

Goddard Scientists Calculate Specific Mass of "Mystery Particle"

by Rande Exler



CHIU

Goddard scientists have developed a method to calculate the mass of one of the least understood elementary particles in the universe—the electron neutrino.

Ramifications of this study may help explain "missing" mass in the Universe that scientists have not been able to account for using existing observational data.



KONDO

So little is known about neutrinos that theorists have dubbed them "mystery particles." What is known is that neutrinos are stable particles with no electric charge that are created in the course of nuclear reactions. These particles are so small that they are referred to in terms of mass rather than size. Neutrinos have so little mass—which usually is measured in terms of weight—that they are measured in terms of electron volts instead of grams.



CHAN

Drs. Hong-Yee Chiu, Code 610.1, and Yoji Kondo, Code 684, of Goddard and Dr. Kwing L. Chan, an Applied Research Corporation scientist working

at Goddard, Code 610.2, say that the rest (not moving) mass energy of a neutrino is approximately 3 eV (electron volts). The rest mass serves as a reference point because, like all matter that is constantly moving, the neutrino mass increases with speed, especially when travelling near the speed of light.

Supernova 1987a

"The detection of a neutrino burst from Supernova 1987a, which is the first clear

detection of neutrinos from outside the solar system, provided valuable information on the rest mass of the electron neutrino," explained Chiu.

"Our calculations show that the probability that 3 eV is the correct mass of the electron neutrino is 97 percent," he said. "If the 3 eV value is confirmed by future experiments, the neutrino is the least massive object known."

"It would take the combined mass of 150,000 neutrinos to equal that of one electron," he added. Electrons are energy-charged particles that form part of all atoms.

When the core of a star collapsed—followed by a subsequent explosion which created Supernova 1987a in a neighboring galaxy, the Large Magellanic Cloud—a countless number of neutrinos were created and hurled to Earth at almost the speed of light. Although billions of neutrinos harmlessly passed through the planet, according to Kondo, these elementary particles are so elusive and interact so rarely with other matter that only twelve were revealed by the giant detectors at the Kamiokande II proton decay experiment in Kamioka, Japan and eight by the Irvine-Michigan-Brookhaven (IMB) experiment near Cleveland, OH. One reason neutrinos were able to pass through the planet is because their interaction with other particles is so weak.

Energy Levels Vary

The detected neutrinos carrying different amounts of energy reached Earth at slightly different times—during a 6 second period at IMB and a 13 second period at Kamiokande II. Most of the science community reasoned that if neutrinos have mass, the most energetic particles should arrive first and those that follow should have decreasing amounts of energy.

The Goddard team concluded from available data that the neutrinos did not reach Earth in order of sequential descend-

ing amounts of energy. This may mean that the neutrinos were not all created at the same time, according to Chiu. In other words, some of the neutrinos may have been created and emitted during the initial collapse of the star, and some of the neutrinos may have been created and emitted during the subsequent cooling processes.

To determine the rest mass, Chiu, Kondo and Chan coupled the neutrino data for all possible pairs and performed an energy vs. time-of-arrival correlation analysis on the data sets. Their analysis is based on the dispersion of the arrival time of the neutrinos and the energy levels measured.

Continued on page 2

INSIDE

ENGINEER OFFERS FRESH APPROACH TO CREATIVE THINKING

PAGE 6



HAPPY THANKSGIVING

Goddard Marks 10th Anniversary of GAS Program with Fourth Annual Symposium and Hardware Exposition

by David Thomas

Goddard marked the 10th anniversary of NASA's Get Away Special (GAS) Program with the fourth annual GAS Symposium and a hardware exposition last month. Approximately 30 hardware displays and 25 papers were presented from experimenters who have flown or who are slated to fly GAS payloads aboard the Space Shuttle.

The symposium provided a forum for exchanging information within the GAS community on experimental results and plans, as well as on engineering and safety lessons learned during the early years of payload operations and flight.

The hardware exposition allowed past and present experimenters to display their hardware as well as to view the present GAS hardware. Graphic displays of hardware also were available.

