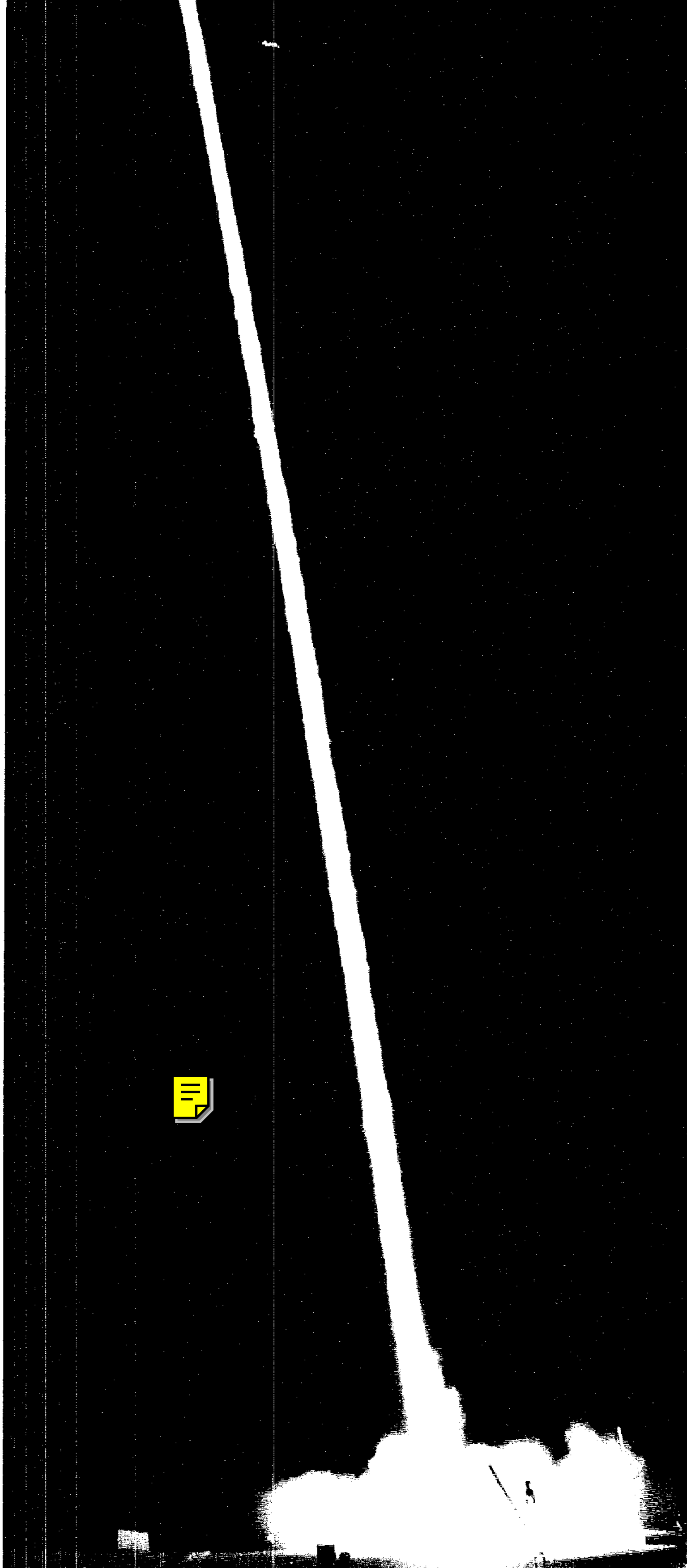
the Atom

Los Alamos Scientific Laboratory
June, 1978



the Atom

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REGULAR FEATURES

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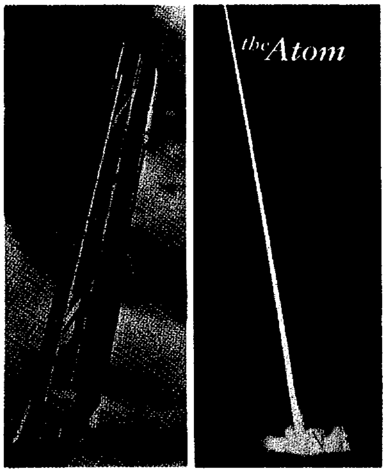


Bill Jack Rodgers took these before and after shots of the rocket used to carry the barium test payload for Avefria into the upper atmosphere.

Study of Sun

Toward A New Era

By Jeff Pederson

Since uncounted time, we've realized the sun has the single greatest influence of any external force on our planet's climate and our lives. But only in recent decades have we been able to probe the sun's intrigues with any scientific precision.

The sun has been characterized as a ball of fire carried on someone's shoulders; a daily wanderer traversing the horizons; a submissive slave; a powerful god. The sun has also proven predictable to a variety of cultures — the Babylonians and Chaldeans, for instance, began tabulating solar eclipses about 2,700 year ago. Ancient Greeks attempted to calculate the diameter of the sun, and Aristarchus believed the sun was the center of an orbit for a rotating earth. Those views lost to the dominance of Aristotle, and we believed the sun was pure fire and heavenly bodies were supernatural beings — until the telescope conclusively proved otherwise.

We know now the sun is incredibly larger than the Greeks dreamed, with a diameter of some 1.5 million kilometers and a mass of about 2×10^{30} kilograms. The solar surface has a temperature of about 6,000 degrees C due to the extreme compression of the solar mass; atoms are subjected to intense pressures; fuse their nuclei, and release energy — of which the earth receives only a small part. And we know the corona is not composed of a special element called "coronium," as once was held, but consists of highly ionized atoms of common elements.

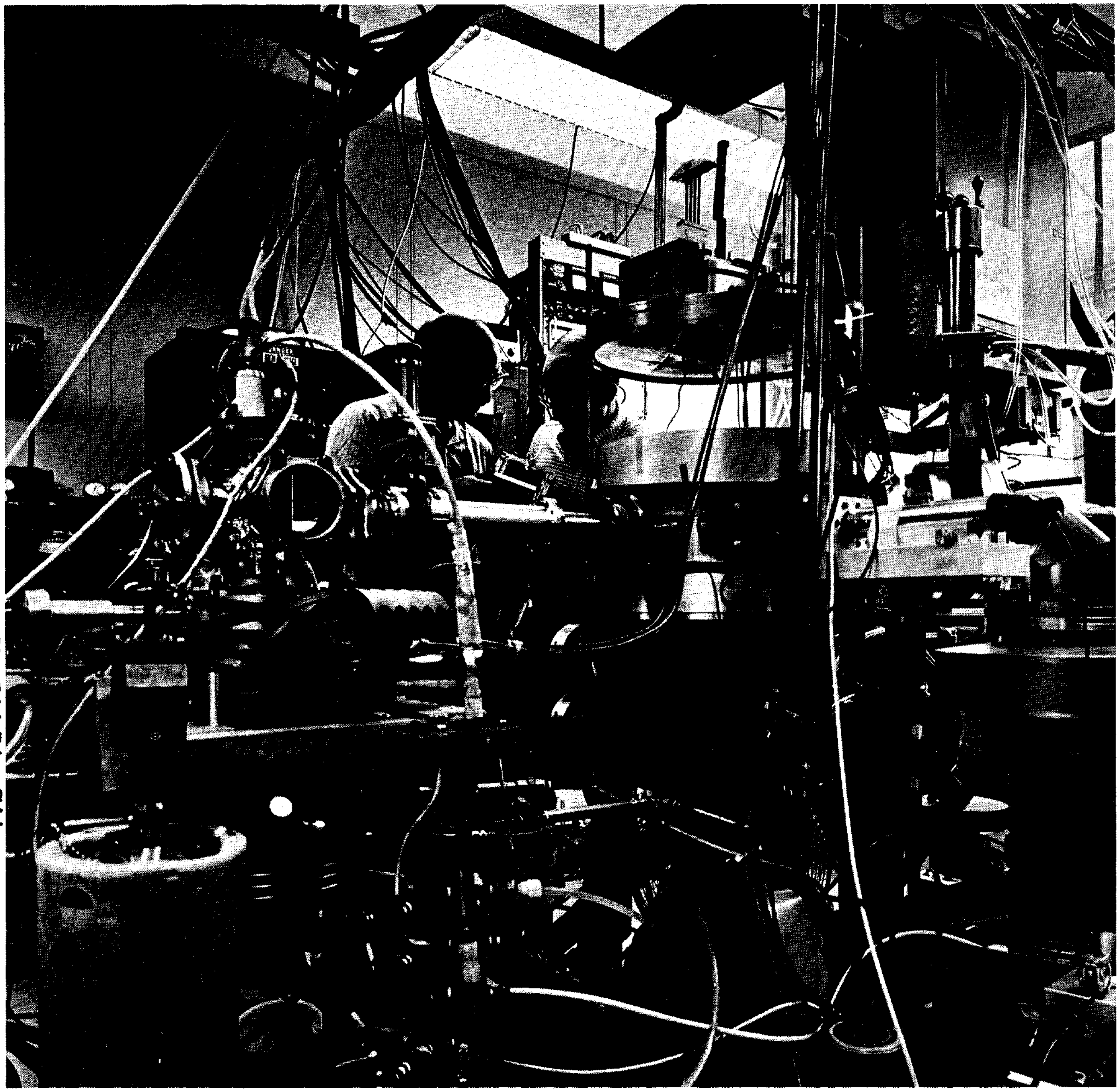
The solar sunspot cycle has been charted against the level of lakes, rainfall, barometric pressure, tree ring growth, even the price of wheat. Just how the sun relates

A high-power laboratory x-ray source glows through a viewing window in this close-up. It was designed especially for LASL testing work, and is a unique instrument. Filaments, when heated, work similarly to an incandescent lamp. They emit electrons that are pulled to an anode where x rays are created and are then sent into the target chamber where solar study devices can be calibrated.

to man's climate and energy needs — and whether we can predict climatic patterns with increased solar knowledge — is the thrust of a LASL effort for the 1983 Space Shuttle.

The LASL Physics (P) Division is moving toward a new era of exciting experiments in solar physics, solar-terrestrial studies, and climatology. With the advent of the Space Shuttle and the possibility of a future solar-terrestrial observatory in space, staff members of the Physics Division and other technical divisions are planning a new generation of powerful experiments, measuring x rays and particles, to study the interaction of solar emissions and the earth's atmosphere. They believe that by studying the sun's activity cycles and the earth's atmosphere and magnetosphere, all as a composite system, it will be possible to understand why the sun modulates our climate.

