeded in touching the hearts of so many executives that the agency changed the commercial.

When it comes to matters of purely personal taste, sometimes the networks disagree with one another as to how far they are willing to go to keep everybody happy. A currently popular commercial pictures the Frito Bandito, a small cartoon caricature depicting a Mexican bandit complete with sombrero and sweeping mustache. The Bandito is guilty of no televised crime greater than holding up people for their bags of corn chips. Yet, a Mexican-American organization saw it differently: as exploiting an unfair stereotype. One network, NBC, considered that point of view, agreed, and gave the Bandito the gate.

Viewer reaction is not always so sensitive. But worrying about what may happen in an unpredictable industry can also cause difficulties. For instance, the TV Code Authority mulled over the whole question of whether to lift its ban on feminine-deodorant spray commercials for a year before saying yes. Norm Nelson detailed how carefully CBS approached these new commercials, even though they meant a small goldmine in new revenue: "We first allowed them on daytime soap operas that mainly women watch, then on late nighttime shows, then on morning shows."

Such a gingerly approach may have paid off. Something did. Nelson reports that the network hasn't received more than three or four letters of complaint. And other networks received a similar response — or lack of it.

Such placid acceptance by the public of a new category of commercials does not indicate that the difficulties involved in making commercials and getting them on the air are likely to diminish in the near future. The whole subject of which commercials will or will not bring on public protest is so complicated and sometimes inconsistent that it is small wonder TV officials frequently wish they had a crystal ball.

What kind of logic, for example, dictates that networks may accept commercials for feminine-hygiene sprays yet bans commercials for hemorrhoid preparations? This ban, too, may soon be lifted — but probably not before causing many additional problems for the industry.

It seems that the very nature of the TV-commercial business will leave few people in it headache-free. And, undoubtedly, many of them wish they could trade their migraines for Odd Job's cough and, like him, happily cough all the way to the bank. ■

THE MATTE

Our entire universe is a subtle fabric of space distorted by the presence of matter.

by Isaac Asimov

It seems very natural to think of space as something that doesn't exist but merely contains. We consider it a vast emptiness that holds matter — and not very much matter at that.

It is possible that there may be as many as 10,000 billion billion stars in the universe. If each star were as voluminous as our sun, all these stars put together would make up a volume that is only about a millionth of a trillionth of a trillionth of the volume of the universe that contains them.

The stars themselves are, for the most part, empty space, in a manner of speaking. They are made up of atoms that are, in turn, made up of particles far smaller than themselves. If all the subatomic particles (the real matter of the universe) in all the stars were packed together, each star would be, on the average, eight miles across. The matter in the universe would then take up only a trillionth of the room that all the loosely packed stars now do.

Perhaps we can get an idea of what this means by tackling something closer to home. Imagine the huge earth we live on to be hollow: a vast, spherical cavity 8,000 miles across. Imagine next an influenza virus too small to be seen through an ordinary microscope but large enough to be made out through an electron microscope. Take this influenza virus and place it inside the hollow earth; place nothing else inside. The volume of the hollow earth would then be to the volume of the single virus molecule floating inside as is the volume of the universe to the total volume of subatomic particles that it contains.

If the hollow earth contained nothing but a single virus, we would certainly feel justified in considering it empty. The single virus would, in terms of content, be totally insignificant. Might we not feel justified in thinking of the universe as empty? Of what importance to it can such a small smattering of matter be?

Let us, then, imagine a completely empty universe. And let us suppose there were some way in which we could observe it without being part of it. What conclusions could we reach? None, really. In order to deal with the concept of distance within a universe, we must begin by locating two points within it and using the separation between those two points as a unit of distance. In order to deal with the concept of duration, we would have to sense changes in that separation and accept some convenient segment of change as a unit of duration. But if a universe is completely empty, there is no way of locating two points within it; no way of noting separation or change, distance or duration. In short, there is no way of indicating the existence of either space or time.

It is meaningless, therefore, to speak of space and time in the absence of things contained in space and time. The container only exists and endures by virtue of the contents, regardless of how insignificantly small the contents may be in comparison.

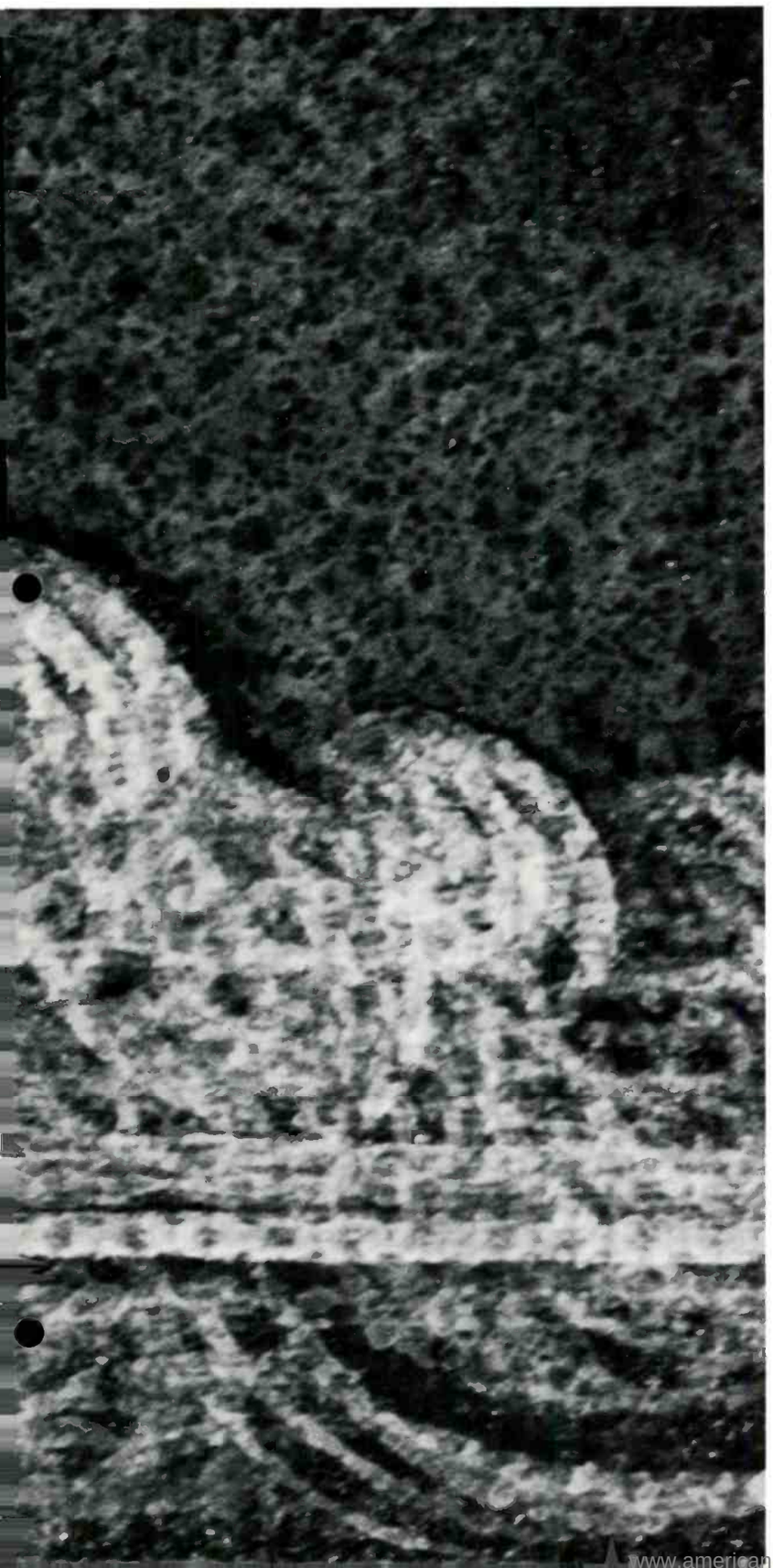
Next, let us imagine a universe with just one piece of matter in it: a single, featureless sphere. Imagine, further, that we can sense the rest of the universe from a position at the center of the sphere. Now what can we tell about the universe? To begin with, we might suppose the single piece of matter is moving. The first law of motion states that, if any object in the universe is left entirely to itself, is completely unaffected by anything else in the universe, and is moving at some speed, it will continue moving at that speed constantly and forever in the same straight-line direction. In the special instance in which its speed is zero, it would be "at rest" to begin with and would stay "at rest" forever.

This law was worked out, nearly four centuries ago, from observations made in our own universe with its trillions of trillions of pieces of matter. But it does not seem to depend on the number of pieces of matter present in a universe. If, one by one, those pieces were to disappear, there seems no obvious reason why the first law of motion should cease to hold.

One might thus suppose that the first law of motion ought to apply to a piece of matter that was alone in a universe. In fact, one might even argue that it should particularly apply to that single piece. That one piece, after all, cannot possibly be affected by anything else in the universe, since there isn't anything else in the universe. It ought to obey the first law of motion exactly. Yet, from the center of that lonely piece of matter, one can observe only nothingness all around. The nothingness would be precisely the same whether the piece of matter were at rest or moving at any constant speed in any given direction.

Isaac Asimov is the author of numerous books on science and science fiction.

R OF SPACE



A universe with one featureless piece of matter in it would be as blank and as immeasurable as one with no matter at all. But let us consider a universe with two featureless pieces of matter in it, the two pieces close enough so that one can be sensed from the other — with, perhaps, the relative positions of the earth and the moon — and a picture of one taken from the center of the other. If one studies the successive images of Piece A from the vantage point of Piece B's center, he may notice that Piece A gets brighter and dimmer or, if it shows a visible disc, that it gets larger and smaller. It might be supposed that it really is periodically brightening and dimming or expanding and shrinking. Or one might suppose that its brightness and size remain unchanged but that Piece A is periodically approaching Piece B and then receding. As it approaches, it seems brighter and larger; as it recedes, it seems dimmer and smaller.

Whatever the reason for it, there is a periodic change. Hence, the concept of time becomes possible. And, if the change is assumed to be one of distance, the concept of space also becomes possible.

But there is no way of telling which of the two pieces of matter is actually approaching and receding. Furthermore, no matter how many other pieces of matter are added to the universe, there is no way of telling whether any one of them is at rest while the others are moving. One can assume that some particular body is at rest and determine the positions and motions of all other bodies according to the distances and directions we measure from the place of assumed rest. But one can equally well assume that some other particular body is at rest and determine a new set of positions and motions of all other bodies.

