

NASA Photo One

James C. Ross

Front Cover:

Space Shuttle Columbia is being ferried back to Kennedy Space Center by a NASA JSC flight crew led by NASA pilot Ace Beall. This photograph was taken from F-18, NASA 852, over Twentynine Palms with NASA test pilot Dick Ewers at the controls (*NASA photo EC01-0055-04-1*).

Back Cover:

NASA test pilot Frank Batteas and NASA flight test engineer Mike Holtz fly F-18, NASA 852, towards the ground during a Mars Science Lab pod test. Photo was taken from F-18, NASA 846, with NASA test pilot Jim Less in command (*NASA photo*).

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PREFACE

NASA Photo One is the call sign for in-flight photographer Jim Ross. For more than two decades Jim has documented much of the aeronautics research accomplished at NASA's Dryden Flight Research Center. From the back seat of supersonic and subsonic aircraft he has managed to create a visual history of the innovative work done by the dedicated men and women of this unique research center.

These images are not just beautiful pictures: they document myriad programs and projects that are the hallmark of Dryden. The work done at the center has led to improvements in aircraft design and safety, and lessened the environmental impact of air travel. Many of the technologies developed at Dryden have found their way into commercial, military, and general aviation aircraft. The images also document the many contributions Dryden researchers have made to the United States space program.

The images in this volume can stand alone as fine art photography, and some have won international acclaim and awards for their visual impact. That said, they are more valuable as an aid to the many engineers and scientists in their pursuit of expanding our knowledge of our home planet and beyond.

Steven L. Lighthill
Visual Communications Manager
NASA Dryden Flight Research Center

I would like to thank the following people for making this book possible.

My wonderful and supportive boys: Nicholas and Trenton.

My parents, Howard and Peggy and my brother Mike.

Roberta, who helped me achieve this goal.

My photo staff through the years: Carla Thomas, Tony Landis, Thomas Tschida, Angela Lasley, Patricia Martinez, Joy Nordberg, Sarah Eddy, Kerrie Davis, Sonja Belcher, Ryan Dailyard, and Ken Ulbrich.

My graphics staff: Justine Mack, Dennis Calaba and David Faust.

My good friend, Sean McLain, who encouraged me to write this book years ago.

The many people who helped create, edit, and make this book a reality: Steve Lighthill, Beth Hagenauer, Lori Losey, Nils Larson, Christian Gelzer, Kevin Rohrer, Kate Squires, and David McBride.

And finally all of the men and women that have touched my heart through my many years at NASA Dryden Flight Research Center.

James C. Ross began his photographic career when he was seven years old and was given a Kodak box camera from his grandfather, John B. Saxman.

He received a Bachelor of Science degree from Montana State University in Bozeman, MT, majoring in Film and Television Production, photography option in 1987. He moved to Los Angeles in 1988 and worked for Hecht Custom Photo as a color printer. He also photographed for 20th Century Fox and NBC until an ad in the Los Angeles Times looking for a photographer at NASA Dryden Flight Research Center caught his eye. He applied and was hired in October 1989.

Ross was given a check flight in a T-38 in 1991. After struggling through the first few flights, and fending off motion sickness, he began his new career as an aerial photographer in 1992. Ross currently has more than 700 hours in seven different aircraft including: F-15, F-16, F-18, T-33, T-34C, T-38 and KC-135.

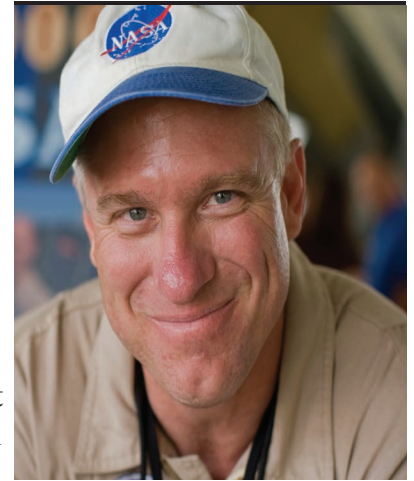
In 2001, Ross received a NASA Public Service Medal. The inscription on the award reads as follows, “For exceptional public service by providing outstanding professional and exceptional aerial photography to the Dryden Flight Research Center.” This award is the highest award given to contractor employees working at the National Aeronautics and Space Administration.

Later that same year, Ross won Aviation Week & Space Technology’s International photo contest with an image of Space Shuttle Columbia on the back of the 747 SCA flying back to Kennedy Space Center.

In 2004, Ross received a Master of Arts degree in Humanities from California State University - Dominguez Hills.

Ross currently works for Arcata Associates and resides in Lancaster, CA, with his two sons, Nicholas and Trenton.

NASA Photo by Sean Smith



FOREWORD

Even after 382 logged hours of space flight, my first love still was flying regularly in airplanes, and I thought, following the Challenger accident, I'm going to look for a flying job before I'm too old to get one. I had done a lot of airplane flying, much more than the average astronaut did. I flew the zero-G airplane regularly, all through the years I was working on the Space Shuttle. I also then, after STS-3, checked out on the Shuttle carrier 747. So I was able to keep my hand in and managed to get a test pilot job at NASA Dryden.

NASA Dryden is a test pilot's dream. You have to fly a variety of airplanes do new things; flying experiments that hadn't been done before. The challenge of organizing the flights, writing the test cards, completing the research checklists and delivering the data was one of real satisfaction.

I'm often asked about my favorite airplane that I have had the opportunity to fly. If I had to go back and pick one, it'd be hard to beat the F-18 for a pure kick to fly a pilot-friendly airplane. But flying the bigger airplanes is more of a challenge, really. Fighters are easy to fly. Big ones are really different from one to the next, and flying them with engine failures and that sort of thing are bigger challenges. So there's some higher level of satisfaction in mastering a beast like a B-52. I guess I'd have to say that my favorite aircraft is the one I happen to be in at that time.

The policy at NASA Dryden was that the photographers must get totally comfortable when flying so they can do the job when they don't feel so hot. That means a lot of regular flying, being really enthusiastic about aviation.

When Jim Ross was hired, and put in charge of Photography, he had no prior flying experience but was ardent about meeting the challenges. His enthusiasm was contagious and it spread to the present and new hires. Most of the photographers had recently retired so there was a big turnover and Jim had agreed and insisted to let his assigned photographers be ardent flyers.

It was always a pleasure flying with Jim, who was always prepared by having thought through the sun angles required for the best photos. He is a true pro who takes personal pride that results in quality photos during his missions.

C. Gordon Fullerton
Astronaut/Test Pilot

This book is dedicated to the memory of

MARTA BOHN-MEYER

1957 - 2005

She believed in me...When I didn't believe in myself.



NASA photo EC92-2273-1

In October 1991, I was given the opportunity of a lifetime. I was offered a check ride in a NASA T-38 to see if I had what it took to become an aerial photographer. When it was over...I came back with a bag full of vomit and very low self-esteem. I thanked the Flight Operations Branch for showing me what a NASA T-38 was capable of doing and turned down their offer. I didn't have what it took. A few days later a well respected flight test engineer and SR-71 crew member, Marta Bohn-Meyer, called me up to her office and wanted to talk about my flight. Here was a living legend wanting me to tell her about one of the most embarrassing moments of my life. I swallowed my pride and told her it did not go very well. She asked what happened. I told her I got sick. She said that was not all that uncommon on a first flight. I said I got sick A LOT. She asked me to define A LOT, I told her it was four times in the hour flight. I could tell she wanted to react...but she kept a straight face. She thought about it a moment and then asked me how long it took for me to recover when I got sick. I paused a few seconds and then said it took about a minute. Her face brightened up and she said that she didn't see a problem there at all. I had 56 minutes to take pictures which would be plenty of time to get my job done. That response surprised me and I wasn't sure what to say. She told me to think about it, but that I really did need to give it another try. I am now coming up on almost two and a half decades since that first flight and have more than 700 hours in high performance aircraft.

NASA Dryden Pilots mentioned in this book.

Test Pilots

Tom McMurtry

Bill Dana

Rogers Smith

Ed Schneider

Jim Smolka

Gordon Fullerton

Steve Ishmael

Dana Purifoy

Mark Stucky

Dick Ewers

Frank Batteas

Craig Bomben

Nils Larson

Kelly Latimer

Troy Asher

Tim Williams

Jim Less

Research Pilots

Bill Brockett

Jim Barrileaux

Dee Porter

Ed Lewis

Hernan Posada

Stu Broce

NASA Dryden Aircraft shown in this publication

Aircraft Type	Tail Number	Call Sign
Photo Chase Aircraft		
F-18	N846NA	NASA 846
F-18	N852NA	NASA 852
T-38	N863NA	NASA 863
F-15B	N836NA	NASA 836
Research Aircraft		
SR-71	N831NA	NASA 831
F-18	N843NA	NASA 843
F-18	N840NA	NASA 840
F-15B	N837NA	NASA 837
SR-71	N844NA	NASA 844
T-38	N863NA	NASA 863
T-38	N864NA	NASA 864
F-18	N846NA	NASA 846
ER-2	N809NA	NASA 809
F-18	N850NA	NASA 850
747-SP	N747NA	NASA 747
F-16XL	N849NA	NASA 849
B-52	N008NA	NASA 008
DC-8	N817NA	NASA 817
Predator B	N870NA	NASA 870
F-15B	N836NA	NASA 836
X-29	N049NA	NASA 049
F-15	N835NA	NASA 835
F-18	N842NA	NASA 842
F-16XL	N848NA	NASA 848
F-18	N845NA	NASA 845
F-18	N853NA	NASA 853
F-18	N852NA	NASA 852
King Air	N801NA	NASA 801
Global Hawk	N872NA	NASA 872
F-104	N826NA	NASA 826
T-34C	N865NA	NASA865
C-20A	N502NA	NASA502



In 1987, the SR-71B located at Dryden, was invited to fly during the AirVenture convention in Oshkosh, WI. Marta Bohn-Meyer, an SR-71 crew member, asked me to fly aboard the Edwards Air Force Base KC-135 tanker that was going to fly with the SR-71B. My objective was to take pictures of the Blackbird over Oshkosh and the surrounding areas. The SR-71B 831 was crewed by Rogers Smith and NASA flight test engineer Bob Meyer. The KC-135 took off from Edwards several hours ahead of the SR-71B, and the two aircraft joined up over Lake Michigan in the early afternoon. With the help of Air Force flight test boom SSgt. Dave Francey, I was able to get this photo as we were on an approach to the Oshkosh runway for a low pass during the show (*NASA photo EC97-44167-03*).