The Space Shuttle — part of the Space Transportation System — will have as its basis an airplane-like vehicle that begins its ride toward earth orbit in a piggyback fashion on an expendable rocket booster. Planned for launch around 1980,



Working with a holder used to calibrate crystals used in solar experiments are Jim Bergey, left, and Dwight Barrus, both P-4. Nearby is LASL's calibration chamber, and the x-ray source is to the left.

with frequent launches scheduled by 1983, the reusable shuttle will land on a runway on earth after missions lasting from 7 days to 2 months. A large cargo bay will accommodate many kinds of payloads, and 2 kinds of rockets can be carried to deliver satellites beyond the earth orbit or to special orbits. One Space Transportation System project, the Spacelab, is an international effort managed by the European Space Agency. Spacelab will have a pressurized section for crew members and will be an orbiting laboratory. American Space Shuttle launch and recovery operations will be at Kennedy Space Center in Florida, and Vandenburg Air Force Base in California. The Shuttle will provide a national capability to orbit very large experiments and handle large quantities of data.

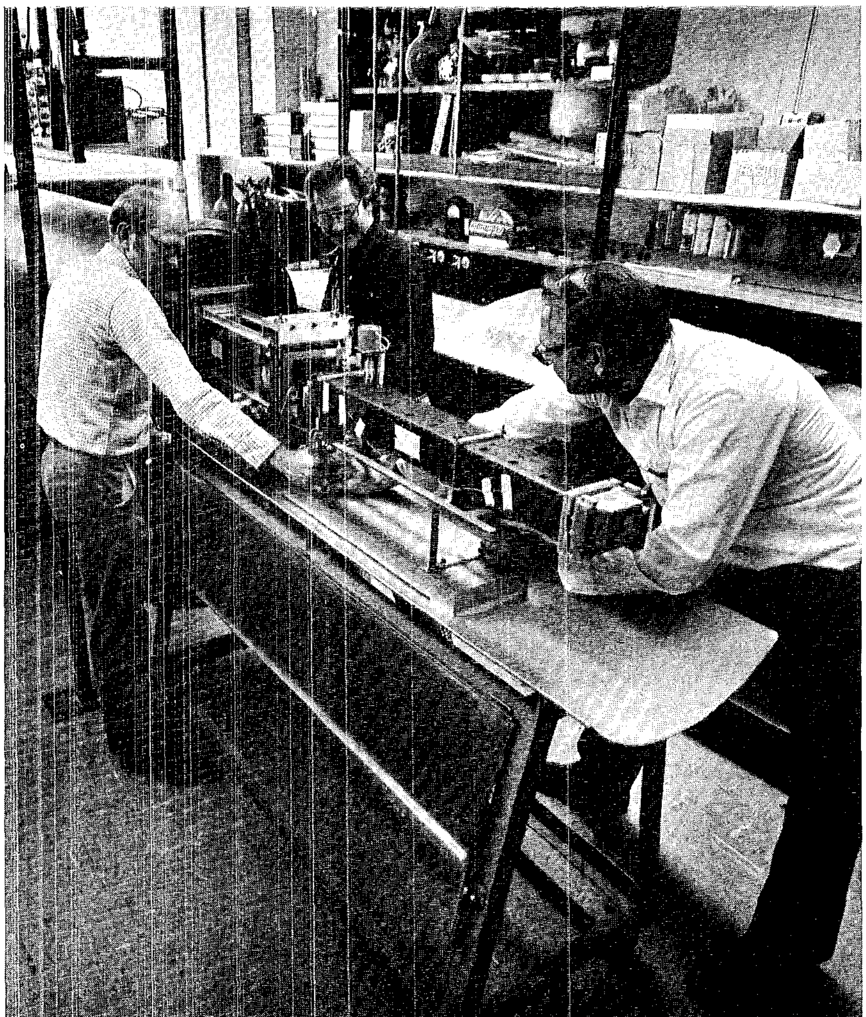
Researcher Richard Blake of P-Division, among others, wants to use coronal studies as a tool to forge answers to the questions of the nature and cause of solar activity. There is also more to discover about the variability of the solar wind — gas flowing into space, streaming out millions of miles to touch the earth. P-Division has some of the world's leading scholars in the measurement and interpretation of the solar wind, said Blake — both in interplanetary space and after the wind impinges on earth's magnetic field. LASL scientists are concerned with how the solar radiation controls the upper atmosphere, how these influences can be converted into effects on weather and climate, and how man's energy technologies modify natural processes.

One must know a little of the sun to understand the Laboratory's research.

In the sun, temperatures and pressures of the hot gases decrease rapidly as they move from the interior to the surface. The visible surface, or photosphere, is the thin layer that is seen in visible light when an image of the sun is projected onto a reflective surface. Further out, the solar gas continues to decrease in density, but the temperature rises — to about 10,000 degrees C in the chromosphere, the colorful reddish ring that shows dramatically during a solar eclipse.

A few thousand kilometers above the surface, the temperature rises to several million degrees C in the corona, just outside the chromosphere. Due to high temperatures and low densities, atoms in the corona are highly ionized and emit radiation in the extreme ultraviolet and x-ray portions of the spectrum. The corona is not homogeneous; recent x-ray photos from space have shown that gas exists primarily in loops, defined by magnetic fields. In turn, the magnetic fields are greatly concentrated around sunspots. A group of sunspots in one location on the sun's surface is called an "active region." On the solar disk, the number of active regions varies in the well-known 11-year cycle of solar activity.

Visible light emitted from the solar photosphere is the force that drives the circulation of earth's atmosphere, and is responsible for our weather. Other emissions — especially particles, x rays, and



Inserting a precision x-ray collimator into the test chamber at the Physics Division laboratory are Dwight Barrus, Richard Blake, and Leroy Cope. The chamber evaluates the transmission and angular response of the instrument, as if it were in flight and viewing active regions on the sun. The 3-meter test chamber, used for calibrating many non-LASL instruments, is kept at a vacuum.

PVB 78176-9 P-4 Space Simulation

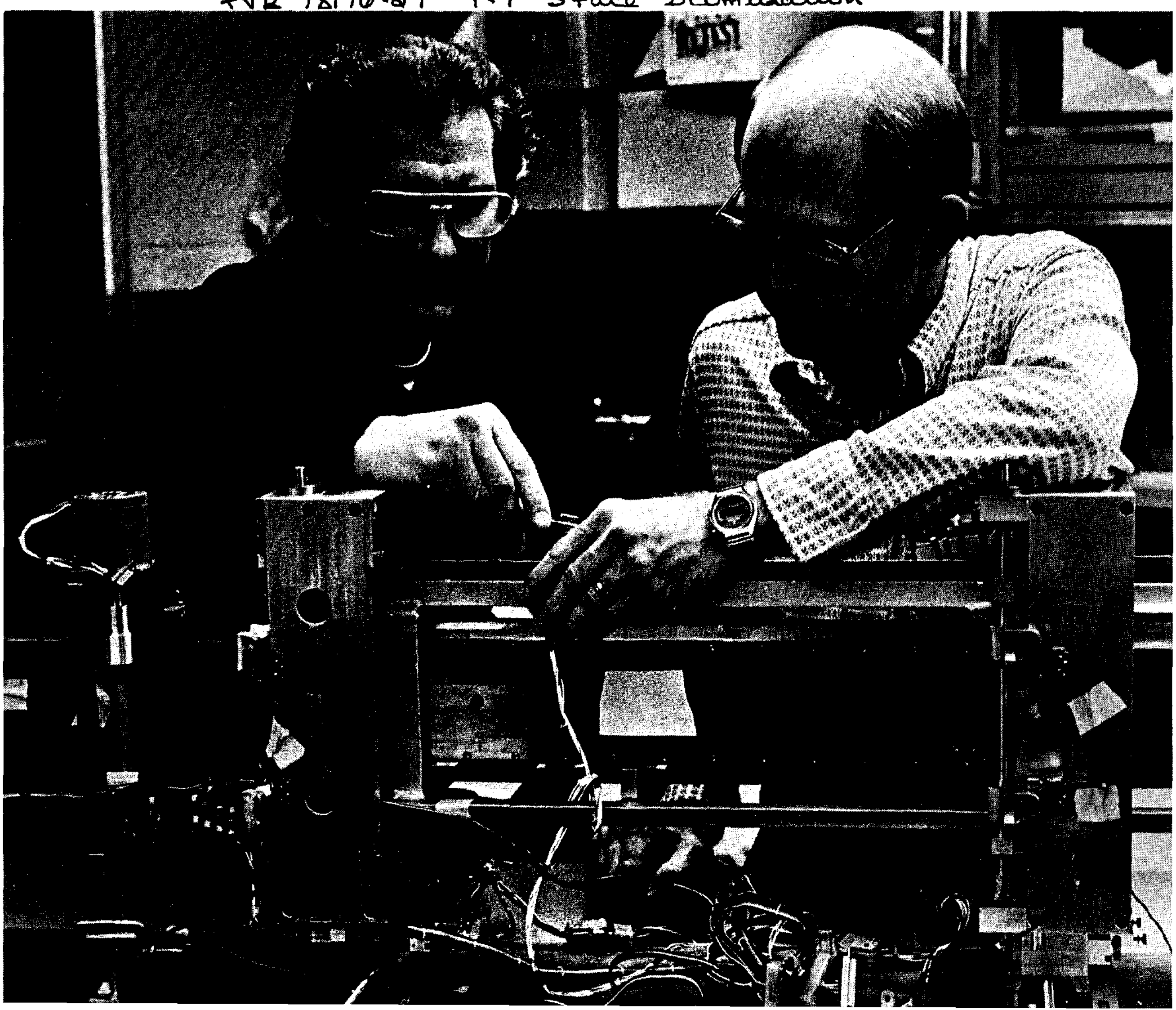
extreme ultraviolet radiation — are responsible for the behavior of the earth's ionosphere and magnetosphere. Ultraviolet emissions absorbed in earth's upper atmosphere cause the famous ozone layer. These invisible rays change over the 11 year period in the solar activity cycle.

Evidence has been building up, increasingly since around 1940, that solar activity modulates earth's weather and climate. In the past 4 years, compelling evidence has confirmed this connection. One of the most intriguing discoveries is that solar activity sometimes ceases for 50 or more years, and the earth then enters a cooler climatic period. Such a situation, when prolonged, will require more energy production to maintain the present-day quality of life. For this and other reasons, the Department of Energy and LASL need to know the magnitude of solar modulations of our natural environment, and hopefully enough can be learned to predict the effect of the sun's variability on our climate.

