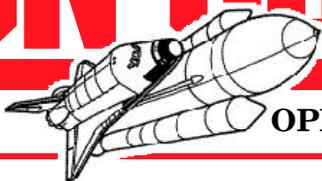


MISSION SUCCESS[®]

October 14, 2002

MICHOUD



OPERATIONS

BULLETIN

STS-112 launch takes on a whole new look

For the first time, those watching at home probably “felt” closer than ever before to the thunder and power of a Space Shuttle launch when STS-112 lifted off October 7.

Why? Because Michoud technicians had mounted a “live” camera high on the External Tank to give viewers a downward or aft view as the shuttle took off.

“It certainly brought a fresh perspective to shuttle launches,” said **Brian Knipfing**, Michoud’s lead engineer at KSC Operations who was responsible for implementing the ET camera system. “Being able to see Florida and then the Earth recede drove home the fact that the shuttle gets out of town pretty quickly – eight



An aerial view shows the camera perspective looking down from near the top of the External Tank that viewers saw “live.”

and a half minutes to orbit.”

Besides providing great launch pictures, the camera was also designed to show Solid Rocket Booster (SRB) separation and Orbiter separation. But something happened at SRB separation to obscure the view. NASA believes that exhaust from the SRB separation motors deposited a film over the lens, affecting video quality for the rest of the flight. The earlier footage was, nevertheless, spectacular.

Knipfing has coordinated the camera system with NASA the past three years. He also supervised the project at the Cape this spring as Michoud employees from KSC and New Orleans worked 12-hour days for six weeks installing the camera system on the ET.

The SONY camera, six inches long and about the diameter of a quarter, was tucked inside an aluminum fairing that was covered with protective foam and attached to the Liquid Oxygen Tank cable tray. Technicians mounted the battery pack and transmitter on the crossbeam inside the Intertank. Two antennae were placed on the outside of the Intertank 180 degrees apart.

Back at Michoud, designing the system through hardware fabrication and test was a challenging task, according to engineer **Angelo Greconia**.

“The hardware had flown previously on other unmanned vehicles, but we had to package it in a way unique to the External Tank. We strengthened the design

and added safety features to have the least amount of impact on the shuttle vehicle with the goal of still providing great pictures.”

Copeland wins Nova Award

Lockheed Martin has named **Gale Copeland**, chief engineer at Michoud Operations, a Nova Award winner for “leading the



Gale Copeland

development of the Super Lightweight Tank” (SLWT).

The corporation’s highest honor, the Nova is reserved for those who make outstanding

contributions to Lockheed Martin’s missions and objectives by demonstrating excellence in one of four categories: exceptional service, leadership, teamwork or technical excellence.

Copeland received his award for exceptional service on the SLWT, which resulted in Michoud securing a \$2 billion sole-source contract to continue producing the External Tank.

The corporation presented the Nova Awards – a Lockheed Martin star projected from a black marble base – at a recent ceremony hosted by Chairman & CEO Vance Coffman at the Smithsonian Air & Space Museum in Washington, D.C.

PMES - high technology with less paper!

It might look like something from the set of BattleBots, but this mobile computer (seen at right) will soon play a big role in the Paperless Manufacturing Execution System (PMES).

Given the go-ahead by the ET Project office at Marshall Space Flight Center, Michoud Operations is about to unveil its latest effort to the challenge of improving ET production – in the document zone.

PMES means less paper, with the goal to greatly reduce the amount of paperwork generated for ET production and buy-off. By accessing computer workstations strategically placed throughout the facility, employees can electronically record ET build data such as tool numbers, temperature/humidity and serial numbers.

Mobile workstations and laptops are available for workers who move between various locations.

This new system makes it possible to attach drawings and photos to ET build work orders such as Manufacturing Process Plans. Electronically-generated Non-Conformance Documents, automatically routed for disposition, eliminate the need to manually search and expedite the process, thereby increasing efficiency and reducing potential



David Speir (left) and Stephen Mayfield put a mobile prototype dubbed "Johnny 5" through its paces recently during a stamp warranty practice run.

errors.

