

IN REMEMBRANCE



Michael Smith



Francis 'Dick' Scobee



Ronald McNair



Ellison Onizuka



Christa McAuliffe



Greg Jarvis



Judy Resnik



'The best we can do is remember our seven astronauts — our Challenger Seven'

— President Reagan

THE explosion. Then the disbelief. Then the search for debris — and for answers. Then, finally, a period of national mourning mingled with a pledge to carry on.

This is how the events unfolded in the tragedy of the space shuttle Challenger. The story is told by the Houston Chronicle in this special section of articles, photographs and graphics. Reports from Florida, New Hampshire, Washington, D.C., and the Houston area are included in a chronological presentation of excerpts from last week's editions.

Each page begins with a short excerpt from one of President Reagan's speeches last week, including his Friday speech at the Johnson Space Center.

The special section is published as a public service, so that a dark episode in America's quest for knowledge can be documented and remembered.

'They . . . slipped the surly bonds

Scobee started career as mechanic

HOUSTON, Jan. 29 — Francis R. "Dick" Scobee, commander of Challenger, began his aviation career as a grease monkey with dirt under his fingernails — working on airplanes instead of flying them.

Lacking desire and money for a college education, Scobee worked briefly for the Boeing Co. in Seattle before joining the Air Force in 1957 as a mechanic on propeller-driven airplanes.

Scobee was born May 19, 1939, and he said his fascination with airplanes began during his childhood in Auburn, Wash.

"That's why I ended up working on them," he once said in an interview.

While in the Air Force, Scobee, 46, attended night school in San Antonio and later graduated from the University of Arizona with a degree in aerospace engineering. He completed officers candidate school and then talked his way into pilot's school.

Scobee flew a combat tour in Vietnam and became an Air Force test pilot.

The next step was to fly in space.

"Along came the astronaut program, and I signed up for



Scobee

The astronaut profiles on these pages were written by Tom Moran of the Chronicle staff.

it," Scobee said.

"When you find something you really like to do and you're willing to risk the consequences of that, you really probably ought to go do it," the pilot said.

NASA hired Scobee in 1978.

Scobee took his first shuttle flight on April 6, 1984, as the pilot of the Challenger on what was the most ambitious shuttle mission to that point — the capture and repair of the faltering sun-watching Solar Max satellite.

He was to command Challenger again Tuesday.

He was carrying a computer disk from Texas A&M University education students, having developed a keen interest in an honors program for math and science teachers at the university.

On the subject of the shuttle carrying the first private civilian into space, teacher Christa McAuliffe, Scobee had said, "My perception is that the real significance of it, and especially a teacher, is that it will get people in this country, especially young people, expecting to fly in space," Scobee said in an interview.

Scobee was married to the former June Kent of San Antonio. They had two children, Kathie and Richard.

J.R. felt she had best job in world

HOUSTON, Jan. 29 — Judith A. Resnik always played down her role as America's second woman in space.

She said it was more significant that the United States had launched a large number of people into space before her.

"I think the major significance of my being on this flight is not so much that I'm the second woman," she said, "but that I am the 40th or 45th, or whatever the number is, American astronaut to go on the space shuttle in a period of a couple of years and how far we've come in a few years."

After her first space flight in 1984, Resnik went back home to Akron, Ohio, to accept the accolades.

"I think astronauts probably have the best jobs in the world," she told her audience during a speech on Oct. 18, 1984.

It was her last public appearance in her hometown.

Resnik, 36, applied for a job as an astronaut while looking for a way to broaden her career as an electrical engineer. But, she didn't think she had much of a chance.

As it turned out, she was among the first female astronauts selected by NASA in 1978. By being named to fly on the initial flight of the shuttle Discovery in August-September 1984, she became America's second woman, after Sally Ride, to fly in orbit.

Resnik, who enjoyed being called by her initials, "J.R.," said she never hesitated to pursue an engineering career despite the few women in the field.



Resnik

"I was always good in math and science and I liked it. Maybe I liked it because I was good in it. As I went through high school, I liked that better than the arts, so I decided to be a math major," she recalled.

She later changed her degree plan to engineering to give her more flexibility. She also was a classical pianist.

After graduation from Carnegie-Mellon University in 1970, she joined RCA, where she worked as a design engineer on phased-array radar control systems, and provided engineering support for NASA sounding-rocket and telemetry-systems programs.

In 1974, Resnik joined the National Institutes of Health in Bethesda, Md., as a biomedical engineer and staff fellow, doing research on the physiology of visual systems.

"You could see where engineering principles could be applied to other types of problems, to the human system. You could analyze the system not as a doctor would or a scientist, but as an engineer," she said.

In 1977, Resnik received her doctorate in electrical engineering from the University of Maryland.

She had taken a job as a systems engineer in product development with the Xerox Corp. in 1978 when she learned she was accepted to the astronaut corps.

She was Jewish, but preferred to keep her religious beliefs private.

Before her first space flight, a Jewish publication asked her to talk about her religious background. She declined the interview, telling her father she did not want to be thought of as a woman astronaut or a Jewish astronaut, "just another astronaut, period."

Onizuka felt the Earth was fragile

HOUSTON, Jan. 29 — On the official records, he was Lt. Col. Ellison S. Onizuka, U.S. Air Force, test pilot and astronaut. To his friends and neighbors, he was simply El.

Onizuka was one of the class of astronauts selected in 1978. A native of Kealahou, Hawaii, he was a chief of the engineering support section of the Air Force test pilot school at Edwards Air Force Base, Calif.

His flight on the Challenger was his second aboard a shuttle. His first was a year ago on a flight of the shuttle Discovery. That flight, which had an all-military crew, launched a secret Defense Department intelligence satellite into orbit.

After that flight, Onizuka, 39, said he and his fellow crew members saw the Earth as something fragile that needed to be protected. "We saw no lines out there, no divisions separating countries," he said at a banquet in his honor in Hawaii. "We had the opportunity to see the Earth as one."

He was a committee member for the Houston Livestock Show and Rodeo. He carried several show flags into space during his flight and gave them to show officials after his return.