LASL has participated in a variety of rocket experiments over the years to study the sun and our atmosphere. These short-lived flights normally follow a parabolic trajectory, attain a 200-kilometer height, and fall to earth 50 kilometers from the launch point. When studying the sun, a payload measuring 2 meters by 38 centimeters contains a telescope with a television camera, an x-ray finding device that searches the sun for the cores of bright x-ray features, and spectrometers that can measure intensities and shapes of solar x-ray lines. Data is relayed to earth by telemetry; the sun can be viewed with a ground television monitor. Commands from the ground station can be sent to move the rocket's field of view to any location on the sun. The rocket returns to earth, suspended by a parachute, after its mission.

Rocketry on the part of J-Division and P-Division was used to send a probe from Fairbanks, Alaska, to study the magnetospheric cleft in 1975. Sounding rockets were used to study magnetic fields from a Hawaiian launch later that year. Instruments designed at LASL have gone on the Mariner 10 satellite exploration of Venus and Mercury, and on the Pioneer 10 voyage to Mars, Jupiter, and Saturn. Last November, Operation Lagopedo released water, carbon

RVR 78176-27 P.4 Space stimulation



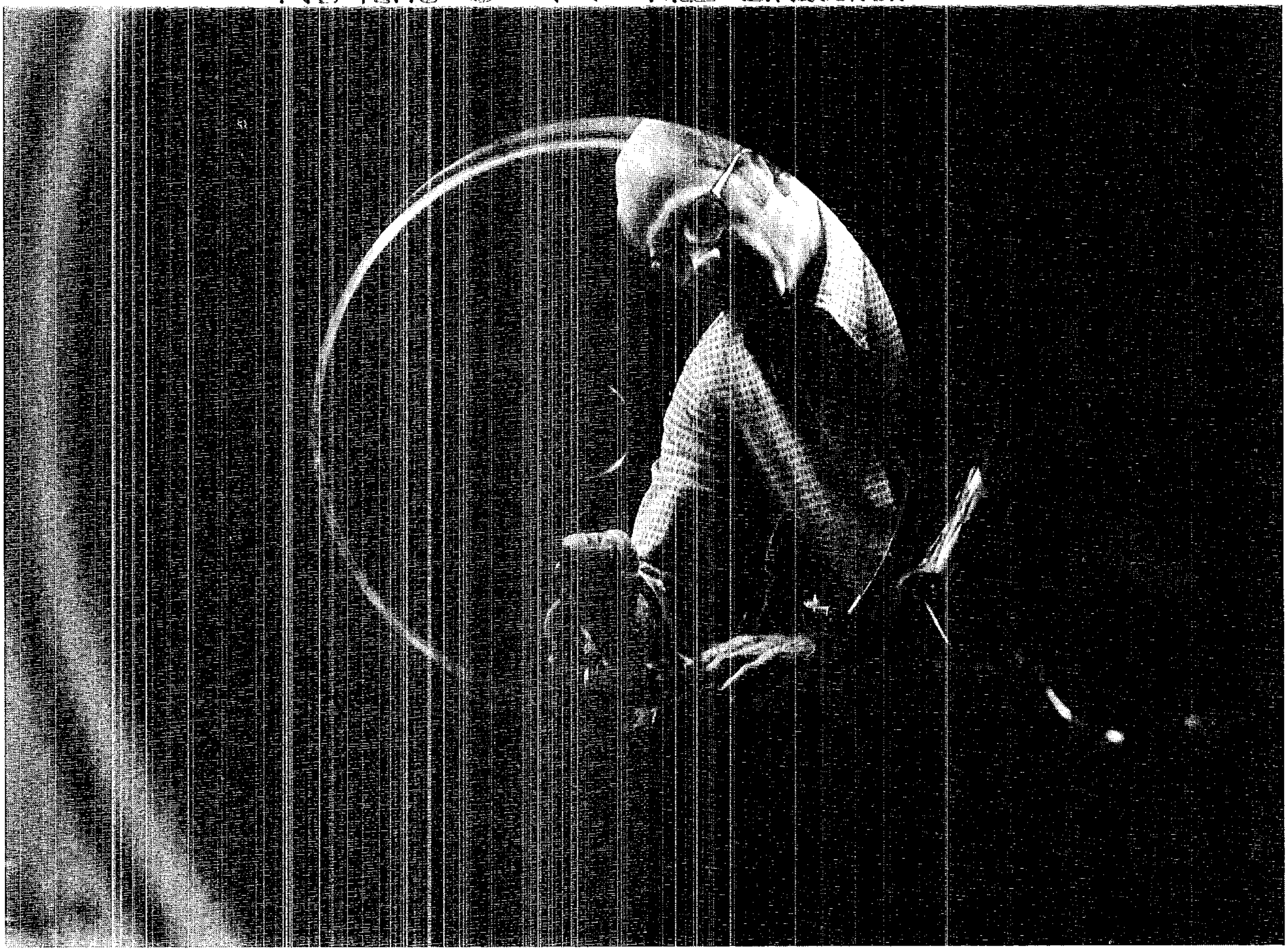
Richard Blake and Dwight Barrus install a test collimator, one of 2 that is tested in the spherical LASL chamber. Researchers hope to build on Laboratory testing facilities and rocketry programs to launch a high-resolution solar analysis experiment with the Space Shuttle in the next 7 years.

NO Number Photo from Richard Blake

1 File Copy in P-4

This x-ray image of the sun shows primarily the points of greatest activity, as well as a thin crescent of weak emissions from the quiet corona. It was obtained with a NASA Skylab instrument. Active regions are concentrated here in an east-west band; emissions are strong (dark) where magnetic fields are concentrated by processes that evolve with the 11-year activity cycle of the sun. Using sophisticated — and as yet unbuilt — instruments such as XRISP and HXII, scientists hope to expand the scope of solar research on the Space Shuttle beyond the stage of rocket experiments.

PVB 78176-43 P-4 Space Simulation



Standing on the x-ray course end of the calibration chamber, Dwight Barrus shows perspective of the 3-meter metal tube. The testing device is so sensitive to minor vibrations that it is anchored to the floor with hundreds of pounds of lead weights.

dioxide, and nitrogen into the F-layer of the earth's ionosphere.

"Devices in orbit that would study in detail the release of energy from the sun would greatly advance our knowledge and give us up to 2 years' viewing time," said Blake. The rocket experiments normally allow just 3 minutes' viewing time. "We think we're approaching the limit of what a rocket x-ray experiment can do," he adds.

Two such devices that would powerfully scrutinize active regions and solar flares have been proposed and are under consideration by the National Aeronautics and Space Administration (NASA). One of them, XRISP (for X-ray Imaging Spectrometer Polychromator) would function similarly to the human eye. A group of crystals would image a region of the sun in terms of emitted x-ray wavelengths. The other instrument, HXII (for Hard X-Ray Imaging Instrument) would image solar flares in hard x rays, by using multiple fan beams. "XRISP would simultaneously provide high resolution images and high resolution spectra. Its sensitivity and diagnostic capabilities would be at least 100 times better than any x-ray experiments flown or now on the drawing board," said Blake. "We could do much more detailed studies, of the buildup and release of energy in the sun's corona, for instance."

It is upon the successes and lessons of the rocket experiments that Blake and other researchers hope to build. "A device like this would be very sophisticated, very precise, and would weigh about as much as a subcompact car," he notes. The price for XRISP or HXII would be about $15 million, but the cost per unit of new scientific data would be unusually favorable, he adds.

XRISP would take 100,000 counts of data each second in each of 172 channels; a rocket probe will record 100 counts per second. Further, XRISP could resolve very tiny portions of solar active regions and would have a spectral resolving power of 100,000 — compared to 6,000 on a rocket. The XRISP proposal was submitted to NASA last November, and could become a multi-use facility for national experimenters. The instrument can image the sun, with a resolution of about one one-thousandth of the solar diameter, through a series of grids that can be fabricated by the present-day integrated circuit industry. The instrument is designed to fit into the Space Shuttle and will measure 1 by 1 by 3 meters.

XRISP shown in a cutaway: Flare finders will locate sun's "hot spots" and the view is seen through a grid collimator system. Crystals reflect light to detectors for analysis. The field of view can be limited to a small 3 arc seconds for detailed study. XRISP is one of the most powerful instruments ever conceived for solar research.

Human vision and the imaging scheme of XRISP are quite similar. The human eye is blessed with both a focusing ability and peripheral vision. You can focus on only a certain spot at any one time, but you are aware of the surrounding scene as well. The central part of the eye, "foveal centralis," a small depression in the retina, constitutes the area of most distinct vision.

In XRISP, a "foveal array" works on the same principle. Nine crystal elements are used for the first stage of peripheral imaging, with a resolution of one arc minute — determined by the grid system (collimator). More detail can then be seen by looking at one-ninth of that amount, with a resolution angle of 20 arc seconds. Ultimately, a small foveal field of view can be scrutinized, with angular resolution of 3 arc seconds. Operating in space, flare finders on XRISP would spot active regions and cause the pointing mechanism to direct the field of view to them.