Additionally, the Quality Data Center, where completed work documents and information for ET buy-off (DD-250) are stored and used, becomes an electronic library, making data available at the stroke of a key. Stamp Warranty verification will take place electronically using "badge readers" similar to those located at turnstiles and gates.

Spearheading the system implementation since October 2001, the PMES Team represents departments integral to the new system. The team worked with a software vendor to define the system requirements, including upgrades to the Local Area Network for faster data retrieval.

Initial development and functionality of the PMES software clears the way for the pilot program starting in November. PMES rollout is slated for spring 2003.

Prior to the cutover, all users will receive extensive training, including pilot programs in several work centers with NASA and the Defense Contract Management Agency assisting Michoud personnel.

The first factory pilot is planned for the Tooling area. Others to follow include Welding, the Commodity Shop, Final Assembly and Transportation and Handling. Each pilot will last about two weeks, ending with evaluations and recommendations for improvements.

If you have questions about PMES, call team members **Carlos Ramirez** (7-3530), **Tom LeBoeuf** (7-1785), **Patti Jones** (7-0820) or **Casey DeHoog** (7-2705).

Michoud passes ISO 9001 audit

Michoud Operations has successfully cleared another hurdle by completing the third scheduled assessment of the new ISO 9001:2000 standard.

During the mid-September visit, the British Standards Institution (BSI) auditor found employees attentive and conscientious about their work and reported that Michoud's systems and processes were robust.

The fourth and final audit to upgrade to the new ISO 9001 standard will be conducted by BSI in March 2003.



Cheryl Alexander

Alexander promoted to HR director

Cheryl Alexander has been named director, Human Resources at Michoud Operations. She succeeds **Hugh Farabaugh** who retired after 24 years with Lockheed Martin. In her new role, she will oversee organizational development, compensation & benefits, EEO, employee/labor relations, medical services and performance enhancement.

She began her Lockheed Martin career as an HR associate analyst in 1980. Previously, she was manager of Staffing, EEO and Compensation.

Her professional involvement includes working with the New Orleans Workforce Investment Board, the New Orleans East Human Resources Council and the Louisiana Liaison Group.

Tolerance and respect -- add to an enriched life

In previous Diversity Council updates I discussed the first two of four key attributes – *knowledge, understanding, acceptance and*



Pat Powell, Diversity Council Chairperson

behavior – that influence how we respond to workforce diversity. This article explores the third attribute, *acceptance*. Acceptance has two components: tolerance and respect.

Tolerance refers to your ability and willingness to accept differences among your co-workers and allowing them to express their cultural backgrounds. Accepting people as they are, and not judging them based on their status, how they look, speak or worship, for

example, demonstrates a high level of acceptance for people different from you. Respect means having full regard for others and ensuring your perception of others is never influenced by cultural or racial stereotyping.

To improve your tolerance for and ability to respect others, you should consciously guard against allowing distrust and prejudices to influence how you treat others. Explore past feelings you may have had that kept you from interacting with someone different from you.

For example, did you ever resent someone getting ahead because "she got a break?" But when you advanced, it was your reward for hard work. Have you ever stereotyped a person as being "too lazy to get a job done?" But when your task was incomplete, it was because you were too busy.

Learn how people different from

you want to be treated and become more familiar with this person's culture. Then create an opportunity to interact with this person – this time with an open mind, consideration and respect.

Only you can decide whether you will treat others with respect and tolerance or based on fears and unproven assumptions.

Diversity adds richness to your life. Learn to appreciate it, and you will grow as a person. Your positive attitude toward others will usually be reciprocated.

In celebration of our Diverse workforce, diversity posters, banners, billboard and EWS messages are on display as a reminder that employees are our most important asset.