Pilots at NASA's Dryden Flight Research Center are required to do so many hours of formation flight to maintain currency. Dick Ewers is shown in this photo of F-18 843. NASA test pilot Gordon Fullerton, who I was flying with in F-18 846, would often fly alongside Dick Ewers doing a few aerobatics maneuvers. During this particular photo Fullerton inverted 846 as well. In these situations (which happens more than you might think), I shoot through the top portion of the canopy while trying not to lose my lunch. The shooting is not as difficult as it may sound. One just has to follow the aircraft through the maneuver firing the shutter at opportune moments (NASA photo EC00-0179-4).



In 1995, the F-18 HARV (High Alpha Research Vehicle) program was winding down. A follow-on program was developed by NASA Langley engineers where a nose cone was designed with strakes. The idea was to see if these nose strakes helped stabilize the front of the aircraft during high alpha flight. In order to get good photographs of these strakes, I flew in an Air Force KC-135 tanker lying on my belly and jamming the lens up against the boom window, which is about two-feet-square. I was fortunate enough to work with Air Force test boom operator MSgt. Paul Pillar who helped me coordinate with Jim Smolka who was flying the F-18 840, into a good position for this photograph (*NASA photo EC95-43249-4*).



In 1998, NASA Dryden Life Support Branch was working on a series of ejection seat tests. Due to some complications that occurred when Dryden had a pilot eject from the X-31 aircraft, the group began researching the application of a larger parachute in Dryden's F-18 aircraft. Life Support worked with the Navy who had a specially modified two-seat F-4 rigged for live ejection tests. Life Support outfitted a mannequin and placed it into an F-18 ejection seat then mounted it into the rear seat of the F-4. I was tasked with trying to get the ejection sequence that lasted about two seconds. There was very little room for error. I used Dryden's Nikon F5 camera and set it to eight frames per second, which gave me four and a half seconds worth of film. A cloudless day and precision flying by Rogers Smith in F-18 852 resulted in a positive proof of concept documented through photos (*NASA photo EC98-44830-02*).



In 2005, NASA Dryden acquired two T-38 aircraft from NASA Johnson Space Center that were to be used as proficiency aircraft for test pilots. In 2007, during a proficiency flight, Kelly Latimer and Frank Batteas teamed with Deputy Director for Flight Operations Mike Thomson and NASA flight test engineer Martin Trout for some formation flight work with the newly acquired aircraft. I was teamed with Dick Ewers, in F-18 852, an expert at flying the F-18 over the top of other aircraft to get a perfect photograph (*NASA photo ED07-0222-13*).



During the middle of the 1990s, NASA Dryden was conducting high-angle-of-attack research. One of the aircraft used as a test bed for this research was the F-15 ACTIVE (Advanced Control Technology for Integrated Vehicles) 837. It was equipped with thrust vectoring nozzles and forward canards (the aircraft was also used in several other flight test programs). During the return-to-base portion of this test mission, Rogers Smith and Tom McMurtry flew the ACTIVE test aircraft back to Edwards Air Force Base. I had the pleasure of flying with Mark Stucky who caught up with the F-15 and nicely rolled F-18 852 over into an inverted position above the ACTIVE for a great over the top photograph (*NASA photo EC96-43780-01*).



The skies at Edwards were beautiful the night before Space Shuttle *Atlantis* was to be ferried to Kennedy Space Center in Florida following the STS-44 mission. I raced down to the Mate-Demate area with a medium format Bronica camera and tripod and set up for some long-exposure images. We used color negative film at that time and I had either ASA 160 or 400 to work with. I used the 400 and bracketed the exposures to come up with this image showing the beautiful colors of the high desert sky (*NASA photo EC91-659-5*).



Toward the end of the X-31 program, management had yet to get a good 70 degree high-angle-of-attack photo. We tried on several occasions from our F-18 chase aircraft, but it wasn't working. The team from Wolfe Air Aviation was called in to lend a hand and brought out their modified Learjet to do the work. I was asked to fly onboard and run the Jetstills system, which took the still photographs. This was my second time using the system, which consisted of a medium format Hasselblad camera, a 180 millimeter lens and outfitted with a 70 millimeter film back. After a few passes, I was able to meet the requirement with this shot of Deutsche Aerospace test pilot Karl Lang during a Herbst maneuver (*NASA photo EC94 42478-3*).



In 1993, the Blackbird program was going strong. NASA's Jet Propulsion Laboratory was using the airplane to gather data. These flights were conducted at night, so we had very few opportunities to take good photographs of the aircraft. Rogers Smith and I flew in F-18 846 and took off with the SR-71A 844. In the few minutes we flew alongside and as they began building their speed for a Mach 3 run, we were able to get this shot. The Blackbird flown by Steve Ishmael and NASA flight test engineer Bob Meyer made our F-18 feel like it was a Cessna 172 as the SR-71 easily pulled away from our Mach 1.5 speed (*NASA photo EC93-03092-4*).



This photo came about one night as I traveled home from work. As I passed Space Shuttle *Atlantis* in the Mate-Demate area, after the landing of the STS-76 mission, and saw the moon rising up behind the orbiter, I decided the next evening I would stay late and try to capture that same image. I went out just before the time I saw the moon rise the night before, but nothing happened. I waited an hour and still no moon. I decided to pack it in for the night. Just as I removed the camera from the tripod and put it in my bag, I turned back to see the moon rising. I rushed and put everything back together in time to get this perfect photo (*NASA photo EC96-43493-7*).



Kevin Petersen, NASA Dryden’s former Center Director, was given a “fini” flight in the F-18 aircraft upon his retirement in 2009. He flew with NASA Dryden’s chief test pilot Frank Batteas in 846. Dryden’s Flight Operations Branch invited the Edwards Air Force Flight Test Center Commander Maj. Gen. David Eichhorn to fly in formation with an F-16. I was in T-38 863 with Tim Williams. We had essentially 10 minutes to get to the formation and get photos of the “two ship.” Tim did an exceptional job orienting us to get a few great photos (NASA photo ED09-0081-02).



NASA Dryden received two ER-2 aircraft from NASA Ames in the late 1990s. In 1999, they were given a new paint scheme and I was asked to get photographs of NASA 809 following one of its missions. Ed Schneider and I were in F-18 846 and met up with ER-2 pilot Jim Barrileaux over the Mojave Desert to get the aerial photos. Since the two airplanes don't match up very well in speed, Schneider did a great job getting me in position for these photos (*NASA photo EC99-45225-2*).



I was tasked in 2007 to fly to Waco, TX, to support a modified Boeing 747SP test flight. The program is called SOFIA (Stratospheric Observatory for Infrared Astronomy) and the airplane had been modified with a sliding door in the rear that would eventually be opened to reveal a telescope able to document astronomical events all over the world. The flight testing done in Waco was in the early stages. I was primarily tasked to shoot video, but brought a still camera to try to sneak in a photo here and there. Frank Batteas and I were in F-18 846. We had just refueled on the ground after doing the first hop chasing the SOFIA 747SP, piloted by Bill Brockett and Gordon Fullerton, and were rejoining with the mission. Nils Larson was in F-18 850 (and we were swapping out with him). Prior to resuming my video duties I grabbed this still of the SOFIA Boeing 747SP and F-18 850 (NASA photo ED07-0100-11).



In 1991, at the completion of the STS-44 mission, the orbiter was processed on Rogers Dry Lake. That particular evening there was an extremely beautiful sunset like we often get in the fall months. Prior to Shuttle *Atlantis* being towed back to the Mate-Demate area, I was able to get this photo with the colorful sky background (*NASA photo EC91-644-2*).



In 1995, NASA Dryden was working on sonic boom tests and used the SR-71A 844 and the F-16XL 849. The SR-71A would break the sound barrier and the F-16XL would fly underneath it gathering data using sensors that had been applied to the aircraft. Following the flight testing NASA chief test pilot Rogers Smith and I in F-18 846, joined up with the two aircraft following the return-to-base call. The SR-71A flown by Steve Ishmael and NASA flight test engineer Bob Meyer joined up with the F-16XL flown by Dana Purifoy. I recall that I was shooting pictures like crazy and Rog said, "I know you can never have enough pictures...but let me know when you have enough pictures." I continued taking pictures and finally said, "okay, that, should...about...do...it." Rog then released Dana and we chased the Blackbird in for a landing (*NASA photo EC95-43025-1*).