He and his wife, Lorna, belonged to the same Buddhist youth group in Hawaii, but got better acquainted during their



Onizuka

college days in Colorado. They have two children, Janelle, 16, and Darien, 10.

Onizuka had said he developed an interest in aircraft and aviation "pretty early" and by his later years in elementary school already was being inspired by the Mercury space-flight program that began in 1959.

His jobs on the mission that ended in tragedy Tuesday would have included helping to deploy a satellite to form part of a shuttle communications network and another to study Halley's comet.

In an interview earlier this month, he said, "I'll be looking at Halley's comet. They tell me I'll have one of the best views around."

Onizuka said he hoped to keep participating in NASA space program flights.

"There's no cut-off age for astronauts," he said. "I enjoy what I'm doing right now and hope to continue as long as I can contribute to the program."

A neighbor, Barbara Spencer, described Onizuka Tuesday as just a regular guy. She recalls seeing him early one morning last month taking down the Christmas lights on his house. "He said he had to hurry because he didn't have much time," she said.

She said Onizuka never expressed concern about the flight but that he joked about the liftoff of Discovery. He said Discovery vibrated soon after liftoff. "I wanted to turn around and go back," she quoted him as saying.



Steve Campbell / Chronicle

The First Baptist Church choir sings from behind a semicircle of seven flags at a memorial service.



Lydia Mae Cornelieus kneels with her rosary at a mass honoring the seven Challenger astronauts at

of earth to touch the face of God'

McAuliffe planned to keep journal

HOUSTON, Jan. 29 — Sharon Christa McAuliffe viewed her flight on the space shuttle Challenger as "the ultimate field trip."

McAuliffe, 37, was the Concord, N.H., teacher who won out over 11,000 other educators for the chance to be the first private citizen to fly in space.

"This is a chance to prove that an ordinary person's perspective is just as important as a scientist's perspective," she said last summer a few days after beginning her training at the Johnson Space Center.

She taught her students in her social studies classes that to truly understand history one must also understand the feelings and perceptions of the people who lived that history. Her chance to fly on the shuttle was McAuliffe's



McAuliffe

chance to tell people of those perceptions and feelings.

What she hoped to accomplish as a teacher in space, she said during the competition, was "to de-mystify NASA and space flight. I want students to see and understand the special perspective of space and relate it to them."

McAuliffe planned to keep a journal on the flight and to teach two lessons, using a television hookup from Challenger to hundreds of schools on the ground. "I wanted to do something I felt comfortable with," she explained. "And in my classes, I have always emphasized how important ordinary people are — how important journals are in understanding history."

She found herself in the center of a media whirlwind in July after the National Aeronautics and Space Administration selected her for the flight. Her hometown newspaper had a one-word headline — "Wow!"

When she returned to Concord after the announcement in Washington, there was a parade down Main Street.

For Jarvis, a new kind of right stuff

HOUSTON, Jan. 29 — Gregory Jarvis was one of the new breed of astronauts who began going into space as shuttle travel became almost routine.

Jarvis was not a hotshot jet jockey. He was not even a government employee.

He was an engineer for Hughes Aircraft Co. where he worked on a variety of sophisticated satellite designs.

He was one of a group of astronauts who fly under a program that allows major shuttle customers to send employees on space missions to operate equipment.

In some ways, Jarvis is the prototype of the men who will eventually conquer space. If the Mercury astronauts were like Daniel Boone pushing back the frontier, Jarvis and future astronauts like him will be like the farmers who settled the new lands.

Earlier astronauts proved they had the "right stuff" by pushing experimental jet fighters to the limit. Jarvis proved he had what it took by designing communication satellites in a laboratory.

Jarvis was assigned to the crew of the ill-fated shuttle



Jarvis

Challenger to conduct six days of orbital experiments in fluid dynamics to figure out better ways to build satellites.

Jarvis, 41, a native of Detroit, described himself before the launch as a "workaholic" and said he eagerly awaited his chance to fly in space.

"You get very comfortable that for any contingency they know what to do, so I feel very, very comfortable," he said. "I'm excited but not nervous."

He had been assigned to two earlier shuttle flights but each time he was bumped so that an influential congressman could ride.

A spokesman for the Hughes Aircraft Corp. confirmed Jarvis was to have been aboard two previous missions — one in April 1985 on which Sen. Jake Garn, R-Utah, became the first congressman in space, and the other in December that carried Rep. Bill Nelson, D-Fla.

Jarvis graduated from State University of New York in 1967 with a degree in electrical engineering. He earned a master's degree from Northeastern University.

In July 1969, he joined the Air Force and was assigned to the Space Division at El Segundo, Calif., specializing in advanced tactical communications satellites.

Jarvis was married to the former Marcia Jarboe and was the father of three children.

Pilot Smith on first shuttle flight

HOUSTON, Jan. 29 — Michael J. Smith survived a year as a Navy aviator in Vietnam attacking some of the most heavily defended airspace in history. He was killed in what everyone expected to be a routine flight of the space shuttle Challenger.

It was his first flight as an astronaut.

Smith, the pilot of the craft, was one of the most experienced pilots in the astronaut program. He had logged more than 4,300 hours in 28 different kinds of aircraft.

Smith, 40, born in Beaufort, N.C., earned a bachelor of science degree from the Naval Academy in 1967 and a master's degree in aeronautical engineering from the U.S. Naval Postgraduate School in 1968.

Married to the former Jane Jarrell and the father of three children, he held the Navy Distinguished Flying Cross, three



Smith

Air Medals and the Vietnamese Cross of Gallantry with Silver Star.

After earning his master's degree, Smith completed jet training in 1969 and was assigned to the advanced jet training command where he served as an instructor from May 1969 through March 1971.

During the next two years, he flew A-6 Intruders and completed a Vietnam cruise assigned to the aircraft carrier USS Kitty Hawk.

In 1974, Smith worked on cruise missile guidance systems at the Strike Aircraft Test Directorate at Patuxent River, Md., and went on to serve as a Navy test pilot instructor.

Before joining NASA as an astronaut in 1980, Smith completed two tours of duty in the Mediterranean Sea aboard the carrier USS Saratoga.