Shootin' the Sh..optalk Horseplay inappropriate in the workplace

It's break time – time to grab a soda, gather with your coworkers, relax and shoot the bull. Unknowingly, the "shoptalk" that is about to transpire could end up as a complaint on the desk of Michoud's Ethics Officer.

Shoptalk can be characterized as a group of individuals who work together and amuse themselves with conversation, jokes or remarks about the appearance, mentality and sexuality (of themselves or others) in ways that are vulgar, demeaning and demoralizing.

Shoptalk may include remarks about harming people and damaging property. This verbal horseplay should not be tolerated in the workplace.

"Anything that would be inappropriate to say at the family dinner table should be the measure of what is inappropriate in public and at work," said **Feltus Kennedy**, Ethics Officer.

Some of us have accepted shoptalk in the workplace as a means of normal interpersonal relationship. "Here at Michoud, dilemmas arise when we cannot discriminate between shoptalk and malicious, defaming remarks," explained Kennedy.

Such conduct might be fun for those involved in the shoptalk group, but it may be disrespectful, degrading, insulting, threatening, distasteful and just simply inappropriate to others. We cannot take fellow workers' feelings and emotions for granted. The values of "respect" and "trust" are the standard for forging a wholesome work environment.

Employees working for Lockheed Martin have the right to a professional environment, free of harassment and intimidation. For further information on workplace conduct refer to the Michoud Operations *Rules and Safety Regulations* (Rules 5 & 7).



Everett Mitchell with NASA plaque

Mitchell receives NASA Star Award

NASA Space Shuttle Program Manager **Ron Ditemore** recently presented the NASA Star Award to **Everett Mitchell** at a shuttle meeting in Denver.

During routine External Tank dome processing, Mitchell, a welder in Production Operations, noticed a dome panel out of tolerance and notified his supervisor. A subsequent investigation determined that the supplier had misidentified the panel.

Mitchell is the first Michoud Operations employee to receive the NASA Star Award.

5th Buy & Super Lightweight Tank take shuttle program to next level...

Makes deployment of the International Space Station possible

Michoud Operations completed a much-anticipated program milestone on September 24 when it delivered the final External Tank of 5th Production Buy to NASA. The Super Lightweight Tank, ET-121, is the last of 60 ETs, and Michoud delivered it ahead of the September 30th end of 5th Buy.

Since the first tank in 5th Buy flew in 1994, 52 other ETs have propelled shuttle flights into orbit with 335 astronauts aboard from nine nations.

“With hard work, ingenuity and creativity, we helped NASA achieve its programmatic goals during the past decade,” said **Ron Wetmore**, vice president, External Tank Project.

And one doesn’t have to look far to see the signature event of 5th Buy.

“Building the Super Lightweight Tank will stand out as the biggest achievement of 5th Buy,” Wetmore said. “We used a lighter, stronger aluminum-lithium alloy that shaved 7,500 pounds off the previous ET, and we built it from beginning to post-production in 46 months.

“Our employees put in an outstanding effort to complete the

first Super Lightweight Tank (SLWT) within NASA’s budget and in support of the shuttle manifest.”

Those 46 months posed quite a challenge to Michoud workers. **Wanda Sigur**, current director of Engineering & Technical Laboratories, remembers eight years ago being a team lead for the Tank Weld Assembly Team, one of 10 teams assigned to SLWT.

“We were responsible for the weld, assembly and proof of the Aluminum-Lithium Test Article (ALTA – a one-barrel hydrogen tank with two domes) at Michoud and the structural verification tests at Marshall as well as the weld assembly and proof tests of the pressure vessels. Without having the benefit of traditional tests, we had to demonstrate and verify that the Super Lightweight Tank-redesigned vehicle could fly. The biggest challenge was getting it done on schedule and under cost. The weight bogeys were severe. It was very challenging work.”