In December 2002, Boeing's X-45A program was in full swing. The autonomous aircraft had five flights under its belt and I was chasing number six. Dana Purifoy and I had an early morning hop to chase the drone with F-18 846 chase aircraft. Dana got me in nice and close, which wasn't always possible, and we were able to get some of the best in-flight photographs of the aircraft to date (*NASA photo ED02-0295-5*).



On March 27, 2004, the X-43 project made its second flight attempt. We flew at an altitude close to 40,000 feet for the launch. The flight path took us out over the Pacific Ocean where we would do one cold pass to make sure all the systems were functioning correctly. Then a pass when the B-52 008 would drop the rocket that would ignite and fly to an altitude releasing the X-43 to perform its test. For this flight I was in F-18 852 with Frank Batteas. I was shooting the still photographs and Lori Losey was in the other F-18 846 with Jim Smolka shooting video. The bomber crew of Dana Purifoy and Gordon Fullerton dropped the rocket on the second pass and it performed exactly as expected. On return to base, Frank's mask microphone broke and he was not able to communicate inside or outside of the aircraft. So...that task became mine. I was not familiar with what to say, so Frank was passing notes over his head and shouting things to say. With the help of the control room and the bomber crew, we muddled our way back to Edwards (*NASA photo EC04-0092-18*).



During the spring of 1994, NASA Dryden was well into high-alpha flight research with the F-18 HARV (High Alpha Research Vehicle) and the X-31 aircraft. The Air Force was also working with the same technology with their F-16 MATV (Multi Axis Thrust Vectoring) aircraft. An opportunity presented itself for all three airplanes to be in the air at the same time. The Wolfe Air Learjet was at Edwards documenting the X-31 flight, so the project managers got together and planned a photo flight with the three airplanes in formation. Ed Schneider coordinated much of the event. German Air Force test pilot Quirin Kim flew the X-31 and U.S. Air Force test pilot Mike Gerzanics flew the MATV. I shot this photo using the Jetstills system and it made its way to an *Aviation Week & Space Technology* cover, which was my very first one (NASA photo EC94-42513-2).



Space Shuttle *Atlantis* is towed down Contractor's Row following a landing at Edwards Air Force Base on May 24, 2009, completing the STS-125 mission. I shot this from the rooftop of NASA Dryden's main building. It includes all of the support vehicles that need to stay with the orbiter until it reaches the Mate-Demate in the Space Shuttle processing area (*NASA photo ED09-0127-112*).



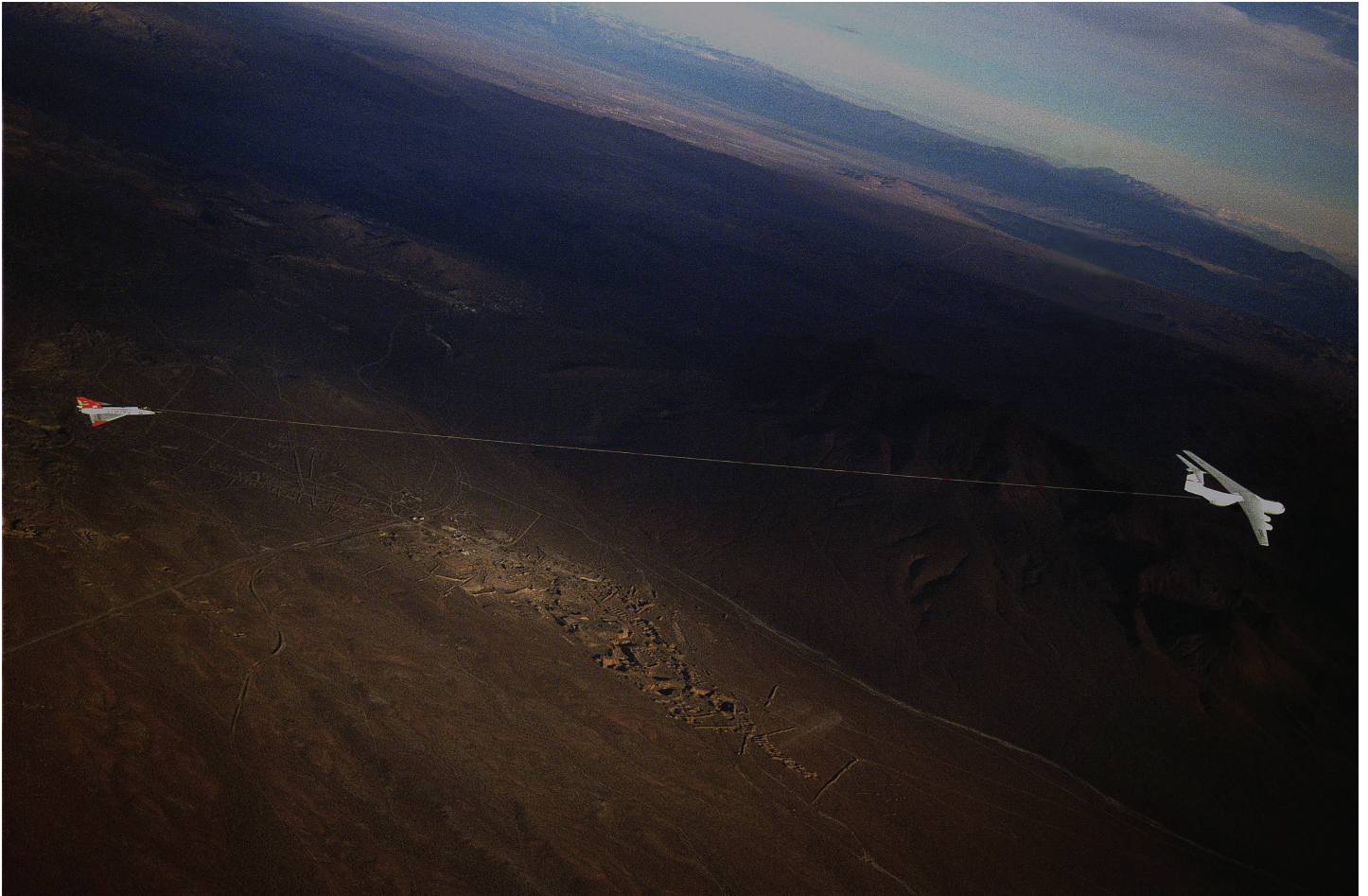
In 1998, shortly after NASA Dryden received the DC-8 aircraft from NASA Ames, the project wanted to take some promotional photos over some of the easily accessible landmarks in the area. Tom McMurtry and I took off in F-18 846 and caught up with Gordon Fullerton, Ed Lewis and Dick Ewers who were flying the DC-8 817 along with NASA flight engineer Doug Baker, the NASA mission manager Chris Jennison and NASA flight test engineer Dave Webber. We met them over the Owens Valley and followed them over the top of Mount Whitney, which is the tallest mountain in the contiguous United States (*NASA photo EC98-44414-007*).