Before his assignment as co-pilot of the shuttle Challenger, Smith served in a variety of capacities including work in the shuttle avionics laboratory and a stint as technical assistant to the flight operations director.

McNair was on his second flight

HOUSTON, Jan. 29 — Like his Challenger crewmates Judy Resnik, Ellison S. Onizuka and Francis R. "Dick" Scobee, Ronald E. McNair was a member of the astronaut class selected in January 1978.

He was also America's second black astronaut in space.

The ill-fated flight of Challenger was McNair's second ride in the craft. His first was in February 1984.

His job on his first flight was to operate the remote maneuvering arm while fellow astronauts tested rocket-powered backpacks. On this flight, he was to launch a small but important satellite to study Halley's comet.

McNair, 35, was born in Lake City, S.C., where his mother taught elementary school and his father worked as an auto



McNair

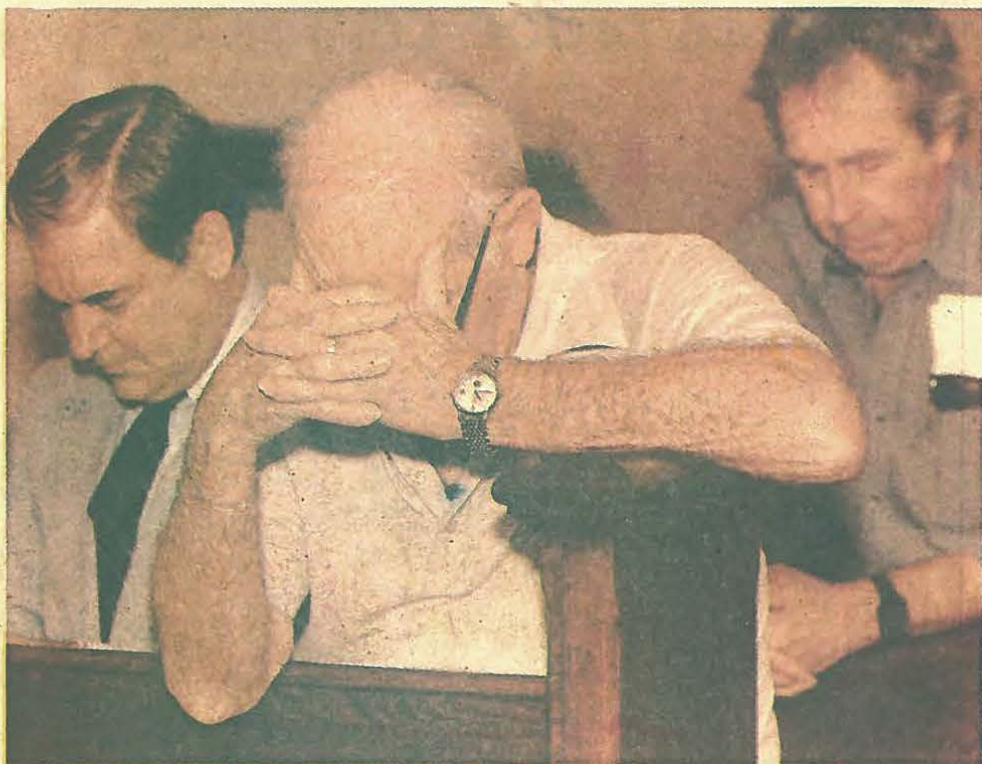
body repairman.

As a black in a small Southern town in the 1950s and 1960s, McNair learned quickly not to let racial discrimination impede his goals.

"It means trying a little harder, fighting a little harder to get what you perhaps deserve," he said. "It means building up a tolerance and not being discouraged by some of the obstacles that get put in front of you."

McNair received a bachelor of science degree in physics from North Carolina AT&T State University, where he graduated magna cum laude in 1971, and a doctorate in physics from Massachusetts Institute of Technology in 1976.

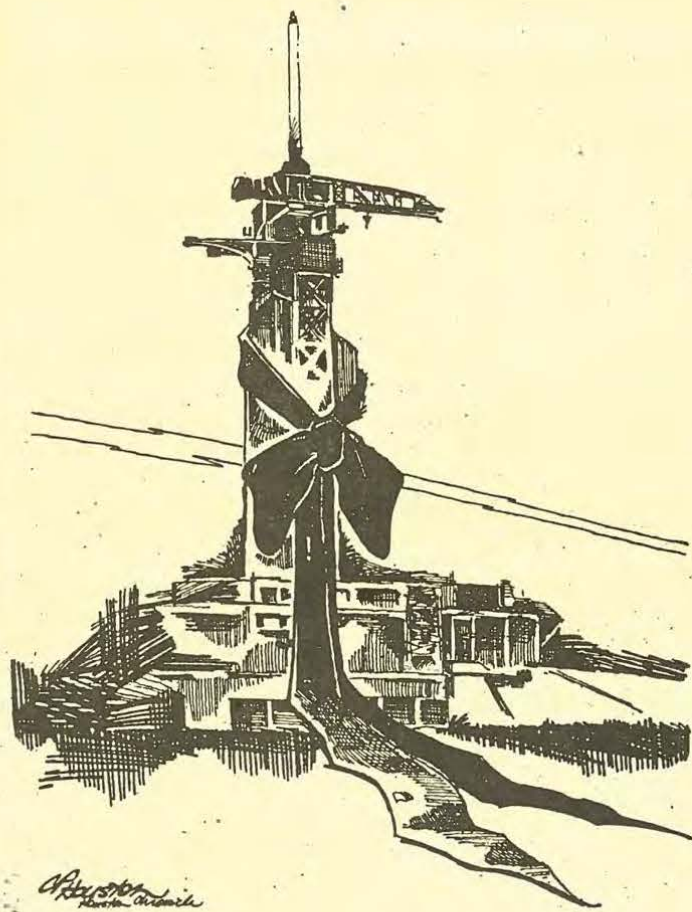
McNair was an expert in laser physics. He studied at E'cole D'ete Theorique de Physique in France and worked as a staff physicist with Hughes Research Laboratories in Malibu, Calif., before being selected for the astronaut corps in 1978.