There is no such thing as "absolute rest." Nor is there "absolute motion," determined by comparing positions of a moving body with that of something that is really at rest. Nor is there "absolute space" or "absolute time," determined by noting the progressive changes in position of a moving body compared to something that is really at rest.

All one can measure are motion, space, and time, relative to some object that it is convenient to pretend is at rest. This results in "relative motion," "relative space," and "relative time," the concepts with which Einstein worked to build his system of the universe.

Another thing one can deduce from the behavior of the two pieces of matter is that something is wrong with the first law of motion. If both pieces were following the first law of motion, then Piece A would behave in one of a certain limited number of ways as observed from Piece B. It might remain motionless. It might recede forever, according to some simple mathematical relationship that could be worked out. It might approach, reach some minimum distance (which would be zero if there were a collision), and, then, if there were no collision, recede forever. One thing that would not happen under any circumstances, if the first law of motion were in effect, would be a periodic approach and recession.

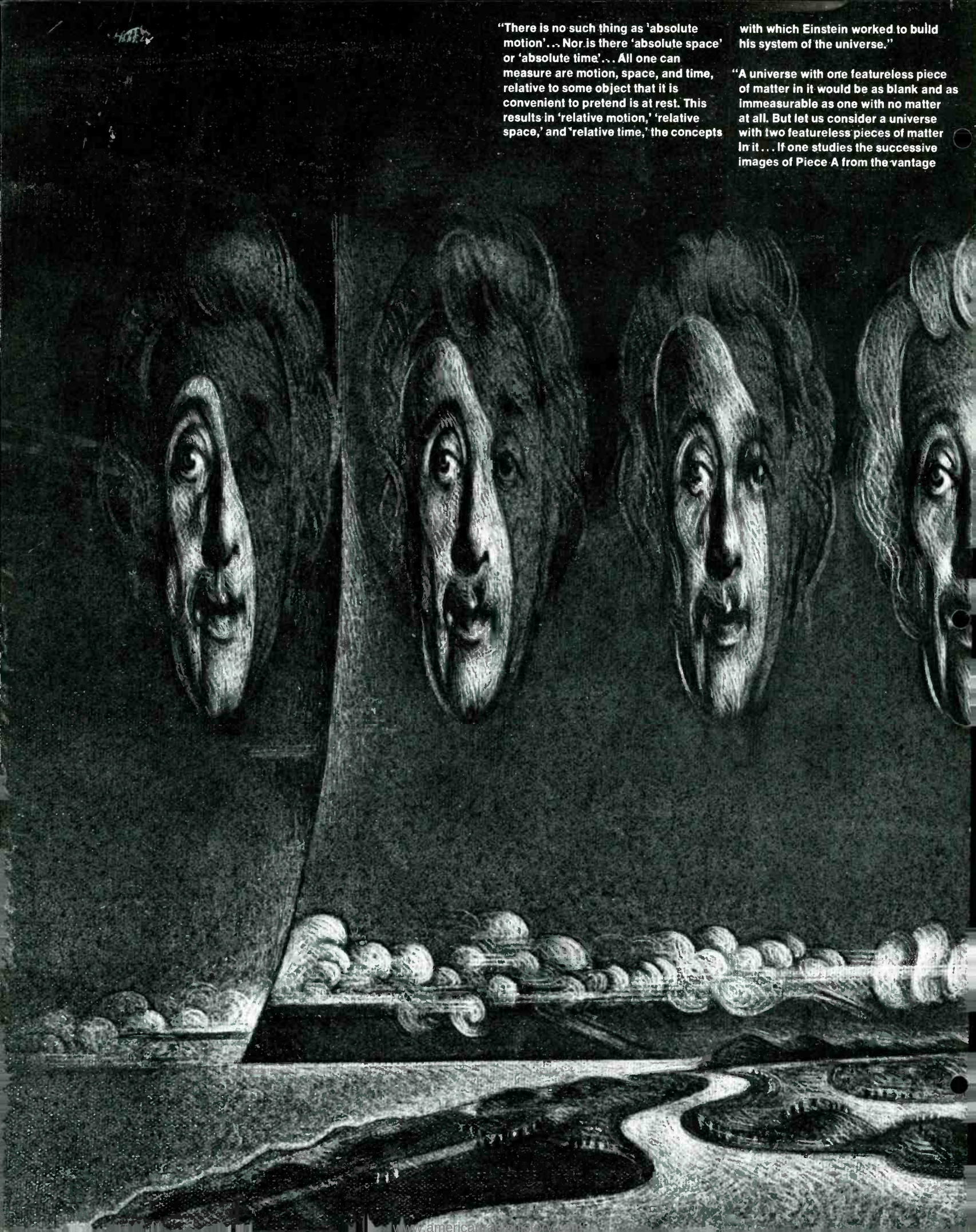
Can it be that only one of the pieces is disobeying the first law of motion? No. From either piece, the other one will appear to show the periodic approach and recession. Since it cannot possibly be decided that the periodic motion belongs solely to Piece A or to Piece B, it can only be concluded that neither piece of matter is obeying the first law of motion.

However, the law states that a body will travel at a constant speed and in the same straight-line direction only if it is left to itself and is unaffected by any other body. The fact that the two pieces of matter are not following the first law means that each is being affected by something else. Since there are only two pieces of matter in this imagined universe, we must conclude that Piece A is somehow affecting Piece B and that B is somehow affecting A.

But we cannot know the nature of such an effect. Nor can we be sure that all that is happening is the approach and recession. Piece A may, in fact, also be moving sidewise relative to Piece B; we could only determine this relative to other objects in the universe.

Suppose we add a third object, Piece C, to the universe, much farther away from A and B than those two are from each other. (We can imagine the third piece of matter to be where the sun is with reference to the earth and the moon.) Now we can use C as a background against which to measure the position of A as seen from B — or B as seen from A. The distance between A and C will progressively increase so that sidewise motion can be measured.

It will then be possible to decide that A and B are both moving in ellipses about a point located somewhere between their centers. It is because they are moving in ellipses that the distance between them changes periodically. If they had happened to be moving in exact circles about



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"Mass is whatever it is about matter that produces a gravitational attraction and reacts to it."

that point (as is possible but extremely unlikely), then the distance would have remained constant; and, if the universe had contained only those two pieces of matter and nothing else, it would have seemed that each was following the first law of motion.

In the case of the earth and the moon, the point happens to be located only 3,000 miles from earth's center, which is still 1,000 miles below earth's surface. So, on casual inspection, it would seem that the moon is moving in an ellipse about an unresponsive earth; but close attention would show that the earth is moving about the center of gravity of the earth-moon system just as truly as the moon is.

Now, if we add a fourth object very far away — say at the position of the star Sirius — we can use that as a background and discover that A and B, even as they circle each other, are together moving in a grand sweep about C (assuming that C is much larger than A or B, as the sun is much larger than the earth or moon).

The more pieces that are added to the universe, the more the effects of piece upon piece multiply and the more complicated things might be. Fortunately, the complications do not go beyond the capacity of the human mind to unravel. The pieces of matter are usually so arranged that one piece or another is large enough, or close enough, to have by far the dominating influence over others in its neighborhood. By concentrating on the dominating influence in some particular group of pieces of matter, the nature of that influence can be puzzled out.

Three hundred years ago, Isaac Newton was able to show that the motions of the heavenly bodies could be satisfactorily explained by assuming that each body affected all the other bodies in accordance with a rather simple rule: Any particular body in the universe attracts any other particular body by an amount that is proportional to the product of the masses of the two bodies and inversely proportional to the square of the distance between their centers.

In other words, the attraction between two bodies grows stronger when their masses are increased and weaker when the distance between them increases. The attraction is called "gravitation," and Newton's rule represents the law of universal gravitation.

But what is this "mass" that has been thus introduced?

Actually, no one really knows. Mass is whatever it is about matter that produces a gravitational attraction and reacts to it. When gravitational attraction exists between two bodies, the conclusion is that both bodies possess mass. From the size of the gravitational attraction, it is possible to come to certain conclusions concerning the amount of mass in either body or in both. On the other hand, if there is no gravitational attraction between two bodies, then one or the other (or both) does not possess mass.

Anything that has mass is usually considered "matter." By this criterion, a rock or a human being is matter but a beam of light is not.

By Newton's rule, if earth and moon suddenly doubled their distance from each other, the attraction would be four times weaker than it was before. If they tripled their distance, the attraction would be nine times weaker. If, on the other hand, the distance were decreased, the attraction would become correspondingly stronger.

If the distance between earth and moon were unchanged but the mass of the earth suddenly doubled (or halved), the gravitational attraction between earth and moon would be doubled (or halved). The same would be true if the mass of the moon suddenly doubled (or halved). If both masses doubled (or were halved), the gravitational attraction would be quadrupled (or quartered).

Suppose we are dealing with the earth and some small object on its surface, such as yourself. We can assume that your distance from the earth's center will always be the same so long as you remain on one spot on the earth's surface and that the mass of the earth always stays the same, too. The only thing we cannot be sure of is the exact quantity of your mass, and the gravitational attraction between you and the earth will be greater or less according to whether your mass is greater or less.

It is the gravitational attraction between yourself and the earth that you measure when you weigh yourself on an ordinary bathroom scale. You determine your "weight" in this fashion, and this is often accepted as being equivalent to your mass.

Weight, however, is not identical to mass. If you weighed yourself on a mountaintop, you would be farther from the earth's center than when you were at sea level. The gravitational attraction between yourself and the earth would be slightly weaker, and you would weigh slightly less — not because you had less mass, only because there is greater distance. If you weighed yourself on the moon, you would be closer to the moon's center than ever you were to the earth's, and you would be standing on a body with considerably less mass than the earth. The result of the combination of factors would be that your weight on the moon would be one-sixth what it is on earth.

It is more accurate, then, to weigh not only yourself but also other objects that have a known mass and compare the gravitational attraction on yourself and on them. Changes in distance or in the mass of the body on which you are standing cancel out, and you get a truer notion of your own mass. This is what we do, for example, when we weigh objects in a balance with the unknown in one pan and standard weights in the other.

The question arises, How can one body affect another across space? There are a quarter of a million miles separating the earth and moon and 93 million miles separating the earth-moon system and the sun. What is it that can reach across those distances and produce gravitational attraction?