The view of the active region through the grid pattern will permit x rays to pass through and strike one of many precisely aligned

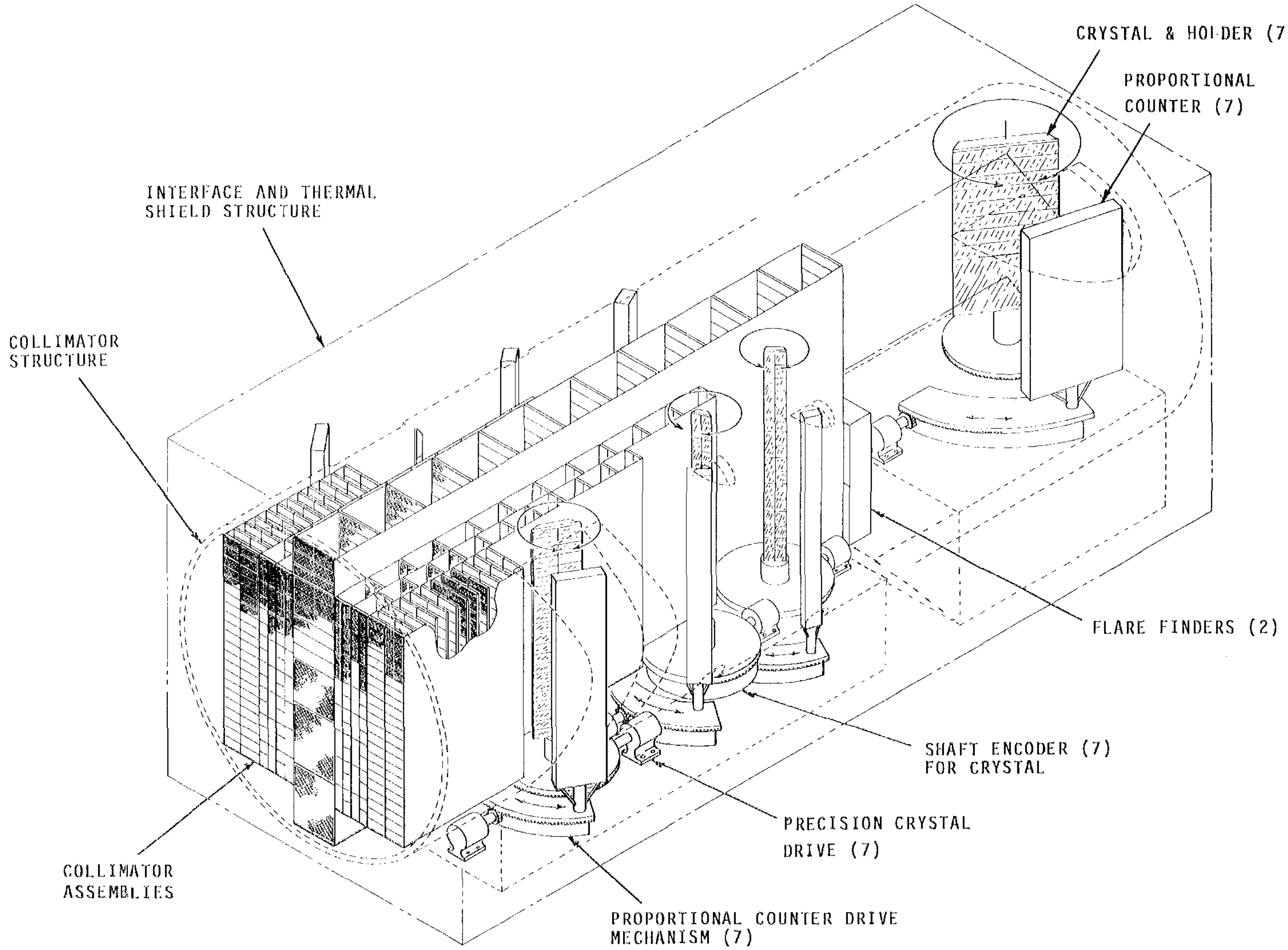


FIGURE X-RAY IMAGING SPECTROMETER POLYCHROMATOR (XRISP) CONFIGURATION crystals, which reflect the x radiation to the detector. Spectral details are resolved with very high dispersion by the crystals, which are aligned at different angles so each one sees a different portion of the active region. Data processing is used later to meld the pieces into a full image.

"You do this millions of times a day with your eyes," noted Blake. "But it's an accident, really, the two imaging schemes turned out to be nearly the same. It was in retrospect I realized the similarity of XRISP to the eye."

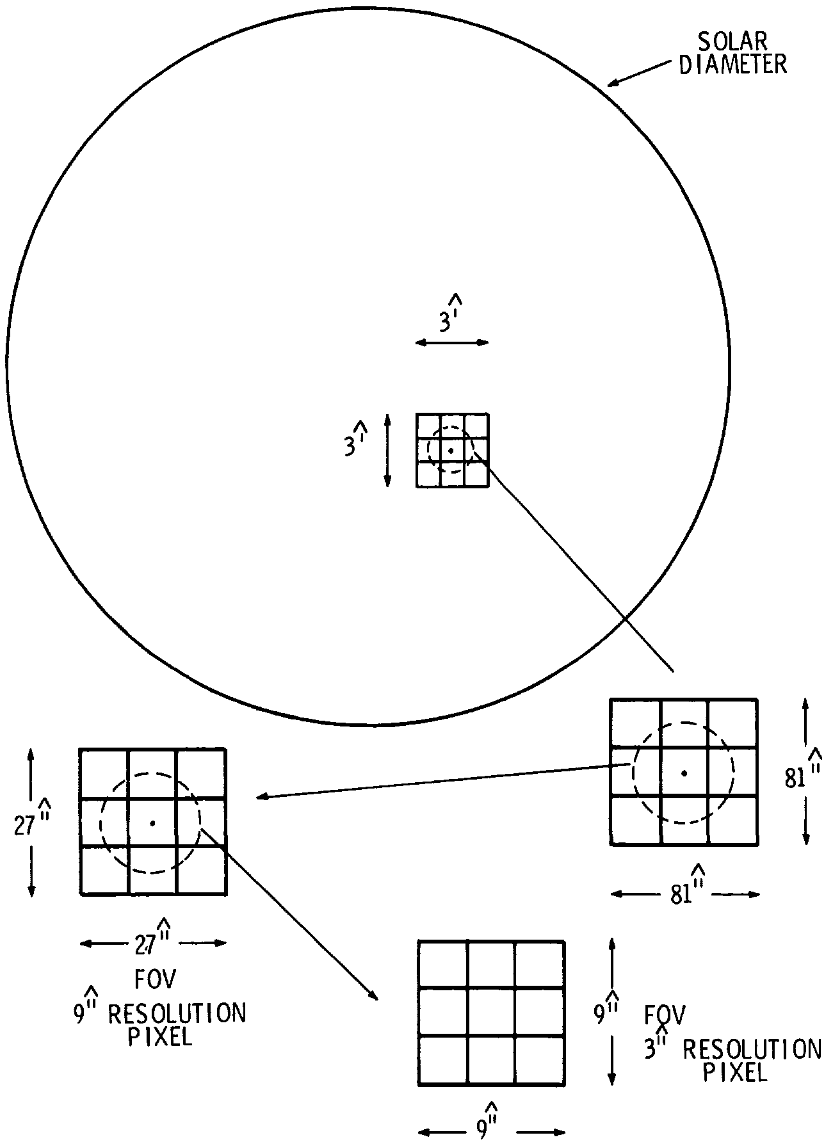
A Space Shuttle version of XRISP would have 7 spectrometers and could perform a number of tasks: spectral scanning, imaging, spectroheliograms (isolation of a certain color for the image), many-color monitoring, studies of mass motions, and polarization studies. XRISP has a great potential to study active solar regions, especially solar flares.

Solar flares, seen at the edge of the sun during an eclipse, are sudden violent eruptions in active regions where great quantities of particles, along with extreme ultraviolet and x radiation, are emitted. Those 2 kinds of radiation cause sudden changes in the ionization of the earth's upper atmosphere, with immediate disruption of short-wave radio communications. The lower atmosphere and weather can be affected through chemical, radiative, and dynamic processes.

The particles and magnetic fields that are carried out from the sun after certain flares cause compression of the earth's magnetic field. Consequences on the earth's surface can incude disruption of long-range power transmission, interference on long-distance telephone conversation, erratic behavior of oil and gas pipeline monitors, false data in mineral prospecting instruments, changes in the ozone layer, and radiation hazards to jet pilots — to list a few.

Because flares can have so many effects on our activities, researchers would like to learn more about the activity cycle in general and solar flares in particular. To this end, a simpler predecessor to the XRISP instrument has been designed. Called HXII (Hard X-Ray Imaging Instrument), it would provide images of flare-emitted hard x rays, but would not do high-reslution spectroscopy. It would reveal the locations of very energetic flare processes but would have very limited capability to diagnose the processes themselves. Blake is a member of an 8-person national team assigned by NASA to define and implement the experiment.

HXII (often pronounced as Hixie) would also go into the Space Shuttle. It could have a variety of grid imaging arrangements and could be incorporated into the 1983



This scheme of a foveal imaging system, which can search for active regions on the sun much the same as the human eye would focus on an object of interest. The maximum field of view is 3 arc minutes — enough to cover an active region on the solar disk. The central box, in each case, is imaged with 9 additional smaller channels. The process is repeated 3 times to arrive at the highest resolution: 9 channels, each with 3 arc seconds resolution.

launch data — a time of solar activity anticipated to be moderately high. HXII would be about the same size as XRISP, and would be able to make the first high resolution observations of the fine structure of nonthermal sources in solar flares.

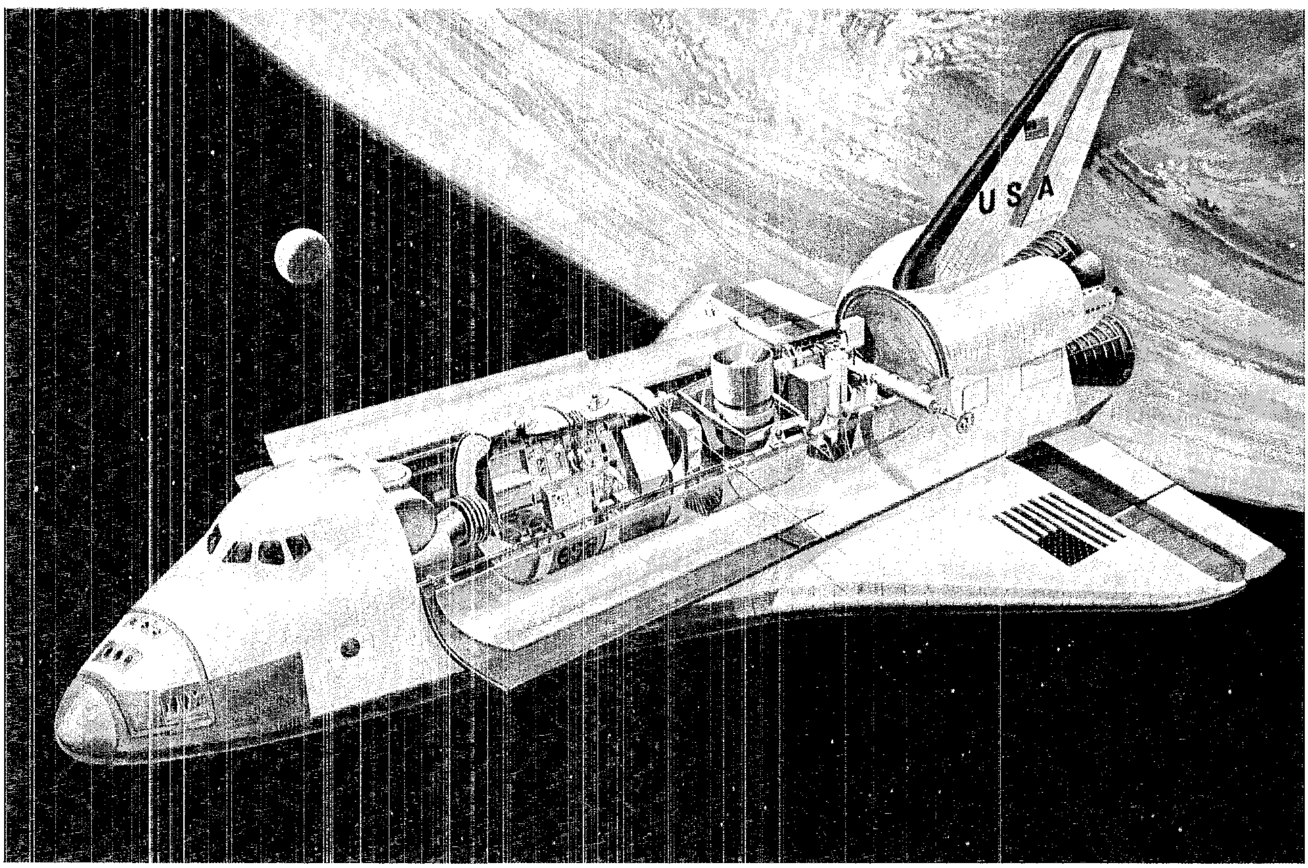
By adapting the grid configuration, HXII could make both solar and cosmic studies. It would use a xenon proportional counter to study x radiation of energetic particles, thus revealing their location and coarse characteristics of their spectrum. Radio and x-ray observations of solar flares have shown that energetic electrons appear both at the early impulsive phase and in subsequent coronal processes — where the connection with the flare needs more detailed study.