R.L. Robinson was among those who paid their respects at the Trinity Episcopal Church Wednesday.

'Today, we promise Dick Scobee and his crew that their dream lives on; that the future they worked so hard to build will become reality'

EDITORIAL



Challenger: A disastrous loss, a national tragedy

Ever since Alan Shepard became America's first man in space in 1961, NASA's manned spacecraft have carried aloft not only their crews but also Americans' hopes and dreams for the future.

The explosion of the space shuttle Challenger, then, represents not just an aerospace catastrophe, but also a national tragedy.

For this community, it is a particularly wrenching tragedy. The men and women of space are not distant heroes, they are friends and neighbors. Our deepest sympathy to all.

While NASA's engineers ponder the cause of the explosion, the nation mourns the apparent loss of commander Francis R. Scobee; pilot Michael Smith; specialists Judith Resnik, Ellison Onizuka, Ron McNair and Gregory Jarvis; and Christa McAuliffe, who was to become the United States' first private citizen and teacher in space.

They are a somber reminder that space exploration remains an extremely risky business, and that those who embark upon it share all the hardships and danger of earlier pioneers. While Challenger's crew members are the first to die during a U.S. space mission, three astronauts perished in a launch pad fire, four others died in crashes of their training jets, and three narrowly survived an explosion aboard Apollo 13 as it

headed for the moon.

The destruction of Challenger represents an obvious setback for the U.S. manned space program. Caution dictates that it will be many weeks or months before the cause of the explosion is determined and corrected and the next shuttle launched. It may be longer before NASA again risks sending a private citizen into space.

There will be those who will say such a disaster was bound to happen sooner or later, and that America's space program has come too far, too fast, too risky. That is nonsense. To allow one fatal accident, however tragic, to curtail America's thrust into space and scrap our vital goals for science, industry and national security would be like erasing the history of aviation progress because of the first crash of a Jenny biplane.

Considering the cosmic scope and monumental risk of its endeavors to date, NASA has maintained a phenomenally good safety record, while providing the nation and mankind with technological, economic and scientific benefits beyond measure. That NASA will overcome this setback should not be in any doubt.

While Americans mourn the loss of Challenger and its crew, the nation's future in space has lost none of its promise. That would be a loss we truly could not bear.

A major setback

Explosion deals crippling blow to space program aspirations

By WILLIAM E. CLAYTON JR.
Houston Chronicle Washington Bureau

WASHINGTON, Jan. 29 — America's space program will suffer a serious setback in an ambitious schedule because of the disastrous explosion of the space shuttle Challenger, knowledgeable followers of the space agency said.

Jesse Moore, NASA's associate administrator, said there would be no further shuttle flights until investigators determine the cause of the Challenger explosion Tuesday. Such a delay would mean the cancellation or substantial delay of three missions considered important to science.

Ironically, the Challenger explosion will considerably slow spending on the space program at a time when it faced at least one round of automatic cuts under the newly enacted Gramm-Rudman balanced-budget law and possibly even larger reductions over the next four fiscal years.

In March, the shuttle Columbia was scheduled to study Halley's comet during the time the comet is approached by one space probe from the European Space Agency, two from the Soviet Union and another from Japan.

Shuttles Challenger and Atlantis were sched-

uled for May flights launching probes to Jupiter and to the sun. These two missions will have to be rescheduled. Jupiter and the sun will not be in proper alignment again for two years.

Rep. Don Fuqua, D-Fla., chairman of the House Science and Technology Committee, said the group will investigate only after NASA's accident review board issues its findings.

After the tragedy of the 1967 fire aboard the Apollo spacecraft, the investigative report took a year to issue. Manned flights resumed 22 months after the disaster.

In that instance, the NASA review board, using 21 panels of 1,500 specialists, began an investigation and after weeks of evaluations issued a 3,000-page report that criticized both the space agency and the spacecraft's maker, North American Rockwell Corp., now Rockwell International.

NASA delayed its moon program so it could rework the entire design of the Apollo spacecraft to make it more fireproof.

Engineers rewired, covered exposed areas with metal troughs, modified the escape hatch so it could be opened in five seconds, and used non-combustible materials wherever possible.

The Challenger, one of four shuttles the National Aeronautics and Space Administration

scheduled for service during 1986, was to have flown 13 other missions in the next 2½ years. The cargo-bay on two of those flights would have been devoted exclusively to work for the Department of Defense, NASA said.

With one of its four shuttle craft destroyed, the shuttle schedule is automatically changed, regardless of the length of an investigation.

But beyond that, Rep. Robert S. Walker of Pennsylvania, ranking Republican on the House space subcommittee, said, "There have to be a lot of things rethought" about the current shuttle program.

Nobody could predict with accuracy the length of the current investigation, but one factor could be the absence of evidence. The Challenger exploded high over deep ocean, scattering debris into the water over a wide area. The violence of the explosion will surely have left little of the spaceship intact, even with recovery of some of the debris.

Members of Congress talking about Tuesday's disaster mostly want the program to go forward, but only after the probe of the accident is completed. That in itself will throw the schedule off.

A few legislators want the shuttle program slowed regardless, so that the next generation of launch vehicles can take over.

Astronauts return to training

BY KIM COBB
and KEVIN MORAN
Houston Chronicle

HOUSTON, Jan. 30 — Just 24 hours after the crew of the Challenger died in a blast over the Atlantic Ocean, NASA astronauts were back in training at the Johnson Space Center for a space shuttle program riddled with uncertainties.

While they grapple with the loss of the Challenger crew, they will continue the shuttle training that is ongoing even after astronauts are certified for flight. There are 96 astronauts on flight status, and the space center is expecting a new class of 13 astronaut candidates this summer.

Those astronauts will be training for flights put into a holding pattern with the destruction of Challenger. Not only has NASA vowed to suspend any further shuttle flights until the source of Tuesday's disaster is found, but the destruction of Challenger eliminated one-fourth of NASA's shuttle fleet and therefore cut back the number of possible flights.