One way of considering the problem is to suppose that the presence of mass distorts the fabric of the universe. Imagine a perfectly smooth, frictionless surface extending in every direction for some distance above the surface of the earth, with earth's gravitational attraction pulling down at right angles to the earth.

If the two-dimensional surface were hard and rigid, a body would slide along it in a perfectly straight line and at a constant speed, something like a hockey puck speeding along smooth ice. It would obey the first law of motion. Suppose, however, that the smooth surface were actually a very thin, rubbery material that gave under the pull of the earth's gravity upon the mass of matter resting upon it. Each piece of matter would sink down, pulling the surface with it. The more massive the body, or the more the mass is concentrated into a small volume, the farther down it sinks. The entire surface is distorted in this fashion — greatly so in the neighborhood of the massive body, less so farther away. The distortion is never quite zero, though, no matter how far we go from the body.

Now imagine two such bodies on the surface, each in motion. Imagine that the fabric rises behind them and sinks in front of them without friction and without impeding the movement. As the less massive body approaches the more massive one, it slides down the sharp declivity produced by the latter. It moves faster and faster and may strike the body; or, if it passes by, it may slide partway down, whirl around, and go shooting up and out on the other side of the declivity. Seen from above, it will have followed a curve called a hyperbola. If it made a particularly close near-miss, it would circle the declivity round and round in what would seem, from above, to be an ellipse, accompanying the larger body wherever it went and unable to shoot out of the pit into which it had tumbled.

If you imagine an endlessly large, elastic fabric of this sort — with a vast and even gravitational attraction pulling downward — and if you place trillions of bodies here and there on it, you will have a bumpy and uneven surface. No part of it will be quite level, except where two or more slants temporarily happen to cancel each other out. Every part of it will slope at a continually changing angle according to the movement of the various bodies, and all motions will be affected by the slope.

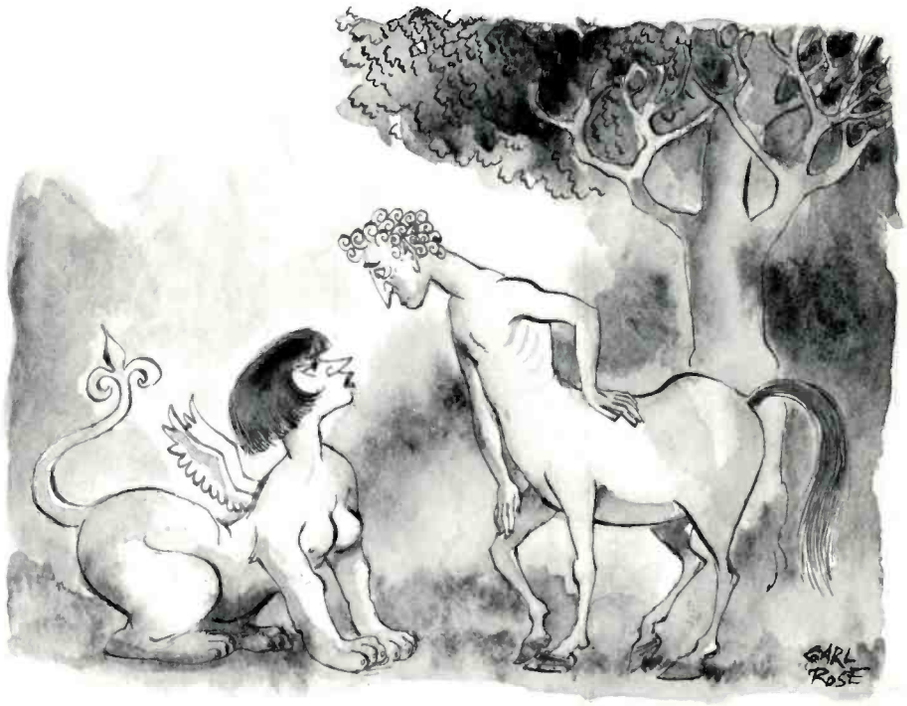
If the fabric were invisible and these bodies viewed from above, we would very likely conclude that there were mysterious attractions among all the various bodies and work out a law of attraction that would be like Newton's.

In a three-dimensional way, the picture outlined above is what Einstein visualized the universe to be. There is a subtle fabric of space that is distorted by mass. Every piece of matter is sliding up and down gravitational slopes, so to speak, and moving in closed ellipses or open hyperbolas, large or small; speeding up; slowing down; all in accordance with the immensely complicated, ever-changing nature of local distortions.

In that case, we might logically maintain that the universe contains not just actual matter in countless trillions of pieces but also the sum of the distortions each piece produces. Since the distortions are everywhere, the universe is not empty, or even nearly so, but full — would be full even if there were only two subatomic masses in it and nothing more. ■

This Electronic Age...

"Somebody's been watching my TV set," said the Poppa bear.
"Somebody's been watching my TV set," said the Momma bear.
". . . and somebody's been watching my TV set," said the Baby bear,
"and they've twisted off all the dials!"



"Listen, the computer says we are an ideally matched couple, so who are you to argue with the computer?"

冬季オリンピック

Head of snow statue being built for Sapporo Snow Festival.

Skaters silhouetted against shadow of Olympic rings.

1972 Winter Olympics: The Games People Play in the Snow

by Kenneth B. Platnick

The first recorded Olympics competition was held in 776 B.C. — at Olympia in Elis, near the western coast of Greece — and a local cook named Coroebus ran away with it. The contest at that time consisted of a single 200-yard race. Within a century, boxing, wrestling, pentathlon, and a four-horse chariot race were added.

Olympic Games were religious festivals, originally celebrated in the belief that the spirits of the dead were gratified by those spectacles which had delighted them during their earthly life. But they were also a quadrennial tribute to Greek manhood. (Women were barred not only from taking part but even from observing the games.) Trading was suspended while they were held, and the warring states of Greece temporarily laid down their arms. Even time was measured in terms of the Olympic Games, with the interval between festivals known as an "Olympiad."

Kenneth B. Platnick is on the RCA Public Affairs staff.

In all, the ancient Olympics spanned nearly 1,200 years, until A.D. 393, when the Roman emperor Theodosius absolutely forbade them. Yet, they had long since deteriorated as an exercise in the ideals for which they were established. A growing professionalism permeated the games. Victory was paramount. The erstwhile city-states — no longer functioning as political entities after the Macedonian invasion in the fourth century B.C. — devoted their efforts almost exclusively to training young men for Olympic victory. It was thus only a matter of time until these city-states began to hire athletes outright and "nationalize" them in time to qualify.

By contrast, the international Olympic Games of today are dedicated to the concept of sport as part of the development of an individual: "First of all, it is necessary to maintain in sport the noble and chivalrous character which distinguished it in the past, so that it shall continue to be part of the education of present day peoples, in the same way that sport served so wonderfully in the times of ancient Greece. The public has a tendency to transform the Olympic athlete into a paid gladiator. These two attitudes are not compatible."

The words are those of the Baron Pierre de Coubertin, the man largely responsible for the renewal, in 1896, of the games in Athens. Since that time, the games have expanded greatly — more participating nations, more contestants, more sports. Indeed, it was this expansion that made feasible the establishment of separate Olympic Games for winter and summer sports.

The first of the Winter Olympics, held in 1924, featured 293 men and women from 16 countries in 16 events. (Women had been permitted to take part in the games since 1900.) In the 1968 Winter Olympics, 1,358 athletes from 37 countries competed in 35 events. The figures will run still higher for the 1972 version, with more than 1,400 contestants expected to enter events in biathlon (cross-country skiing and rifle shooting), bobsledding, figure skating, ice hockey, luge (tobogganing), Nordic and Alpine skiing, and speed skating.

Previously included in the program were skeleton sled (cresta) in 1948 and dogsled racing in 1932, with demonstrations at one time or another in such sports as military ski patrol, pentathlon (shooting; downhill skiing; 10-kilometer, cross-country ski racing; fencing; and horseriding), curling, bandy, and ice dancing.

Japan is the first Asian nation to serve as host to the Winter Olympics, as it was for the Summer Olympics at Tokyo in 1964. This time, the site is Sapporo, the prefectural capital of Hokkaido, the northernmost of the country's four main islands.

Unlike most Japanese cities, which developed from feudal towns, Sapporo was created by clearing a primeval forest. Although it is a relatively new city — only 103 years old and known throughout Japan as the "City of Youth" — Sapporo is the center of political, economic, and cultural life on the island. Its 1 million inhabitants also make it the largest city ever to stage the Winter Olympics. Yet, all the Olympic venues are within a one-hour drive from the center of the city. The farthest point is 19 miles away, compared with 39 miles, the most distant point of competition from Grenoble in the 1968 Winter Games.

To facilitate movement of spectators and athletes, the Japanese have constructed a modern subway system — at a cost of more than $120 million — traversing the entire area of the games. That area, according to weather bureau statistics, should prove ideal for the outdoor events: an average of 23 snowy days during the month of February and an average temperature of 23 degrees. (Ironically, the Japanese have had only one medal winner, Chiharu "Chick" Igaya, in the Winter Olympics; and he learned to ski as a Dartmouth College undergraduate on the hills of New Hampshire.)

In all, an average of some 12 million Americans will watch the televised events as they take place at Sapporo. Telecasts will be routed via satellite both live and taped, depending on the time of day. (The 14-hour time difference between New York and Sapporo also means that opening-day events on February 3 will be televised throughout the United States on February 2.)

For the first time, television coverage of the games will be presented to American viewing audiences during prime time; the show will continue into the late-

night hours, replacing Johnny Carson's "Tonight Show." NBC is providing 36 hours of broadcasting during the 12-day period of events at a record cost of about $7 million. By comparison, the same network allocated 14 broadcast hours and $1.6 million for the 1964 Summer Olympics in Tokyo.

"There are a lot of reasons for the increased expenses," says Dick Auerbach, the show's producer. "First of all, things just cost more these days. Then, too, there's the difference between color and black-and-white television. There's the use of a satellite transmission, which, incidentally, was used in 1964 only for the opening ceremony and maybe one or two events. There's the difference between 14 and 36 hours of broadcast time. There's a larger staff — nine writers instead of six, for example. It all adds up."