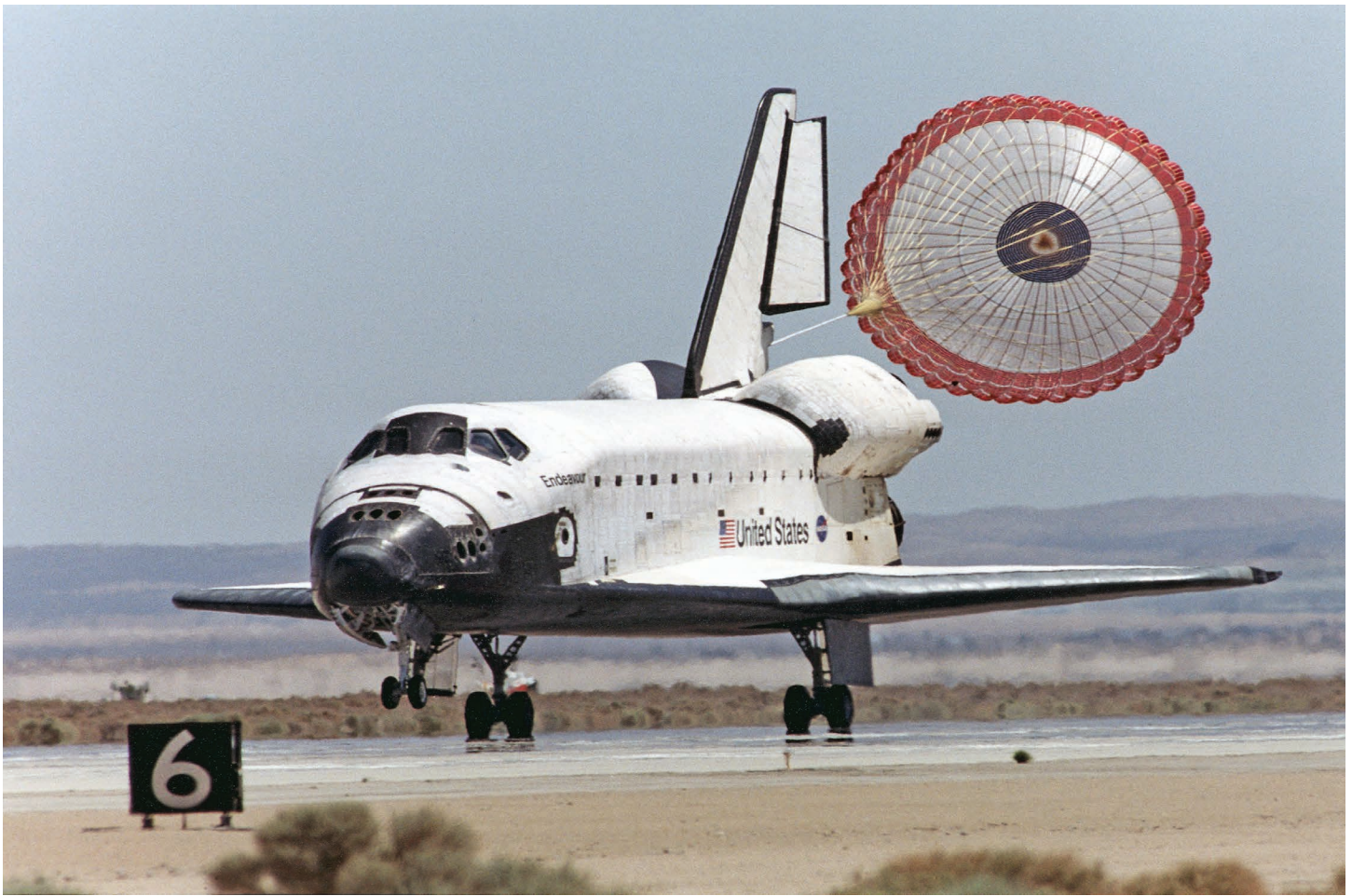
During the summer of 2007, fire season was going strong and our unmanned Predator B “Ikhana” aircraft was flying into some of the fire areas to do some digital imaging to help out the firefighters. I was tasked to get still photos and video of the aircraft with the imaging pod under the wing. After Hernan Posada got Ikhana off the ground, Kelly Latimer and I took off in the T-34C aircraft trying to take on the challenge we had been given. We have found that we get better imagery in the T-34C aircraft if we roll the window back. Better pictures...bad for audio. We really had a hard time hearing each other, but Kelly kept me in a great position and we got the job done even though we had no idea what each other was saying (*NASA photo ED07-0186-01*).



One very cold January morning in 1992 not much was going on in the Photo Lab, so I decided to go out to the runway and take photos of the SR-71B 831 taking off from Edwards Air Force Base. It was a heavily overcast day and the temperature was in the low 30s Fahrenheit. I took my usual position on the runway as Rogers Smith and Steve Ishmael rolled onto the runway for takeoff. Because of the weather conditions, I was able to capture this amazing photo showing the shock diamonds as the aircraft took to the sky. I remember feeling the heat of the afterburner on my face as the aircraft went by (*NASA photo EC92-01284-1*).



A new launch concept called Eclipse was tested at NASA Dryden in 1998. It involved an F-106 fighter jet and a C-141 cargo aircraft. The two airplanes were hooked together with a tow rope on the ground and then took off tethered. Mark Stucky was the only pilot on this project to fly the F-106. The U.S. Air Force supplied the crews for the C-141. The problem with getting good photos was that when they took off the rope between the two planes would essentially disappear. So it was difficult to show the two planes hooked together. One early morning flight, Dana Purifoy and I worked angles in F-18 852 to try to get the light to show up on the rope and this photo was the result of our efforts (*NASA photo EC98-44415-19*).



June 19, 2002, ended the STS-111 mission with a Space Shuttle landing on Runway 22 at Edwards Air Force Base. When Dryden experienced a Space Shuttle landing, we have all four photographers out on the runway. On this particular mission, I was stationed at the center of Runway 22. I used our 600 mm lens to capture the drag chute deployment of Space Shuttle *Endeavour* (NASA photo EC02-0131-3).



In 1996, our F-15B 836, was being brought up to speed. It came from the Hawaii National Guard and was being used as a replacement for the F-104 aircraft that NASA Dryden was using for high-speed research. On one particular day when I was flying with the U.S. Air Force in one of their KC-135 aircraft, Rogers Smith and NASA flight test engineer Brad Neal were out doing a proficiency flight. Rog wanted to do some practice refueling with the KC-135. With the help of U.S. Air Force flight test boom SSgt. Dave Francey, we were able to get Rog and Brad to move around and get some nice pictures over the top of Lake Isabella (*NASA photo EC96-43546-01*).



The CV-990 program was in full force during the summer of 1993. I came in early for one of their taxi test missions. As it turned out, the mission cancelled, but program manager Bob Baron wanted to have his picture taken with the CV-990 airplane. There was a beautiful sunrise that morning, so when I was done with Bob, I stopped off at the F-18 and took a nose-on photograph with the beautiful desert sunrise behind it (*NASA photo EC93-42116-03*).



Gulfstream Aerospace Corporation brought a project to NASA Dryden in 2006 called “Quietspike.” It was an aerodynamics test put on the nose of our F-15B 836. This was a very successful flight test. They flew at high speeds for most of the flights, so it was often difficult to have many opportunities to get good photographs of the airplane flying because our F-18s couldn’t match the speed of the F-15. During early December, Frank Batteas and I went out in F-18 852 and chased Jim Smolka and NASA flight test engineer Leslie Molzhan in the F-15B as they slowed and began their return-to-base activities (*NASA photo ED06-0187-12*).



Toward the end of the SR-71 program at NASA Dryden, Lockheed put a Linear Aerospike engine on the back of the aircraft for flight testing. The program wanted to get some good video and stills of the aircraft with the engine attached, so they hired the photo Learjet from Wolfe Air Aviation to come out and do a dedicated photo flight. Once again I used the Jetstills camera system and photographed the SR-71A 844 flown by Ed Schneider and NASA flight test engineer Bob Meyer as it pulled in behind us over the Mojave Desert (*NASA photo EC98-44509-11*).



Shortly after my arrival at NASA Dryden in 1989, NASA Headquarters television wanted to do a program on the X-29. They brought in a film crew and shot various scenes of the aircraft around the Dryden complex. I worked with our lead photographer Robert M. Brown and learned a great deal about lighting and composition during this project. Bob mentored me during my early days and helped me become the photographer that I am today. This early morning photograph was taken on Rogers Dry Lake at Edwards Air Force Base (*NASA photo EC90-357-18*).



August 9, 2005, marked the end of the STS-114 mission. After the shuttle lands and all of the safety checks have been performed, the support team begins to work on getting the crew out of the Space Shuttle. Once astronauts all get out and walk around a bit, kick the tires, and see what kind of condition the orbiter is in, we organize a group photo with the commander. In this instance it was Eileen Collins. Some of the commanders can be difficult to work with, which is understandable given they have been in space for an extended period of time, but Eileen was very cordial and agreeable. She got the group together and we got a nice image of them in front of *Discovery*. The crew of STS-114 are, left to right: Stephen Robison, Eileen Collins, Andrew Thomas, Wendy Lawrence, Soichi Noguchi, Charles Camarda, and James Kelly (*NASA photo EC05-0166-10*).



When I first started at NASA Dryden, I was assigned as a ground photographer, so I was often called out to the runway to shoot takeoff and landing photos for the different projects. In 1991, the F-15 HIDEC (Highly Integrated Digital Electronic Control) project was in full test mode. I was tasked to get a good takeoff of project plane 835 being flown by Jim Smolka. When I got out there I realized it was going to be a formation takeoff with the F-18 chase 842 flown by Tom McMurtry. A challenge with this kind of takeoff is keeping separation between the airplanes. But the pilots flew the take-off as if they knew exactly where I was and produced the perfect pose for me (*NASA photo EC91-677-01*).



NASA Dryden received two T-38 aircraft from NASA's Johnson Space Center. In 2007, after both were operational, Dryden's Flight Operations Branch was interested in getting some images of 863 and 864 in a formation flight. Kelly Latimer and NASA flight test engineer Marty Trout flew in one airplane and Frank Batteas and Deputy Director for Flight Operations Mike Thomson flew in the other. They did a fly-by of the NASA Dryden Flight Research Center while Dick Ewers and I documented the event from F-18 852 (*NASA photo ED07-0222-29*).



The F-16XL 848 was doing high-speed, wing-glove research in 1995. On this particular mission the Flight Loads Branch had put exciters on the wings of the aircraft and Dana Purifoy and NASA flight test engineer Mark Collard did the flight test for the day. The exciters would rotate, forcing air through them making the wing move up and down at higher or lower frequencies. Tom McMurtry and I flew in F-18 846 and used the early morning light of the November day to get this beautiful photograph (*NASA photo EC95-43345-5*).



Space Shuttle *Columbia* came back to Palmdale for refurbishment and was ready to return to Florida's Kennedy Space Center in March 2001. Dick Ewers and I had the task of taking a few photos of *Columbia* and the Boeing 747 Shuttle Carrier Aircraft (SCA), flown by a NASA Johnson crew led by Ace Beall, as it departed the California desert. A rain storm delayed the flight for approximately a week and I feared that we were not going to get to chase it out, but the weather finally opened up and Dick and I both had our first shot at chasing an orbiter in F-18 852 (*NASA photo EC01-0055-10*).