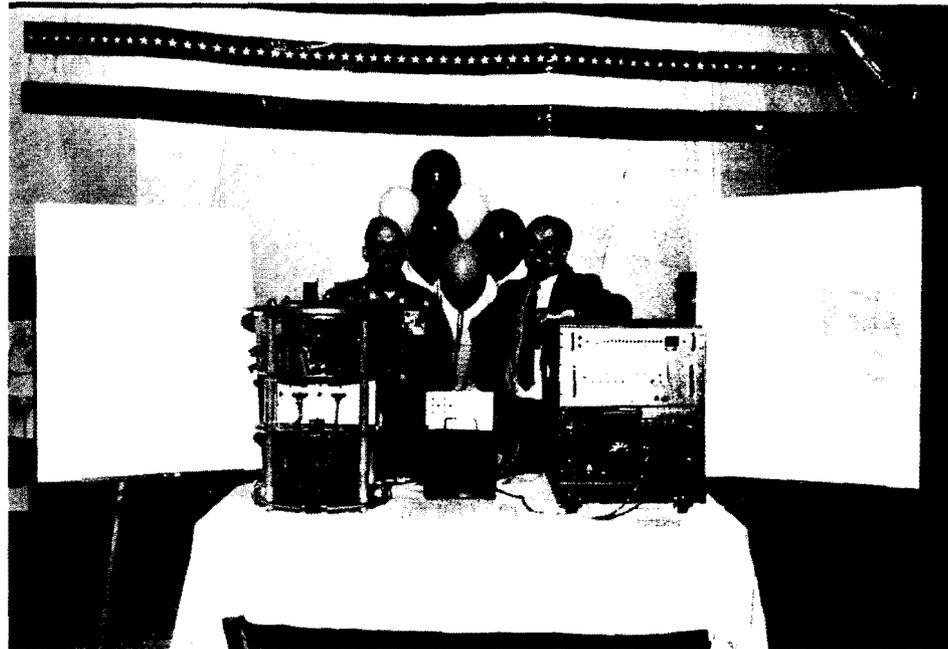
More than 300 people attended the symposium and exposition, which was open to all users, domestic and foreign. The meet-

ing included a day and a half of presentations, culminating in a panel discussion with technical and administrative personnel from the GAS program. Craig Covault, Senior Space Technology Editor, *Aviation Week and Space Technology*, was the keynote speaker for the event.

NASA's GAS program affords individuals, groups and organizations an opportunity to buy space on a Shuttle to conduct scientific experiments. Experiments are housed in small, self-contained canisters and placed in the orbiter's cargo bay. The canisters, available in two-and-a-half and five-cubic-foot sizes, hold 60, 100 and 200-pound payloads, and cost \$3,000, \$5,000 and \$10,000, respectively.

Fifty-three GAS canisters have flown to date. Goddard manages the program for NASA. Larry Thomas is the technical liaison officer for the GAS program at Goddard; George Gerondakis is Goddard's GAS mission manager.

PHOTO: RANDY FRISCH



HARDWARE EXPOSITION—Ken Meese, Code 683.1 (left) and Jim Houston, Code 683.2 (right) were among the Goddard participants at the fourth annual Get Away Special (GAS) Symposium last month in the Building 8 Auditorium. Pictured is the Orbiter Stability Experiment (OSE), a GAS experiment slated to fly on a shuttle at a later date. The OSE was built at GSFC by Code 680 and will attempt to measure the high-frequency variation of the shuttle's orientation due to vibration that may be present in the orbiter's structure during routine in-flight operations.

"Mystery Particle"

Continued from page 1

"Missing" Mass

The Goddard study may someday help explain "missing" mass in the Universe, according to Kondo. The behavioral properties of the galaxies require a certain amount of mass which scientists have not been able to detect.

Even though the mass of a neutrino is so small, these particles may account for this undetected mass because their number is so great. Using the value of 3 eV for the neutrino mass energy, Chiu and Kondo estimate that the Universe may have at least 20-times greater mass in neutrinos than in matter.

The Chiu, Kondo, Chan study will be published in the May 1, 1988, *Astrophysical Journal*.

Neutrino Facts

- The star which collapsed and created Supernova 1987a emitted 10^{58} neutrinos within a few seconds. This is about ten times the number of protons, neutrons and electrons in the Sun.
- The interaction of neutrinos with other matter is so weak that even though approximately three thousand trillion neutrinos passed through the 7,000-cubic-meter Irvine-Michigan-Brookhaven experiment, only eight were detected.
- Billions of neutrinos passed through the Earth and possibly had a harmless interaction with every person on the planet.



DIAL 286-NEWS

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NASA Pipeline

JOHNSON SPACE CENTER, Houston, TX — The Manned Flight Education Foundation, Inc. announced recently that it will create a world center at Johnson to chronicle the continuing story of manned space flight. Walt Disney Imagineering will design the new center, which is scheduled to open in early 1991.