For Auerbach, the 1972 Winter Olympics began in November, 1969, when he made his first of four trips to Tokyo and Sapporo. NBC had just won the bid for rights to broadcast in the United States, its territories and possessions, and Puerto Rico. Since then, Auerbach has walked every ski course and surveyed every camera location proposed by NHK, the Japanese national television network, in order to anticipate requirements and difficulties involved in production. After observing games at Sapporo last January and February during International Winter Sports Week — virtually a dress rehearsal for the Olympics — he drew up a list of technical suggestions for improving coverage; and, in subsequent meetings, he persuaded NHK officials to accept most of them.

Like representatives of European and other foreign TV networks, Auerbach was limited to suggestions by the nature of Japan's agreement to provide camera coverage of the Olympic Games and "sell off" transmission rights to individual nations. This makes production control, to the extent that it exists at all, extraordinarily difficult.

"There is a basic difference in philosophy," says the NBC producer. "Like they prefer just to mount their cameras on towers and get a broad view of the skiers as they pass below. We like to get our cameras down in the snow and shoot up at the skiers to get some feeling of speed and steepness. They'll go wide at the gate for a full view where we'd go in for a close-up. Sometimes you get a lot of human interest just by shooting in close."

The difference between human-interest and "straight" coverage has meant that Auerbach and NBC must spend a lot of time and money — and ingenuity — in supplementary as well as regular coverage of the games. The network will have its own broadcast center in Sapporo: a studio for three color cameras; a videotape room with eight high-band machines, two slow-motion cameras, and a 16-mm film chain; a control room; film editing rooms; an off-camera commentary room; and production offices. NBC telecasts can be made somewhat more exciting and informative than the standard fare by the addition of specialized films and tape. They can show the loneliness of a skier in the 50-kilometer race or the slow motion of a turn where the slalom was decided.

A hand-picked crew of 80 will work with Auerbach on the games. This includes not only writers and editors, engineers, and production staff but interpreters, office workers, and drivers as well. It also includes what the network refers to as "talent," the on-camera men and women who will report news and background information concerning the events.

There will be four commentators with expertise in selected sports: Peggy Fleming, winner of the figure-skating gold medal in 1968; Billy Kidd, who, in 1970, became the only skier ever to win both amateur and professional world championships in the same year; Art Devlin, four-time winner of the U.S.A. National Ski Jumping Championship; and Terry McDermott, the 1964 gold-medal speed skater who won his first competition at the age of nine. Four others, not yet selected, will serve in varying capacities — covering ice hockey or bobsledding one day and acting as anchorman the next. West Coast newsman Jack Perkins will provide the background, or "color," material.

"All these people," says Auerbach, "are going to have to put in long, hard hours. Seven in the morning to three the next morning in some cases and around the clock for at least four of the 12 days. They have to be not only knowledgeable but congenial as well. After all, that's a long time to be thrown together, especially when that kind of pressure is on."

That the pressure of Olympic coverage is heavy is readily attested by Roy Silver, one of Auerbach's writers for the show. Silver also worked on the 1964 games in Tokyo. And he lost 25 pounds in the three weeks he was there.

What, then, is there about the games that would entice any network to spend the requisite time and money — themselves of Olympian proportions — for coverage?

"Prestige," says Auerbach. "That's what it all comes down to in the end. You have commercial sponsorship the way you'd have commercial sponsorship for any other show. You hope to make money on the show the way you hope to make money on any other show.

"Right now, we've got a 12-month-a-year sports operation at NBC that can't be matched in terms of over-all balance. Not just football, or football and a little golf, or football and a little golf and maybe a couple of tennis matches in the summer. We've got football and baseball and golf and tennis and NCAA basketball. We've got a lot of each of those. And now we've got the 1972 Winter Olympics, an international event with the top names in sports." ■

For the Records...

Beethoven Concerto in D, Op. 61 a
Seiji Ozawa conducting the
New Philharmonia Orchestra
Peter Serkin, pianist LSC-3152

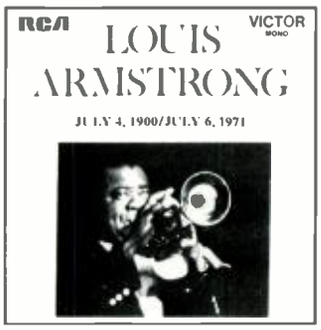
This third Serkin/Ozawa collaboration on RCA Red Seal has produced the first major recording of Beethoven's own piano version of the familiar violin concerto. (This is the only Beethoven concerto of which two versions exist: the original Opus 61 for violin and the piano arrangement, Opus 61 a.) The concerto was written for the violin and, at the request of Muzio Clementi — the famed Italian composer-pianist who became a music publisher in 19th-century England — subsequently arranged by Beethoven for the piano. The concerto, which is seldom studied by pianists or included in repertoires, was learned and performed by Serkin shortly before this recording.

Penderecki: Utrenja, The Entombment of Christ
Eugene Ormandy conducting
The Philadelphia Orchestra LSC-3180

This extremely complex work by contemporary Polish composer Krzysztof Penderecki is a large-scale oratorio for two choruses, full orchestra with a massive percussion section, and five soloists. A follow-up to his "St. Luke's Passion," it dwells on the burial of Christ — with the title referring to the morning prayers of the Eastern Orthodox Church for the Saturday before Easter. Mr. Ormandy conducts this world premiere recording of "Utrenja," which was first performed in the United States by The Philadelphia Orchestra under his direction in 1970.

Luciano Berio Conducts his Epifanie and Folk Songs
Luciano Berio conducting the
BBC Symphony Orchestra
Cathy Berberian, soprano
The Juilliard Ensemble LSC-3189

This is the first recording of Berio's "Epifanie" — the revised version of the work as it was heard in its 1967 American premiere in Chicago — and of his complete "Folk Songs" arrangements. "Epifanie" is a cycle of orchestral pieces into which a cycle of vocal pieces has been interpolated. The orchestration calls for an unusually large ensemble, including three string sections. "Folk Songs" is a suite of 12 traditional melodies from various parts of the world and was arranged especially for soprano Cathy Berberian, who has become a specialist in Berio's music.



Louis Armstrong: July 4, 1900/July 6, 1971
VPM-6044

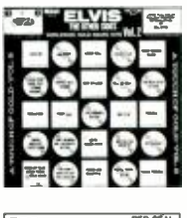
Two days after his 71st birthday, one of the great figures in the world of music was dead. To commemorate Louis Armstrong's work, RCA Records has released a two-disc package containing samplings of his recorded performances for the label during three different decades. Many of the selections appear in an album for the first time and include such rarities as "(You So and So) You'll Wish You'd Never Been Born," from one of Armstrong's first Victor sessions in December, 1932, and "Mississippi Basin," "Dusky Stevedore," and "I Believe" recorded shortly thereafter.

Poems, Prayers and Promises
John Denver LSP-4499

John Denver is among the top concert attractions on college campuses and is also a best-selling recording artist. His songs reflect the concerns of young America: the simple pleasures, the fears and worries, the desire for peace, and the concern with ecology. He is best known for his composition "Leaving on a Jet Plane," which appeared on an earlier RCA album, although his million-selling single, "Take Me Home, Country Roads," is included in this release and is an admirable rival. He is backed on this collection by a young couple — Bill Danoff and Taffy Nivert — known professionally as Fat City.

Bach's Greatest Hits, Vol. 1
Eugene Ormandy conducting
The Philadelphia Orchestra
Leopold Stokowski conducting the
New Symphony Orchestra of London
Arthur Fiedler conducting the
Boston Pops
Robert Shaw Chorale; Norman Luboff Choir; Julian Bream, guitarist; and Gustav Leonhardt, harpsichordist
LSC-5004

This Red Seal release is part of a new "Greatest Hits" series that presents some of the most familiar shorter works of major classical composers — Beethoven, Tchaikovsky, Ravel, Mahler, Puccini, Wagner, and Johann Strauss — as well as of contemporary composers George Gershwin and Leroy Anderson.



Other Current RCA Releases

A bat's ability to distinguish subtle differences in sound is the key to the way its "radar" functions. Millions of bats are able to fly in close proximity, apparently without mutual interference of signals.

SECANT

Flight tests have recently proved the effectiveness of key elements of this new air-safety system.

by Herman Lowenhar

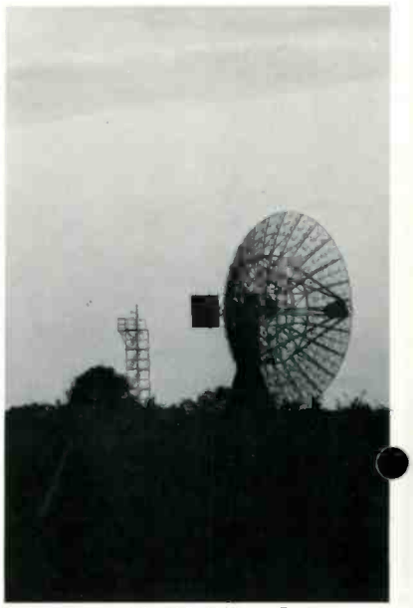
Those of us who think of air travel in terms of cocktails after takeoff and in-flight movies doubtless take for granted the safety and convenience of scheduled flights and couldn't care less about how they are kept that way. Electronics has long been an integral part of this country's swift and sure system of air transportation. And, as the volume of such travel has grown (currently more than tripling each decade), electronic and avionic equipment has emerged as the single most important air-safety factor. Excellent as the record of safety is today, it will be further strengthened by a new system called SECANT. Key elements of the system being built by RCA have already proved themselves in RCA's flight tests.

SECANT is an acronym for Separation Control of Aircraft by Nonsynchronous Techniques. It represents a simple, yet ingenious, system that will enhance flight safety in this nation's increasingly traveled skies. The system gives each pilot detailed information about all aircraft in his vicinity and, as a design option, can automatically interface with the Federal Aviation Administration's Air Traffic Control (ATC) system to alert the ATC to an impending encounter. It also recommends to each pilot a flight path that assures safe separation from all other aircraft, without wasting precious airspace by either requiring unnecessarily large separations or upsetting the smooth and orderly flow of air traffic.

Navy flight tests held this autumn independently checked the effectiveness of the system in actual operation. These tests included use of a simulator in which signals equivalent to extremely large numbers of interacting aircraft were generated electronically. Although the Navy's Air Development Center at Johnsville, Pa., sponsored the evaluation, actual flight tests included participation by the FAA.