HXII would also be able to map the Crab Nebula (seen by the Chinese to break up about 900 years ago) in hard x rays with a resolution angle of 4 arc seconds. Potential study subjects would also include clusters of galaxies and the earth's aurora. The whole sun could be imaged by multiple fan beams in a grid collimator with HXII; the instrument could home in on smaller areas of activity, especially solar flares, for optimum imaging with a foveal array.

There are similarities and differences with XRISP and HXII, Blake points out. The XRISP package would be designed for high spectral, spatial, and temporal resolution of flares and active regions. The addition of crystals makes its sensitivity lower than HXII, but its versatility makes it superior for analyzing physical processes on the sun. In many regards, Blake feels, the best of all worlds would be to fly XRISP and HXII side by side. Then, HXII could provide fast imaging response, and XRISP could provide the diagnostic power to study the evolution of plasma in a solar flare.

Together, these two instruments would be the equivalent of a "Mount Palomar in space" for solar

Earth-orbiting Space Shuttle, scheduled for first take-off about 1980, could carry x-ray telescopes and other large instruments. Above our distorting atmosphere, scientists hope to detect new details about our sun and far galaxies; free-flying satellites can also be carried in the payload. The reusable Space Shuttle will take cargo and crews to operate a space laboratory and will land as an airliner after an orbiting mission, perhaps with XRISP and HXII instruments aboard. The Space Shuttle version shown here includes Spacelab, being built by the European Space Agency.



x-ray astronomy.

Typically needed for a rocket experiment are 5 to 10 man-years of effort and $500,000. XRISP would require about 50 man-years and $15 million; with such cost and effort, the best possible job of testing and calibrating instruments before flight must be carried out. This front end work is needed to avoid a rocket failure and to assure the maximum return of new knowledge for the investment.

Blake's team at LASL is known in scientific circles as one of the best in the world for test and calibration facilities. Over the course of many years, they have developed unique techniques and laboratory equipment and have assisted several other research groups in establishing their own facilities. They frequently perform crystal and collimator calibrations for other scientists, including some at LASL who are applying x-ray instruments to diagnose laser and magnetic fusion plasmas. Blake has been given the responsibility to completely test and calibrate HXII when it is built. He has already planned the system as an extension of existing rocket techniques. Performance of an x-ray collimator, for example, can be measured at LASL in a 3-meter chamber in a way superior to what has so far been done in a 300-meter chamber at a NASA center.

When this space science team is not working on priority tasks for rocket or satellite projects, they use their laboratory for relevant x-ray studies of materials. Recently they were able to measure and explain some remarkable resonances in the reflection of x rays from crystals, and analagous resonances in absorption of x rays by numerous materials in gas or solid phases. "With the help of Dwight Barrus, Ed Fenimore, Jim Bergey, and Roy Cope we have recently been able to make some really solid contributions to x-ray physics and technology," says Blake, "as well as making thorough preparations for another launch of our rocket experiment, scheduled for later this summer."

We would like to believe we know the sun; sunspots can be seen clearly, after all, when a solar image is projected onto a screen or observed in a telescope. The sun rotates on its axis, 7,200 kilometers per hour, with the equator moving faster than the poles. Many dynamic features — granules, spicules, prominences, loops, and flares — have been studied and observed.

All the while, solar radiation makes life on earth an energetic scene. Our fossil fuels stem from stored energy. Plants today depend on the sun for photosynthesis and to continue the capillary force that makes for continuous evaporation between roots and the small openings on leaves — the process that gives us oxygen to breathe.

There is still much we don't know about the sun's power, which we hold in awe when we are not taking it for granted. We discovered only recently, from British radar units facing the English Channel in World War II, that the sun is a source of high frequency radio emissions. We have come some distance, however, from Egyptian mythology of sun worship — where their heiroglyph, incidentally, most likely evolved into our christian symbol for the cross.

Moses admonished the Israelites not to worship the heavenly bodies. With XRISP and HXII, both as yet unbuilt, we can learn more about them — and of the world in which we live.

Short Subject

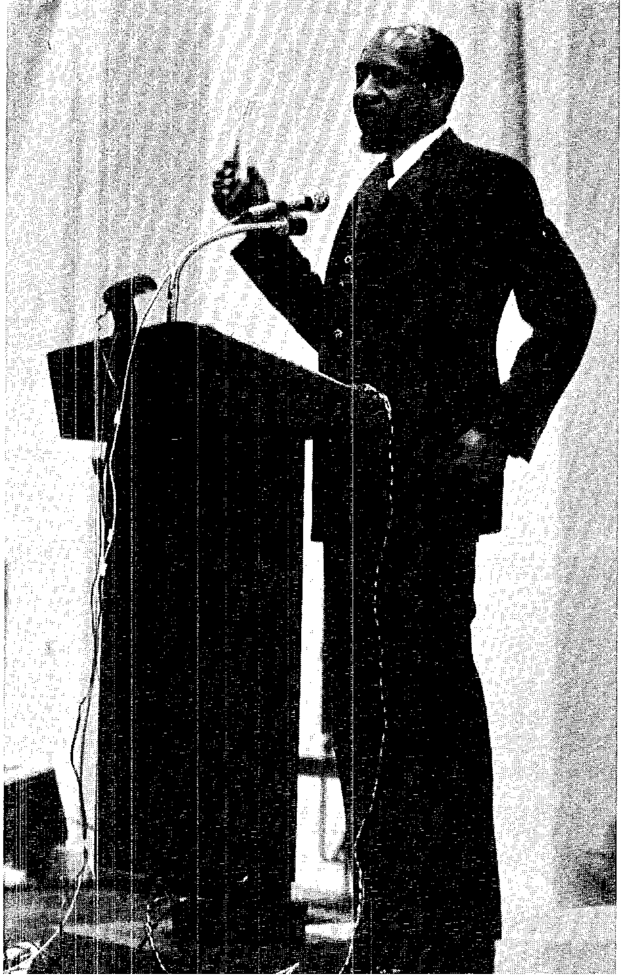
PUB 78194-1 Dir-off

Marjorie Dube, secretary to LASL Director Harold Agnew, creates a familiar pose in her normally busy work day. She retired recently and was honored with a party in Fuller Lodge.

PUB78196-9
Dir - OPA

Jean Davis, one of the Laboratory's EEO officers, was treated to a surprise party to recognize her 35 years of service to LASL. Looking at her hiring sheet is Robert Thorn, associate director for weapons. Jean and guests enjoyed a large cake made to resemble an EEO work form, and several gifts were presented to the long time employee.