During 2005, NASA Dryden's F-18 SRA (Systems Research Aircraft) 845 was flying on one of its final missions. Dick Ewers and NASA flight test engineer Marty Trout flew with the Omega tanker doing autonomous refueling. Dick would get the F-18 in position and then the computer would take over and fly the airplane so that the refueling probe would fly exactly into the center of the basket. This proved that unmanned aircraft have the ability to refuel in flight, if the situation were to arise. Frank Batteas and I documented the event from F-18 846 (*NASA photo ED05-0223-22*).



During the fall of 1991, the California desert region was ravaged by wildfires. This produced a haze that hung around the high desert. I was tasked to photograph a ground test involving an F-15 aircraft dubbed HIDE (Highly Integrated Digital Electronic Control). During the shoot the sun began to rise over the lake bed and the smoke diffused the sun just enough to make it show up in the photograph. Tom McMurtry ran the test, while I took this beautiful sunrise photo of the aircraft (*NASA photo EC91-515-01*).



In 2003, NASA Dryden was testing an aeroelastic wing on F-18 853. The project was called AAW (Active Aeroelastic Wing). Engineers took the more rigid wing off of the F-18 and replaced it with a more flexible wing and did a series of tests. Gordon Fullerton and I photographed Dana Purifoy doing an aileron roll in the test aircraft over California City, CA, during one of its missions (*NASA photo EC03-0039-1*).



When I first started at NASA Dryden in 1989, we were the prime landing site for the Space Shuttle Program. We would get a landing at Dryden every six weeks or so. We were a staff of five photographers and when the shuttle was here we worked 24 hours a day. There were two shifts, day and night, 12 hours each. Being the new guy, I usually worked the night shift. I was single and had nothing really going on in my life, so it was good for me. I was always fascinated with how much light there was in the Mate-Demate area when the shuttle was being processed at night. I would often go down and take different pictures of the orbiter in various stages while being processed. This has always been one of my favorite images from the Mate-Demate area (*NASA photo EC90-65-12*).



After the F-15 ACTIVE (Advanced Control Technology for Integrated Vehicles) 837 got a fresh coat of paint, the project wanted to get some nice photographs of the aircraft. I got the assignment to fly onboard an Air Force KC-135 tanker to get the nice F-15 front view pictures from the boom position in the back of the tanker. Once again, I had the outstanding assistance of SSgt. Dave Francey, who was the flight test boom operator onboard that day. Dave helped me work with Jim Smolka and Rogers Smith, who were flying the F-15 ACTIVE, to get the aircraft into a good position for this shot over the southern Sierra Nevadas (*NASA photo EC95-43485-13*).



The year 2000 was a busy year for me. In February, I was assigned to travel to Kiruna, Sweden, which is approximately 90 miles north of the Arctic Circle. NASA Dryden's DC-8 and ER-2 aircraft were there supporting a science mission studying the ozone layer. All of the prep work to get the ER-2 ready to fly had to be done outside where it was minus 32 degrees Fahrenheit. I liked the look of the fresh snow and the way the hangar lights lit up the airplane, so I would go out for short periods of time and take a few pictures. I have always liked the way this one turned out (*NASA photo EC00-0037-3*).



During a visit to Russia in 1998, I was tasked to document a flight by NASA test pilot Gordon Fullerton in the Tu-144. He was to become the first western pilot to fly the aircraft. The first day we were there the Russians took us out during an engine run and showed us the aircraft. It was beautiful and I was in love. As I walked around the aircraft I noticed that there were other older Tu-144 aircraft around the one that had been refurbished for flight, so I put the nose of the nice airplane over one of the older birds and took this photo (*NASA photo EC98-44729-07*).



During a trip to Oshkosh, WI, I was in the boom pod of an Air Force KC-135 aircraft, with SSgt. Dave Francey, when the SR-71 flown by Rogers Smith and NASA flight test engineer Bob Meyer joined up with us over Lake Michigan. Dave got the Blackbird into a good position and I got several good pictures of the SR-71 as it transitioned back over land. This has always been my favorite aircraft and I was really fortunate to be able to take this trip on the KC-135 and photograph the aircraft over something other than brown desert. This has always been one of my favorite pictures (*NASA photo EC97-44163-11*).



During the late 1990s Dryden was hosting the X-38 program. It was being run by NASA's Johnson Space Center. Dryden's B-52 008 was used as the drop aircraft for the X-38. Two F-18 airplanes would be used to chase the X-38 drop. F-18 846 carried a videographer and F-18 852 carried a still photographer. During this particular mission, which was November 2, 2000, I was the still photographer and was flying with Dick Ewers. During the hot pass, Frank Batteas and Dana Purifoy turned the B-52 as I got this shot of the airplane with the video chase that carried Jim Smolka and videographer Lori Losey in the lower right corner of the photograph (*NASA photo EC00-0317-154*).



In 1992, the Air Force was well into their F-16 AFTI (Advanced Fighter Technology Integration) program. NASA Dryden hosted the airplane and provided the maintenance and a pilot to the program. The program had a new helmet and they wanted to get good photographs and video of it working the hardware on the airplane. The Wolfe Air Learjet was brought in and I was asked at the last minute to fly onboard. This was my first experience using the Wolfe Air Aviation Jetstills camera system. It took me a bit to learn the camera system, but eventually I was using it like a pro. General Dynamics test pilot Joe Sobczak would use the helmet to move the balls on the front of the aircraft in the direction he was looking. Being able to have the airplane in trail of the Learjet, with the 360 degree capability of the Jetstills system, worked perfectly for the photos (*NASA photo EC92-10061-10*).



Night shuttle landings were always a challenge for us. It was pitch black except for two high-powered Xenon lights that were directed straight down the runway. They were not set up to help the visual imagery people, but to help the pilot find the runway. The only time there was enough light to get an image was just after the orbiter dropped into the lights, which was only a few seconds. Then as it travelled down the runway the light diminished fast and the orbiter was no longer visible to film or digital media. This landing was the close of the STS-114 mission in 2005, when Edwards was chosen as the landing site. (*NASA photo EC05-0166-02*)



During the February 2000 aircraft operations in Kiruna, Sweden, life support technician Jim Sokolik readies Dee Porter for his ER-2 science flight into Russian air space. This was the first time since the U-2 incident with Gary Powers that this aircraft type had flown back into Russian air space. Everyone was a bit nervous about the flight, but it went off without a hitch and it was an exciting day for each and every one of us (*NASA photo EC00-0037-33*).



This shot was taken as Deutsche Aerospace test pilot Karl Lang flew the X-31 over Cuddeback Lake. The photo was from the same photo shoot when we called in the folks from Wolfe Air Aviation. As always, the Jetstills camera took a bit of getting used to since I did not use it all that often. The system consisted of a Hasselblad camera mounted in a turret that went out of the bottom of the Learjet. The camera was pointed at a mirror, which is what I took the image from. The viewfinder was hooked up to a monitor and that's where I could see what I was shooting but there was no focus ability. The focus came with a knob that was marked in feet and you could gauge the distance based on the size of the image in the monitor. I took several pictures as I changed the focus and managed to get some great shots from the morning flight (*NASA photo EC94-42478-2*).



NASA chief test pilot Bill Dana ground tests the thrust vectoring system on F-18 840 for the first time in 1991. This was the first high priority assignment I was given. It was difficult to get the afterburner to show up, but I shot several photos and with the help of HARV ground crew chief John McKay who got me a good position, I was able to get many quality shots. The vibration nearly knocked all of the fillings out of my teeth (*NASA photo EC90-0075-038*).



On October 11, 1994, the STS-68 mission ended and shuttle *Endeavour* landed at Edwards Air Force Base. This was a major event since it was becoming less and less frequent that NASA Dryden would have a shuttle landing. What made this even more of an occasion was that Gordon Fullerton and Tom McMurtry were flying the 747 SCA (Shuttle Carrier Aircraft) and bringing shuttle *Columbia* back to Palmdale's Plant 42 for refurbishment. Gordo called the Edwards control tower and asked if he could do a low approach to Runway 22 with *Columbia* and the 747 SCA aircraft. He was granted permission and did a pass by shuttle *Endeavor* making for a great photographic opportunity (NASA photo EC94-42789-4).



Kiruna, Sweden, is an extremely cold place during the winter. I found myself there in 2000 supporting science flights being conducted by NASA Dryden's ER-2 and DC-8 aircraft. During that time of the year, the sun never really gets above the horizon. This picture was taken at full sun for that particular day. ER-2 809 was being prepped for an official flight in Russian air space. It was a challenge to get the pictures at temperatures well below freezing and very little sunlight, but we managed to get some that were very nice during the 10 day stay (*NASA photo EC00-0037-11*).



In the early months of 2010, the SOFIA (Stratospheric Observatory for Infrared Astronomy) 747SP was finishing up flight testing. The SOFIA crew, consisting of Tim Williams and Bill Brockett, would put the aircraft in different configurations and open the telescope cavity door to measured levels. During this mission, I was flying in F-18 846 with Nils Larson over the Sierra Nevadas. A series of snow storms blew through the area and there was a lot of snow in the mountains. Nils did a great job getting me in the perfect position where the lighting was just right as the door opened (*NASA photo ED10-0080-01*).