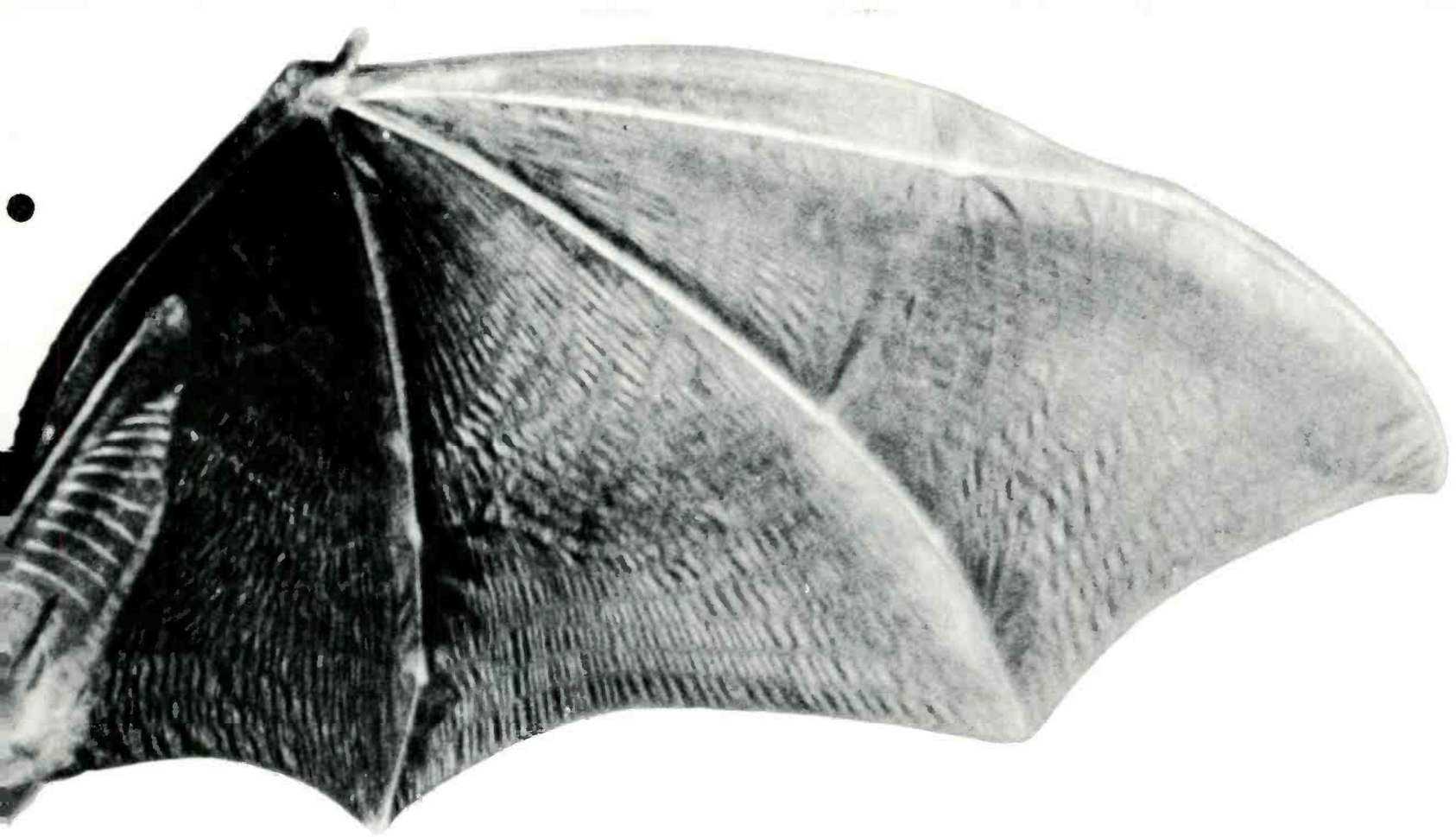
Equipment that RCA built for the flight tests includes two Transponder Correlator Ranging Units (TCRUs). One of these has only a proximity warning function, while the other is able to track interacting aircraft to determine their range and closure rate with great precision. RCA also developed a dense-traffic simulator to barrage SECANT equipment with interfering signals and test its immunity to such interference, as well as a calibrator that can simulate signals from aircraft flying at precisely known velocities.

SECANT employs a transponding technique, which is probably the most striking difference between it and earlier aircraft-separation schemes. This SECANT



Radar antenna at the U.S. Air Force Eastern Test Range.

Herman Lowenhar is a frequent writer on aerospace topics.



technique involves transmission of an interrogating message by each airplane — a message to which all nearby aircraft respond. The transmitted question is, in effect, "Is anyone out there?" It is encoded as a train of pulses and automatically interpreted aboard receiving aircraft — each of which then replies with a pulse train that specifies its location and identity. Range (distance) is determined by noting the reply's time of arrival.

Transponders are hardly new; but, with SECANT, every question is encoded in a unique form that evokes a unique response. Thus each aircraft can tell which of the many thousands of replies that may fill the air at any instant are answers to its own interrogation. Further, each interrogation from a given airplane differs from the one that preceded it in a random, but carefully noted, manner so that no two aircraft can even accidentally use the same code signals simultaneously.

Jack Breckman, staff engineer at RCA's Moorestown, N.J., facility and inventor of SECANT, acknowledges a debt to the "radar" system that bats have evolved over millions of years.

"For years," says Breckman, "the astonishing ability of millions of bats to fly in close proximity, each squeaking without apparent mutual interference, fascinated me. The secret clearly lay in slight, but distinguishable, differences in the sound that each emitted. The idea of duplicating this technique by using a random noise generator to determine the precise message form was the conceptual breakthrough. After that, everything fell into place: SECANT's immunity to interference, its flexibility, its ability to detect weak signals through noise backgrounds (by adding the signal energy from each pulse of the 100-pulse message while letting noise and interference virtually average itself out to zero). Everything was there, based on that initial concept."

The random noise generator to which Breckman refers is a sort of electronic coin tosser. As each pulse is about to be transmitted, the generator arbitrarily decides whether that pulse shall be "heads" or "tails." This decision results in the transmission of one of two frequencies — frequencies to which receiving aircraft respond in kind. But, while the interrogating pulses are at either of two frequencies, answering pulses are at any of four frequencies, for each responding aircraft has two separate frequencies with which to answer each type of received pulse. In this way, the responding aircraft has the means to convey information, since each frequency of these responding pairs represents either the "one" or the "zero" of the digital pulse train needed to communicate in digital language.

The random signaling technique is highly beneficial. Its most important aspect is that it enables SECANT to distinguish between relevant and irrelevant replies — the latter called "fruit" by the military. While, on the average, equal numbers of heads and tails are transmitted and responded to, SECANT converts replies received in the proper sequence into a train of exclusively positive pulses and adds together the energy of those 100 pulses to achieve excellent sensitivity. Fruit, too, is sent through the same converter; but, since its sequence is wrong, as many negative as positive pulses are usually produced. When these are totaled, they yield an average value of zero. Interference, whether noise or replies to other interrogations, thus virtually cancels itself out.

Breckman's "bat radar" analogy is a good one, because SECANT bears another similarity to that system: It requires no synchronism among participants. Instead, each can interrogate at any time without either overloading the constantly changing network of participants or causing interference. Since earlier systems have no way of distinguishing one reply from another, they have to ensure that only one aircraft is interrogating and all others are answering at any moment. This requires all participating aircraft to operate from a common time base and, as a result, needs complex and expensive precision-timing devices both in the airborne equipment and in a costly chain of ground stations. SECANT is unique in that it provides low-cost participation by general aviation. Moreover, since such earlier systems assign a particular time slot to each aircraft for transmission and reception purposes, they are potentially saturable in the very dense air traffic anticipated by the 1990s.

SECANT is also conceptually different from those systems in another basic way. It emphasizes safe and sure defensive flight well in advance of actual hazard and can automatically enlist the aid of the ATC system. SECANT complements its range-tracking technique with an angle-tracking technique to determine the near-miss point for all nearby aircraft long before any potential encounter. At the FAA's discretion, ATC can be alerted through an air-to-ground "hot line," a specially formulated request for assistance that details all the particulars of a potential encounter to the air-traffic controllers below. In those rare instances when the

controllers fail to resolve the situation, the pilot can still take appropriate action at an early moment by following the course correction recommended by SECANT. This contrasts sharply with earlier systems, which, because of inherently large false alarm rates, emphasized independent, last-minute "escape" maneuvers and quite rightly were called "collision-avoidance" systems.

SECANT's flexibility derives largely from its use of an identifying "word" containing the aircraft's serial number and altitude in the message transmitted in response to an interrogation. This, and the fact that each message has an associated range, permits for the first time the unambiguous identification of each respondent. The operation of almost all current types of electronic equipment that radiate signals depends on there being no other perceptible signals at the same frequency in the region of coverage. SECANT is virtually immune to such potential interference and thus ideal for use at busy air terminals. Of equal importance is the precise ranging information that the system extracts from replies. A reply consists of 100 pulses, transmitted one at a time every one-thousandth of a second, with each pulse one-millionth of a second long.

To achieve a better ranging accuracy (clearly an important requirement near air terminals), a traditional system would have to use more of the precious and already crowded electromagnetic spectrum. But SECANT uses another means that has the effect of making the one-megahertz bandwidth of its pulse serve as though it comprised 36 megahertz. It does this by employing a ranging technique used in precision-tracking radars. Rather than determining range from a single pulse, SECANT brackets the approximate range (time of pulse reception) with what is in effect a cluster of signal-sensing circuits. By constantly repositioning these circuits in time to match the respondent's motion in flight, the system gradually refines its estimate of range. SECANT repositions the sensing circuits and averages their outputs during almost 700 consecutive pulses (only seven-tenths of a second for each potential encounter), achieving in this way a remarkable ranging precision of 18 feet.

This sort of precision far exceeds that of other comparable avionics equipment now in use or in development. Also, it is well-matched to the projected needs of the short takeoff and landing (STOL) services that will eventually provide rapid air travel from city center to city center as well as to or from suburban airports. Such operations will require pinpoint precision in guidance and navigation. SECANT — and its potentially derivative systems for instrument landings, hazard marking (of mountains, transmission towers, etc.), and navigation — seems likely to play an important role in STOL service.

Irving K. Kessler, RCA Executive Vice President, Government and Commercial Systems, views SECANT in the broad context of RCA's traditional concern that technology be used for the benefit of society rather than merely as a means to corporate profit. Kessler recognized the importance of SECANT when it was merely a concept and gave high priority to its prompt development. "This system," he says, "is one of those rare breakthroughs that will have a major impact in the vital area of air safety as well as a far-reaching influence on the design of electronic systems of all types."