AMES RESEARCH CENTER, Moffett Field, CA — Ames has entered negotiations to award a \$16,184,800 fixed-price contract to Continental Construction Corp., Las Vegas, NV, for construction of an Integrated Test Facility (ITF) to support testing of advanced aircraft and their complex, interdependent systems. The new facility will allow NASA to significantly reduce aircraft systems checkout time and costs, since researchers will be able to integrate all systems in a controlled manner while they are being tested rather than being limited to separate systems checkouts. When completed, the ITF will be the only site in the free world that offers complete systems checkout and testing capability in one fully equipped facility. The ITF can accommodate up to six different aircraft at once.

MARSHALL SPACE FLIGHT CENTER, Huntsville, AL — Representatives of space agencies in Europe and Japan, NASA officials, U.S. astronauts, designers and potential users of the permanently manned Space Station met at Marshall recently to participate in a Space Station laboratory workshop.

Workshop attendees toured full-scale engineering mock-ups of the U.S. laboratory module and habitation module to see firsthand what living and working in the Space Station will be like.

JET PROPULSION LABORATORY, Pasadena, CA — An antenna design expected to play a key role in NASA's mobile satellite experiment (MSAT-X) program has been successfully tested by JPL engineers. Mounted on the roof of an automobile, the antenna, during an extensive test, locked onto the INMARSAT satellite in geosynchronous orbit over the western Pacific Ocean. It's believed to be the first time a steerable antenna mounted on a passenger vehicle has tracked an in-orbit satellite. A mobile satellite communications system would extend mobile telephone service to a whole new community of users, including forestry personnel, ships at sea, planes in flight and other wide-ranging land transportation systems.

NATIONAL SPACE TECHNOLOGY LABORATORIES, Bay St. Louis, MS — The third acceptance-test firing of Space Shuttle main engine number 2027 was conducted recently at NSTL. While initial data following the 520-second test indicated that the engine performed normally, there were indications of a potential leak in the oxidizer heat exchanger. The potential heat exchanger leak is being analyzed by NASA and its prime contractor for the main engines, the Rocketdyne Division of Rockwell International. Unless it turns out to be a generic condition affecting other engines, this problem is not expected to affect the STS-26 scheduled launch.

HEADQUARTERS, Washington, DC — NASA has announced recently the selection of three firms for negotiations leading to parallel contract awards to perform the first of a two-phase systems definition study for a proposed unmanned, cargo-carrying launch vehicle. The first study phase, valued at approximately \$1.5 million for each of the firms, is expected to require four months to complete. The new vehicle, named the Shuttle-C (for cargo), would have a lift capability of 100,000 to 150,000 pounds to low-Earth orbit, giving the U.S. space program a launch vehicle with two to three times the payload capability of the present Space Shuttle. The firms selected by NASA are: Martin Marietta Manned Space Systems, New Orleans, LA; Rockwell International, Space Transportation Systems Division, Downey, CA; and United Technologies Corp., USBI Booster Production Company, Inc., Huntsville, AL.

FIFE Project Concludes First Year Measurements

by Carter Dove

A team of approximately 100 scientists—including a group from Goddard—recently concluded its first year of field measurements over the Konza prairie area near Manhattan, KS, in a major NASA-managed effort to understand how the Earth's vegetation influences climate and weather.

Known as FIFE—First Field Experiment of the International Satellite Land Surface Climatology Project—the results of its measurements “should lead to significantly improved weather forecasts and better predictions of long-term climate trends,” according to Dr. Forrest Hall, Code 623.

Hall, along with Dr. Piers Sellers of the University of Maryland and Dr. Ghassem Asrar of Kansas State University, was the coordinator of the project.

Their team spent 60 days throughout the spring, summer and fall of this year in a 86-sq.-mi. (225-sq.-km.) natural prairie tract—last of the great tall grass areas—near Manhattan in central Kansas.

During four intensive field campaigns, the FIFE science teams came to the prairie to measure daytime patterns of visible, infrared and microwave radiation; moisture and heat flux; and carbon dioxide and other gas fluxes—using hand-held, truck and aircraft-mounted instruments.

The FIFE data set, consisting of about 1,000 computer tapes, has been assembled at Goddard on the Laboratory for Terrestrial Physics data system, for access by the FIFE science community.

Hall said that FIFE scientists will be analyzing this data over the next two years, participating in workshops and reporting results at various symposia, as papers become available.

FIFE is scheduled to continue through 1989.

**See your name
in print!**

Mail your story to the Goddard News
(Code 130), or call the Editor at
286-7277.