The X-45A, an autonomous drone aircraft, had a big event in 2004. The aircraft did a weapons delivery at China Lake Naval Weapons Center. The program wanted both still photo and video chase. I was in F-18 852 with Gordon Fullerton and videographer Lori Losey was in the other F-18 846 with Dick Ewers. After the deployment, Gordo did an over the top of the two other aircraft and I was able to get a good photo of the two airplanes in formation (*NASA photo EC04-0100-10*).



A landing at Edwards Air Force Base on December 9, 1992, marked the end of the STS-53 mission. Technicians were just finishing up with Space Shuttle Discovery's runway engineering work and were getting the shuttle ready to be towed back to NASA Dryden's Mate-Demate area. There was a lunar eclipse that particular evening and I was I lucky enough to catch it with *Discovery* in the foreground, since the moon was in a perfect position behind the orbiter's wing (*NASA photo EC92-12096-5*).



The year 1995 brought an end to HARV (High Alpha Research Vehicle) research at NASA Dryden. NASA Langley brought a small follow-on project to the airplane using a nose that had strakes built in it. The strakes could be deployed to various positions. The project management wanted pictures of the nose strakes deployed. We figured an Air Force KC-135 tanker would be the best platform to do the job. MSgt. Paul Pillar and I worked in the boom pod to get Ed Schneider in the perfect position. Once there, he activated the strakes and I was able to get both good still photos and video of the airplane's nose looking straight down (*NASA photo EC95-43249-10*).



SOFIA 747SP flight testing had just begun in the spring of 2007, when I was assigned to fly in F-18 846 to Waco, TX, in support of the 747 test flights. I flew with Frank Batteas and we were a ship of three F-18s with Jim Smolka in 843 and Nils Larson in 850. The photograph shows the two Hornets on approach into the Waco area after flying from Edwards Air Force Base via El Paso, TX (*NASA photo ED07-0100-23*).



In 1991, when NASA Dryden first acquired the SR-71 aircraft, a magazine wanted to do an article on NASA and the airplane. The two pilots assigned to the program, Rogers Smith and Steve Ishmael, agreed to dress out in their pressure suits and pose with the airplane. This has always been a surreal photograph to me because it gives a futuristic sense, since you can't identify the pilots as human beings. This has always been one of my favorite pictures involving the NASA Dryden test pilots (*NASA photo EC91-056-16*).



In 1998, an opportunity came for me to make a dream come true. I was tasked to travel to Moscow, Russia – a place I had always dreamed of seeing. I was asked to document Gordon Fullerton’s test flight on the Tu-144 aircraft. Videographer Lori Losey traveled with me and we stayed in Moscow. We were taken by van, about an hour drive, to Zhukovsky Air Base each day. While we were there, Gordo convinced the Russians to allow him to put the aircraft into the condition it would be if he were making a Mach 2 run and slowly fly it past the flight line for photo purposes. The beautiful image is the resulting photograph (*NASA photo EC98-44729-23*).



Around the turn of the century, I was fortunate enough to be able to have a few flights with two of NASA Dryden's finest pilots. NASA test pilots Dick Ewers and Gordon Fullerton were out practicing their formation flying with the F-18 aircraft. I was with Gordo in F-18 846 and we would chase Dick through various aerobatic maneuvers. I took this photo during a barrel roll that we followed Dick through when he was flying F-18 843 (NASA photo EC00-0179-1).



During 2003, NASA Dryden began a new project on aviation safety. One of the platforms used for the flight testing was an Air Force C-17. Our NASA crew consisted of Frank Batteas and Jim Smolka. NASA Dryden did not have many photos of the C-17, so Gordon Fullerton and I were handed the task of getting some. The C-17 was approaching the NASA complex, so Gordo maneuvered the F-18 to get a photo over the top of the C-17 with Dryden in the background. Gordo flipped us upside down, my lunch stayed put, and I was able to get a shot almost directly over the center (*NASA photo EC03-0311-07*).



During the beginning of the F-15 ACTIVE (Advanced Control Technology for Integrated Vehicles) project, management wanted to get good photos of the beautiful red, white and blue airplane. I was tasked to fly in a KC-135 tanker and get those photos. I flew in the boom pod with SSgt. Dave Francey. He directed Jim Smolka and McDonnell Douglas test pilot Larry Walker in behind the tanker. I took several photos of 837 over the southern Sierra Nevadas. When I got the photos processed and gave them to the project, they were not happy because the aerial refueling door was not painted and the green paint stood out in the photos. So a few weeks later, I went back up and took more with the painted door. I still really like this photo...green door and all (NASA photo EC96-43456-02).



On Feb. 21, 2001, *Atlantis* landed at Edwards Air Force Base ending the STS-98 mission. When all of the engineering work had been completed on the runway and Space Shuttle *Atlantis* was ready to be towed back to the Mate-Demate area, I took this photo with a medium format Bronica camera. It was twilight and the clouds produced a nice diffused light that made for a good photograph. It was a runner-up in the 2001 *Aviation Week & Space Technology* photo contest (NASA photo EC01-0041-9).



A company called AeroVironment brought some unique aircraft to NASA Dryden during the 1990s. They would get a few flights off with the aircraft on Rogers Dry Lake and then it was off to Hawaii. The aircraft pictured, Pathfinder, conducted flight testing at the U. S. Navy's Pacific Missile Range Facility on the island of Kauai. We were sent out to document these flights and used a helicopter to chase the aircraft. The helicopter, flown by former Naval aviator Dave Nekemoto, would fly circles around the Pathfinder and we would do our best to get photos as the rotor wash blasted us through the open doors. Dave and AeroVironment photo coordinator Ray Morgan would sit up front and sing Waylon Jennings and Willie Nelson songs as videographer Lori Losey and I would struggle to get our imagery. Yet another perk to the job...the trip to Hawaii, not the singing (*NASA photo EC98-44629-53*).



The Eclipse program at NASA Dryden began in 1997. The platform chosen to conduct the testing was the F-106 aircraft because of its nice delta-wing configuration. I was in the tanker covering an SR-71 flight. Mark Stucky found out that I was going to be there and was flying a proficiency flight in the F-106 that day. Mark asked, “If I flew up behind the tanker, could you get some pictures for the project?” I agreed. Since I was on an Air Force tanker from another base, I briefed the crew and they agreed it would be fine. The boomer helped me get the F-106 in a good position and we got the project this nice photograph over the NASA Dryden complex (*NASA photo EC97-43932-15*).



NASA Dryden test aircraft are always provided a safety chase aircraft. On this particular mission, we were fortunate to be able to have two photographers to document the test mission of the F-15 ACTIVE (Advanced Control Technology for Integrated Vehicles) 837. I was aboard a KC-135 tanker with U.S. Air Force boom operator SSgt. Dave Francey. Our other flight photographer Carla Thomas was in F-18 846 seen in this photograph with Rogers Smith. From the boom pod I was able to get this nice photo over the Lake Isabella area. The F-15 ACTIVE was being flown by Jim Smolka and McDonnell Douglas test pilot Larry Walker (*NASA photo EC96-43456-05*).



In March 2001, Space Shuttle *Columbia* was finished being refurbished at Palmdale's Air Force Plant 42 facility and was ready to be ferried back to the Kennedy Space Center in Florida. I had never been able to fly photo chase on an orbiter ferry flight, so I lobbied to try to make it happen. It was approved, and we set up the F-18 chase. Weather came in and delayed the flight more than a week and I kept thinking they were going to drop the chase. Eventually, Dick Ewers and I were tasked to chase the Shuttle Carrier Aircraft (SCA) with *Columbia* on top, flown by a flight crew from Johnson Space Center led by NASA Johnson pilot Ace Beall, out from Palmdale in F-18 852. When we were close to our limit on gas, which was near the Twentynine Palms area, Dick did a few over-the-top maneuvers for me and I got this beautiful photograph. I entered it that year into *Aviation Week & Space Technology's* annual photo contest and won the "Best of the Best," or top award offered in the contest (NASA photo EC01-0055-2).



NASA's Jet Propulsion Laboratory approached the Blackbird program in 1993 to do a project. It required the SR-71 to fly at night. Since early morning and twilight have the best lighting conditions for photographs, Flight Ops decided to put a chase up with the SR-71A 844 for one of these flights. Rogers Smith and I flew in F-18 846 and did an airborne pick-up with the Blackbird flown by Steve Ishmael and NASA flight test engineer Bob Meyer. It was always awesome to be flying Mach 1.5 and watch the SR-71 accelerate away from the F-18 like it wasn't moving at all. We were with them for about 15 minutes during which time I was able to get this great photograph (*NASA photo EC91-03092-05*).



In 1995, I was given the task to shoot a new picture of the test pilot staff. I wanted to get them a really good photo, so I took out the Wista 4 x 5 camera and set it up with a couple flash units and placed the pilots in front of F-18 850. It took a bit of setting up to get the shot and the guys grumbled a little, but I was able to get them a shot that they could be proud of. The crew consisted of, left to right: Director for Flight Operations Tom McMurtry, Ed Schneider, Jim Smolka, Dana Purifoy, chief test pilot Rogers Smith, and Gordon Fullerton (NASA photo EC95-43228-01).