The potential market for all categories of SECANT equipment is estimated at more than $100 million a year, and RCA hopes to encourage participation by all avionics manufacturers both here and abroad. Kessler has made it clear that RCA hopes to bring the stimulus of vigorous competition to the manufacture of equipment.

"We consider it our duty," he explains, "to ensure that this vital equipment becomes available as rapidly as possible and at the lowest possible cost. Competition is the best way to achieve that goal."

RCA, in line with its long-standing policy, will grant to all companies that request them patent licenses to manufacture the equipment and hopes to keep the industry informed about the system through a series of newsletters that will detail the progress of SECANT. That progress will doubtless be followed with great interest by the airlines, whose emphasis on flight safety has often been the stimulus for technical innovation.

The vast community of lightplane pilots, whose aircraft now number more than 120,000 in the United States alone, will also find much to cheer in SECANT's promise of all-weather flight safety at modest cost. Compatibility with the more elaborate versions of SECANT equipment is the key to the effectiveness of the low-priced Proximity Warning Indicator (PWI), which costs less than $1,000 installed.

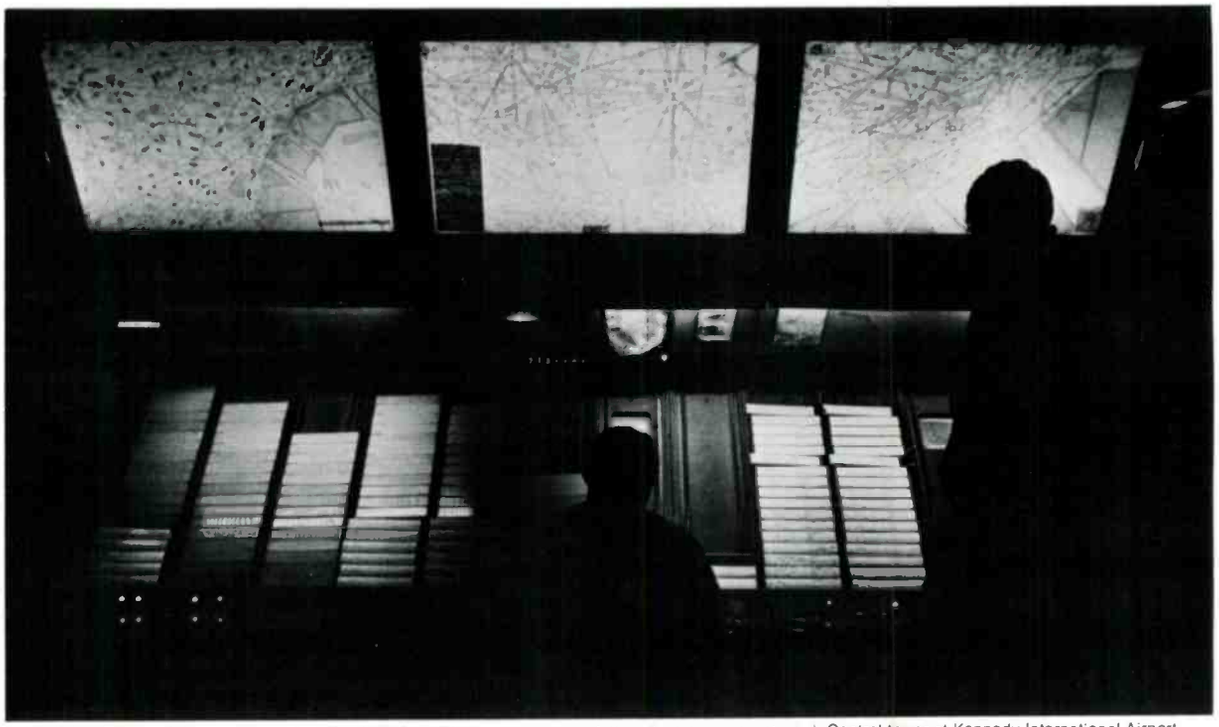
It uses the same message structure as do the more comprehensive versions of SECANT equipment but operates with reduced transmitter power, reduced receiver sensitivity, and reduced signal-processing capability — all scaled to be appropriate to the task of protecting relatively slow-flying light aircraft. A PWI-equipped aircraft extracts two items of interest from replying messages: the range and relative altitude of all responding aircraft. Any relatively co-altitude reply with a range that represents a potential hazard automatically alerts the pilot, who then has plenty of time to locate the intruder and alter course accordingly.

The next category of SECANT equipment, also probably for light aircraft, is called a Vicinity Traffic Finder (VTF). This provides the pilot with the range, relative velocity, and time-to-closure of intruding aircraft, along with their bearing and elevation to facilitate visual acquisition.

The version of SECANT equipment intended for business aircraft extracts from identical messages the heading of each responding aircraft in addition to its range, altitude, relative velocity, time-to-closure, and identity. As in the VTF, by simply dividing their ranges by their respective velocities, the system determines which of the responding aircraft must be attended to first. As each potential encounter is resolved, the system automatically goes on to solve the problem of next greatest concern.

The most sophisticated SECANT equipment adds an important capability: a cathode-ray tube display indicating the range, velocity, and course of all possibly conflicting aircraft. This category of equipment has, appropriately, been labeled a Traffic Monitoring System.

SECANT currently comprises these four distinct classes of equipment and, in addition, includes a Remitter, an even lower-priced member of the SECANT family that has obvious potential as an inexpensive and reliable hazard-marking beacon. The possibilities are endless and may eventually lead to the manufacture of many types of equipment for airborne use alone. In fact, SECANT's potential applications are so numerous that all sorts of other equipment categories can be envisioned for use on the ground as well.



Control tower at Kennedy International Airport. Charts show reference points for calculating flight paths in surrounding area.

Plato was one of the first to note that art mimes nature — rather poorly, in his view. If he could have witnessed the flight tests of SECANT (and had been familiar with the habits of bats), he might have noted with astonishment that technology, too, can mime nature — in this case superbly and with great effect.

By adapting one of nature's techniques to the urgent needs of modern technology, SECANT will initiate a new era of aviation safety, creating new opportunities for the electronics industries and effectively utilizing technology to serve mankind. ■

Van Cliburn

Original score for Chopin's "Polonaise in B Flat" represents the Romantic music that dominates Cliburn's repertoire.

For 13 years, the prize-winning pianist from Texas has remained one of the best-selling artists in the world of music.

By Mary Campbell

They don't laugh when Van Cliburn sits down at the piano. They listen quietly and intently, applaud heartily when he finishes, and a few days later go out and buy his records.

American symphony orchestras today are experiencing financial trouble. Audiences for classical music — especially young people — are turning to small chamber-music groups and to solo instrumentalists; they are seeking a one-to-one relationship between the artist and the listener. Right at the top of the list of those they're turning to is pianist Van Cliburn.

"When Van walks on stage," says Jack Pfeiffer, executive producer of RCA Red Seal Artists and Repertoire, who personally produces Cliburn's albums, "you immediately feel people kind of opening up. Van has a charisma, a mystique, something about him that makes people accept what he does. He communicates very well with a great many people. There is no question that he is in the same class as the great ones — the same class as Horowitz and Rubinstein. If he weren't, he would never have lasted this long. No amount of publicity or promotion could have sustained him for 13 years. You can't fool the public. Individually, people might not know very much about music but collectively they know everything."

Pfeiffer's reference is to the 1958 International Tchaikovsky Piano Competition. Cliburn won first prize in the competition, held every four years in Moscow, and thus became the first — and still the only — American to have won it. He was immediately acclaimed a hero in the United States. New York City gave him the only ticker-tape parade it has ever accorded a musician. RCA Victor signed him to a recording contract; and his first release, Tchaikovsky's Piano Concerto No. 1 in B Flat Minor, became the only classical album to sell more than a million copies as well as the only classical album to reach No. 1 on the popular best-seller charts.

Cliburn keeps up the momentum generated by the Tchaikovsky prize by giving 60 to 100 concerts a year and by releasing a new record every year or so. His next biggest-selling record was "My Favorite Chopin," released in 1966. Actually, the pace has not been even, and Cliburn seemed to have slowed down for a season or two before the Chopin album. But, since then, he has regained that momentum, and his appeal has become stronger than ever. Moreover, young people's interest in classical music has recently turned from Baroque to Romantic, in which Cliburn excels.

Cliburn is extremely serious and dedicated in his approach to his career. He is unmarried, has no hobbies, and regrets that he does not have more time to attend concerts by friends and colleagues, although he does go to the opera whenever he can. When on tour, he tries to schedule concerts with a day in between so that he has time to practice. Cliburn seldom takes a vacation. And, when he does, he never stops thinking about music.

"You're never really away from music," he says, "and you don't want to be. That's the nice thing. Everyone has times when he wishes he could go off and forget everything. But that feeling leaves you in a few hours, and you're ready to go on."

In short, Cliburn lives and breathes music. Audiences seem to sense the dedication to the music and respond to it.

All pianists practice regularly. (An exception is Rubinstein, who likes to limber up his fingers on his knees as he sits at a movie.) They practice even after they have learned a piece of music, not so much to make sure that they will get the notes in the right place as to study what the music is saying, the way it flows. In this way, even those pianists who try most carefully to play the music exactly as they think the composer intended it create their own interpretations. And as a pianist plays a piece in concert and in practice, his way of playing it may change a great deal through the years.

This is why Cliburn has been reluctant to produce more than the relatively few recordings he has made. He feels that his thinking about a certain piece of music will change and improve through the years, and he does not want to record an interpretation that he might later be able to make more satisfactorily.

Beethoven's "Appassionata" Sonata, for instance, was recorded by Cliburn at least six times in the last 10 years before it was released. The next to the last time he recorded it was in Rome in 1967. Pfeiffer listened to it and liked it very much, but Cliburn wasn't satisfied. He recorded it again last August, and that version has come out this autumn.

As a matter of fact, Cliburn had six albums issued this autumn: Rachmaninoff's Rhapsody on a Theme of Paganini and Liszt's Piano Concerto No. 2 in A, with The Philadelphia Orchestra under Eugene Ormandy; "Two 20th Century Masterpieces" — Prokofiev's Sonata No. 6 in A and Barber's Sonata for Piano; The Beethoven Piano Concerto No. 3 in C, with The Philadelphia Orchestra under Eugene Ormandy; Beethoven's "Moonlight," "Pathétique," and "Appassionata" Sonatas; "My Favorite Brahms"; and "My Favorite Concertos, Vol. 1."