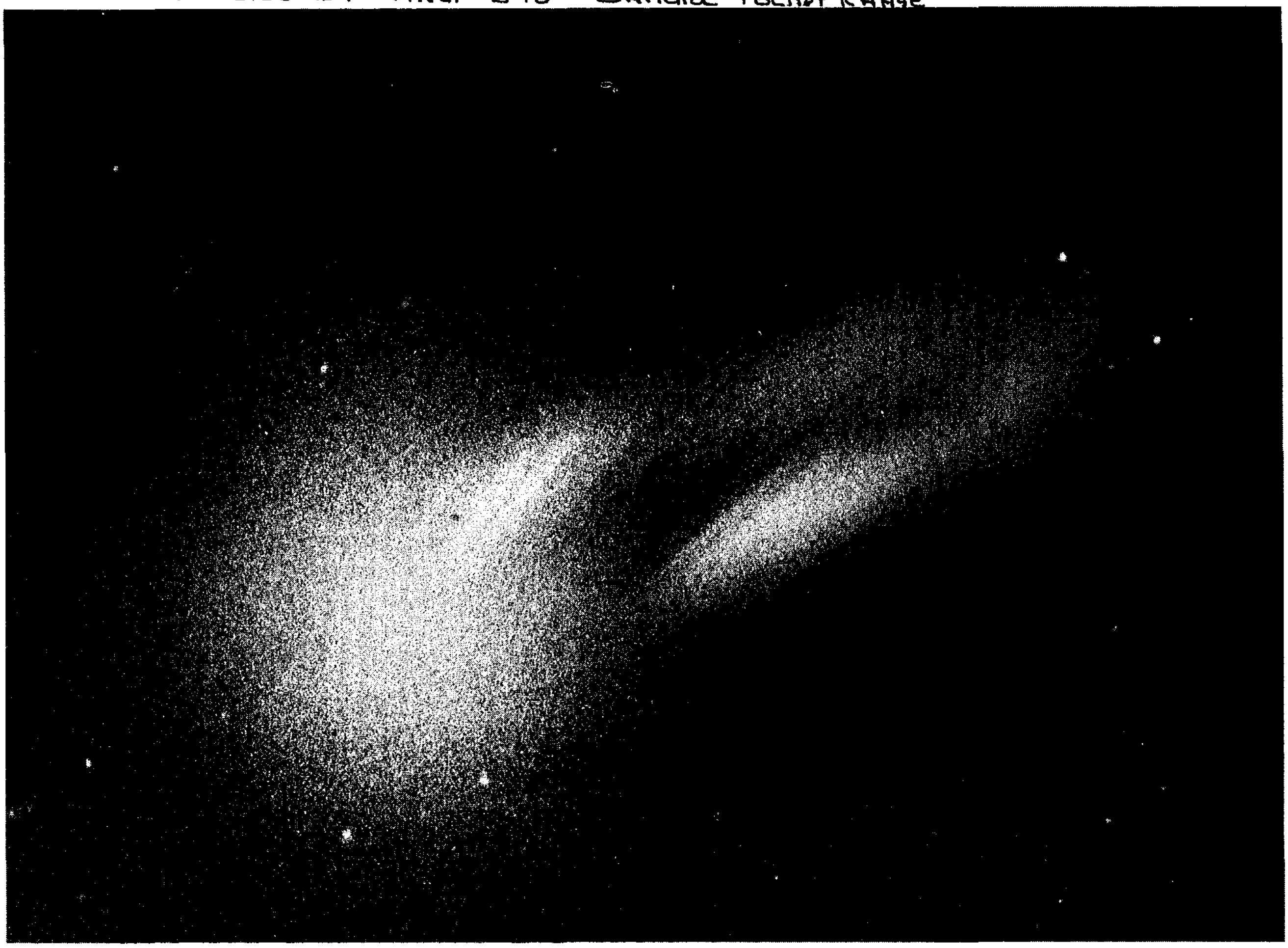
Conf. Fusion: Conf. ANS: PUB78175-3



Jim Mayl, assistant to Robert D. Thorne, Assistant Secretary for Energy and Technology in the Department of Energy, gave the opening keynote remarks to begin the 3-day Technology of Controlled Nuclear Fusion conference in May in Santa Fe. The topical meeting was sponsored by the American Nuclear Society's Trinity Section, the American Nuclear Society Division of Controlled Nuclear Fusion, the DOE offices of Fusion Energy and Laser Fusion, and Electric Power Research Institute.

Painting The Sky

PVB 78188 -109 Filed: J-10 Sandia Rocket Range



The rocket payload was detonated high above the Nevada desert, and the pink and green barium release was visible to millions of viewers in the western part of the United States.

By Johnnie Martinez

The early morning darkness of the Nevada sky was painted a delicate green and pink on 2 occasions last May with the launching of Avefria Uno and Avefria Dos — both probes of the ionosphere conducted by the Laboratory's atmospheric sciences and optical physics (J-10) group.

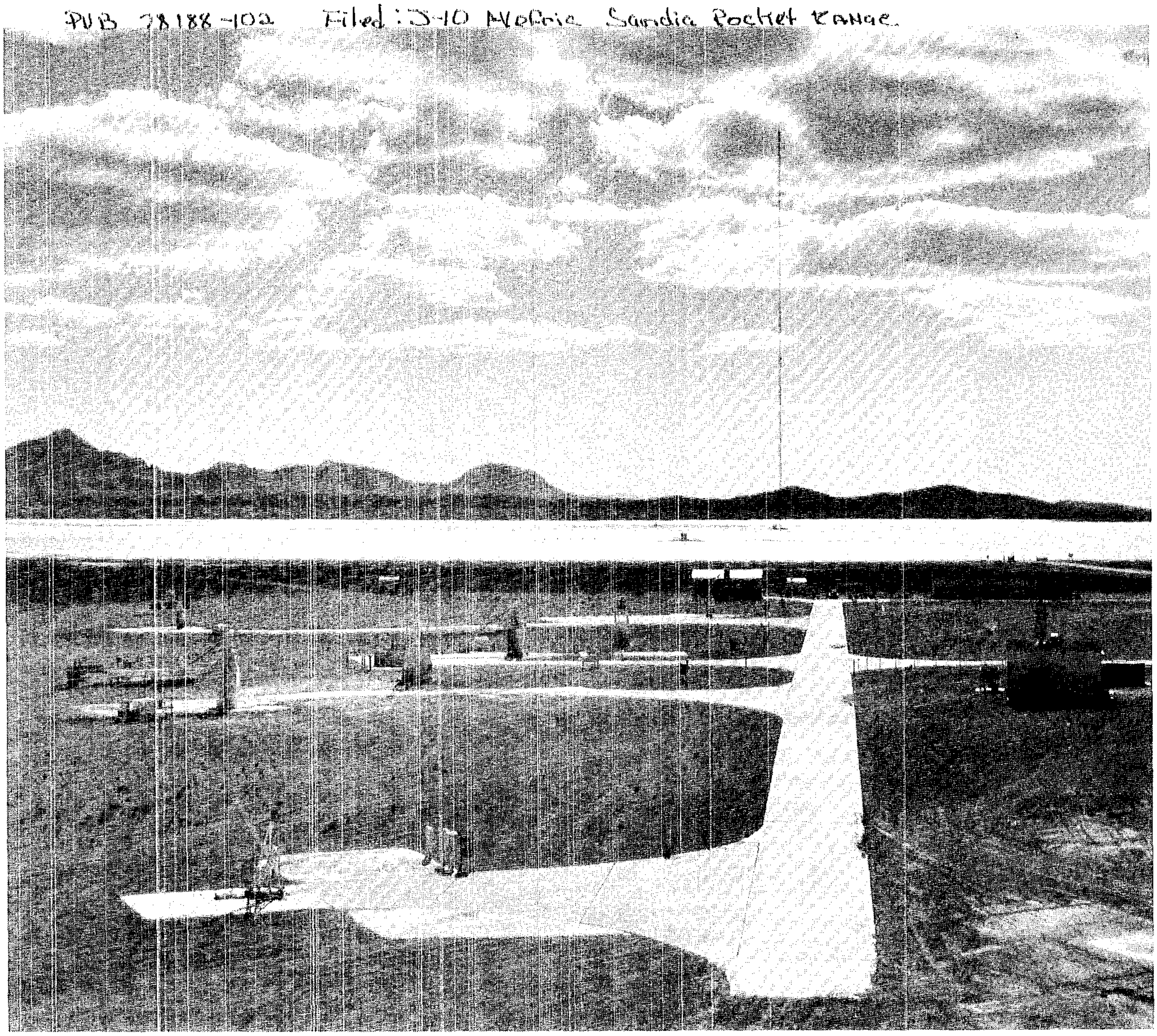
Avefria (Spanish for lapwing) was the latest in a series of high-altitude experiments fielded by J-10. Unlike previous experiments, which were conducted from such distant locations as the Pacific Missile Range in Hawaii and from Poker Flats, Alaska, the 2 rocket-borne probes were launched from the Tonopah Test Range, a Sandia Laboratories of Albuquerque-operated facility near Tonopah, Nevada.

Like other atmospheric probes in which ionized barium was used to "paint the sky" for ground-based observation stations, Avefria produced an eerie display of pink and green light that hung as a cloud that slowly dissipated in the desert sky and was visible over much of a 5- or 6-state area.

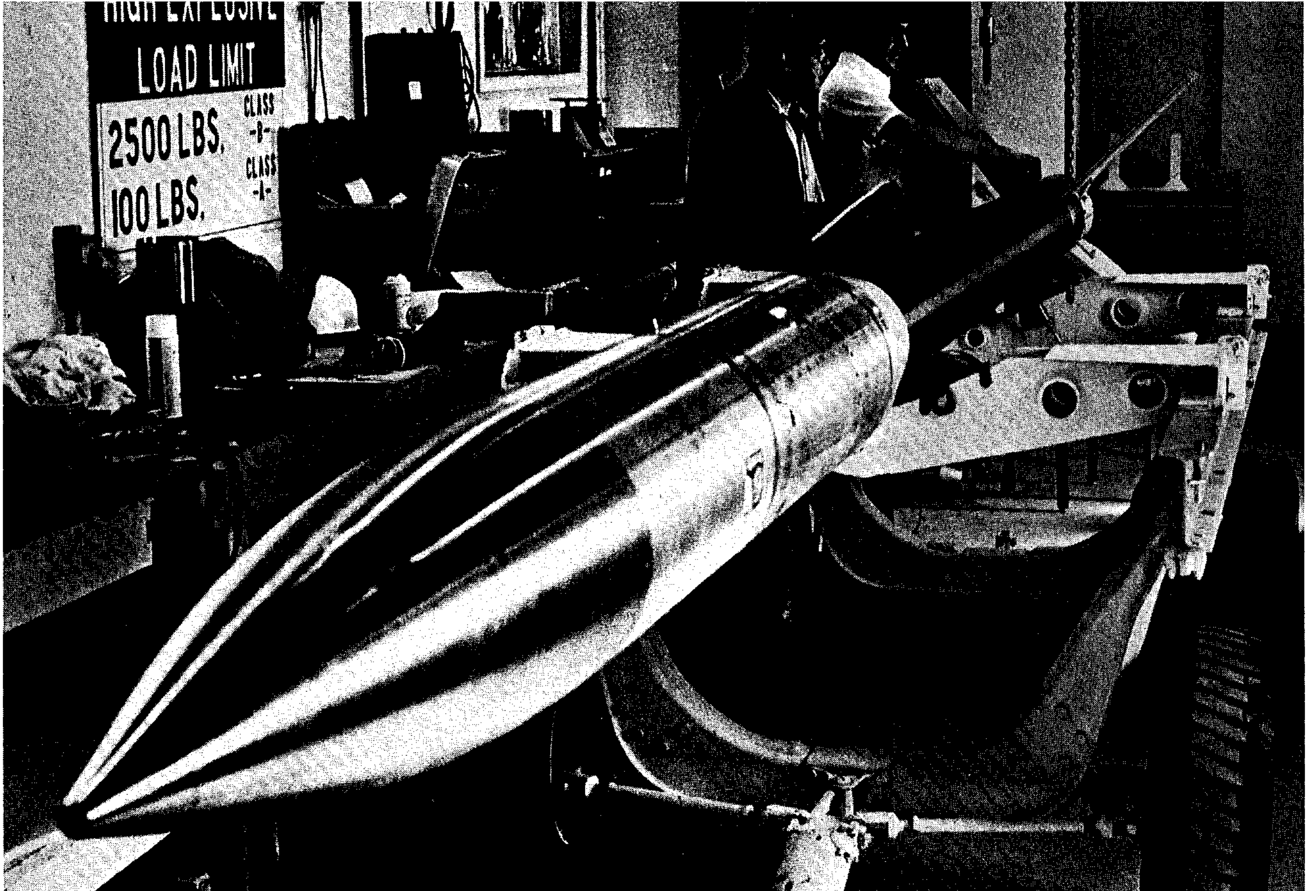
The experiments, funded jointly by the Department of Energy and the Defense Nuclear Agency (DNA), were designed to perturb the ionosphere and enable scientists from LASL and a number of other organizations to study the properties of ionospheric irregularities and their effects upon radio communications.