But for astronauts like Guion Bluford, there are priorities beyond training for an indefinite flight date. He came into the NASA ranks with the class of 1978 along with Challenger crew members Ronald McNair, Francis Scobee, Judith Resnik and Ellison Onizuka — and their deaths have given him a personal agenda.

"My job right now is I'm concerned about their families," Bluford said. "Second, we need to make sure we find the problem."

However, when you ask Bluford if he'd be willing to go up in the shuttle again, despite Tuesday's disaster, he almost stiffens. It's very obviously a matter of deep pride.

"I'm hoping we'll solve the problem and get back to business as usual," Bluford said. "I look forward to flying again."

Bluford visited with McNair's wife Wednesday morning, and the strain was still evident on his face that afternoon. He and McNair had shared the limelight as America's first and second black astronauts.



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John Everett / Chronicle

President Reagan bends to offer condolences to 8-year-old Erin Smith, daughter of Challenger pilot Michael J. Smith, one of the seven space shuttle astronauts honored at a solemn memorial service at Johnson Space Center on Friday.

Challenger fragments wash ashore as probe continues

By CARLOS BYARS
and EVAN MOORE
Houston Chronicle

HOUSTON, Jan. 30 — As charred fragments of Challenger washed onto Florida beaches, officials continued to grope for an explanation of the space tragedy, and a series of nationwide memorial gestures began for the shuttle's seven crew members, including teacher Christa McAuliffe.

Her husband today thanked Americans for their condolences. "We have all lost Christa," he said. It was his first public statement since the explosion.

"We wish we could comfort all of you as you have comforted each of us," Steve McAuliffe said in a statement issued to news services by his Concord law office.

McAuliffe, 37, and his two children, Scott, 9, and Caroline, 6, have been in seclusion in Florida.

"We thank you for respecting our privacy and for sharing our grief," McAuliffe said. "To the families of the other crew members we send our love and share their sorrow."

"My children and I are very aware of the tremendous outpouring of grief and support across America. We have all lost Christa."

NASA officials declined to speculate on why the \$1.2 billion spacecraft exploded over the Atlantic Ocean less than two minutes after takeoff from the Kennedy Space Center at Cape Canaveral, Fla., on Tuesday morning.

The explosion appears to have started with a fire between the shuttle and the external fuel tank, indicating a leak somewhere was the cause.

But Jay Greene, flight director in Mission Control at the Johnson Space Center here, indicated during a news conference Wednesday that the probe into the explosion must start from scratch.

"We train awfully hard for these flights and under every scenario anyone can imagine," he said. "This one just stopped."

NASA disclosed Wednesday that one of two booster rockets that swerved free of Challenger after the explosion threatened to hit the Florida coast and therefore a radio signal was sent that destroyed both boosters.

President Reagan and his wife Nancy will attend a memorial service for the crew at the Johnson Space Center on Friday. Reagan will speak at the service, scheduled to begin at 11:40 a.m. The service is closed to the public.

Details of the president's visit had not been arranged Wednesday. The president spoke on the telephone with relatives of each crew member, and pledged to continue the space program.

Soviet Union leader Mikhail Gorbachev and Soviet cosmonauts relayed an expression of grief to the United States.

In Houston and across the country, drivers flashed headlights in the daylight in a show of solidarity, church bells pealed 24 hours after the explo-

sion, and flags flew at half-staff. The New York Stock Exchange suspended operations for a moment.

As the search for the remains of Challenger began its third day, only about 600 pounds of the 4.5-million pound spacecraft had been recovered.

That debris, described as thin aluminum with a polyurethane backing, twisted and seared by intense heat, was returned to the Trident Submarine Base at Port Canaveral on Wednesday aboard an 82-foot Coast Guard cutter.

The debris will be stored in a hangar at nearby Patrick Air Force Base, where experts will assume the tedious task of reassembling the parts in an attempt to determine the cause of the blast, NASA officials said Wednesday.

First, however, the task of recovering them may also be time-consuming. So far, five helicopters and four airplanes, six Coast Guard vessels, four Navy ships, two NASA recovery ships and a barge and crane have been employed in the search, covering a 5,500-square-mile area.

Shuttles are connected to the huge tank by two 17-inch fuel lines, one each for liquid oxygen and hydrogen, and three small, one-inch lines. Two of the small lines maintain pressure in the tank; the third is used only in the fueling process before launch.

The external tank supplies hydrogen and oxygen from separate sections of the tank to the three main engines.

Challenger's tank held about 1.2 million pounds of liquid oxygen and 400,000 pounds of hydrogen at launch.

A personal grief in national sorrow

DOWN ON THE east coast of Florida at Cocoa Beach there's a big bar where the press gathers before and after space shots at Cape Canaveral. On this night I am reminded of, I was sitting in there with a little bunch of veteran reporters, guys who had covered space exploration ever since Alan Shepard's Freedom 7 flight in 1961.

We were there to write about one of the early shuttle launches. I think it was the third, maybe the fourth. The conversation concerned a news conference held that afternoon, when a guy in the audience had asked what the Canaveral press corps calls a sick question.

He wondered what would happen at launch if only one of the solid fuel rockets on the shuttle ignited, and the other fizzled.

It's pretty obvious what would happen, and it would all be very bad indeed. So most reporters figure it's not appropriate to ask.

But it was plain from the talk at that table that all of us thought about it, just the same. And somebody made a remark that has stayed with me. He said, "There's a good reason why the shuttle is called an experimental vehicle. These shots are raw tests, man. This entire program is an experiment."

He was saying that we've got to expect that things will malfunction, and they'll be costly and tragic.

After that trip I couldn't watch a space launch on TV without thinking of all that could go wrong. A shuttle lifting off is a beautiful sight, but it's frightening, as well. The potential for disaster is so great. For a while I even quit watching them. If one of the things exploded, I didn't really want to see it happen.

Then, gradually, I began to relax about the matter. Because they kept going up there and coming back, time after time, year after year, with so few troubles. They lifted off in glory. They glided back home so smoothly. I thought, hey, this is getting all right. Maybe the danger is past.