When someone commented that it was a marathon of recording, Cliburn called it "only a small marathon," because 20 of his albums are scheduled for release by spring, 1973.

Cliburn is essentially a Romantic pianist, playing music from the era dominated by Weber, Mendelssohn, Schumann, Chopin, Wagner, Berlioz, Liszt, and others who wrote when expression of emotion was one of the main motives for composition. Recently, he has been trying out more impressionistic works by two modern American composers, Copland and MacDowell. What "feels" right to Cliburn, he learns and adds to his repertoire. What doesn't, he leaves alone. "No matter what I learn," he explains, "I love it very much or I don't learn it. If I don't like something, why should I make an audience suffer?"

Whatever the repertoire, though, the pianist does not especially like the Romantic label. "All music is Romantic," he says. "Even Bach is Romantic. Life should be Romantic because there is emotion in everything. If a human being had no emotion, he would be a robot."

Romantic or not, Cliburn feels strongly that he should be faithful at all times to the composers of the works he loves. "I am only a person who performs music. My position has a secondary status, because I am playing music created by another person. It is a humbling position. But if there were not a group of people who wanted to hear the music, there would be no reason for my existence. It is a thrill when someone gives you attention and you feel that you can bring something of pleasure and beauty to him. I think this should be an inspiration to all those who perform, because they are only serving."

The pianist — named Harvey Lavan Cliburn, Jr. — was born in Shreveport, La., in 1934. His mother, who had studied to become a concert pianist, gave piano lessons to children. At the age of three, Van sat down at the piano one day and played something he had heard one of his mother's students play. So his mother began to give him lessons. And, when he started school, his teacher found that, though he could not read words, he could read music.

When he was 17, after having studied with his mother for 14 years, Cliburn entered the Juilliard School of Music in New York and began to study with the only other teacher he ever had, Rosina Lhevinne. It was her idea that he enter the Tchaikovsky competition.

The Tchaikovsky piano concerto wasn't the only piece that Cliburn played in the contest, although many people think so because it was the first work he recorded after his return to the United States. He also played works by Prokofiev, a Tchaikovsky sonata and a fugue, and a piece written specially for the competition that each contestant had three weeks to study. Each contestant also had to choose another concerto, and Cliburn chose Rachmaninoff's Third.

It irritates Cliburn a bit — and he shows it despite his usually pleasant manner —

Mary Campbell is music writer for the Associated Press.

Cliburn's intense involvement with music surfaces in rehearsal with the Philadelphia Dell Orchestra for his 1968 guest appearance as conductor.

that people suggest he must be tired of the Tchaikovsky piano concerto by now. "If they're serious, they should know that art is forever. No performer can ever kill a great piece by playing it often. The Tchaikovsky concerto holds up year after year because it is a masterpiece. It is greater than the performer."

Cliburn has been criticized for having too limited a repertoire, but it is possible that people who say that think of him only in terms of Tchaikovsky. Just within the concerto repertoire, he plays the Grieg, the two Liszts, Rachmaninoff's Second and Third Concertos and the Rhapsody on a Theme of Paganini, the MacDowell, Prokofiev's Third, the two Chopins, the two Brahms, and three of the five Beethoven concertos — and he's learning the other two.

Cliburn has been back to Russia to perform four times since he won the Tchaikovsky prize. Now he would like to perform in China. "I had invitations to Peking when I was in Russia in 1958 and 1960. Of course, as an American, I couldn't go, but they were very kind and understanding. It would be very exciting. I know that the Peking Conservatory of Music is very good. I heard most of their teachers and some of their students at a music festival held at the Moscow Conservatory."

Pianists often become accustomed to one piano they like better than any other, which becomes like a friend to them. They come to know all its deficiencies and sometimes complain about them, but its endearing qualities keep bringing them back to it. Van Cliburn has a favorite piano reserved for him by Steinway and Co. in New York.

Wanting the right piano isn't just an artistic quirk. The right kind of piano is especially important to Cliburn because he has a very lyric approach. He has a way of making the music come out in long melodic lines, in a flow of sound. Since all pianos differ, the "Cliburn sound" would be difficult to produce on some kinds of pianos.

Van Cliburn with Maria Callas and Eugene Ormandy after a concert at the Philadelphia Academy of Music in 1959.

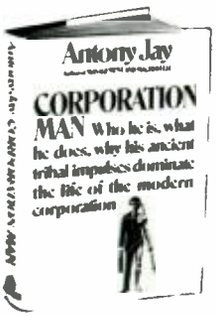
When he is working on an album, he records in the evening. Having geared his life to performing in the evening, it is the most natural time for him to be playing. Once, in Rome, he recorded from 10:00 P.M. to 11:00 A.M. the next day. Sometimes, after a concert, with his mind all keyed up and full of music, he will practice at the piano all night and sleep most of the next day. This is fine except when he is on tour and has to travel the next day.

Cliburn is known to be one of the highest paid performers in the classical music world. But he lives frugally, wondering where he can get the best haircut at the best price and sharing a home with his parents in Kilgore, Tex. He has a house in Tucson, Ariz., and an apartment in New York, but he rents the apartment to other people when he is not there because he feels he couldn't afford to keep it if it had to be empty much of the time.

Still slim and soft-spoken, the pianist, at 37, doesn't look much older than the polite 6-foot-4 Texas lad who won the Tchaikovsky prize. But, now that he has left the fair-haired-boy stage of his life and has not yet become a white-haired old master, one wonders how old he feels.

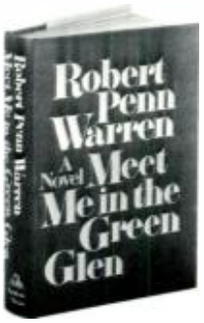
"I feel about 18. I hope I always will. As a musician, I hope I always feel that I'm just embarking, because there is still a thrill when you hear music. When it ceases to be a thrill, then I think that is the time for me not to be a part of music. Meanwhile, there's no reason to feel jealous or threatened. You're hopeful that your profession can be enriched by the knowledge and abilities of other people. They can inspire you. I go to a marvelous performance sometimes, and when I go home I'm so inspired that I just want to work and remember the beauty that came to me in those moments. The thrill for me is the new ambition and inspiration." ■

Books at Random...



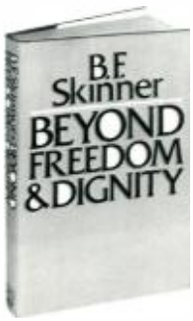
Corporation Man
by Antony Jay (Random House)

Antony Jay likens the corporation man to a primitive hunter who, facing the perils of the hunt, stalks his prey, kills it, and brings it back to camp. As he does so, the modern "hunter" forms what Jay calls "ten-groups," which Jay considers similar in size and purpose to the tribal hunting bands of ancient times. The author's unconventional views explode nearly every accepted idea of modern business organization as he contends that man's behavior in business is derived not from logic and reason but from his primitive hunting instincts.



Meet Me in the Green Glen
by Robert Penn Warren (Random House)

Robert Penn Warren, Pulitzer Prize winner for both fiction and poetry, has set his latest novel in rural Tennessee. The central character is Cassie Spottwood, 42, the wife of an invalid. Four men are involved in Cassie's tragic story, which starts when a young man arrives in the remote valley. He brings into Cassie's life a love that, for a time, seems to be true. When she finally must face reality, Cassie's desperate measures cause crisis after crisis in a complex story of love, betrayal, revenge, and murder.

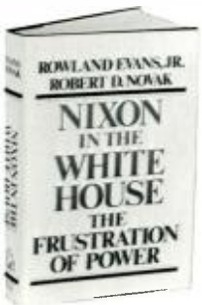


Beyond Freedom and Dignity
by B. F. Skinner (Alfred A. Knopf)

B. F. Skinner, perhaps the most controversial and influential psychologist living today, argues in his new book that traditional concepts of freedom and dignity must be sharply revised. At present, he says, they perpetuate the use of punishment and block more effective cultural practices. Skinner rejects traditional explanations of behavior, which dwell largely on mental attributes, in favor of explanations to be sought in an individual's genetic endowment and personal history. And he feels that society should direct its efforts to changing the physical and social environments in which man lives rather than trying to change man himself.

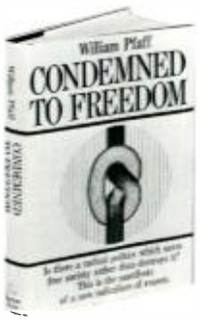
The Condor Passes
by Shirley Ann Grau (Alfred A. Knopf)

The ruthless accumulation, spending, and ultimate disposal of a great New Orleans fortune are the subject of this novel. It tells the story of three generations of Americans whose lives are shaped by the influence of power and money. The dramatic scenes encompass a lavish variety of incidents and locales, ranging from a plague-ridden ship out of South America at the turn of the century to the New York art world of the 1950s, from underworld gunnings to the marital wars of the superrich. The author was awarded a Pulitzer Prize for her earlier novel, *The Keepers of the House*.



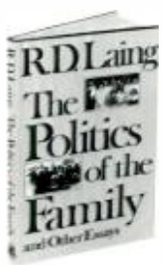
Nixon in the White House: The Frustration of Power
by Rowland Evans, Jr., and Robert D. Novak (Random House)

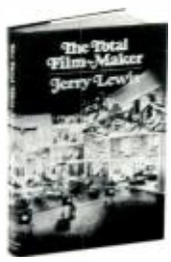
The authors of this extraordinary profile, two of Washington's most respected journalists, argue that President Nixon has not known what to do with the immense power he finally won. His administration, they say, is characterized by the "frustration of power." The reason for it lies in the personality of Nixon himself: "a complicated, enigmatic man—sometimes super-pragmatic, sometimes vacillating, but always alone and often lonely." The examples they use are chosen to show how Nixon has delayed in making agonizing decisions, how he has failed to communicate with blacks and youth, and why his grand designs have remained unfulfilled.



Condemned to Freedom
by William Pfaff (Random House)

The crisis of liberal politics — the loss of faith in freedom and reason — has placed liberal government in jeopardy and threatened it with attacks from both sides and apathy or fear from the middle. Seeking to save free political government rather than destroy it, Pfaff calls for a "post-liberal" politics. He states that "there is no political freedom without intelligence, and today intelligence is in need of defense" and urges Americans to rethink the structure of their government and economy and work toward a necessary, radical reform.