The teams working on the test article and the SLWT had to clear several lengthy design reviews in 1994 and 1995 – while working on

ALTA – before actual assembly of the first SLWT could begin. Confirming the performance of the aluminum-lithium alloy and the new SLWT design, Sigur’s team delivered the test article to NASA in January 1996.

Structural engineer **Neil Duncan** recalls being part of the SLWT redesign team – the most interesting and hardest engineering task he’s been involved in.

“We really had to struggle to meet the weight reduction goal. We were all under a lot of pressure to make the new aluminum-lithium tank design work, and the Al 2195 alloy had lots of surprises in store for us. However, we overcame most of them through smarts, teamwork, tenacity and sometimes just trial and error. We worked long hours and through holidays to get the job done, but I think we can all be very proud of the achievement.”

Michoud workers quickly discovered that the aluminum-lithium alloy was not a “drop-in” material and could be very cantankerous.

Welder **Keith McClaine** remembers trying to find the right combination for the aluminum-lithium. “We spent countless hours trying to make it work. It was a big challenge. The managers had put together a good team – the engineers, welders and quality control. We finally broke through. It’s a piece of cake now.”

Senior mechanic **Daryl Smith** remembers the project as a total

team effort. He recalls coming in Saturdays and Sundays at 3 a.m. and leaving at 4 p.m., just so he and his co-workers could give the tank back to welding Monday morning.

“We knew we could go in, set our tools up, drill the holes and bolt the struts and stabilizers up. Everybody knew what they were doing. We tried to get the job done the quickest and best way with no errors working as a team.”

Finally, the 46th month came, and Michoud delivered the first SLWT to NASA in January 1998. At the tank’s rollout several days later, employees

applauded and felt a huge sense of satisfaction.

“The significant weight savings realized from the SLWT have enabled the shuttle to support the assembly and operation of NASA’s International Space Station,” Wetmore said.

“To put it bluntly to you, we can’t build Station without Super Lightweight Tank. Everyone is counting on it, and you people are stepping up to the plate and meeting the challenges. We know how hard you’ve been working – how diligent an effort you’re making – and thank you so very much.”

— Shuttle Commander **Jim Halsell**
August 15, 1997



Employees felt a great sense of accomplishment at rollout festivities for the first Super Lightweight Tank on January 16, 1998.

From its first flight in June 1998, the SLWT has flown 21 times, mostly in support of the International Space Station.

“Besides Super Lightweight Tank, the other big accomplishment of 5th Buy is that we have significantly reduced our hours to build a tank,” Wetmore said. “We’ve made improvements, NCDs are down, and all this puts us in a position to head into 6th Buy with momentum.”



A 5th Buy External Tank fueled John Glenn’s historic STS-95 flight.



The success of the Aluminum-Lithium Test Article (above) with the new alloy and innovative design paved the way for the Super Lightweight Tank.



The new barrel panel orthogrid design is striking in this October 1996 photograph of the ET-96 Liquid Hydrogen Tank, the first Super Lightweight Tank.

Highlights of 5th Buy

- June 1988 5th Buy pre-production work awarded to Lockheed Martin
- February 1994 NASA go-ahead to design, develop and test Super Lightweight Tank
- July 1994 STS-65 – First Louisiana astronaut, Jim Halsell of Monroe, pilots *Columbia*
- June 1995 STS-71-100th U.S. Human Space Mission docks with *Mir* for first time
- January 1996 Delivery of Aluminum-Lithium Test Article at Michoud to NASA
- January 1998 ET-96 – Delivery and rollout of first Super Lightweight Tank
- June 1998 STS-91 – First Super Lightweight Tank launches
- October 1998 STS-95 – John Glenn returns to space
- December 1998 STS-88 – First launch of International Space Station hardware
- July 1999 STS-93 – Eileen Collins, first woman commander
- October 2000 STS-92 – 100th Space Shuttle launch
- November 2000 STS-97 – Deployment of Lockheed Martin-built solar arrays at space station
- September 2002 Michoud delivers final 5th Buy tank to NASA

SPACE SEEKERS: A Quest to Space Center Houston



fifth grade students who correctly answer questions on air and space flight with a chance to win an escorted round-trip flight to Space Center Houston. There the students will experience the wonders of America's human space flight program in a fun, educational environment.