Look, they're taking U.S. senators up there, and congressmen, and hundreds of reporters are wanting to go, and school teachers, and retired TV anchors. Everybody



LEON
HALE

wants to go. So maybe it's not so experimental any longer. Maybe the potential for disaster isn't that great any longer.

Then when the explosion happened on Tuesday, I wasn't ready for it.

What I feel right now is personal grief. Probably in print that will sound maudlin, but they have asked me to write what I feel and that's what it is, sorrow.

Not only for the people on that spaceship and their families, but for me, personally, and for this country.

The last time I felt this way was when a friend called and said, "Did you hear yet? They've shot Kennedy in Dallas." I felt an awfulness inside me that day, and I went out and walked in stores and looked at faces. I did that again Tuesday.

I went to a noisy place where I get sandwiches for lunch sometimes. It's generally full of chatter and laughter and friendly shouts. By noon Tuesday it was almost silent. People chewing slow. Some not eating at all. Some looking empty-eyed at walls. It was that same way the day Kennedy was shot.

This is one thing my government does that I think is splendid. It does a lot of stuff I think is not splendid but space exploration I endorse with a great shout, and I'm afraid this tragedy will hurt it.

In the newspaper business we are taught not to get involved, personally, in stories. We're supposed to stand over to the side and observe and tell you what's happening and what it means, but we mustn't be cheerleaders.

I never had any trouble with that concept except in the case of space exploration. It's the greatest story of my time on this Earth. What story could be bigger than one about people preparing to leave their planet and go to other places in the universe?

Those veteran reporters in that bar at Cocoa Beach told me, long ago, that there would be a day like Tuesday. No story as big as space travel could go on with success after success and no failure.

'We know in our hearts that you who flew so high and so proud now make your home beyond the stars'

'We will never forget you,' Reagan says in eulogy

By JIM BARLOW
Houston Chronicle

Somber music muted a springlike day as President Reagan promised the seven fallen Challenger astronauts that their dreams of conquering the frontier of space will live on, keeping alive their "unquenchable desire" to explore the universe.

In many ways, the memorial service at the Johnson Space Center here seemed like the gathering of friends and loved ones at a country funeral. There was sadness and tears, but also a spirit of reaffirmation, of those who loved and shared coming together to mourn.

There were friends greeting old friends, hugs, handshakes and tears. There were many tears.

The names of the seven who died Tuesday in the explosion that destroyed the Challenger space shuttle were invoked

again and again:

Dick Scobee, Michael Smith, Judith Resnik, Ellison Onizuka, Ronald McNair, Gregory Jarvis and Christa McAuliffe.

"We will always remember them, these skilled professionals, scientists and adventurers, these artists and teachers and family men and women, and we will cherish each of their stories — stories of triumph and bravery, stories of true American heroes," Reagan said.

"Dick, Mike, Judy, El, Ron, Greg and Christa — your families and your country mourn your passing.

"We bid you goodbye, but we will never forget you," the president said in a short talk.

"For those who knew you well and loved you, the pain will be deep and enduring. A nation, too, will long feel the loss of her seven sons and daughters, her seven good friends.

"We can find consolation only in faith, for we know in our hearts that you who flew so high and so proud now make

your home beyond the stars, safe in God's promise of eternal life.

"May God bless you all and give you comfort in this difficult time."

The memorial service was noted for its appropriate somber tone, and also its simplicity.

By 10 a.m., thousands clustered around a roped area to await the midday service.

Everyone stood as the families were escorted to the area, shortly before a somber-looking Reagan and his wife, Nancy, arrived.

Acting NASA Administrator Dr. William Graham opened the services with brief words about the seven.

Astronaut Lt. Col. Charles Bolden Jr. read from the Bible — the 46th Psalm — before Reagan took the podium.

"We come together to mourn the loss of seven brave Americans," Reagan said, "to share the grief we all feel and, perhaps in that sharing, to find the strength to bear our

sorrow and the courage to look for the seeds of hope.

"What we say today is only an inadequate expression of what we carry in our hearts," Reagan said. "Words pale in the shadow of grief; they seem insufficient even to measure the brave sacrifice of those you loved and we so admired."

As Reagan spoke, many of the audience wiped away tears. Others sobbed, some openly, some hiding their faces in their hands.

Reagan likened those who explore space to the early American pioneers who pushed forward to settle the American West. They too frequently suffered, the president said.

Like those pioneers who pressed on, despite the cost, so will the American space program, Reagan said.

"We will not disappoint them," the president added.

As the music soared, so did four T-38 jet aircraft — the same airplanes flown by the astronauts during training.

It was the traditional Air Force goodbye to a departed member.

Commercialization of space seen as still on target here

By MIKE SHERIDAN
Houston Chronicle

HOUSTON, Jan. 29 — Houston's much-heralded efforts to diversify its oil-soaked economy — of which the space industry was touted as a major part — will be affected by the loss of the space shuttle Challenger, but not dramatically.

Instead, say individuals intimately involved in the diversification efforts as well as analysts who have been monitoring the situation, increased interest could be generated in space commercialization projects.

"I think in the long run, the Challenger tragedy really won't have a detrimental effect on the diversification plans," said Ed McClelland, vice president and regional economist for RepublicBank Corp. of Dallas. "Houston has already made its commitment and that commitment is long-term."

McClelland and others say that although there might be some hesitation on the part of some firms eyeing the space commercialization industry during the next few months, the long-term prognosis for Houston's diversification efforts and its space commercialization plans are on target.

"If you recall, we experienced a tragedy with the Apollo program, and our plans were delayed a year or so, but we still put a man on the moon," McClelland said. "We suffered a devastating loss Tuesday, but that won't mean people will just stop their plans."

Space has been one of the cornerstones of the Houston Economic Development Council's effort to wean the city away from its dependence on oil. Even though medicine, particularly in view of the world-renowned Texas Medical Center, also has been touted, Houston's ties with space have been described as the city's best shot at diversification.

For example, Clear Lake City has been selected for the development of the Space Station Program, an \$8 billion project with a target date for permanent orbit in 1992, the 500th anniversary of Columbus' discovery of America. Billions of dollars are expected to be pumped into the area's economy within the next few years,

generating additional cottage industries.