Mixed Fleet MANIFEST Through 1990

Space Shuttle					
Flight	Date/ Orbiter	Primary Payload	Flight	Date/ Orbiter	Primary Payload
26	6/2/88 <i>Discovery</i>	TDRS-C	36	12/7/89 <i>Atlantis</i>	DOD
27	9/8/88 <i>Atlantis</i>	DOD	37	3/9/90 <i>Columbia</i>	GPS-2 SYNCOM IV-5
28	12/1/88 <i>Columbia</i>	DOD	38	3/29/90 <i>Discovery</i>	STARLAB
29	2/2/89 <i>Discovery</i>	TDRS-D	39	4/26/90 <i>Atlantis</i>	DOD
30	4/27/89 <i>Atlantis</i>	Magellan	40	6/4/90 <i>Columbia</i>	GRO
31	6/1/89 <i>Discovery</i>	HST	41	7/2/90 <i>Discovery</i>	DOD
32	6/29/89 <i>Columbia</i>	ASTRO-1	42	8/2/90 <i>Atlantis</i>	TDRS-E
33	8/24/89 <i>Atlantis</i>	DOD	43	8/31/90 <i>Columbia</i>	SKYNET-4A EURECA-1L
34	10/9/89 <i>Discovery</i>	Galileo	44	10/5/90 <i>Discovery</i>	Ulysses
35	11/9/89 <i>Columbia</i>	GPS-1 IBSS			

Expendables		
Date	Launch Vehicle	Payload
1/88	Delta 181	DOD-2
3/88	Scout S-206C	San Marco-D1
5/88	Scout S-212C	ITV-2
5/88	Atlas 63E	NOAA-H
8/88	Delta 183	DOD-3
8/88	Scout S-213C	SOOS-3
10/88	Atlas Centaur 68	FLTSATCOM-F 8
2/89	Delta 184	COBE
2/89	Scout S-214C	SOOS-4
3/89	Atlas 50E	NOAA-D
5/89	Scout S-215C	ITV-3
8/89	Scout S-210C	NOVA-II
2/90	Delta	ROSAT
2/90	Scout S-218C	TRANSIT-27
3/90	Atlas Centaur	GOES-I
5/90	Scout S-216C	ITV-4
6/90	Atlas Centaur	CRRES
6/90	Atlas 34E	NOAA-I
8/90	Scout S-211C	TRANSIT-28
12/90	Atlas Centaur	GOES-J

Glossary			
ASTRO	Ultraviolet Astronomy Telescope	ITV	Instrumented Test Vehicle
COBE	Cosmic Background Explorer	MAGELLAN	Venus radar mapping satellite
CRRES	Combined Radiation Release Experimental Satellite	NOAA	National Oceanic and Atmospheric Administration
DOD	Department of Defense	NOVA	Advanced Navy Navigation Satellite
EURECA	European Retrievable Carrier	ROSAT	Roentgen Satellite
FLTSATCOM	Fleet Satellite Communications	SAN MARCO	NASA/Italian Earth physics satellite
GALILEO	Jupiter probe	SOOS	Stacked U.S. Navy Navigation Satellites
GOES	Geostationary Operational Environmental Satellite	STARLAB	DOD Spacelab
GPS	Global Positioning System	SYNCOM	Hughes Geosynchronous Communication Satellite
GRO	Gamma Ray Observatory	TDRS	Tracking and Data Relay Satellite
HST	Hubble Space Telescope	TRANSIT	Navy Navigation Satellite
IBSS	Infrared Background Signature Survey	ULYSSES	Formerly International Solar Polar Mission

Goddard Payload Is First To Fly in '88

NASA recently issued a new, mixed fleet manifest reflecting primary payloads for Space Shuttle missions through 1990 and expendable launch vehicles (ELVs) through 1995. A Goddard-managed Tracking and Data Relay Satellite (TDRS-C) will be the sole payload on Flight 26, the first post-Challenger flight.

In addition, Goddard has primary payloads—or plays a major role in primary payloads—on ten of the nineteen shuttle missions and eight of the ELV missions scheduled through 1990. For this time period, two Goddard-managed Delta rockets will serve as launch vehicles.

Goddard's payload involvement is in addition to its regular Shuttle duties of managing the world-wide tracking network and serving as the hub of the Agency's communication's operations.

Among the secondary shuttle payloads to fly will be Goddard's Shuttle Solar Backscatter Experiment (SSBUV). The SSBUV will fly on Flight 29 with TDRS-D in February 1989, according to the Project Manager Ernie Hilsenrath. Secondary payloads are formally scheduled 12 months in advance.

The manifest reflects the high priority assigned to major science payloads. In 1989, five NASA science missions, some with international cooperation, will be launched. Four will fly on the Shuttle.