Both experiments were designed to be carried to an altitude of about

PUB 78188-102 Filed: J-10 Avefria Sandia Rocket Range



The Tonopah Test Range was site of Avefria Uno and Dos shots.



PVB 78188-8 Filed: J-10 Avefria Sandia Rocket Range

195 km on Nike-Tomahawk-12 rockets assembled and launched by Sandia Laboratories personnel. The fast-traveling sounding rockets carried payloads containing shaped-charge barium-cone assemblies provided by LASL's design engineering (WX) division.

The rocket launches were scheduled for approximately 4:45 a.m. Pacific Daylight Time – a time at which the early morning sun would illuminate the barium cloud released by the payload's detonation. During the release, and for the duration of the cloud's visibility, optical tracking stations located near Los Angeles, California at the Jet Propulsion Laboratory's Table Mountain Observatory and at 4 scattered sites in central Nevada recorded the barium cloud's interaction with the ionosphere as it was pulled apart.

In addition to the optical diagnostics fielded by LASL and Technology International Corporation, a variety of communications-propagation experiments were conducted by SRI International and the University of Texas Applied Research Laboratory.

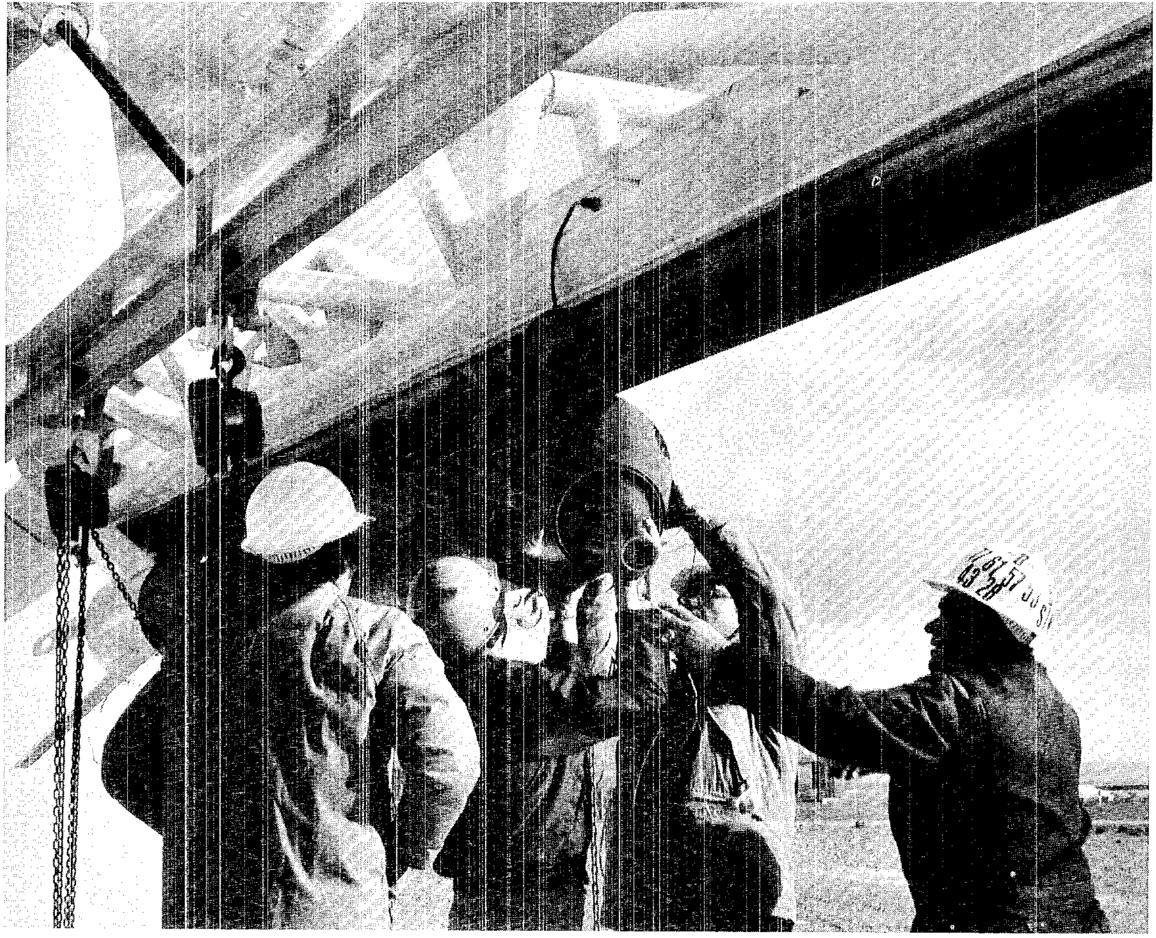
The launch dates were scheduled to occur from May 6 through May 20, a period of time when the moon would not be present during the early morning hours to complicate optical observations.

Weather conditions in the launch area and over the observation stations had to be at an optimum for both range safety and optical reasons. Both launchings were delayed several days each because of weather problems that produced winds in the launch area or clouds over the observation stations.

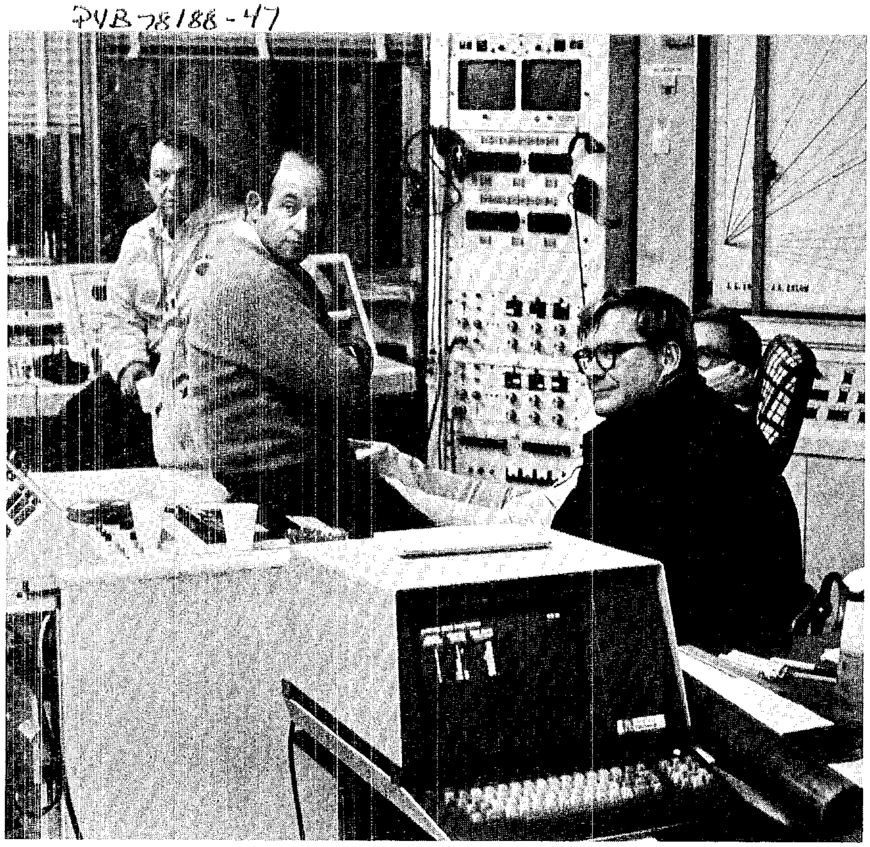
Avefria Uno was eventually launched May 8 and Avefria Dos followed on May 18. J-10 experimenters, many of whom were involved in a rocketborne chemical injection last year over the Hawaiian Islands, found themselves battling unseasonably cold, windy weather during an exhausting work schedule that called for them to man their respective stations during the wee hours of the morning.

Chris Johnson, right, of LASL, and a Sandia researcher helped prepare the rocket and its payload.

The glowing, green cloud produced by the experiments was a highly visible indication of the success of the experiments that are adding to man's knowledge of the distant, but critically important, ionosphere.



Sandia Laboratories personnel begin to assemble parts of the rocket.

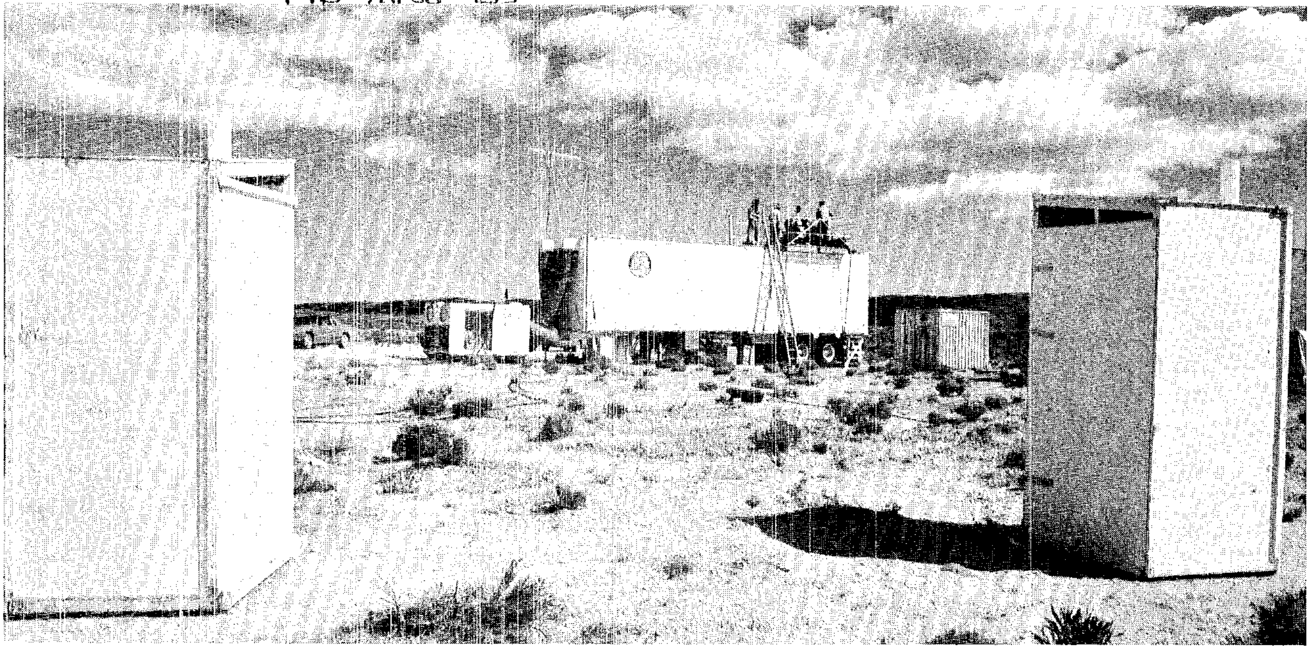


LASL researchers, from left, Morris Pongratz, Guy Barasch, Bob Jeffries, and Gordon Smith, put in many hous in the control room area for both Avefria shots.