Space commercialization came from President Reagan's Strategic Defense Initiative, popularly known as star wars, as well as from a basic change in philosophy. The government now intends to start handing over more responsibility for space shuttle operations to outside contractors. Commercial opportunities in space could become a \$65 billion industry by the turn of the century.

"Our emphasis is on space commercialization as a long-term affair. We are not looking for significant economic gains in the immediate future," said Dick Bryant, communications specialist with the Houston Economic Development Council. "It's a brand new industry and will have a lot of effect on the economy, but we are talking about the business of being in space rather than the business of getting into space."

Last year, for example, NASA announced that a Houston firm — using no government money for its multimillion-dollar venture — had won the space agency's approval to build and operate the first commercial factory in space.

Max Faget, a space pioneer who is president of Space Industries Inc., the winner of the NASA space factory contract, said the space platform is expected to be ready to be carried into orbit by the space shuttle in 1989. It then will be leased to manufacturers of products such as pharmaceuticals, electronic crystals and metals that can be produced only in the gravity-free environment of space.

The Industrial Space Facility, as it is called, is designed to be used either as a free-flying craft cast adrift in orbit and visited two or three times annually by the shuttle, or as a module that can be attached to the U.S. space station.

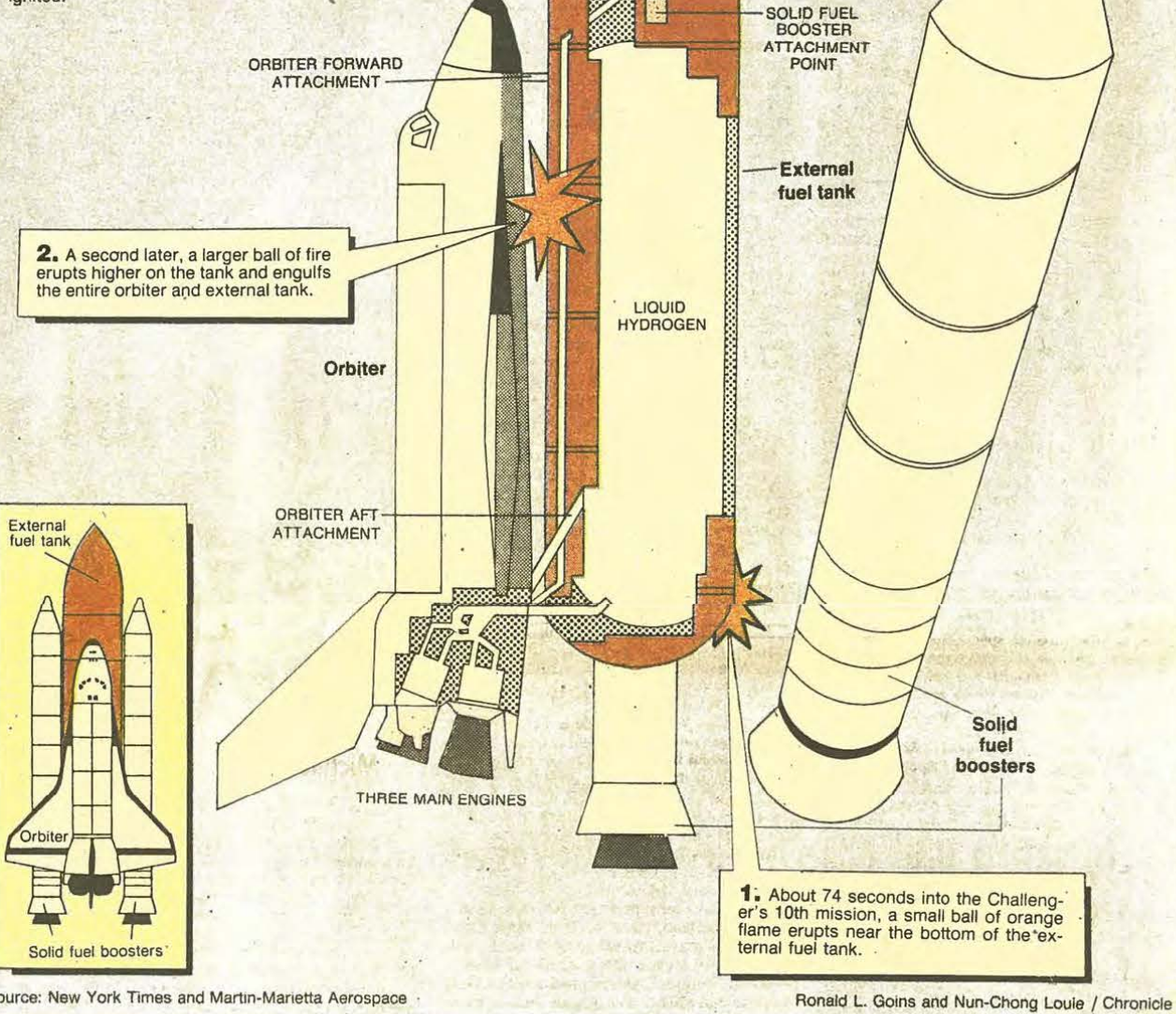
Faget estimates the cost of producing the tube-shaped spacecraft at between \$250 million and \$500 million.

Peter Bishop, associate professor at the University of Houston at Clear Lake and chairman of the school's Studies of the Future Program, said that some of the space diversification efforts may not proceed full speed ahead because of the tragedy, but they will go forth.

CHALLENGER'S STORY

The shuttle orbiter is attached to an external fuel tank containing liquid hydrogen and liquid oxygen, which power the shuttle's three main engines throughout the shuttle's ascent. During the first few minutes after liftoff, thrust is also provided by two solid fuel boosters, which are attached to the external fuel tank. They are jettisoned when their fuel, a mixture of aluminum perchlorate, powdered aluminum, iron oxide and a plastic binder, is used up. The external fuel tank is jettisoned into the Indian Ocean once the shuttle has reached orbit.

Main propulsion comes from burning combined hydrogen-oxygen fuel. Liquid oxygen and liquid hydrogen carried in the external fuel tank are pumped under pressure through the aft attachment point to tubing surrounding the rocket nozzles, where the liquids are converted to gases. The gases are then pumped to the rocket engines where they are combined and ignited.