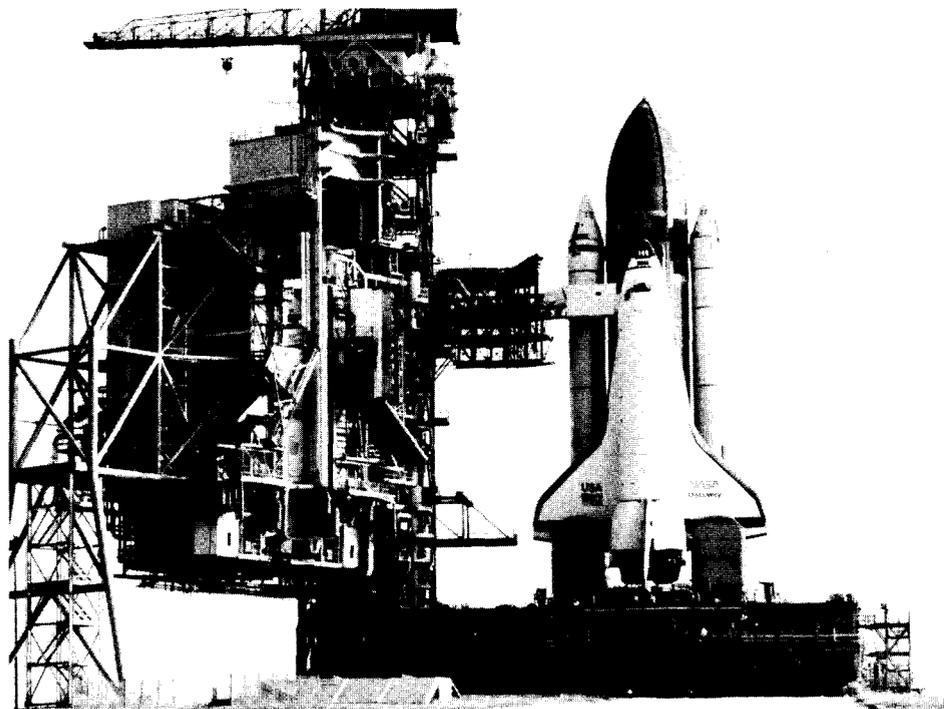
The four Shuttle missions include—Magellan, which will map Venus with high-resolution radar, in April; Hubble Space Telescope (HST), one of NASA's highest priorities and a cooperative project with the European Space Agency (ESA), in June; ASTRO-1, a Shuttle-born ultraviolet observatory, also in June; and Galileo, a cooperative project with Germany to make the first comprehensive survey of Jupiter and its moons, in October.

In addition, the Cosmic Background Explorer (COBE), a Goddard-managed mission to investigate the Big Bang theory of the origin of the universe, is planned for launch on a Delta in February 1989. NASA also will accelerate deployment of other space science missions by fully utilizing ELV's.

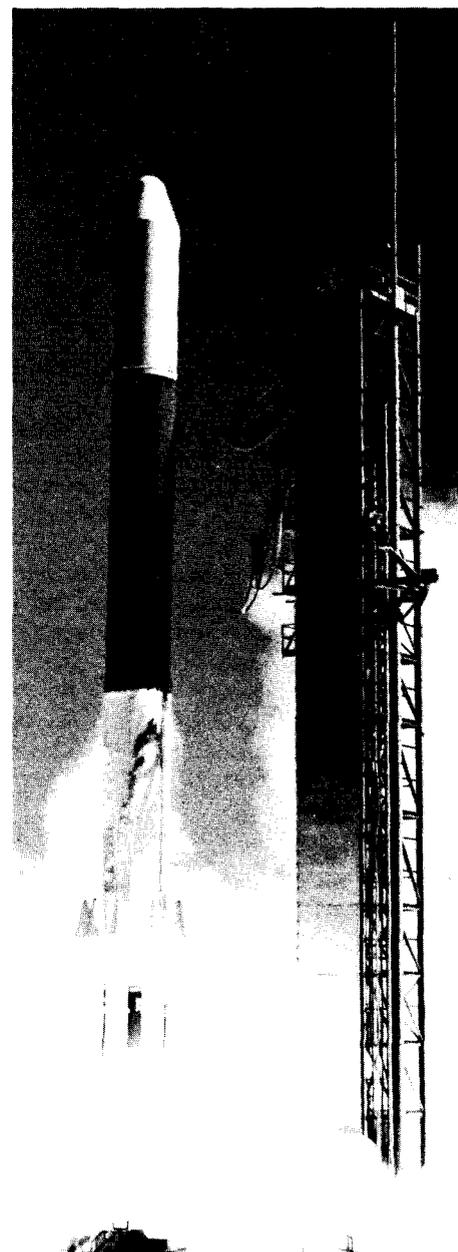
Following are shuttle missions in which Goddard will be involved with payloads; included is the flight number, date and payload, respectively:

Flight 26, June 2, 1988, TDRS-C; Flight 29, February 2, 1990, TDRS-D; Flight 30, April 27, 1989, Magellan; Flight 31, June 1, 1989, Hubble Space Telescope; Flight 32, June 29, 1989, ASTRO-1; Flight 34, October 9, 1989, Galileo; Flight 38, March 29, 1990, STARLAB; Flight 40, June 4, 1990, Gamma Ray Observatory; Flight 42, August 2, 1990, TDRS-E; Flight 44, October 5, 1980, Ulysses.

Following are ELV emissions through 1990 in which Goddard will be involved with payloads; included is the date and payload, respectively: March 1988, San Marco-D1; May 1988, National Oceanic and Atmospheric Administration (NOAA)-H; February 1989, COBE; March 1989, NOAA-D; February 1990, Roentgen Satellite; March 1990, Geostationary Operational Environmental Satellite (GOES)-I; June 1990, NOAA-I; December 1990, GOES-J.



SHUTTLE LAUNCHES—Beginning with Flight 26 on June 2, 1988, the Space Shuttle Discovery is scheduled to fly seven missions through October 1990. Nineteen shuttle missions are scheduled in the new manifest.



DELTA LAUNCHES—Goddard will manage two of the five Delta launches scheduled on the Expendable Launch Vehicle manifest issued by NASA Headquarters recently.

Engineer Offers Fresh Approach to Creative Thinking

by David Thomas

Nearly 30 years ago, Jim Kerley decided "enough was not enough" and started teaching his kids a newer math than the "new math" being taught in the schools. Actually, what he began teaching was not new math but rather a "fresh approach" to the thinking process.

Seven years ago, he brought the fresh approach to Goddard and began teaching a class to engineers titled "Creative Design, Invention and Research." Recently, he lectured on his new method to an advisory group to Dr. William Bennett, Secretary of Education.

The fresh approach is based on the natural processes of thinking, namely, induction and deduction. His approach is unique, however, not because it presents problems to be solved by deductive or inductive logic, but because it combines the two.

Testimonies from all beneficiaries have been laudatory.

"The greatest benefit I got," said one of the engineers here who took his class, "is how to approach any problem and get a solution that fits the circumstances of the problem."

Kerley, 66, has been an engineer at Goddard for the past 15 years, but has invented for industry and government. He said he holds about 24 patents. He has a civil engineering degree from Dartmouth, and has worked for Vitro, Litton, Westinghouse and Lockheed; he also has owned his own engineering company but gave it up after four years.

"You can't run a business right and do a lot of inventing at the same time," he said.

Methods Adopted

Between the time he started tutoring his kids and teaching engineers here, Kerley's new way of thinking and problem solving has been adopted effectively by local teachers in "home schools" and accepted by engineering organizations at home and abroad who've heard him lecture on the subject.

A tutor who currently uses his method recalled her success in helping two students who once struggled pitifully with math in grade school, but who now make the highest grades in a private high school.

PHOTO: RANDY FRISCH



FRESH APPROACH—Jim Kerley has been teaching Goddard engineers "Creative Design, Invention and Research" for seven years. Eleven engineers recently participated in this training. Pictured are Jim Kerley (standing) and Joe Generie. Kerley's approach combines deductive and inductive logic.

In addition, Kerley has hundreds of letters, from local, national, and international groups, attesting to the effectiveness of his fresh approach to creative thinking.

But even before he began tutoring his kids, Kerley was developing college students' creative talents as professor of civil engineering at George Washington University.

"I've been studying the philosophy of science all my life," Kerley said. "My approach to inventing is psychological, as well as philosophical, and this is very evident in my classes."

Kerley said that it is important to teach more about the thinking process because it forces people to use their brain more. "People are so used to having their problems solved for them," he said.

But the many seeds he's planted over the years are starting to sprout now, in that most of his five children are teaching, to some degree, he said. One is an engineer. And, he said, last year one of his daughters was "one of the three leading teachers in the state of Maryland."

Castor-IVA Rocket Failure Cause Found

by Carter Dove

Goddard officials announced late last month that scale model tests conducted by Morton Thiokol at their Huntsville, AL, plant, successfully duplicated a Castor-IVA solid rocket motor failure experienced in August 25. The Castor-IVA motor, under development by Morton Thiokol, will be used to increase the lift capacity of the Delta expendable launch vehicle.