The contest, a virtual scavenger hunt, consists of seeking answers to 10 questions that are located on the sponsoring companies' websites. The winners will be drawn from successful entry forms received.

Although families of Lockheed Martin employees are ineligible to participate in Space Seekers, you will want to encourage friends and relatives to participate in this unique cosmic adventure.

Contest rules and official entry forms can be found at: www.lockheedmartin.com/michoud/

Hurry...deadline for entry is October 25, 2002. The flight to Space Center Houston departs on November 13, 2002.

The Space Seekers program has landed just in time for the 2003 celebration of the 100th anniversary of human flight and the IMAX® "Space Station 3D" film (now showing at the Entergy IMAX® Theatre).

Lockheed Martin, the Audubon Nature Institute and Southwest Airlines will award 25 fourth and



SFA launches new safety campaign

With the theme, "We Have Friends in High Places," the National Space Flight Awareness (SFA) Panel is initiating a new year-long safety campaign this month to revitalize employees' personal commitment to safety.

The ongoing campaign will rotate key safety messages each month. SFA's goal is to help all employees understand the critical role they play in astronaut safety and Mission Success.

"We've always had a strong safety focus here at Michoud, and that's one reason our Mission Success record is 100 percent," said **Ralph Tortorich**, Space Flight Awareness.

"But we can't let our guard down. We've got to always remind ourselves that we build a vehicle that men and women fly on. Their families are counting on us to be careful and to be thorough.

"Exploring space is only going to get more complicated. So our products must have the very best quality workmanship."

The upcoming SFA Safety Awareness campaign will be a regular reminder that safety is an essential and integral part of ensuring the success of America's human space flight program.



Hurricane Lili and Tropical Storm Isidore reminded all of us once again of the importance of opening our hearts to neighbors and communities in times of need.

Michoud Operations employees have always come through in this way by generously donating to the United Way. A community-run organization, United Way provides assistance to agencies that help people recover from catastrophes like hurricanes and tropical storms.

When you give to United Way, the money you donate stays where you live.

Every year United Way campaigns raise funds for local organizations like the American Red Cross, Boy & Girl Scouts, St. Tammany Association for Retarded Children (STARC), Big Brothers/

Big Sisters, Second Harvesters Food Bank, YMCA/YWCA, Cancer Association of Greater New Orleans and the United Negro College Fund.

These United Way agencies and dozens of others have been able to help thousands in our communities, in large part, because of the generosity of your past contributions at Michoud.

Nearly one in three people in our area is helped in one way or another by the health and human care programs funded through the United Way.

Last year, Michoud employees raised \$305,113 for the United Way. This year, the campaign is on-line, beginning on October 21 and continuing through November 1.

Michoud will once again offer employees a chance to win \$100 "I" Bonds for 2001-2002 sustaining contributors, 2002 contributors at the close of the campaign and monthly "I" Bonds for sustaining contributors through the year. The New Orleans United Way will also offer incentives for Supportive Level contributors.

Employees can select from the following United Way Agencies:

- UW-LA New Orleans
- UW-CA Los Angeles
- UW-FL Brevard
- UW-LA St. Charles
- UW- MS Southern Mississippi
- UW-AL Madison County

Designation forms for individual United Way agencies are available from departmental representatives.

Your contributions make the good works of the United Way agencies possible, many of which receive no government funding. It is up to us to make certain that these and other resources are available in our community so we can be prepared for a crisis like a storm hitting our area.

Won't you please give generously?