Probe is expected to take a long time

By EVAN MOORE
Houston Chronicle

CAPE CANAVERAL, Fla., Jan. 31 — A NASA engineering specialist who participated in the reconstruction of Apollo 1 after a fire 19 years ago said the investigation of the destruction of space shuttle Challenger "will probably take a good, long time."

Jim Mizell, a NASA spokesman and former NASA microwave engineer, said he began working on the Apollo investigation shortly after the fire occurred in 1967 and did not finish until almost two years later.

"In those days we had to use a

slide rule and something called a Gerber scale (to measure depth) and start piecing it together bit by bit. We didn't have the magnetic tape computers they have today. We didn't have a lot of things."

Mizell said NASA inspection teams for Challenger "are not well enough organized yet to determine how long the process will take, but it won't be quick."

"Right now, the search is the important thing, trying to recover anything that would shed light on the accident — engines, solid rocket booster casings, the external casings, any large pieces that might contain anything that would mean anything."

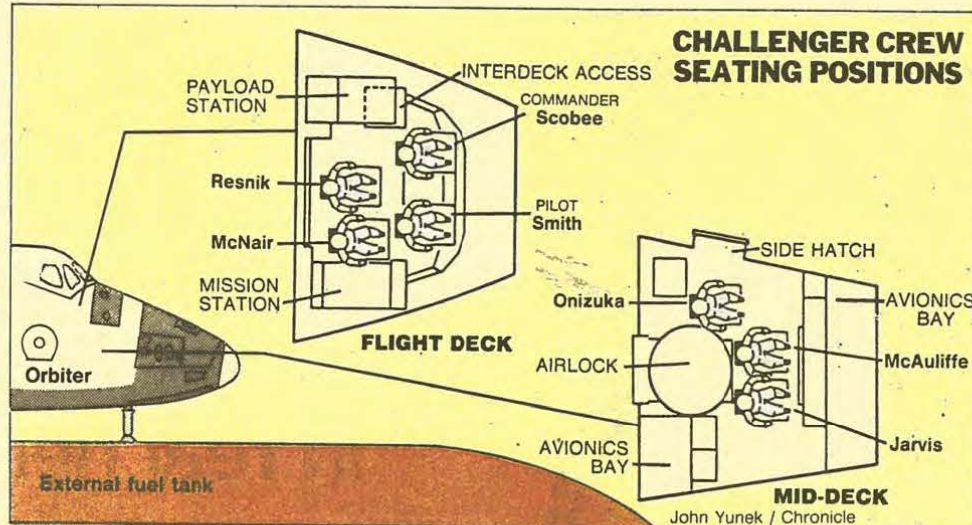
Those pieces will eventually be ar-

ranged in an effort to reconstruct the accident, Mizell said. More important, however, are the miles of computer tape data that recorded the mission.

"Somewhere on those miles of tape is something that shows the exact sequence of the accident," Mizell said.

From the time sequence, he said, investigators may be able to determine at exactly which phase the mission began to go wrong.

"They'll have to look at that to determine the time," he said. "But, when they find it it will be within a millisecond, maybe even a microsecond of when the accident started."



Coded signals destroyed two giant solid fuel boosters on Challenger

By JIM BARLOW
Houston Chronicle

CAPE CANAVERAL, Fla., Jan. 30 — About 30 seconds after the explosion that killed seven astronauts and destroyed the shuttle Challenger, two more massive blasts shook the Kennedy Space Center here.

These weren't accidents.

NASA officials revealed Wednesday that an Air Force officer sent coded radio signals to destroy the two giant solid fuel boosters, on each side of the shuttle, that help lift it into space.

The two rockets on Challenger apparently survived the still unexplained initial explosion and were putting out millions of pounds of thrust, and had to be destroyed.

The officer in charge, called range safety officer, has the awesome task of destroying these boosters when they threaten populated areas.

Quite simply the range safety officer also holds the power of life and death over America's astronauts.

In the Challenger accident, the force of the original blast separated the boosters from the craft and sent them flying in crazy patterns, leaving behind trails of smoke that looked like gigantic question marks in the sky.

And, by the time the range safety officer pushed the button blowing up Challenger's boosters Tuesday, the seven crew members were beyond help.

"They destroyed the boosters because they were out of control," said Lt. Col. Robert Nicholson, an Air Force public affairs spokesman. "They didn't know where they were going."

The Air Force, from an installation at nearby Cape Canaveral Air Force Base, is charged with destroying a spacecraft if it goes out of control after launch and threatens populated areas.

Two Air Force officers sit in reach of a red button that

can send a coded signal to detonate packets of explosives on the spacecraft.

It's up to one of those two, the range safety officer, to decide whether to push the button.

Officials declined to let reporters talk to the range safety officer on duty when the Challenger exploded Tuesday, or to any other range safety officer, about the job.

The range safety officer's job, in Nicholson's words, "is to protect the land mass."

On Tuesday, when the two rockets were blown up, they were 10 miles high and out of control.

"That's a lot of altitude and a lot of energy up there," Nicholson said. "How far could it have gone? God only knows, and we didn't intend to find out."

Before every launch from Kennedy, or any other U.S. spaceport such as Vandenberg AFB in California, strict limits are set on how far a space vehicle may go off course.

The limit is a fan-shaped imaginary wedge in the sky. A

dotted line on a computer screen represents the correct trajectory, Nicholson said.

Powerful radar and optical instruments track each craft as it rises into the sky, sending back data to the range safety officer, as well as to NASA controllers.

Seldom are there problems, Nicholson said. The 24 shuttle missions launched before Tuesday, and pre-shuttle manned flights, maintained proper trajectories during launch.

Most range safety officers at Kennedy hold the rank of major. They are usually engineers by training, and have 10 to 20 years experience in their jobs.

They train regularly with computer simulations to test their judgment.

The range safety officer does not sit alone. Beside him is a senior range safety officer. The two are in constant communication with the launch director at Kennedy and the flight director at Johnson Space Center in Houston.