The failure occurred in the motor because of staple holes left in a thin membrane of insulation known as a "stress relief flap" located between the main propellant and the front end of the motor. At motor ignition, propellant—which filled the holes during the manufacturing process—burned through the flap into the main propellant and ignited localized areas which then burned back through the flap holes in an intense jet of flame, causing burn-through of the front end of the motor.

Scale model tests have demonstrated this process, including ignition of the fuse, creation of the flame jet and case burn-through.

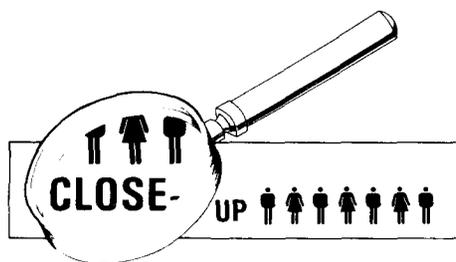
Program engineers subsequently have developed new procedures which preclude the use of staples for stabilizing the stress relief flap during the application of insulation to the motor casing. The new procedure uses the natural tackiness of insulation in its pre-vulcanized state. The use of the staples at any time during the manufacturing process has been eliminated.

William A. Russell, Jr., Delta Project Manager at Goddard, said, "The tests confirm our hypothesis and establish the failure cause beyond any doubt." Russell also said that the rocket motor test failure is not expected to have an adverse impact on the Delta launch schedule, because near-term Delta missions use the current Castor-IV motors.

Retirees

Best wishes to the following Goddard employees who retired recently!

	CODE	YEARS
Dinn, Beverly	151.1	36
Dubach, Leland L.	612	21
Leyh, Frederick	730	32
Smor, Paul	501	36
Tebay, Jack C.	683.2	18
Tochunko, Hubert F.	717.4	30



QUANN

The American Astronautical Society (AAS) recently elected Deputy Director **JOHN J. QUANN** as a Fellow of the Society. This highest-ranking level of membership was awarded in recognition of Quann's significant contributions to astronautics. The awards ceremony was held in conjunction with the 34th Annual AAS Symposium in Houston, TX. Deputy Director for space station



BROWNING

RONALD K. "RON" BROWNING also participated in the symposium. Browning served on the Automation and Robotics for the Space Station Panel. His topic was: "Flight Telerobotic Servicer and Platforms View."

Goddard's Fitness Lab held its Annual Fall Picnic recently to celebrate the running of the 24th Intercenter Run. During the awards ceremony, the following individuals and teams received trophies for the two-mile event: **MARK BAUGH**, First Male Finisher; **AMY KEKEISEN**, First Female Finisher; Code 511's **SPEED AND SNOOZE**, First Team; and **CAC FLEET OF FEET**, Team With Most Finishers.

DAVE HARRIS has accepted the position of manager, Space Network Operations, NASA Headquarters, effective October 25. Harris joined Goddard in 1959 and formerly was chief, Flight Mission Support Office. In his new position, he manages the operations of the TDRSS Program, which includes space operations, the White Sands, NM ground terminal elements and Goddard's Network Control Center. Also, he is the primary user interface at the program level.

Don't Miss Your Chance To Transfer — FERS Open Season Ends December 31

It's time to make up your mind about retirement systems. The Federal Employees Retirement System (FERS) transfer open season ends on December 31, 1987.

The FERS and Civil Service Retirement System (CSRS) plans are quite different. FERS is more like a private sector plan because benefits come from a modified Civil Service pension, Social Security, and a tax-deferred savings plan. The CSRS is a less complicated plan—benefits are derived from a Civil Service pension and an option to participate in a tax-deferred savings plan.

The CSRS plan is not portable and generally suits those who intend to work a full career with the Federal government and retire at age 55 with 30 years of service, or age 60 with 20 years of service. The FERS plan may be more attractive for those who plan to leave the Federal government before they are eligible to retire or otherwise wish to keep their options open.

The decision to remain in the CSRS or transfer to the FERS is one that shouldn't be taken lightly since it will impact your future financial security. To arrive at the decision you will need to assess both your and your spouse's career plans, goals, social security status and current financial position. Along with these assessments, consider the following factors:

- Do you intend to stay with the Federal government until retirement? If so, at what age do you think you would retire?
- Whether or not you stay with the Federal government, how long do you intend to work?
- Have you earned any Social Security quarters of coverage? If so, how many?
- Will your spouse be eligible for Social Security benefits based on his or her work history?
- Do you intend to work after retirement?
- Will you contribute to the Thrift Savings Plan? If so, how much?
- Will you be able to achieve tax savings by contributing to the Thrift Savings Plan?
- Will the differences in disability and survivors benefits between CSRS and FERS have an impact on your benefits?