PVB78188 - 132 Filed: J-10 Avefria Sandia Pocket Range

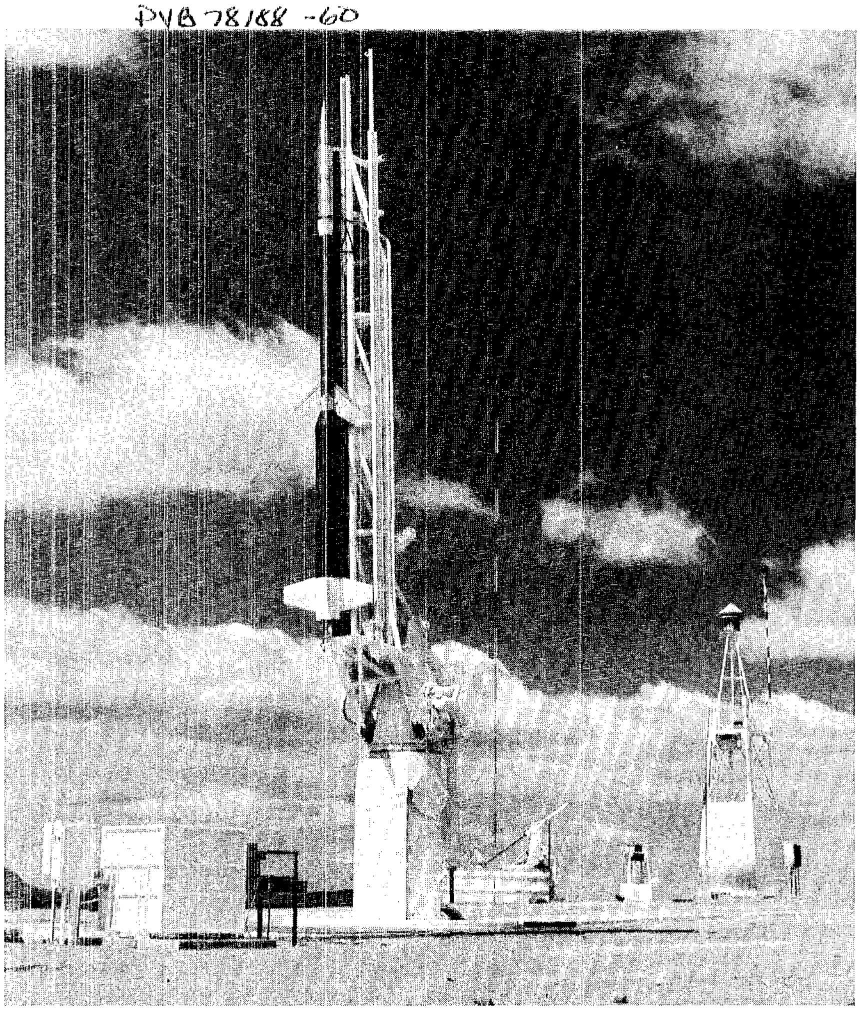
Al Beldring, right, and Bob Carlos, center background, assist other Avefria participants in setting up a camera station before the test.

PVB 78188 -133



Stations to monitor and record photographically the barium test were set up throughout the test range.

PVB 78188 -60



The rocket carrying the test payload is ready for launch at the Tonopah test range.

Snow Slows Sun Day Activities

Los Alamos Scientific Laboratory participated in nationwide Sun Day activities in May, after the heavy snow stopped falling.

There were some anxious moments, as the snow threatened to dampen the spirit of the observance of the sun as an energy source. Activities were scheduled in Los Alamos and in Santa Fe, and were only a little delayed, as the sun finally broke through the clouds.

Laboratory facilities such as the National Security and Resources Study Center, and the solar mobile modular homes were opened to the public. Guided tours were offered.

PVB 78207-21 Filed: Special Events "Sun Day" 5/3/78

Heavy snowfall caused a temporary uncertainty about Sun Day activities.

This Laboratory employee, one of 16 who received their degrees from the University of New Mexico in ceremonies in May, shakes hands with Richard Taschek, associate director for research at LASL.

16 Graduate From UNM

Sixteen Los Alamos Scientific Laboratory employees received their degrees from the University of New Mexico at UNM's second convocation in Los Alamos in May.

Fourteen LASL employees and area residents received 2-year Associate of Science degrees at the convocation.

Keynote speaker for the convocation was UNM Provost McAllister Hull, Jr. Other speakers included Charles Browne, LASL associate director for Administration, and Richard Taschek, associate director for research.

Receiving degrees were Alvin R. Larson, L-5, Ph.D.; Robert R. Butcher, AP-2, M.S.; Anne C. Demuth, P-14, M.S.; Georgia T. Fritz, WX-2, M.S.; Flavio Gurule, P-DO, M.S.; Kay A. Hansborough, C-4, M.S.; Clifford Huggins, CDC, M.S.; Jerry Lopez, E-1, M.S.; Michael T. Lynch, WX-7, M.S.; Daniel J. Osetek, H-5, M.S.; Patricia Rose, E-5, M.S.; R. David Sachs, M-1, M.S.

Also, William B. Hutchinson, CMB-1, B.S.; Joseph E. Nasise, CMB-3, B.S.; Michael A. Nicolini, ENG-2, B.S.; and Thomas Zaugg, CTR-3, B.S.

Receiving A.S. degrees were Joseph R. Bradley, E-2; John F. Flemming, Jr., E-1; John Patrick Gonzales, Q-3; Richard A. Harlow, WX-3; Ronald Harrison, MP-8; Joseph L. Lowery, CMB-11; Jerom Romero, WX-5; Michael A. Salazar, E-1; Vicente D. Sandoval, CMB-11; Dennis Shampine, M-6; and John E. Valencia, L-1.

Area residents receiving A.S. degrees included Rudolph Polaco, Peter J. Walsh, and Robert L. Williford.

10 Years Ago

Culled from the June, 1968 Files Of
The Atom* and *Los Alamos Monitor

By Robert Y. Porton

HONOR

Samuel Glasstone, a consultant to the Los Alamos Scientific Laboratory since 1952, has been selected as the recipient of the Authur Holly Compton Award for 1968. The award was presented to Glasstone at the annual meeting of the American Nuclear Society in Toronto, Canada, June 11 by Raemer E. Schreiber, LASL technical associate director and retiring ANS president. The recognition is given periodically for outstanding contributions in fields of science and engineering. It was established in 1966 in honor of the late Dr. Compton, who received the 1927 Nobel Prize in physics.

TEST

LASL has announced that the most powerful nuclear rocket reactor yet developed by the Laboratory was tested yesterday at Jackass Flats, Nevada. Phoebus 2A was the 12th Los Alamos designed and developed nuclear rocket reactor to be tested since the first of the Kiwi series in July, 1959. Local scientists estimated that Phoebus 2A would produce more than 4,000 megawatts of power.

MOVIE

Film crews, representing Bavarian Education TV Networks, West Germany, and RAI Corporation Italian Radio TV System, were at Los Alamos this week to visit LASL. Photographs taken by the West German unit will become part of a television program entitled "A Look Into the Future of Nuclear Energy." Footage taken by the Italians will be used in a series of 5 one-hour television programs called "The Future of the Atom," which will be broadcast over the entire Italian system.

APPOINTMENTS

Harold M. Agnew, weapons division leader at the Los Alamos Scientific Laboratory, and Frank C. DiLuzio, former area manager for the Atomic Energy Commission in Los Alamos from 1952 to 1957, have been named to the Aerospace Safety Panel of the National Aeronautics and Space Administration. DiLuzio is currently president of the Reynolds Electrical and Engineering Co., Inc. (REECO), performing test support services at the Nevada Test Site.

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Among Our Guests

PVB 78151-9 Visitors: Evelyn Oberg

Evelyn B. Oberg, state director of the Department of Treasury's Savings Bonds Division, visited the Laboratory recently to stress employee participation in the Savings Bonds program. Meeting with her are, left, David L. Moore, Public Relations Department head, and Charles Browne, associate director for administration at LASL.

Joseph DiMarco, left, CTR Division, explained the workings of the ZT-40 experiment to several visitors who toured Los Alamos during an American Nuclear Society meeting the second week of May. This torroidal A-pinch apparatus, under construction, will tell scientists more about the behavior of ionized gases under magnetically-induced heat and pressure. About 60 ANS conferees came by bus to learn more about LASL fusion projects.

PVB 78177-25 Filed: Visitors: ANS

LASL photographers took many of the print awards at the 19th annual conference of the Industrial Photographers of the Southwest recently in Albuquerque. Winning the IPSW national award for outstanding contributions to photography was Bill Jack Rodgers, left, PUB-1. Rodgers also won 2 first place awards and 1 second place award. Other winners, left to right, back row, are Ralph Burton, ISD-7, a first place; Eric Johnson, ISD-7, a third place; Julie Grilly, M-DO, a first place; Fred M. Rick, ISD-7, a third place; and Bob Brewer, ISD-7, a second place. Seated, left to right, were W.L. Headdy, ISD-7, who won a first place and best of show for his photograph of the ZT-40 toroidal pinch; and Leroy Sanchez, CMB-11, who won a second and third place award. Henry Ortega, ISD-7, not pictured, won second and third place awards.