During an F-18 HARV (High Alpha Research Vehicle) flight in 1994, the project put grease on the wing and wanted to get photos of the flow patterns that were created at different alpha points. I was tasked to get the pictures and was flying with Steve Ishmael in F-18 846. Steve flew in a good tight formation with F-18 840 pilot Ed Schneider and I was able to get this nice photograph at roughly 35 degrees alpha over the southern Sierra Nevadas (*NASA photo EC94-42645-9*).



February 20, 2001, brought the STS-98 mission to an end. The crew of Space Shuttle *Atlantis* landed on Runway 22 at 3:33 p.m. after almost 13 days in space. I was able to get the shot I had been trying to get for years, which was a photograph just as the orbiter touches down and the tires smoke. This landing photo is one of my favorites (*NASA photo EC01-0041-1*).



Arctic winters bring cold temperatures and very little light for photography. In 2000, NASA Dryden's DC-8 and ER-2 were flying science missions out of Kiruna, Sweden. Videographer Lori Losey and I were sent over to document these missions. The takeoff photos were very hard to get, since the light levels were very low and the fast moving jets would require fast shutter speeds to stop motion blur. This photograph of the DC-8 817 takeoff, flown by Gordon Fullerton and Bill Brockett, was taken with full available sunlight. I had to push process the film two stops to get the image to come out (*NASA photo EC00-0037-8*).



During Christmas break 2009, I fell off a ladder and broke my wrist. I was off flight status for about three months. Once I was cleared back on status, the next flight that came up was to do photo chase on the F-16 ACAT (Automatic Collision Avoidance Technology) project. This was an Air Force project that NASA Dryden hosted and provided a pilot and engineering support. The chase pilot, Nils Larson, and I thought we would fly with the F-16 a bit, get the photos and then just easily fly around a while so I could get reacclimated to high performance flying. Not how it went. The project wanted us to chase them through all of their fast and brutal low level maneuvers. After the brief, both Nils and I were thinking I probably shouldn't fly that day, but neither of us spoke up. I did the flight and got sicker than I have ever been in my life. I threw up gum I had swallowed in the second grade! Nils was so supportive and kept encouraging me through the flight. I would not have made it through if it wasn't for him. There were times that I was thinking ejecting would be a better option than continuing to suffer through the flight. Well...I held it together enough to get the photos they wanted like this one of Calspan test pilot Kevin Prosser and Air Force test pilot Col. J. J. Mitchell flying the F-16 over the Boron mine (*NASA photo ED10-0045-15*).



In the latter part of 2010, NASA's Global Hawk program wanted to gather data on how another aircraft would handle flying in trail of their aircraft. Dick Ewers and Scaled Composites test pilot Mark Stucky got the task of flying the King Air 801 behind the Global Hawk 872 operated by Tom Miller. Jim Less and I had the task of getting imagery of the flight. One of the shots the project really wanted was an over the top photo. Jim was able to get me in just the right position to get this photo that they really liked (*NASA photo ED10-0377-02*).



I had been working at NASA Dryden just over four months when the STS-36 mission ended on Rogers Dry Lake on February 28, 1990, bringing the crew of *Atlantis* back to Earth. This was a Department of Defense mission that lasted just over four days. I was an extra body on this particular shoot, so I was placed in a unique position for the landing. Unfortunately, no one briefed the Air Force about this. As I was waiting for the orbiter to return, a helicopter circled over my head, which I thought was pretty cool, but eventually it landed and out jumped what looked like a teenager with a machine gun. Not really so cool and not the best situation. The military policeman yelled at me to get my hands out of my pockets, which I quickly did. He came over, checked my credentials and then thanked me. He returned to the helicopter and it took off and flew away. The photo crew then made a shuttle landing vest with a bull's eye on it to help the military police find me better (*NASA photo EC90-65-2*).



As Dryden finished up with the flight testing for the SOFIA (Stratospheric Observatory for Infrared Astronomy) 747SP aircraft, an unusual situation happened. They wanted both video and still photographs of the first time the telescope door was going to be opened 100 percent. Dryden only had one two-seat F-18 operational, so F-15B 836 was brought up to fly as the still photo airplane. I was shooting video from F-18 846 flown by Jim Smolka. Carla Thomas was shooting stills from the F-15B with Nils Larson. Upon return to Palmdale, where the SOFIA 747SP is based, I widened out the video camera and placed it on my knee so the control room would still see their video feed and snapped a few pictures of the F-15B and the 747SP, which was flown by Frank Batteas and Troy Asher (*NASA photo ED10-0352-33*).



In early 2011, NASA Dryden began flying the TG-14 aircraft that the center received from the Air Force. Flight Ops had no in-flight pictures of the TG-14, so Dick Ewers and I were tasked to take the T-34C up and try to get some photos. It was a bit of a challenge, and I got to revisit my breakfast, but we were able to get some good photos of the aircraft as Frank Batteas and Tim Williams approached the NASA Dryden complex (*NASA photo ED11-0016-25*).



When the Space Shuttle landed at Dryden there were various items that needed to be documented. One of these was the condition of the space suits that were used during EVA (Extra-Vehicular Activity) activities. I would go inside the orbiter and crawl into the space just before the payload bay door and document the space suits. The gold face shield was always the hardest because of reflections. I would have to bounce the flash behind me to minimize the reflection, but still get enough light for an exposure. What I liked about these shots was that often they would end up being self portraits, as you can see me and a space suit technician in this photograph (*NASA photo EC01-0033-46*).



If I wasn't able to be in the F-18 chase aircraft, I was almost always in a KC-135 tanker during the SR-71 flights. I loved photographing the SR-71 and took advantage of every opportunity. In 1996, the Blackbird crew was deep into various projects using the airplane. This particular flight was a training mission for Ed Schneider and Rogers Smith in the SR-71B 831 model that had two cockpits and the aircraft could be flown from either one. That day it was being chased by Gordon Fullerton and NASA flight test engineer James Yamanaka in F-18 846. I was in the right side of the boom pod and was able to get this image as the two planes were clearing off after the SR-71B 831 had been refueled (*NASA photo EC96-43862-04*).



We rarely get to fly during the evening hours. Flight testing is done primarily during the daylight hours. In November 1993 NASA concluded a late afternoon flight that finished at dusk. I was fortunate enough to fly in F-15B 836 with Ed Schneider. We rarely use the F-15B for photo chase, so when we do it is a real pleasure. I shot this colorful picture of the F-104 flown by Rogers Smith just as I was about to lose the light (*NASA photo EC93-42325-22*).



On the morning of September 21, 2012, when Space Shuttle *Endeavour* and the SCA 747 905, flown by NASA Johnson pilot Jeff Moultrie and Bill Brockett, were in the sky over the Antelope Valley, I decided to experiment with using my iPhone to take photos and send them from the chase plane to our Public Affairs Chief Kevin Rohrer so that he would have imagery to provide the media. I was able to get service from F-18 852 flown by NASA chief test pilot Nils Larson so I emailed the images. This image, taken just north of Ventura, was shot with my iPhone 4S and transmitted directly to Dryden Public Affairs for use while we were flying the Los Angeles route. This was the last ferry flight of *Endeavour* for delivery to the California Science Center (*NASA photo EC12-0317-207*).



The chase plane met up with Space Shuttle *Endeavour* and the SCA 747 905, flown by NASA Johnson pilot Jeff Moultrie and Bill Brockett, just south of Santa Barbara on September 21, 2012. I remember it being a nice relaxing flight down the California coast as we passed by Ventura, Point Mugu and Malibu. I took photos here and there still not really believing that I was actually doing the task I was assigned for that day. I remember Bill Rieke, another Johnson pilot aboard SCA 905, calling out 10 miles to the Santa Monica Pier. I started to get butterflies in my stomach knowing that my world was about to get real interesting. I recall NASA chief test pilot Nils Larson, in F-18 NASA 852, asking me if I was ready. I replied I was as ready as I was going to be. We had a good laugh before I shot this image over the Santa Monica Pier marking the beginning of our Los Angeles route and ending my relaxing flight over the California coast (*NASA photo ED12-0317-017*).



Once we passed into the Los Angeles Basin I realized what we were in for. It is one thing to look at L.A. from a window of a passenger aircraft, but from an F-18 at 1500 feet and 250 knots it's a whole new experience. I had no idea how we were going to find all of the landmarks that we were asked to photograph with Space Shuttle *Endeavour* and the SCA 747 905, flown by NASA Johnson pilot Jeff Moultrie and Bill Brockett. As NASA chief test pilot Nils Larson pulled F-18 852 close in to the SCA I realized that I was just going to keep my face buried in the camera all afternoon and get my direction from Nils. The money shot we needed was the California Science Center since they were our customer for this assignment. As we got close I asked Nils to give me a couple "taters" so I could be ready for the shot. So he gave me a 3...2...1...click, click, click. I recall Nils making a clicking sound as my camera was actually clicking away, which made me chuckle. He did not recall doing it until I brought it up a few days later and we thought it was the funniest thing (*NASA photo ED12-0137-026*).