To donate, follow these steps:

Go to the Michoud Operations Intranet or Gumbo (<http://gumbol>)

- Look to the left and click on Human Resources
- Then click on LMPeople
- Type in your User ID and Password. Select MAF as domain
- Then click on "Click Here"
- My Money/Payroll Data
- Charitable Contributions

United Way coordinators at Michoud are available to assist you if necessary.



Congratulations to the Weld Operations Sub-Assembly II Team! Astronaut Pat Forrester presents the Build Process Team of the Quarter award to Team Lead Mike McGehee (center) and Assistant Lead Benny Robinson (right) for improved quality performance, safety and cost.

UW Participation Incentives	Qualifications
(10) \$100 "I" Bonds*	2001-02 sustaining Michoud UW contributors
(10) \$100 "I" Bonds*	Contributors at close of Michoud UW campaign
(5) \$100 "I" Bonds*	Year-round monthly drawings for sustaining Michoud UW contributors
2002 Honda Civic (Courtesy Royal Honda Olds Mazda)	Area UW drawing for contributors at the Supportive Level
\$500 in gasoline (Courtesy Murphy Oil USA)	Area UW drawing for contributors at the Supportive Level
Two nights at Broadwater Resort in Biloxi	Area UW drawing for contributors at the Supportive Level

* Lockheed Martin awards – to be announced on EWS.

The United Way helps nearly one in three people in our area!



Launch Honorees recognized at KSC
Being named a Launch Honoree is one of Michoud Operations' highest forms of recognition. Pictured at the STS-112 banquet at Kennedy Space Center are front row from left: honorees Neil Sterling, Jeffrey Wiegel (Goodrich Aerospace), astronaut Nicole Stott, Patricia Edgington (Chromalox), Eric Champagne and Richard Whittington. Middle row: Herbert Smith, William Ory, Kenneth Michael, Herbert Bush, Mike Steiner and President Dennis Deel. Back row: Ed Kirch, Roger Worrill, Lionel Smooth and Michael Witter.

MILESTONES

Employees celebrating anniversaries with Lockheed Martin in September and October

25 years

Eric Atlow
 Lillian Baham
 Joseph Bruno
 Michael Cinquigranno
 Gregory Cucinella
 Etta Jackson
 Calvin Madison
 Lawrence Meserve
 John O'Neal
 Sheila Pedesclaux
 Joseph Pleasant
 Randy Strahan

Erick Engelhardt
 Metrovon Fomich
 Michael Gnau
 Boris Goufman
 Toni Herrin
 Blanche Holding
 Martin Hrovat
 Antonio Johnson
 Robert Johnson
 Randolph Lufriu
 Scot Marshall
 Barry Matherne
 Roger Meunier
 Dave Richardson
 Curt Smith
 Scott Spiehler
 Raymond Wagner
 Richard Welch

20 years

Beuron Cannon
 Lori Cantrell
 Daniel Diliberto
 Dana Dreyfus

15 years

Nelda Bellinger
 Roy Charbonnet
 Dilip Dudgaonkar
 John Laguaité
 Stuart Layton
 Paul Lorio
 Margaret Peppersack
 Sandra Petkosh
 Cynthia Spraul

10 years

Patrick Connolly

5 years

Janice Allen
 Derrick Archie
 John Arseneaux
 Adam Baran

Mark Bertrand
 John Brawley
 Claude Brown
 Rudolph Brown
 Trevor Converse
 Miroslav Cutura
 Troy Dupuis
 Carroll Flurry
 Michael Gioia
 Daren Hubbard
 Pernell Keelen
 Stephen Koch
 Jessie Lee
 Jacques Lirette
 Jeremy Luke
 Sean Lusk
 Michael Medine
 Valerie Melancon

Greg Menesses
 Clifton Mitchell
 Henry Moskau
 Phat Nguyen
 Lori Richardson
 Carl Saunders
 Jess Shelley
 Larry Sigur
 John Singelmann
 Alan Snyder
 Danny Stevens
 Juan Toliver
 Reginald Williams
 Jonathan Zullo

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