Other Recent Random House Books

Electronically Speaking...

Recent RCA Developments in Electronics

Optical Cavity for Semiconductor Laser

Scientists at the RCA Laboratories in Princeton, N.J., have developed a universal design that can provide laser light at power levels suitable for virtually any application of semiconductor lasers. The design involves placing an optical cavity within a semiconductor laser, which doubles the output efficiency at high peak powers. It represents an important step toward the practical use of lasers in closed-circuit TV and in commercial and military communications systems.

The new Large Optical Cavity (LOC) is essentially a passageway through which the light can travel. It permits the laser light to propagate away from the area where it is generated in the semiconductor and to be emitted from the device with very little loss of power. The power level of the light emitted can be fitted to a specific application simply by changing the size of the optical cavity. Before the LOC was introduced, light was generated and emitted from essentially the same area in semiconductor lasers, resulting in loss of light through absorption.

The optical cavity makes possible a universal semiconductor laser design that can be made by a single manufacturing process and used for many different functions.

Hologram Storage in Crystals

A crystal that can store holograms in the form of atomic patterns has been developed by RCA. The advance ultimately may lead to a new document-storage system in which files of statistics, architectural or engineering drawings, computer data, photographs, maps, and other graphic material could be stored permanently in crystals about the size of a sugar cube. These crystals are made of lithium niobate or barium sodium niobate — the latter nicknamed "banana" for its chemical formula, $Ba_2NaNb_5O_{15}$.

One advantage of such a system is its large information-storage capacity. Theoretically, a trillion bits of information could be stored in a cubic centimeter of crystal. The holograms also can be retrieved and read out relatively easily, since an extremely small change in the angle at which the readout laser strikes the crystal makes it possible to select a different hologram. Another positive factor is brightness, for even when the same readout laser is used, a display from a crystal hologram is about 15 times brighter than that of a conventional hologram on photographic film.

Though holograms have been recorded in crystals before, the process required a very powerful laser and lengthy exposure times. The significance of the RCA advance is that the crystals are about 500 times more sensitive than any others made so far, an effect that permits the use of low-power gas lasers. The high sensitivity is achieved by doping the crystals (adding metallic impurities). Also, a new technique makes it possible to fix the holograms so they can be stored in the crystals as long as needed and not erased by laser light during readout.

Surveying by Laser

RCA has developed for NASA a laser system for surveying national parks, forests, and other large tracts of government property. It will be used in a test program conducted by NASA's Goddard Space Flight Center for the U.S. Forestry Department.

The laser will be mounted on a tripod at a known property point and aimed so that the narrow, intense laser beam is transmitted vertically. Using a NASA-developed sensor for laser light, surveyors then can measure the angle from another property point to the location over which the laser is positioned. The sensor serves the same function as a surveyor's transit, but it is more accurate and can be used to take measurements over much longer distances than can conventional instruments. Since the beam is transmitted far above treetops and can be detected by the sensor over long distances, faster and more accurate determination of boundary lines will result.

With this portable system, which weighs only 24 pounds, surveyors will be able to do in minutes the kind of work that presently requires many hours to complete. The test program is an excellent example of aerospace technology being put to use in a "down-to-earth" project.

Microcomputer for Space Missions

NASA has awarded RCA a contract to develop a space computer that would be 100 times smaller and lighter than equivalent commercial systems. The test model could be the forerunner of a system for such space vehicles as the space shuttle and the Earth Orbiting Space Station. (The former is a reusable craft that will take off like a rocket and land like an airplane. The latter will be a permanent, orbiting laboratory designed to accommodate successive groups of scientists.)

The new computer will weigh 10 pounds, occupy a half cubic foot of space, and require only 15 watts of power. Through the use of Large-Scale Integrated arrays (LSI), it will be able to process the same amount of material as would a room-sized commercial model and will have a speed of 100,000 operations a second. By using RCA's computerized design-automation system to design, manufacture, and test the LSI chips, engineering costs will be reduced by 75 per cent.

The system, called Spaceborne Ultra-reliable Modular Computer (SUMC), also can be expanded in segments to meet data-processing requirements for a wide variety of space missions anticipated for 1975 to 1985. It is one of several continuing computer-systems programs under way in RCA's Government and Commercial Systems group. Beyond its uses in spacecraft, the SUMC could find wide applications in test equipment, communications, navigation, and other areas of data processing.

Range-Safety System

The first mobile range-safety system that can track ballistic missiles in flight and destroy them if they deviate radically from their course will be built for the U.S. Air Force by RCA. The system will incorporate radar, real-time data processing, displays, telemetry, and command and control into a fully integrated, transportable range-safety system. Designed for high-accuracy monitoring of intercontinental missile test flights, it will provide the Air Force with an important range-safety capability.

The range-safety system provides for optical monitoring of test launches to an altitude of 40,000 feet. During the optical monitoring period, any necessary missile destruction would be accomplished through the command-destruct transmitters. Above 40,000 feet, the missile is acquired and tracked by radar. Coded destruct commands are transmitted, if necessary, by the radar beam.

RCA Glōbcom Extends Service in Far East

Direct international telegraph service between mainland China and the United States was restored on September 15, 1971, as the result of an agreement between RCA Global Communications, Inc., and the Shanghai Telecommunications Administration. The agreement opened the way for reestablishing a direct high-frequency radio channel for the transmission and reception of overseas telegram traffic between Shanghai and San Francisco. The overseas telegram channel is to be operated on a daily basis, and a separate high-frequency circuit will be used for transmission of picture material as needed.

Service between the two countries had been interrupted on November 15, 1968. Reactivation of direct service is a first step in the necessary expansion of telecommunications facilities and services to handle government and press communications during President Nixon's forthcoming visit to Peking.

Service also has been inaugurated between New York and Tokyo for exchanging computer data on a call-up basis. The new service — International Datel — was opened by RCA Glōbcom in conjunction with Kokusai Denshin Denwa Co., Ltd., Japan's international communications carrier. Datel is designed for businesses that have moderate amounts of data to exchange internationally and do not find it economical to use a full-time dedicated circuit. The circuit is available around the clock, and subscribers are offered other service options when it is not in use for data communications.

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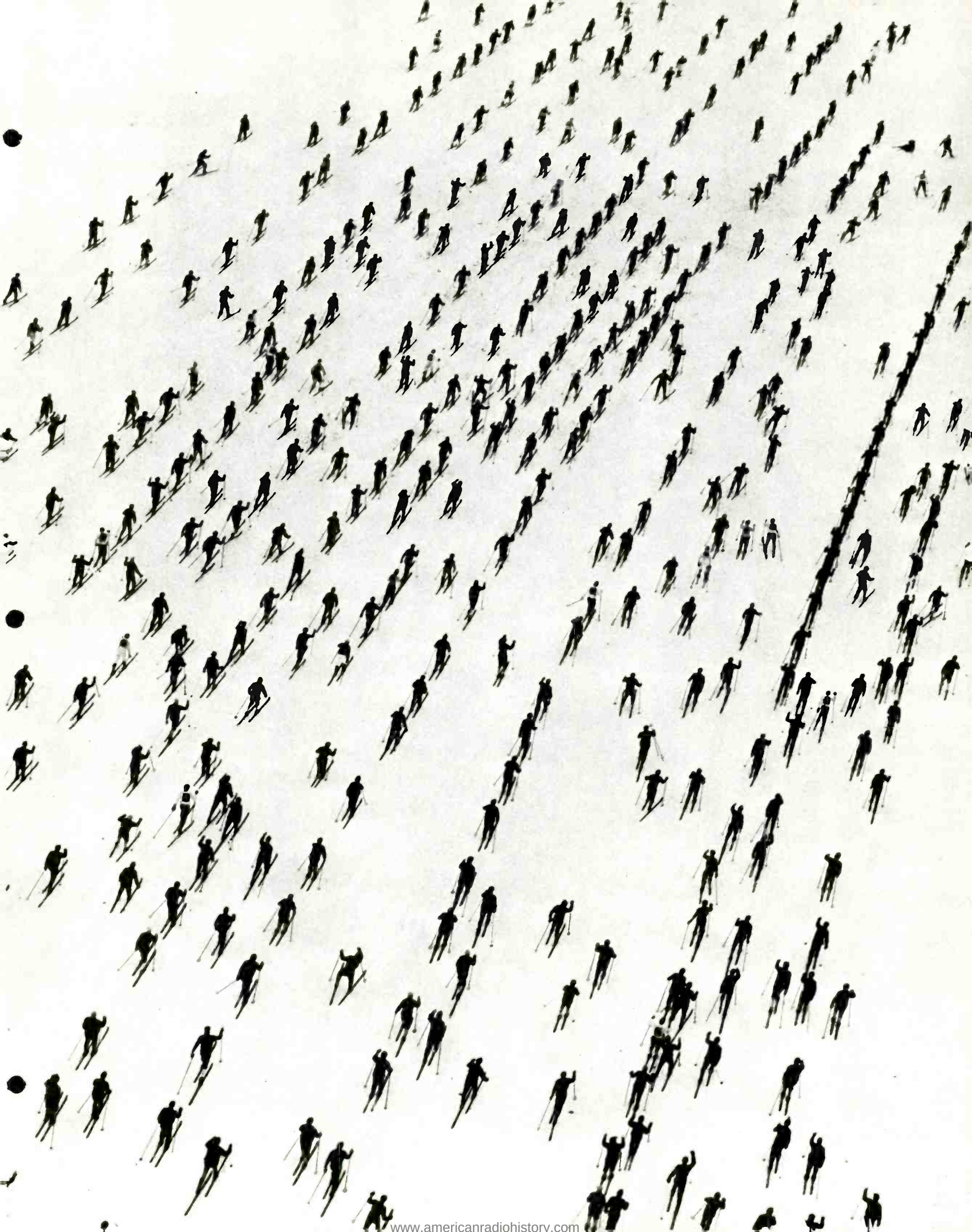
Cross-country skiing is becoming an increasingly popular sport. Early this year, more than 3,600 "runners" of all ages—including a man of 77—entered this annual 25-mile marathon at Engadine, Switzerland. During the 1972 Winter Olympics, about 100 skiers from 12 nations are expected to participate in the Nordic cross-country races. An article describing preparations for the Winter Olympics begins on page 20.



RCA

Electronic Age

Autumn 1971