Once we finished shooting over the California Science Center, we moved on and shot the Space Shuttle *Endeavour* and the SCA 747 905, flown by NASA Johnson pilot Jeff Moultrie and Bill Brockett, over one of the most famous landmarks in the Los Angeles area, the Hollywood sign. NASA chief test pilot Nils Larson and I were directly off the SCA's wing in F-18 852. As we approached Nils asked me where I wanted to place the sign. As I had my face buried in the camera so as not to miss the shot, I told him I trusted him and he could make the choice. He decided to place it above the SCA and *Endeavour*. Much of the credit for the composition of the photo goes to Nils, I was focused on not missing the shot and he worked at setting up the perfect shots for me to take (NASA photo ED12-0317-034).



I am a huge Disney fan, so to say the least, the shot I really was looking forward to was over Disneyland. As we talked about it I had in mind the shot I was going to get, but at the last minute, Disney asked if we could fly a slightly different route with the Space Shuttle *Endeavour* and the SCA 747 905, flown by NASA JSC pilot Jeff Moultrie and Bill Brockett. It did not seem like much but when we got there...it was an issue. NASA chief test pilot Nils Larson and I were in F-18 852 and I asked him for a distance. He said it was a mile off the nose. I kept looking through the camera, but was not recognizing anything. He then said it was off the nose. I said I wasn't seeing it. He said, "take pictures now." I said, "still not seeing it." Just then out of the corner of my eye I saw Space Mountain. I widened out and asked Nils for a little left rudder and got three shots off. Both Nils and I were amazed we got the image we did, but it was one I was happy with (*NASA photo ED12-0317-046*).



On our final approach into Los Angeles International Airport, NASA chief test pilot Nils Larson and I in F-18 852 traded flight positions with Troy Asher and Dryden videographer Lori Losey in F-18 846 so that they could videotape the landing of Space Shuttle *Endeavour* and the SCA 747 905. F-18 846 had been on our wing most of the flight and we determined that video would be prime for landing and we could get pictures of the F-18 with the SCA and *Endeavour*. By this time Nils and I were worn out. We had photographed all but one of our targets, which, given the circumstances, was pretty dang good. We missed the *Queen Mary* ocean liner because of positioning. I remember getting a little choked up that this was the last time I was ever going to shoot a Space Shuttle ferry flight. Doing so has always been one of my favorite tasks at NASA Dryden. I was exhausted, but really did not want the flight to end. But all good things must end and I got this shot of *Endeavour* and the SCA being chased by the F-18 video crew (NASA photo ED12-0317-060).



During March 2004, NASA mission manager Walter Klein asked Dryden videographer Lori Losey and myself to accompany the DC-8 817 on its mission to Costa Rica and Chile. During their synthetic aperture radar flights looking for ruins overgrown by the jungle in Central America, we would fly aboard and capture the scientists working or we would go to various ground locations and shoot other activities. This photo was shot as Ed Lewis and Dick Ewers taxied the airplane back after a science mission (*NASA photo ED04-0056-072*).



I was invited by NASA Johnson Space Center to fly chase on the Space Shuttle *Discovery* delivery on April 17, 2012, to Dulles International Airport. NASA Johnson used all of their aerial photographers in other positions, leaving a position open for me. I flew in T-38 967 flown by NASA Johnson chief pilot Bill Ehrenstrom. We took off about 40 minutes after the prime T-38 chase and orbited over Andrews Air Force Base for our chase opportunity. When we took over we were to chase Space Shuttle *Discovery* and SCA 905, flown by NASA Johnson pilots Jeff Moultrie and Bill Rieke, to landing. I got this shot over the Potomac River during that portion of the flight (*NASA photo ED12-0115-002*).



NASA Johnson chief pilot Bill Ehrenstrom and I flew photo chase in T-38 NASA 967 for Space Shuttle *Discovery* and SCA 905, flown by NASA Johnson pilots Jeff Moultrie and Bill Rieke. We were tasked with getting a photograph of *Discovery* and the SCA over the Steven F. Udvar-Hazy Center. The prime chase was unsure as to whether they had a good shot, so we were asked to get a backup shot prior to videotaping the landing. Dryden had procured a Nikon D800 to use for both the stills and video. It worked perfectly and kept me from having to switch back and forth between two cameras. This is the product of that effort (*NASA photo ED12-0115-008*).



On December 14, 2010, SCA 905 was given an unusual task, which was ferrying Boeing's Phantom Ray aircraft from St Louis, MO, to Edwards Air Force Base. The flight leg to Dryden had been delayed and we were unsure if we were going to be able to chase it. I was in F-18 846 with Jim Less and we were asked to join up with SCA 905 flown by NASA Johnson pilots Jeff Moultrie and Bill Rieke over the Colorado River and escort it the rest of the way. It was late in the afternoon when we made the join up, which made for nice lighting (*NASA photo ED10-0393-01*).



Following STS-125, I was given the rare opportunity to chase a Space Shuttle ferry flight. This was the second time in my 20 years at NASA Dryden. Jim Smolka and I took off on June 1, 2009, in F-18 852 and did an airborne pick-up of Space Shuttle *Atlantis* and SCA 911 being flown by NASA Johnson pilots Ace Beall and Jeff Moultrie. We chased it to near the California border and then let the SCA continue on its way. I was very fortunate in that I was able to photograph the ferry flight of four out of the five Space Shuttles (*NASA photo ED09-0127-099*).



In June 2005, we had recently painted our T-34C aircraft and we needed some aerial photos of it. Craig Bomben was taking NASA co-op student Shannon Kolensky on a familiarization flight and it was a good opportunity for us to get photos of the aircraft. Dick Ewers and I took off in F-18 852 and did several photos in the Lake Isabella and Mojave Desert areas. This over-the-top shot, a maneuver Dick was famous for when flying the F-18, was taken near California City (*NASA photo EC05-0123-03*).



In January 1993, the F-16XL 848, was just beginning its flight testing. I was tasked to get some new aerials of the aircraft and was assigned to fly with Gordon Fullerton in F-18 846. It was a late afternoon flight so the lighting was nice, especially since it was winter. The F-16XL crew for that day was Jim Smolka and NASA flight test engineer Marta Bohn-Meyer. They were refueling from a KC-135 tanker over the snowy mountains. This was the only time I chased a flight that Marta was in during the time I worked with her, so this was always a memorable flight for me (*NASA photo EC93-01214-18*).



NASA Dryden Flight Ops began working closely in 2012 with the Edwards 416th Test Wing providing chase support. Jim Less and I provided support in F-18 846 along with Frank Batteas in F-18 843 for the Peace Vector F-16, flown by Lockheed Martin test pilot Andrew Soundy. We needed to refuel so we went to a KC-10 tanker, which has the capability to refuel both F-18 and F-16. Aircraft 843 refueled off the basket, while the F-16 Peace Vector waited to get its fuel from the boom (*NASA photo ED12-0263-11*).



The first day back to work in 2013 provided for a great opportunity. C-20A 502, flown by Dick Ewers and Stu Broce, was doing a check flight and the project wanted to get updated photos of the aircraft. Frank Batteas and I took off in F-18 846 and orbited over the Boron mine waiting for 502 to takeoff. Dick knew the various shots that were requested and one was over the top. Frank and I were able to get this over-the-top shot near the California City area (*NASA photo E13-0002-19*).



Dick Ewers and Stu Broce fly C-20A 502 over the NASA Dryden Flight Research Center on January 2, 2013. This was to update photos of the new configuration that the aircraft was flying and it is always good to have new photos of our aircraft over the Center for public release. Frank Batteas and I captured this photo from F-18 846 (*NASA photo ED13-0002-05*).



Following an F-16 Peace Vector chase mission with the Air Force's 416th Test Wing, F-18 852, flown by Frank Batteas and Jim Less, and my aircraft, F-18 846 flown by Jim Smolka returned to Edwards in a two-ship formation. As we passed off to the east of California City, I was able to get a few photos of 852. We don't have many pictures of the two-seat F-18s because we tend to fly in them instead of photographing them (*NASA photo ED12-306-12*).



On April 16, 2012, I was flying with NASA Johnson chief pilot Bill Ehrenstrom in T-38 967 from Houston, TX, to Dulles International Airport. We were a two-ship formation with T-38 955 flown by NASA Johnson pilot Scott Reagan and Johnson photographer Robert Markowitz. Over the Midwest we encountered some nice clouds and I really liked this photo of the T-38 as we flew through the clouds (*NASA photo ED12-0115-65*).



The end of October 2000 brought a rare Space Shuttle landing to Edwards Air Force Base. It was always enjoyable to photograph all of the events that involved processing the shuttle. This particular landing, the whole crew had been trying to get good “pretty pictures” of the shuttle in the processing area. One morning the night photo crew met with the day crew and we went down together to take pictures. I enjoyed that morning and this photograph was my contribution to the morning’s activities and was a runner-up in the *Aviation Week 2001* Photo Contest (*NASA photo EC00-0311-7*).



When NASA Dryden obtained the F-16 XL 849, laminar flow studies began when a wing glove was put on the left wing of the aircraft. This was one of the big projects when I started at Dryden and I would go out to the hangar and photograph the process of the engineers and technicians installing the glove. So when the aircraft began to fly it was very exciting for me. The project was looking for some public release photos and I got the assignment to chase F-16XL 849, flown by Jim Smolka. Gordon Fullerton and I were in F-18 846 and followed the F-16XL on a low pass over NASA Dryden (*NASA photo EC92-0932-11*).

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