The FERS Transfer Handbook distributed to employees last summer addresses these and other factors to consider if you are thinking about transferring to the FERS. Remember, that once you transfer officially to the FERS, the decision *cannot* be changed. If you have any questions about transferring to the FERS, call the FERS HOTLINE at x62779.

COPE Provides a Sympathetic Ear for Troubled Goddard Employees

Everyone has problems. Family conflicts, drug or alcohol abuse, or emotional difficulties are often easier to handle when there is someone to talk to, especially if that someone is a trained psychologist. Tom Strange, representative of the COPE program at Goddard, encourages troubled civil servants to call him for an appointment to talk things through.

The Center for Occupational Programs for Employees, or COPE, is a function of Goddard's Employee Assistance Program (EAP). Employees can be referred to the program by their supervisors, or make an appointment on their own. About 20% of the participants are referred by their supervisors, while the other 80% are self-referred, according to Strange.

COPE is a confidential program. For employees who contact COPE themselves,

no information is provided to their workplace. When an employee comes to the COPE program through a supervisory-mandated referral, general information regarding the employee's participation is provided to the supervisor only after the employee signs a release of information form.

One of the main objectives of the program is to identify and provide short-term counseling and resolution assistance; longer-term problems are referred to resources in the employee's community based on the nature of the problem.

For employees who need counseling before or after working hours, COPE also maintains an office in the Greenway shopping center. For more information about COPE, call Tom Strange at the Health Unit, x6666.

Second Phase of Visitor Center Renovation Begins

by Randee Exler

The Visitor Center's (VC) Hall of Satellites closed for renovations last month and is expected to reopen its doors in March. This latest VC renovation is the second and final phase of a total facelift for the facility.

When the ribbons were cut for the VC's Hall of Space Exploration a year ago October, employees, families and friends got to take a look at exhibits on current and

future projects of the Nation's space program. This latest section to be renovated will have a more historical perspective.

"We want our Visitor Center to be a place where people come to learn about NASA and Goddard programs," said Public Affairs Specialist Sheila Stanford who is overseeing the VC renovation.

"Renovating the VC is not just an attempt to update the exhibits, but will make

it more enjoyable and educational through the use of interactive displays," she explained.

Exhibit areas will be framed by space station-like structures. One exhibit will feature Dr. Robert Goddard, the rocket pioneer for whom our Center is named. Another display is about the people at Goddard and the kinds of work we do. An area called "How Do We Study Space Science?" will explain how we get data from space.

The Gemini 12 capsule and a full-scale mockup which visitors can sit in are featured in an area called "How Do We Use Spacecraft?"

A special section explains the role of other NASA centers, and how we work together as a team.

Other interactive displays include a computer game on building your own spacecraft and an ATS-3 satellite transmitter/receiver site where visitors, during certain hours, can hear their voices relayed via satellite.

Repeat visitors will recognize some of the old displays, such as the International Ultraviolet Explorer (IUE) prototype and data feed from the satellite. The Vanguard and Delta models are among the old models worked into new exhibits.

A current events corner will highlight Goddard research. The theme will be Supernova 1987a when the Visitor Center reopens.

During the renovation, the Hall of Space Exploration and the auditorium will remain open. The VC will continue to feature model rocket launches on the first and third Sunday of each month at 1:00 p.m. and will host other public programs.

When the renovation is complete, visitors should leave the VC with a better understanding of the importance of the national space program and of the major role played by the people of the Goddard Space Flight Center.



PHOTO: MARGIE SMALL

GEMINI 12—Former Astronaut James A. Lovell, Jr. visited Goddard recently and stopped by the Visitor Center to see the Gemini XII spacecraft which carried him and Edwin E. "Buzz" Aldrin in near-Earth orbit from November 11-15, 1966. This final Gemini mission made 59 revolutions around the Earth, lasted 94 hours and 34 minutes, and carried 14 scientific experiments. Lovell, currently Group Vice President of the Centel Corporation, Chicago, also flew on Gemini 7 and Apollo 8 and 13. The Gemini 12 capsule will be displayed alongside a full-scale mockup in which visitors can sit and "fly" when the Visitor Center renovation is complete this spring.

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Executive Editor... James C. Elliott
Managing Editor... Randee Exler
Senior Editors... Michael Braukus,
Carter Dove,
Joyce Milliner and
Carolynne White

